Rs.10

JIMA

Volume 67 (RNI) ♦ Number 12 ♦ DECEMBER 2023 ♦ KOLKATA

JOURNAL *Of the* INDIAN MEDICAL ASSOCIATION

Official Publication of the Indian Medical Association

Indexed in

INDEX COPERNICUS INTERNATIONAL

Scopus

Volume 121 (JIMA) ♦ Number 12 ♦ December 2023 ♦ KOLKATA

Largest Circulated Medical Journal in India

ISSN 0019-5847

94 TH YEAR OF PUBLICATION

Visit us at https://onlinejima.com

^Fexofenadine & Monte ukast

Reference:

1. Walekar A, Chodankar D, Naqvi M, Trivedi C: Assessment of Bioequivalence of Fexofenadine and Montelukast Fixed Dose Combination Tablet Versus Separate Formulations of the Individual Components at the Same Dose Levels. Indian journal of pharmaceutical sciences, 2016, 78(5), 656-56 2. Kumar R , Kumar D ,Parakh A. Futicasone furoate: A new 'Intranasa corticosteroid. J Postgrad Med 2012;58:79-831.
Allerga Nasal Spray API :https://www.sanofi.in/dam/jcr:d0151535-e26e-4011-8bc4-c044d5fd197d/Allegra%20Nasal%20API.pdf
Allerga Nasal Duo API : https://www.sanofi.in/dam/jcr:4cc83095-772a-4324-8d30-9770b3a5f075/Al egra%20Nasal%20Duo%20API.pdf
Allerga- M : https://www.sanofi.in/dam/jcr:927c3836-686f-4cc0-9a1e-df6366327510/Allegra%20M_API_Sep%202021.pdf

TEAM IMA (2022-24)


Chief Patron
Past President,WMA,MCI, IMA
Dr Ketan Desai


National President
(2022-23)
Dr Sharad Kumar Agarwal


Imm. Past National President
(2022-23)
Dr Sahajanand Prasad Singh


National President
(2023-24)
Dr R.V. Asokan


Hony. Secretary General
(2022-24)
Dr Anilkumar J Nayak


National Vice President
(2022-23)
Dr. Jayesh M Lele


National Vice President
(2022-23)
Dr Sachchidanand Kumar


National Vice President
(2022-23)
Dr Shailesh H Shah


National Vice President
(2022-23)
Dr Daggumati Shree Harirao


National Vice President
(2023-24)
Dr R Gunasekaran


National Vice President
(2023-24)
Dr. Suresh Gutta


National Vice President
(2023-24)
Dr Ashok Sharda


National Vice President
(2023-24)
Dr Shiv Kumar Utture


Hony. Finance Secretary
(2022-24)
Dr Shitij Bali


Hony. Joint Secretary
from NCR (2022-24)
Dr Munish Prabhakar


Hony. Joint Secretary
from National Capital
Region (2022-24)
Dr. Prakash Lalchandani


Hony. Joint Secretary
from rest of the country
(2022-24)
Dr. M. Venkatachalapathy


Hony. Joint Secretary
stationed at Calcutta
(2022-24)
Dr. Pradeep Kumar Nemani


Hony. Joint Secretary
nominated by National
President (2022-23)
Dr Anand Prakash


Hony.Jt Finance Secretary
from rest of the country
(2022-24)
Dr Mahendra Nath Thareja


Hony. Joint Finance Secretary
stationed at Calcutta
(2022-24)
Dr Sarbari Dutta

IMA College of General Practitioners


Hony. Asst. Secretary
from NCR (2022-24)
Dr Thakur Padmanabhan


Hony. Asst. Secretary from
rest of the country (2022-24)
Dr Paramjit Singh Maan


Dean, IMA-CGP
(2022-23)
Dr Rayapu Ramesh Babu


Dean, IMA-CGP
(2023-24)
Dr Satyajit Borah


Vice Dean,IMA CGP
(2022-24)
Dr Poonam Singh


Hony. Secretary
IMA CGP (2022-24)
Dr. R Anburajan


Hony. Joint Secretary IMA CGP
from Tamilnadu (2022-24)
Dr M Thravam Mohan


Hony.Jt.Secy., IMA CGP
from Tamilnadu (2022-24)
Dr D Senthil Kumar


Hony. Joint. Secy. IMA CGP from
rest of the country (2022-24)
Dr Satish Joshi


Hony. Joint. Secy. IMA CGP from
rest of the country (2022-24)
Dr Sunil Bhikhabhai Chenwala


Hony. Joint. Secy.\, IMA CGP
from rest of the country (2022-24)
Dr Yeshwant Vasantrao Gade


Hony.Joint.Secy. IMA CGP from
rest of the country (2022-24)
Dr Pavankumar N Patil

TEAM IMA (2022-24)

Journal of IMA


Hony. Editor-JIMA
(2022-23)
Dr Nandini Chatterjee


Hony. Editor-JIMA
(2023-24)
Dr Sanjoy Banerjee

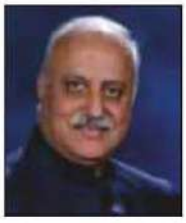

Hony. Associate Editor
JIMA (2022-24)
Dr Ranjan Bhattacharyya


Hony. Associate Editor
JIMA (2022-24)
Dr Prasanta Kr. Bhattacharyya


Hony. Secretary
JIMA (2022-24)
Dr Sibabrata Banerjee


Hony. Asstt. Secretary
JIMA (2022-24)
Dr Meenakshi Ganguly

IMA Academy of Medical Specialities


Chairman, IMA AMS
(2022-23)
Dr Pankaj Mutneja


Chairman, IMA AMS
(2023-24)
Dr Nomeeta Shiv Gupta


Vice Chairman, IMA-AMS
(2022-24)
Dr Nibedita Pani


Hony. Secretary, IMA-AMS
(2022-24)
Dr Sriram Abkari

IMA AKN Sinha Institute


Director
IMA-AKNSI (2022-23)
Dr G N Prabhakara


Director
IMA-AKNSI (2023-24)
Dr Ramneek Singh Bedi


Hony. Executive Secretary
IMA-AKNSI (2022-24)
Dr Sanjiv Ranjan Kr. Singh


Hony. Joint Secretary
IMA-AKNSI (2022-24)
Dr Deepak Kr. Singh


Hony. Joint Secretary
IMA-AKNSI (2022-24)
Dr Parul Vedgama

Your Health of IMA


Hony. Editor
Your Health (2022-24)
Dr Kakoli Sen Mandal


Hony. Associate Editor
Your Health (2022-24)
Dr Sankar Sen Gupta


Hony. Associate Editor
Your Health (2022-24)
Dr Bibartan Saha


Hony. Secretary
Your Health (2022-24)
Dr Samrendra Kumar Basu

Apka Swasthya of IMA


Hony. Editor
Apka Swasthya (2022-24)
Dr Sudhir Singh


Hony. Associate Editor
Apka Swasthya (2022-24)
Dr Arun Kumar Tripathi


Hony. Secretary
Apka Swasthya (2022-24)
Dr Ritu Garg

IMA Hospital Board of India


Chairman
IMA HBI (2022-24)
Dr A K Ravikumar


Hony. Secretary,
IMA HBI (2022-24)
Dr Dinesh Bhujangrao Thakare


Treasurer IMA HBI
(2022-24)
Dr Rajeev Balkrishna Agarwal

We thank all the Hon'ble Referees who contributed a lot during the year 2023

We thank all the Hon'ble Referees who contributed a lot during the year 2023

We thank all the Hon'ble Referees who contributed a lot during the year 2023

JIMA COMMITTEE 2022-2024


Dr. Sharad Kumar Agarwal
National President, IMA
(2022-23)


Dr. R V Asokan
National President, IMA
(2023-24)


Dr. Anilkumar J Nayak
Hony Secretary General, IMA


Dr. Pradeep Kumar Nemani
Hony. Joint Secretary, Hqs


Dr. Sarbari Datta
Hony. Jt. Finance Secretary, Hqs


Prof (Dr) Nandini Chatterjee
Hony. Editor, JIMA
(2022-23)


Dr Sanjoy Banerjee
Hony. Editor, JIMA
(2023-24)


Dr Ranjan Bhattacharyya
Hony. Associate Editor,
JIMA


Dr Prasanta Kumar
Bhattacharyya
Hony. Associate Editor, JIMA


Dr. Sibabrata Banerjee
Hony. Secretary,
JIMA


Dr. Minakshi Gangopadhyay
Hony. Assistant Secretary,
JIMA


Prof (Dr) Tamonas Chaudhuri
Member, JIMA Committee


Dr Debraj Jash
Member, JIMA Committee


Dr Awadhesh Kumar Singh
Member, JIMA Committee


Dr Sekhar Chakraborty
Member, JIMA Committee


Dr. Prakash Chandra Mondal
Member, JIMA Committee

JOURNAL
Of the
INDIAN MEDICAL ASSOCIATION

Volume 121 (JIMA)
Number 12
December 2023
KOLKATA
ISSN 0019-5847

Contents

Editorial

13 The Journey of Scientific Publication — *Nandini Chatterjee*

Original Articles

15 Anaemia in Patients with Acute Heart Failure with Reduced Ejection Fraction — A Hospital-based Study — *Shaila Jay Shah, Sandeep R Chavda, Niyati Harsh Mehta, Ravi Sanjaykumar Suthar*

21 Drug Utilization in Resistant Hypertension — *Bhuvaneswari K, Jegatheeswari Murugesan, Mohamed Musthafa S, Aathira S*

24 Free of Cost Operation with Trans Obturator Tape (TOT) in Stress Urinary Incontinence among Poor Women — A Hospital-based Prospective Trial — *Barunoday Chakraborty, Aishwarya Divakaran*

29 Types of associated Anomalies with Ano-rectal Malformation : An Institutional Retrospective Cohort Study — *Zaheer Hasan, Digamber Chaubey, Ramjee Prasad, Shishir Kumar*

34 Clinical and Ultrasonographic Assessment and Analysis of Liver Span in Children — *Keertana Vajrapu, Mathivanan Malaisamy, Shriram T, Vasanth Krishna Chalasani*

37 A Study on Restless Legs Syndrome in Patients with Chronic Kidney Disease in a Tertiary Care Hospital — *Subhajit Das, Nandini Chatterjee, Anupam Mandal, Pradip Kumar Datta*

41 Immediate Impact of Tele Yoga Intervention on Physiological and Psychological Variables of COVID-19 Mild Symptomatic Patients : Two Groups Randomized Controlled Cross Over Study — *Pragya Jain Shrimal, Satyapriya Maharana, Anupama Dave, Raghuram Nagarathna, Shivendra Shrimal*

47 Study of Sensory Nerve Conduction Study Parameters in Upper & Lower Limb & their Maturation Pattern in Infants & Children in a Tertiary Health Care Institute of West Bengal — *Bosumita Sinha, Sumana Gupta, Sangita Sen, Goutam Ganguly*

51 Prevalence and Risk Factors for Exposure of Healthcare Professionals of Delhi (India) to Physical and Psychological Violence : A Cross-Sectional Study — *Shikha Bassi, Rajni Bansal, A K Khokhar, Vinay Aggarwal*

(Continued next page)

JOURNAL
Of the
INDIAN MEDICAL ASSOCIATION

Volume 121 (JIMA)
Number 12
December 2023
KOLKATA
ISSN 0019-5847

Contents

59 **Review Article**

Court Judgements on Expert Opinion in Medical Negligence Cases — Systematic Review — *Gaurav Aggarwal, Sharad Kumar Agarwal, Poonam Khatri*

64 **Case Reports**

66 Somatic Neoplasm Arising from Teratoma Ovary with Peritoneal Recurrence — *Deepa Das C K, Subitha K, Lovely Jose, Prasad P H*

68 Solitary Diaphragmatic Hydatid Cyst — *Omkar Ranganath Konjeti, Nitin Gaikwad, Kundan Mehta, Sanjay M Khaladkar, Mukul Saini*

Balanced Robertsonian Translocation in 15 and 22 Chromosome in a Child with Down's syndrome — *Ashis Kumar Saha, A Halder, A Dutta*

71 **View Point**

Dubious Medical Literature Publications during COVID-19 — Another 'Epidemic' ! — *Surajit Bhattacharya, Kaushik Bhattacharya, Neela Bhattacharya*

74 **Drug Corners**

78 Real World Evidence Study to Evaluate the Effectiveness and Tolerability of Oral Lincomycin in the Treatment of Surgical Site Infection (SSI) and Skin & Soft Tissue Infection (SSTI) — *Milind Ruke, Anish Desai, Sunaina Anand, Sreeni Nair*

82 Specific Collagen Peptide — A Missing Piece in the Management of Osteoporosis — *M S Gupta, K S Grover, Gurinder Bedi, Anish Desai*

Efficacy and Safety of Human Placental Extract (HPE) in Women with Cervical Erosion — *L Jayanthi Reddy*

84 **Image in Medicine**

— *Bhoomi Angirish, Bhavin Jankharia*

85 **Letter to the Editor**

86 **Index to Volume 121**

Editorial

The Journey of Scientific Publication

— Nandini Chatterjee
MD, FRCP (Glasgow), FICP
Professor, Department of Medicine,
IPGME&R and SSKM Hospital, Kolkata 700020 and
Hony Editor, JIMA

Medical science is expanding its horizons day by day and there is an emergent need for new evidences to be documented for the dissemination of knowledge. New evidence generated from research or clinical observations need to be documented for the knowledge of a wider population. Published literature in peer reviewed journals leads to wider dissemination of data and also credits those that share their data. In these days of open access journals, there is widespread availability of information which can be reused for further experimentations. Though publications also benefit individuals,providing higher positions in the medical and academic hierarchy or subsequent funding through research programs, the basic and most **important aspect of scientific documentation is that, information is preserved for posterity to compare and build upon by future researchers.**

History of the scientific research articlegoes back to the seventeenth century when the Royal Society of London, became the first public institution dedicated to experimental scientific research and learning. Its initial full name was “The Royal Society of London for Improving Natural Knowledge” In 1665, the Society began publishing its Philosophical Transactions, the first and foremost scientific periodical in Europe until the 19th century.The Philosophical Transactions initially published news, letters and descriptions of experimental reports without a standardized format or style.

Observations about natural calamities like earthquakes or unusual fetuses were mostly documented in the first 80 volumes of the Transactions. Experimental reports were very scarce accounting for 5 to 20% of the features.

With the passage of time, there was a gradual evolution of the Philosophical Transactions in the 19th century when the journal was divided into two distinct sections in 1887, one dealing with mathematical and physical topics and the other with biological papers.

In those days of yore, the experiments were presented in great detail so that they could be reproducible to verify the accuracy of the reported results. As the genre evolved, these detailed descriptions were replaced by today’s usually concise Materials and Methods section of research articles. However, rhetorical language

was used to express personal opinions due to a lack of confidence regarding the accuracy of the results.

Scientific reports were characterized by narrative structure and personal author centric description in the text.

Throughout the 20th century, there was a constant effort to develop the structure and content of research papers. The standardization of experimental procedures, led to a less-detailed, shorter Methodology section and greater emphasis on discussing results in order to put them in perspective and delineate their relevance. This led to the trend of comparing ones own results with other publications and citations, thus increasing the extent of the Discussion sections.

The Introduction, Methods, Results and Discussion (IMRAD) structure of research articles was constituted in 1978, following the meeting of several biomedical journal editors who formed the Vancouver Group, which later came to be designated as the International Committee of Medical Journal Editors (ICMJE).

ICMJE has laid down standardized formats for not only research articles but for different aspects of publication like citation methods and publication ethics.

The Journal of the Indian Medical Association (JIMA) has kept up the tradition of publication in accordance to the principles laid down by the ICMJE.

This article about the history of publications will be incomplete if we do not reminisce about the history of the Journal of the IMA, JIMA.

The Indian Medical Association launched its own journal in the name of "Indian Medical World" in March 1930, under the Editorship of Sir Nil Ratan Sircar and an All-India Editorial Board of 21 members . Altogether 18 monthly issues of the "Indian Medical World" were published. Thereafter n the 7th All India Conference of IMA, which was held in Pune, under the Presidentship of Dr Jivraj N Mehta, a new resolution was taken up to change the name of the journal to "Journal of the Indian Medical Association". Since then more than ninety two years have passed and JIMA has traversed a chequered path to cross new frontiers. It is the largest circulated indexed journal to reach out to more than 3,50,000 members of the Indian Medical Association from different specialties all over the country.

Every modern day journal has to be a part of the digital revolution that has changed the face of publication in the last two decades.

There is the shift in the paradigm with the advent of the open access online journal. Every indexed journal has a website, an online submission system , digital peer review facility and digital archives of its past publications. The JIMA is surging ahead with all these features incorporated into its system of functioning.A process of digitization of the archives of this historical journal has been undertaken to preserve the precious publications of the past which may be accessed at the click of a button.

It is a challenge to keep up with the fast expanding volume of digital information and the influx of newer evidences in disease spectra and management strategies need to be incorporated into the conglomeration of research articles, insightful systematic reviews, scientific correspondence and interesting and uncommon case descriptions in the journals in order to expand its frontiers.

Having said this , it is to be remembered that the measure of success of any journal does not stem just from the number of submissions, publications, citations, or impact factor; but through its contribution to the upgradation of next generation of physicians and overall upliftment of standard of patient care and we aspire to achieve that goal.

Long live IMA, Long live JIMA!

Further Readings

1 Atkinson D — Scientific Discourse in Sociohistorical Context: the Philosophical Transactions of the Royal Society of London, 1675-1975. Mahwah, New Jersey: Lawrence Erlbaum Associates; 1999. [Google Scholar]
2 Bazerman C — Shaping Written Knowledge: The Genre and Activity of the Experimental Article in Science. Wisconsin: The University of Wisconsin Press; 1988. [Google Scholar]
3 Hyland K — Academic Discourse: English in a Global Context. London: Continuum; 2009. [Google Scholar]
4 Swales JM — Genre Analysis English in Academic and Research Settings. Cambridge: Cambridge University Press; 1990. [Google Scholar]
5 Hyland K, Salager-Meyer F — Scientific Writing. *Annu Rev Inform Sci* 2008; **42:** 297-338. [Google Scholar]
6 Ken Hyland — Hedging in Scientific Research Articles. Amsterdam: John Benjamins Publishing Company; 1998. [Goo

Original Article

Anaemia in Patients with Acute Heart Failure with Reduced Ejection Fraction — A Hospital-based Study

Shaila Jay Shah[1], Sandeep R Chavda[2], Niyati Harsh Mehta[3], Ravi Sanjaykumar Suthar[4]

Background : The presence of anaemia increases the risk of hospitalization and mortality in heart failure however, anaemia in acute heart failure is not well studied. The aetiology of anaemia in heart failure is varied and so are its effects across populations of varied ethnicity. The aim of this study was to know the prevalence and type of anaemia and its association with heart failure severity in patients who had acute heart failure with reduced ejection fraction.

Materials and Methods : The study was carried out at a tertiary care teaching hospital of Ahmedabad between August 2018 to December 2020 in adult indoor patients who were admitted with signs and symptoms of heart failure and had reduced Ejection Fraction (EF) ≤40% on a 2Dechocardiogram. Patients who were pregnant, on maintenance dialysis and any other acute disease or sepsis were excluded. Anaemia and its severity was decided as per WHO guidelines. The New York Heart Association (NYHA) class was used to determine severity of heart failure.

Results : During the study, 262 out of 462 patients had reduced EF, 105 of those patients had anaemia. The prevalence of anaemia in acute HFrEF was 40.08%. Absolute Iron Deficiency (AID) was observed in 38(36.1%), Functional Iron Deficiency (FID) in 14(13.33%) and Anaemia of Chronic Disease (ACD) in 53(50.47%). There was no significant association of the type of anaemia with the NYHA class or the mean Hb. Majority of the patients had moderate to severe anaemia. The severity of anaemia strongly related to heart failure severity.

Conclusion : Anaemia is common in acute HFrEF. Aetiology of anaemia is not related to severity of anaemia or heart failure. Severity of anaemia is directly proportional to NYHA class. Patients with iron deficiency should be considered for intravenous iron therapy after stabilisation of heart failure.

[*J Indian Med Assoc* 2023; **121(12):** 15-20]

Key words **: Anaemia, Heart failure, NYHA Class, Reduced Ejection Fraction.**

It has been estimated that heart failure affects nearly 26 million people globally[1]. The prevalence of anaemia in patients with HF (defined as hemoglobin <13 g/dL in men and <12 g/dL inwomen)[2]. varies between 9% to 69.6%. Presence of anaemia increases risk of hospitalization and mortality in 46.8% patients as compared to 29.5% in their non-anaemic counterparts[3]. Other co-morbid conditions like Chronic Kidney Disease (CKD), advanced age and severity of heart failure have also been found to be increasingly associated with anaemia[4]. The aetiology of anaemia in heart disease remains incompletely understood, with the strongest evidence-based data available for iron deficiency and inflammation[5], though there are several factors that likely contribute including: co-morbid chronic kidney disease, blunted erythropoietin production, haemodilution, aspirin-induced gastrointestinal blood loss, the use of Renin-angiotensin-aldosterone System (RAAS) blockers, cytokine-mediated inflammation (anaemia of chronic disease), and gut malabsorption with consequent nutritional deficiency. Iron deficiency is also, common. Cytokine mediated sequestration of iron in the reticuloendothelial system may contribute to a functional iron deficiency, while an absolute deficiency can result from decreased oral iron absorption associated with cytokine induced hepcidin synthesis[6]. In brief, iron deficiency (ID), chronic diseases, dilutional anaemia and renal failure remain the most common causes of anaemia in patients with heart failure[7]. Anaemia has been associated with increased mortality and hospitalization, poor quality of life and reduced exercise capacity and tolerance in heart failure patients[8]. The effects of anaemia seem to differ across diverse ethnic populations[9]. There are few studies from India that have studied anaemia in heart failure

Editor's Comment :

- Patients with HFrEF and anaemia have more severe heart failure hence it is important to address this in all patients with heart failure during hospitalisation as well as follow-up of patients. Intravenous iron therapy should be considered for all patients who are having absolute iron deficiency anaemia after stabilisation of heart failure.

Department of General Medicine, GCS Medical College, Hospital and Research Centre, Ahmedabad, Gujarat 380025
[1]MD, Associate Professor and Corresponding Author
[2]MD, Senior Resident
[3]MD, Assistant Professor
[4]MBBS, 1st year Resident

Received on : 05/02/2023
Accepted on : 20/04/2023

especially in acute heart failure. We have attempted to throw some light on this subject through our humble effort in this study.

Materials and Methods

Study Design :

This was a prospective observational study carried out at the Department of Medicine at a Tertiary Care Teaching Hospital in Ahmedabad, Gujarat. The study was approved by the institutional review board vide no. GCSMC/EC/TRIAL/APPROVE/2019. Only patients who gave consent were included in the study. The study period was from August, 2018 to December, 2020.

Objectives of the Study :

- To estimate the prevalence of anaemia in patients who were admitted with heart failure with Reduced Ejection Fraction (HFrEF).
- To determine the type of anaemia present in these patients.
- To determine the correlation of type and severity of anaemia with the severity of heart failure.

Study Population :

Inclusion criteria :

- Indoor patients
- Age ≥18 years
- Left Ventricular Ejection Fraction (LVEF) ≤40%
- Haemoglobin<13g%(male) and <12g%(female)

Exclusion criteria :

- Outdoor patients
- Non-consenting adults
- LVEF >40%
- Pregnant patients
- Patients already on maintenance dialysis
- Patients with sepsis or any other acute disease other than heart failure

Data Collection :

The demographic and clinical data of the patients like age, gender, clinical history for symptoms of heart failure and active bleeding, pulse, blood pressure, NYHA class and relevant details of clinical examination was entered in excel data sheet for further analysis. All patients underwent estimation of complete blood count with peripheral smear for RBC morphology, blood sugar, serum iron, TIBC and ferritin estimation, B12 estimation, Brain Natriuretic Peptide (BNP), blood urea, serum creatinine and serum sodium and potassium estimation. All patients underwent the test for occult blood in stool. X-ray chest was also performed. 2Dechocardiography was carried out in all patients and Ejection Fraction (EF) was estimated by Simpson's method. Heart failure was defined and an EF of less than or equal to 40% was considered as reduced ejection fraction as per American Heart Association guidelines 2013[10]. Anaemia was defined and severity was considered as per WHO classification which states as anaemia to be present in males if Hb <13g% and in females if Hb <12g%[2]. Anaemia when present was classified into iron-deficiency anaemia and anaemia of chronic disease depending on Transferrin Saturation (TSAT). Iron-deficiency anaemia was further classified into absolute iron deficiency and functional iron deficiency anaemia. Patients with TSAT of <20% were considered to be iron depleted. A ferritin level is below 100 ug/ml in HF patients with TSAT<20% was considered as absolute iron deficiency while ferritin level between 100-299 ug/ml with TSAT above 20% was considered functional deficiency. TSAT above 20% with ferritin levels higher than 300 ug/ml was classified as anaemia of chronic disease in our study[11].

Statistical Analysis :

Categorical variables were expressed as mean and standard deviation while non-categorical variables were expressed as percentages and ratios. ANOVA test and unpaired t-test was used for categorical variables to establish statistical significance while chi-square test was used for non-categorical variables for the same. Pearson's correlation co-efficient was used to determine statistical significance for two different categorical variables. P-value <0.05 was considered statistically significant with confidence interval of 95%. Statistical analysis was done online on socscistatistics.com. (https://www.socscistatistics.com)

Results

Prevalence of Anaemia :

During the study period 462 patients with acute heart failure were admitted at our institute. On screening, 262 patients had HFrEF and 105 patients of these had anaemia. Hence the prevalence of anaemia in HFrEF in our study was estimated to be 40.08%. These 105 patients were then included in the study.

Demographics :

The mean age of our study population was 58.14±9.98 years. Maximum patients were between the age group of 50-69 years. Thirty-eight (36.19%) patients were between 50-59 years of age and 36 (34.28%) patients were between the age of 60-69 years. The age wise distribution along with the gender has been demonstrated in Fig 1.

There were 69(65.17%) males and 36(34.83%) females in the study. The male: female ratio in the study was 1.91:1.

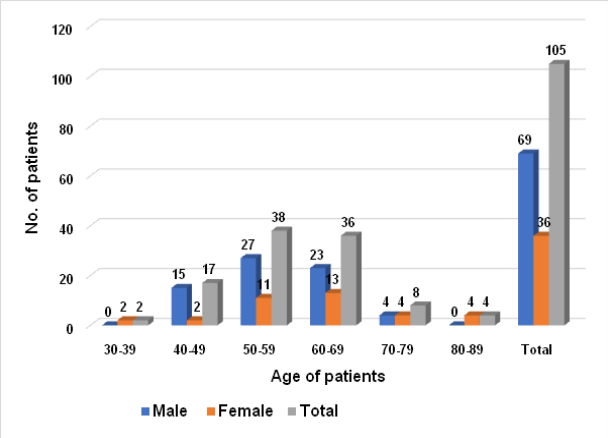


Fig 1 — Age and gender distribution of study patients

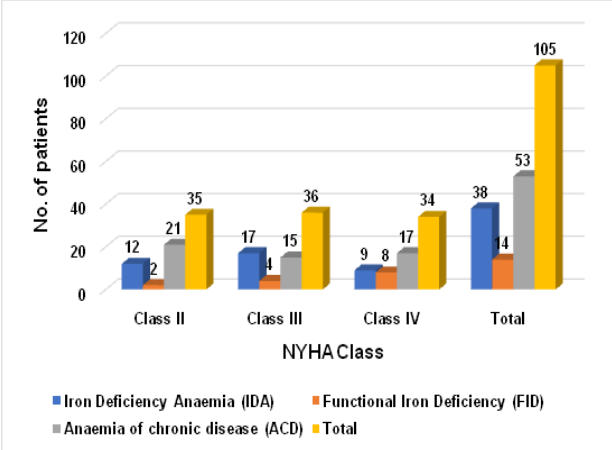


Fig 2 — Relationship of type of anaemia with severity of heart failure as per NYHA class

The mean Hb in males was 8.41±1.72 g/dl while that in females was 8.08±1.39 g/dl. There was no significant difference in the mean haemoglobin concentration between the genders (t=0.6695,p=0.50). There was also no statistically significant difference with regards to type of anaemia between the two genders (χ^2=3.7688, p=0.152).

Type of Anaemia :

Absolute Iron Deficiency (IDA) was observed in 38(36.1%), Functional Iron Deficiency (FID) in 14(13.33%) and Anaemia of Chronic Disease (ACD) in 53(50.47%) in the present study. There was no significant association of the type of anaemia with the NYHA class as shown in Fig 2. As seen in Table 1, the mean Hb was not significantly different across anaemia types. Interestingly the mean ferritin and mean creatinine values were higher with FID patients than ACD patients. FID patients were also found to have significantly lower iron levels as compared to AID patients. They also had lower mean Hb and higher mean BNP levels than the other two groups though this was not statistically significant. The type of anaemia also showed no significant difference with respect to BNP which reiterates the observation that type of anaemia did not have a significant relation with the NYHA class.

Anaemia and Heart Failure Severity :

It is evident from Table 2, that majority of the patients in the study had moderate to severe anaemia. The number of patients in the moderate and severe group are nearly equal. However, it is evident that while most patients with moderate anaemia belonged to NYHA class II and III, with NYHA class IV, all patients had only severe anaemia. This is reflected again in Table 3, which shows that with increasing NYHA class there was a significant drop in the mean haemoglobin concentration with a parallel significant rise in the mean BNP levels. However, the drop in Hb was far more statistically significant than the rise in BNP levels. We found a negative correlation between Hb concentration and BNP levels (Pearson's correlation coefficient R= -0.2295, p=0.109) but it was not statistically significant. Similarly, BNP and ferritin levels were positively correlated without statistical significance (R=0.0626, p=0.665) The mean creatinine was not statistically significant across NYHA class unlike that seen with the type of anaemia which had a greater influence on mean creatinine levels.

Table 1 — *Comparision of different parameters across type of Anaemia*

	Iron Mean (SD)	Ferritin Mean (SD)	TSAT(%) Mean (SD)	Hb g/dl Mean(SD)	BNP Mean(SD)	S.creat Mean(SD)	Total pts. (%)
Absolute Iron Deficiency(IDA)	53.68(23.98)	24.81(16.37)	12.58(5.38)	8.62(1.50)	965.22(330.87)	1.10(0.24)	38(36.19)
Functional Iron Deficiency (FID)	37.99(15.40)	381.94(240.16)	14.95(3.64)	7(0.9)	1053.42(424.30)	2.02(0.96)	14(13.33)
Anemia of Chronic Disease (ACD)	87.51(52.39)	287.47(268.28)	49.33(41.24)	8.42(1.7)	1010.04(304.06)	1.42(0.65)	53(50.48)
f-ratio (ANOVA)	5.944	11.009	9.255	2.938	0.201	6.0052	
p-value	0.049*	0.00012†	0.0004‡	0.062	0.81	0.0047¥	

*Q=6.02,p=0.00028 between IDA and FID,Q=4.43,p=0.00821 between IDA and ACD
†Q=4.34,p=0.00984 between FID and ACD
‡Q=4.39,p=0.00885 between IDA and ACD,Q=4.11,p=0.01512 between FID and ACD
¥Q=5.45, p=0.00101 between IDA and FID, Q=3.57, p=0.0039 between IDA and ACD

Table 2 — *Distribution of patients as per gender with severity of anaemia and severity of heart failure*

NYHA Class / Gender / Anaemia severity	Class II		Class III		Class IV		Total (%)
	Male	Female	Male	Female	Male	Female	
Mild							
11-11.9 g/l female							
11-12.9g/l male	2	0	0	0	0	0	2(1.9)
Moderate 8-10.9g/l	23	6	15	10	0	0	54(51.42)
Severe <8.0g/l	2	2	6	5	21	13	49(46.68)
Total (%)	35(33.33)		36(34.28)		34(32.38)		105(100)

Table 3 — *Relationship between severity of heart failure with BNP, haemoglobin and creatinine*

NYHA Class	II	III	IV	f-ratio (ANOVA)	p-value
BNPMean(SD)	805.1(262.48)	915.33(292.67)	1132.73(320.04)	4.674	0.013*
Hb g/dl Mean (SD)	10.38(0.36)	8.47(0.91)	7.01(1.36)	51.732	<0.00001†
S.creatinine Mean (SD)	1.33(0.67)	1.26(0.40)	1.58(0.83)	1.074	0.349

*Q=4.16,p=0.013 between NYHA Class III and IV
† Q=5.45,p=0.00101 between Class II and III, Q=14.61,p=0.0000 between Class II and IV, Q=9.16, p=0.0000 between Class III and IV

Discussion

Prevalence of Anaemia :

The prevalence of anaemia in our study was 40.08%. This is comparable to study by Ikama, *et al*, which had a similar study design where the prevalence was 42%[12]. In the Beijing AHF registry involving 3279 patients 45.4% of the patients were found anaemic[13]. Most studies conducted regarding anaemia in heart failure are on patients of chronic heart failure. There is meagre information on the prevalence of anaemia in patients with acute heart failure.

Patient Demographics :

We had maximum number of patients in the age groups of 50-59 years and 60-69 years. The mean age of participants in our study was 58.14±9.98 years. According to a position statement released by the Cardiology Society of India, the mean age at presentation for heart failure is around 60 years which is younger than that of developed countries[14]. Also, in a study conducted by Chopra, *et al* the mean age of participants was 59.1±11.8 years which is like that of our study population[15].

The male to female ratio in our study was 1.91:1. There were 69(65.71%) males in our study population. This is similar to studies conducted by Arora, *et al*[16] and Sharma, *et al*[17] where 68% were male and 32% were female respectively.

With regards to the type of anaemia there was no significant difference between the genders. (The chi-square statistic is 3.7688. The p-value is 0.151922. The mean Hb between the genders was also not statistically significant. This contrasts with studies depicting female gender as an independent predictor of ID[18,19]. However, the study by Mohan G had similar inference as ours the possible reason being the mean age being postmenopausal status of women in both our studies[20].

Type of Anaemia :

Absolute Iron Deficiency (IDA) was observed in 38(36.1%), Functional Iron Deficiency (FID) in 14(13.33%) and Anaemia of Chronic disease (ACD) in 53(50.47%). Our findings are similar to a study by Mohan, *et al* where 41.6% had ID with anemia, while (18.3%) were having ID but no anemia[20]. Similarly in a study by Opasich et al demonstrated iron deficient erythropoiesis in only 36.48% patients while 57% patients had ACD[21]. Our findings are of significance in the wake of the current literature for the management of acute HF with respect to anaemia. In the AFFIRM-AHF trial, no significant difference was found in the treatment and placebo groups regarding mortality at one year with treatment with Ferric Carboxymaltose (FCM), however, total rehospitalizations were decreased significantly in the FCM group. On subgroup analysis, it may be postulated that patients with absolute ID may be benefitted more than those with functional ID, as FID tends to get resolved on treatment of heart failure while absolute ID is more likely to persist[22]. There is meagre information on functional iron deficiency in heart failure but surprisingly our study shows that this subset of patients though small may be sicker as compared to those with AID or ACD, considering that these patients had lower iron, lower Hb and higher BNP levels suggestive of haemodilution or congestion along with higher ferritin and creatinine levels which may be due a combination of inflammation and hypoperfusion, possibly on a pre-existing chronic kidney disease. In a study involving a large cohort of veterans with CKD, it was found that AID was associated with a modestly increased risk of cardiovascular hospitalisation within 1 to 2 years but was not associated with increased mortality or dialysis initiation while FID was also associated with increased mortality. Further studies are required to study this subset of FID patients in heart failure[23]. With regards to ACD, the RED-HF trial demonstrated that the use of darbopoietin alpha did not influence outcome of

death from any cause or hospitalization for worsening heart failure. In fact, the darbopoietin group had increased thromboembolic events in the form of fatal or non-fatal stroke[11]. In heart failure patients the erythropoietin response is believed to be blunted but another proposed mechanism is the non-responsiveness to erythropoietin due to an inflammatory response thus explaining the failure of the RED-HF trial[24].

Relationship between Anaemia and Severity of Heart Failure :

We observed that there was a significant difference in the levels of haemoglobin between different NYHA classes of heart failure and the trend was decreasing haemoglobin with increasing class. A similar relationship has been established in studies done by Anand, *et al*[25] and Horwich, *et al*[26].

However, we did not find a relation between type of anaemia and NYHA class. Haemodilution is one of the proposed mechanisms of development of anaemia in HF patients which in turn is due to water retention. It has been demonstrated with radio-labelled albumin that up to 46% patients with anaemia and HF have haemodilution and should be treated with diuretics[27]. It was also demonstrated by Adlbrecht, *et al* that haemodilution was responsible for anaemia across a large spectrum of heart failure severity and for iron deficiency anaemia to a smaller extent[28]. The same can also be demonstrated in our study by significantly higher BNP levels with increasing severity of NYHA class. However, on the contrary, level of haemoglobin did not have any significant corelation with the BNP. This suggests that all anaemia in acute heart failure is not likely to be due to haemodilution alone and as previously mentioned may be true anaemia due to various factors already discussed. A review article by T Bordonali, *et al* had mentioned that a relevant percentage of patients may have anaemia in HF without haemodilution[29]. The inference from the HERO study, which included patients with acute heart failure was that moderate to severe anaemia in heart failure was an independent predictor of mortality since these patients were likely to have real anaemia which may persist after haemoconcentration[30]. We also did not find a statistically significant corelation of ferritin with BNP although BNP significantly corelated to NYHA class. This suggests that while inflammation may not be related with increasing severity of heart failure, type of anaemia may have little to account for the severity of heart failure as opposed to the severity of anaemia itself.

We are aware that our study had several limitations like being a single centre study with a relatively small sample size. We have also not considered the cardiorenal anaemia syndrome in our study as we studied acute heart failure and this was out of the scope of the study. However, we do believe that our study can make a significant contribution to the ever-burning problem of managing anaemia in heart failure as this remains a problem largely ignored in heart failure management.

Conclusion

Anaemia in chronic heart failure is extensively studied but the same does not hold true for acute heart failure. Absolute iron deficiency is found in almost one-third of anaemic patients with acute heart failure but may also be present without anaemia. These patients should be targets for intravenous iron therapy for a better quality of life. As of today, erythropoiesis stimulating agents like darbopoietin have no role in treatment of anaemia in heart failure. Patients with anaemia have increased severity of heart failure and much of this may be true anaemia and not a result of haemodilution. Functional iron deficiency in acute heart failure remains an elusive entity but needs to be paid attention. Iron deficiency is easy to treat and remains an important intervention in HFrEF patients as both remain independent risk factors of mortality in heart failure patients.

References

1 Ambrosy AP, Fonarow GC, Butler J, Chioncel O, Greene SJ, Vaduganathan M, *et al* — The Global Health and Economic Burden of Hospitalizations for Heart Failure: Lessons Learned from Hospitalized Heart Failure Registries. *J Am Coll Cardiol* 2014; **63(12):** 1123-33. doi: 10.1016/j.jacc.2013.11.053.

2 World Health Organization. The World Health Report 2005: Global database on anemia survey 2005. (DEFINITION OF ANEMIA)

3 Anemia and mortality in heart failure patients a systematic review and meta-analysis. Groenveld HF, Januzzi JL, Damman K, van Wijngaarden J, Hillege HL, van Veldhuisen DJ, van der Meer P. *J Am Coll Cardiol* 2008; **52:** 818-27. [PubMed] [Google Scholar] [Ref list]

4 Anemia, heart failure and evidence-based clinical management. Pereira CA, Roscani MG, Zanati SG, Matsubara BB. *Arq Bras Cardiol* 2013; **101:** 87-92. [PMC free article] [PubMed] [Google Scholar] [Ref list]

5 Anemia in heart failure - from guidelines to controversies and challenges. Sîrbu O, Floria M, Dascalita P, Stoica A, Adascalitei P, Sorodoc V, Sorodoc L. *Anatol J Cardiol.* 2018; **20:** 52-9. [PMC free article] [PubMed] [Google Scholar] [Ref list]

6 Siddiqui SW, Ashok T, Patni N, Fatima M, Lamis A, Anne KK — Anemia and Heart Failure: A Narrative Review. *Cureus* 2022 Jul 23; **14(7):** e27167. doi: 10.7759/cureus.27167. PMID: 36017290; PMCID: PMC9393312.

7 Pereira GAR, Beck-da-Silva L. Iron Deficiency in Heart Failure with Reduced Ejection Fraction: Pathophysiology, Diagnosis and Treatment. *Arq Bras Cardiol* 2022; **118(3):** 646-54.

English, Portuguese. doi: 10.36660/abc.20201257. PMID: 35319614; PMCID: PMC8959039.
8 Chairat K, Rattanavipanon W, Tanyasaensook K, Chindavijak B, Chulavatnatol S, Nathisuwan S — Relationship of anemia and clinical outcome in heart failure patients with preserved versus reduced ejection fraction in a rural area of Thailand. *Int J Cardiol Heart Vasc* 2020 Jul 30; **30:** 100597. doi: 10.1016/j.ijcha.2020.100597. PMID: 32775603; PMCID: PMC7399103.
9 Goh VJ, Tromp J, Teng TK, Tay WT, Van Der Meer P, Ling LH *et al* — ASIAN-HF investigators. Prevalence, clinical correlates, and outcomes of anaemia in multi-ethnic Asian patients with heart failure with reduced ejection fraction. *ESC Heart Fail* 2018; **5(4):** 570-8. doi: 10.1002/ehf2.12279. Epub 2018 Mar 31. PMID: 29604185; PMCID: PMC6073031.
10 Yancy CW, Jessup M, Bozkurt B, Butler J, Casey DE Jr, Drazner MH, *et al* — American College of Cardiology Foundation; American Heart Association Task Force on Practice Guidelines. 2013 ACCF/AHA guideline for the management of heart failure: a report of the American College of Cardiology Foundation/American Heart Association Task Force on Practice Guidelines. *J Am Coll Cardiol* 2013; **62(16):** e147-239. doi: 10.1016/j.jacc.2013.05.019. Epub 2013 Jun 5. PMID: 23747642.
11 Anand IS, Gupta P — Anemia and Iron Deficiency in Heart Failure: Current Concepts and Emerging Therapies. *Circulation* 2018; **138(1):** 80-98. doi: 10.1161/CIRCULATIONAHA.118.030099. PMID: 29967232.
12 Ikama MS, Nsitou BM, Kocko I, Mongo NS, Kimbally-Kaky G, Nkoua JL — Prevalence of anaemia among patients with heart failure at the Brazzaville University Hospital. *Cardiovasc J Afr* 2015; **26(3):** 140-2. doi: 10.5830/CVJA-2015-021. PMID: 26592909; PMCID: PMC4538906.
13 Ye SD, Wang SJ, Wang GG, Li L, Huang ZW, Qin J, Li CS, *et al* — Association between anemia and outcome in patients hospitalized for acute heart failure syndromes: findings from Beijing Acute Heart Failure Registry (Beijing AHF Registry). *Intern Emerg Med* 2021; **16(1):** 183-92. doi: 10.1007/s11739-020-02343-x. Epub 2020 Apr 30. PMID: 32356137.
14 Guha S, Harikrishnan S, Ray S, Sethi R, Ramakrishnan S, Banerjee S, *et al* — CSI position statement on management of heart failure in India. *Indian Heart J* 2018 Jul; **70 Suppl 1(Suppl 1):** S1-S72. doi: 10.1016/j.ihj.2018.05.003. Epub 2018 Jun 8. Erratum in: *Indian Heart J* 2018 Nov - Dec; **70(6):** 952-953. Erratum in: *Indian Heart J* 2021; **73(1):** 138. PMID: 30122238; PMCID: PMC6097178.
15 Chopra VK, Mittal S, Bansal M, Singh B, Trehan N — Clinical profile and one-year survival of patients with heart failure with reduced ejection fraction: The largest report from India. *Indian Heart J* 2019; **71(3):** 242-8. doi: 10.1016/j.ihj.2019.07.008. Epub 2019 Aug 7. PMID: 31543197; PMCID: PMC6796637.
16 Arora H, Sawhney JPS, Mehta A, Mohanty A — Anemia profile in patients with congestive heart failure a hospital based observational study. *Indian Heart J* 2018; **70 Suppl 3(Suppl 3):** S101-S104. doi: 10.1016/j.ihj.2018.06.017. Epub 2018 Jun 30. PMID: 30595239; PMCID: PMC6309281.
17 Sharma YP, Kaur N, Kasinadhuni G, Batta A, Chhabra P, Verma S, Panda P — Anemia in heart failure: still an unsolved enigma. *Egypt Heart J* 2021; **73(1):** 75. doi: 10.1186/s43044-021-00200-6. PMID: 34453627; PMCID: PMC8403217.
18 Sharma SK, Agarwal SK, Bhargava K, Sharma M, Chopra K, Arumugam G — Prevalence and spectrum of iron deficiency in heart failure patients in south Rajasthan. *Indian Heart J* 2016; **68(4):** 493-7. doi: 10.1016/j.ihj.2015.10.387.Epub 2016 Jan 11.PMID: 27543
19 Klip IT, Comin-Colet J, Voors AA, Ponikowski P, Enjuanes C, Banasiak W, *et al* — Iron deficiency in chronic heart failure: an international pooled analysis. *Am Heart J* 2013; **165(4):** 575-82.
20 Mohan G, Mohan G, Chandey M, Kaur A, Sikand TS, Kaur R — Prevalence and spectrum of iron deficiency anaemia in heart failure patients. *Int J Adv Med* 2020; **7(1):** 132-7.
21 Opasich C, Cazzola M, Scelsi L, De Feo S, Bosimini E, Lagioia R, *et al* — Blunted erythropoietin production and defective iron supply for erythropoiesis as major causes of anaemia in patients with chronic heart failure. *Eur Heart J* 2005; 26: 2232-7. doi: 10.1093/eurheartj/ehi388
22 Ponikowski P, Kirwan BA, Anker SD, McDonagh T, Dorobantu M, Drozdz J, *et al* — AFFIRM-AHF investigators. Ferric carboxymaltose for iron deficiency at discharge after acute heart failure: a multicentre, double-blind, randomised, controlled trial. *Lancet* 2020; **396(10266):** 1895-904. doi: 10.1016/S0140-6736(20)32339-4. Epub 2020 Nov 13. Erratum in: Lancet. 2021 Nov 27;398(10315):1964. PMID: 33197395.
23 Awan AA, Walther CP, Richardson PA, Shah M, Winkelmayer WC, Navaneethan SD — Prevalence, correlates and outcomes of absolute and functional iron deficiency anemia in nondialysis-dependent chronic kidney disease. *Nephrol Dial Transplant* 2021; **36(1):** 129-36. doi: 10.1093/ndt/gfz192. PMID: 31641775.
24 Yeo TJ, Yeo PS, Ching Chiew Wong R, Ong HY, Leong KT, Jaufeerally F, *et al* — Iron deficiency in a multi ethnic Asian population with and without heart failure: prevalence, clinical correlates, functional significance and prognosis. *Euro J Heart Fail* 2014; **16(10):** 1125-32.
25 Anand I, McMurray JJ, Whitmore J, Warren M, Pham A, McCamish MA, *et al* — Anemia and its relationship to clinical outcome in heart failure. *Circulation* 2004; **110(2):** 149-54. doi: 10.1161/01.CIR.0000134279.79571.73. Epub 2004 Jun 21. PMID: 15210591.
26 Horwich TB, Fonarow GC, Hamilton MA, MacLellan WR, Borenstein J — Anemia is associated with worse symptoms, greater impairment in functional capacity and a significant increase in mortality in patients with advanced heart failure. *J Am Coll Cardiol* 2002; **39(11):** 1780-6. doi: 10.1016/s0735-1097(02)01854-5. PMID: 12039491.
27 Androne AS, Katz SD, Lund L, LaManca J, HudaihedA, Hryniewicz K, *et al* — Hemodilution is common in patients with advanced heart failure. *Circulation* 2003; **107:** 226-9
28 Adlbrecht C, Kommata S, Hülsmann M, Szekeres T, Bieglmayer C, Strunk G, *et al* — Chronic heart failure leads to an expanded plasma volume and pseudoanaemia, but does not lead to a reduction in the body's red cell volume. *Eur Heart J* 2008; **29(19):** 2343-50. doi: 10.1093/eurheartj/ehn359. Epub 2008 Aug 12. PMID: 18701467.
29 Vizzardi E, Bordonali T, Tanghetti E, Metra M, Cas L — Anaemia and heart failure. *Open Medicine* 2011; **6(1):** 11-25.
30 Li J, Jiang C, Lai Y, Li L, Zhao X, Wang X, *et al* — Association of On-Admission Anemia With 1-Year Mortality in Patients Hospitalized With Acute Heart Failure: Results From the HERO Study. *Front Cardiovasc Med* 2022; **9:** 856246. doi: 10.3389/fcvm.2022.856246. PMID: 35600475; PMCID: PMC9114434.

Original Article

Drug Utilization in Resistant Hypertension

Bhuvaneswari K[1], Jegatheeswari Murugesan[2], Mohamed Musthafa S[3], Aathira S[4]

Background : Resistant Hypertension (RHT) is defined as a Blood Pressure (BP) that remains above 140/90 mmHg despite concurrent use of three antihypertensive agents of different classes taken at maximally tolerated doses, one of which should be a diuretic. Specifically, the triple combination of an Angiotensin-Converting Enzyme (ACE) inhibitor or Angiotensin Receptor Blocker (ARB), a long-acting Dihydropyridine Calcium Channel Blocker Amlodipine and a long-acting Thiazide-like diuretic is often effective and generally well tolerated.

Aims and Objectives : (1) To measure the prevalence of RHT at a Tertiary Care Hospital. (2) To identify the RHT related morbidity. (3) To identify the drug /drug combinations suggested in the treatment of RHT.

Materials and Methods : After IHEC approval a retrospective cross sectional clinical study was performed at General Medicine and Cardiology department using IP resistant hypertension case records for a period of 1 year January, 2018 to December, 2018 using Data collection tool and analyzed after calculating sample size using global prevalence rate 10.3%.

Results : Prevalence of RHT was 3.45%. The combination used predominantly was ACE inhibitor with a Diuretic and Beta blocker. Co-morbidity observed were Coronary Artery Disease [64%], Diabetes [57%], Dyslipidemia [22%], CKD [23%], Hypothyroidism [10%].

Conclusion : Majority of the RHT patients were on 3 or more drug therapy and CAD co-morbidity was high.

[*J Indian Med Assoc* 2023; **121(12):** 21-3]

***Key words* : Resistant Hypertension, Diuretics, ACE Inhibitors, Comorbidity.**

Resistant Hypertension (RHT) is defined as a Blood Pressure (BP) that remains above goal despite concurrent use of three antihypertensive agents of different classes taken at maximally tolerated doses, one of which should be a diuretic. True resistant hypertension requires that white coat hypertension and nonadherence to treatments have both been excluded as reasons for the uncontrolled BP[1].

Resistant Hypertensions are at high risk for adverse cardiovascular events and hence fast reduction in BP is must. Obstructive sleep apnea ,Renal parenchymal disease, Primary Aldosteronism, Renal artery stenosis, Cushing's disease, Aortic coarctation and Hyperparathyroidism are some of the reasons for resistant hypertension when a person even on regular drug treatment[2].

Review of Literature :

Common approach is to treat RHT by sequentially combine agents with different mechanisms of action. Specifically, the triple combination of an Angiotensin-Converting Enzyme (ACE) inhibitor or Angiotensin Receptor Blocker (ARB), a long-acting Dihydropyridine Calcium Channel Blocker (CCB) Amlodipine and a long-acting thiazide-like diuretic is often effective and generally well tolerated. RHT are treated with at least three antihypertensive agents, including a diuretic (usually a thiazide, but loop diuretics are selected in patients with estimated glomerular filtration rate [eGFR] <30 mL/min/1.73 m^2)[3,4].

Editor's Comment :

- Resistant hypertension is an emerging disease.
- Physicians have to titrate one drug to the maximum dose then have to add the next drug.
- Hyperaldosteronism has to be checked for RHT patients.

eGFR is an important clinical aid to apply diuretics in RHT. Thiazide-type diuretic (Hydrochlorothiazide), choice of therapy for patients who have an eGFR ≥30 mL/min/1.73 m^2. Even after addition of Thiazides if persistent signs of hypervolemia (edema), the recommended drug is a loop diuretic[5] (Furesemide / Bumetanide/Torsemde). Hypokalemia is a more common problem in patients with resistant hypertension due to at least in part to higher aldosterone levels and can be treated with Spironolactone.

Patient preferences, drug side effects and compliance can help to select choice of drug treatment. A Vasodilating Beta Blocker, such as labetalol, carvedilol, or nebivolol may be preferred with tachycardia. To provide more antihypertensive benefit

Department of Pharmacology, PSG Institute of Medical Sciences & Research, Coimbatore, Tamil Nadu 641004
[1]MD, Professor and Head and Corresponding Author
[2]MBBS, MD, Postgraduate Trainee
[3]MBBS, MD, Associate Professor
[4]MBBS, Student

Received on : 14/02/2023
Accepted on : 16/03/2023

with fewer side effects compared with traditional beta blockers[6].

Pseudo-resistant (seemingly resistant) hypertension is high BP that seems to be resistant to treatment, but other factors like Wrong medication or wrong dose, improper Medicines and supplements, Lifestyle factors, White-coat effect, Stiffening of the arteries, Inadequate measurement technique[7].

The prevalence of RHT is unknown. Cross- sectional studies and hypertension outcome studies suggest, that it is not uncommon. National Health and Nutrition Examination Survey (NHANES) participants being treated for hypertension, only 53% were controlled to <140/90 mm Hg[1]. In a cross-sectional analysis of Framingham Heart Study participants, only 48% of treated participants were controlled to <140/90 mm Hg and less than 40% of elderly participants (>75 years of age) were at a goal BP[8]. Among higher- risk populations and, in particular, with application of the lower goal blood pressures recommended in the Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (JNC 7) for patients with Diabetes Mellitus (DM) or Chronic Kidney Disease (CKD), the proportion of uncontrolled patients is even higher. Of NHANES participants with Chronic Kidney Disease (CKD), only 37% were controlled to <130/80 mm Hg[9] and only 25% of participants with diabetes were controlled to <130/85 mm Hg[10].

RHT is called "refractory" when it remains uncontrolled on five or more antihypertensives of different classes including a diuretic and a Mineralocorticoid receptor antagonist[11]. When white coat or masked HTN is suspected, an ambulatory BP monitor can help. One study found that more than 37% of those with a diagnosis of RHT had normal BPs on ambulatory monitoring. Similarly, individuals with correctly calibrated BP cuffs can measure their BP at home to assist in the assessment of their usual BP. it is vital to obtain as accurate an assessment of BP as possible, certainly before a diagnosis of RH is diagnosed[12].

Since prevalence of RHT is variable throughout country and globally due to many patient related factors and is a major barrier to stop avoidable cardiac and renal morbidity and mortality. Hence, this study has been planned to assess the prevalence and cardio renal complication with RHT.

Aims and Objectives

(1) To measure the prevalence of RHT at a Tertiary Care Hospital.

(2) To identify the RHT related morbidity.

(3) To identify the drug /drug combinations practiced in the treatment of RHT.

Study Type : A retrospective cross sectional clinical study.

Study Location : PSG IMSR General Medicine and Cardiology Departments, Peelamedu, Coimbatore.

Study Populations : SHT patients attending PSG IMSR General Medicine and Cardiology Departments, Peelamedu, Coimbatore.

Sample size : $n = Z^2P(1-P) / d^2$ Where n is the sample size, Z is the statistic corresponding to level of confidence, P is expected prevalence (that can be obtained from same studies or a pilot study conducted by the researchers) and d is precision (corresponding to effect size). The level of confidence usually aimed for is 95%, most researchers present their results with a 95% Confidence Interval (CI). Prevalence rate 10.3%[13].

$n = Z^2pq / d^2$

n = sample size and z = confidence level at 95% (std value 1.96)

p, q = variance of population

q = 1 – P

d = allowance error 5% and (Precision) d = 0.05

Prevalence = 10.3%

p = 0.10

q = (1 – p) = 0.90

$$N = \frac{(1.96)^2 \times 0.10 \times 0.90}{(0.05)^2}$$

$$= \frac{0.3457}{0.0025} = 138.28$$

n = **138**

Study Data : Patients IP and OP records of PSG IMSR Hospitals Medicine and Cardiology departments, Peelamedu COIMBATORE.

Study period : January, 2018 to January, 2019

Mode of data Collection : Through data collection tool (attached)

IHEC Approval

Materials and Methods

Analysis using suitable statistical method

Data collection using data collection tool and Documentation

General Medicine, Cardiology [resistant hypertension IP/OP case sheets cases record will be collected from MRD]

Inclusion Criteria : All patients attending General Medicine and Cardiology departments above 18 years with or without Co-morbidities and on antihypertensive treatment both IP and OP.

Exclusion Criteria : Patients admitted in other wards and on any other complications including HT emergency and urgency.

Statistics : Descriptive statistics.

Results : Prevalence of RHT was 3.45%. The combination used predominantly was ACE inhibitor with a Diuretic and Beta Blocker. Co-morbidity observed were Coronary Artery Disease [64%], Diabetes [57%], Dyslipidemia [22%], CKD [23%], Hypothyroidism [10%] (Tables 1-3).

Table 1 — Percentage of Co-morbidity

Co-morbidity	Percentage
CAD	64%
Hypothyroidism	10%
Diabetes	57%
Dyslipedemia	22%
CKD	23%

Table 2 — *Number of Patients on Different Combination Therapy*

Drug Combinations	No of patients
ACE I + Diuretic + Beta Blocker	64
ARB + Diuretic + Beta Blocker	22
CCB + Beta Blocker + Diuretic	9
CCB + ARB + Diuretic	5
CCB + ARB+ Alpha Blocker + Diuretic	8

Table 3 — *Combination Therapy*

Combination therapy	No of patients
No of patients on 3 drug therapy	100
No of patients on 4 drug therapy	33
No of patients on 5 drug therapy	5

Discussion

Prevalence of RHT was less (3.45%) when we compare to Global Prevalence Rate (10.3%). Even though we had reduced prevalence, the patients are not treated with maximum doses of drugs in combination therapy. Only those patients started with Thiazide Diuretics showed a greater reduction in BP in a month. But in many of them Thiazide are not given at the maximum dose (50 mg) The burden of Resistant Hypertension (RHT) is highest in patients with Chronic Kidney Disease (CKD) globally[13] but in our study Coronary Artery Disease was the main co-morbidity. New treatments for RHT are highly needed, considering the disastrous complications of the disease. Physicians must give full dose of one drug for Hypertension if patient not responded then only they have to switch over to next drug therapy for patient compliance and manual record of BP must be advised to every patient.

Conclusion

Majority of the RHT patients were on 3 or more drug therapy and Coronary Artery Disease Co-morbidity was high. Prevalence of RHT was less (3.45%).

Acknowledgement

I express my deepest gratitude and sincere thanks to Dr K Bhuvaneswari, MD, PGDBE, Professor and Head, Department of Pharmacology of PSG Institute of Medical Sciences & Research, for being my guide. It was her mentoring, valuable suggestions, guidance and constant encouragement in every step that has helped me to complete my research work.

I am thankful to my family members from my heart for unwavering confidence they have rendered on me throughout the study and encouraging me to complete my research work and they are my pillars of support.

I would like to thank all my Co-workers in this study.

Conflict of Interest : Nil

References

1 Carey RM, Calhoun DA, Bakris GL — Resistant Hypertension: Detection, Evaluation, and Management: A Scientific Statement From the American Heart Association. *Hypertension* 2018; **72:** e53.
2 Vongpatanasin W — Resistant hypertension: a review of diagnosis and management. *JAMA* 2014; **311:** 2216.
3 Whelton PK, Carey RM, Aronow WS — 2017 ACC/AHA/AAPA/ABC/ACPM/AGS/APhA/ASH/ASPC/NMA/PCNA Guideline for the Prevention, Detection, Evaluation, and Management of High Blood Pressure in Adults: A Report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines. *Hypertension* 2018; **71:** e13.
4 Braam B, Taler SJ, Rahman M — Recognition and Management of Resistant Hypertension. *Clin J Am Soc Nephrol* 2017; **12:** 524.
5 Gaddam KK, Nishizaka MK, Pratt-Ubunama MN — Characterization of resistant hypertension: association between resistant hypertension, aldosterone, and persistent intravascular volume expansion. *Arch Intern Med* 2008; **168:** 1159.
6 Townsend RR, DiPette DJ, Goodman R — Combined alpha/beta-blockade versus beta 1-selective blockade in essential hypertension in black and white patients. *Clin Pharmacol Ther* 1990; **48:** 66
7 https://www.hopkinsmedicine.org/health/conditions-and-diseases/high-blood-pressure-hypertension/resistant-hypertension
8 Lloyd-Jones DM, Evans JC, Larson MG, O'Donnell CJ, Rocella EJ, Levy D — Differential control of systolic and diastolic blood pressure: factors associated with lack of blood pressure control in the community. *Hypertension* 2000; ***36:*** 594-9.
9 Peralta CA, Hicks LS, Chertow GM, Ayanian JZ, Vittinghoff E, Lin F, *et al* — Control of hypertension in adults with chronic kidney disease in the United States. *Hypertension* 2005; **45:** 1119-24.
10 Hajjar I, Kotchen TA — Trends in prevalence, awareness, treatment, and control of hypertension in the United States, 1988-2000. *JAMA* 2003; ***290:*** 199-206
11 Calhoun DA, Booth JN, 3rd, Oparil S — Refractory hypertension: determination of prevalence, risk factors, and comorbidities in a large, population-based cohort. *Hypertension* 2014; **63:** 451-8.
12 Daugherty SL, Powers JD, Magid DJ — Incidence and prognosis of resistant hypertension in hypertensive patients. *Circulation* 2012; **125:** 1635-42.
13 Noubiap JJ, Nansseu JR, Nyaga UF, Sime PS, Francis I, Bigna JJ — Global prevalence of resistant hypertension: a meta-analysis of data from 3.2 million patients. *Heart* 2019; **105(2):** 98-105.

Original Article

Free of Cost Operation with Trans Obturator Tape (TOT) in Stress Urinary Incontinence among Poor Women — A Hospital-based Prospective Trial

Barunoday Chakraborty[1], Aishwarya Divakaran[2]

Background : A study was conducted on a group of 15 patients with Genuine Stress Urinary Incontinence, to know the outcome of placement of a Trans Obturator Tape, in terms of its effectiveness and postoperative complication at B S Medical College, Bankura, West Bengal.

Materials and Methods : Most of the patients were Multiparae, belonging to low socio-economic status. More than half of them belonged to the age group of 41-50 years. About half of them (53.3%) had associated cystocele/ urethrocele, so they underwent concomitant anterior colporrhaphy with placement of TOT.

Discussion : For our study a normal Hernia mesh which was available in our OT was used for the preparation of the tape, since the Monofilament Macroporous Polypropylene Mesh is costly and could not be afforded by our patients.

Result : Among 15 patients, only 1 of them had urinary retention in the immediate postoperative period which was managed successfully by loosening of the mesh. After 6 weeks following surgery, all of them were continent with no residual urinary symptoms.

Conclusion : One of our patient presented with mesh infection 2 weeks after surgery, for which she was hospitalized and treated conservatively with IV antibiotics. She recovered completely with no urinary symptoms at the end of 6 weeks.

[*J Indian Med Assoc* 2023; **121(12):** 24-8]

***Key words* : Trans Obturator Tape (TOT), Stress Urinary Incontinence (SUI), Genuine Stress Urinary Incontinence (GSUI).**

Involuntary urinary leak without the participation of the detrusor muscle of the urinary bladder that occurs during episodes of increased intra abdominal pressure during a cough, sneeze or carrying a weight is called Stress Urinary Incontinence (SUI). The reason is the increased intracystic pressure that overwhelms the urethral resistance the so-called Urethral Closing Pressure. It becomes a day to day social and hygienic problem to elderly women in whom the incidence is pretty high – nearly 30% between ages 30-60 years[4]. The levator ani muscle, the endopelvic fascia and their attachments on the pelvic side walls form a hammock beneath the urethra that responds to episodes of increase in intra abdominal pressure by closing the urethra transmitting a pressure from its posterior aspect towards the bony symphysis pubis thus compressing the urethro-vesicle junction the so-called Urethral Closing Pressure. The striated muscle of the urethra; also the non-striated smooth muscle of the urethra and the vascular and submucosal elastic tissue of the urethra maintain a Resting Urethral Tone mediated by α adrenergic receptors in response to a constant sympathetic discharge constitutes the Intrinsic Urethral Tone that keeps the urethra closed at rest while the bladder gets filled up only to make a call for micturition when the accumulated urine within it becomes 150ml or more by increased para-sympathetic discharge leading to detrusor contraction and simultaneous lowering of urethral closing pressure by inhibition of sympathetic discharge. Any disturbance in this synchronous events leads to urinary

Editor's Comment :

- Before doing TOT placement, one has to confirm it to be a case of Genuine Stress Urinary Incontinence and not urge incontinence, by thorough history and appropriate clinical test.
- It is possible to make a TOT tape by using hernia mesh which is always freely available in a government hospital.
- The learning curve for this operation is very short and the success rate is more than 90%.

[1]DGO, MD, DNB, FICOG, Professor, Department of Obstetrics and Gynaecology, Bankura Sammilani Medical College and Hospital, Bankura, West Bengal 722102 and Corresponding Author

[2]MS (Obstetrics & Gynaecology), Specialist Medical Officer, Chhatna Super-Speciality Hospital, Bankura, West Bengal 722132

Received on : 14/11/2022
Accepted on : 08/12/2022

incontinence. Obviously then if the Intrinsic mechanism is normal and incontinence is happening it is due to the laxity of the bladder neck or the posterior support of urethra the so-called Genuine Urinary Stress Incontinence or Incontinence due to urethral sphincter defect which needs to be corrected by surgery.

Therefore, the logical treatment of SUI is conservative first with maintaining a bladder diary and following a bladder drill ie, to pass urine after every 2-3 hours; pelvic floor exercise, use of α-agonist drug like Prazosin then excluding a detrusor overactivity / dyssynergia by urodynamic test thus declaring the case as Urethral Incontinence that indicates a posterior strengthening procedure on urethra. Pelvic Organ Prolapse eg. Cystourethrocele or grade 2, grade 3, utero-vaginal descent in 80% cases contributes to urethral incontinence especially when longstanding due to traction on the bladder neck causing increased urethral mobility. Transobturator Suburethral tape is one such popular method of strengthening the posterior aspect of urethra (Fig 1) without tension that uses a polypropylene monofilament mesh in the form of a tape which is passed through the obturator foramen perforating the obturator fascia on either side at the level just above the bulb of the clitoris. Commercially available tapes are costly in the range of Rs 9 to 12 thousands. So, our effort was to make a 20cm long tape 2.5 cm wide by joining two pieces of the tapes cut out from 6" x 4" hernia mesh freely available in our OT as a free of cost government supply and perform a TOT procedure to help poor women – our results are discussed herein and we propose to use this procedure by surgeons in other government hospitals also.

In 1996 Ulmensten, *et al* first introduced the placement of a retropubic mid urethral sling made up of polypropylene monofilament mesh by passing it transvaginally with a trocar following the retropubic route. That time Burch Colposuspension and the autologous rectus fascial sling procedures were the reference standards for the surgical treatment of Stress Urinary Incontinence. However, both of these operations required wider dissection of the retropubic space of Ritzeus to expose the bladder neck and hence were associated with brisk bleeding from venous plexus present within the Retropubic space. But Ulmensten's retropubic mesh-sling procedure involved minimal bleeding with the disadvantage of being blind and hence has the potential of bladder, bowel and vascular injury with a beginner hand. More than one million such procedures have been performed Worldwide with rare incidence of such serious complications and success rates reported in the range of 86% to 99%[3]". The transobturator approach of placement of a midurethral tape was 1st described by Delorme in 2001 is becoming popular day by day. Here the possibility of bowel, bladder injuries has been minimized since the sling is passed through the obturator foramen avoiding the retropubic space[1]. However, metaanalyses of small studies comparing the two procedures indicate a similar success rate and one large multicentric study with 12 months follow up after surgery comparing nearly 300 cases in each arm (Retropubic sling *versus* Transobturator sling) in 2010 reported a success rate of 80.8% in the Retropubic group *versus* 77.7% in Transobturator group (95% CL: - 3.6 to 9.6)[3]" (Fig 2).

Materials and Methods

This was a prospective study spanning one year during 2019-2020 where we have placed suburethral TOT tapes in 15 incontinent women though our original plan was to have 45 cases which had to be contracted due to COVID-19 situation. In absence of urodynamic study testing facility in our institution our basic criteria to select cases was an objectively demonstrated urinary leak during cough and valsalva in the absence of cystitis with or without a cysto-urethrocele. The confirmatory test to assign a case as urethral incontinence was a positive Bonney's test and a positive Q tip test indicating hypermobility of the urethra. Cases associated with genital prolapse with a utero-vaginal

Fig 1 — Our OT made tape and the hernia mesh

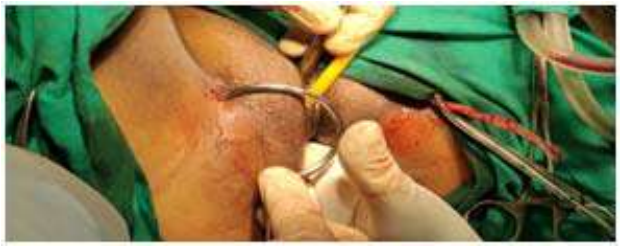


Fig 2 — Operative view of tape placement and TOT needle

descent admitted for Ward-Mayo's vaginal hysterectomy were also included for a simultaneous placement of TOT tape after vaginal hysterectomy completed and cysto-urethrocele corrected by fascial repair. A pre-designed questionnaire; urine microscopy and culture, ultrasound KUB and uterus adnexa and measurement of residual post void urine, Bonney's test ie, elevation of paraurethral tissue against the symphysis pubis and asking the woman to cough and to note the disappearance of incontinence was ascribed as a positive test; Q tip test where a sterile lubricated cotton swab was inserted well within the urethra upto the bladder neck and the woman was aked to valsalva resulting in a arc-like upward movement of the swab-stick and if the angle of excursion of the arc was more than 30^{o} that indicated a hypermobility of urethra were all that we used as a study tool. Routine pre-anaesthetic investigations were complete blood count, sugar, urea, creatinine, ECG, serology for Hepatitis B,C HIV and COVID-19 RTPCR.

We prepared the TOT tape by cutting out two strips 12cm long, 2.5cm wide from a 6 inches x 3 inches polypropylene monofilament hernia mesh and then stitching them together with a 2.5 cm double breasting in the middle by placing 6 intermittent No 1-0 vicryl sutures. The two ends of this 20cm long tape was tied with 4 cm long No1-0 vicryl tags so as to tie it to the TOT needle firmly before it is pulled out of the obturator foramen. We performed outside-in technique for TOT under spinal anaesthesia when a vaginal hysterectomy was done before TOT and under saddle block when TOT was the sole procedure. Position of the patient was lithotomy with a 14F rubber catheter within bladder. Two stab incisions made just lateral to the Labio-inguinal fold 5cm lateral, 0.5cm above the bulb of the clitoris on either side for future entry of TOT needle. The suburethral connective tissue in between vaginal mucosa and urethra was infiltrated with Normal saline-Adrenaline (1 in 2 lakhs) mixture 10 ml on either side of the urethra as a hydrodissection prior to actual operation. The suburethral vaginal mucosa was held by an Allis Tissue forceps 1cm away from the external urethral meatus and a second Allis tissue forceps was also placed 3cm proximal to the first near the bladder neck. Then with gentle outward traction on both the Allis forceps the loose suburethral vaginal mucosa was incised longitudinally for a length of 3cm; further two Allis tissue forceps placed in the middle of the incision over the vaginal mucosa to provide lateral traction to facilitate sharp dissection to separate the urethra from the vaginal mucosa and then a finger dissection with little fingers (left for the right side and vice versa) was performed to reach the inferior pubic rami on either side thus getting a rhomboid shaped field of operation exposing the urethra thanks to previous hydrodissection which ensures limited capillary and venous bleeding. Now the Metzen-Bom dissecting scissors was insanuated through the suburethral incision towards the obturator foramen the tip being directed upwards and outwards towards the skin incision. The blade of the scissors was then opened up to release the obturator fascia. The same procedure was done on the other side. The Bom scissor was then taken out. Next, the TOT needle was held over the skin incision lateral to labial fold, the tip pointing perpendicularly downwards, the handle of the needle parallel to the introitus. Then a vertical pop was exerted over the needle to puncture the obturator foramen, keeping the index finger of the left hand suburethrally towards the obturator foramen, and with the right hand grasping the handle of the needle which was gradually pushed away from the introitus and at the same time giving pressure along the curvature of the needle. The needle thus follows its curvature within the obturator foramen and the fascia covering it and at the same time the left index finger guides the tip of the needle to come out through the obturator foramen within the suburethral space, thus fully exteriorizing the needle outside the operative field. The left end of the tape was tied snuggly to the hub of the needle with the joining knots facing outside the urethra. The tape was then exteriorized through the obturator foramen on the skin incision by untwisting the TOT needle using the right hand of the surgeon. When the whole of the needle came out through the skin, the tape was grasped using an artery forceps and the knot with the hub of the needle was cut. Thus the needle was completely

released. The same procedure was performed to pass the other end of the tape suburethrally in the same plane to take it out through the obturator foramen on the right side of the patient with the left hand of the operator being the dominant hand and the right index finger guiding the tip of the needle through the right obturator foramen suburethrally. The TOT needle was then taken out by exteriorizing it along its curvature till the tape is visible outside the perineal skin beside the clitoris. Again the tape was grasped using an artery forceps and the knot with the hub of the needle was cut, thus releasing the needle. The blade of the Metzen Bom scissor was placed below the urethra but above the tape along the direction of urethra. The blades were then half-opened. The assistant, by his both hands gave counter traction on the 2 artery forceps simultaneously, so that the tape was now properly placed without kink or tension, with the joining knots placed outside the double breasting region, which lied below the urethro-vesicle junction. NOT TOO TIGHT, NOT TOO LOOSE, JUST ACCOMODATING THE HALF OPEN METZEN BOM SCISSORS. The redundant portion of the tape on both sides over the perineum below the 2 artery forceps were cut. Then the suburethral vaginal mucosa was stitched by intermittent 2-0 vicryl sutures. The skin on the perineal region was also closed without taking a bite on the tape, using single suture on both sides.

Postoperatively antibiotics and analgesics were given. Foleys catheter was omitted 48 hours after the surgery. Once the patient passed urine spontaneously she was discharged. If any residual incontinence persisted after omitting catheter, she was counselled regarding the possibility of residual incontinence which would resolve within 6 weeks once there was complete fibrosis of the mesh and also the surgery for stress incontinence aimed to give more control over the bladder. It cannot always cure the problem completely. The methodology was duly approved by our Institutional Ethics Committee.

Discussion and Results

In our study above 90% cases (14 out of 15) were multiparous; above 50% (8 out of 15) had a cystourethrocele and above 90% cases (14 out of 15) were above 40 years of age. Incidence of postoperative urinary retention after removal of catheter was one out of fifteen and persistent urinary incontinence was also one out of fifteen cases. Fourteen out of 15 cases had no urinary hesitancy after six weeks but the other with persistent incontinence developed recurrent urinary tract infection with severe burning sensation at the urethra. Her suburethral stitches gave away exposing the tape and an orange-red colour small stone was found stuck onto the suburethral mesh (Fig 3). We did a second operation under saddle block, dissected the stone from the mesh 0.5cm x 0.5cm size, we removed the suburethral portion of the mesh by dissecting it from underlying fibrotic tissue avoiding any urethral injury laterally upto the inferior pubic rami on either side. The suburethral mucosa was mobilized and stitched up using 2-0 vicryl suture. Till date the result is satisfactory though cannot be designated as a total cure (Fig 4). Different literature has shown a postoperative urinary retention of 10% and postoperative urinary tract infection of around 7% and even in a low cost setup cost of TOT operation was around Rs.4000/-[5].

So with practice the TOT operation gives encouraging results and is gradually becoming gold standard operation in SUI, the only difficult aspect being the end-point tension of the tape over the urethra which we have practiced keeping a half-opened Bom scissors beneath the tape before closing the suburethral mucosa. Theoretically a life-threatening complication of this operation is a fatal injury to obturator vessels which is always obviated by helical configuration of TOT needle and of course a knowledge of the surface anatomy of the obturator vessels. We acknowledge

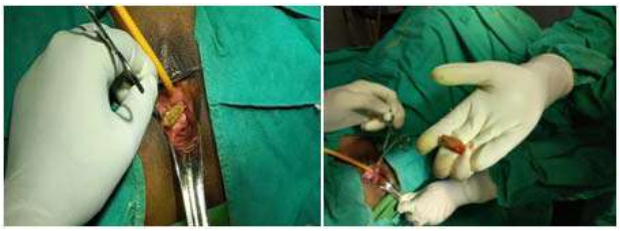


Fig 3 — Complication : Suburethral Stone

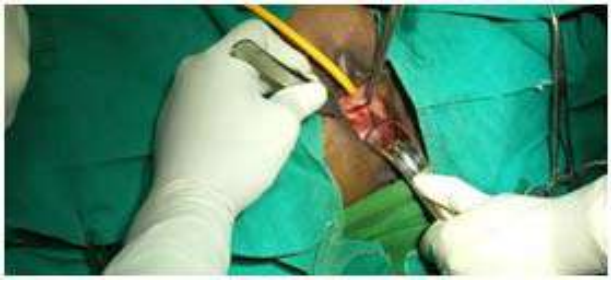


Fig 4 — After removal and repair of suburethral mucosa

that our study is rather small but we have tried to create an awareness to our colleagues in other government hospitals to practice our procedure to do free-of-cost operations for the benefit of poor women and publish their results comparing that of ours.

Conclusion

The placement of TOT in the treatment of SUI was found to be an effective procedure with complete recovery of symptoms in all patients at the end of 6 weeks postoperative.

The procedure is simple and does not require a prolonged learning curve. The technique of the operation can be adopted by a resident by attending a live workshop followed by hands on training on two cases. This is in contrast to abdominal procedures like Marshall Marchetti Krantz (MMK) and Burch colposuspension which requires a prolonged learning curve.

Abdominal procedures involve approach through the retropubic space of Retzeius, which pose an increased risk of intra-operative bleeding and bladder injury, thus making postoperative cystoscopy a must. In contrast to this, TOT involves placement of a tape suburethrally through an avascular space passing through the obturator foramen on both sides, hence posing almost no risk of intra-operative bleeding and bladder injury. Therefore, postoperative cystoscopy is not always necessary following TOT placement.

A life-threatening complication of this surgery is injury to the Obturator vessels, but the configuration of the TOT needle to surpass the obturator vessels in the obturator foramen and a good knowledge of the surface anatomy of the obturator vessels make this complication very rare.

References

1 Magon N, Kalra B — Stress Urinary Incontinence: What, When, Why and then What ? http//www.jmidlifehealth.org IP : 244, 167.193.54.

2 Kim HG, Park HK — Comparison of Effectiveness between Tension Free Vagina Tape (TVT) and Transobturator Tape (TOT) in Patients with Stress Urinary Incontinence and Intrinsic Sphincter Deficiency : PLOS ONE/DOI : 10.1371/ journal.pone.0156306 May 26, 2016.

3 Richer HE, Albo ME — New Eng.J.Med 362:22 NEJM.ORG JUNE 3, 2010. Retropubic Versus Transobturator Midurethral Slings for Stress Incontinence.

4 Novara G, Ficarra V — Tension-Free Midurethral Slings in the treatment of Female Stress Urinary Incontinence : A Systematic Review and Meta-analysis of Randomised Controlled Trials of Effectiveness : Uropean Urology, 52 (2007):663-679. doi:10.1016/j.euro.2007.06.018.

5 Khan FN, Hamid A — An Evaluation of Use of Transobturator Tape(TOT) Sling Procedure in the Current Surgical Management of Female Stress Urinary Incontinence : International Journal of Health Sciences.Vol 2;No.2,July 2008.

6 Barber MD, Kleeman S — Transobturator Tape Compared With Tension-Free Vaginal Tape for the Treatment of Stress Urinary Incontinence, A Randomised Controlled Trial. *Obstetrics and Gynecology* 2008; **III(3):** 611-21.

Original Article

Types of associated Anomalies with Ano-rectal Malformation : An Institutional Retrospective Cohort Study

Zaheer Hasan[1], Digamber Chaubey[2], Ramjee Prasad[3], Shishir Kumar[4]

Background : The study was performed to study the association of other congenital anomalies in patients of Ano-rectal Malformation (ARM) presented to our department. There is a paucity of study regarding anomalies associated with Anorectal malformation in this geographical region. The current study aimed to get an insight into the associated congenital anomalies present in patients with an ARM in this referral hospital and compare our findings with available literature.

Methodology : This was a retrospective cohort study in which all cases of Ano-rectal malformation were admitted to our Tertiary Care Centre over five years (January 2016 to December 2020) were included. Ethical clearance was obtained from the Institute's ethical committee. The statistical analysis was done by PSPP software version 20 calculating the percentage of different types of anomalies in each broad group of anomalies involving a particular system. Logistic regression analysis was done to calculate odds ratios (95% confidence interval). Comparison between groups was done using 'Perineal Fistula' as the base group.

Results : Associated anomalies were documented in a total of 200/473 (42.2%) patients and were frequent among male patients (53%) suffering from Ano-rectal malformation. Among anomalies genitourinary 15.01% and Syndromal associations (10.14%) were found to be predominant. Associated anomalies were more frequent in Cloaca (ODDS ratio 13:20) and rectovesical fistula (ODDS ratio 12:21).

Conclusion : The substantial association of anomalies related to ARM possesses challenges to its management. Associated anomalies are important as these determine the quality of life in survivors. For a satisfactory outcome, these cases should be managed in collaboration with other departments.

[*J Indian Med Assoc* 2023; **121(12):** 29-33]

***Key words* : Ano-rectal malformation, Associated anomalies, Retrospective study.**

Ano-rectal Malformation (ARM) has been a significant problem for pediatric surgeons all over the globe. Apart from the primary lesion, associated anomalies complement its morbidity and mortality as three fourth of children with ARM have other associated malformations[1]. Up to half of these cases are thought to be non-syndromic. The current understanding of normal development and pathologic variations of ARM is incomplete. However, the defect would have to occur very early in development for the malformation to happen[2]. There is a paucity of study regarding anomalies associated with an ARM in this geographical region.

Department of Pediatric Surgery, Indira Gandhi Institute of Medical Sciences, Patna, Bihar 800014

[1]MCH, Professor

[2]MCH, Associate Professor. At present : All India Institute of Medical Sciences, Patna 801507 and Corresponding Author

[3]MCH, Assistant Professor

[4]BSc (Biostatistics), Additional Professor, Department of Community Medicine, Indira Gandhi Institute of Medical Sciences, Patna, Bihar 800014

Received on : 07/12/2022

Accepted on : 08/06/2023

Editor's Comment :

- Identifying associated anomalies with Ano-rectal malformation is crucial, as they can contribute to mortality and significantly impact the quality of life for survivors.
- Genitourinary anomalies are frequently linked to Ano-rectal malformation, with penoscrotal transposition being the most prevalent within this category.
- Ano-rectal malformations typically occur sporadically.

Materials and Methods

This was a retrospective observational cohort study conducted over five years (January, 2016 to December, 2020) in which all cases of ARM admitted to our Tertiary Care Hospital were evaluated. The current study aimed to study the associated congenital anomalies present in patients with an ARM in this referral hospital and co-relate our findings with the available literature. This study was approved by the Institutional Ethics committee. Records of patients with ARM operated during this period were evaluated. ARMs were categorized according to the Krickenbeck classification. In all babies, routine blood count, babygram, prone cross-table lateral X-ray, echo-cardiography, and abdominal sonography were

performed. The chromosomal study was done in cases of apparent syndromal association. Micturating Cystourethrography (MCUG) were done in follow up cases. Medical and radiological reports of these patients were reviewed. Associated anomalies were categorized by different organ systems eg, Cardiovascular, Genito-urinary, Gastro-intestinal, vertebral and syndromal association. The statistical analysis was done using PSPP software calculating the percentage of different types of anomalies in each broad group of anomalies involving a particular system. Logistic regression analysis was done to calculate odds ratios (95% confidence interval). Comparison between groups was done using 'Perineal Fistula' as the base group as there were lot of patients and incidence of anomalies were the lowest in this group.

Results

ARM represented 28% of neonatal surgical emergencies. Records of 473 patients of ARM were available for the study. There were 336 males (71%) and 137 females (29%). The male to female ratio was 2.45:1 (Table 1). The majority of the patients had presented in the neonatal period (53.6%). Common types of ARM were Rectourethral Fistula (51.7%), Perineal Fistula (18.8 %), and followed by Rectovestibular Fistula (18.4%). The Perineal Fistula was 2.42 times more common in males than in females. Associated anomalies were documented in a total of 200/473 (42.2%) and were frequent among male patients (53%) suffering from ARM (Tables 2&3). Among anomalies, genitourinary (15.01 %) and syndrome (10.14 %) associations were found to be predominant. Cloaca (ODDS ratio 13:20) and rectovesical fistula (ODDS ratio 12:21) were found to be associated with the high percentages of anomalies (Table 4). Anomalies related to the genitourinary tract were the commonest constituting 15% in patients of ARM. Among the genitourinary anomalies' incidence of penoscrotal transposition was highest at 4.01% followed by VUR 3.1%, Vaginal anomalies 2.74%, Hypospadias 2.11%, Undescended testes 1.69% and Hydronephrosis 1.2% in the decreasing order (Table 5). Out of 15 cases of vesicoureteric reflux disease, 11 were bilateral and 4 were unilateral. We also found one case of Aphallia in a monozygotic twin which was found to be associated with atretic urinary bladder. In 13 female patients with vaginal atresia, we noticed a septate vagina in five cases, a bicornuate uterus in two cases, and two cases with Mayer- Rockitansky Kuster Hauser syndrome (MRKH syndrome). Three cases out of 16 cases of cloaca were accompanied with hydrometrocolpos. The incidence of the Gastro-intestinal Tract (GIT) related anomalies was 3.8% (18/473) in our study among them tracheoesophageal fistula 55.5% (10/18) was the commonest among GIT anomalies. It was also a component of the VACTERL association (Tables 6 & 7). Syndromal associations were reported in a total of 10.1% (48/473) patients of ARM among them VACTERL was the commonest association 37.5% (18/48) in our series. We found an unusual case of the

Table 1 — *Gender wise distribution of ARM*

ARM type	Male	Female	Percentile (%)
Perineal fistula	63	26	18.8%
Rectovestibular fistula	0	87	18.4%
Rectourethral fistula	245	0	51.79%
Rectovesical fistula	19	0	4%
No fistula	6	2	1.7%
Cloaca	0	16	3.38%
Others	3	6	1.9%
Total	336 (71%)	137 (29%)	473

Table 2 — *Associated anomalies in various types of ARM*

Type of ARM	Number	Genito-urinary	CVS	Gastro-Intestinal Tract	Vertebral	SYND
Perineal fistula	89	8	2	0	0	1
Rectovestibular fistula	87	15	6	2	7	8
Rectourethral fistula	245	25	12	6	9	17
Rectovesicalfistula	19	11	7	8	6	8
No fistula	8	1	1	0	2	5
Cloaca	16	8	4	1	6	5
Others	9	3	0	1	1	4
Total	473	71	32	18	31	48

Table 3 — Distribution of associated anomalies according to system/gender wise cross tabulation

ARM anomalies	Male	Female	Total
Cardiovascular	17	15	32
Genitourinary	41	30	71
GIT	10	8	18
Vertebral	13	18	31
Syndrome	25	23	48
Total	106(53%)	94(47%)	200

Table 4 — *Genitourinary (GUT) Associations in ARM*

GUT Anomalies	No of Patients (n=71)	Percentage(%) (15.01%)
Hydronephrosis (HDN)	6	1.2
Solitary Kidney (SK)	5	1.05
Undescended testes	8	1.69
Hypospadias	10	2.11
Penoscrotal Transposition (PST)	19	4.01
Vesicoureteric Reflux Disease (VUR)	15	3.1
Aphallia	1	0.2
Vaginal Anomalies (VA)	13	2.74

Table 5 — *Gastro-intestinal Tract (GIT) anomalies associated with ARM*

GIT	No of Patients (n=18)	Percentage(%) (3.80%)
Tracheoesohageal fistula	10	2.11
Duodenal atresia	3	0.6
Ileal atresia	2	0.4
Meckle's diverticulum	2	0.4
Malrotation with Complete Situsinversus	1	0.2

Table 6 — *Syndromes associated with ARM*

Syndrome	No of Patients (n=48)	Percentage (%)(10.14%)
Down (DS)	15	3.1
Trisomy 18	1	0.2
VACTERL	18	3.8
Currarino	11	2.3

VACTERL association in which ARM was associated with trisomy 18 and unilateral proximal focal femoral deficiency. 16/48 (33.3%) cases were found to have Down syndrome. Among them, 5 out of 15 were found to have fistulous communication with the underlying urethra. Anomalies related to CVS were found in a total of 6.7% (32/473) patients of ARM and the commonest anomaly among CVS anomalies was Atrial Septal Defect (ASD) which was 50% (16/32). Other CVS anomalies documented in ARM patients are shown in Table 8. Among the craniofacial anomalies, there were two cases of cleft lip and one female baby had bilateral choanal atresia. Among the skeletal anomalies, partial sacral agenesis 22 (71%) was common finding (Table 9).

Discussion

The incidence of ARM varies from 1 in 1,500 to 5,000 live births[3]. Ano-rectal malformations may not only represent localized lesions but may also be a part of a broader spectrum of defects that may contribute to morbidity and mortality.

The nature of these anomalies which occur in anatomic regions that develop far from the ARM itself suggests that these are more generalized defects that occur during embryonic development[4]. We found a clear male preponderance resulting in a male to female ratio of 2.45:1 which corresponds to the observations made by other authors ie, from 1.46:1 to 2.4:1[5,6]. The perineal fistula was 2.42 times more common in males than in females, which was nearly similar to the reported by Shenoy, *et al*[7]. In our study, syndrome association was common in low-birth-weight babies similar to the study by Stoll, *et al*[8]. We also found a greater association of anomalies in the patients of high ARM as per other studies[7,9]. Among them, we have found a higher incidence of genitourinary tract anomaly especially noticed in cloaca and rectovesical fistula[10] (Table 4). In our study incidence of associated anomalies was about 37.8%, which corresponds to the incidence reported in literature among other series (30-78%)[5,7,11]. Cho, *et al* in their study found associated anomalies in decreasing frequency as genitourinary anomalies (49%), musculoskeletal anomalies (43%), craniofacial anomalies (34%), cardiovascular anomalies (27%), gastrointestinal anomalies (18%), respiratory anomalies (13%) and central nervous system anomalies12%[12]. However, we encountered genitourinary (15.1%), syndromal (10.14%), cardiovascular (6.76%), vertebral (6.55%), and gastro-intestinal (3.8%) anomalies in the decreasing order respectively. Among the genitourinary system, the most common association found was penoscrotal transposition comprising of 19/71(26.7%). One case had complete transposition. Millar, *et al* reported 23 cases of penoscrotal transposition; of which seven were associated predominately with imperforate anus[13]. Apart from penoscrotal transposition, the other associated anomaly most frequently encountered were vesicoureteric reflux (15), vaginal anomalies (13), hypospadias (10), undescended testes (8) and hydronephrosis (6) in the decreasing order. Studies have also documented a decreasing incidence of genitourinary abnormalities with diminishing complexity of the ARM, which also coincides with the present study in which the perineal fistula group had the lowest incidence of genitourinary anomalies with the highest incidence seen in the cloaca (OR,6.07 95% CI,1.74-21.1) and rectovesical fistula group (OR,5.90 95% CI,1.81-19.2). In the CVS system, the commonest association was atrial septal defect followed by a ventricular septal defect and patent ductusarteriosus. The tracheoesophageal fistula was the common gastrointestinal tract anomaly (1.7%) detected, which

Table 7 — *CVS Association in ARM*

CVS Anomalies	No of Patients (n= 32)	Percentage (%)(6.76%)
ASD	16	3.38
VSD	8	1.6
PDA	3	0.6
Teratology of fallot	1	0.2
Dextrocardia	2	0.4
Perinealhemangioma	2	0.4

Table 8 — *Vertebral anomalies associated with ARM*

Vertebral	No of patients (n=31)	Percentage (%)(6.55%)
Sacral agenesis	22	71%
Fusional anomaly	9	29 %

was consistent with other studies[12]. A VACTERL association was considered only when three of the possible seven criteria were acknowledged[14]. VACTERL association was the most frequent syndrome association seen in 3.8% of patients; other investigators reported 5-15% in their respective studies[5,12]. We did not find a single case with all components of the VACTERL association in our study. Aphallia is a very rare congenital anomaly and associated with guarded prognosis. We have found one case of Aphallia which was associated with atretic urinary bladder in a monozygotic twin pregnancy. Colostomy was done, atretic urinary bladder was exteriorsed. However, we tried to delineate the upper urinary tract but we could not find ureter and kidneys. Unfortunately, patient was succumbed in the post-operative period due to renal failure. Proximal Femoral Focal Deficiency (PFFD) is a rare congenital malformation, associated with shortening and altered function of the involved lower extremity. We found an unusual case of the VACTERL association in which ARM was associated with trisomy 18 and unilateral proximal focal femoral deficiency. Down syndrome was the second most common chromosomal anomaly which was present in 3.1% of the cohort and similar to the 2 to 9% observed by other authors[15,16]. Sacral mal-development in association with ARM appears important in terms of postoperative function. We noticed 6.5% of vertebral anomalies mostly partial sacral agenesis as apparent on the spinal radiograph. The Currarino triad which links sacral agenesis with ARM that includes a presacral mass, partial sacral agenesis and anorectal defect. Carson, *et al* observed that the children with coexisting anorectal and sacral anomalies have a surprisingly higher incidence of unsuspected and correctable spinal cord lesions[17] therefore; they suggested MRI evaluation for timely intervention if needed. We noticed thirteen patients with vaginal anomalies with two having MRKH syndrome. Levitt, *et al* recommend a thorough investigation and treatment of these anomalies before they get symptomatic as a significant number of these patients have some form of atresia that may someday obstruct the drainage of menstrual blood and provoke serious problems in adolescence[18]. Despite reports of familial associations by authors[19] we did find only one case of twin baby in which both babies were suffering from ARM (one had a perineal fistula and another had high recto vestibular fistula suggesting that there is an insignificant role of hereditary transmission in ARM, hence the occurrence of ARM was mostly sporadic. Also, we noticed a high percentile of syndromal association which probably reflects the genetic association of ARM as corroborated by studies by other authors[20,21]. However, the present study was retrospective and the results were hospital-based which made it is not representative of the population and is a true limitation of this study. The reason why we used the perineal fistula patients as the base group was that there were lot of patients and incidence of associated anomaly was the lowest in this group.

Conclusion

The substantial association of anomalies related to ARM poses challenges to its management and also requires regular follow-up. Associated anomalies are important as these are not uncommon causes of death but also often determine the quality of life in survivors. For a satisfactory outcome, these cases should be managed in collaboration with other departments.

References

1 Moore SW — Associations of anorectal malformations and related syndrome. *Paediatr Surg Int* 2013; **29(7):** 665-76.doi: 10.1007/s00383-013-3306-8

2 Kluth D, Hillen M, Lambrecht W — The principles of normal and abnormal hindgut development. *J Paediatr Surg* 1995; **30(8):** 1143-7.doi: doi.org/10.1016/0022-3468 (95)90007-1

3 Levitt MA, Pena A — Imperforate anus and cloacal malformations. In: Holcomb GW III, Murphy JP, editors. Ashcraft's Paediatr Surgery. 5th ed. Philadelphia, PA: Saunders Elsevier; 2010. pp. 468-90.

4 Ratan SK, Rattan KN, Pandey RM, Mittal A, Magu S, Sodhi PK — Associated congenital anomalies in patients with anorectal malformations–a need for developing a uniform practical approach. *J Paediatr Surg* 2004; **39(11):** 1706-11. doi: 10.1016/j.jpedsurg.2004.07.019

5 Nah SA, Ong CCP, Lakshmi NK, Yap T-L, Jacobsen AS, Low Y — Anomalies associated with anorectal malformations according to the Krickenbeck anatomical classification. *J Paed Surg* 2012; **47(12):** 2273-8. doi: 10.1016/j.jpedsurg.2012.09.017

6 Endo M, Hayashi A, Ishihara M, Maie M, Nagasaki A, Nishi T, *et al* — Analysis of 1992 patients with anorectal malformations over the past two decades in Japan. The steering committee of a Japanese study group of anorectal anomalies. *J Paed Surg* 1999; **34(3):** 435-41.doi: 10.1016/s0022-3468(99)90494-3.

7 Shenoy NS, Kumbhar V, Basu KS, Biswas SK, Shenoy Y, Sharma CT — Associated anomalies with anorectal malformations in the Eastern Indian population. *Journal of Pediatricand Neonatal Individualized Medicine (JPNIM)* 2019 Aug 12; **8(2):** e080214. doi: 10.7363/080214

8 Stoll C, Alembik Y, Dott B, Roth MP — Associated malformations in patients with anorectal anomalies. *Eur J Med Genet* 2007; **50(4):** 281-90. doi: 10.1016/j.ejmg.2007.04.002

9 Leonor A — Anorectal malformations: finding the pathway out of the labyrinth. *Radiographics* 2013; **33.2:** 491-512. doi: 10.1148/rg.332125046

10 Pena A — Advances in the management of fecal incontinence secondary to anorectal malformations. *Surg Annu* 1990; **22:** 143-67.
11 Kumar A, Agarwala S, Srinivas M, Bajpai M, Bhatnagar V, Gupta DK, *et al* — Anorectal malformations and their impact on survival. *Indian J Pediatr* 2005; **72:** 1039-42.doi: 10.1007/BF02724407
12 Cho S, Moore SP, Fangman T — One hundred three consecutive patients with anorectal malformations and their associated anomalies. *Arch Pediatr Adolesc Med* 2001; **155(5):** 587-91. doi: 10.1001/arch pedi.155.5.587
13 Miller SF— Transposition of external genitalia associated with the syndrome of caudal regression. *J Urol* 1972; **108:** 818. doi: 10.1016/s0022-5347(17)60878-4
14 Wheeler PG, Weaver DD — Adults with VATER association: long-term prognosis. *Am J Hum Genet* 2005; **138(3):** 212-7. doi: 10.1002/ajmg.a.30938
15 Cuschieri A — EUROCAT Working Group. Anorectal anomalies are associated with or as part of other anomalies. *Am J Med Genet* 2002; **110(2):** 122- 130.doi.org/10.1002/ajmg.10371
16 Chen C-J — The treatment of imperforate anus: experience with 108 patients. *J Paed Surg* 1999; **34(11):** 1728-32.doi.org/10.1016/S0022-3468 (99)90655-3
17 Carson JA, Barnes PD, Tunell WP, Smith I, Jolley SC — Imperforate anus: the neurologic implication of sacral abnormalities. *J Paediatr Surg* 1984; **19(6):** 838-41.doi.org/10.1016/S0022-3468 (84)80380-2
18 Levitt MA, Stein DM, Pen¯a A — Gynecologic concerns in the treatment of teenagers with cloaca. *J Paediatr Surg* 1998; **33(2):** 188-93. doi.org/10.1016/S0022-3468 (98)90429-8
19 Boocock GR, Donnai D — Anorectal malformations: familial aspects and associated anomalies. *Arch Dis Child* 1987; **62(6):** 576-9. doi: 10.1136/adc.62.6.576
20 Towe PL, Brock — Hereditary syndrome of imperforate anus with hand foot and ear anomalies. **J Paediatr** 1972; **81(2):** 321-6. doi.org/10.1016/S0022-3476 (72)80302-0
21 Haynes JH, Bagwell CE — Hirschprung's disease and imperforate anus in Pallister-Hall syndrome. A new association. *J Paediatr Surg* 2003; **38(9):** 141. doi: 10.1016/s0022-3468(03)00411-1.

Original Article

Clinical and Ultrasonographic Assessment and Analysis of Liver Span in Children

Keertana Vajrapu[1], Mathivanan Malaisamy[2], Shriram T[3], Vasanth Krishna Chalasani[4]

Background : Liver is one of the major organs in human body, tangled with over 500 physiological-functions relevant to metabolism-digestion-immunity, which are necessary for the sustenance of life. Liver-measurement is vital for suspicion of hepatic diseases in children. The clinical assessment of liver-size by estimating liver-span, is a more reliable-index than palpation just below costal margin. Liver-size can be accurately measured using ultrasonography.

Objective : To assess and compare the normative liver-span in children of various age groups clinically and by ultrasound and their correlation with gender, height, and weight.

Materials and Methods : The study was taken up in the Paediatrics-Department of Aarupadai Veedu medical college and hospital. A total of 510 children varying 2-12 years attending the Paediatric-outpatient-department were taken for the study. After obtaining consent and demographic details, clinical-assessment & radiological-assessment were done and categorised based on age, gender, weight and height. Data was tabulated, analysed using SSPS-version-28.

Results : The study consisted of 272 boys, 238 girls. Among the 510 subjects, Children were categorised based on age and gender distribution. The mean clinical liver-span in boys and girls was found to be 8.6 & 8.9 respectively with a difference of 3% between the genders. The ultrasonic assessment of liver-span was found to be 8.7- boys, 8.4- girls, with a difference of 4%. On comparison of Clinical and Ultrasonographic of Liver-span of both boys and girls association were noted which was statistically significant. Statistical data proved that, clinical liver-span and ultrasonic liver-span in males & females was found to be statistically correlated with r-value 1 and p-value 0.00001 and r-value of 0.99 and p-value of 0.00001 respectively.

Conclusion : It is observed that, liver-span increases with age and there was significant correlation with age, weight, height with liver-span. We could find an accurate clinical-assessment of liver-span that is 98% similar to values of ultrasonic-assessment.

[*J Indian Med Assoc* 2023; **121(12):** 34-6]

***Key words* : Liver-span, Clinical assessment, Ultrasonic assessment.**

Liver size measurement is vital for the suspicion of hepatic diseases. The clinical assessment of liver size by estimating liver span is a more reliable index than palpation just below the costal margin[1]. A significant, distinct edge on the liver does not necessarily indicate that the organ is enlarged. The liver span must be measured to assess whether the liver is more significant than usual[2]. A more reliable indicator is liver span. An enlarged firm liver is indicative of neoplasia and storage illness. An inflammatory condition may be indicated by enlarged liver tenderness. Hepatomegaly can also result from cystic liver disease[3].

The size of the liver can be accurately and consistently measured using ultrasonography. Since sonography has various advantages without exposing patients to radiation, it is frequently used to examine children's visceral organs. During the examination, repeated sonography is non-invasive, quick, safe, and accurate method[4].

Editor's Comment :

- On comparison of Clinical and Ultrasonographic assessment of Liver span in both boys and girls were noted statistically significant. Hence, We may proceed to diagnose preventable causes of hepatomegaly and initiate early intervention in patients with clinically assessed liver span in less equiped areas, isolated rural places, low socio-economic areas for a better outcome.

Very few studies were conducted in the past to assess the liver size clinically as well as radiologically among Paediatric age group. Thus, this study was aimed to compare the clinical and ultrasound assessments of liver span in among Paediatric population and their correlations with gender, age, height, and weight and to assess the normal liver span in children.

Material and Methods

Five hundred and ten children of age group 2-12 years were recruited from the Paediatric Out Patient Department of Aarupadai Veedu Medical College, Puducherry from December 2020 to October 2022 along with their siblings who attended the OPD.

Children with fever of any cause, any systemic illnesses such as cardiovascular, respiratory, neurological and abdominal problems and significant

Department of Paediatrics, Aarupadai Veedu Medical College and Hospital, Puducherry 607402.
[1]MD, Postgraduate Trainee and Corresponding Author
[2]MBBS, MD, DCH, Professor and Head
[3]MBBS, MD, Associate Professor, Department of Radiodiagnosis
[4]MBBS, MD, Postgraduate Trainee

Received on : 12/03/2023
Accepted on : 10/04/2023

disease in the recent past were excludedfrom the study. The total sample size calculated was 500 with a 95% confidence interval and 80% power with non-response rate=10% recruited using convenience sampling technique.

A written informed consent was obtained from the mother, along with the explanation of the method and procedures. Sex, age, height and weight of the children were noted were further clinically examined by palpation and percussion method. The liver size was measured with the child in the supine position,their midclavicular point was located and a vertical line was drawn between this and the mid inguinal point, denoted as the Midclavicular Line (MCL). The reference point for all clinical and sonographic measurements is MCL.

The sonographic examinations were performed with a high-resolution real-time scanner with 3.5-MHz convex transducers with the children in the supine position.

The Correlation between the clinical and ultrasound liver span measurements were studied using Pearson's correlation.The correlation of liver span with age was derived from spearman's correlation. The mean and SD of the liver span of both sexes were obtained individually, and the p-value was calculated.

The mean clinical liver span, ultrasound liver span, and 95th percentiles of various age groups were tabulated.

The collected data were coded, entered into a Microsoft Excel worksheet, exported and were analysed using SPSS version 21. Data was presented in percentage categories and then represented using tables and graphs. Pearson's test for correlation was used as a test of significance.

Results

The mean clinical liver span in males was found to be 8.6, the mean clinical liver span in females was found to be 8.9, and the difference was found to be 3% between the genders (Tables 1&2).

The ultrasonic assessment of liver span was found to be 8.7 in Males and 8.4 in Females with a difference of 4% (Tables 3,4 & 5).

The Pearson coefficient was calculated between the mean values of liver span assessed clinically and ultrasonically, and the values are tabulated below (Table 6).

Table 1 — *Mean Clinical Liver Span in Males and Females according to Age and Sex*

Age in years	Male	Standard Deviation	Female	Standard deviation
2	6.3	0.52	6.4	0.45
3	7.3	0.48	7.4	0.59
4	7.4	0.49	7.4	0.59
5	7.5	0.5	7.8	0.6
6	8.8	0.61	8.3	0.53
7	8.7	0.6	8.7	0.64
8	9	0.57	8.9	0.69
9	9.5	0.81	9.6	0.83
10	9.8	0.83	9.9	0.86
11	10.4	0.91	10.7	0.93
12	11	0.98	11.3	0.99

Table 2 — *Mean Ultrasonic Liver Span in Males and Females according to Age and Sex*

Age	Male	Standard Deviation	Female	Standard deviation
2	6.3	0.69	6.4	0.45
3	7.3	0.54	7.4	0.59
4	7.4	0.55	7.6	0.61
5	7.5	0.56	7.7	0.62
6	8.8	0.63	8.9	0.7
7	8.7	0.64	9	0.54
8	9	0.56	9.2	0.6
9	9.5	0.82	9.6	0.78
10	9.8	0.84	9.9	0.88
11	10.4	0.92	10.7	0.96
12	11	0.97	11.3	0.99

Table 3 — *Correlation between Clinically assessed liver span and ultrasound size, age, height and weight*

Correlation	correlation	P value	95% Confidence interval
Liver span *Vs* Ultrasound	0.981	<0.001*	0.997-0.984
Liver span *Vs* age	0.869	<0.001*	0.846-0.889
Liver span *Vs* height	0.894	<0.001*	0.875-0.910
Liver span *Vs* weight	0.791	<0.001*	0.756-0.821

*Statistically significant at a 5% level of significance

Table 4 — *Comparison of Clinical and Ultrasonic Liver span in male and female*

Age	Clinical Liver Span in Male	Clinical Liver Span in Female	Ultrasonic Liver Span in Male	Ultrasonic Liver Span in Female
2	6.3	6.4	6.3	6.4
3	7.3	7.4	7.3	7.4
4	7.4	7.4	7.4	7.6
5	7.5	7.8	7.5	7.7
6	8.8	8.3	8.8	8.9
7	8.7	8.7	8.7	9
8	9	8.9	9	9.2
9	9.5	9.6	9.5	9.6
10	9.8	9.9	9.8	9.9
11	10.4	10.7	10.4	10.7
12	11	11.3	11	11.3

Discussion

Clinical measurements of liver size are obtained by palpating the lower portion of the liver. Children's liverincreases at a tremendous rate, making it essential to correctly measure liver size. A more accurate method to describe liver size is liver span[5]. The liver is anatomically situated below the diaphragm in the right upper quadrant of the abdomen. However, pleural effusion or tympany in the right upper abdomen might occasionally cause the size of the liver to be overestimated[6]. Ultrasound measurement of liver size is an important imaging procedure since it is simple to get a real-time image without the need of anaesthetic or other ionising radiations[7].

Table 5 — *Comparison of Clinical assessment, Ultrasonic assessment of Liver span and gender*

Sex	N	Mean	Standard Deviation	T value	P value
Clinical - Liver span :					
Male	272	8.6	1.5	2.267	0.012*
Female	238	8.9	1.3		
Ultrasonic - Liver span :					
Male	272	8.7	1.6	2.225	0.011*
Female	238	9	1.42		

Table 6 — *Correlation between the clinical and ultrasonic liver span of male, Female*

Assessment	Pearson correlation value 'r'	P value
Clinical Liver Span in Male Ultrasonic Liver Span in Male	1	0.00*
Clinical Liver Span in Female Ultrasonic Liver Span in Female	0.99	0.00*

The study by Patzak, *et al*, states that mean liver size was found to be 15.1 in males and 14.9 in females[8]. Another study by Kratzer, *et al*, stated that mean liver size was found to be 130 mm. Ozmen, *et al*, found that mean liver size in males was found to be 150 mm, 147 mm in males and 147 mm and 149 mm in females[9,10]. In our study, the mean clinical assessment of liver span was found to be 8.6 cm in males and 8.9 cm in females, whereas the ultrasonic assessment of liver was found to be 8.7 cm in males and 9 in females.The difference was found to be 3% in clinical assessment and 2% in ultrasonic assessment. According to Gupta, *et al*, clinical assessment often lacks accuracy and reliability. But in our study, we could find an accurate clinical assessment of liver span that is 98% similar to the values of ultrasonic assessment[11,12].

In the current study, the mean clinical assessment of liver span was found to be 8.6 cm in males and 8.9 cm in females, whereas the ultrasonic assessment of liver was found to be 8.7 cm in males and 9 in females[11]. The difference was found to be 3% in clinical assessment and 2% in ultrasonic assessment. As per the literature, clinical assessment often lacks accuracy and reliability. But in our study, we could find an accurate clinical assessment of liver span that is 98% similar to the values of ultrasonic assessment[12].

Other study reports by Konus, *et al* and Rocha, *et al* proved that ultrasonic liver size assessment was best correlated with height.[13,14]. In our study, liver span by clinical and ultrasonic assessment was correlated with all the variables like age, sex, weight and height.

From the study results, it was noted that there is a good correlation between clinical and ultrasonic assessment of liver span in males and females. The statistical data proved that, clinical liver span and ultrasonic liver span in male was found to be statistically correlated with r value 1 and p value 0.00001 which is significant at 5%. From the results, it was also concluded that the clinical and ultrasonic assessment of liver span in females was found to be correlated with an r value of 0.99 and p value of 0.00001, which is significant at 5%.

The study results were well correlated with the study of Chen CM, *et al*, who stated that clinical and ultrasonic assessments in the Chinese population was well correlated when measured by these two methods[15].

The study results also showed that, the liver span increases with age and there was significant correlation between age and liver span by ultrasound. Further there was significant correlation between the increased size of liver and the height. It was also found that there was a significant correlation between the liver size and the weight of the children.

References

1 Furman D, Campisi J, Verdin E, Carrera-Bastos P, Targ S, Franceschi C, *et al* — Chronic inflammation in the etiology of disease across the life span. *Nature Medicine* 2019; **25(12):** 1822-32.

2 Kuntz E, Kuntz HD — Biochemistry and functions of the liver. Hepatology Textbook and Atlas: History· Morphology Biochemistry· Diagnostics Clinic. *Therapy* 2008; **3:** 35-76.

3 Kreskas F — Sonography Principles and Instruments. 8th ed. St Louis, MO, Saunders Elsevier, 2011

4 Orenstein BW— Ultrasound history. *Radiol Today* 2008; **9(24):** 28-32.

5 Jan MM — Neurological examination of difficult and poorly cooperative children. *Journal of Child Neurology* 2007; **22(10):** 1209-13.

6 Jany B, Welte T — Pleural effusion in adults—etiology, diagnosis, and treatment. *DeutschesÄrzteblatt International* 2019; **116(21):** 377.

7 Riestra-Candelaria BL, Rodríguez-Mojica W, Vázquez-Quiñones LE, Jorge JC — Ultrasound accuracy of liver length measurement with cadaveric specimens. *Journal of Diagnostic Medical Sonography* 2016; **32(1):** 12-9.

8 Patzak M, Porzner M, Oeztuerk S — Assessment of liver size by ultrasonography: Sonographic liver size. *J Clin Ultrasound* 2014; **42(7):** 399-404.

9 Ahmad Z A-M, Stojanovic S — Measurement of liver size and factors affecting it by using CT or ultrasonography. *Int J Ad Res* 2016; **4:** 1543-8.

10 Özmen Z, Aktaº F, Özmen ZC, Almus E, Demir O — Ultrasound measurement of liver longitudinal length in a North Anatolian population: A community-based study. *Niger J Clin Pract* 2018; **21(5):** 653-7.

11 Gupta K, Dhawan A, Abel C, Talley N, Attia J — A re-evaluation of the scratch test for locating the liver edge. *BMC Gastroenterol* 2013; **13(1):** 1-6.

12 Reuben A — Examination of the abdomen. *Clin Liver Dis (Hoboken)* 2016; **7:** 143-50.

13 Konus OL, Ozdemir A, Akkaya A, Erbas G, Celik H, Isik SA — Normal liver, spleen, and kidney dimensions in neonates, infants, and children: evaluation with sonography. *American Journal of Roentgenology* 1998; **171(6):** 1693-8.

14 Rocha SM, Ferrer AP, Oliveira IR, Widman A, Chammas MC, Oliveira LA, *et al* — Sonographic determination of liver size in healthy newborns, infants and children under 7 years of age. *Radiologia Brasileira* 2009; **42:** 7-13.

15 Calle-Toro JS, Back SJ, Viteri B, Andronikou S, Kaplan SL — Liver, Spleen, and Kidney Size in Children as Measured by Ultrasound: A Systematic Review. *J Ultrasound Med* 2020; **39(2):** 223-30.

Original Article

A Study on Restless Legs Syndrome in Patients with Chronic Kidney Disease in a Tertiary Care Hospital

Subhajit Das[1], Nandini Chatterjee[2], Anupam Mandal[3], Pradip Kumar Datta[4]

Background : The prevalence of Restless Legs Syndrome (RLS), a common neurological disorder, is higher in subjects with Chronic Kidney Disease (CKD) than general population. In general population, the prevalence of RLS ranges from 3% to 9%, depending upon age and gender but the prevalence of RLS in ESRD characterized as permanent loss of renal function requiring Renal Replacement Therapy or Dialysis, is 6.6% to 70%, which is much higher than general population. RLS in CKD patients has been variably reported to be associated with socio-demographic and metabolic variables though the results are very inconsistent.

Methodology : Single centre cross-sectional study to be done in IPGME&R and SSKM Hospital, Kolkata of all the Indoor and Outdoor patients with Chronic Kidney Disease between February, 2021 to October, 2022. Patients with Chronic Kidney Disease will be evaluated in terms of anthropometric data, clinical presentation, biochemical analysis, abdominal radiography and questionnaire regarding Restless Leg Syndrome (RLS).

Results : A total 100 patients were taken among which four male and seven female were having RLS leading to a prevalence of RLS of 11%. Statistical significance were present with CKD duration (p=0.006), Hemodialysis duration (p=0.014), Blood Urea Nitrogen (p=0.017), Serum Iron (p=0.03), Serum Vitamin D (p=0.003).

Conclusion : Restless Legs Syndrome (RLS), is a sensorimotor disorder with a profound impact on sleep and Quality of Life. The incidence of Restless Legs Syndrome is 11% among CKD patients based on this study among the Eastern Indian population with female to male ratio 7:4. CKD duration, Hemodialysis Duration, Blood Urea Nitrogen, Serum Iron, Vitamin D level has been found to be associated with development of RLS among CKD patients.

[*J Indian Med Assoc* 2023; **121(12):** 37-40]

***Key words* : Restless Legs Syndrome (RLS), Chronic Kidney Disease (CKD).**

Restless Leg Syndrome (RLS) is a common neurological disorder, which can be primary or, associated other conditions. RLS symptoms are characterized by the uncomfortable or abnormal sensations inside the legs or arms associated with on urge to move the limbs. The symptoms usually occur at rest and at night and can be temporarily relieved by movement. RLS has an adverse impact on the Quality of Life (QoL) and can be associated with mood disorders such as anxiety and depression[1].

In general population, the prevalence of RLS ranges from 3% to 9%, depending upon age and gender[2]. However, the prevalence of RLS in ESRD characterized as permanent loss of renal function requiring Renal Replacement Therapy or Dialysis, is 6.6% to 70%, which is much higher than general population[3].

RLS in CKD patients has been variably reported to be associated with female gender, duration of dialysis, diabetes mellitus, iron deficiency anemia, parathyroid hormone, increased body mass index and increased homocysteine level. However, results are very inconsistent.

The occurrence of RLS among CKD patients impairs QoL compared with CKD patients without RLS possibly due to poor sleep quality, insomnia, depression. As of now only one Indian study is done among North Indian population by Bhoumick *et al*[7] therefore, further studies are needed to determine the prevalence, risk factors and impact of RLS in CKD patients, particularly among the Eastern Indian population.

Editor's Comment :

- Restless legs syndrome (RLS), is a sensorimotor disorder with a profound impact on sleep and Quality of Life.
- CKD duration, hemodialysis duration, blood urea nitrogen, serum iron, vitamin D level has been found to be associated with development of RLS among CKD patients.

Department of Medicine, IPGME&R and SSKM Hospital, Kolkata 700020

[1]MD (Gen Med), Senior Resident and Corresponding Author

[2]MD, FRCP (Glasgow), FICP, Professor

[3]MD (Gen Med), Associate Professor

[4]MD (Gen Med), Professor, Department of General Medicine, Medical College, Kolkata 700073

Received on : 04/11/2023

Accepted on : 28/11/2023

Aims and Objectives

(1) To determine the prevalence of RLS among CKD patients.

(2) To investigate possible relationship between Restless Legs Syndrome and Socio-demographic and Metabolic parameters amongst Chronic Kidney Disease.

Materials and Methods

Study Subjects : All CKD patients attending Indoor and Outdoor Department of Internal Medicine in a Tertiary Care Hospital of Kolkata for a duration of 18 months were approached for our study. Patients will be excluded when (i) they are below 18 years of age, (ii)fails to give informed consent , (iii) who presented with uraemic encephalopathy and (iv) unable to give proper history and symptoms. The protocol was approved by the Institutional Ethics Committee and written informed consent were obtained.

Study Design : A single centre cross-sectional observational study was conducted. All the patients diagnosed with RLS met the criteria laid by IRLSSG which includes (I) A desire to move the limbs often associated with paraesthesia or dysaesthesia, (II) Symptoms that are worse or present only during rest and are partially or temporarily relieved by activity, (III) Motor restlessness and (IV) Nocturnal worsening of symptoms.

The demographic variables included Age, Gender, Height, Weight, BMI, History was taken regarding, CKD duration, Dialysis duration. Laboratory investigations were done which included Hemoglobin, BUN, Creatinine, eGFR, Iron, TIBC, Ferritin, FBS, HbA1c, Calcium, Phosphate, Vitamin D, iPTH (Table 1).

Table 1 — *Demographic variables*

Parameters	Values
Age (year)	51.58±14.64
Sex (Male:Female)	54:46
Height (cm)	159.6±8.55
Weight (kg)	63.68±8.82
BMI	25.02±1.75

Statistical Analysis : The data were analysed via SPSS version 27.0 (SPSS Inc., Chicago IL, USA). T test was used for continuous variables and Chi Square test was used categorical variables. The continuous data are presented as mean and Standard Deviation (SD) (normal distribution). P<0.05 was considered statistically significant.

Results

The data of 100 patients were analysed in our study . There were 54 males (54%) and 46 females (46%). The mean age was 51.58±14.64. There were 11 patients who had RLS according to IRLSSG diagnostic criteria out of which 4 were male and 7 were female. Demographic data and routine laboratory blood test data are summarised in Table 2 and Table 3 . According to T test, CKD duration (P=0.006), dialysis duration (P=0.014) was found to be statistically significant and may be a risk factor in developing RLS.

Among the laboratory data, BUN was significantly higher (Mean = 56.61 in RLS- group *versus* Mean = 71.81 in RLS+ group, P=0.017) and serum iron (Mean = 46.97 in RLS- group *versus* Mean = 35.82 in RLS+ group, P=0.03) , Vitamin D level (Mean = 34.33 in RLS- group *versus* Mean = 23.01 in RLS+ group, P=0.003) was significantly lower in RLS positive individuals compared to those who did not developed RLS. Age, sex, height, weight, BMI, serum calcium, phosphate, fasting blood sugar, TIBC, ferritin, HbA1c, hemoglobin level shows no relationship with RLS (P>0.05).

Discussion

Restless Legs Syndrome (RLS), a Sensorimotor Disorder with a profound impact on sleep has been

Table 2 — *The demographic data of the CKD patients with and without RLS*

Variables	RLS -	RLS +	P value
Age	53.17±14.38	45.45±10.86	0.09
Sex	50 males, 39 females	4 males, 7 females	0.213
Height	158.10±8.58	159.64±8.69	0.846
Weight	63.92±8.83	61.64±8.5	0.419
BMI	25.13±1.69	24.12±2.00	0.071
CKD duration	8.59±13.24	21.89±24.92	0.006*
Dialysis duration	1.84±2.9	4,18±3.21	0.014*

*P<0.05 is statistically significant

Table 3 — *The laboratory data of the CKD patients with and without RLS*

Variables	RLS -	RLS +	P value
BUN	56.61±20.82	71.81±39.59	0.017*
Creatinine	6.82±4.72	7.81±6.62	0.336
eGFR	18.15±17.00	13.26±10.72	0.358
Hemoglobin	7.71±1.74	7.69±0.97	0.435
Iron	46.97±16.54	35.82±7.92	0.03*
TIBC	164.31±95.27	221.73±38.80	0.052
Ferritin	349.08±539.32	420.83±483.64	0.677
FBS	82.84±22.82	89.36±25.01	0.378
HbA1C	6.53±0.83	6.03±0.89	0.062
Calcium	9.07±0.77	8.89±0.51	0.446
Phosphate	5.34±1.69	6.00±1.91	0.237
Vitamin D	34.33±12.02	23.01±6.39	0.003*
iPTH	184.63±84.06	238.70±165.88	0.087

*P<0.05 is statistically significant

called the "most common disorder that you have never heard of". Patients with CKD have a higher prevalence of RLS compared with the general population, although it often is under-recognized in this patient population. Symptoms of RLS in these patients may increase or exacerbate the presence of sleep disorders, negatively affect Quality of Life (QoL), may result in a higher rate of dialysis discontinuations, and may have serious adverse effects on other disease outcomes, in particular cardiovascular health. Present in 85% to 95% of patients with RLS, PLMS may affect normal nocturnal hemodynamics, leading to increases in hypertension and CVD and changes in cardiac structure.

Although prevalence studies indicate that up to 12% of Caucasian population have RLS, many physicians lack the awareness of the disorder, impeding patients ability to obtain relief from the dysaesthesia and compelling urge to move, that characterize RLS.

Out of the study population of 100 patients with CKD , 11 had diagnostic features of RLS, amounting to a frequency of 11%.

Previous study by Collado-Seido, *et al*[4] shows prevalence of RLS to be 17% among patients with ESRD. It was found to be 62% by Hui D, *et al*[5] among Chinese populations, 14.8% by Gilberto, *et al*[6] among Brazillian population, 6.6 % by Bhoumick, *et al*[7] among North Indian populations, 22.96% by Nikic, *et al*[8] among Serbian population, 22% by Gigli, *et al*[9] among Italian population. It may therefore be that the frequency of RLS closely correlates with race, being rare amongst Africans and Asians (0.1 to 5 percent) as already reported by Chaundhuri[10] and more common amongst people of Northern European descent.

The mean age of CKD patients with and without RLS was 45.45± 10.86 and 53.17± 14.38, corroborates the observation of Salako that most ESRD patients are young adults; compared to the developed nations were CKD mostly affects senior citizens however no statistical significance is present of RLS with age.

Although males and females are generally believed to be equally affected by RLS, Berger[11],showed that RLS affects women more frequently than men however, Wilkelman[12] did not find any association between RLS score and age or sex in patients with CRF. Gilberto thought that unlike primary RLS, it seems age and gender were not important factors for the development of RLS in chronic renal failure subjects. This study found four males and seven females with RLS; this appears to support Berger's finding which may be due to prevalence of iron deficiency anemia among the females, however, no statistical significance was present.

Among other parameters measured it was found that CKD duration, dialysis duration to be statistically significant with mean duration of CKD patients with and without RLS to be 21.89 months and 8.59 months respectively and dialysis duration of patients with and without RLS being 4.18 and 1.84 months respectively

Serum iron level, an important factor in the etiopathogenesis of RLS was also found to be statistically significant with mean being 35.82±7.92 and 46.97±16.54 among patients with and without RLS respectively. Serum Vitamin D level, Blood Urea Nitrogen (BUN) level was also been found to be statistically significant (P value <0.005) associated with RLS.

Although, RLS was much more commonly associated with low eGFR and high Creatinine level, no significant statistical association was found.

In contrast to some previous literatures, no significant association between Diabetes Mellitus type 2 and RLS among CKD patients was found. It is not clear whether diabetes mellitus itself or diabetic peripheral neuropathy is the dominant risk factor. Some other studies found that there are no correlationship between Diabetes Mellitus and the occurrence of RLS however a multicenter study in Taiwan shows that having Type 2 Diabates Mellitus is associated with RLS.

In this study no statistical difference of BMI between CKD patients with RLS and those without RLS was found , which was similar to some previous literature but some indicated that increasing BMI led to significantly higher odds of developing RLS both in patients with CKD and general population.

Also in this setting no difference between two groups regarding Parathyroid hormone was found. Previous studies show mixed results with one found PTH levels to be lower in CKD patients with RLS than those without RLS contrary to a recent one that indicated PTH was a independent risk factor , which was supported by the finding that Parathyroidectomy improved RLS in the CKD patients. Therefore, further large studies are needed to clarify the relationship between PTH and RLS in CKD patients.

The mean serum calcium, phosphate, ferritin, hemoglobin of CKD patients with and without RLS did

not show any significant difference, so also did the height, weight of both groups not show statistically significant difference.

RLS can be treated in patients with CKD; non-pharmacologic and pharmacologic methods can reduce symptoms and the burden of the disorder. Because of the potentially significant consequences RLS/PLMS may have on patients with CKD, health care providers treating these patients should identify the symptoms of RLS. There also is a need for more studies that can identify appropriate treatments that will reduce the symptoms of RLS/PLMS and improve clinical outcomes in patients with renal disease.

Conclusion

Restless Legs Syndrome (RLS), is a Sensorimotor disorder with a profound impact on sleep and Quality of Life. The incidence of Restless Legs Syndrome is 11% among CKD patients based on this study among the Eastern Indian population with female to male ratio 7:4. CKD duration, Hemodialysis duration, Blood Urea Nitrogen, Serum Iron, Vitamin D level has been found to be associated with development of RLS among CKD patients.

References

1 Abetz L, Allen R, Follet A, Washburn T, Earley C, Kirsch J, *et al* — Evaluating the quality of life of patients with restless leg syndrome. *Clin Ther* 2004; **26(6):** 925-35.

2 Trenkwalder C, Paulus W, Walters AS — The restless legs syndrome. *Lancet Neurol* 2005; **4(8):** 465-75.

3 Lin CH, Wu VC, Li WY, Sy HN, Wu HL, Chang CC, *et al* — Restless legs syndrome in end-stage renal disease: a multicenter study in Taiwan. *Eur J Neurol* 2013: **20(7):** 1025-31.

4 Collado-Seidel V, Kohnen R, SamHeben W, Hilleband G,\F, Oertel W H, Treankwalder C — Clinical and Biochemical findings in uraemic patients with and without restless legs syndrome. *Am J Kidney Dis* 1998: 324-8.

5 Hui DSC, Wong Tyh, KO FWS — Prevalence of sleep disturbances in Chinese patients with ESRD on continous ambullatory peritoneal dialysis. *Am J Kidney Dis* 2000; **36:** 783-8.

6 Gilberto. Geoffredo Filho, Claudia C. Gorini, Andrei S. Purysko, Herta SC, *et al* — Restless legs syndrome in patients on chronic hemodialysis in a Brazilian city,. Arq. *Neuropsiqviatra* 2003; **61(3-B):** 723-7.

7 Bhowmik O, Bhatia M, Gupta S, Agarwal SK, Tiwari SC, Dush SC — Restless Legs Syndrome in hemodialysis patients in India: a case controlled study. *Sleep Med* 2003; **4(2):** 143-617.

8 Nikic PM, Andric BR, Statonovic ST, Anojevic A, Dordevic Petrovic D — Vonosanit. *Pregl* 2007; **62(2):** 129-34.

9 Gigli GL, Adorati M, Dolso P, Piani A, Valente M, Brotini S, *et al* — Restless legs syndrome in End Stage Renal Diseases. *Sleep Med* 2004; **5(3):** 309-15.

10 Chaudhuri KR, Appiah-Kubi. Restless legs syndrome. *Neurolo-Neurosurg-psychiatry* 2001; **71:** 143-6.

11 Berger K, Luedemann J, Trenkwalder C — Sex and the risk of RLS in the general population. *Arch Intern Med* 2004; **164(2):** 196-202.

12 Winkelman J, Stautner A, Smatleben W, Trenkwalder C — Long-term course of restless legs syndrome in dialysis patients after kidney transplantation, Mov Disord, 2002; **17(5):** 1072-6.

Original Article

Immediate Impact of Tele Yoga Intervention on Physiological and Psychological Variables of COVID-19 Mild Symptomatic Patients : Two Groups Randomized Controlled Cross Over Study

Pragya Jain Shrimal[1], Satyapriya Maharana[2], Anupama Dave[3], Raghuram Nagarathna[4], Shivendra Shrimal[5]

Background : Yoga can assume a ground-breaking complementary and alternative therapy in the battle against the Coronavirus Disease (COVID-19) as it will help in improving the physical and mental wellbeing of people during the pandemic.

Objective : To determine immediate impact of Tele Yoga intervention on physiological and psychological variables of COVID-19 mild symptomatic patients.

Materials and Methods : In two groups randomized controlled cross-over study trial, 50 COVID-19 mild symptomatic patients admitted in the hospital confinement were randomly allocated to Yoga (n=25) & Supine rest (n=25) groups. Tele-based Yoga intervention was given to yoga group while control group was on supine rest. All assessments were carried out on day 5th and 6th after 15 minutes of intervention. Data were analyzed using SPSS (V.16.0).

Result : Mann Whitney 'U' test between-group for combined group effect (n=50) has shown that there was a significantly (P<0.001) better improvement in mindfulness, physiological and psychological variables in Yoga session than Supine rest session immediately after the intervention. Wilcoxon's signed-rank test for Individual group effects showed that there was a significant (P<0.001) change between two sessions (Yoga/Supine rest) for all the variables in Groups 1 & 2.

Conclusion : Integrated Yoga intervention has shown improvement in physiological and psychological variables in COVID-19 positive mild symptomatic patients as an add-on therapy. (Study Registration: CTRI registration number is CTRI/2020/10/0284866, 20/10/2020. http://www.ctri.nic.in/) [*J Indian Med Assoc* 2023; **121(12):** 41-6]

***Key words* : Meditation, Yoga, COVID-19 mild symptomatic patients, Breathing exercise, Physiological and Psychological variable.**

Coronavirus Disease (COVID) is a deadly disease caused by the Novel Coronavirus SARS CoV-2 (Severe Acute Respiratory Syndrome Corona Virus-2)[1]. On 30th January, 2020, World Health Organization (WHO) declared it as a Public Health Emergency of International Concern[2]. The virus mainly affects the respiratory tract, common symptoms include fever, dry cough, throat pain/itching, body ache, headache, shortness of breath, diarrhea, nausea, and runny nose[3].

The SARS COV-2 virus has caused serious threats to people's physical health and lives. It has also triggered a wide variety of psychological problems such as stress, depression, anxiety and others[1]. Along with medical measures of treatment that were under trial, a search was made for alternative therapies,especially for overall improvement in health.

Editor's Comment :

- Integrated Yoga Intervention helps in increasing oxygen saturation, decreased respiratory rate and heart rate, reducing stress and anxiety and increasing mindfulness in COVID-19 mild symptomatic patients.

In the modern era, Yoga is recognized as a form of alternative therapy to promote physical and mental wellness[4]. In a survey done by Nagarathna, *et al,* 2021 it was seen that Yoga practice is beneficial for maintaining a healthy lifestyle and endurance under restrictions and stress imposed by lockdown during COVID-19[5]. The preventive aspect of complementary and alternative therapies such as Yoga and Ayurveda has been highlighted in various studiesin the battle against the Novel Coronavirus[5-7].

Because of the pandemic,there was an urgent need to identify strategies to help prevent and treat SARS-CoV-2 infection along with complementary therapies with a primary focus on certain complementary practices such as breathing exercises, pranayama, and meditation with relevance to improving immune function as a part of COVID-19 treatment and/or

Department of Yoga and Life Science, SVYASA Deemed to be University, Bengaluru, Karnataka 560105

[1]PhD Scholar, MSc in Yoga therapy, BE in ECE

[2]PhD, Associate Professor

[3]MS, MRCOG, FACOG, DNB, Professor, Department of Obstetrics and Gynaecology, MGM Medical College, Indore, Madhya Pradesh 452001 and Corresponding Author

[4]MBBS, MD, FRCP Edin, Chief Medical Officer

[5]MBBS, Medical Officer, Department of Emergency Medicine & Casualty, ESIC MH Indore, Ministry of Labor & Employment Government of India, Indore 452011

Received on : 27/08/2022

Accepted on : 21/01/2023

prevention and these practices need rigorous scientific investigation[6]. Which inspired us to conduct a study on 50 COVID-19 patients with mild symptoms. The study aimed to assess the efficacy of tele-based integrated Yoga intervention as an adjunctive treatment. The objective of the study was an immediate effect on the improvement of mindfulness, physiological and psychological variables.

Materials and Methods

Trial Design : This was a two groups randomized controlled cross-over study.

Participants : The study was conducted at MTH (Maharaja Tukojirao Holkar), COVID-19 dedicated Hospital Indore, Madhya Pradesh, India from November, 2020 to January, 2021. The inclusion criteria were COVID-19 RT-PCR positive patients in hospital confinement with mild symptoms as per the National Health Commission (7th ed.) criteria[8]; age 18-80 years; male & female. Exclusion criteria were unwillingness to participate; physical & mental disability; medical restriction for physical movement; history of recent surgery; patients with pneumonia; admitted in Intensive Care Units; pregnant females; severe co-morbid conditions (Congestive Heart failure, Uncontrolled Diabetes, Renal failure on hemodialysis, Cancer patients).

Intervention : Tele-based Yoga was taught under the observation of medical staff in non-contact mode, in which social distancing was maintained by medical staff on duty donninga PPE kit. The intervention consisted of Breathing practices, Pranayama & Meditation shown in "Table 1". The module was adapted from the study by R Nagarathna, *et al* 2020[9].

Methods : Patients were given orientation of 4 days, for 2 sessions of 15 minutes each with the help of Television in their respective wards. In the morning sessions of 15 minutes, the practice was under observation of medical staff and in the evening self-practice for 15 minutes. After completing 4 days of familiarization with practices, on the 5th day they were randomized into two groups (Group A & Group B). On the 5th day Group A was given 15 minutes of tele-based Yoga intervention and Group B was in a supine rest position for 15 minutes and on the 6thday vice versa.

Outcomes : Outcomes were assessed after an intervention. Primary outcomes were physiological variables -Oxygen Saturation (SPO2), Heart Rate (HR), Respiratory Rate (RR), Blood pressure (BP) and secondary outcomes were psychological variables - Stress, Anxiety, and Mindfulness.

Table 1 — *Details of the practice for COVID-19 patients with mild symptoms*

Type of activity	List of practices	Time Duration
Breathing Practices	Hands in and out Breathing Hand stretch Breathing Abdominal Breathing	6 minutes
Pranayama	Bhrastrika Pranayama Nadi ñodhanä	6 minutes
Meditation	Sun Meditation	3 minutes

Assessment methods :

Physiological variables —

SPO2 & HR : Were measured by fingertip pulse oximetry.

RR : Measured by observing the number of breaths per minute using a stopwatch.

Systolic (SYS) and Diastolic (DYS) BP : By manual mercury Sphygmomanometers.

Psychological variables —

Stress : Visual Analog Scale (VAS)was used to measure stress. VAS is particularly well suited for the clinical assessment of self-reported stress[10]. This scale ranges from 0-100. "0" means no stress & "100" means as bad as it could be**.**

Anxiety : State-Trait Anxiety Inventory (STAI-SF-6) consists of six items. It demonstrated a good reliability coefficient ($r > 82$)[11].

Mindfulness : The State Mindful Attention Awareness Scale **(**SMAAS-5) is a valid tool for measuring state mindfulness. This is a receptive state of mind and sensitive awareness of observing the present moment. SMAAS-5 has shown excellent psychometric properties (Cronbach's alpha = 92)[12].

Sample size calculation : A sample size of 46 was obtained by using the 'G power' software, (alpha =0.05, power=0.95 and effect size=1.10). The sample size was calculated from an earlier intervention study[13].

Randomization : 500 people were admitted to the hospital during the study period. Out of which 200 patients screened, 150 did not meet the eligibility criteria. Total (n=50) patients were randomly assigned to either the Yoga group (n=25) or the supine rest group (n=25) by using a simple randomized toss method. Patients were counter balanced randomly into two sessions. Patients were assessed on 2 separate days. Fig 1 depicts the study model.

Statistical analysis : Statistical analysis was done using SPSS Version 16.0. As the data were not normally distributed, Wilcoxon's test (with-in groups) was used for statistical analysis & between groups comparisons were done using the 'Mann-Whitney 'U' test'.

Results

A total of 50 COVID-19 patients were randomized into two groups, group 1(GP1) - 25 patients and group 2(GP2) - 25 patients (Fig 1).

Demographic and Clinical details :

The entire study was completed by 50 patients, among those 68% were male and 32% were female. Age ranges were between 18-80 years, in which 44%

were 18-45 years, 28% were 46-60 years and 28% were 61-80 years. The urban population (82%) was more infected than the rural population (18%).

Body ache was the most common clinical symptom in 86% of patients and other symptoms were cough, headache, sore throat, and nasal discharge 76%, 64% 28% and 14% respectively. Around, 30% of patients had a medical history. Other demographic details showed in Table 2.

Combined group effects details :

Changes in physiological and psychological variables immediately after the sessions of Yoga & Supine rest (n=50) : Mann-Whitney test (between sessions : P<0.001) showed that there was a significantly better improvement in all physiological and psychological variables with changes of 1.65% in SpO2, 8.53 % in HR, 10.36% in RR, 4.83 % in BP Systolic & 5.42% in BP diastolic, 75.47 % changes in stress, 11.74 % in anxiety & 44.27 % in mindfulness in Yoga than the supine rest session in Table 3.

Individual group effects :

Group 1 : Wilcoxon signs rank test showed that there were significant (P< 0.001) changes between two sessions (yoga/supine rest) in all the physiological and psychological variables in Table 4 with a change of 1.57% in SpO2, 8.12 % in HR, 11.38 % in RR, 4.83 % in BP Systolic, 6.93 % in BP diastolic, 63.63 % in stress, 11.79 % in anxiety & 44.33 % in mindfulness in yoga than the supine rest session.

Group 2 : Wilcoxon signs rank test showed that there were significant (P<0.001) changes between two sessions (yoga/supine rest) in all the physiological and psychological variables with a change of 1.73% SpO2, 8.94 % in HR, 9.33 % in RR, 4.83 % in BP Systolic, 3.95 % in BP diastolic 86.58% in stress, 11.69% in anxiety & 79.23% in mindfulness in Yoga than the supine rest session in Table 4.

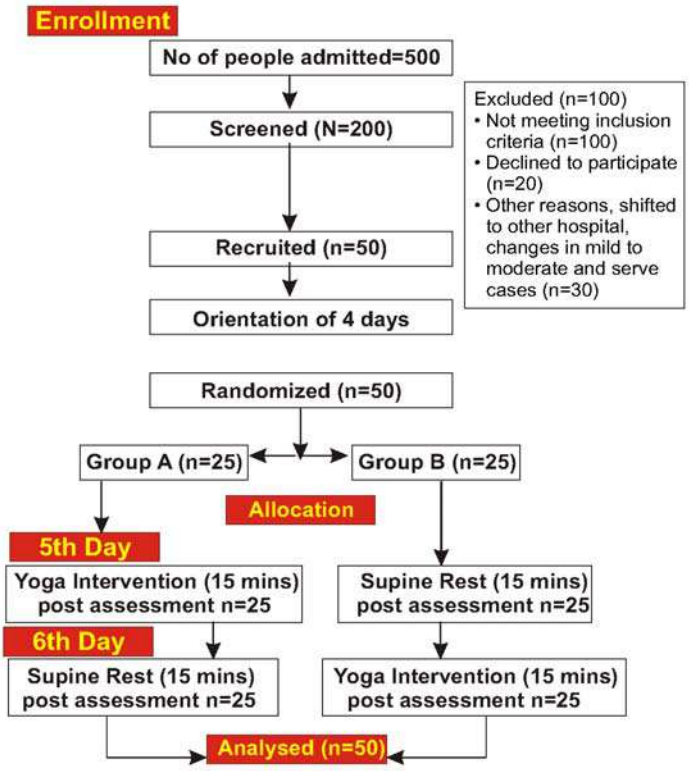


Fig 1 — CONSORT flow diagram for RCT design

Table 2 — *Demographic and Clinical characteristics of the supine rest group and the Yoga Group*

Demography		Clinical Characteristics		Medical History 15(30%)	
Variable	Frequency, n(%)	Variable	Frequency, n(%)	Variable	Frequency, n(%)
Gender	50	Fever	2(4%)	COPD	3(6%)
Male	34 (68%)	37.3-38.0°C	1(2%)	Bronchitis	4(8%)
Female	16 (32%)	38.1-39.0°C>39.0°C	1(2%)	Hypertension	8(16%)
Age (Years)		>39.0°C	0	Diabetes Mellitus	1(2%)
18-45	22(44%)	Cough	38(76%)	Asthma	3(6%)
46-60	14(28%)	Sore throat	14(28%)	Migraine	2(4%)
61-80	14(28%)	Sputum	2(4%)	Cigarette Smoking	1(2%)
Area		Breathlessness	4(8%)	Other Co-morbid Condition	1(2%)
Urban	41(82%)	Nausea	2(4%)		
Rural	9(18%)	Chest pain	0	-	-
Education Status		Abdominal pain	4(8%)	-	-
Less than Graduation	18(36%)	Vomiting	4(8%)	-	-
Graduate	24(48%)	Nasal Discharge	7(14%)	-	-
Postgraduate	5(10%)	Headache	32(64%)	-	-
Others-Uneducated	3(6%)	Hemoptysis	2(4%)	-	-
Occupation Status		Diarrhea	1(2%)	-	-
Agriculture	6(12%)	Body ache	43(86%)	-	-
Business	12(24%)	-	-	-	-
Employed	10(2%)	-	-	-	-
Homemaker	6(12%)	-	-	-	-
Retired	3(6%)	-	-	-	-
Student	3(6%)	-	-	-	-
Professional	8(16%)	-	-	-	-
Unemployed	2(4%)	-	-	-	-

Table 3 — *Changes in Physiological and Psychological variables immediate after Yoga intervention & Supine rest session*

Variable	Yoga Intervention N=50			Supine Rest N=50			ES	% Change	Sig- P values Between Gps (Mann-Whitney test)
	Mean/SD	UB	LB	Mean/SD	UB	LB			
SpO2	94.40±1.92	94.95	93.85	92.84±1.70	93.33	92.35	0.86	1.65	0.001
HR	79.68±5.94	81.37	77.99	86.48±8.11	88.79	84.17	0.95	8.53	0.001
RR	19.48±1.55	19.92	19.04	21.50±2.37	22.18	20.82	1.00	10.36	0.001
BP SYS	123.66±8.40	126.05	121.27	129.64±10.99	132.77	126.51	0.61	4.83	0.008
BP DYS	81.88±8.03	84.16	79.60	86.32±5.94	88.02	84.62	0.62	5.42	0.016
VAS	31.80±8.96	34.35	29.25	55.80±11.62	59.10	52.50	2.31	75.47	0.001
STAI	13.62±1.38	14.01	13.23	15.22±1.14	15.55	14.89	1.26	11.74	0.001
S-MAAS	16.58±2.09	17.17	15.99	9.24±1.80	9.75	8.73	3.76	44.27	0.001

Abbreviations : SPO2: Oxygen Saturation in the blood, HR: Heart Rate, RR: Respiratory Rate, BP SYS: Blood Pressure Systolic, BP DYS: Blood Pressure Diastolic, VAS (Stress): Visual Analogue Scale, STAI: State Trait Anxiety Inventory, S-MAAS: State Mindful Attention Awareness Scale, SD: Standard Deviation, UB: Upper Bound, LB: Lower Bound, ES: Effect Size, Gps: Groups.
Legends : There is significant improvement in yoga group compare to supine rest group. (p<0.001)

Discussion

The present study was based on Tele-based Yoga intervention for mild symptomatic patients of COVID-19. The results showed that there is significant improvement in mindfulness, physiological & psychological variables after yoga intervention compared to supine rest.

This study is the first of its kind Yoga-based intervention study with COVID-19 patients in the Indian population as well as the world population. No definitive & specific treatment was available to prevent or cure the COVID-19 disease. Some western, traditional & home remedies provided comfort and alleviate the symptoms of mild COVID-19[14]. Current treatment modalities have limitations also. The present study was a tele-based yoga intervention that helped the patients.

During the 1st wave of the COVID-19 pandemic in India commonly reported symptoms were 71.5% fever, 42.8% shortness of breath, cough, fatigue and sore throat[15] while, in the present study body ache was seen in 86%, cough in 76%, headache, sore throat, nasal discharge & abdominal pain were other common symptoms.

A meta-analysis of Farha Musharrat Noor, *et al* 2020 result showed that COVID-19 is associated with a high risk of mortality and Co-morbidities[16]. In India, COVID-19 patients with co-morbidities incidence seen was 57.3%[8]. A study by Nitin Gupta, *et al* 2021 showed that 32.7% of symptomatic patients had hypertension,

Table 4 — *Changes in Physiological and Psychological variables in Group-1 (n=25) and Group-2 (n=25) immediate after Yoga intervention & Supine rest*

Variable	Yoga Intervention N=50			Supine Rest			ES	% Change	Sig- P values Within Gps (Wilcoxon sign rank test)
	Mean/SD	UB	LB	Mean/SD	UB	LB			
Group - 1 :									
SpO2	94.24±2.16	95.13	93.35	92.76±1.73	92.04	93.48	0.75	1.57	0.001
HR	79.76±5.94	82.21	77.31	86.24±6.11	88.77	83.71	1.07	8.12	0.001
RR	19.68±1.37	20.25	19.11	21.92±2.73	23.05	20.79	1.03	11.38	0.001
BP SYS	122.40±6.63	125.14	119.66	128.32±9.10	132.08	124.56	0.74	4.83	0.001
BP DYS	80.80±8.62	84.36	77.24	86.40±4.20	88.13	84.67	0.82	6.93	0.004
VAS	30.80±9.96	34.91	26.69	50.40±12.06	55.38	45.42	1.77	63.63	0.001
SAI	13.56±1.26	14.08	13.04	15.16±1.02	15.58	14.74	1.39	11.79	0.001
SMAAS	16.24±2.55	17.29	15.19	9.04±2.28	9.98	8.10	2.97	44.33	0.001
Group - 2 :									
SpO2	94.56±1.68	95.26	93.86	92.92±1.70	93.62	92.22	0.97	1.73	0.001
HR	79.60±6.05	82.10	77.10	86.72±9.84	90.78	82.66	0.87	8.94	0.001
RR	19.28±1.72	19.99	18.57	21.08±1.91	21.87	20.29	0.99	9.33	0.001
BP SYS	124.92±9.84	128.98	120.86	130.96±12.66	136.19	125.73	0.53	4.83	0.028
BP DYS	82.96±7.41	86.02	79.90	86.24±7.43	89.30	83.18	0.44	3.95	0.140
VAS	32.80±7.91	36.07	29.53	61.20±8.32	64.64	57.76	3.49	86.58	0.001
SAI	13.68±1.52	14.31	13.05	15.28±1.27	15.81	14.75	1.14	11.69	0.001
SMAAS	16.92±1.47	9.92	8.96	9.44±1.15	17.53	16.31	5.66	79.23	0.001

Abbreviations: SPO2: Oxygen Saturation in the blood, HR: Heart Rate, RR: Respiratory Rate, BP SYS: Blood Pressure Systolic, BP DYS: Blood Pressure Diastolic, VAS (Stress): Visual analogue Scale, STAI: State Trait Anxiety Inventory, SMAAS: State mindful attention awareness scale, SD: Standard deviation, UB: Upper Bound, LB: Lower Bound, ES: Effect Size, Gps: Groups.
Legends: There is significant improvement in yoga group compare to supine rest group. (p<0.001)

and 30.8% had diabetics. Similarly, this study found that 16% had hypertension, 8% bronchitis, 6% COPD and asthma and other co-morbidities.

COVID-19 infection is associated with lung involvement & respiratory distress. There is a fall in SPO2 and there may be a rise in BP. Various yoga practices like breathing exercises and pranayama helps in improving the vital capacity of the lungs. A study by Malhotra, *et al* 2021 on healthy subjects results showed that there was a significant fall in pulse rate($p<0.001$) indicating a shint towards parasympathetic dominance. SPO2 dropped, indicating a shint to anaerobic metabolism during Yoga practice[17]. A study by Kuppusamy, *et al*, 2020 on healthy adolescents showed that yoga breathing practices improve heart rate variability[18]. In the present study, there is a significant improvement in physiological variables immediately after Yoga intervention in the yoga group compared to supine rest ($p>0.001$). In the combined group effect SPO2-1.65%, HR-8.53%, RR-10.36%, BP SYS-4.83%, and BP DYS-5.42% depict statistically better improvement compared to supine rest.

A study on young female participants (non-COVID) showed the immediate effect of Yoga intervention on blood pressure and heart rate. Results mentioned significant differences in Systolic BP, Diastolic BP, and HR following a single yoga session recorded by sphygmomanometer and pulse oximeter, respectively[19]. The study by Ankad, *et al* 2011 showed that short-term practice of pranayama & meditation had improvements in cardiovascular functions which were assessed by recording pulse rate, systolic BP, diastolic BP and mean BP in healthy individuals and found beneficial effects[20]. In the present study in the yoga group, there was a significant reduction in BP SYS, BP DYS and HR between the group and within the group ($p<0.001$).

This study assesses the effect of yoga intervention on improvement in respiratory and cardiovascular functions and found that SPO2 increased, HR and RR decreased significantly with Yoga intervention ($p<0.001$). There was a drop in systolic and diastolic values of BP.

A systematic review and meta-analysis reported that the prevalence of psychological morbidities was high among COVID-19 patients. About half of the population faced psychological impacts such as poor sleep quality (40%), stress (34%) & psychological distress (34%)[21]. A randomized study on web-based relaxation interventions during periods of social isolation by Pizzoli, *et al* 2020 provides insight into the use of such interventions for the general population and patients[22]. Relaxation practices might be helpful exercises for coping with anxiety and stressful sensations and the present study, found that immediate effect after Yoga intervention on psychological variables stress, anxiety, and mindfulness which were assessed through VAS, STAI-SF-6, SMAAS-5 significantly improved even after short intervention ($p<0.001$).

In a pilot study byJeneferJerrin, *et al* 2021 on 130 COVID-19-positive patients through Yoga and Naturopathic intervention were given 60 min/day for two weeks. The Hospital Anxiety Depression Scale (HADS) and Corona Anxiety Scale (CAS) were used to assess the anxiety and depression. Results showed a significant reduction in respective scores after the intervention[23]. In the present study, STAI-SF-6& VAS were used to assess anxiety & stress. Results showed that there is an immediate significant reduction in both anxiety and stress ($p<0.001$) after an intervention. And so these interventions can be used as add-on therapy for the better mental and physical well-being of the patients.

A study by Liu, *et al* 2020 on Progressive Muscle Relaxation (PMR) technology anxiety & sleep quality in COVID-19 patients concluded that it is a helpful auxiliary method[13]. Similarly,the present study also included breathing exercises & pranayama which help in muscle relaxation.

Because of restrictions during the initial phase of the COVID-19 pandemic, only tele-based intervention for the short term was possible. To minimize exposure to COVID-19 patient's short version of the questionnaire was used with limited questions. More personal intervention would be helpful.Yoga and Pranayama have been concluded as safe alternative interventions with no adverse effects in most studies. The size of the study population is a limitation and so larger clinical trials are advisable[24].

The COVID-19 pandemic has affected the population Worldwide and there is no well-defined pharmacological treatment. Integrated Yoga intervention has shown improvement in physiological and psychological variables in COVID-19 mild symptomatic patients as an add-on therapy.

Acknowledgment

We are thankful to all participants of this study for their co-operation during the project. We express our sincere gratitude to the Doctors, management and nursing staff of MTH, dedicated COVID-19 Hospital, Indore, Madhya Pradesh, India. We are also thankful to Dr. Sasidharan k Rajesh for the study design.

Author's Contribution : Author PJS, SM and RM conceived the conception, and study idea. AD contribution to data collections. PJS, SM and RM did data analysis. PJS, AD and SM wrote the manuscript. RM did the final proof reading and corrections. All

authors read and approved the manuscript.

Conflict of Interest : We would like to express that there is no conflict of interest among the authors of this research trial.

Funding : No funding in any form was required for this research.

Ethical Statement : Institutional Ethics Committee of SVYASA University, Bengaluru, India approved the study on 15-10-2020 with reference number RES/IEC-SVYASA/180/2020/A. Written permission was obtained from the MTH, Hospital, Indore before starting the project. The participants received explanations of the purpose and contents of the study. All patients declared their voluntary participation in this study by signing an informed consent form before study commencement. Patients were informed about their freedom to withdraw from the study at any point and the patient's information was kept confidential.

References

1 Qiu J, Shen B, Zhao M, Wang Z, Xie B, Xu Y — A nationwide survey of psychological distress among Chinese people in the COVID-19 epidemic: Implications and policy recommendations. *General Psychiatry* 2020; **33(2):** 19-21.

2 Wu W, Zhang Y, Wang P, Zhang L, Wang G, Lei G, *et al* — Psychological stress of medical staffs during outbreak of COVID 19 and adjustment strategy. *Journal of Medical Virology* 2020; 0-3.

3 Parikh DP — Role Of Homoeopathy In COVID-19 Management-A Clinical World Journal of Pharmaceutical Research. 2020; (May).

4 Kulkarni MS, Kakodkar P, Nesari TM, Dubewar AP — Combating the psychological impact of COVID-19 pandemic through yoga: Recommendation from an overview. *Journal of Ayurveda and Integrative Medicine [Internet]* 2021;(xxxx). Available from: https://doi.org/10.1016/j.jaim.2021.04.003

5 Nagarathna R, Anand A, Rain M, Srivastava V, Sivapuram MS, Kulkarni R, *et al* — Yoga Practice Is Beneficial for Maintaining Healthy Lifestyle and Endurance Under Restrictions and Stress Imposed by Lockdown During COVID-19 Pandemic. *Frontiers in Psychiatry* 2021; 12(June).

6 Bushell W, Castle R, Williams MA, Brouwer KC, Tanzi RE, Chopra D, *et al* — Meditation and Yoga Practices as Potential Adjunctive Treatment of SARS-CoV-2 Infection and COVID-19: A Brief Overview of Key Subjects. *Journal of alternative and complementary medicine (New York, NY)* 2020; **00(00):** 1-10.

7 Tillu G, Chaturvedi S, Chopra A, Patwardhan B — Public Health Approach of Ayurveda and Yoga for COVID-19 Prophylaxis. *The Journal of Alternative and Complementary Medicine* 2020; X(X): 1-5.

8 Goel V, Goyal BR, Mathur A, Chand G, Marwaha V, Dhar A — An institutional based study on imaging conundrum of newly diagnosed coronavirus disease 2019 (Covid-19) – a retrospective analysis in India population. *International Journal of Current Research and Review* 2020; **12(19 Special Issue):** S-5-S-14.

9 Nagarathna R, Nagendra H, Majumdar V — A perspective on yoga as a preventive strategy for coronavirus disease 2019. *International Journal of Yoga [Internet]* 2020 [cited 2020 May 23];13(2):89. Available from: http://www.ijoy.org.in/text.asp?2020/13/2/89/283656

10 Lesage FX, Berjot S — Validity of occupational stress assessment using a visual analogue scale. *Occupational Medicine* 2011; **61(6):** 434-6.

11 Marteau TM, Bekker H — The development of a six item short form of the state scale of the Spielberger State—Trait Anxiety Inventory (STAI). *British Journal of Clinical Psychology* 1992; **31(3):** 301-6.

12 Brown KW, Ryan RM — The Benefits of Being Present: Mindfulness and Its Role in Psychological Well-Being. *Journal of Personality and Social Psychology* 2003; **84(4):** 822-48.

13 Liu K, Chen Y, Wu D, Lin R, Wang Z, Pan L — Effects of progressive muscle relaxation on anxiety and sleep quality in patients with COVID-19. *Complementary Therapies in Clinical Practice* 2020; 39.

14 World Health Orgnization 2020. Q & As on COVID-19 for older people.

15 Res M, Ruts C, Hospital CR, Sciences M, Committee IE, Crh-smims S — Clinical profile of hospitalized COVID-19 patients in first & second wave of the pandemic: Insights from an Indian registry based observational study. 2018; (May): 517-20.

16 Noor FM, Islam MM — Prevalence and Associated Risk Factors of Mortality Among COVID-19 Patients: A Meta-Analysis. Vol. 45, *Journal of Community Health* 2020; 1270-82.

17 Malhotra V, Takare A, Bharshankar R, Mishra S, Ravi N — Effect of Yoga on Pulse rate and Oxygen Saturation: Analysis of Psychophysiological Parameters. *Cadernos de Naturologia e Terapias Complementares* 2021; **9(17):** 9.

18 Kuppusamy M, Kamaldeen D, Pitani R, Amaldas J, Ramasamy P, Shanmugam P, *et al* — Effects of yoga breathing practice on heart rate variability in healthy adolescents: a randomized controlled trial. *Integrative Medicine Research [Internet]* 2020; **9(1):** 28-32. Available from: https://doi.org/10.1016/j.imr.2020.01.006

19 B SR, P RH, J TK — Immediate effect of yoga on blood pressure and heart rate following a single yoga session in young female. 2020; **5(2):** 90-4.

20 Ankad R, Patil S, Chinagudi S, Herur A, Shashikala G— Effect of short-term pranayama and meditation on cardiovascular functions in healthy individuals. *Heart Views* 2011;**12(2):** 58.

21 Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID- 19 . The COVID-19 resource centre is hosted on Elsevier Connect , the company ' s public news and information . 2020;(January).

22 Pizzoli SFM, Marzorati C, Mazzoni D, Pravettoni G — Web-based relaxation intervention for stress during social isolation: Randomized controlled trial. *JMIR Mental Health* 2020; 7(12).

23 Jenefer Jerrin R, Theebika S, Panneerselvam P, Venkateswaran ST, Manavalan N, Maheshkumar K — Yoga and Naturopathy intervention for reducing anxiety and depression of COVID-19 patients – A pilot study. Clinical Epidemiology and Global Health [Internet]. 2021; **11(April):** 100800. Available from: https://doi.org/10.1016/j.cegh.2021.100800

24 Thakar V, Joshi V, Patadiya A, Wagh K — Role of Yoga in improving respiratory distress and anxiety during COVID-19 pandemic-An evidence based review. ResearchgateNet [Internet]. 2020; (July). Available from: https://www.researchgate.net/publication/342814764

Original Article

Study of Sensory Nerve Conduction Study Parameters in Upper & Lower Limb & their Maturation Pattern in Infants & Children in a Tertiary Health Care Institute of West Bengal

Bosumita Sinha[1], Sumana Gupta[2], Sangita Sen[3], Goutam Ganguly[4]

Background : Age is an important physiological variable in the study of nerve conduction. The changes in the peripheral nervous system are most impressive in the first few years of life and are related to the maturational factors of the peripheral nerves. Nerve Conduction Studies (NCS) are considered as one of the most valuable and sensitive parameters to determine the nerve maturation, to define nerve activity and to exclude any peripheral nervous system disorder. Nerve conduction study parameters detecting evolution of sensory nerves are different for upper and lower limbs and also varies in different sensory nerves. Aim: The aim of our study was to evaluate how the peripheral sensory nerve NCS parameters vary from upper and lower limbs and their maturation pattern from birth to 6 years of age.

Materials and Methods : A cross-sectional prospective study was done on 70 normal infants and children in the department of Physiology of IPGME&R and collaboration with the department of Pediatrics of the same Institute and Bangur Institute of Neurology, Kolkata, West Bengal. Sensory Nerve Action Potential (SNAP) amplitude and SNAP onset latencies of Median, Ulnar, and Sural nerves were measured.

Results : were analyzed by SPSS version 20, Unpaired 't' test, means plot were calculated. It was seen sensory NCS parameters varied significantly between upper and lower limb. And their maturation pattern towards adult normal values from birth to 6 years of age for different sensory nerves depicted by means plot and bar diagram.

Conclusion : Sural SNAP amplitude progresses to adult value more rapidly than that of Median and Ulnar SNAP amplitude although SNAP amplitude of Median and Ulnar nerves in upper limbs are greater than that of Sural nerve in lower limb.

[*J Indian Med Assoc* 2023; **121(12):** 47-50]

Key words **: Peripheral Nervous System, Sensory Nerve Action Potential, Nerve Conduction Study.**

Age is a determinant factor of Peripheral nervous system development & maturation[1]. Development of the peripheral nervous system starts in utero, less developed at birth & maturity attained at 5-6 years of age[2]. Nerve Conduction Studies (NCS) measures the electrophysiological parameters of peripheral nervous system at different ages and the parameters vary with progression of age & it is different from adult value.

At present very few information about peripheral sensory nerve parameters are available by NCS. Moreover, comparative data regarding evolution of sensory nerves in upper & lower limbs in infants & children up to six years are not available. To diagnose different sensory neuropathies[3] & for assessing the normal development & evaluation of PNS, study of sensory nerve conduction of both upper & lower limb is of immense help.

[1]MD, Associate Professor, Department of Physiology, R G Kar Medical College and Hospital, Kolkata 700004

[2]MD, DPH, Assistant Professor, Department of Physiology, Tamralipto Government Medical College, Tamluk, West Bengal 721636 and Corresponding Author

[3]MD, Professor, Department of Physiology, IPGME&R and SSKM Hospital, Kolkata 700020

[4]DM (Neurology), Ex-Professor, Department of Neurology, IPGME&R and SSKM Hospital, Kolkata 700020

Received on : 29/07/2023

Accepted on : 26/08/2023

Editor's Comment :

- Sensory nerve conduction study parameters are essential components for assessing maturation of peripheral nervous system in infants and children up to 5 years of age.

Materials and Methods

A cross-sectional prospective study was conducted in the department of Physiology IPGME&R in collaboration with Bangur Institute of Neurology & department of Pediatrics of IPGME&R, Kolkata. Ethical clearance had been obtained from The Institutional Ethics Committee of IPGME&R, Kolkata. Seventy healthy normal infants & children upto 6 years of age as Cases and 30 normal healthy adults (age ranging from 20-35 years) as Controls were selected. Informed consent of Cases were taken from their mothers and from controls. Babies of difficult labour, mother with gestational diabetes, APH complication, babies of preterm delivery, with hyperbilirubinemia, sepsis, birth asphyxia were excluded from the study.

Results were computed & analyzed by using SPSS version 20, unpaired t test, means plot were calculated.

"RMS Aleron201Electromyograph"[4] with a software RMS EMG NCV EP MKII installed computerized machine was used for nerve conduction study on selected sensory nerves. Skin temperature was kept

at 32-34 degree Celsius[5]. No sedation was administered. Room temperature was remained at 25-28 degree Celsius by use of an AC. In sensory nerve conduction study, antidromic stimulation method is applied. Only single stimulation was given. SNAP onset latency & SNAP amplitudes were measured from Medial & Ulnar nerve in upper limb and in lower limb from the Sural nerve.

Analysis and Result

Total 70 subjects were taken of (0-6) years of age. They were allocated into six groups. Thirty normal healthy adults (age ranging from 20-35 years) were taken as Controls (Table 1).

In sensory nerve conduction studies of upper & lower limb, the SNAP onset latencies & SNAP amplitude of each case were taken into account. Then the mean & Standard Deviation of all the above-mentioned parameters of the tested nerves were calculated (Table 2).

Statistically significant maturation difference was found in Groups 4, 5 and 6 for mean onset latency in comparison between Median and Sural nerves.In all age groups, onset latencies of Median and Ulnar nerve are very close to each other (Table 3).

The mean onset latencies are almost half in the neonatal period (Group 1)compared to adult values. There is marked progression of onset latencies during the first year of life and again a significant increase is seen around four years of age, to approach the adult values.The onset latencies are always lower in Sural nerve, compared to Median and Ulnar nerves, in all the age groups (Fig 1).

Gradual increase was seen in SNAP amplitude according to the age. SNAP amplitude of Median & Ulnar nerve are always more than Sural nerve,in all ages , throughout the study (P<0.01)(Fig 2).

The bar diagrams showed that the mean SNAP amplitudes in neonatal group (Group 1) are almost one-third, in comparison to the normal adult values (Fig 3).

Table 2 — *Nerve conduction parameters of Normal Adults & comparison of values of our control population with normal adult values as found by different authors*[4]

Parameter studied	Values obtained in control population (Mean ± SD)	Normal adult values, as found by different authors
Median SNAP onset latency(ms)	2.32 ± 0.28	2 - 3.5 ms
Median SNAP amp (μV)	44.23±4.76	20 - 45 μV
Ulnar SNAP onset latency(ms)	2.02 ± 0.34	2 - 3.5 ms
Ulnar SNAP amp (μV)	45.78 ± 5.32	20 - 45 μV
Sural SNAP onset latency(ms)	2.24 ± 0.39	2 - 3.5 ms
Sural SNAP amp (μV)	32.46 ± 4.25	15 - 35 μV

Table 3 — *Comparison of sensory NCS parameters between upper & lower limbs in different age groups*

Group	Age	Sensory nerves	SNAP latency Mean±SD(ms)	P value	SNAP amplitude Mean±SD(μV)	P value
Group 1 (n=8)	(0-6) months	Median	1.3± 0.19	0.354	17.06±4.6	0.0001
		Sural	1.24±0.19		8.10±1.35	
		Ulnar	1..21±0.186	0.754	13.73±5.65	0.0159
		Sural	1.24±0.19		8.10±1.35	
Group 2 (n=9)	(6-12) months	Median	1.52±0.09	0.404	23.13±3.51	0.0001
		Sural	1.45±0.228		9.11±2.11	
		Ulnar	1.47±0.09	0.809	17.23±2.54	0.0001
		Sural	1.45±0.228		9.11±2.11	
Group 3 (n=11)	(12-24) months	Median	1.63±0.09	0.774	27.18±2.75	0.0001
		Sural	1.62±0.07		10.81±1.15	
		Ulnar	1.61±0.07	0.741	25.99±2.28	0.0001
		Sural	1.62±0.07		10.81±1.15	
Group 4 (n=11)	(24-36) months	Median	1.73±0.06	0.005	34.70±3.46	0.0001
		Sural	1.65±0.06		12.90±1.67	
		Ulnar	1.67±0.07	0.480	33.35±3.24	0.0001
		Sural	1.65±0.06		12.90±1.67	
Group 5 (n=14)	(36-48) months	Median	1.80±0.07	0.0389	40.40±4.77	0.0001
		Sural	1.75±0.05		18.83±6.57	
		Ulnar	1.71±0.08	0.1247	35.88±3.99	0.0001
		Sural	1.75±0.05		18.83±6.57	
Group 6 (n=17)	(48-72) months	Median	2.18±0.27	0.039	49.10±9.26	0.0001
		Sural	2.01±0.182		29.91±5.88	
		Ulnar	2.07±0.28	0.464	44.74±7.67	0.0001
		Sural	2.01±0.182		29.91±5.88	

Discussion

All the 70 healthy infants and children in the study were chosen after a detailed history and clinical and neurological examination. A cross-sectional prospective study was performed. Being an objective examination, Nerve conduction studies are especially useful in infants and children, as clinical examination especially sensory systems are very difficult for this age[6]. Myelination and maturation of peripheral nervous system begins during intrauterine period, becomes electro physiologically evident after birth and it becomes complete at around 5 years of life[7].

Therefore, standard values of nerve conduction parameters are essential in evaluating infantile neuro-muscular diseases. In order to obtain such standard values in our areas of Eastern India, we investigated the progressive evolution of sensory nerve conduction parameters in infants and children before they attain

Table 1 — *Age and number wise distribution of cases*

Group	Age	Number
Group 1	(0-6) months	8
Group 2	(6-12) months	9
Group 3	(12-24) months	11
Group 4	(24-36) months	11
Group 5	(36-48) months	14
Group 6	(48-72) months	17

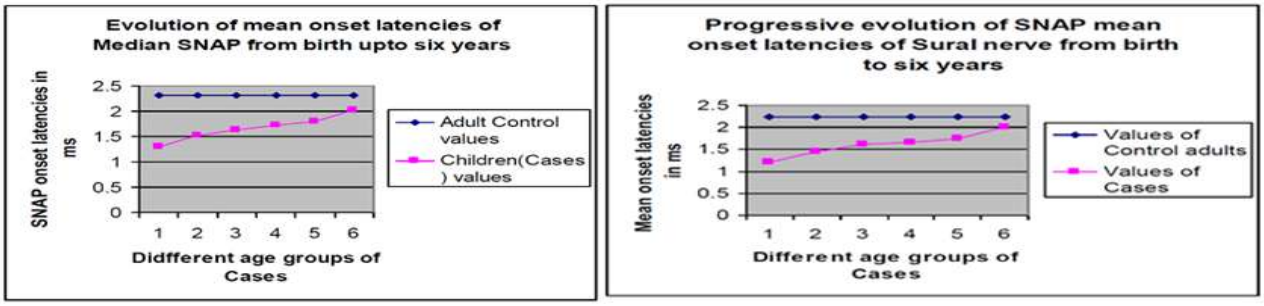


Fig 1 — Progressive evaluation of SNAP mean onset latency of Median and Sural nerves and their comparison with adult value

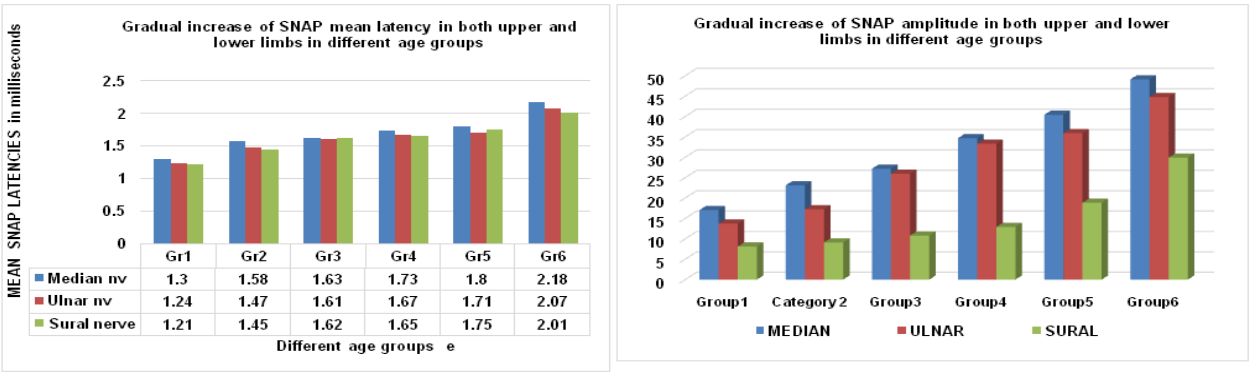


Fig 2 — Gradual increase of SNAP mean onset latency and SNAP amplitude in both upper and lower limbs in different age groups of cases

the normal adult values, by using a non-invasive technique, using surface electrodes.

However, despite of SNAPs being obtained using surface electrodes are of lower amplitudes, this allows potentials to be obtained with less variability in serial studies[8]. Distal sensory component (SNAP onset latencies, SNAP amplitudes both in upper and lower limb nerves) were assessed. The mean values of the NCS parameters of upper limb were compared with the parameters of lower limb. The parameters were studied in six age groups and their progression towards the adult value was also observed.

The sensory nerve action potential of mixed nerve like Median is a compound potential that represents the summation of all the individual fibre action potential. For each stimulation site, the onset latency, peak latency, amplitude and duration are measured. In this study our considerations were only onset latencies and SNAP amplitudes. SNAP amplitude is a semiquantitative measure of the number of sensory axons that conduct between the stimulation and recording site. Onset latencies represent nerve conduction time to the recording electrodes for the largest cutaneous sensory fibres[9].

Onset latencies of SNAPs are also considered in our study. Onset latency represents nerve conduction time from the stimulus site to the recording electrodes for the largest cutaneous sensory nerves. Although SNAP peak latencies have been discussed in different studies, onset latencies have been studied in only a few[10] (Garcia and Calleja, *et al* 2000). Here we found all the neonatal SNAP onset latencies are almost one-third of the normal adult values, in accordance with the previous report. In this study, the values of onset

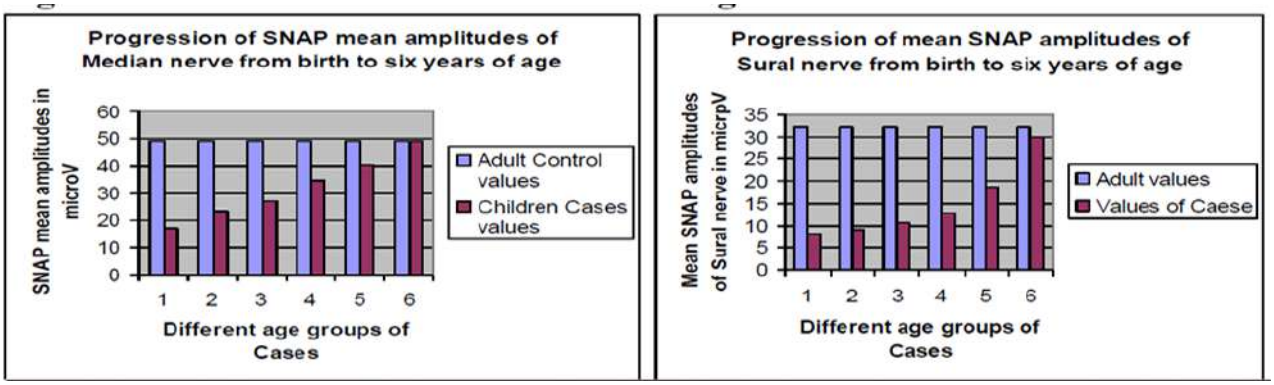


Fig 3 — Progression of SNAP mean amplitude of Median and sural nerve and their comparison with adult value

latencies in Median, Ulnar and Sural nerve achieve the adult value by 48 to 72 months of age.

In this study, some statistical differences as compared to other previous studies were noted in SNAP amplitudes. In earlier studies, it was noted that SNAP amplitudes approached adult values by the second year of life[11].

In contrast, SNAP amplitude of these three nerves showed different status. In case of Median nerve, SNAP amplitude is almost half (17.06±4.6 μV) of the adult value (44.23±4.76 μV) in Group I, Ulnar SNAP amplitude in the same group is one-third of standard adult value, Sural SNAP amplitude in the same group is one-fourth of standard adult value. The increase in SNAP amplitude is not uniform during the period of study[2] (A Gracia, Jesús Calleja, *et al* 2000). Still all these three parameters arrived the adult value at about 48months to 72 months of age. In case of Median SNAP, the progression of amplitude is maximum within the 12 months of age. Regarding Ulnar SNAP, the amplitude progression towards adult value is maximum in 12-24 months of age. And in respect of Sural SNAP the amplitude advancement is maximum in 24-36 months of age. It appeared that the progression of Sural SNAP amplitude to adult value is more rapid than that of Median and Ulnar SNAP. In this study we opted for antidromic stimulation and most of the studies choose orthodromic stimulation of sensory nerves but in both cases, SNAP amplitudes are same, as suggested by Meyhaler JM, *et al* in 1994[12]. If SNAP is absent from birth or within 6 months of age, it should not be casually treated as technical fault, it is an important sign of abnormality.

Conclusion

So, we can conclude sensory NCS parameters of peripheral nervous system detects maturation of sensory nerves from neonate to 6 years of age and it is different in upper and lower limbs. The progression pattern of maturation of the three important sensory nerves-Medial, Ulnar and Sural nerve varied significantly throughout the time period. SNAP amplitudes of Median nerve and Ulnar nerves are always greater than Sural nerve throughout the study. It appeared that the progression of Sural SNAP amplitude to adult value is more rapid than that of Median and Ulnar SNAP amplitude. The progression of Sural SNAP amplitude is more than that of Sural SNAP onset latency than that of Median and Ulnar SNAP amplitude and onset latencies of these two nerves.

Factors underlying this characteristic of Sural SNAP is yet to be explained. Multiple regression analysis demonstrated that SNAP onset latencies were more correlated with height during growth than age whereas the Median SNAP onset latency is correlated more with age[13] (Lars Hyllienmark, *et al* 1996). In the Sural nerve, onset latency was not dependent on height; though a negative correlation has been found in children[14] (Lang, *et al* 1977) which is yet to be confirmed. Anatomical variations of sural neve eg, variability in the course of the sural nerve and in the union site between the MSCN and LSCN, may affect the onset latency and amplitude of Sural nerve sensory action potential leading to misinterpretation of electrodiagnostic study[15].

Limitation of the study : It was a single centre study. The study population consisted of infants and children mostly from eastern India, hence further studies are required to generalize the findings among the population at large.

Conflicts of interest : None.

References

1 García-García A, Calleja-Fernández J — Neurophysiology of the development and maturation of the peripheral nervous system. *Revista de Neurologica* 2004; **38(1):** 79-83. Source: Pubmed.

2 Berciano J,Garcia A, Calleje J, Antolin FM — peripheral motor and sensory conduction studies in normal infants & children. *Clinical Neurophysiology* 2000; **III:** 513-20.

3 Lawrence DG, Locke S — Neuropathy in children with diabetes mellitus. *Brit Med J* 1963; **(i):** 784.

4 Aleron201 Electromyograph, *Recorders Medicare Systems* (RMS) RMS EMG NCV EP MK II.

5 Enrico P, Antonio U, De Vivo DC, Robert E L — Electrophysiologic correlates of peripheral nervous system maturation in infancy and childhood, *Journal of Child Neurology* 1993; **8:** 336-8.

6 Lambert EH — Neurophysiological techniques useful in the study of neuromuscular disorders. *Res Publ Ass Res Nerv Ment Dis* 1960; **38:** 247-50.

7 Webster HF, Favilla JT — Development of peripheral nerve fibers, Peripheral Neuropathy, vol.1,2nd edition, *Philadelphia, WB Saunders*, 1984; p329-59.

8 Wilbourne AJ : Sensory nerve conduction studies, *J Clin Neurophysiol* 1994; **11:** 584-601.

9 David C, Preston, Barbara E — Shapiro : Electromyography and Neuromuscular disorders, *Clinical-Electrophysiologic correlations*; 2nd edition, 2005; **Chapter 8:** 89-90

10 García A, Calleja J, Antolín FM, Berciano J — Peripheral motor and sensory nerve conduction studies in normal infants and children. *Clin Neurophysiol* 2000; **111(3):** 513-20. doi: 10.1016/s1388-2457(99)00279-5.

11 Gamstorp I, Shelburne SA — Peripheral sensory conduction in ulnar and median nerves of normal infants,children and adolescents, *Acta PediaScand* 1965; **54:** 309-13.

12 Meyhaler JM, Tuel SM, Cross LL, Reichart RT, Wertsch JJ — VV Electrophysiologic analysis of SNAP amplitude in orthodromic and antidromic studies. *Electromyogr Clin Electrophysiol* 1994; **34(6):** 323-9.

13 Brismar T, Cooray G, Sundgren M, Hyllienmark L — On the physiology of cognitive decline in type 1 diabetes. *Neurophysiol Clin* 2021; **51(3):** 259-65. doi: 10.1016/j.neucli.2021.02.005. Epub 2021 Mar 17.

14 Lang AH, Forsström J, Björkqvist SE, Kuusela V — Statistical variation of nerve conduction velocity. An analysis in normal subjects and uraemic patients. *J Neurol Sci* 1977; **33(1-2):** 229-41. doi: 10.1016/0022-510x(77)90196-4.

15 Ki-Hoon Kim — Ultrasonographic evaluation of Sural nerve for NCS, 2014.

Original Article

Prevalence and Risk Factors for Exposure of Healthcare Professionals of Delhi (India) to Physical and Psychological Violence: A Cross-Sectional Study

Shikha Bassi[1], Rajni Bansal[2], A K Khokhar[3], Vinay Aggarwal[4]

Background : Workplace violence against healthcare professionals is a global endemic leading to increased stress affecting their psychology, lowering their productivity, performance, dissatisfaction and increasing turnover.

Materials and Methods : A cross-sectional survey was conducted among 469 healthcare professionals from 8 hospitals (four Public and four Private) of Delhi (India), to estimate the prevalence of Physical and Psychological workplace violence against healthcare professionals and to identify the associated factors.

Results : In total, 469 healthcare workers including, nurses (39.7%), doctors (33.6%) and paramedical staff (26.7%) participated. The study participants had experienced more Psychological violence (41.5%) in the preceding year compared to the physical (5.3%) violence. Verbal, physical violence and bullying, has been reported more compared to female counterparts. All three types of violence (verbal, physical and bullying) were reported more by physicians, staff who come in direct physical contact with patients, public hospitals and participants working in the night shifts. The incidents of physical and verbal violence reported more in emergency departments whereas, bullying in OPDs. Verbal abuse reported higher among older participants (>50 years) whereas, physical violence among the age group below 50 years. Doctors had four times higher odd of being verbally abused as compared to paramedical staff. Staff working in Private hospitals had 57% less odds of being verbally abused than their government counterparts. The odds of verbal violence were half at IPDs as compared to OPDs.

Conclusion : Need to introduce strict policy measures and their enforcement by the Indian Government to ensure workplaces are safe and secure for healthcare workers.

[*J Indian Med Assoc* 2023; **121(12):** 51-8]

***Key words* : Violence, Workplace Violence, Physical Violence, Psychological Violence Healthcare Professionals, Healthcare Providers.**

Workplace Violence (WPV) against healthcare professionals has become endemicall over the world[1], which significantly threatens their safety. This leads to increased stress amongst healthcare professionals affecting their psychology at the workplace, lowering their productivity, performance, dissatisfaction with work and increasing turnover[2]. 8%-38% of health professionals are the victims of any form of WPV, and many are intimidated[3]. Before COVID-19, violence against healthcare professionals was documented in clinics and hospitals, globally as well as in India and this has now become an escalating concern. The study by the Indian Medical Association (IMA) on violence against healthcare professionals has reported that more than 75% medical practitioners have confronted violence at some point of their practice and out of this, 68.3% were committed by the patients' attenders.

Editor's Comment :

- Addressing the rising occurrences of violence necessitates a comprehensive strategy that involves implementing government policies and regulations to establish a secure working environment.
- Training healthcare workers to deal with workplace violence, developing soft skills, and patient education are necessary to reduce such incidents.

The COVID-19 pandemic has been posing a threat to everyone, including the healthcare community. The pandemic put unprecedented demands on health systems, causing healthcare providers to struggle to keep pace with the increased needs, causing widespread disruptions in the delivery of healthcare services. Apart from many cases of violence occurring during routine medical practice,these incidents got further aggravated against the healthcare workers during the pandemic around the world, including India.

[1]PhD Scholar, Chitkara Business School, Chitkara University, Rajpura Punjab 140401 and Manager - Executive & FPM Programs - International Institute of Health Management Research, New Delhi 110075 and Corresponding Author

[2]PhD, Associate Professor, Chitkara Business School, Chitkara University, Rajpura Punjab 140401

[3]DNB (Hospital Administration), Adjunct Professor, Department of Hospital Management, International Instiute of Health Management Research Delhi 110075

[4]MBBS, Chief Managing Director, Pushpanjali Medical Centre, Ghaziabad, Uttar Pradesh 201012 and Past National President, IMA

Received on : 25/08/2023
Accepted on : 10/12/2023

The Corona Virus stress has been leading to unknown fears, anxiety, despair, boredom, sleeplessness, anger, obsessive thoughts, etc. which may again be a precursor to violent indulgence. The lack of any actions taken against perpetrators of violent incidents is also responsible for increased violence. The surveillance system for attacks on healthcare professionals by the WHO revealed that 2134 attacks across 17 countries and territories during the period of March 2020 to November, 2020 resulted in 690 deaths 1108 injuries[4].There has been a sharp increase in incidences of assaults against healthcare professionals in India, being 155 in 2020 against the 49 in 2017 making it one of the most dangerous countries for healthcare workers[5].

A series of efforts at the international and national levels have been undertaken to prevent workplace violence against healthcare professionals. The International Labour Office, International Council of Nurses and World Health Organization have collaboratively developed the Framework guidelines for addressing workplace violence in the health sector to support the development of violence prevention policies in non-emergency locations[7]. The Medical Protection Act 2013, was enacted to prohibit violence against Medicare service persons and harm to property in Medicare service institutions and for matters connected therewith[8]. With the upsurge in the incidences of violence during COVID-19, the Government of India took it very seriously and promulgated an Ordinance by passing the Epidemic Disease (Amendment) 2020, to protect healthcare workers and personnel, providing the most important services. This ordinance made such offences as "cognizable and non-bailable offences" with zero tolerance. These amendments served to fill the gaps in existing laws which were deficient in protecting healthcare professionals against workplace violence and at home[9]. Despite these measures, healthcare workers have been continuously facing threats and violence, amidst pandemics, which is jeopardizing the country's future progress. With this background, this study had been conducted to estimate the prevalence of Physical and Psychological violence suffered by the healthcare professionals of Delhi (India) at their workplace and to identify the factors (risk and protective) associated with those experiences of physical and psychological violence.

Materials and Methods

Study design, settings and participants

A cross-sectional survey was conducted in 8 hospitals (four Public and four Private) of Delhi (India). The study involved all categories of professional staff ie, doctors, nurses and para-medics. The study was conducted from July, 2021 to August, 2021. The rationale for choosing hospitals in Delhi as studysite, being the CapitalState with a huge caseload for all diseases. The healthcare workers in Delhi are overburdened, which further leads to more violence. Delhi is also the State where patients from many other cities and States come to access healthcare, so it provided a representative sample for our study. These hospitals were selected from all four zones of Delhi (North, East, West, and South) to ensure equal representation. The convenience sampling technique was used for the selection of hospitals and participants (selection of participants from tertiary care, representatives from multiple departments).

The sample size for the study was determined using the Arbitrary SS formula. Assuming that 50% of the participants have experienced WPV e=0.05 (marginal error), with a 95% confidence level, 10% non- response rate. For our study, we determined that a minimum sample size of 422 participants, including physicians, nurses and support personnel.

The inclusion criteria were participant's consent to participate in the survey, their age being more than 18 years to 65 years, recruited from private and public hospital for the study, posted in emergency/ IPD / OPD or laboratory and having a minimum oneyear ofworking experience in the selected hospital.

Data collection, survey instrument and measures:

The survey was conducted to estimate the prevalence of physical and psychological workplace violence against the healthcare professionals of Delhi (India) and to identify the factors (risk and protective) associated with those experiences of Physical and Psychological violence. The study is based on World Health Organization definition of workplace violence which is broad enough to cover various outcomes related to physical violence, psychological violence, verbal abuses, bullying and sexual harassment. It is defined as "*incidents where staff are abused, threatened or assaulted in circumstances related to their work (including commuting to and from work), involving an explicit or implicit challenge to their safety, well-being or health*"[10,11].

The data with the study participants (doctors, nurses and para-medical staff) was gathered using questionnaire developed collaboratively by the International Labour Office (ILO), World Health Organization (WHO), International Council of Nurses and the Public Service International in 2003. This

questionnaire has been used in earlier studies in both the developed and developing countries as a validated and standardized, self-administered instrument[11-12]. This comprises of 5 sections, and 63 ie, Personal and workplace data (16), Physical workplace violence (03), Psychological workplace violence (36), Health sector employer (05) and Opinions on workplace violence (03). It included both multiple-choice questions and a few open-ended questions[13].

To test and ensure content validity, the study instrument, the questionnaire along with the blueprint objectives were sent to healthcare industry experts (n=15). Responses were sought using email and telephonic reminders. The modifications proposed by the expert group such as changing the age from categorical to continuous variable, deletion of the sections on ethnic minority identification, racial har assment and inter-country migration were made.The survey was pilot tested in the month of October 2020 with healthcare workers (n=53) of various disciplines (Doctors/Nurses and Paramedical staff) of Government and Private hospitals, using web based google form. The internal consistency was found to be 0.88, which is a high reliability of the questionnaire. The participants response to the questionnaires clarity and understandability was obtained. As per participants response, the questionnaire required 10-15 minutes for completing the same. Apart from the experts, feedback was also sought from working healthcare professionals, in order to make further modifications.

Ethical approval for the study was obtained from the Human Ethical Committee of Chitkara University (Approval No: EC/NEW/INST/2020/531/44).

Statistical analysis

The statistical analyses were performed using SPSS version 26.0 software (SPSS Inc, Chicago, Illinois, United States of America). Descriptive statistics were used to characterize the health staff's demographic characteristics. The threshold for significance was set at $p<0.05$. The independent variables were gender, professional type, educational status, department, type of hospital, shift wise duties, number of years of experience. Violence and type of violence (physical, verbal, psychological, bullying, sexual harassment) were treated as dependent variables. To assess the association between individual demographic and workplace characteristics and exposures to different types of violence univariate logistic regression models were used.

Results

Study participants' characteristics :

Of the total 552 healthcare workers approached to participate, 469 healthcare workers including, nurses (n=186, 39.7%), doctors (n=158,33.6%) and paramedical staff (n=125, 26.7%) participated in our study with participation rate of 85.0%. 53.1% of the study participants were from private and the other counterpart, 46.9% from public facilities. The percentage of male respondents was 51.2% and females was 48.8%. The participant median age was 34 years while the interquartile range was between 29-40 years. Experience-wise analysis of responses showed that 33.7% had experience between 1-5 years and 13.4% of participants had more than 21 years of experience. Two third of the respondents were involved in performing night shifts (67.3%) while other one third performed day duties only ie, 32.7%. Similarly, two third of respondents had routine direct physical contact with the patients (66.1%) (Table 1).

In comparison to physical (5.3%) violence, the study participants had experienced more psychological violence in the preceding year. In terms of psychological

Table 1 — *Descriptive characteristics of the study participants (N= 469)*

Characteristic		Frequency (N)	Percentage (%)
Facility Type	Private hospital	249	53.1
	Governmental hospital	220	46.9
Gender	Male	240	48.8
	Female	229	51.2
Age (in years)	20-35	268	57.1
	36-50	164	35
	Above 50	31	6.6
Marital Status	Unmarried	126	26.9
	Married	335	71.4
	Divorced	4	0.9
	Widowed	4	0.9
Job Category	Nurses	186	39.7
	Doctors	158	33.7
	Paramedical staff	125	26.7
Full-time Job	469	100	
Job Experience	1 - 5 years	158	33.7
	6 - 10 years	94	20
	11 - 15 years	107	22.8
	16 - 20 years	47	10
	Over 20 years	63	13.4
Department	Emergency department	127	27.1
	IPD	99	21.1
	Laboratory services	62	13.2
	OPD	176	37.5
Shift Duty	Yes	324	69.1
	No	145	30.9
Night Duty/shift	Yes	321	68.4
	No	148	31.6
Direct Physical Contact with Patient	Yes	310	66.1
	No	159	33.9

violence, verbal abuse was more frequently reported (32.6%) than was bullying (8.3%) and sexual violence was (0.6%)(Tables 2, 3 & 4)

Table 2 describes the occurrence of proportional wise physical violence amongst different subgroups.

Table 2 — *Prevalence of Physical Violence among the study participants (n=469)*

Overall Physical Violence		**5.3% (25/469)**	
Factor	**%**	**Factor**	**%**
Gender		**Employment sectors**	
Male (n=226)	5.8	Private (n=249)	3.6
Female (n=218)	4.8	Governmental (n=220)	7.3
Age groups (in years)		**Night shift**	
20-35 (n=268)	5.4	Yes (n=299)	6.9
36-50 (n=164)	5.2	No (n=145)	2.0
51 and above (n=31)	3.2	**Routine direct physical contact with patients**	
Marital status		Yes (n=310)	5.8
Divorced (n=4)	0	No (n=159)	4.4
Married (n=335)	4.5	**Primary department**	
Unmarried (n=126)	7.9	Out-patient (OPD) (n=176)	6.3
Widowed (n=4)	0	Emergency (n=127)	7.2
Professional group		In-patient (IPD) (n=99)	2.0
Doctor (n=158)	9.5	Laboratory (n=62)	3.2
Nurses (n=186)	2.2	**Violence reporting procedures in workplace**	
Paramedical (n=125)	4.8	Yes (n=351)	4.8
Work experience (years)		No (n=118)	6.8
1 to 5 (n=158)	6.3	**Perpetrators**	
6 to 10 (n=94)	5.3	Relatives of the patients	75
11 to 15 (n=107)	7.5	Patients	13
16 to 20 (n=47)	0	Supervisors/Managers	12
21 and above (n=63)	3.2		

Table 3 — *Prevalence of Verbal Violence among the study participants (n=469)*

Overall Verbal Violence		**32.6% (153/469)**	
Factor	**%**	**Factor**	**%**
Gender		**Employment sectors**	
Male (n=226)	35.4	Private (n=249)	24.1
Female (n=218)	29.7	Governmental (n=220)	42.3
Age groups (in years)		**Night shift**	
20-35 (n=268)	30.2	Yes (n=299)	38.3
36-50 (n=164)	33.5	No (n=145)	20.3
51 and above (n=31)	41.9	**Routine direct physical contact with patients**	
Marital status		Yes (n=310)	35.2
Divorced (n=4)	25.0	No (n=159)	27.8
Married (n=335)	33.7	Primary department	
Unmarried (n=126)	29.4	Out-patient (OPD) (n=176)	36.9
Widowed (n=4)	50.0	Emergency (n=127)	37.8
Professional group		In-patient (IPD) (n=99)	23.2
Doctor (n=158)	51.3	Laboratory (n=62)	24.2
Nurses (n=186)	24.7	**Violence reporting procedures in workplace**	
Paramedical (n=125)	20.8	Yes (n=351)	29.6
Work experience (in years)		No (n=118)	41.5
1 to 5 (n=158)	27.8		
6 to 10 (n=94)	40.4		
11 to 15 (n=107)	33.6		
16 to 20 (n=47)	36.2		
21 and above (n=63)	28.6		

The male healthcare professionals reported slightly more physical violence than the female participants (5.8% *versus* 4.8%). Healthcare professionals around 50 years of age and below reported more incidences of physical violence (10.6%) than those above 50 years of age (3.2%). Unmarried staff (7.9%) reported a greater proportion of physical assault incidents than married staff (4.5%). Physicians (9.5%), and paramedical staff (4.8%) reported the highest prevalence of physical violence than other categories. People with work experience of less than 15 years reported a higher number of incidents (19.1%) than people who had more than 15 years of work experience (3.2%). Staff working in the public sector hospitals reported double the number physical violence incidents (7.3%) than their counterpart in private hospital (3.6%). Participants working in night shifts (6.9%) reported a higher proportion of physical violence than staff working only in day shifts. Maximum incidents of physical violence occurred in emergency (7.2%) followed by OPD units (6.3%). The healthcare workers from hospitals having violence reporting procedures reported a lesser proportion of physical violence incidents (4.8%) in the last one year as compared to healthcare worker from hospitals without such procedures (6.8%). The main perpetrators of physical violence incidents (75%) were the patients' relatives in the last one year followed by patients themselves for 13% and supervisors/ managerial level staff responsible for 12% of the incidents of physical violence.

Prevalence of Verbal Violence :

The verbal violence (32.6%) was more common than physical violence (5.3%). A larger proportion of male participants (35.4%) reported verbal violence as compared to female participants (29.7%). 30%-42% of working professionals in our study from different age groups were the victims of verbal violence in the past one year. It was more amongst older participants (41.9%) than in younger participants (30.2%). More than half of the healthcare workers reported being abused verbally in the past 12 months as compared to 25% of the nurses and nearly 20% of the paramedical staff. In 42% of the staff from the government/public hospital

Table 4 — *Prevalence of bullying among the study participants (n=469)*

Overall Bullying		8.3% (39/469)	
Factor	**%**	**Factor**	**%**
Gender		**Employment sectors**	
Male (n=226)	10.8	Private (n=249)	4.8
Female (n=218)	5.7	Governmental (n=220)	12.3
Age groups (years)		**Night shift**	
20-35 (n=268)	6.0	Yes (n=299)	10.2
36-50 (n=164)	11.6	No (n=145)	4.1
51 and above (n=31)	9.7	**Routine direct physical contact with patients**	
Marital status		Yes (n=310)	10.0
Divorced (n=4)	0	No (n=159)	5.1
Married (n=335)	9.9	**Primary department**	
Unmarried (n=126)	4.8	Out-patient (OPD) (n=176)	10.2
Widowed (n=4)	0	Emergency (n=127)	8.7
Professional group		In-patient (IPD) (n=99)	5.1
Doctor (n=158)	11.4	Laboratory (n=62)	4.8
Nurses (n=186)	7.5	**Violence reporting procedures in workplace**	
Paramedical (n=125)	5.6	Yes (n=351)	7.7
Work experience (years)		No (n=118)	10.2
1 to 5 (n=158)	3.8		
6 to 10 (n=94)	13.8		
11 to 15 (n=107)	7.5		
16 to 20 (n=47)	8.5		
21 and above (n=63)	12.7		

reported verbal violence as compared to 24% of the private hospital staff. More verbal violence was reported by participants working in night shifts (38.3%) as compared to those working in day shift only (20.3%). A largest proportions of verbal violence incidents occurred in emergency (37.8%), and OPD units (36.9%). A larger proportion of verbal violence events were also reported at the workplaces having no violence reporting procedures (41.5%), as compared to workplaces where such procedures were available (29.6%) (Table 3).

Prevalence of Bullying :

As compared to verbal abuses (32.6%), the incidents related to bullying were reported by a few staff (8.3%) in the past 12 months. More male staff (10.8%) reported being bullied as compared to the female staff (5.7%). There was no clear pattern among the age groups, but married staff reported being bullied more (9.9%) than the unmarried staff (4.8%). Bullying incidents were reported more often by the physicians (11.4%), healthcare professionals working in public hospital (12.3%), and the staff working in night shifts (10.2%). Most of the incidents were reported by the staff working in OPDs (10.2%) (Table 4).

Prevalence of Sexual Violence :

Only three respondents reported sexual violence (0.6%) in the past 12 months among our study participants, so drawing any assumption based on the subgroups would be incorrect. It would require a larger sample size to understand the patterns clearly.

Associated factors of Violence :

Despite frequency analysis highlighting more physical violence among physicians as compared to paramedical staff and the nurses, the findings were not statistically significant in the univariate logistic regression (Table 5). Despite a wide difference in the proportions of physical violence amongst staff from the government *versus* private hospitals, no statistical significance was found based on the set p-value of less than 0.05. As per the univariate analysis, staff working in the day shift had 1/4th the odds of facing physical violence as compared to the staff working night shifts. Doctors had four times higher odd of being verbally abused as compared to paramedical staff. Staff working in Private hospitals had 57% less odds of being verbally abused than their government counterparts. The odds of verbal violence were half at Inpatient Department (IPDs) as compared to Outpatient Departments (OPDs). The odds of verbal violence reporting at a workplace without violence reporting procedures were 68% more than that of a workplace with violence reporting procedures. With regards to other forms of psychological violence, that is bullying, staff with lesser work experience had lesser odds (1-5 years) of bullying as compared to staff with more experience (21 years and above). Private hospital staff had 64% less odds of being bullied than their government counterparts. Due to lower number of sexual violence events, no assumption can be drawn from the univariate logistic regression (Table 5).

Discussion

This is one of the few studies that estimated the prevalence of workplace violence amongst healthcare professionals and identified associated factors therewith. This study included all category of healthcare professionals (physicians, nurses and paramedical staff) in public as well as private sector hospital in Delhi(India). As of now, all over the world, most of the studies related to violence against healthcare professional currently are related to individual department functioning of hospital or are related to individual categories of staff viz doctors, nurses etc[3,15-17]. Our study attempted to look at workplace violence in an integrated manner enrollinga representative sample of diverse range of healthcare professionals (physicians, nurses and paramedical

Table 5 — *Factors associated with physical and psychological violence in healthcare professionals according to univariate logistic regression with Odd ratio and 95% Confidence Interval (CI)*

	Physical		Verbal		Bullying		Sexual	
Risk factor	p-value	OR (95% CI)	p-value	OR (95% CI)	p-value	OR (95% CI)	p-value	OR (95% CI)
Gender								
Female	0.62	0.81 (0.36-1.83)	0.18	0.77 (0.52-1.13)	0.04	0.49 (0.24-0.99)	0.59	0.52 (0.47-5.79)
Male	–	1.0	–	1.0	–	1.0	–	1.0
Age groups (years)								
20-35	0.57	1.80 (0.23-14.17)	0.28	0.66 (0.31-1.40)	0.50	0.64 (0.17-2.33)	0.98	0.00 (0.00-0.00)
36-50	0.58	1.78 (0.21-14.62)	0.42	0.73 (0.33-1.58)	0.72	1.25 (0.34-4.53)	0.98	0.00 (0.00-0.00)
51 and above	–	1.0	–	1.0	–	1.0	–	1.0
Marital status								
Divorced/ Widowed	0.99	0.00 (0.00-0.00)	0.62	1.44 (0.32-6.35)	0.99	0.00 (0.00-0.00)	0.99	0.00 (0.00-0.00)
Married	0.14	0.54 (0.23-1.24)	0.37	1.22 (0.78-1.91)	0.87	2.18 (0.89-5.35)	0.81	0.75 (0.67-8.35)
Unmarried	–	1.0	–	1.0	–	1.0	–	1.0
Professional group								
Doctor	0.14	2.08 (0.78-5.52)	<0.01	4.00 (2.35-6.82)	0.95	2.16 (0.87-5.36)	0.99	0.00 (0.00-0.00)
Nurses	0.20	0.43 (0.12-1.57)	0.42	1.25 (0.72- 2.15)	0.50	1.37 (0.53-3.50)	0.99	0.00 (0.00-0.00)
Paramedical	–	1.0	–	1.0	–	1.0	–	1.0
Work experience (years)								
1 to 5	0.36	2.06 (0.43-9.68)	0.91	0.96 (0.50-1.84)	0.02	0.27 (0.09-0.81)	–	1.0
6 to 10	0.52	1.71 (0.32-9.11)	0.13	1.69 (0.85-3.36)	0.26	1.10 (0.42-2.83)	–	1.0
11 to 15	0.26	2.46 (0.50-11.99)	0.49	1.26 (0.64-2.49)	0.48	0.55 (0.19-1.56)	0.99	0.00 (0.00-0.00)
16 to 20	0.99	0.00 (0.00-0.00)	0.39	1.41 (0.63-3.17)	0.83	0.64 (0.18-2.26)	0.99	0.00 (0.00-0.00)
21 and above	–	1.0	–	1.0	–	1.0	–	1.0
Employment sectors								
Private	0.84	0.47 (0.20-1.10)	<0.01	0.43 (0.29-0.64)	0.05	0.36 (0.17-0.73)	0.99	0.00 (0.00 – 0.00)
Governmental	–	1.0	–	1.0	–	1.0	–	1.0
Night shift								
Yes	–	1.0	–	1.0	–	1.0	–	1.0
No	0.04	0.28 (0.08-0.95)	<0.01	0.52 (0.33-0.82)	0.03	0.38 (0.15-0.93)	0.99	0.00 (0.00-0.00)
Routine direct physical contact with patients								
Yes	–	1.0	–	1.0	–	1.0	–	1.0
No	0.52	0.74 (0.30-1.82)	0.10	0.70 (0.46-1.07)	0.07	0.47 (0.21-1.06)	0.99	0.00 (0.00-0.00)
Primary department								
Out-patient (OPD)		–	1.0	–	1.0	–	1.0	– 1.0
Emergency	0.89	1.06 (0.43-2.60)	0.94	1.01 (0.63-1.62)	0.47	0.75 (0.34-1.63)	0.80	1.41 (0.08-22.7)
In-patient (IPD)	0.10	0.28 (0.62-1.29)	0.01	0.49 (0.28-0.87)	0.09	0.41 (0.15-1.15)	0.99	0.00 (0.00-0.00)
Laboratory	0.31	0.45 (0.99-2.09)	0.52	0.52 (0.27-1.00)	0.14	0.39 (0.11-1.38)	0.45	2.87 (0.17-46.59)
Violence reporting procedures in workplace								
Yes	0.42	1.42 (0.60-3.40)	–	1.0	–	1.0	–	1.0

staff) from both private and public health facilities.

Accordingly, to our study's findings, the majority of the study participants had experienced psychological violence rather than physical or sexual violence in the preceding year. Among the study participants, verbal abuse was more commonly reported than bullying in terms of psychological violence.

Verbal, physical violence as well as bullying, has been reported more compared to female counterparts. With regard to a professional group, all three types of violence (verbal, physical and bullying) were reported more by physicians and other staff who come in direct physical contact with patients. Regarding the type of health facility and shifts, all types of violence have been reported more in public hospitals and participants working in the night shifts, respectively. The incidents of physical and verbal violence tended to be reported more in emergency departments whereas, bullying in OPDs.Verbal abuse tended to be somewhat higher among older participants (>50 years) whereas, physical violence was reported more among the age group below 50 years.

As far the nature of violence, the prevalence of psychological violence was reported to be higher compared to physical violence in our study. Our study findings corroborate to studies conducted in other countries like China, Taiwan, Turkey and in Indian States[13,18-19]. During the first six months of the pandemic, the International Committee of the Red Cross (ICRC) also recorded more than 600 incidents of violence, from 40 countries, against healthcare workers, patients and medical infrastructure concerning COVID-19 cases. Of these incidents,more

than 15% were verbal assaults or threats[20]. The study has been undertaken during the COVID-19 period and more incidents of psychological violence may be due to the higher patient loads due to the pandemic in Delhi (India) and the study state (Delhi) being most severely impacted during both the "first" and "second" waves of COVID-19.

In our study, physicians were more exposed to different kind of violence (verbal, physical and bullying). The univariate analysis reported that doctors had four times higher odd of being verbally abused as compared to paramedical staff. Systematic reviews and meta-analysis found that compared to other healthcare providers, a high prevalence of workplace violence against physicians and nurses[21]. As per the study paper of the Indian Medical Association, in India, almost 75% of the doctors had dealt with one or the other form of violence during their practice. This is similar to the rates from other countries on the continent[22]. The healthcare professionals who come in direct contact with the patients having routine direct physical contact with the patients are in more at-risk settings for violence as a similar has been reported in our study.

Healthcare professionals working in public hospitals were at higher risk to be the victims as compared to professionals working in a private facility. Probably, the differences in this data could be due to more patient load, and specific Standard Operating Procedures (SOPs) against physical workplace violence in private facilities and our study findings confirmed this. The healthcare professionals working in private facilities had 57% less odds of being verbally abused and 64% less odds of being bullied than their government counterparts.

Healthcare professionals with work experience of less than 15 years reported a greater number of physical violence incidents (19.1%) than those who had more than 15 years of work experience (3.2%). This could be due to the fact that younger healthcare professionals had less work experience, which might lead to error in patient care and lack of skills in handling difficult cases. This could be addressed by developing targeted education and training programmes to cope with such cases of violence.

In our study, male healthcare professionals were reported to be at a higher risk of WPV as compared to their female counterparts. The same has been reported and is in agreement with the studies conducted in other countries like China, Italy, Palestine[23-24] as well as in Northern India in an urban tertiary care hospital[30]. This could be because of varying biological, psychological and environmental vulnerabilities in responding to similar condition in a different way. The findings highlight the need for gender-specific interventions to control workplace violence against healthcare professionals.

Strengths and limitation of the study lies in the fact that it is one of the few studies that estimated the prevalence and identified associated factors with workplace violence experienced by a wide range of healthcare professionals (physicians, nurses and paramedical staff) from both public and private healthcare facilities. The data was collected using validated and standardized tool, which was self-administered. There is also the possibility of recall bias because participants may not accurately recall having violence incidents in last one year. The study was conducted among health care professionals from one of the Indian states namely, Delhi and hence, the study findings may not be generalized to entire Indian population of healthcare professionals.

Conclusion

Healthcare workers, like all other workers, have a right to a safe workplace environment. We know and realize that it has become a public health emergency, particularly in light of the COVID-19 scenario and various other contributing factors. Hence, the actions required to mitigate the violence necessitate a multipronged strategy. The menace has to be dealt with at the political, social, administrative, professional, and legislative levels. The issue needs concerted efforts of patients, healthcare providers and other stakeholders. Promulgation of Epidemic Disease (Amendment) Ordinance 2020 by the Government of India had been a right step in this direction. However, there is a need that the Indian government should introduce strict policy measures and their enforcement to ensure workplaces are safe and secure for healthcare workers. The mandatory training of healthcare workers in soft and communication skills, as well as protection and coping mechanisms to prevent and de-escalate such incidents is need of the hour. To ensure safety, there is also a need to provide the right quantity and quality of personal, protective equipment along with medical care. Train the healthcare professionals to use of code Violet. Reporting of violent incidents needs to be encouraged and the victim should be provided Physical, Psychological and legal support. The surveillance of violent incidents by creating a database repository to determine the true scope of the problem and to formulate effective prevention strategies is required.

Keeping in view the suffering of healthcare professionals and consequent quality of medical care, policy and importance of the issue, reducing WPV against health providers should be a component of India's National Health Programmes.

References

1 Zafar W, Siddiqui E, Ejaz K, Shehzad MU, Khan UR, Jamali S, Razzak JA — Health care personnel and workplace violence in the emergency departments of a volatile metropolis: results from Karachi, Pakistan. *The Journal of Emergency Medicine* 2013; **45(5):** 761-72.

2 World Health Organisation: Preventing violence against health workers (2013): Available from https://www.who.int/activities/preventing-violence-against-health-workers. [Last Accessed on Augus 25, 2023].

3 Anand T, Grover S, Kumar R, Kumar M, Ingle GK — Workplace violence against resident doctors in a tertiary care hospital in Delhi. *National Medical Journal of India* 2016; 29(6).

4 World Health Organsiation : Surveillance system for attacks on Health care (SSA);2022. Available from https://extranet.who.int/ssa/LeftMenu/Index.aspx?utm_source=Stopping%20attacks%20on%20health%20care%20QandA&utm_medium=link&utm_campaign=Link_who[Last Accessed on June 25, 2023]

5 Violence against health care during the COVID-19 pandemic in 2020;2021. Available from http://insecurityinsight.org/wp-content/uploads/2021/02/Violence-against-health-care-during-the-COVID-19-pandemic-in-2020-March-2021.pdf[Last Accessed:August 25, 2023].

6 Framework guidelines for addressing workplace violence in the health sector. International Labour Office (ILO), International Council of Nurses (ICN), World Health Organization (WHO), Public Services International (PSI); 2002.Available from https://fctc.who.int/publications/i/item/9221134466#[Last accessed on August 25, 2023].

7 The Delhi Medicare Service Personnel and Medicare Service Institutions (Prevention of Violence and Damage to Property) Act, 2008. Delhi Gaz.;2008. Available from https://www.indiacode.nic.in/handle/123456789/13634?sam_handle=123456789/1362 s[Last accessed August 25, 2023].

8 COVID-19 : Indian government vows to protect healthcare workers from violence amid rising cases. BMJ. 2020 Apr 23;369:m1631. doi: 10.1136/bmj.m1631. PMID: 32327409.

9 Duma S, Mayers P, Banda CK — Violence against nurses in the southern region of Malawi. health sagesondheid 2016; **21(1):** 415-21.Sen M, Honavar SG. It's a doc's life–Workplace violence against doctors. Indian journal of ophthalmology. 2019 Jul;67(7):981.

10 Boafo IM, Hancock P — Workplace violence against nurses: a cross-sectional descriptive study of Ghanaian nurses. *Sage Open* 2017; **7(1):** 2158244017701187.

11 Garg R, Garg N, Sharma DK, Gupta S — Low reporting of violence against health-care workers in India in spite of high prevalence. *Medical Journal Armed Forces India* 2019; **75(2):** 211-5.

12 Niu SF, Kuo SF, Tsai HT, Kao CC, Traynor V, Chou KR — Prevalence of workplace violent episodes experienced by nurses in acute psychiatric settings. *PloS one* 2019; **14(1):** e0211183.

13 Workplace Violence in the Health Sector - Country Case Study Research Instruments- Survey Questionnaire : ILO/ICN/WHO/PSI (2003). Accessed: August 25, 2023: https://www.who.int/publications/m/item/workplace-violence-in-the-health-sector—country-case-study-research-instruments—survey-questionnaire

14 Hossain MM, Sharma R, Tasnim S, Al Kibria GM, Sultana A, Saxena T — Prevalence, characteristics, and associated factors of workplace violence against healthcare professionals in India: a systematic review and meta-analysis. *medRxiv* 2020 Jan 3:2020-01.

15 Sachdeva S, Jamshed N, Aggarwal P, Kashyap SR — Perception of workplace violence in the emergency department. Journal of emergencies, trauma, and shock. 2019; **12(3):** 179.

16 Liu S, Yang L, Zhang C, Xiang YT, Liu Z, Hu S, Zhang B — Online mental health services in China during the COVID-19 outbreak. *The Lancet Psychiatry* 2020; **7(4):** e17-8.

17 Zhao S, Qu L, Liu H, Gao L, Jiao M, Liu J, Liang L, Zhao Y, Wu Q — Coping with workplace violence against general practitioners and nurses in Heilongjiang Province, China: social supports and prevention strategies. *PLoS One* 2016 Jun 21; **11(6):** e0157897.

18 Hacer TY, Ali A — Burnout in physicians who are exposed to workplace violence. *J Forensic Leg Med* 2020; **69:** 101874.

19 International Committee of the Red Cross (ICRC) : 600 violent incidents against health workers : https://www.icrc.org/en/document/icrc-600-violent-incidents-recorded-against-healthcare-providers-patients-due-covid-19.[Last Accessed on: August 25, 2023]

20 Liu J, Gan Y, Jiang H, Li L, Dwyer R, Lu K, *et al* — Prevalence of workplace violence against healthcare workers: a systematic review and meta-analysis. *Occupational and Environmental Medicine* 2019; **76(12):** 927-37.

21 Tian J, Du L — Microblogging violent attacks on medical staff in China: a case study of the Longmen County People's Hospital incident. *BMC Health Services Research* 2017; **17:** 1-6.

22 Maran DA, Cortese CG, Pavanelli P, Fornero G, Gianino MM — Gender differences in reporting workplace violence: a qualitative analysis of administrative records of violent episodes experienced by healthcare workers in a large public Italian hospital. *BMJ open* 2019; **9(11):** e031546..

23 Sun L, Zhang W, Qi F, Wang Y — Gender differences for the prevalence and risk factors of workplace violence among healthcare professionals in Shandong, China. *Frontiers in Public Health* 2022; **10:** 873936.

24 Vaishali V, Chayal V, Khanna P — Violence against resident doctors, its psychological impact and associated factors in accident & emergency department in a tertiary care institute of Haryana. *Indian Journal of Community Health* 2018; **30(4):** 368-72.

Review Article

Court Judgements on Expert Opinion in Medical Negligence Cases — Systematic Review

Gaurav Aggarwal[1], Sharad Kumar Agarwal[2], Poonam Khatri[3]

Background : Litigations against the healthcare providers have been rising in India as well as across the world. Patients expect quick and successful treatment in all situations. Medical negligence errors are a reality but statistics regarding the same are hard to come by. Data from Indian courts revealed a total of 564 decided cases of medical negligence in the past about one year.

Material and Method : Seventy number of decided cases from judgments of Indian courts were studied and systematically analysed within the past one year. Cases were searched and tabulated from results obtained through internet resources. Cases studied for expert opinion for the study were taken from the past one year. Results were analysed using standard chi-square statistical tests.

Observations : The results showed 21.4% cases from District Consumer Courts, 40% from State Commissions, 27.1% from National Commission, 8.6% from High Courts and 2.8% from the Supreme Court of India. In 31.4% of cases medical negligence was adjudged by courts of law, while it took an average of 8.04 years of time for the complainants to get justice. A medical board was empanelled to judge the medical negligence in 34.3% of cases. Expert opinion from the respondent was obtained in 8.6% of cases, and 11.4% by the complainant, while no expert opinion was taken either by the respondent-doctor or the complainant in 70% of cases.

Discussion : About one-third of the cases had been assessed for the question of medical negligence by a panel of State Medical Council or Government hospital and about two-thirds of the cases had been exonerated of the charge of medical negligence by the court. It is also significant for the fact that every case of alleged medical negligence, if supported with an expert opinion by the respondent doctor /medical establishment, even in the absence of an order of the court, is likely to exonerate him of the charge of medical negligence.

Conclusion : It is suggested that the Government amend Section 45 of IEA to make it more comprehensive and that the opinion of an expert is made mandatory to prove or disprove medical negligence.

[*J Indian Med Assoc* 2023; **121(12):** 59-63]

***Key words* : Court Judgements, Medical Negligence Cases.**

With increasing reach of social media and consequential awareness of the masses in dealing with unexpected results of medical treatment, litigations against the healthcare providers have been rising in India[1-4] as well as across the World[5-7]. According to a study, the number of cases of medical negligence has seen a rise of an alarming 110% every year in India (year on year) and 12% of all cases decided by consumer courts are on medical negligence[1]. Medical treatment is not infallible, yet patient expectations demand quick and wholly successful results of treatment. However, patients cannot be squarely blamed for their lack of awareness of how medical science works. Medical negligence errors are a touchy subject in India, healthcare providers are shy in sharing information of the same and this coupled with non-existing framework to report and collect such data, the real world statistics relating to medical negligence cases is hard to come by. However, sparingly available data suggests that the problem of medical negligence errors is more than what is believed to be. Haryana Government's panel on medical negligence found that out of 112 complaints received between June, 2017 to Jan, 2019, only 15% of medical negligence cases were genuine and there

Editor's Comment :

- Expert opinion, from a panel of specialists in the field, should be taken in all cases of medical negligence.
- Reliable and reputable textbook references must be supported with the expert opinion of subject specialists.
- The Indian Medical Association, or the Speciality Association of the speciality subject in question, should be approached by the respondent-doctor, despite an opinion from the State Medical Council, to obtain an opinion into the allegation of medical negligence.

[1]MD, Professor and Head, Department of Forensic Medicine, Venkateshwara Institute of Medical Sciences, Amroha, UP 244236 and Corresponding Author

[2]MD, Professor Head, Department of Forensic Medicine and Toxicology, Krishna Mohan Medical College & Hospital, Mathura, Uttar Pradesh 281001

[3]LLB, Advocate, Department of Law, Tis Hazari Courts, New Delhi 110054

Received on : 01/12/2023
Accepted on : 07/12/2023

was no medical negligence either from doctors' side or medical establishments' side in 85% of cases[8]. In the year 2019, a total of 2638 cases came up at the District level and in the same year, a total of 435 cases were pursued by the appellants to the State Commission or the National Commission[9]. Authentic data from canfonet search (Indian database of all decided cases) showed a total of 564 decided cases of medical negligence between 1st January, 2023 and 15th November, 2023 (10.5 months) from all District, State, National Consumer Commissions, High Courts (including circuit benches) and the Supreme Court. The number of cases may be much higher if the data that has not yet been uploaded on Canfonet by Consumer Courts is included (likely 2 times). This will further rise if data of pending cases is included (likely 10 times of which are decided/year), out of court settlements (likely 5 times the number of decided cases/year). The total number of medical negligence cases at any given time may be about ten thousand. If this is compared with the total number of MBBS doctors in the country (about 13 lakhs), then about one out of thirteen MBBS doctors has a case of medical negligence against them.

Legal position :

Expert evidence is described under Sec. 45 to 51 of the Indian Evidence Act (IEA). The general rule is that the opinion of experts is not admissible as evidence, however with the advent of time the law relating to expert evidence has evolved and come a long way through the law of precedents. It is well known to the legalist that the Evidence Act does not apply to the Consumer Courts. The hon'ble SC has held in 2010 Legal Eagle (SC) 155 (para 8)[10] and Malay Kumar Ganguly *Vs* Dr. Sukumar Mukherjee[11] that complaints before the consumer fora are tried summarily and the strict Evidence Act does not apply. The same has also been held in the case of Indian Medical Association vs VP Shantha[12]. Section 1 of the IEA also provides that it is applicable to judicial proceedings in civil, criminal and court-martials, but not to arbitration proceedings and affidavits. The hon'ble SC has held that "the Consumer Commission is merely to comply with the principles of natural justice, save and except the ones laid down under Sec 13(4) of the CPA 1986"[11]. They must conduct themselves in accordance with principles of natural justice, equity and good conscience (Figs 1&2).

Who is an Expert ?

Expert opinion is not defined under Indian law, while an expert is defined under section 45 of the IEA 1872. Indian Evidence Act Chapter 2- Opinions of third persons when relevant: "45. Opinions of experts- When the Court has to form an opinion upon a point of foreign law or of science, or art, or as to the identity of handwriting, the opinions upon that point of persons specially skilled in such foreign law, science or art, are relevant facts. Such persons are called experts." Qualified medical doctors are covered under science & art. If an expert is giving an opinion, it is considered as a relevant fact for the case. An expert has devoted his time in learning a special branch of expertise and thus is specially skilled in the subject. It can include superior knowledge and/or practical experience.

Evidentiary value of an Expert Opinion :

There are two types of evidence, namely data evidence and opinion evidence and Expert Evidence constitutes the latter[13]. The report given by the expert is relevant and admissible in a Consumer Court. If any

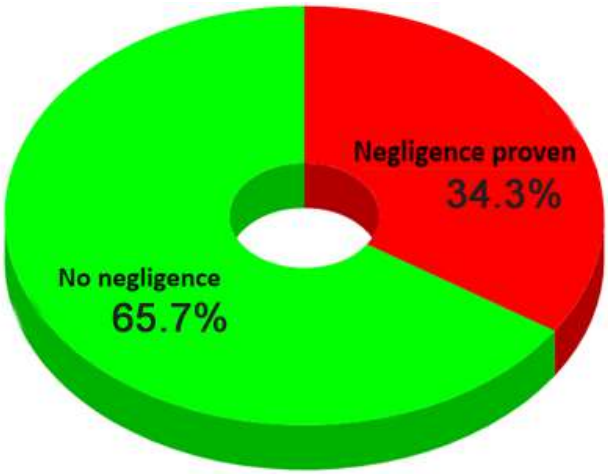


Fig 1 — Medical negligence

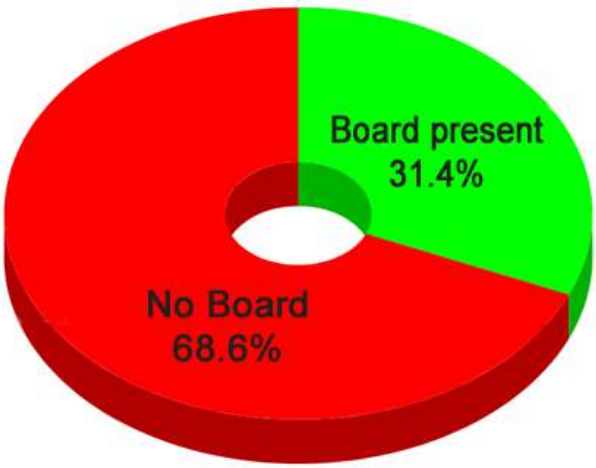


Fig 2 — Medical board

oral evidence contradicts the data or report, it will not make the evidence invalid. But, as per section 46 IEA (Facts bearing upon opinions of experts- Facts, not otherwise relevant, are relevant if they support or are inconsistent with the opinions of experts, when such opinions are relevant), if any fact is in contradiction to the opinion of the expert, then that fact becomes relevant. As far as determining negligence is considered, courts have to depend on the advice of experts, except in cases of blatant violation of protocol (*res ipsa loquitur*) and doing things which are considered to be unreasonable and imprudent. The level of subjectivity in such decisions is quite high and the purpose of law to be certain and specific is defeated to a large extent[14].

Before prosecuting medical professionals for the offence of criminal negligence, a Criminal Court should obtain opinion of the medical expert and if from such opinion, a prima facie case of criminal negligence is made out against a medical professional, only then the machinery of criminal law should be set into motion[15].

As a part of the defence put up by the respondent doctor / medical establishment, there are several weapons available in the legal armamentarium to save themselves. Among the defences available to the defendant against medical negligence like no duty owed, duty discharged according to prevailing standards, no act of commission or omission, complications of treatment, therapeutic misadventure, emergency situation, error of judgement, supporting expert opinion, contributory negligence, vicarious liability, *res judicata*, limitation, fraudulent concealment, informed consent, *novusactusinterveniens*, etc, the average defendant-doctor is not legally sound enough to realise the value of these defences, and more importantly when to use which defence. The objective of this paper is to analyse the legal value, admissibility, framework and the current practice of expert opinion in medical negligence cases decided by Indian courts of law (Fig 3).

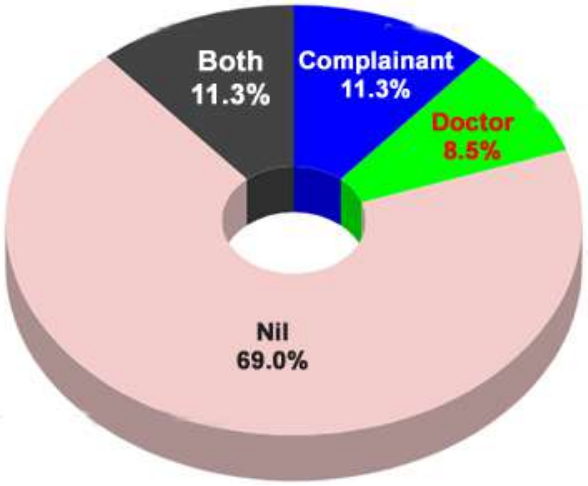


Fig 3 — Expert opinion at individual level, by whom taken

Material and Method

Judgements of Indian courts of law were studied and systematically analysed with the following inclusion criteria - cases with allegation of medical negligence, qualified medical doctors, consumer or criminal court, and within the past one year. Cases of medical negligence of unqualified medical practitioners, before the past one year and cases without any allegation of medical negligence were excluded from the study. Cases were searched and tabulated from results obtained through the following websites - canfonet, casemine, Indiankanoon, using Google as the search engine. While data was collated using the search words 'medical negligence' for the past 10 years; the cases studied for expert opinion for the study were taken from the past one year. Seventy cases were studied for the present study with the following parameters - gender of patient-complainant, type of court, level of court, whether medical negligence was proved or not, whether board of doctors was empanelled or not, whether expert opinion was taken or not, compensation granted and main reason for adjudging medical negligence of the respondent doctor/hospital. Standard chi-square tests were applied to analyse the statistical significance.

Observations

The systematic review of seventy cases studied showed that there were 53% (n=37) of males as compared to 47% (n=33) of female patients(victims of medical negligence). At 40% (n=28), majority of cases were from the State Consumer Commission (SCDRC), while about one-fourth, at 21.4% (n=15) were decided in District Consumer Commissions (DCDRC), a quarter (27.1%, n=19) coming from the National Commission, while only 8.6% (n=6) were from the High Courts including Circuit benches, and only 2.8% (n=2) were from the Supreme Court of India, thereby implying that majority cases either went in appeal to the State Commission(after having lost in the District Commission) or were directly filed there(being of amount claimed to be more than 20 lakhs but less than 1 crore). Medical negligence was adjudged in approximately one-third of cases (31.4%, n =22) of cases by the hon'ble courts of law, while it took an

average of 8.04 years of time for the complainants to get justice (irrespective of the number /level of courts appealed to). A medical board was empanelled to judge the medical negligence in only one-third of cases (34.3%, n=24), thereby leaving almost two-thirds of cases without a lawful medical board of experts to comment on the question of medical negligence. Expert opinion, at the individual level, from the respondent (doctor/medical establishment) was obtained in 8.6% (n =6) of cases, and 11.4% (n =8) by the complainant (patient or attendants), while an expert opinion was obtained by both complainant and respondent in 11.4% (n =8) of cases. No expert opinion supporting thee defence or the allegations, whatsoever, was obtained either by the respondent-doctor or the complainant in a large majority (70%, n=49) of cases. The average compensation awarded was 8.95 lakh rupees out of 22 cases in which compensation was awarded against the respondent doctors/hospitals, the highest being 162 lakhs and the lowest 1 lakh rupees only. In 70% (n=49) cases, no compensation whatsoever was awarded to the complainants by courts in India. To correlate the data of court-decided non-negligent defendants with the presence of a medical board in the cases, and vice-versa, the Chi-square test was applied and the association between negligence and presence of a board was found statistically not significant (p=0.429). The odds of having no negligence, when a board of experts is present, is 0.66 which is lesser by 0.34 for having negligence (p=0.431). Although it is not statistically significant (may be attributable to small sample size), the higher odds ratio shows that the probability of having odds of no negligence (66%) increases if a board of experts is present. This odds ratio was calculated using logistic regression through SPSS software. The *p* value less than 5% is considered as significant.

Discussion

The defendant-doctor has to provide a solid rebuttal in order to defend himself in the court in an attempt to put his best foot forward. There is no parliament-enacted law on medical negligence. Courts of law, whether under consumer courts or criminal courts, in India rely on the Law of Precedents to adjudge a matter of alleged medical negligence. In this regard, the landmark judgement in the case of *Jacob Mathew Vs. State of Punjab* by the hon'ble Supreme Court of India, is relied upon with authority by the courts, and the same adjudged the matter of medical negligence, thus[16] - "The 3 essential components of medical negligence are:- (1) Duty- the existence of a duty to take care, which is owed by the doctor to the patient; (2) Breach- the failure to attain that standard of care, prescribed by the law, thereby committing a breach of such duty; and (3) Resulting damage- damage, which is both causally connected with such breach and recognized by the law, has been suffered by the complainant (Para 1.23). If the claimant (complainant) satisfies the court on the evidence that all the three ingredients are made out, the defendant (accused) should be held liable in negligence (Para 1.24).

It is interesting to note that the above systematic analysis infers that about one-third of the cases had an opinion into the question of medical negligence taken by a panel of doctors, either the State Medical Council or a Government hospital-appointed panel, and approximately two-thirds of the cases had been exonerated of the charge of medical negligence by the court. It is a significant and comforting observation for the doctor in the private sector who is equated with a trader of goods under the CPA 2019 (Sec 2.6). It is also significant for the fact that every case of alleged medical negligence, if supported with an expert opinion by the respondent doctor /medical establishment, even in the absence of an order of the court, is likely to exonerate him of a charge of medical negligence. The same is often ignored or undervalued by the respondent doctor, while preparing the Written Statement (WS) for the purpose of court. Imagine a scenario where a complainant has produced a supporting expert opinion in his favour from a specialist doctor and won the case while the respondent doctor failed to do so in the overconfidence that he will win the case in the court as he has done nothing wrong! The importance of an expert opinion cannot be overemphasised in the cases of medical negligence.

According to Section 45, the opinion by an expert, if proper, is admissible as a relevant fact in a given case. Moreover, any other fact, which was otherwise irrelevant, will become relevant if it either supports or contradicts the opinion of the expert[17]. It is important to note that expert testimony is only corroborative in nature. In other words, it is used as a supplement to the direct or ocular evidence in a case. Moreover, it is a mere advisory and thus, not binding on the Court. It is for these reasons that sole reliance on expert evidence is not sufficient to convict an accused. However, it is a mere rule of caution and not a rule of law[18].

Since an expert opinion is used as a corroboration device, what will happen in a situation where the expert's opinion is inconsistent with the direct or ocular evidence? It has been held that, in a case of

inconsistency between expert opinion and ocular evidence, the latter shall prevail over the former[19]. In Darbara Singh *Vs* State of Punjab, the Supreme Court reiterated this position in the context of medical expert evidence and noted: "So far as the question of inconsistency between medical evidence and ocular evidence is concerned, the law is well settled that, unless the oral evidence available is totally irreconcilable with the medical evidence, the oral evidence would have primacy."

The courts have given contrary opinions, depending upon the matter at hand, when it comes to the legal value of expert testimony supporting a complainant or defendant[20-23]. One of the most significant judgments in recent times has been the upholding the rule that the opinion of an expert is necessary to prove or disprove medical negligence. The State Consumer Court of Madhya Pradesh recently overturned the order of the District Consumer Court, Gwalior, which had exonerated a doctor from charges of medical negligence without consulting the opinion of an expert. Setting aside the lower court order, the State Commission has directed the District Commission to send all the medical records of the patient to the Dean of Gajraja Medical College Gwalior and get a medical expert opinion from the college[24].

Conclusion

As per practice, it is more of a rule than an exception to not obtain an expert's opinion to support the respondent's defence for a court of law. Recent decisions of courts are a good step in the direction of making the law clearer in the area of evidentiary value of expert opinion. The law on the subject needs to be more precise and certain. That will surely give a better understanding about the "reasonable man" as cited in Bolam's principle[15]. It is argued that the Indian legal framework with respect to 'expert opinion' is not thorough and extensive. There exists lacunae within the law, due to which expert opinion is considered a weak, and not a substantive, form of evidence. It is suggested that the legislature should enact new laws or amend Section 45 to fill the legal void[25]. It is suggested that the government amend Section 45 to make it more comprehensive. It is suggested that the legislature formulate some guidelines with respect to the qualifications of an expert and the relevant procedure for rendering an opinion before the Court. In conclusion, it cannot be said that expert opinion will successfully tilt the case in favour of the provider of it, but it can confidently be stated that it will give an upper hand to the one using it in his favour in the court especially if the opposite party does not.

References

1 Singh S — Alarming rise in medical negligence. Times of India. http://timesofindia.indiatimes.com/city/nagpur/alarming-rise-in-medical-negligence-litigation-study/articleshow/55484635.cms. Published Nov 18, 2016 (accessed Nov 15, 2023).
2 Chandra MS, Math SB — Progress in medicine:Compensation and medical negligence in India:Does the system need a quick fix or an overhaul? *Ann Indian Acad Neurol* 2016; **19 (Suppl 1):** S21-7.
3 Pandey SK, Sharma V — Commentary:Increasing cases of litigations against ophthalmologists:How can we minimize litigations during ophthalmic practice? *Indian J Ophthalmol* 2019; **67:** 1527-30.
4 Pandey SK — How to minimize litigations and medical malpractice claims during ophthalmic practice? *Kerala J Ophthalmol* 2022; **34:** 8-11.
5 Kohn T, Corrigan J, Donaldson MS — To err is human: building a safer health system National Academy Press, Washington, DC (2000), p.6.
6 Oyebode F — Clinical errors and medical negligence. *Med Princ Pract* 2013; **22(4):** 323-33. doi: 10.1159/000346296.
7 43 million medical errors occurring worldwide, study suggests. Medical Malpractice Attorneys of NewJersey.http://www.medmalnj.com/legal-articles/43-million-medical-errors-occurring-worldwide-study-suggests/ (accessed Nov 14, 2023.
8 Choudhry C — Only 15% medical negligence cases genuine.Times of India. http://timesofindia.indiatimes.com/city/gurgaon/only-15-medical-negligence-cases-genuine/articleshow/67579198.cms. Published Jan 18, 2019 (accessed Nov 14, 2023).
9 Medical Negligence Statistics in India. Delhi Medical Negligence. https://www.delhimedicalnegligence.com/post/stats-on-medical-negligence-cases-in-india-in-comparison-to-other-countries. Published February 13, 2022 (accessed Nov 14, 2023).
10 PranatiGhose v. LIC of India FA A/9/2015, SCDRC Tripura.
11 Malay Kumar Ganguly v. Dr. Sukumar Mukherjee and Ors, (2009) 9 SCC 221.
12 Indian Medical Association v. V.P. Shantha &Ors, 1996 AIR 550, 1995 SCC (6) 651 (decided on 13-11-1995).
13 Forest Range Officer v. P. Mohammad Ali, AIR 1994 SC 120.
14 Tiwari DS. Medical Negligence in India: A Critical Study. November 4, 2013. Available at SSRN: https://ssrn.com/abstract=2354282 or http://dx.doi.org/10.2139/ssrn.2354282.
15 Farooq Ahmad Bhat v. Syed BasharatSaleem&Anr, CRMC No. 47/2018, Jammu and Kashmir and Ladakh High Court at Srinagar (decided on Sep 2, 2022).
16 Jacob Mathew v. State of Punjab, (2005) 6 SCC 1, Aug 5, 2005.
17 The Indian Evidence Act, 1872. Section 46.
18 MaganBihariLal v. State of Punjab, (1977) 2 SCC 210.
19 Darbara Singh v. State of Punjab, (2012) 10 SCC 476.
20 Titli v. Alfred Robert Jones, AIR 1934 All 273.
21 Ramesh Chandra v. Regency Hospital Limited (2009) 9 SCC 709.
22 Martin F. D'Souza v. Mohd.Ishfaq, SC CA3541/2002, Feb 17, 2009.
23 Sethuraman SubramaniamIyer v. Triveni Nursing Home and Another, (1998) CPJ 110.
24 Keshav Kumar Sharma v. Suyash Hospital, M. P. State Consumer Disputes Redressal Commission, Bhopal, Revision Petition No. 18 of 2022, Dec 27, 2022.
25 Singh G. Evidentiary Value of Expert Opinion Under The Indian Evidence Act: A Critical Analysis of Section 45. International Journal of Legal Science And Innovation. 2020; 2(1). ISSN 2581-9453.

Case Report

Somatic Neoplasm Arising from Teratoma Ovary with Peritoneal Recurrence

Deepa Das C K[1], Subitha K[2], Lovely Jose[3], Prasad P H[4]

Mature cystic teratomas are the commonest germ cell tumors of the ovary. Malignant transformation is very rare in teratoma. Peritoneal involvement of this malignancy is even rarer. We are reporting a case of peritoneal involvement of squamous cell carcinoma arising from a mature cystic teratoma.

[*J Indian Med Assoc* 2023; **121(12):** 64-5]

Key words **: Teratoma, Squamous cell carcinoma, Peritoneal involvement.**

Ovarian Dermoid cysts or Mature cystic teratomas are the commonest germ cell tumors of the ovary, comprising of about 20% of all ovarian neoplasms[1]. Malignant transformation is a rare complication of mature cystic teratoma, which occurs in about 2% of the cases and is usually observed in postmenopausal patients[2]. Squamous cell carcinoma is the most common neoplasm accounting for 80% of malignant tumours within teratomas[1]. Patients with ovarian Squamous cell carcinoma often have a dismal prognosis and the stage of the disease is an important factor to the prognosis. The 5-year survival rate for all stages is around 48.4%. Prognostic factors include FIGO stage, degree of cytoreduction in surgery, tumor grade, growth patterns, capsular rupture and vascular invasion[3]. We report a case of a woman with peritoneal recurrence of Squamous cell carcinoma arising from ovarian mature cystic teratoma.

Editor's Comment :

- Malignant transformation in mature cystic teratoma is very rare. So, the pathologist should be aware of thoroughly sampling of all specimens of mature cystic teratoma, especially when there are solid areas so as not to miss this diagnosis.

Case Report

A 43-year-old female presented with lower abdominal pain of 2 weeks duration. On Clinical examination a mass measuring 10x10 cm was felt per abdomen. CT Abdomen showed a large heterogeneously enhancing lesion measuring 9.5 x 6.6 x 6 cm with fatty soft tissue component and calcified component. Minimal ascites was noted. A diagnosis of Dermoid cyst Right ovary was suggested.

Total abdominal hysterectomy with bilateral salpingo-oophorectomy and omentectomy was done. Right ovary showed a cyst measuring 12 x 8.5 x 4cm. Cut section showed a uniloculated cyst filled with cheesy material and hair. Also there were multiple grey white granular solid areas (Fig 1a,1b). Microscopy showed a cyst lined by mature squamous epithelium, with wall showing glial tissue and fat. Solid areas showed islands of tumour cells having eosinophilic cytoplasm, pleomorphic vesicular nucleus. Mitosis 5-6/hpf (Fig 1c,1d]. Immunohistochemistry showed CK strong membranous positivity and p63 nuclear positivity in tumour cells (Fig 1e,1f). A diagnosis of Squamous cell carcinoma arising from mature cystic teratoma right ovary was given. Peritoneal wash cytology was negative for malignant cells.

On follow up, 3 months later patient developed massive ascites. Ascitic fluid cytology done showed atypical squamous cells dispersed singly. Also noted tad pole and fibre cells admixed with mixed inflammatory infiltrates in a dirty, necrotic background. Smear was reported as positive for malignant cells from Squamous cell carcinoma (Fig 2). Patient succumbed to death due to metabolic derangements before initiation of chemotherapy.

Discussion

Malignant transformation in mature cystic teratoma is a rare finding which is most frequent in the elderly women. Squamous cell carcinoma is the most common type of malignant transformation in Mature cystic teratoma, consisting up to 80%-90% of cases followed by adenocarcinoma. Clinically, this tumor cannot be readily differentiated from an uncomplicated mature cystic teratoma or other ovarian tumor[4]. Evidence of rapid growth, pain and loss of weight suggest the presence of a malignant tumor. In many cases, the tumor may be an incidental finding[2]. Better prognosis has been reported when the malignant element is a squamous cell carcinoma confined to the ovary and is excised without spillage of the contents. In such cases, the reported 5-year survival is 63%[2]. But our patient inspite of being in Figo Stage I had a dismal prognosis. This is contradictory to the finding of Kim HS, *et al*, who demonstrated that

Department of Pathology, Government Medical College, Thrissur, Kerala 680596
[1]MBBS, Junior Resident
[2]MBBS, MD, Professor and Corresponding Author
[3]MBBS, MD (Pathology), Associate Professor
[4]MBBS, MD (Pathology), Professor

Received on : 08/02/2023
Accepted on : 01/04/2023

disease confined to the ovary as clinical stage I is a clinical prognostic factor improving optimal survival[3]. Vigilant grossing and sampling need to be done as the malignant component of the tumor might be present in only part of the lesion causing difficulty in suspecting the malignancy. Cytological evidence of tumor cells in the ascitic fluid is the gold standard for diagnosing peritoneal carcinomatosis, in comparison with the physiological examination, radiological techniques, and chemical analysis. Malignant effusions are usually rare in squamous cell carcinoma[5]. In our case the patient had recurrence and presented with malignant ascites, which is rare. Primary cytology as well as secondary cytology (after treatment) of ascitic fluid is an important parameter in the diagnosis, staging, therapeutic approach, recurrence and overall survival rate[6]. Only limited data is available on reccurent and metastatic cases, rate of which can be high as a definite treatment protocol is not available due to the low incidence of the cases[7].

Conclusion

Squamous cell carcinoma arising from mature cystic teratoma is therefore a rare, lethal disease that is difficult to diagnose clinically. Extensive sampling has to be done in all cases of teratoma to exclude malignancy. Recurrence and metastasis of Squamous cell carcinoma arising from teratoma ovary can be high as no definite treatment protocol is available. Advances in chemotherapy could result in better prognosis.

Source of Funding : None.

Conflict of Interest : None.

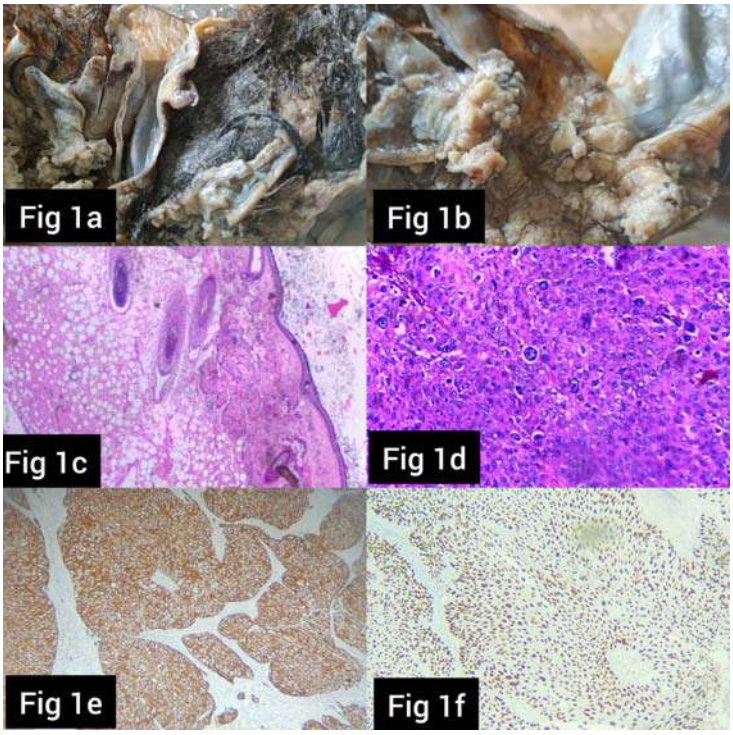


Fig 1a & b — Gross images of the cyst
Fig 1c — Cyst lined by stratified squamous epithelium [H&Ex10]
Fig 1d — Islands of malignant tumor cells [H&Ex40]
Fig 1e — Immunohistochemical staining -CK showing strong membranous positivity [x40]
Fig 1f — p63 showing nuclear positivity in tumor cells [x40]

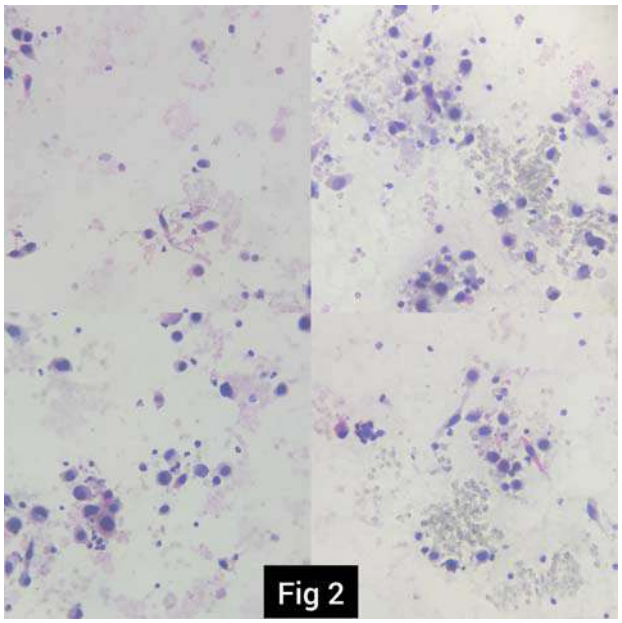


Fig 2 — Ascitic fluid cytology showing atypical squamous cells

References

1 Lokuhetty D, White V, Cree I, editors. WHO classification of tumors : Female genital tumours. 5th Edition. Lyon, France: International Agency for Research on Cancer (IARC); 2020. 119-22.

2 Kurman RJ, editor. Blaustein's pathology of the female genital tract. 6th ed. Springer Science & Business Media; 2011. 869-92.

3 Kim HS, Kim JW, Chung HH, Park NH, Song YS, Kang SB — Disease confined within the ovary and smaller amount of ascites are good prognostic factors for survival of patients with squamous cell carcinoma arising from mature cystic teratoma of the ovary: a case series in Korea and review of the published reports. *Journal of Obstetrics and Gynaecology Research* 2009; **35(1):** 99-105.

4 Devi YS, Mohanty S, Das DS, Sekar V — Squamous cell carcinoma arising from mature cystic teratoma of the ovary. *Oncology Journal of India* 2019; **3(1):** 13.

5 Krugmann J, Schwarz CL, Melcher B, Sterlacci W, Ozalinskaite A, Lermann J, *et al* — Malignant ascites occurs most often in patients with high-grade serous papillary ovarian cancer at initial diagnosis: A retrospective analysis of 191 women treated at Bayreuth Hospital, 2006-2015. *Archives of Gynecology and Obstetrics* 2019; **299:** 515-23.

6 Janagam C, Atla B — Study of ascitic fluid cytology in ovarian tumors. *Int J Res Med Sci* 2017; **5(12):** 5227-31.

7 Goudeli C, Varytimiadi A, Koufopoulos N, Syrios J, Terzakis E — An ovarian mature cystic teratoma evolving in squamous cell carcinoma: A case report and review of the literature. *Gynecologic Oncology Reports* 2017; **19:** 27-30.

Case Report

Solitary Diaphragmatic Hydatid Cyst

Omkar Ranganath Konjeti[1], Nitin Gaikwad[2], Kundan Mehta[3], Sanjay M Khaladkar[4], Mukul Saini[5]

Hydatid Cyst is an endemic parasitic disease commonly involving the lungs and liver. Hydatid Cysts of the diaphragm are infrequently reported in the literature and when present is usually associated with liver hydatidosis. The occurrence of a Hydatid Cyst in the diaphragm without hepatic involvement is exceedingly rare, with around 100 cases reported in the literature. We report a case of a 44-year-old male who presented with left hypochondriac and diffuse chest pain. Ultrasonography of the thorax and abdomen revealed a multiloculated cystic lesion in the left hypochondriac. CT scan of the thorax and abdomen showed a well-defined mixed density peripherally enhancing lesion in the left diaphragm. Ultrasound-guided percutaneous aspiration showed clear watery fluid on aspiration, which on wet mount showed scolices and hooklets suggestive of echinococcus granuloses. The patient was diagnosed with a hydatid cyst of the left hemidiaphragm not associated with other hydatid cysts. He underwent successful surgical resection of the cyst with an uneventful postsurgical recovery. This case highlights the diagnostic challenges with atypical presentations on Hydatid Cyst.

[*J Indian Med Assoc* 2023; **121(12):** 66-7]

***Key words* : *Echinococcus Granulosus*, Hydatid Cyst, Diaphragm.**

Hydatid disease also known as echinococcosis, is caused by the entrapment of larvae of *Echinococcus* in the metacestode stage in various organs of humans which is not a natural host in its lifecycle. Canidae family members, such as dogs, wolves, and coyotes, are the principal hosts for the infecting pathogen. Sheep, cattle and deer serve as intermediary hosts. Humans become infected by coming in contact with infected canine faces[1]. Hydatid cysts most commonly affect the liver (59-75%) but are also found in Lungs (27%), Kidneys (3%) and Bones (1-4%). Other sites including the diaphragm are rare (less than 1%)[2]. Patients with cystic echinococcus have single organ involvement in 85-90% of cases, and 70% have a solitary cyst[3]. Diaphragmatic localization of these cysts is extremely rare and is usually associated with Hepatic Hydatid Cysts[4]. We report a case of a Hydatid Cyst of the left hemidiaphragm that was successfully treated.

Case Report

A 44-year-old male presented with diffuse Chest pain and pain in the left hypochondriac region for 2 months. There was no history of fever, cough, dyspnoea, or weight loss. He had no gastrointestinal complaints. His past and family history were non-contributory. General examination was unremarkable. Examination of the respiratory system showed absent breathe sounds and dull percussion note in the left mammary area and infra-axillary area. The laboratory parameters were normal. The chest radiograph was also normal.

Editor's Comment :

- The primary diaphragmatic Hydatid Cyst is a rare clinical condition that poses a diagnostic challenge and requires a high index of suspicion.
- Surgery is the curative treatment for Hydatid Cyst disease.

Ultrasonography of the thorax and abdomen revealed a multiloculated cystic lesion in the left hypochondriac region closely abutting the posterosuperior aspect of the spleen. The patient was subjected to contrast-enhanced Computed Tomography (CT scan) of the thorax and abdomen which showed a well-defined mixed density peripherally enhancing lesion measuring approx. 65 x 40 x 70 mm in the left lower hemithorax in relation to the anterior surface of left 10th and 12th ribs with an inward displacement of adjoining diaphragm and lateral surface of spleen suggesting an intrathoracic, diaphragmatic cyst. The liver, lungs and other visceral organs were normal and revealed no cysts (Fig 1).

The serology study for echinococcus IgG (hydatid serology) was negative. Keeping in mind the possibility of anaphylactic reaction as a complication, the patient was subjected to ultrasound-guided percutaneous aspiration with all due precautions. Clear watery fluid was aspirated, which on wet mount showed scolices and hooklets suggestive of *Echinococcus granulosus* confirming the diagnosis of Hydatid Cyst of diaphragmatic origin (Fig 2).

The patient was treated with oral Albendazole 400mg twice daily and was evaluated for surgical excision.After pre-operative evaluation the patient underwent exploratory laparotomy which revealed Hydatid Cyst between the muscle fibers of the left hemidiaphragm, without liver or

Department of Pulmonary Medicine, Dr D Y Patil Medical College, Pune, Maharashtra 411018
[1]MBBS, Resident and Corresponding Author
[2]MBBS, MD, Professor
[3]MBBS, DMRD, MD, Assistant Professor
[4]MBBS, MD, Professor, Department of Radiology
[5]MBBS, Junior Resident

Received on : 19/02/2023
Accepted on : 10/04/2023

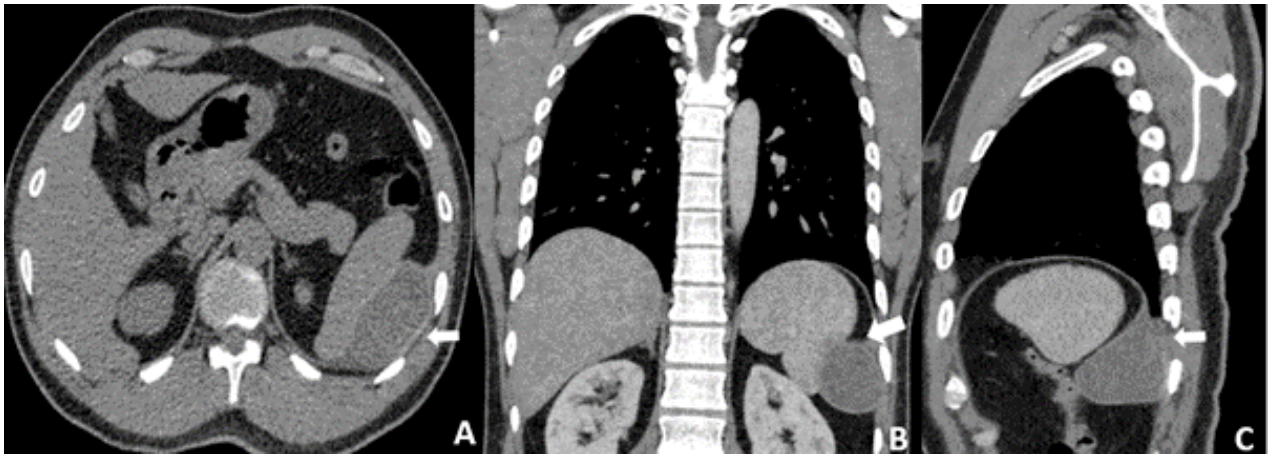


Fig 1 — Contrast-enhanced CT of thorax and abdomen axial (A), coronal (B) and sagittal (C) images

lung involvement, pushing down on the spleen. Dissection of the muscle fibers with evacuation of the cyst contents and removal of the cyst's membrane was done. The postoperative recovery was uneventful and the patient achieved significant clinical and radiological improvement on follow-up.

Discussion

Diaphragmatic hydatid cyst is a rare clinical condition that poses a diagnostic challenge. The differentials considered during our diagnosis included loculated organised empyema or Hydatid Cyst. Ultrasound-guided percutaneous aspiration confirmed the diagnosis of a Hydatid Cyst. Hydatid infection can affect people of any age or gender; however, it is more common in people between the ages of 20 and 40. The early stages of the primary infection are usually asymptomatic and can remain so for years[3]. Symptoms usually start when the cyst is large enough to cause compression symptoms. Occasionally they may be picked up on routine examination or investigation during the asymptomatic stage.

The exact pathogenesis of the diaphragmatic Hydatid Cyst is unknown. The oncosphere enters the wall of the intestine after ingestion of infected food and then enters the portal system to reach the liver. Disease in other end organs is caused when the parasite eggs reach the systemic circulation. The liver and lungs act as filters through which larvae must pass and are therefore the commonest sites for Hydatid Cysts. The larvae that can bypass these filters through AV malformations or lymphatics can then reach other organs causing cysts. If a micro breach occurs in a cyst, direct dissemination to nearby areas is another uncommon way of spread. The absence of hepatic or pulmonary hydatid disease in our patient suggests a rare type of lymphatic spread[5].

Ultrasound, Magnetic Resonance Imaging (MRI), and Computed Tomography may be used in conjunction with a chest X-ray to detect the location of the Hydatid Cyst. The sensitivity of hydatid disease serological testing is 64- 87% and therefore has a low negative predictive value as in our case[4].

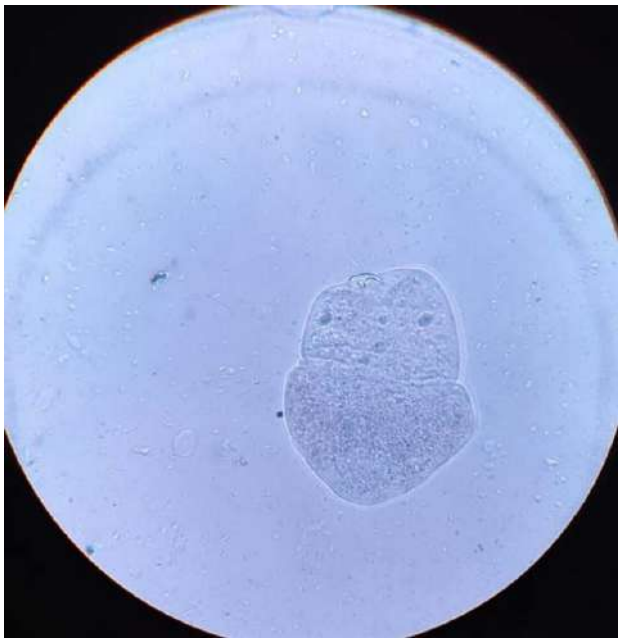


Fig 2 — Wet mount preparation of the cyst content showed scolices and hooklets suggestive of Echin

Surgery is the curative treatment for Hydatid Cyst disease and is the therapy of choice as these cysts can be entirely removed to achieve complete resolution.

References

1 Eren S, Ulku R, Tanrikulu AC — Primary giant hydatid cyst of the diaphragm. *Annals of Thoracic and Cardiovascular Surgery* 2004; **10(2):** 118-9.
2 Dumitrescu M, Bolca C, Cordos I — Primary hydatid cyst of the diaphragm: a case report. *J Surg* 2014; **10(3):** 253-4.
3 Morar R, Feldman C — Pulmonary echinococcosis. *European Respiratory Journal* 2003; **21(6):** 1069-77.
4 Hakeem H, Fareed G, Irfan M — Left Hemi-Diaphragmatic Hydatid Cyst-A Rare Presentation and Diagnostic Challenge. *Int J Respir Pulm Med* 2016; **3:** 046.
5 Gümüþ M, Yaðmur Y, Gümüþ H — Primary hydatid disease of diaphragm with subcutenous extension. *The Journal of Infection in Developing Countries* 2011; **5(08):** 599-602.

Case Report

Balanced Robertsonian Translocation in 15 and 22 Chromosome in a Child with Down's Syndrome

Ashis Kumar Saha[1], A Halder[2], A Dutta[3]

Balanced Robertsonian Translocations between chromosomes 15 and 22 comprise 0.6% of all Robertsonian Translocations worldwide. Here we describe a case in which most of the clinical features were similar to Down's syndrome and chromosomal study demonstrated trisomy 21 along with balanced Robertsonian translocation between 15 and 22 (q10; q10), but no evidence of any neurological abnormality other than obesity and hyperphagia. His mother was a carrier of balanced Robertsonian translocation between 15 and 22 (q10; q10) and had no history of abortion. Therefore, phenotypically presenting Down's syndrome with balanced Robertsonian translocation of chromosomes 15 and 22 may be rare in the field of Medicine.

[*J Indian Med Assoc* 2023; **121(12):** 68-70]

Key words **: Robertsonian Translocation, Prader-Willi syndrome.**

Prader-Willi syndrome is a multisystem disorder characterised by poor sucking abnormalities and poor weight gain without nutritional support along with neonatal hypotonia, delayed developmental milestones, mild cognitive impairment and hypogonadism that leads to genital hypoplasia, short stature and insufficient puberty[1,2]. Its frequency ranges from 1 in 10,000 to 1 in 30,000. This disease develops from deletion of chromosome 15 in each cell leading to the loss of critical genes present in this region. Because paternal copies of the chromosome are active so missing genes from the paternal copy activate the maternal copy[3]. In 25% of cases the child receives two copies of chromosome 15 from his or her mother instead of one copy from each parent which is known as unpaired disomy (Fig 1)[4]. In rare cases chromosomal translocation may lead to an abnormal turn off of paternal genes on chromosome 15. There are two types of Robertsonian translocation, unbalanced and balanced. The 11:22 and 4:8 balanced translocations are common whereas 15:22 translocation is rare (Fig 2).

Down's syndrome is fairly common and is characterised by features such as learning disabilities, cardiac defects and craniofacial dysplasia. It is associated with trisomy 21 (Hsa21)(Fig 3).

There are some common clinical and functional features between Prader-Willi syndrome and Down's syndrome such as obesity, muscular hypotonia, laxity of ligament and mental retardation which worsen with advancing age. Muscle hypotonia leads to impairment of postural control and gait abnormalities which are characteristics of both congenital diseases.

Editor's Comment :

- Trisomy 21 together with a balanced Robertsonian translocation of chromosomes 15 and 22 can lead to a mixed syndrome combining features of Down's Syndrome and Prader-Willi Syndrome.
- Carriers of Robertsonian translocations may be unaware of this abnormality.
- Karyotyping of both parents can help with differential diagnosis in ambiguous cases.

Case Report

A 3-year-old child presented with stunted growth, delayed language and short term memory loss. Upon examination, the child was shorter than the average height with a flat nasal bridge, short neck, excessive flexibility, short and broad hand and a single palmer crease in the middle of the palm. The first digital cleft was wide (Figs 1-4).

The child lacked characteristic features of Down's Syndrome such as the slanting eyes, flattened face and had normal muscle tone, could run fast when required, could play and ate food on his own.

However, he had abnormal characteristic features, such as almond shaped eyes which did not slant upward and the absence of tiny white spots on the coloured part of the iris.

The patient had a normal sucking reflex, a triangular head, a tented upper lip, increased appetite, and was overweight. His vital signs were normal with no evidence of hypotonia and respiratory distress.

His father was 45 years old and mother was 32. There was no history of consanguinity in marriage.

Investigations :

A chromosomal study of the peripheral blood including

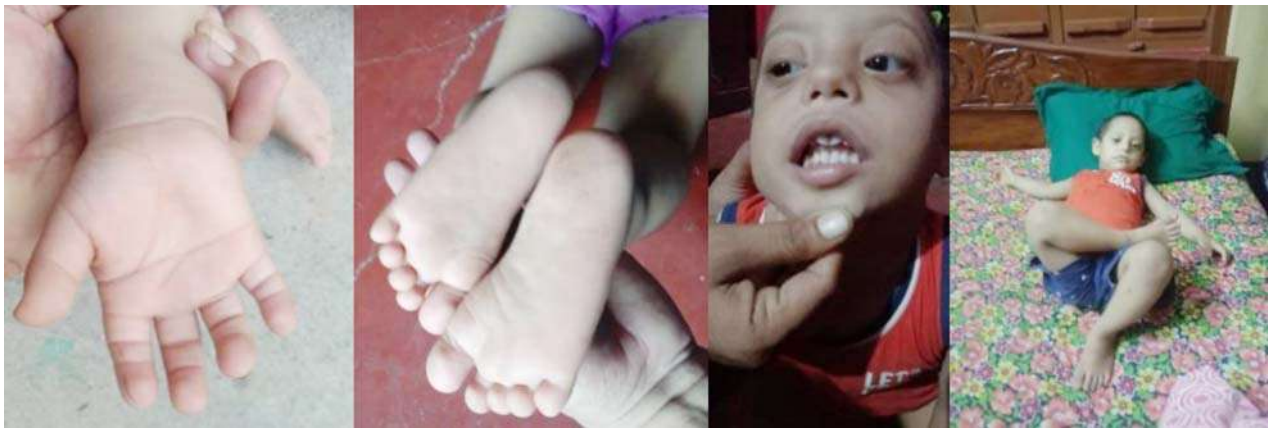
[1]MD (Medicine), FRCP (Edinburgh & Glasgow), FACP, FICP, MNAMS, Professor, Department of Medicine, Director, Nirnayan Science & Research, Kolkata 700059 and Corresponding Author

[2]MSc, PhD, Consultant Geneticist, Head, Department of Genetics, Nirnayan Science & Research, Kolkata 700059

[3]MSc (Biochemistry), PhD (Biotechnology), Consultant Geneticist, Department of Genetics, Kolkata 700059

Received on : 04/10/2023

Accepted on : 14/11/2023



Figs 1-4 — xxx

cytogenetic analysis of 20 metaphases revealed (Fig 5):

(a) A male chromosome complement with extra chromosome 21 (Trisomy 21) which is consistent with the diagnosis of Down's Syndrome.

(b) An additional abnormality was observed in the balanced Robertsonian translocation between long arms of chromosomes 15 and 22.

Maternal chromosome analysis of peripheral blood demonstrated a balanced Robertsonian Translocation between long arms of chromosomes 15 and 22 (Fig 6).

Paternal chromosome analysis of the peripheral blood demonstrated normal chromosomal arrangement (Fig 7).

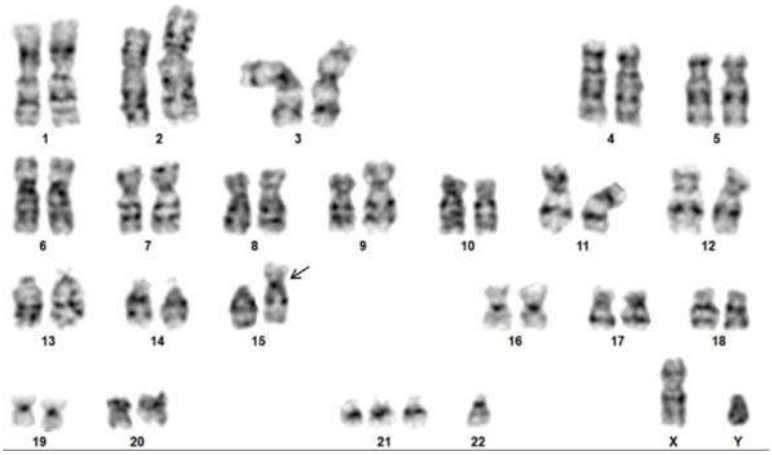


Fig 5 — Patient's chromosome

Differential Diagnosis :

This patient had features of Down's Syndrome along with Trisomy 21 in the chromosome study and few features of Prader-Willi Syndrome along with balanced Robertsonian translocation between chromosomes 15 and 22 (q10; q10). Here translocation is balanced, that is the break points did not impact any gene and there was no loss or any gain of chromosomal material. The balanced translocation has no impact on the health or development of the child but difficulties during the expansion of their family after marriage.

In this case although the mother was the carrier, the child was phenotypically obese with increased appetite only and no features of hyporeflexia or hypotonia. In this case there were many phenotypic features of Down's Syndrome along with few features of Prader-Willi Syndrome, similar to the case reported by Becher, *et al* but without the Philadelphia chromosome.

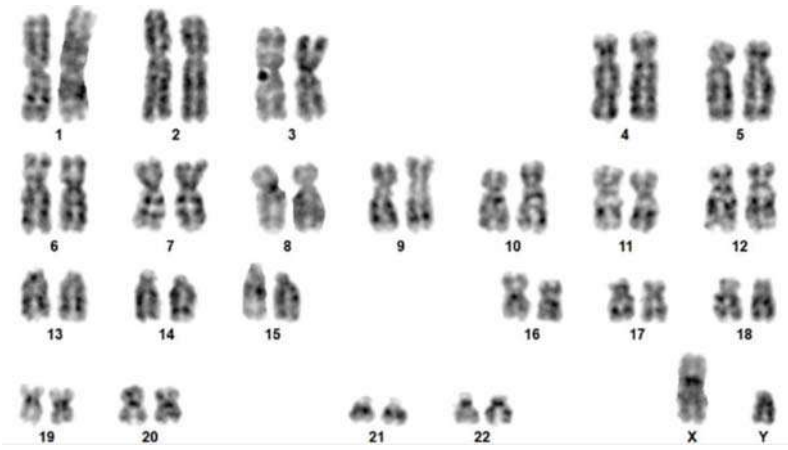


Fig 6 — Chromosome of Patient's father

Treatment : Nil

Outcome and follow-up : None

Discussion

Robertsonian Translocation itself is very common occurring in 0.1% of the population but translocation involving chromosomes 15 and 22 is very rare accounting for the 0.6% of all Robertsonian translocations[5]. Usually the carriers of this balanced Translocation do not know that their chromosomes are different from others and

will only find out during investigations for different reasons. According to a study by Gupta et al., balanced translocation occurs in one out of 560 individuals[6]. Common balanced translocations that occur frequently are the 11: 22 and 4: 8 translocations. However 15: 22 balanced translocation is rare. Non-Robertsonian translocations involving acrocentric chromosomes are rare compared with Robertsonian Translocations involving acrocentric chromosomes, and the breakage point is (q10; q10)[7]. In a child with Down's syndrome Baruffi, *et al* demonstrated evidence of non-Robertsonian Translocation between chromosomes 15 and 22 as 46 XX der(15) whereas in this case of Down's syndrome, there is balanced translocation between chromosomes 15 and 22, 46XY der(15,22)(q10; q10)+21[20][8]. Balanced, unbalanced or normal gametes depend on two factors: the chromosomes involved and the location of the breakage points. At the pachytene stage the quadrivalent composition is responsible for alteration in the segmentation pattern, leading to the formation of different types of gametes. Although this balanced translocation is responsible for recurrent abortion if the mother is a carrier, in this study, although the mother was carrier there was history of abortion[9].

To date, four balanced translocation cases have been identified in the cytogenetic studies, of which one was 40 year old man (q10; q10) who developed Philadelphia chromosome positive chronic myeloid leukemia; second was a 5 years 6 months old girl (p11; q11) who developed cardiofacial cutaneous syndrome; the third was 11 year old girl der(15,22)(q10; q10) who developed short stature, low hair line, broad neck and thorax, high palate and numerous nevi in the thorax and the back; and the fourth one was a 5 year old boy with 46 XX der(15;22)(q10; q10) who presented with generalized hypotonia with hyporeflexia, respiratory distress, tented upper lip and single umbilical artery[10].

Therefore this balanced Robertsonian Translocation of chromosomes 15 and 22 in this case may be the 5th recorded case and its association with Down's syndrome is rare.

Financial Interest : Nil.

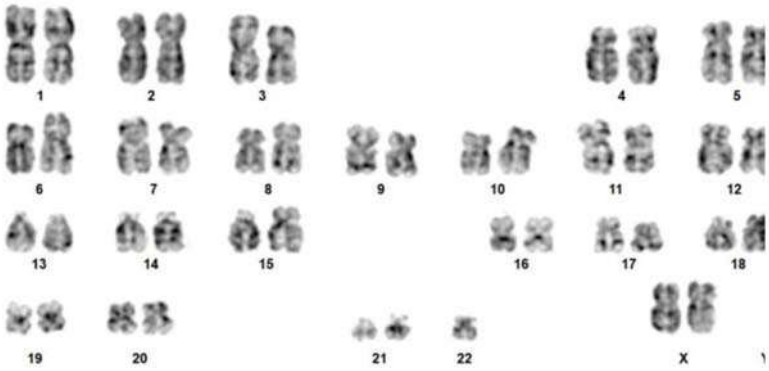


Fig 7 — Chromosomes of the patient's mother

References

1 Theodoro MF, Talebizadeh Z, Butler MG. Body composition and fatness pattern in Prader Willi syndrome: comparison with simple obesity. *Obesity* 2006; 12685-1690.

2 Chedd N, Levine K, Wharton RH — In: Management of Prader Willi syndrome. 3. Butler MG, Lee PDK, Whitman BY, editor: New York: Springer: 2006; Educational consideration for children with Prader Willi syndrome. 302-316.

3 Bittel DC, Butler MG — Prader Willi syndrome. Clinical genetic, cytogenetics and molecular biology. *Expert Rev Mol Med* 2005; **7:** 1-20.

4 Cassidy SB, Driscoll DJ — Prader Willi syndrome. *Eur J Hum Genet* 2009; **17(1):** 3-13.

5 Bernicot I, Schneider A, Mace A, Hamamah S, Hedon B, Pellestor F, *et al* — Analysis of fish of sperm and embryos from two carriers of rare rob(13;21) and rob(15;22) Robertsonian translocation undergoing PGD. *Eur J Med Genet* 2012; **55:** 245-51.

6 Gupta N, Dalvi R, Koppaka N, Mandava S — Balanced reciprocal translocation: Multiple chromosome rearrangements in an infertile female. *J of Hum Reprod Sci* 2019; **12(1):** 72-4.

7 Dalvi R, Koppaka N, Chavan D, Mandava S. A rare balanced non-Robertsonian translocation involving acrocentric chromosomes: Chromosomal abnormality of t(13:15)(p11.2:q22.1). *J of Hum Reprod Sci* 2016; **9(2):** 128-30.

8 Baruffi MR, Souza DH, Silva RA, Ramos ES, Moretti-Ferrira D — A rare non-Robertsonian translocation involving chromosome 15 and 21. *Paulo Med J* 2013; **131:** 427-31.

9 Fried K, Bukovsky J, Rosenblatt M, Mundel G — Familial translocation 15/22. A possible cause for abortions in female carriers. *J of Med Genetics* 1974; **11:** 280-2.

10 Bocher R, Wendt F, Kuhn D — Constitutional Robertsonian T(15;22) in Ph-positive CML. *Hum Genet* 1987; **76:** 399.

View Point

Dubious Medical Literature Publications during COVID-19 — Another 'Epidemic' !

Surajit Bhattacharya[1], Kaushik Bhattacharya[2], Neela Bhattacharya[3]

More than 5,82,645 articles were published about the Coronavirus pandemic till 2022 and were demarcated as global literature on COVID-19 by the World Health Organisation. The majority of the journals rushed to get COVID-19 related manuscripts through fast-track peer review, and this resulted in many dubious publications in medical journals about the Coronavirus thereby spreading misinformation and manipulation of evidence-based medicine.

[*J Indian Med Assoc* 2023; **121(12):** 71-3]

Key words **: Corona Virus, Hydroxychloroquine, Peer review, COVID-19, Medical Literature**

The World Health Organisation (WHO) has demarcated about 5,82,645 articles published in various medical journals on Corona virus as Global literature on COVID-19 and they feature on the website of WHO[1]. There was a hurry to get any article on COVID-19 through peer review during the pandemic. MedRxiv took just a median review time of 72 days for pre-prints of articles on COVID-19 to appear in peer-reviewed journals which was twice as fast as pre-prints on any other topic from the server. In a study of 11 medical journals in the first six months of 2020, it was found that they published papers on COVID-19 much faster than normal, at the expense of publishing other research more slowly[2]. It was disconcerting to note that 30,000 papers on COVID-19 published in 2020 were pre-prints which accounted for 17% to 30% of total COVID-19 research papers. This fast-track publication of data and half-cooked evidence resulted in many dubious publications about COVID-19 in the medical literature.

Research-based or Pharma-based Publications ?

There were innumerable research-publishing scandals[3]. The dubious intention was evident when many high-profile articles on COVID-19 were retracted, including studies that relied extensively on electronic health records from a website Surgisphere in Chicago, Illinois. By December 2020, the Retraction Watch site reported that about 15 pre-prints and 24 so-called peer-reviewed papers on COVID-19 were withdrawn or retracted[4]. It was due to a concern about authenticity that 5 papers were 'temporarily" retracted while 5 more papers had authors expressing concern.All these retracted literature had a conflict of interest and had relied heavily on health-record analyses of a company that would not reveal its original data for a scientific audit. Exactly 2 weeks after a high-profile multinational registry analysis manuscript in *The Lancet*[5] reported that hydroxychloroquine, the antimalarial drug that was extensively used then for COVID-19, might actually be dangerous to patients, three of its four authors retracted the work because they were unable to independently verify their data which was a large proprietary collection of electronic health records analyzed by Surgisphere.Similarly, on 4th June 2020, researchers and other co-authors retracted a paper in the *New England Journal of Medicine* (*NEJM*) for the same reason[6]. That study, finally published a month ago, had researched the impact of certain heart medications on people with COVID-19 and had found no safety concerns.

In a significant move, on 22nd May 2020, a hydroxychloroquine study was published which had purportedly analyzed electronic health records of 96,000 patients in 671 hospitals across the globe. Finding many inconsistencies in the data, critics raised questions and asked for more details on its origins which led to 120 researchers signing a letter to *The Lancet* highlighting their concerns 6 days after the publication. Several queries were also raised on the *NEJM* study which relied on Surgisphere data that

Editor's Comment :

- A pandemic of the stature of COVID-19 affecting every nook and corner of the planet also saw a pandemic of half-cooked and half-baked unscientific research publications in medical journals without any peer review and these publications were suddenly retracted after the initial hype.
- There is no shortcut to scientific research and every peer review protocol should be strictly followed before any COVID-19 publication makes its entry in a reputed medical journal.

[1]MS, MCh (Plastic Surgery), Senior Consultant Plastic, Reconstructive & Aesthetic Surgery, Sahara Hospital, Lucknow 226010

[2]MS, DNB, MNAMS, FAIS, FACS, FRCS, (Glasg) FRCS(Edin), Associate Professor (Surgery), Mata Gujri Memorial Medical College and LSK Hospital, Kishanganj 855107 and Corresponding Author

[3]MS, DNB, MCh (Plastic Surgery), Consultant Plastic and Reconstructive Surgeon, Anandaloke Multispeciality Hospital, Siliguri 734001

Received on : 20/05/2022
Accepted on : 15/06/2022

apparently covered 9,000 patients across 169 hospitals. Even when the scientific validity of the data was challenged, Surgisphere did not present its raw data available to third-party auditors for verification. The retraction notice in the *Lancet* cited Surgisphere as feeling that transferring the data would violate "client agreements and confidentiality requirements".

Mysterious disappearance of the Ivermectin study:

A significant reduction in COVID-19 mortality rates was found by the study of Desai, *et al* using Surgisphere data when patients were given the anti-parasitic drug Ivermectin, but that study suddenly vanishedfrom the social-sciences preprint server SSRN, where it was first posted on 6th April 2020 and a second version was posted on 19th April 2020[6]. Mehra told *Nature* that he removed the study because he "did not feel it was ready for peer review". The scenario was completely ironic to claiminitially that Ivermectin reduced COVID-19 deaths by 90% on April 6th, 2020 and then to watch the paper being withdrawn from the pre-print server on July 14, 2020! The immediate concern at that juncture was whether this was a genuine error of judgment or wanton scientific dishonesty.

Even though the paper was not published in a peer-reviewed indexed journal,nonetheless it contributed to a huge surge in the popularity of ivermectin for COVID-19 treatment! Such hurried publications, inadequate peer reviews and subsequent withdrawal can at best cause confusion in the reader's mind and at worst can be a pharmaceutical company-driven propaganda to skyrocket the popularity of a drug for a short period of time, reap the financial benefits and then withdraw the publication citing confidentiality issues. This is neither good for the journals involved nor for the integrity of science! Both *The Lancet* and the *NEJM* had their credibility severely damaged but maintained that their peer-review processes were strictly confidential and they could not divulge details on how the papers were so quickly reviewed and accepted for publication.

Before the so-called reputed journals published such studies, researchers and reviewers should have asked more questions about how such comprehensive data could be obtained from hospitals across the World in the middle of a pandemic. The retraction won't get anywhere near as much news as the original study, and we may never get an answer about the treatment of COVID with Hydroxychloroquine or reduction in mortality following treatment with Ivermectin!

Dubious publications on Mask :

The Annals of Internal Medicine back-tracked on a highly cited paper it had published in 2020 which inferred that face masks were ineffective in preventing the spread of COVID[7]. This paper, which must have passed the peer-review system of the esteemed journal, had included just 4 study subjects but the misinformation it sent out led to careless exposure and infection of millions of people! How can such acts of omission be justified which demean the very basis of science?

Failure of Ethics in Publication :

Retraction Watch shows that 137 papers related to COVID-19 have been retracted since July 2020. Twelve more were retracted due to journal error and in 7 publications 'expressions of concern' were raised. Five papers were retracted and reinstated during the same time[4]. Since Retraction Watch does not distinguish between withdrawal and retraction, journals have typically done so without assigning a reason for retracting a paper, and sometimes make a paper disappear without a trace or controversy. Journals may retract a paper at the authors' request and/or if the editors identify fundamental flaws that would have precluded acceptance if spotted during the review. A pre-print is usually withdrawn only at an author's request. Since no claim is made to have peer-reviewed and certified the scientific content in the first place,a pre-print server will not typically withdraw a flawed preprint against the wishes of the author but may do so in instances of fraud, ethics violations, dangerous material, or legal issues. Typically, it takes three years for editors to retract a paper, but during the pandemic, it took just months — in part because these papers were facing so much scrutiny[8]. But retractions are a proxy for attention perhaps more than anything else and the damage they do in a short span of time is incalculable!

Retraction Watch has wondered, 'One does not know how many more COVID-19 papers are likely to be retracted'. One also cannot say with any certainty that COVID-19 papers are any more likely to be retracted than others. In the world of medical documentation, it seems that scientific integrity has declined,and quality was replaced by quantity during COVID times. Ethics in scientific research is more essential than ever now. The pandemic was the first of its kind in our lifetime and we did not have a similar experience to fall back upon. Today we need more information about a new disease. We need it quickly and we need it from genuine sources. Journals are our only source, and we take printed words as gospels and blindly trust them. So, whatever goes through a journal peer review system should be honest, unbiased, and totally reliable. This is not like a social media post – posted today and retracted tomorrow, with or even without an apology. Journals have a responsibility towards their readers and posterity will hold them accountable for scientific insincerity and misadventure.

Failure of newer drugs and misinformation :

There was huge enthusiasm for the magic treatment of Coronavirus with monoclonal antibodies,

Remdesivir/ Tocilizumab, and Convalescent plasma therapy. But all of them failed in detailed trials.No clinical benefit was observed from the use of Remdesivir in patients who were hospitalized for COVID-19 when symptomatic for more than 7 days and required oxygen support[9]. Evidence from the RECOVERY trial showed that, among patients hospitalized with COVID-19, high-titer convalescent plasma did not improve survival or other prespecified clinical outcomes[10]. In a randomized trial involving hospitalized patients with severe COVID-19 pneumonia, the use of Tocilizumab did not result in significantly better clinical status or lower mortality than placebo at 28 days[11].

All these medicines which have now been proved'useless' in COVID-19 were in huge demand once in India during the Second wave and were the root cause behind pandemic profiteering.

Ethics cannot be compromised for speed of publication.

Complete vaccination of the World sounds more like a myth than an achievable goal today, because of both vaccine hesitancy as well as the vaccine-deprived status of the third World despite the World Health Organization's fervent pleas to the developed countries to share the vaccine. Even if this Utopian objective is achieved Coronavirus is going to be with us in its various mutant avatars. So, science must regain its ethical center and shrug off the pressures of urgency and haste. Clinical trials should be seriously re-looked – is there incomplete enrolment of patients in clinical trials? Are we strictly adhering to the inclusion and exclusion criteria? Do we have adequate consumables and kits for carrying out the desired scientific steps? Have research workers returned to their workstations from lockdowns? Do funding agencies still have the funds to support the trials? These are practical roadblocks that researchers have encountered of late, but these should not compromise science. Another elephant in the room is the role of politics in scientific research – science cannot dish out politically convenient conclusions every time. If irresponsible election rallies have resulted in an increased number of infections, scientists should be able to fearlessly conclude the same. The scientific community of the US recently requested the U.S. President not to politicize research[12].

Conclusion

Scientists published well over 5,82,645 articles about the Coronavirus pandemic in 2020-22 and newer publications keep rolling out now on the sequels. Fast-track peer review to beat the deadline and be the first to publish was the objective of both the researchers and the journal editors. This haste resulted in many articles slipping through the peer-review and getting published but because of heightened interest and intense scrutiny they had to be hastily retracted, but not before they managed to do incalculable harm to patient care. Retraction Watch shows that 137 papers related to COVID-19 have been retracted since July 2020. Twelve more were retracted due to journal error and 'expression of concern' was raised against 7. While a few of them could be because of unintentional errors on the part of the authors, when we see a pattern of papers on the use of Hydroxychloroquine, Ivermectin, monoclonal antibodies, Remdesivir/ Tocilizumab and Convalescent plasma therapy appearing in print with a lot of promise and then getting retracted or being followed by publications refuting their utility, a concern should be expressed unambiguously – were these windows of glory designed by the sponsors of these researches to facilitate windfall profits for the pharmaceutical industry?

"*Positive findings are around twice as likely to be published as negative findings. This is a Cancer at the core of evidence-based medicine*".

— Ben Goldacre

Conflict of Interest : Nil
Funding Obtained : Nil

References

1 https://search.bvsalud.org/global-literature-on-novel-coronavirus-2019-ncov/
2 Aviv-Reuven, S. & Rosenfeld, A. Preprint at https://arxiv.org/abs/2010.02594 (2020).
3 https://www.the-scientist.com/features/the-surgisphere-scandal-what-went-wrong—67955
4 https://retractionwatch.com/retracted-coronavirus-covid-19-papers/
5 Mehra, M. R., Desai, S. S., Ruschitzka, F. & Patel, A. N. *Lancet* https://doi.org/10.1016/S0140-6736(20)31180-6 (2020).
6 Mehra, M. R., Desai, S. S., Kuy S., Henry, T. D. & Patel, A. N. *N. Engl. J. Med.*https://doi.org/10.1056/NEJMoa2007621 (2020).
7 https://www.acpjournals.org/doi/10.7326/l20-0745
8 Grant Steen R, Casadevall A, Ferric C — Fang: Why Has the Number of Scientific Retractions Increased? *PLoS One* 2013; **8(7):** e68397. Published online 2013 Jul 8. doi: 10.1371/journal.pone.0068397 Correction in: PLoS One. 2013; 8(7): 10.1371/annotation/0d28db18-e117-4804-b1bc-e2da285103ac. PMCID: PMC3704583\
9 Ader F, Bouscambert-Duchamp M, Hites M, Peiffer-Smadja N, Poissy J, Belhadi D, DisCoVeRy Study Group, *et al*— Remdesivir plus standard of care versus standard of care alone for the treatment of patients admitted to hospital with COVID-19 (DisCoVeRy): a phase 3, randomised, controlled, open-label trial. *Lancet Infect Dis* 2021; **Sep 14:**S1473-3099(21)00485-0. doi: 10.1016/S1473-3099(21)00485-0. Epub ahead of print. PMID: 34534511; PMCID: PMC8439621.
10 RECOVERY Collaborative Group. Convalescent plasma in patients admitted to hospital with COVID-19 (RECOVERY): a randomised controlled, open-label, platform trial. Lancet. 2021 May 29;397(10289):2049-2059. doi: 10.1016/S0140-6736(21)00897-7. Epub 2021 May 14. PMID: 34000257; PMCID: PMC8121538.
11 Rosas IO, Bräu N, Waters M, Go RC, Hunter BD, Bhagani S, *et al* — Tocilizumab in Hospitalized Patients with Severe Covid-19 Pneumonia. *N Engl J Med* 2021; **384(16):** 1503-16. doi: 10.1056/NEJMoa2028700. Epub 2021 Feb 25. PMID: 33631066; PMCID: PMC7953459.
12 https://www.science.org/content/article/trump-has-shown-little-respect-us-science-so-why-are-some-parts-thriving

Drug Corner

Real World Evidence Study to Evaluate the Effectiveness and Tolerability of Oral Lincomycin in the Treatment of Surgical Site Infection (SSI) and Skin & Soft Tissue Infection (SSTI)

Milind Ruke[1], Anish Desai[2], Sunaina Anand[3], Sreeni Nair[4]

Aim : The study aimed to evaluate the effectiveness and safety of oral lincomycin 500 mg in patients with surgical site infection or skin and soft tissue infection.

Methodology : A total of 234 patients were enrolled, comprising 122 males and 112 females, with the majority falling in the age group of 41-50 years. Patients received thrice daily doses of oral lincomycin until the end of their treatment. The primary endpoints assessed signs and symptoms associated with SSI and SSTI using a scoring system ranging from 0 to 3, with 0 representing no symptoms and 3 indicating severe symptoms.

Result : Lincomycin treatment significantly reduced the mean symptom scores for fatigue, cellulitis, pain, and redness around the surgical area (P<0.05). Additionally, mean scores for folliculitis and scar formation completely reduced after lincomycin treatment (P<0.05). Mean score of fluid drainage was also significantly decreased from 2.18 to 0.20. Oral lincomycin 500mg thrice daily was found to be well-tolerated with no major adverse events such as diarrhoea or Clostridium difficile infection reported after treatment.

Conclusion : The study demonstrated that oral lincomycin is effective and well-tolerated in a wide range of surgical site infections as well as in skin and soft tissue infections.

[*J Indian Med Assoc* 2023; **121(11):** 74-7]

Key words **: Surgical Site Infection, Skin & Soft Tissue Infection, Oral Lincomycin, Surgery.**

Skin and soft tissue infections (SSTIs) are characterized by microbial invasion of the skin layers and underlying soft tissues and range in severity from mild to life threatening[1]. SSTIs are the most common type of infection globally as well as in India, constituting about 29-32% of all infections in 2018-2019[2]. Skin infections are commonly caused by Gram positive and anaerobic bacteria like Staphylococcus, Streptococcus and Propionibacterium, therefore Lincomycin can play an important role in SSTI management[3].

The most common pathogens associated with SSTIs have been b-haemolytic streptococcus (groups A, B, C, G, and F) and S aureus, but more recently Gram-negative Bacilli (GNB) have been increasingly reported, especially in polymicrobial infections. Necrotizing SSTIs are often polymicrobial and can include aerobic gram-positive cocci such as S aureus, GNB such as Escherichia coli, and anaerobes including Clostridium spp and Bacteroides fragilis. Surgical infections are predominantly due to group A streptococcus and S aureus, although GNB such as Pseudomonas aeruginosa are also common. Especially since the 1980s, multidrug-resistant bacterial organisms, such as MRSA, vancomycin-resistant Enterococcus, and GNB carrying extended spectrum b-lactamases (ESBLs), have become increasingly common causes of SSTIs both in the health care setting and in the community[4].

Recurrent SSTIs are frequent in people with diabetes mellitus and can occur even before the diagnosis is made. Elevated serum glucose predisposes to SSTIs. Hence, optimizing glycaemic control is an important strategy to prevent SSTIs in diabetic patients. Patients with Human Immunodeficiency Virus (HIV) infection have a high incidence of CA-MRSA SSTIs. Possible biological reasons for this include innate immune factors, low CD41 lymphocyte counts, and detectable HIV viral loads. SSTIs remain a significant problem in outpatients living with HIV, although rates appear to have declined by approximately 40% between 2009 and 2014[4].

Surgical Site Infection (SSI) is described as the infection that develops in a surgically created wound. SSI is the most frequently reported Hospital acquired infection in lower- and middle-income countries and

[1]MBBS, MS, DHA, FICS, FASI, PGCDFM, Head of Medical Surgery Department, Khan Bahadur Bhabha Hospital, Mumbai 400070

[2]MD, FCP, PGDHEP, Director, Medical Affairs, Intellimed Healthcare Solutions, Mumbai 400070

[3]Pharm D, DGM - Medical Affairs Intellimed Healthcare Solutions, Mumbai 400070

[4]Pharm D, Senior Executive - Medical Affairs Intellimed Healthcare Solutions, Mumbai 400070

Received on : 27/10/2023

Accepted on : 30/10/2023

the level of risk is significantly higher than developed countries. The pooled SSI incidence is 11.8% in lower- and middle-income countries. The SSI rate in India widely varies and depending on setting, ranges from 1.6% to 38%[5].

Lincomycin, which is derived from Streptomyces lincolnensis, has been widely used since Mason, *et al* (1962) first drew attention to its properties as an antibiotic[6]. It acts by inhibiting protein synthesis in susceptible bacteria by binding to the 50's subunits of bacterial ribosomes and preventing formation of the peptide bond during transcription. Though considered bacteriostatic, it is bactericidal against susceptible bacteria and when used in high concentrations[3].

It was approved by the FDA in December 1964 and indicated for the treatment of serious bacterial infections caused by susceptible strains of streptococci, pneumococci and staphylococci in patients who are allergic to penicillin or for situations in which penicillin is deemed inappropriate.[7] Lincomycin has been studied in several common outpatient and hospital-based infections like Ear Nose Throat (ENT) and Respiratory Tract Infections (RTI), SSTI including surgical wound infections, bone and joint Infections (osteomyelitis and septic arthritis), and oro-dental infections[8].

Among SSTI, wound infections, including surgical ones, exhibit a high response to Lincomycin. The response has been effective in bacterial dermatosis like folliculitis, furunculosis, impetigo and pyodermas, however deeper infections like cellulitis, and carbuncles may need more prolonged or injectable treatment. Lincomycin along with incision drainage gives effective results in treatment of abscess[9].

This study aims to evaluate effectiveness and tolerability of oral Lincomycin capsule (500 mg thrice daily) in the treatment of SSI and SSTI.

Materials and Methods

Setting and Participants :

Patients who were undergoing surgical operation and had clinical diagnosis of impetigo, folliculitis, or minor soft tissue infection including secondarily infected eczema presumed to be caused by Staphylococcus aureus were included in the study. Patients were prescribed lincomycin 500 mg (manufactured by Wallace Pharmaceuticals) thrice daily for the treatment of SSI or SSTI. Following patients were excluded: pregnancy or breastfeeding, known sensitivity to the study medication, subject with signs of systemic infection (such as fever), or with evidence of abscess or cellulitis at the site to be treated, known history of hypersensitivity to lincomycin or clindamycin, use of a topical antibacterial medication to the area being treated within the last 48 hours.

Outcomes and Follow-up :

The primary endpoints change in signs& symptoms associated with SSI (severity, signs of infection at surgical site, wound healing, postoperative pain) & SSTI (erythema, purulence, crusting, oedema, redness, swelling, warmth, and pain). Symptoms were scored on the scale of 0 to 3, where 0=no symptoms, 1= few symptoms, 2= moderate or considerable number of symptoms, and 3= severe or great deal of symptoms. It was assessed at the time of suture removal or 6 to 8 days after treatment. Data was collected using standardized case report forms at screening; baseline; day14. The other primary endpoints included incision and drainage after the end of original planned course and adding therapy after hospital discharge. The secondary outcomes were incidence of adverse events such as (allergic contact dermatitis, antibiotic resistance, and anaphylaxis), wound size at baseline & follow up, length of hospital stay, SSI & SSTI related 30-day readmission and patient satisfaction.

Statistical Analysis :

A sample size of 234 patients was considered adequate for the study. Descriptive statistics was used to present the data in mean and percentage. Paired t-test and Wilcoxon Sign Ranked Test was used to test significance.

Results

A total of 234 patients were included in the study, comprising of 52% males and 48% females. About 29.5% belonged to the age group of 41-50 years. All patients received oral lincomycin 500mg thrice daily until the end of the treatment (Table 1).

The most common duration of treatment with lincomycin was 7 days (28.63%) with a minimum to maximum range of 4-10 days (Fig 1).

Effectiveness :

Study results indicated that the treatment with oral lincomycin reduced the mean symptom score of fatigue, cellulitis, pain, and redness around surgical area from 0.39, 2.27, 2.41, 2.03 to 0.01, 0.14, 0.19,0.20 respectively ($P < 0.05$). Also, mean score of folliculitis (0.88) and scar (0.07) formation completely reduced after the lincomycin treatment ($P<0.05$). The drainage of fluid was also significantly reduced from 2.18 to 0.20 (Fig 2).

ESR count significantly reduced from 11 to 5 mm/hr and WBC count reduced from10710.66million/mm^3

Table 1 — *Demographics details of patients*		
Age wise distribution		
Age Group	No of Patients (N=234)	Percentage
< 20 Years	18	7.7%
21-30 Years	59	25.21%
31-40 Years	56	23.93%
41-50 Years	69	29.5%
51-60 Years	18	7.7%
61-70 Years	13	5.55%
> 70 Years	1	0.42%
Gender wise distribution		
Male	122	52%
Female	112	48%
Diagnosis wise distribution		
SSTI	77	32.91%
Abscess	21	8.97%
Cellulitis	28	11.97%
Diabetic foot infection	27	11.53%
Injury	1	0.43%
Appendicitis	5	2.14%
SSI	32	13.68%
Post surgical infection	2	0.85%
Wound Infection	21	8.97%
Others	20	8.55%

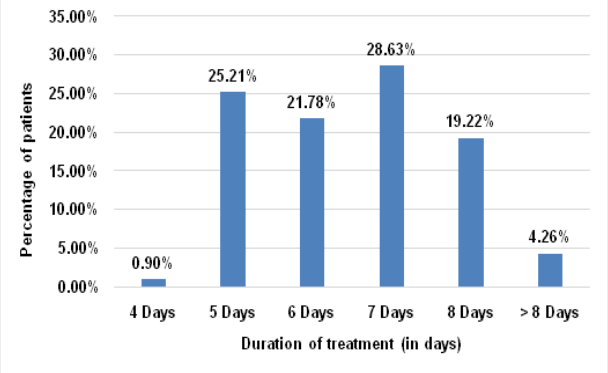


Fig 1 — Duration of treatment

to 7049.27 million/mm^3, respectively (P<0.05). Similarly, haemoglobin improved from 10.28g/dL to 10.66 g/dL (Table 2).

Tolerability :

Lincomycin treatment was safe and well tolerated in the patients. Diarrhoea and Clostrium difficile infection were not observed after treatment. No other major adverse events were observed.

Discussion

The current real-world evidence study found that lincomycin is effective and safe for the treatment of SSI and SSTI. Skin infections commonly arise from Gram-positive and anaerobic bacteria such as Staphylococcus, Streptococcus and Propionibacterium. Lincomycin can play an important role in managing SSTIs.

Table 2 — *Mean values of ESR, WBC, Hb*			
ORAL		Mean	P-Value
ESR (mm/hr)	BT	11.00	0.0351
	AT	5.00	
WBC (million/mm^3)	BT	10710.66	0.0000
	AT	7049.27	
Hb (g/dL)	BT	10.28	0.0016
	AT	10.66	

In this study, there was significant reductions in the average values of various outcomes, including fatigue, pain, cellulitis, folliculitis, redness, and scar formation. Parameters such as ESR and WBC reduced while haemoglobin increased indicating a reduction in infection and overall improvement in the patient's condition. These findings demonstrate the effectiveness of oral lincomycin 500 mg capsule in treating SSI and SSTI.

The efficacy and safety of lincomycin has been well established in previous studies. In a recent Indian study, 30 patients with SSTIs were evaluated for their response to lincomycin 500 mg oral capsules administered two to three times daily. The study showed that by day 14, complete relief of clinical signs and symptoms was achieved in approximately 80% of patients showed improvement, for different conditions: cellulitis (60%), folliculitis (85.7%), furuncles (66.7%), carbuncles (50%), oozing wounds (90.9%), and open wounds/surgical site infections (100%)[3].

In one of the studies on bacterial dermatosis, 315 patients reported an excellent or satisfactory response in 271 out of 315 cases (86%) treated with lincomycin. High rates of clearance were observed for cystic acne (140 out of 171 cases ie, 82%), with a 100% response rate for impetigo and furunculosis, and over 95% response rate for pustular dermatosis. In the same study, few patients on high dose or prolonged Lincomycin treatment developed transient diarrhoea, which did not require discontinuation of treatment[10].

In another study including 30 patients with Staphylococcal (two-thirds) and Streptococcal soft tissue infections (19 abscess cases, 5 cellulitis cases, 5 infected wounds, and 1 phlebitis), all patients reported a satisfactory clinical response. A small study focusing on surgical site and wound infections showed marked improvement, with an excellent response rate of 92.6% (25 out of 27 patients). Microbiological testing revealed that many isolates were of Staphylococcus and three cases of Streptococcus[3].

In this study, no adverse events were reported after Lincomycin treatment indicating good tolerability.

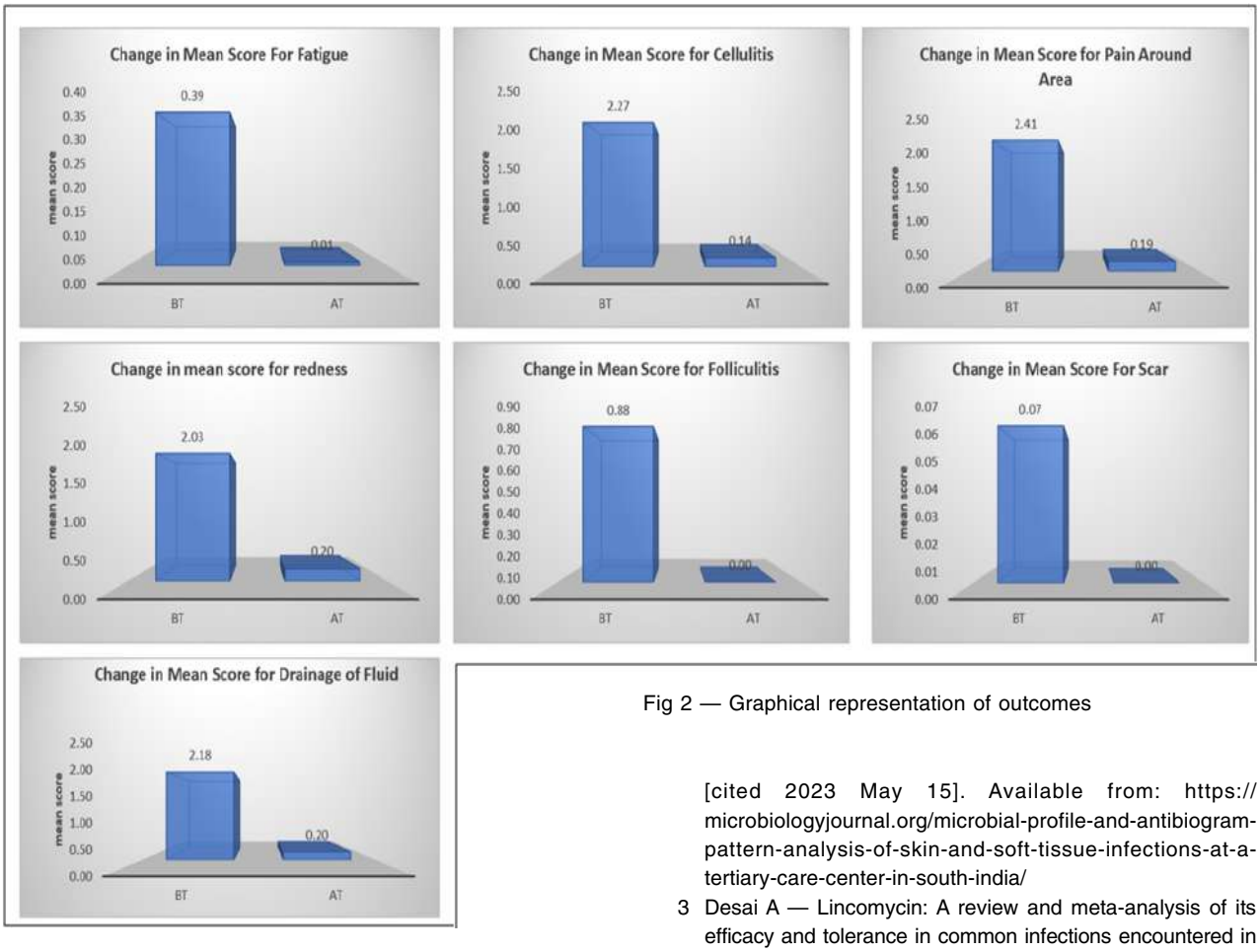


Fig 2 — Graphical representation of outcomes

Conclusion

In this real-world study, Lincomycin 500mg capsule thrice daily has shown to be effective and well tolerated in a wide range of surgical site infections as well as in skin and soft tissue infections.

Declaration : Article is not published / submitted in any other journal.

Acknowledgments : The authors thank all the study investigators, study coordinators, and other study personnel who participated in the study, for their contributions.

Conflict of Interest : No

Fundings : The study and publication were financially supported by Wallace Pharmaceuticals Pvt Ltd.

References

1 Kaye KS, Petty LA, Shorr AF, Zilberberg MD — Current Epidemiology, Etiology, and Burden of Acute Skin Infections in the United States. *Clin Infect Dis* 2019; **68(Suppl 3):** S193-9.

2 Microbial Profile and Antibiogram Pattern Analysis of Skin and Soft Tissue Infections at a Tertiary Care Center in South India [Internet]. Journal of Pure and Applied Microbiology. 2021 [cited 2023 May 15]. Available from: https://microbiologyjournal.org/microbial-profile-and-antibiogram-pattern-analysis-of-skin-and-soft-tissue-infections-at-a-tertiary-care-center-in-south-india/

3 Desai A — Lincomycin: A review and meta-analysis of its efficacy and tolerance in common infections encountered in clinical practice. *J Indian Med Assoc* 2021; **119(8):** 69-75

4 Watkins RR, David MZ — Approach to the Patient with a Skin and Soft Tissue Infection. *Infectious Disease Clinics of North America* 2021; **35(1):** 1-48.

5 Mekhla, Borle FR — Determinants of superficial surgical site infections in abdominal surgeries at a Rural Teaching Hospital in Central India: A prospective study. *J Family Med Prim Care* 2019; **8(7):** 2258-63.

6 Ashton H, Beveridge GW, Stevenson CJ — THERAPEUTICS XII.: Lincomycin and Clindamycin. *Br J Dermatol* 1970; **83(5):** 604-6.

7 Hadi FT, Alabbas NNA — Application of INCOMYCIN Against Induced Skin Infection in Mice by METHICILLIN RESISTANT STAPHYLOCOCCUS (MRSA). *Journal of Survey in Fisheries Sciences* 2023; 10(2S): 866-73.

8 Desai A, Narayanan V, Anand S— Lincomycin: A review and meta-analysis of its efficacy and tolerance in common infections encountered in clinical practice. *Journal of the Indian Medical Association* 2021; **119:** 69.

9 Desai A — Lincomycin in Skin and Soft Tissue Infections and Upper Respiratory Tract Infections. *J Indian Med Assoc* 2021; **119(2):** 62-6

10 Nierman MM — Lincomycin in management of bacterial dermatoses. *Clin Med* 1966; **73(5):** 79.

Drug Corner

Specific Collagen Peptide — A Missing Piece in the Management of Osteoporosis

M S Gupta[1], K S Grover[2], Gurinder Bedi[3], Anish Desai[4]

Osteoporosis remains a pressing global health concern, characterized by a decrease in bone mineral density (BMD) & increased susceptibility to fractures, particularly among the aging population. Current therapeutic approaches, while diverse, often face challenges such as suboptimal patient compliance and potential side effects. This review explores the potential role of collagen peptides as a promising avenue in the management of osteoporosis.

Various preventive and therapeutic strategies exist for osteoporosis, encompassing non-pharmacological interventions, calcium and vitamin D supplementation, and pharmacological agents. However, limitations persist, necessitating novel and effective treatment options. Collagen peptides have garnered attention due to their demonstrated effects in enhancing BMD, bone metabolism, and microarchitecture observed in preclinical studies and clinical trials.This review highlights the role of collagen peptides, mechanism of action, and clinical studies and highlights the promise of collagen peptides in addressing the challenges of current osteoporosis therapy, paving the way for future investigations and clinical applications in this field.

[*J Indian Med Assoc* 2023; **121(11):** 78-81]

Key words **: Osteoporosis, Collagen Peptide, Bone Mineral Density, Osteoblast, Osteoclast.**

Osteoporosis is a generalized bone disease characterized by low bone mass & deterioration of bone structure, leading to fragility of bones and increased risk of fracture. The causes of osteoporosis encompass various factors, including insufficient physical activity, inadequate nutrition, underlying medical conditions, medication use, and non-modifiable elements like aging, gender, and genetic predisposition. Addressing and treating osteoporosis is crucial for both individual and public health due to the chronic pain, reduced mobility, and disability resulting from osteoporotic bone fractures, affecting a significant portion of older individuals worldwide. Estimates suggest that one in every three women and one in five men aged 50 or above will experience bone fractures caused by osteoporosis[1].

Numerous preventive and therapeutic strategies exist for osteoporosis. Non-pharmacological approaches, including regular physical activity, smoking cessation, and reducing alcohol intake, play vital roles in maintaining bone health. Calcium and vitamin D supplementation are recommended components of osteoporosis management, yet their effectiveness in significantly reducing bone fracture risk remains inconclusive. Pharmacological treatments encompass various substances such as bisphosphonates, denosumab, teriparatide, and selective estrogen receptor modulators. Bisphosphonates, considered the primary anti-catabolic therapy, are widely utilized for fracture prevention but may lead to some undesirable side effects[2-4].

Additional therapeutic options involve recombinant hormones or hormone receptor manipulation, but these therapies also present potential side effects[5-7]. Patient compliance with anti-osteoporotic medications tends to be challenging, with approximately 40% discontinuing oral bisphosphonates within the first year and 75% ceasing treatment within 5 years[8]. After diagnosing osteopenia or osteoporosis, foundational therapies involving increased physical activity, a calcium-rich diet, and reducing alcohol and nicotine intake aim to mitigate further bone mineral density loss. However, these approaches are not typically associated with significant improvements in Bone Mineral Density (BMD). Hence, there is a pressing need for effective and compliant therapeutic interventions, especially given global demographic shifts.

[1]MBBS, MS (Orthopedics), Director & Senior Orthopaedic Consultant, Raffels Hospital, Panchkula, Haryana 134113

[2]MBBS, MS (Orthopedics), Senior Consultant Joint Replacement and Orthopedics, Amar Hospital, Patiala, Punjab 147001

[3]MBBS, MS Orthopedics, DNB (Orth.), FRCS, FRCS(Orth), Director & Senior Consultant Orth Surgeon, Head of the Department of Orthopaedics, Fortis Hospital, Vasant Kunj, New Delhi 110070

[4]MBBS, MD, FCP, PGDHEP, Clinical Pharmacologist & Nutraceutical, Physician, Founder & CEO, IntelliMed Healthcare Solutions, Kurla, Mumbai 400070

Received on : 07/12/2023

Accepted on : 11/12/2023

In vitro & animal model studies have demonstrated that collagen peptide administration can enhance bone's organic component[9], improve bone metabolism and microarchitecture[10-12], and bolster the mechanical strength of vertebrae[13]. Furthermore, combining collagen peptides with calcitonin has shown favorable effects in postmenopausal women[14], resulting in statistically significant decreases in bone collagen breakdown products compared to a placebo. The effects of collagen peptide therapy persisted for at least three months after treatment cessation, suggesting an ongoing anabolic effect.

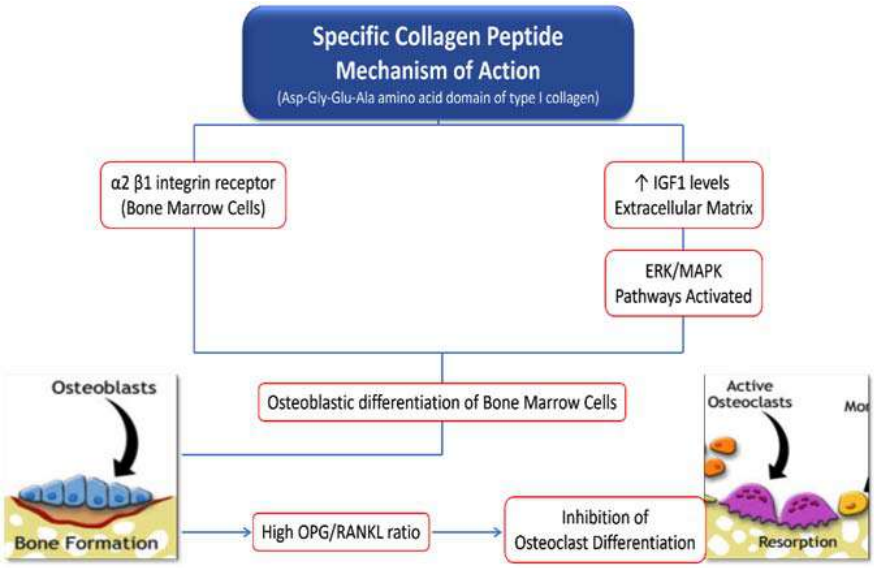


Fig 1 — Proposed mechanism of action of Specific Collagen Peptide

Specific Collagen Peptide :

Approximately 95% is type I collagen in bone, providing viscoelastic strength, torsional stiffness, and load-bearing capacity[15]. Collagen plays an essential role in force transmission and tissue structure maintenance and also determines the amount of mineral deposition. Therefore, the ability of bones to withstand mechanical forces and fractures relies not solely on the quantity of bone tissue (mineralization) but also on its quality[15]. Specific Collagen Peptides (SCP) are a composition of different specific peptides optimized for site-specific physiological benefits. They are derived from a highly controlled production process of collagen, which is determined by hydrolyzation conditions.

Specific Collagen Peptides (SCP) influence bone health through multiple mechanisms (Fig 1). They initiate bone marrow cell differentiation into osteoblasts by interacting with the $\alpha 2\ \beta 1$ integrin receptor on cell membranes. This interaction triggers the expression of type I collagen and bone-specific transcription factors. CP also stimulates osteoblast differentiation, bone matrix formation, and osteogenic markers by activating signaling pathways like ERK/MAPK. Insulin-like growth factor I is linked to collagen in the bone. Collagen networks are broken down during bone remodeling. As a result, growth factors, which in turn promote bone formation, are released. CP could affect osteoclasts by increasing the OPG/RANKL ratio, potentially reducing bone resorption. Further research is necessary to understand the exact mechanism[15].

Clinical studies :

Currently, there are three clinical studies on specific collagen peptides: 3-month study, 12-month study, and 4-year long-term observational study. The below table describes the clinical studies and their results in Table 1.

Estimated Fracture Risk Reduction Associated with BMD Improvement

A meta-regression analysis found that greater improvements in BMD were strongly associated with greater reductions in vertebral and hip fractures. A 2% or 6% enhancement in total hip BMD could potentially correspond to a 28% or 66% decrease, respectively, in the risk of vertebral fractures. Similarly, a 2% or 6% advancement in total hip BMD might correspond to a reduction of 16% or 40% in the risk of hip fractures (Fig 3). While these outcomes may not directly translate to predicting individual patient treatment benefits, they strongly indicate that enhancements in Bone Mineral Density (BMD) through osteoporosis therapies could serve as valuable markers for fracture risk assessment in trials testing new therapeutic agents[19].

Conclusion

The current landscape of osteoporosis management is multifaceted, encompassing various preventive and therapeutic modalities. Despite the availability of treatments, challenges such as low patient compliance and potential side effects associated with existing medications underscore the need for innovative, effective, and well-tolerated interventions.

Table 1 — Showing clinical studies and their results

Trial	Study design	N	Intervention	Results
König Daniel et al.[16]	Prospective, randomized, double-blind, placebo-controlled single-center study.	131	Patients received 5 g of specific collagen peptides (SCP) or placebo (maltodextrin) for 12 months.	The results showed that bone density in the spine and femoral neck significantly increased (p = 0.030) after SCP treatment compared to placebo (p = 0.003). The SCP group showed an increase of almost 3.0% in the spine & 6.7% in the femoral neck, while bone density decreased in the placebo group (-1.3% for the spine and -1.0% in the femoral neck) during the same period.
Zdzieblik Denise et al.[17]	Non-controlled, open-label follow-up observation	31	Patients received 5 g of specific collagen peptides (SCP) for 4 years.	The consumption of 5 g of specific collagen peptides demonstrated a progressive increase in bone mineral density of the spine and femur from the start of follow-up to the fourth year of treatment. BMD increased by 5.79% to 8.16% in the spine & by 1.23% to 4.21% in the femoral neck.
SCP, along with Calcium and Vitamin D supplementation				
Argyrou Chrysoula et al.[18]	Randomized prospective study	51	Group A was administered a sachet comprising 5 g of CPs, 3.6 g of calcium lactate (equivalent to 500 mg of elemental calcium), and 400 IU of vitamin D3, while Group B received a daily chewable tablet containing 1.25 g of calcium carbonate (equivalent to 500 mg of elemental calcium) and 400 IU of vitamin D3 for three months.	Within three months of supplementation, Group A experienced a significant decrease of 13.1% (p<0.001) in P1NP levels and an 11.4% reduction in CTX levels (p=0.058). Conversely, Group B did not display any changes in P1NP or CTX levels. Group A exhibited better compliance compared to Group B and did not report any adverse events.

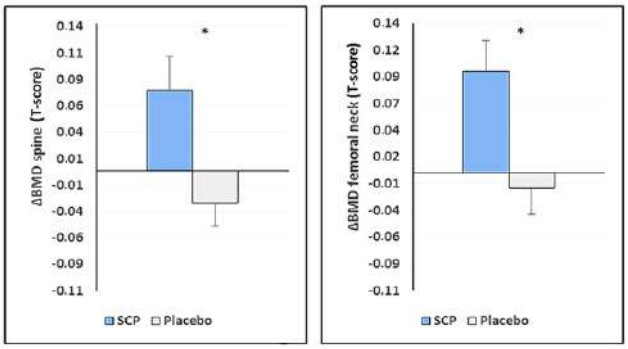


Fig 2 — Depicts the graph of change in bone density at the end of the study (12 months)[16]

	Vertebral fracture	Hip fracture	Nonvertebral fracture
Δ Total hip BMD			
2%	28%	16%	10%
4%	51%	29%	16%
6%	66%	40%	21%
Δ Femoral neck BMD			
2%	28%	15%	11%
4%	55%	32%	19%
6%	72%	46%	27%
Δ Lumbar spine BMD			
2%	28%	22%	11%
8%	62%	38%	21%
14%	79%	51%	30%

BMD = bone mineral density.

Fig 3 — Estimated Fracture Risk Reduction Associated with BMD Improvement[19]

Collagen peptides have emerged as a promising adjunct in the management of osteoporosis. Studies investigating the efficacy of specific collagen peptides have shown encouraging results in improving bone mineral density (spine and femoral neck). The administration of collagen peptides, either alone or in combination with calcium & vitamin D supplementation, demonstrated significant increases in BMD levels and bone markers (P1NP, CT_x) compared to placebo. This indicates a potential role of collagen peptides in enhancing bone health and mitigating bone loss in individuals with osteopenia or osteoporosis.

The clinical evidence from studies on specific collagen peptidessignifies their potential as a valuable addition to the armamentarium against osteoporosis. Further research is warranted to comprehensively elucidate the exact mechanisms of action and long-term effects of collagen peptide therapy. However, the data available thus far present an optimistic outlook for collagen peptides as a prospective therapeutic option in osteoporosis management, potentially offering patients a safer and more efficacious treatment approach.

Acknowledgements

We want to acknowledge Nirav Bhatia and Manish Garg from IntelliMed Healthcare Solutions for providing all the support for drafting the manuscript.

Fundings : The study and publication were financially supported by Universal NutriScience Pvt. Ltd.

References

1 Hernlund E, Svedbom A, Ivergard M — Osteoporosis in the European Union: Medical management, epidemiology and economic burden. A report prepared in collaboration with the International Osteoporosis Foundation (IOF) and the European Federation of Pharmaceutical Industry Associations (EFPIA). Arch. *Osteoporos* 2013; **8:** 136.

2 Kreutle V, Blum C, Meier C — Bisphosphonate induced hypocalcaemia - report of six cases and review of the literature. *Swiss Med Wkly* 2014; **144:** w13979.

3 Kaehling C, Streckbein P — Lethal cervical abscess following bisphosphonate related osteonecrosis of the jaw. *J Cranio-Maxillofac Surg* 2014; **42:** 1203-6.

4 Rachner TD, Platzbecker U, Felsenberg D, Hofbauer LC — Osteonecrosis of the jaw after osteoporosis therapy with denosumab following long-term bisphosphonate therapy. *Mayo Clin Proc* 2013; **88:** 418-9.

5 Montagnani, A. Bone anabolics in osteoporosis: Actuality and perspectives. *World J Orthop* 2014; **5:** 247-54.

6 Dore, R.K. Long-term safety, efficacy, and patient acceptability of teriparatide in the management of glucocorticoid-induced osteoporosis. Patient Prefer. *Adherence* 2013; **7:** 435-46.

7 Hadji P — The evolution of selective estrogen receptor modulators in osteoporosis therapy. Climacteric 2012; **15:** 513-23.

8 Gallagher AM, Rietbrock S, Olson M, van Staa TP — Fracture outcomes related to persistence and compliance with oral bisphosphonates. J Bone Miner Res 2008; 23: 1569-75.

9 Watanabe-Kamiyama M, Shimizu M — Absorption and effectiveness of orally administered low molecular weight collagen hydrolysate in rats. *J Agric Food Chem* 2010; **58:** 835-41.

10 Guillerminet F, Fabien-Soule V, Even PC, Tomé D, Benhamou CL, Roux C, *et al* — Hydrolyzed collagen improves bone status and prevents bone loss in ovariectomized C3H/HeN mice. *Osteoporos Int* 2012; **23:** 1909-19.

11 Han X, Xu Y, Wang J — Effects of cod bone gelatin on bone metabolism and bone microarchitecture in ovariectomized rats. *Bone* 2009; **44:** 942-7.

12 Guillerminet F, Beaupied H — Hydrolyzed collagen improves bone metabolism and biomechanical parameters in ovariectomized mice: An in vitro and in vivo study. *Bone* 2010; **46:** 827-34.

13 De Almeida JE, Cuneo F, Amaya-Farfan J, de Assuncao JV, Quintaes KD — A food supplement of hydrolyzed collagen improves compositional and biodynamic characteristics of vertebrae in ovariectomized rats. *J Med Food* 2010; **13:** 1385-90.

14 Adam M, Spacek P, Hulejova H, Galianova A, Blahos J — Postmenopausal osteoporosis. Treatment with calcitonin and a diet rich in collagen proteins. *Cas Lek Cesk* 1996; **135:** 74-8.

15 Daneault A, Prawitt J, Fabien Soulé V, Coxam V, Wittrant Y — Biological effect of hydrolyzed collagen on bone metabolism. *Critical Reviews in Food Science and Nutrition* 2017; **57(9):** 1922-37.

16 König D, Oesser S, Scharla S, Zdzieblik D, Gollhofer A — Specific Collagen Peptides Improve Bone Mineral Density and Bone Markers in Postmenopausal Women-A Randomized Controlled Study. *Nutrients* 2018; **10(1):** 97.

17 Zdzieblik D, Oesser S, König D — Specific Bioactive Collagen Peptides in Osteopenia and Osteoporosis: Long-Term Observation in Postmenopausal Women. *Journal of bone metabolism* 2021; **28(3):** 207-13.

18 Argyrou C, Karlafti E, Lampropoulou-Adamidou K — Effect of calcium and vitamin D supplementation with and without collagen peptides on bone turnover in postmenopausal women with osteopenia. *J Musculoskelet Neuronal Interact* 2020; **20(1):** 12-7.

19 Bouxsein ML, Eastell R, Lui LY, — FNIH Bone Quality Project. Change in Bone Density and Reduction in Fracture Risk: A Meta-Regression of Published Trials. *J Bone Miner Res* 2019; **34(4):** 632-42.

Drug Corner

Efficacy and Safety of Human Placental Extract (HPE) in Women with Cervical Erosion

L Jayanthi Reddy[1]

Background : Cervical erosion or ectropion is a condition when columnar tissue replaces squamous epithelial tissue of the ectocervix and continues with the endocervical regionpredisposing to the occurrence of chronic wounds. Human Placental Extract (HPE), abundant in PDRN and growth factors, aids tissue repair and regeneration. HPE restores normal cervix cytology, facilitating healing of wounds in cervical erosion.

Objective : To study the efficacy and safety of HPE in 20 women with cervical erosion from J J Hospital, Hyderabad, India.

Method : The present study was conducted in the Department of Obstetrics and Gynaecology from J. J. Hospital, Hyderabad. Twenty subjects aged between 20-50 years, with complaints of abnormal vaginal discharge, pelvic pain, post coital bleeding and dysuria were recruited. The data were compiled, analyzed and compared with baseline and post treatment parameters.

Results : HPE gel showed clinically significant reduction in abnormalvaginal discharge, roughness of cervical epithelium as noted by per speculum examination at the end of the study.

Conclusion : HPE gel is a safe and effective treatment option for cervical erosion/ectropion and showed better tissue regeneration property. [*J Indian Med Assoc* 2023; **121(11):** 82-3]

Key words **: Cervical Erosion, Inflammation, Tissue regeneration, Human Placental Extract gel, Bioactive molecules.**

Cervical erosion or ectropion is a condition when columnar tissue replaces squamous epithelial tissue of the ectocervix and continues with the endocervical region. Cervical erosion of any etiology (hormonal, inflammatory, traumatic) may convert into a wound due to infection, trauma occurring during sexual intercourse, use of tampons etc.This wound ultimately heals by the process of regeneration. Although cervical erosion is not a true erosion, or ulcerit appears as a red, eroded and inflamed tissue. The conventional management of cervical erosion includes cauterisation, antimicrobial agents and vaginal pessaries.

Studies have shown that nucleotides (PDRN) on topical use showed improvement in cervical ectropion. Human Placental Extract (HPE) is rich in biomolecules such as PDRN, NADPH, Ubiquitin like peptide, CRH like peptide, various growth factors and amino acids such as glutamate. Therefore, it exhibits anti-inflammatory, debridement action, immunomodulatory and tissue regeneration actions.Human Placental Extract (HPE) aids tissue repair conducive to regeneration and restores the normal cytology of the cervix. It is especially effective in inflammatory type of cervical erosion.

Objective of the study :

To evaluate the efficacy and safety of HPE gel in women with cervical erosion.

[1]MD, DGO, DNB, FICOG, Consultant & Director, J J Hospital, Hyderabad and Professor (Obstratrics & Gynaecology), SVS Medical College and Corresponding Author

Received on : 06/12/2023
Accepted on : 13/12/2023

Methodology :

The study was a single centre, prospective, observation alone carried out in 20 women with cervical erosion in Hyderabad, India. Women attending the out-patient department of J J Hospital with the complaints of abnormal vaginal discharge, pelvic pain, post coital bleeding, dysuria were screened. Diagnosis of cervical erosion was done based on the presenting complaints and per-vaginal examination.

Inclusion criteria : women of child bearing age group between 20-50 years and with the diagnosis of cervical erosion were included in the study.

Exclusion criteria : Pregnancy, lactation, post-menopausal women, chronic pelvic inflammatory disease, organic causes of cervicitis such as premalignancy-malignancy of cervix and severe systemic diseases were excluded from the study.

Treatment :

All enrolled subjects were treated with 1 gm of HPE gel application twice daily, over a period of 30 days using an applicator. Subjects were educated for the proper use of the gel. No other systemic antimicrobial agents were prescribed. Baseline parameters were recorded. All subjects were followed-up after 21 and 30-days post treatment. All were subjected to per-speculum examination and improvement in symptoms at each visit were recorded. All subjects were enquired for occurrence of any adverse events.

Results :

Twenty subjects were enrolled in the study. The mean age of the subjects was 33.30 ± 6.51 years.

Table 1 — *Presentations at the Baseline*	
Presentation / Symptoms	No of Subjects (n=20)
Vaginal Discharge	20
Dyspareunia	9
Dysuria	8
Back-Ache	7
Pelvic Pain	5
Post-Coital Bleeding	5
Inter Menstrual Bleeding	2

The per speculum examination findings were conducted, the roughness of cervical epithelium was also noted. Baseline data was as follows (Fig 1) :

Symptoms and signs at baseline were compared with post treatment values (Fig 2).

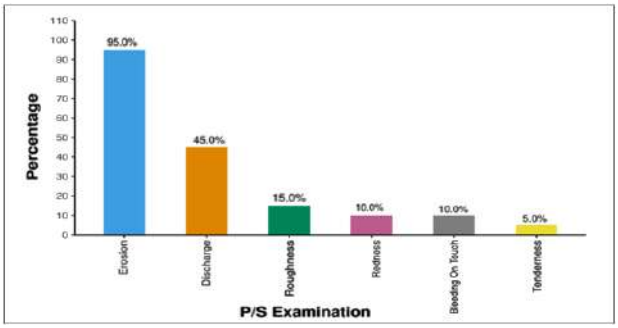


Fig 1 — Baseline data : Per speculum examination

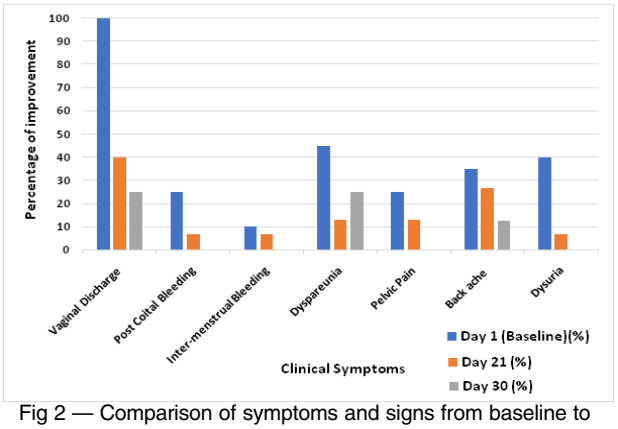


Fig 2 — Comparison of symptoms and signs from baseline to day 21 and day 30

Clinical Global Impression Scale (Physician's Observation)

Clinical Global Impression Scale was measured based on the observations of physicians during per-speculum examination (Table 2).

Good : Complete healing of lesions.
Fair : Partial healing.
Poor : No significant healing.

Table 2 — *Clinical Global Impression Scale*	
Impression	**Scale**
Good	7
Fair	7
Poor	1

Discussion :

In the current study the application of human placental extract gel has resulted in clinically significant reduction in abnormal vaginal discharge, roughness of cervical epithelium as noted by per speculum examination, at the end of day 30. When Clinical Global Impression Scale was measured to know the efficacy and safety of the therapy, 7 subjects rated as good, 7 rated as fair and only one subject rated as poor. None of the subjects reported any adverse events during the course of the study.

As per the study conducted by Dr Chandravati, former professor from Dep. Of OBG from KGMC, Lucknow, HPE gel was found to be an efficacious, safe and cost-effective measure in the management of cervical erosion in reproductive age women. The present study also endorses the role of HPE gel in the management of cervical erosion/ectropion because of its inherent property of tissue regeneration capabilities.

HPE gel is an aqueous extract of human placenta. It is rich in biomolecules such as peptides, nucleotides, NADPH, PDRN's, ubiquitin-like peptide. Thus, the wound healing property of HPE can be explained based on its anti-inflammatory and tissue regenerative properties.It restores squamous epithelium of affected site thus maintains the normal cytology of cervix Also, it has an immunotropic action, at both cellular and humoral levels, thus, fibrinogenesis, angiogenesis and epithelialization are enhanced following the use of HPE.

Conclusion :

As HPE gel is for topical application, it improves patients' compliance and also avoids minor invasive procedures. HPE gel is an efficacious, safe and cost-effective treatment option for cervical erosion. It would be a useful treatment option in the therapeutic armamentarium of gynaecologist's treatment of cervical erosions.

Disclosure : The authors declare no conflict of interest.

Fundings : The publication are financially supported by Albert David Limited.

References

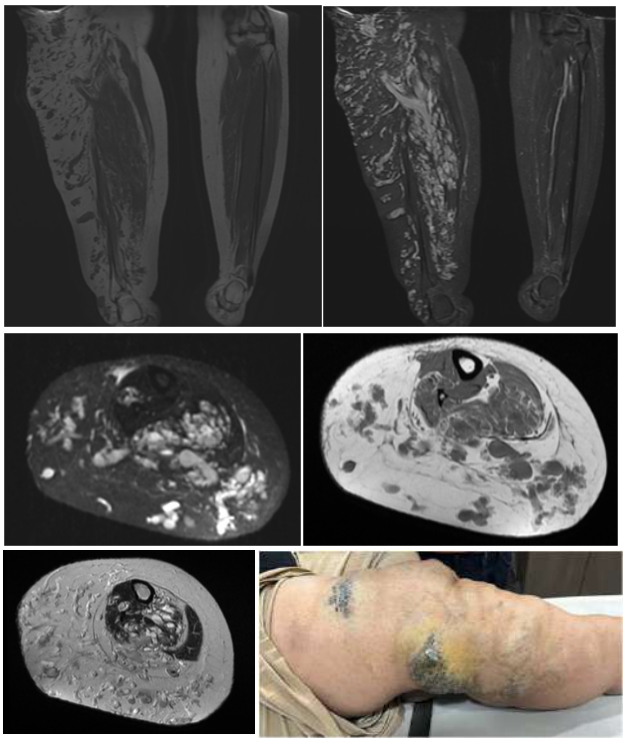
1 Wied GL, Dytch HE — The cytomorphologic and cytometric manifestations of cervical reparative processes. Annali di Ostetricia, Ginecologia, Medicina Perinatale 1990; **111(6):** 349-63.
2 Manju Shukla — Comparative study pf effect of placentrex gel on cervical erosion with cryocauterisation" Obs & gynae today. vol ix no. 12; 823-827 december 2004.
3 Pearl Agarwal — Cervical ectropion. Https://www.ncbi.nlm.gov/books/nbk560709.
4 Colangelo MT, Galli C, Guizzardi S — Polydeoxyribonucleotide regulation of inflammation. *Advances in Wound Care* 2020; **9(10):** 576-89.
5 Chandrawati — Comparative study of effect of Placentrex on cervical erosion with cryocauterisation. Obs & Gynae today, Vol IX No 12, December 2004.

Image in Medicine

Bhoomi Angirish[1], Bhavin Jankharia[2]

Quiz 1

A 34-year-old female presented with gradually increasing limb size since 15 years. Now she complains of spontaneous oozing of blood on and off.



Questions :

(1) What is the Diagnosis ?
(2) What are the complications associated with this syndrome ?

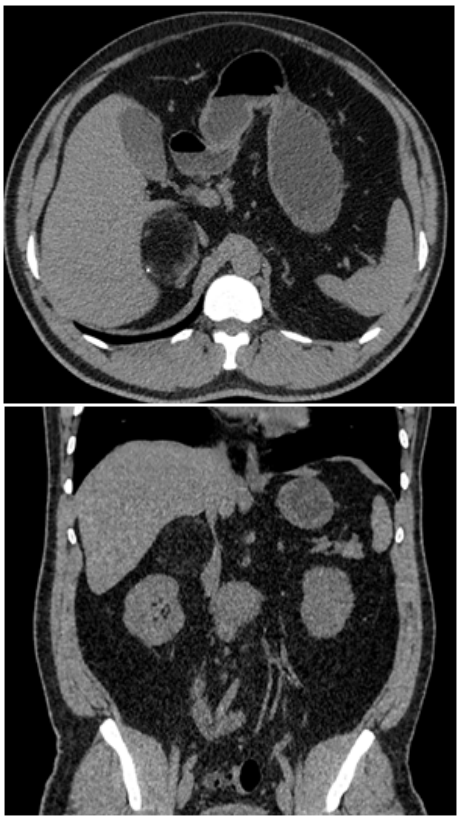
Answers :

(1) There is hypertrophy of lower limb associated with venous malformations involving both superficial and deep venous system. Multiple phleboliths are also seen. On clinical examination, cutaneous capillary malformations and discolouration were evident. These findings are in favour of Klippel-Trenaunay syndrome.

(2) The complications associated are thrombophlebitis of the affected limb, venous thromboembolism, gastrointestinal or genitourinary hemorrhage if there is visceral involvement, if capillary malformations are large enough, they may sequester platelets leading to consumptive coagulopathy.

Quiz 2

A 49-year-old male came for routine abdominal ultrasound and was incidentally diagnosed with suprarenal lesion for which he was advised a CT scan.



Questions :

(1) What is the Diagnosis ?
(2) What are the differential Diagnosis ?

Answers :

(1) A well defined predominantly fat density lesion with peripheral areas of calcification and few peripheral hypodense areas is seen in right suprarenal gland. These findings are suggestive of adrenal myelolipoma.

(2) The common differential diagnosis is lipid rich adrenal adenoma which purely fat containing lesion. Chemical shift MRI imaging is the most reliable for diagnosis when CT findings are equivocal. MR imaging demonstrates signal dropout on opposed-phase images in adenomas.

Department of Radiology, Picture This by Jankharia,
Mumbai, Maharashtra 400004
[1]MD, DNB (Radiology)
[2]MD, DMRD (Radiology)

Letter to the Editor

[The Editor is not responsible for the views expressed by the correspondents]

Hypoglycaemia is the most common and most neglected complication of Diabetes Mellitus

Sir, — Recently I went through an article title "Profile of Patients with Hypoglycemia Presenting to the Emergency Medicine Department of a Tertiary Care Hospital" published in Vol 121, No 2, February, 2023 Journal of the Indian Medical Association, I would like to congratulate the efforts put by authors and colleges for the research work and publication.

Hypoglycaemia is one of the most serious and very common complication in patient suffering from diabetes mellitus and which can be avoidable to some extent. A six-fold increase in deaths due to diabetes has been attributed to patients experiencing severe hypoglycaemia in comparison to those not experiencing severe hypoglycaemia.

Among 123 patients included in the study conducted by Dhivyaramani Leelakrishnan & Kingsly Robert Gnanadurai, 85 werealready diagnosed Diabetes Mellitus among these patients 95.3% had Type 2 Diabetes Mellitus which should be actually 69.10% as same figure mentioned figure 1 - Distribution of Diabetic Status among hypoglycaemia. In 31.8% among diabetic population hypoglycaemic episodes occurred in earlymorning hours.

Other findings most common cause for a hypoglycaemic episodeamong the diabetic was drug induced Hypoglycaemia out of which 32.5% occurred in Oral Hypoglycaemic Agents (OHA) users and 20.3% occurred in both oralhypoglycaemic and insulin users. It was evident that sulphonylureas and insulin mixtard were the common offending agents.

If author can share more information about which OHA responsible for hypoglycaemia other than sulfonylureas as well as which particular sulfonylureas (first / second generation) is more accountable, that will be helpful.

Hypoglycemia prevention though challenging but very essential.

Hypoglycemia prevention is a critical component of diabetes management. Blood glucose monitoring and, for some individuals, CGM are essential tools to assess therapy and detect incipient hypoglycaemia. People with diabetes should understand situations that increase their risk of hypoglycaemia, such as when fasting for laboratory tests or procedures, when meals are delayed, during and after the consumption of alcohol, during and after intense physical activity, and during sleep. Hypoglycemia may increase the risk of harm to self or others, such as when driving. Teaching people with diabetes to balance insulin use and carbohydrate intake and physical activity are necessary, but these strategies are not always sufficient for prevention.

Strategies to prevent Hypoglycaemia.

Formal training programs to increase awareness of hypoglycaemia and to develop strategies to decrease hypoglycaemia have been developed, including the Blood Glucose Awareness Training Program, Dose Adjusted for Normal Eating (DAFNE), and DAFNE plus.

Patient education remains a fundamental component in the prevention of hypoglycaemic episodes. Focus on preventing hypoglycaemia should include patient education on signs and symptoms that constitute hypoglycaemia and early recognition of these signs and symptoms. Patients may also need counselling on meal plans and exercise to manage their condition better.

Adequate interprofessional measures to minimize hypoglycaemic events involve participation and effective communication between the primary care physicians, physician assistants, nurse practitioners, endocrinologists, diabetes educators, pharmacists, specialty-trained diabetes nurses, the patient's family, nutritionists and/or dieticians, and the patient. The cornerstone of this management is the patient.

Group education programs can help patients with diabetes to learn and grow their knowledge among themselves and other members of the household.

Patients should monitor themselves for signs or symptoms of hypoglycaemia and always have sources of glucose (for example, hard candy, fruit juice) immediately available. Developing programs to educate healthcare staff has also been shown to provide better outcomes.

Healthcare professionals can design strategy / patient education to avoid or minimize drug induced hypoglycaemia will be really helpful for the patients and society.

Conclude : Early recognition of hypoglycaemia risk factors, self-monitoring of blood glucose, selection of appropriate treatment regimens with minimal or no risk of hypoglycaemia and appropriate educational programs for healthcare professionals and patients with diabetes are the major ways forward to maintain good glycaemic control, minimize the risk of hypoglycaemia and thereby prevent long-term complications.

References

1 Sanjay Kalra, Jagat Jyoti Mukherjee, Subramanium Venkataraman — Hypoglycemia: The neglected complication. *Indian J Endocrinol Metab* 2013; **17(5):** 819-34.

2 ElSayed NA, Aleppo G, Aroda VR — American Diabetes Association. 6. Glycemic targets: Standards of Care in Diabetes—2023. *Diabetes Care* 2023; **46(Suppl. 1):** S97-S110.

3 Philip Mathew, Deepu Thoppil — Hypoglycemiahttps://www.ncbi.nlm.nih.gov/books/NBK534841/

4 Mohan Viswanathan, Shashank R Joshi, Anil Bhansali — Hypoglycemia in type 2 diabetes: Standpoint of an experts' committee (India hypoglycemia study group). *Indian J Endocrinol Metab* 2012; **16(6):** 894-8.doi: 10.4103/2230-8210.102986

Abhijit Anil Trailokya
MBBS, Head, Medical Affairs
Department of Medical Affairs
Indoco Remedies Ltd, Mumbai, Maharashtra

JOURNAL OF THE INDIAN MEDICAL ASSOCIATION

INDEX TO VOLUME 121

January – December, 2023

ABBREVIATIONS USED

(Assoc N Suppl) Association Note Supplement, (Comm) Commentary, (C) Correspondence, (CR) Case Report, (CS) Case Series, (DC) Drug Corner, (Ed) Editorial, (IM) Imaging in Medicine, (OA) Original Article, (PCME) Pictorial CME, (RA) Review Article, (S Comm) Short Commmunication, (Spl C) Special Correspondence, (VP) View Point

SUBJECT INDEX

A

Acute Appendicitis in Adults Summer Surge of, **Abdul Razack GS, Harindranath HR, Uday C, Nashwath KKH**, (OA), **121(8):** 68-70.

Acute Heart Failure with Reduced Ejection Fraction Anaemia in Patients with - A Hospital-Based Study, **Shah SJ, Chavda SR, Mehta NH, Suthar RS** (OA), **121(12):** 15-20.

Advanced Squamous Cell Carcinoma of the Lung Efficacy and Safety of Afatinib as Second-line Treatment in: A Retrospective Observational Study, **Ali SH, Mondal S, Mondal S, Chakrabarti A**, (OA), **121(10):** 44-7.

Alopecia Areata in Indian Patients A Hospital based Cross-sectional Study Measuring the Psychological Comorbidities Associated with, **Sengupta S, Ghosh A, De P, Ghosh PK, Nandi S**, (OA), **121(11)**: 18-21.

Ano-rectal Malformation: An Institutional Retrospective Cohort Study Types of associated Anomalies with, **Hasan Z, Chaubey D, Prasad R, Kumar S**, (OA), **121(12):** 29-33 .

Anti-phospholipid Syndrome with Triple Antibody Positive (ATAP) Syndrome Presented as Non-healing Foot Ulcer in a Middle-aged Adult Female Atypical Presentation of, **Rathod AN, Rathod VN, Shahane SM**, (CR), **121(2):** 71-2.

Associated Complications among the Elderly of a Block, West Bengal Falls – Its magnitude, Influencers and, **Kerketta P, Ray K, Basu M**, (OA), **121(11)**: 30-4.

Asthenopia? Pseudomyopia : Is it an Underdiagnosed Cause of, **Kabra R, Desai H, Rao K, Shah S, Gajjar R, Patel A, Bhanat R**, (OA), **121(5):** 41-3.

Atherogenic Dyslipidemia Omega-3 Fatty Acids Combined with Statins in : A Comprehensive Review, **Kalra S, Desai A** (DC), **121(10):** 67-71.

Authorship : Mere Names on the Byline? **Chatterjee N,** (Ed), **121(2):** 13-4.

B

Bisalbuminemia in a 61-year-old Male Patient An Unusual Case of, **Chowdhury N, Chakrabarti S, Ghosh A**, (CR), **121(6):** 60-1.

Breast Cancer following Neoadjuvant Therapy and its Prognostic Implication for Patient Management Histomorphological Changes in — Study of 36 Cases in a Tertiary Care Hospital, **Pradhan R, Chatterjee S, Chakraborty A, Mondal S**, (OA), **121(7):** 44-8.

Breast Cancer Patients of Southern Rajasthan ER, PR HER2-neu Study in, **Goyal N, Bhatia G**, (OA), **121(7):** 29-32.

C

Cancer Prevention Diet and: An Evolving Picture, **Kant S, Rais J, Pandey AK**, (RA), **121(5):** 47-52.

Cardiac Dysfunction in Non-alcoholic Cirrhotic Patients in a Tertiary Care Hospital Study of, **Ray A, Saha M, Roy T, Ray J, Ghosh UC, Mondal SS**, (OA), **121(8):** 64-7.

Childhood Blindness and Plan of Action in Bihar A Study of the Epidemiology of, **Ratan V**, (RA), **121(2):** 62-3.

Childhood Diarrhoea A Study of Knowledge, Attitude and Practice among the Mothers Regarding Management of, **Patel S, Mehta VV, Chaudhari NK, Patel ED**, (OA), **121(6):** 23-8.

Chronic Diarrhoea and Malabsorption A Rare Surgical Cause of, **Chand JT, Tharakan GG, Sebastian GM, Paulose A**, (CR), **121(5):** 53-5.

Chronic Kidney Disease in a Tertiary Care Hospital A Study on Restless Legs Syndrome in Patients with. **Das S, Chatterjee N, Mandal A, Datta PK**, (OA), **121(12):** 37-40.

Chronic Obstructive Pulomnary Disease (COPD) Effectiveness of Nursing Care Bundles in Hospitalized Patients with, **Tirkey SR, John RP, Pandey AK, Verma AK, Kant S**, (OA), **121(8):** 58-63.

Chronic Venous Disease in the Indian Population A Prospective Observational Study on Anthropometric Correlation with Severity of, **Raja S, Pillai AV, Nair AS, Ramachandran R**, (OA), **121(10):** 48-51.

Cirrhosis of Liver and its Association with Severity of Disease and Development of Complications A Clinical Study of Dyselectrolytemia in Patients with, **Choudhury BN, Baruah BJ, Gandhi N, Bhattacharyya M, Deka UJ, Nanda J, Medhi P, Sen A, Sarma P, Kalita B, Hazarika SJ, Bhuyan J**, (OA), **121(8):** 22-6.

Clinicoepidemiological and mycological profile from eastern India Dermatophytosis in paediatric population : A study on, **Lal NR, Das N, Ghosh R**, (OA), **121(10):** 32-6.

Common Organisms against Doxycycline Antibiotic Susceptibility Pattern of, **Tiwaskar M, Khadapkar R, Gala MYN, Muchhala S, Dhore M, Bhagat S, Sanghavi A, Rathod R, Kotak B**, (OA), **121(7):** 54-60.

Constitutional Ends Through Unconstitutional Means : A Doctor's

View on Rajasthan Right to Health Care Act 2023, **Kattamreddy AR, Allu JDK**, (C), **121(11)**: 57-8.
Convalescent Plasma-therapy in Moderate to Severely ill COVID-19 Patients Study of Effectiveness of, **Saluja M, Sharma P, Sharma S, Chittora S, Meena D, Bhargava G**, (OA), **121(2):** 33-7.
Coronary Artery Bypass Grafting Surgery Off-Pump : A Narrative Review, **Jannati M, Jannati F**, (RA), **121(2):** 56-61.
Cosmetic Poisoning A Case of : Minoxidil, **Datta J, Chowdhury DK, Roy A**, (CR), **121(10):** 62-3.
COVID Mortality with Different Demographic Factors in Districts of India Variation in, **Goel A, Wason R, Gera R**. (OA), **121(3):** 48-51.
COVID-19 Dubious Medical Literature Publications during — Another 'Epidemic' ! **Bhattacharya S, Bhattacharya K, Bhattacharya N**, (VP), **121(12)**: 71-3.
COVID-19 among Patients Vaccinated and Unvaccinated against SARS-CoV-2 Oral and Systemic Symptoms of, **Goel P, Kumar A**, (OA), **121(8):** 54-7.
COVID-19 and ENT Manifestations among Health Care Workers in Our Centre A Cross Sectional Study of Prevalence of, **Smitha SG, Pillai N, Raveendran JK, Nayak B**, (OA), **121(1)**: 33-6.
COVID-19 Era Study of Hindrances in Sustaining — Body Donation Programme in, **Roy S, Roy H, Biswas A, Pal A, Ray K, Chakraborty P**, (OA), **121(2):** 38-40.
COVID-19 in Southern Rajasthan High Fear & Stress in the Quarantine Population of : A Survey, **Hitawala G, Kherada S, Gehlot RK, Faizee F, Raiger LK**, (OA), **121(2):** 22-6.
COVID-19 Infection and Stress Levels among Ambulance Drivers during COVID-19 Pandemic Knowledge about — A Cross Sectional Study, **Kumar KA, Kumar SV, Ahooja S, Chauhan A, Dhondge S, Marwaha V, Nair AS, Surendran S, Roy S, Arora A**, (OA), **121(1)**: 37-41.
COVID-19 Pandemic Evaluating MBBS Students Perception on Transition from Classroom to Online Teaching during — A Cross Sectional Survey, **Sheena DM, Pandey SK, Panigrahy S, Ankani BTS, Thotakura TM**, (OA), **121(7):** 15-9.
COVID-19 Pandemic Personal Protective Equipment Associated Symptoms amongst Frontline Health Care Workers in — A Cross Sectional Study, **Firos JRB, Shruthi S, Bhat B, Patil S**, (OA),**121(3):** 25-9.
COVID-19 Stroke — Next Wave of Complications from, **Singh J, Gulati A, Khari S, Chaudhary H, Mahanta P, Verma A, Sirohi TR**, (CR), **121(2):** 67-8.
Creatine Kinase (CK) and Rhabdomyolysis Suspected Tigecycline and Levetiracetam induced raised, **Chatterjee S, Ghiya R, Chatterjee D**, (CR), **121(11)**: 45-7.

D

Dengue — The Remedial Steps. **Singh S, Srivastava MK**, **(C), 121(8): 92.**
Dengue & Platelets, **Bhattacharya A, Ghosh A**, (C**), 121(7)**: 81-2.
Dengue 2, Influenza A (H1N1), Influenza *B, Human Rhinovirus 17, Human Adenovirus, and Human Respiratory Syncytial* Virus Antiviral Effect of Doxycycline against : An In-vitro Study, **Thacker H, Dhore MR, Muchhala S, Gala M, Sanghvi A, Bhureddy S, Mahesh BN, Kotak B**, (OA), **121(6):** 41-6.
Dengue Fever with Thrombocytopenia A Case Report of Ischemic Stroke in an Adult Patient of, **Puri S, Grover AK, Choudhry PN, Saurabh S, Datta S, Pathak SP**, (CR), **121(1)**: 48-9.
Dermatophytoses in a Tertiary Care Hospital in Kolkata Clinico-mycological Profile of: A Cross Sectional Study, **Sikdar S, Pal S, Ray (Ghosh) R, Ballav A, Chatterjee M**, (OA), **121(8):** 49-53.
Diabetes : Para-ballism and Para-chorea in a Diabetic Patient with Diaphragmatic Myoclonus Dancing Feet Syndrome in, **Debnath R, Das A, Das A, Ghosh M, Mukhopadhyay J**, (CR), **121(2):** 69-70.
Diabetes and Related Complications One-hour Post load Hyperglycemia : A Powerful but Underestimated Marker of Incident, **Jesrani G, Gupta M, Gupta S, Gaba S**, (RA), **121(6):** 51-6.
Diabetes Post COVID Central Retinal Vein Occlusion in a Young Woman with Well-controlled, **Rajesh KP**, (CR), **121(10):** 59-61
Diabetic Patient Presenting as Multiple Splenic Abscesses Burkholderia Pseudomallei Infection in a — A Case Report, **Meenakumari PB, Rekha R, Neena PS, Suresh R**, (CR), **121(4):** 63-5.
Down's Syndrome Balanced Robertsonian Translocation in 15 and 22 Chromosome in a Child with, **Saha AK, Halder A, Dutta A**, (CR), **121(12)**: 68-70.
Dyslipidemia and improving the Cardiovascular Health Omega-3 Fatty Acids : A Promising Therapy for management of, **Anand A, Desai A**, (DC), **121(5):** 69-74.

E

Eclampsia MR Imaging in, **Rishadha A, Onimi S, Rani U, Chandrasekharan A, Rajeswaran R**, (OA), **121(4):** 14-8.
Ectopic Pregnancy in a Tertiary Care Hospital in Bangalore Prevalence, Clinical Features and Risk Factors of, **Sinha A, Sinha R**, (OA), **121(11)**: 22-5.
Equina Syndrome Juvenile Allergic Urethritis with Urethro-vasal Reflex Masquerading Cauda, **Anthony FM, Govani D, Patel R, Patel R**, (CR),**121(3):** 62-4.
Evaluating Contraceptive Use among Women in Gujarat, India, **Parekh D, Shah TG, Dave VK**, (C), **121(10):** 74.
Extended Pharmaco-invasive Therapy A Study of Left Ventricular Global Longitudinal Strain in ST-segment Elevation Myocardial Infarction after, **Haldar A, Satpathy C, Mohanty NK, Routray SN**, (OA), **121(5):** 23-7.

F

Face Rash on the, **Paul R**, (PCME), **121(7):** 70.
Family Physicians : Have we lost them? **Bhadoria A**, (C), **121(7)**: 80.
Farm House Residents in Vijayapur District, Karnataka Morbidity Pattern among the — A Cross Sectional Study, **Yankanchi SG, Udigiri R**. (OA), **121(2):** 27-32.
Fine Needle Aspiration Cytology on Evaluation of Lymphadenopathy Utility of, **Nanda R, Dutta G, Gharei RM, Mishra J,** (OA), **121(9):** 39-43.
Fostering Competent Medical Graduates : The Imperative of Medically Trained Teachers in Medical Education, Inspired by Dr Frances Oldham Kelsey, **Samajdar SS, Munshi S**, (C), **121(11)**: 58.
Founiers Gangrene using Laterally based Medial Thigh Fasciocutaneous Flap Aesthetic Reconstruction of Scrotum after, **Rao AL, Vishnu PS**, (OA), **121(2):** 52-5.
Free Softwares – Part 1 : Prevalence Studies Sample Size Calculation using, **Palal D, Rathod H, Jadhav SL, Verma P, Jadav V, Johnson S**, (S Comm), **121(11)**: 48-50.

G

Garcin Syndrome Intricacy of Post Covid Mucormycosis leading to,

Quazi ZA, Maheshwari D, Sardana V, Bhushan B, (CR), **121(5):** 56-8.
Guillain-Barre Syndrome Following Covishield Vaccine : A Case Report, **Pagadala S, Keerthi N, Behera SK, Shweshikaa K, Prabha RB**, (C), **121(5):** 75-6.

H

Haematological Reference Intervals for Healthy Adults in Karamsad at Shree Krishna Hospital Establishment of, **Mer JK, Mulla FI, Gupta M**, (OA), **121(7):** 40-3.
Haemolytic Anaemia due to IgA and IgG Warm Autoimmune — A Rare Clinical Scenario, **Dikshit N, Basu A, Prasad GH**, (CS), **121(3):** 59-61.
Head and Neck Malignancy Using On Board Imaging: Experience from Tertiary Care Center Analysis of Set Up Margin Required during Delivery of Conformal Radiotherapy in, **Bera A, Dutta S, Banerjee C, Banerjee S, Mandal S**, (OA), **121(4):** 36-40.
Health Policy and Education, Research and Impact on the Socio-economic Situation of Indians Reproductive Tract Infection : Challenges to, **Dutta DK, Dutta I, Dutta I**, (OA), **121(4):** 49-51.
Healthcare Professionals Cardiovascular Diseases Risk Assessment of, **Singh DP, Kumar M, Sinha AK, Singh BP**, (OA), **121(6):** 38-40.
Healthy Ageing (2021-2030) Reflections on the Decade of — are we ready? **Chatterjee N**, (Ed), **121(10):** 12-3.
Hepatic Masses Diagnostic Utility of Percutaneous FNAC in the Evaluation of, **Saikumar GV, Rao KSSR, Roy A, Pawar JG**, (OA), **121(9):** 25-32.
HIV Following Initiation of Antiretroviral Therapy Changes in Serum Levels of IL-6, TNF-á and CRP in People Living with — A Longitudinal Cohort Study from a Tertiary Hospital In Eastern India, **Mandal (Kayal) M, Basu S, Roy D, Debnath A**, **Guha SK**, (OA), **121(9):** 20-4.
Human Placental Extract (HPE) in Women with Cervical Erosion Efficacy and Safety of, **Reddy LJ Reddy LJ,** (DC), **121(12)**: 82-3.
Hydatid Cyst Solitary Diaphragmatic, **Konjeti OR, Gaikwad N, Mehta K, Khaladkar SM, Saini M**, (CR), **121(12):** 66-7.
Hyperglycemia Management of Steroid-induced, **Pramanik S, Ray S, Biswas K, Bandyopadhyay T, Mukhopadhyay M**, (RA), **121(10):** 52-6.
Hypertension Drug utilization in Resistant, **Bhuvaneswari K, Murugesan J, Mohamed MS. Aathira S**, (OA), **121(12):** 21-3.
Hypertension Effect of Lifestyle Modification in Control of, **Parekh D, Shah TG, Dave VK**, (Spl C), **121(5):** 62-6.
Hypertensive Women with Branch Retinal Vein Occlusion (BRVO) Effectiveness of Intravitreal Ranibizumab in a Postmenopausal, **Dharmalingam V, Fredrick N, Nirmal S**, (CR), **121(10):** 64-6.
Hypoglycaemia is the most common and most neglected complication of diabetes mellitus, **Trailokya AA**, (C), **121(12)**: 85.
Hypoglycemia Presenting to the Emergency Medicine Department of a Tertiary Care Hospital Profile of Patients with, **Leelakrishnan D, Gnanadurai KR**, (OA), **121(2):** 44-8.

I

In Memorium, **Abbas M**, **121(6):** 70.
In Memorium, **Adhikary T**, **121(4):** 74.
In Memorium, **Kar PK**, **121(4):** 74.
Indian Healthcare Centres Footwear Usage and Practice in, **Vignesh NJ, Britto R, Santhosh S, Senthilnathan S, Praveen S, Stanley S, Selvapriya J**, (RA),**121(3):** 52-4.
Indian Medical Students Patient Safety Attitude among — A Comparative Cross-sectional Questionnaire Study, **Sreekumar K, Bhoomkar N, Gaunkar R, Sardessai M, Rodrigues M, Satarkar E**, (RA), **121(4):** 52-8.
Infertility Coenzyme Q10 in Male and Female, **Gopinath PM, Chaturvedi A, Desai A,** (DC), **121(1)**: 50-4.
Intensive Care Unit and Its Predictors in a Tertiary Care Centre of West Bengal, India Prolonged Stay in. **Mayur N, Mondal S**, (OA), **121(4):** 19-22.
Intralesional Injection Triamcinolone Acetonide in the Treatment of Chalazion A Study of Efficacy of, **Kandle AA, Sarawade SS, Jadhav SS**, (OA), **121(5):** 32-5.
Intraocular Lens Opacification Hydrophilic — A Case Report, **Chandravanshi SL, Jain S, Tripathi D, Ramraika D**, (CR), **121(2):** 73-4.
Is there any Vaccine available which does have Zero side effect? **Mukhida S, Khan S, Das NK, Kannuri S**, (C), **121(9):** 70.
Isolated Systolic Hypertension at a Tertiary Care Hospital in Eastern India : An Observational Study The Prevalence of, **Brahmachari RK, Chakraborty S, Nandi S**, (OA),**121(3):** 43-7.

J

Jaundice in the Tropics An Unusual Cause of, **Phadnis NA, Shiddapur G, Harsh P, Rana N**, (CR), **121(11)**: 43-4.
Journey of a Novice Academic Writer: Manuscript Writing till Publication. **Ajagunde JN, Algule S, Shah H, Das N, Lekshmi R**, (C), **121(3)**: 73.

L

Large Ovarian Mass Mullerian Anomaly with — Where Two Worlds Collide, **Lucksom PG, Thatal A, Sharma BK, Bhutia GP, Sinha D**, (CR), **121(1)**: 45-7.
Left Inguinal Hernia with an Unknown Syndrome Case of, **Wadhawan G, Sharma D, Singh R** (CR), **121(3)**: 65-6.
Lincomycin Injectable and Oral in the Treatment of Surgical Site Infection (SSI) and Skin & Soft Tissue Infection (SSTI) Real World Evidence Study to Evaluate the Effectiveness and Tolerability of, **Ruke M, Desai A, Anand S, Nair S**, (DC), **121(11)**: 51-4.
Liver Span in Children Clinical and Ultrasonographic Assessment and Analysis of, **Vajrapu K, Malaisamy M, Shriram T, Chalasani VK**: (OA), **121(12):** 34-6.
Locally Advanced Breast Cancer (LABC) and Its Correlation with Hormone Profile Effects of Neo-adjuvant Chemotherapy on, **Pandya J, Ambre SR, Deshpande S**, (OA), **121(9):** 15-9.
Locally Advanced Breast Carcinoma Thoracoabdominal Flap Coverage after Excision of, **Bera A, Roy A, Chaudhuri GR, Das S, Mukherjee R, Dagra R**, (CS), **121(6):** 57-9.
Ludovici Angina — A Rare Case Report, **Ishwariya, Raja M, Jude V**, (CR), **121(8):** 86-7.

M

Malaria The Changing Face of, **Chatterjee N**, (Ed), **121(5):** 12-3.
Mandibular Fracture and Its Association with Anatomical Location Presenting to Emergency Department Epidemiological Study on, **Kumar SSV, Shekhli S, Jose A**, (OA), **121(11)**: 35-9.
Manuscript Writer : Are they Eligible for Authorship in Scientific Article ? If yes then which place ? **Mukhida S , Khan S , Das NK , Patil R , Lekshmi R**, (C), **121(2):** 76.
Medical Negligence Cases Court Judgements on Expert Opinion in

— Systematic Review, **Aggarwal G, Agarwal SK, Khatri P**, (RA), **121(12)**: 59-63.
Medical Sciences Academic Honesty and Dishonesty in Different Disciplines and Degrees at the University of : A Descriptive Cross- Sectional Study, **Vizeshfar F, Zare M, Keshtkaran Z**, (OA), **121(1)**: 15-8.
Medical Students in Eastern India with Other Undergraduates : An Analytical Study Comparison of Substance Abuse among, **Ghosh D, Palit S, Mukhopadhyay K, Ghosh B, De D, Chatterjee C,** (OA), **121(7):** 49-53.
Medical Under Graduates Effect of Online Formative Assessment Feedback on Learning Outcomes among, **Palve SS, Lagoo JY, Palve SB**, (OA), **121(10):** 37-41.
Mirtazapine Induced Acute Pancreatitis with Hypertriglyceridemia — a case report, **Santra T, Mukherjee A, Ranjit P, Mukherjee PP**, (C), **121(11**): 56.
Monkeypox as a Global Health Emergency — A Threat after COVID-19 Pandemic, **Murugesan M, Ramamurthy S**, (C), **121(2):** 78.
Monkeypox Outbreak in 2022 Growing Homophobia due to, (VP), **Ansar M, Chatterjee A, Roy Chowdhury S**, (VP), **121(7):** 73.
Mucormycosis Disease Spectrum — A Descriptive Observational Study New Onset Facial Nerve Palsy : A Part of Post COVID, **Das SK, Barman D, Samaddar S, Chatterjee P, Mondal AR, Das Biswas K, Mondal S, Das SK,** (OA), **121(1)**: 28-32.
Multiple Cranial Nerve Palsy Idiopathic Intracranial Hypertension Presenting with, **Mahapatra U, Ganguly D, Sen S, Ghosh S**, (CR), **121(5):** 59-61.
Musculoskeletal Pain Clinical Effectiveness and Tolerability of 2% Menthol in : A Pilot Observational Real-world Evidence Study, **Kamilya R, Desai A,** (DC), **121(3)**: 67-70.
My CORONA Diary, **Agrawal R**, (C), **121(3)**: 73.
Myths Snake Bite — An Emergency Shrouded in, **Chatterjee N**, (Ed), **121(9):** 12-4.

N

Neuroblastoma Quintessence Case of Adrenal Gland, **Laturkar N, Dhok A**, (PCME), **121(5):** 67.
Neurology Setting Antimicrobial Utilization Study in a, **Nasare NV, Bhardwaj A, Bablani V, Gupta R, Kushwaha S, Sharma S**, (OA), **121(4):** 41-4.
Nicotine Dependence in a Tertiary Care Hospital and its Relationship with Other Clinical Variables Assessment of Mortality of Admitted Patients having, **Bhattacharyya R, Gupta P, Mandal S, Banik K**, (OA), **121(9):** 33-8.
Nonalcoholic Fatty Liver Disease A Review on the Role of 21st Century Vitamin E : Tocotrienol in, **Pahuja V, Desai A**, (DC), **121(7):** 74-8.
Non-communicable Diseases to High School Students in Jakarta Implementation of Interventions Using School-based Posbindu Module and Applications to Prevent the Risk of, **Widodo S, Suwandono A, Nugraheni SA, Setiawan H**, (OA), **121(7):** 33-9.

O

Oblivion The Road to — Substance use among Students, **Chatterjee N**, (Ed), **121(7):** 13-4.
Ocular Emergencies Presenting at a Tertiary Eye Hospital in Western India During the Second Wave of COVID Pandemic Analysing the, **Hindocha SC, Raval R, Shah K, Patel R**, (OA), **121(10):** 14-7.
Ocular Tuberculosis Cases from A Rural Tertiary Care Center in West Bengal A Series of, **Biswas U, Ray S, Raychaudhuri P, Dey AK**, (CS), **121(3):** 55-8.
Older Adults Health Decline in, **Suthan MS, Dengri C, Chopra J, Aggarwal A, Raizada A, Kotru M, Sharma AK, Goel A**, (OA), **121(6):** 33-7.
Online Learning — Boon or Bane, **Chatterjee N**, (Ed), **121(8):** 13-4.
Oral Lincomycin in the Treatment of Surgical Site Infection (SSI) and Skin & Soft Tissue Infection (SSTI) Real Osteoporosis Specific Collagen Peptide — A Missing Piece in the Management of, **Gupta MS, Grover KS, Bedi G, Desai A,** (DC), **121(12)**: 78-81.
Organoleptic Properties and Compliance with Marketed Cough Syrups Evaluation of : A Cross Sectional Consumer Survey in Indian Patients, **Mehta KK, Contractor A, Maniar S, Mashru A, Singh MK, Gogia A, Mahajan R, Mittal H, Gala MYN, Dhore MR, Muchhala S, Dhanaki G, Sanghavi A, Rathod R, Kotak B**, (OA), **121(8):** 75-80.
Orofacial Clefts Maternal Occupational Exposure and Risk for: A Prospective Study, **Pargal P, Verma J, George EV, Nigam P**, (OA), **121(6):** 47-50.
Ovarian Malignancy Role of D-dimer and CA-125 in the Detection of, **Shekhar R, Pilli GS, Wani RV, Metgud MC**, (OA), **121(10):** 28-31.

P

Paediatric COVID-19 in First and Second Wave of Corona Pandemic Epidemiological Trend of — An Observational Study, **Mishra K, Mishra M**, (RA), **121(1)**: 42-4.
Palliative Care Patients during Pandemic Constraints of the — A Cross-sectional Study, **Mageshwari M, Kannan R, Singh Gaur BP, Kuzhandai VV**, (OA), **121(6):** 29-32.
Pancytopenia without Organomegaly and Lymphadenopathy from A Tertiary Care Hematology Centre of Eastern India Etiological Heterogeneity of, **Baul SN, Mondal K, Saha S, Bhakat B, Sharma A, De R, Dolai TK**, (OA), **121(6):** 19-22.
Pandemic COVID-19 and the Role of Control Room in the Tertiary Care Hospital, **Chauhan P, Naik S, Wardhan N, Debnath E, Singh HR, Kundra P, Jain S, Basu DK, Das PK**: (RA), **121(4):** 59-62.
Pandemic Health Care Systems during: Role of Government and Regulatory Authorities, **Gupta A, Pandey A, Bansal P, Kaur A, Prakash P**. (Comm), **121(8):** 88-90.
Parkinsonism in Eastern India Clinical Profile of Drug Induced, **Yadav PK, Sahu K**, (OA), **121(8):** 41-5.
Peritonitis in a Child Left Basilar Pneumonia Simulating Perforated Appendicitis with, (CR), **Patel RV, Anthony FM, Chhaniara RA, Trambadia RA**, (CR), **121(4):** 66-7.
Personal Physician to His Holiness, Lord Buddha, **Ghosh K**, (S Comm), **121(7):** 71-2.
Personal Protective Equipments among Sanitary Workers in Erode Corporation Area, Tamilnadu Study of Knowledge, Attitude and Practices on Use of, **Subramani HP, Srinivasan S, Ramasamy S, Karuppusamy S**, (OA), **121(5):** 14-8.
Physical and Psychological Violence Prevalence and Risk Factors for Exposure of Healthcare Professionals of Delhi (India) to: A Cross-Sectional Study, **Bassi S, Bansal R, Khokhar AK, Aggarwal V**, (OA), **121(12)**: 51-8.
Physiological and Psychological Variables of COVID-19 Mild Symptomatic Patients : Two Groups Randomized Controlled

Cross Over Study Immediate Impact of Tele Yoga Intervention on, **Shrimal PJ, Maharana S, Dave A, Nagarathna R, Shrimal S**, (OA), **121(12):** 41-6.
Polycystic Ovarian Syndrome Contemporary Knowledge on the Genetic Basis of, **Bhattacharyya S, Barik S, Samashaptak, Saha S**, (OA), **121(9):** 54-9.
Polycythemia, Leucocytosis and Thrombocytosis AL Amyloidosis with : A Case Report, **Anandh U, Vaswani B, Hurmath S**, (CR), **121(4):** 68-70.
Post Cardiac Surgery Patients Acute Kidney Injury among : A Retrospective Study, **Mutyala SCVS, Vaggar JN, Borker S, Kamat S, Lotliker SS, Cacodcar J, Kolwalkar JP, Gonsalves WA**, (OA), **121(3):** 15-20.
Postmenopausal Women with varied Clinical Presentations — A case series Ovarian Torsion in, **Karthiga PJ, Chandrasekaran S, Sen M**, (CS), **121(11)**: 40-2.
Postpartum Depression at Six Months Socio-economic and Psychological Correlates of, **Tanna KJ, Unadkat KM**, (OA), **121(3):** 21-4.
Pulmonary and Hepatic Hydatidosis A Unique Case of, **Jain H, Sarraf S, Shah BA, Julka A**, (CR), **121(6):** 62-3.
Pyogenic Granuloma of Lip Topical Timolol Drops in the Management of, **Takharya R, Mani D, Dileep JE, Kaliyaperumal D**, (CR), **121(10):** 57-8.

Q

Quiz 1, **Angirish B, Jankharia B**, (IM), **121(1**): 55.
Quiz 1, **Angirish B, Jankharia B**, (IM), **121(10):** 72.
Quiz 2, **Angirish B, Jankharia B**, (IM), **121(11**): 55.
Quiz 1, **Angirish B, Jankharia B**, (IM), **121(2):** 75.
Quiz 1, **Angirish B, Jankharia B**, (IM), **121(3):** 71.
Quiz 2, **Angirish B, Jankharia B**, (IM), **121(4):** 71.
Quiz 1, **Angirish B, Jankharia B**, (IM), **121(5):** 68.
Quiz 1, **Angirish B, Jankharia B**, (IM), **121(6):** 69.
Quiz 1, **Angirish B, Jankharia B, (**IM**), 121(7):** 79**.**
Quiz 1, **Angirish B, Jankharia B**, (IM), **121(12**): 84.
Quiz 1, **Angirish B, Jankharia B, (**IM**), 121(8):** 91.
Quiz 2, **Angirish B, Jankharia B, (**IM**), 121(9):** 91.

R

Rabies Post Exposure Prophylaxis to I,84,955 Patients — Evidence from India Feasibility of WHO Recommended 3 visit fractional dose Intra-dermal Rabies Vaccine Regimen (IPC) and only Wound Infiltration of RIG in, **Bharti OK**. (OA), **121(8):** 46-8.
Refractory Idiopathic Intracranial Hypertension Transverse Venous Stenting in Medically — A Case Report, **Kadian S, Pathak S, Banerjee A, Agrawal S**, (CR), **121(9):** 63-4.
Renal Cortical Necrosis Treated with Intravenous Immunoglobulin in a Resource Poor Setting A Young Female with : A Case Report, **Kumari M, Nair SV, Balasubramanian K**. (CR), **121(7):** 65-7.
Respiratory Distress Syndrome Outcome of Early Continuous Positive Airway Pressure (CPAP) in Preterm Newborns with, **Das M, Dasgupta MK**, (OA), **121(5):** 28-31
Retinoblastoma : A Prospective Study Correlation between Magnetic Resonance Imaging & Histopathological Findings In, **Asari WA, Bhojak AA, Shah SN, Sorathiya BP, Prajapati MK**, (OA), **121(11)**: 26-9.
Reverse Osmosis Water and Heart Diseases, Back Pain and Joint Pain Association between, **Patel S, Khokhariya R, Tarani G, Rathod J, Ghosh Chatterji D, Patel J**, (OA), **121(8):** 37-40.
REVIEW :
Hundred Questions on Neurological Disorders, ICP-IAN 100 Questions in Neurological Practice, **Singh G, Maheshwar**i **PK**, **121(10):** 73.
Revival of the Case Series in Publication Circuitry, **Chatterjee N**, (Ed), **121(3):** 13-4.
Rheumatological Manifestations in HIV Infected Patients in a Tertiary Care Centre In Eastern India Prevalence of : A Prospective Observational Study, **Mondal A, Modak D, Guha SK**, (OA), **121(7):** 20-3.
Rhino Orbital Mucormycosis with Pulmonary Mucormycosis Post COVID : A rare case report, **Chatterjee P, Barman D, Das SK, Sengupta A, Kundu S**, (CR), **121(6):** 64-6.
Rising from the Ashes — The Health Phoenix, **Chatterjee N**, (Ed), **121(4):** 12-3.
Role of Antihistamine in Allergic Disorders : A Review and Consensus Statements by Indian Medical Association, (Assoc N Suppl), **Vora A, Madan A, Modi G, Lele J, Mehta K, Wankhedkar M, Vadgama P, Waghray P, Asokan RV, Roy S, Makharia S**, (Assoc N Suppl), **121(3)**: 74-80.

S

Say No To Charity, **Bhadoria AK,** (C), **121(1)**: 56.
Scientific Publication The Journey of, **Chatterjee N,** (Ed), **121(12)**: 13-4.
Scrub Typhus in Children Clinical Spectrum and Laboratory Parameters in : Experience from a Tertiary Care Centre in West Bengal, India, **Mondal M, Mandal PK, Basu R, Sinhamahapatra TK**, (OA), **121(10):** 23-7.
Seizures above 60 Years of Age Etiological Profile of New Onset, **Sundaram S, Devanathan V, Kanna V, Kumar S, Jayaraman S**, (OA), **121(5):** 36-40.
Seizures in Adults Presenting in a Tertiary Care Hospital with their Neuroimaging and EEG Findings A Study on Prevalence of Different Causes of New Onset, **Saha B, Biswas NM, Biswas PK**, (OA), **121(5):** 19-22.
Seminar-based Teaching in Medical Education : Students' Point of View Assessment of, **Singla K, Khan S, Kumar M**, (OA), **121(10):** 42-3.
Sensory Nerve Conduction Study Parameters in Upper & Lower Limb & their Maturation Pattern in Infants & Children in a Tertiary Health Care Institute of West Bengal Study of, **Sinha B, Gupta S, Sen S, Ganguly G**, (OA), **121(12):** 47-50.
Septic Shock Hemoadsorption (CytoSorb®) in the Management of: our Experience from North East India, **Choudhury TA, Lahkar B, Rasul RA**, (CS), **121(9):** 60-2.
Septoplasty among Patients Undergoing Nasal Packing versus Suturing of the Septal Flap by Modified Technique without Packing Postoperative Comfort Score after : A Randomized Controlled Trial, **Srivastava A, Mohan C**, (OA), **121(4):** 23-7.
Sexual Maturity Rating and Clinical Onset of Puberty in an Urban Setting in Gujarat, India Testicular Volume of Boys Aged 5-17 Years in Relation to, **Shah A, Sivanandan S, Agrawal A, Prajapati RB, Gupta NA, Mehta RJ, Patel DM**, (OA),**121(3):** 30-4.
Sexually Transmitted Infections Using Syndromic Approach among Patients Attending Suraksha Clinic at a Tertiary Care Hospital of West Bengal A Study on, **Das S, Mondal S, Mandal PK**, (OA), **121(2):** 49-51.
Sleep Quality and Different Aspects of Memory along with Assessment of Post Exercise and Post Meditation Effects

Association between, **Singh M, Sachdev S, Manhas M, Raj D**. (OA), **121(1)**: 19-23.
Snake Bite in a Rural Tertiary Care Hospital of West Bengal Clinico-epidemiological Profile of, **Mahapatra U, Singh DT, Datta J, Seth BC, Mandal PK, Kar JK**, (OA), **121(9):** 44-9.
Snake bite Patients and Association with Clinical Features Post Mortem Renal Pathological Changes in, **Mukhopadhyay P, Khan J, Banerjee P, Bhattacharya P, Kataruka M, Datta S**, (OA), **121(8):** 71-4.
'Snowball Technique' for Introducing 1st Professional MBBS Students to Clinical Correlation in Biochemistry Implementation of an Interactive Teaching Session using, **Verma N, Singla K, Toora B, Dixit R**, (OA), **121(8):** 32-6.
Stress Urinary Incontinence among Poor Women – A Hospital-based Prospective Trial Free of Cost Operation with Trans Obturator Tape (TOT) in, **Chakraborty B, Divakaran A**, (OA), **121(12):** 24-8.
Submandibular Salivary Glands in Indian Population Using Computed Tomography Biometry of the: A Retrospective Study, **Rathod NR, Onkar DP, Onkar P, Dhok AP, Bodhankar SB, Yadav TS**, (OA), **121(4):** 32-5.
Surgical Site Infection (SSI) and Skin & Soft Tissue Infection (SSTI) A Clinical Study to Evaluate the Efficacy and Safety of Lincomycin Tablet in the Treatment of**, Ruke M, Desai A , Anand S, Nair S**, (DC), **121(9):** 65-8.
Survival in Transported Neonates in a Tertiary Care Centre Study of TOPS Score as a Predictor of, **Shah HH, Ganatra SY, Shah BS, Saini B , Bagavadiya RM, Bhatiya KKC, Kalavadia UN**, (OA), **121(9):** 50-3.
Swallowing in Post-CVA Patients A Study on the Evaluation of, **Anton DX, Mondal GP, Saha S** (OA), **121(8):** 27-31.

T

Teaching Learning Methods Used in Teaching Professionalism to Medical Students, **Khade AM, Wahane JM,** (RA), **121(5):** 44-6.
Teratoma Ovary with Peritoneal Recurrence Somatic Neoplasm Arising from, **Das DCK, Subitha K, Jose L, Prasad PH**, (CR), **121(12)**: 64-5.
Thalassaemic Patients during Pregnancy An Effective Management for, **Das A, Ghosh S, Ghosh S, Sur TK**, (OA), **121(4):** 45-8.
The Inheritence of Clarity, **Chatterjee N**, (Ed), **121(6):** 12-3.
The Realm of Scientific Citation, **Chatterjee N**, (Ed), **121(1)**: 13-4.
The Road not Taken : A Perspective of a Medical Professional's Inability to Choose between Clinical Practice or Postgraduation Degree after Internship, **Roy Chowdhury S, Chakrabarti A**,(C), **121(2):** 77-8.
Thyroid Dysfunction in Metabolic Syndrome Patients Study of, **Patel OB, Shah HM, Gosalia HJ, Doctor NM,** (OA), **121(11)**: 14-7.
Tropical Infections Challenges in, **Chatterjee N**, (Ed), **121(11)**: 12-3.
Truth Unveiled : ICMR Guidelines Debunks Common Misconceptions about Umbilical Cord Blood Banking, **Kattamreddy AR**, (C), **121(4):** 72.
Tuberculosis and Diabetes Mellitus Dyslipidemia in Patients with, **Pandey S, Bajaj S, Goyal VV**, (OA), **121(2):** 41-3.
Type 2 Diabetes and NAFLD : A Pilot Study Based on Biochemical and Transient Elastography Parameters Effect of Tocotrienol on Liver Enzymes, Fatty Liver and Liver Stiffness in People with, **Devarajan A, Jayashankar LKK, Arun P, Barman MH, Barman H, Kumpatla S, Viswanathan V**, (OA), **121(6):** 14-8.
Type 2 Diabetes Mellitus in Patients with Heart Failure in a Tertiary Care Hospital in Eastern India Study of the Prevalence of, **Chatterjee T, Maisnam I, Kundu PK, Bandyopadhyay S, Ray A, Mukherjee AK**. (OA), **121(4):** 28-31.
Type 2 Diabetes Mellitus Patients Role of Counselling and its Impact on the Dietary Habits, Glycemic Control and Diabetic Awareness of Newly Diagnosed, **Patel S, Parmar V, Iyer C, Patel J**, (OA), **121(2):** 15-21.
Type 2 Diabetics Outcome of COVID-19 in : A Cross Sectional Study, **Mukherjee S, Samajdar SS, Mondal PK, Mondal T, Pal J, Joshi S, Tripathi SK**, (OA), **121(7):** 61-4.

U

Uncommon Circumstance A Common Complication in an, **Sowkarthick KS, Vishnu R, Leelakrishnan D, Varghese L**, (CR), **121(7):** 68-9.
Undiagnosed Diabetes and Impaired Glucose Tolerance in a Semi-urban Population from Calicut City Prevalence of, **Rajesh KP,** (OA), **121(1):** 24-7.
Upper Gastrointestinal Bleeding Validation of Glasgow-Blatchford Score in Predicting Management of, **Navgale SS, Deshpande AS, Agarwal S, Dharap SB, Patil R**. (OA),**121(3):** 39-42.
Urethral and Stretched Penile Lengths in the Adult, Indian, Male Population A Study of the, (RA), **Grover RA, Vaidya H, Rajatiya H, Moitra M**, (RA), **121(2):** 64-6.
Urinary Retention in Male Patients Undergoing Surgery Under Spinal Anaesthesia Evaluation of Risk Factors of Postoperative : A Prospective Study, **Lal T, Sivaraman VK, Singh PJ, Sanniyasi S**, (OA), **121(3):** 35-8.

V

Variables using Time Series Data Analysis Causality Assessment of Different Set of — A Prospective Cohort Study, **Verma M, Kosambiya JK, Balusamy D, Mehta S**, (OA), **121(8):** 15-21.
Variants of Concern of SARS CoV2: Overview, **Johnson S, Borah N, Thakur KN, Verma P**, (C), **121(3)**: 72.
Varicella Zoster in the Tribal-dominated District of Western India Clusters of: An investigation Report, **Khan V, Sanghai AA, Rajan J, Sharma AK, Nayak S, Das VK**, (OA), **121(10):** 18-22.
Vasculotoxic Snake Bites in a Tertiary Care Hospital in West Bengal A Study of Laboratory Determinants and Clinico-pharmacological Correlates of, **Pati AK, Nanda S, Chakraborty N, Das Bakshi S, Mishra A**, (OA), **121(7):** 24-8.

W

What is Essential to know in Heart Failure Patients, **Singh S, Srivastava MK**, (C), **121(2):** 76-7.
Whipple "Tunnel of Love" in — In the Pursuit of the Proposer, **De U, Bhattacharya K, Agrawal R**, (VP), **121(6):** 67-8.
Word of Caution for an Unexpected Guest in the Abdomen : Gossypiboma — A Case Series and a Review of the Literature, **Anees A, Hassan Y, Fatima S, Gupta S**, (CS), **121(8):** 81-5.
World Evidence Study to Evaluate the Effectiveness and Tolerability, **Ruke M, Desai A, Anand S, Nair S**, (DC), **121(12)**: 74-7.

AUTHOR INDEX

A

Aathira S: see **Bhuvaneswari K**.
Abbas M: In Memorium, 121(6): 70.
Abdul Razack GS, Harindranath HR, Uday C, Nashwath KKH: Summer Surge of Acute Appendicitis in Adults, (OA), **121(8):** 68-70.
Adhikary T: In Memorium, **121(4):** 74.
Agarwal S: see **Navgale SS**.
Aggarwal A: see **Suthan MS**.
Aggarwal G, Agarwal SK, Khatri P: Court Judgements on Expert Opinion in Medical Negligence Cases — Systematic Review, (RA), **121(12)**: 59-63.
Agarwal SK: see **Aggarwal G**.
Aggarwal V: see **Bassi S**.
Agrawal A: see **Shah A**.
Agrawal R: My CORONA Diary, (C), **121(3)**: 73.
Agrawal R: see **De U**.
Agrawal S: see **Kadian S**.
Ahooja S: see Kumar KA.
Ajagunde JN, Algule S, Shah H, Das N, Lekshmi R: Journey of a Novice Academic Writer: Manuscript Writing till Publication. (C), **121(3)**: 73.
Algule S: see **Ajagunde JN**.
Ali SH, Mondal S, Mondal S, Chakrabarti A: Efficacy and Safety of Afatinib as Second-line Treatment in Advanced Squamous Cell Carcinoma of the Lung : A Retrospective Observational Study, (OA), **121(10):** 44-7.
Allu JDK: see **Kattamreddy AR**.
Ambre SR: see **Pandya J**.
Anand A, Desai A: Omega-3 Fatty Acids : A Promising Therapy for management of Dyslipidemia and improving the Cardiovascular Health, (DC), **121(5):** 69-74.
Anand S: see **Ruke M**,
Anand S: see **Ruke M**.
Anand S: see **Ruke M**.
Anandh U, Vaswani B, Hurmath S: AL Amyloidosis with Polycythemia, Leucocytosis and Thrombocytosis : A Case Report, (CR), **121(4):** 68-70.
Anees A, Hassan Y, Fatima S, Gupta S: Gossypiboma : Word of Caution for an Unexpected Guest in the Abdomen — A Case Series and a Review of the Literature, (CS), **121(8):** 81-5.
Angirish B, Jankharia B: Quiz 1, (IM), **121(1)**: 55.
Angirish B, Jankharia B: Quiz 1, (IM), **121(10):** 72.
Angirish B, Jankharia B: Quiz 1, (IM), **121(11)**: 55.
Angirish B, Jankharia B: Quiz 1, (IM), **121(2):** 75.
Angirish B, Jankharia B: Quiz 1, (IM), **121(3):** 71.
Angirish B, Jankharia B: Quiz 1, (IM), **121(4):** 71.
Angirish B, Jankharia B: Quiz 1, (IM), **121(5):** 68.
Angirish B, Jankharia B: Quiz 1, (IM), **121(6):** 69.
Angirish B, Jankharia B: Quiz 1, (IM), 121(7): 79.
Angirish B, Jankharia B: Quiz 1, (IM), **121(12)**: 84.
Angirish B, Jankharia B: Quiz 1, (IM), 121(8): 91.
Angirish B, Jankharia B: Quiz 1, (IM), 121(9): 69.
Ankani BTS: see **Sheena DM**.
Ansar M, Chatterjee A, Roy Chowdhury S: Growing Homophobia due to Monkeypox Outbreak in 2022, (VP), **121(7):** 73.
Anthony FM, Govani D, Patel R, Patel R: Juvenile Allergic Urethritis with Urethro-vasal Reflex Masquerading Cauda Equina Syndrome, (CR), **121(3):** 62-4.
Anthony FM: see **Patel RV**.
Anton DX, Mondal GP, Saha S: A Study on the Evaluation of Swallowing in Post-CVA Patients, (OA), **121(8):** 27-31.
Arora A: see Kumar KA.
Arun P: see **Devarajan A**.
Asari WA, Bhojak AA, Shah SN, Sorathiya BP, Prajapati MK: Correlation between Magnetic Resonance Imaging & Histopathological Findings In Retinoblastoma : A Prospective Study, (OA), **121(11)**: 26-9.
Asokan RV: see **Vora A**.

B

Bablani V: see **Nasare NV**.
Bagavadiya RM: see **Shah HH**.
Bajaj S: see **Pandey S**.
Balasubramanian K: see **Kumari M**.
Ballav A: see **Sikdar S**.
Balusamy D: see **Verma M**.
Bandyopadhyay S: see **Chatterjee T**.
Bandyopadhyay T: see **Pramanik S**.
Banerjee A: see **Kadian S**.
Banerjee C: see **Bera A**.
Banerjee P: see **Mukhopadhyay P**.
Banerjee S: see **Bera A**.
Banik K: see **Bhattacharyya R**.
Bansal P: see **Gupta A**.
Bansal R: see **Bassi S**.
Barik S: see **Bhattacharyya S**.
Barman D: see **Chatterjee P**.
Barman D: see **Das SK**.
Barman H: see **Devarajan A**.
Barman MH: see **Devarajan A**.
Baruah BJ: see **Choudhury BN**.
Bassi S, Bansal R, Khokhar AK, Aggarwal V: Prevalence and Risk Factors for Exposure of Healthcare Professionals of Delhi (India) to Physical and Psychological Violence: A Cross-Sectional Study, (OA), **121(12):** 51-8.
Basu A: see **Dikshit N**.
Basu DK: see **Chauhan P**.
Basu M: see **Kerketta P**.
Basu R: see **Mondal M**.
Basu S: see **Mandal (Kayal) M**.
Baul SN, Mondal K, Saha S, Bhakat B, Sharma A, De R, Dolai TK: Etiological Heterogeneity of Pancytopenia without Organomegaly and Lymphadenopathy from A Tertiary Care Hematology Centre of Eastern India, (OA), **121(6):** 19-22.
Bedi G: see **Gupta MS**.
Behera SK: see **Pagadala S**.
Bera A, Dutta S, Banerjee C, Banerjee S, Mandal S: Analysis of Set Up Margin Required during Delivery of Conformal Radiotherapy in Head and Neck Malignancy Using On Board Imaging: Experience from Tertiary Care Center, (OA), **121(4):** 36-40.
Bera A, Roy A, Chaudhuri GR, Das S, Mukherjee R, Dagra R: Thoracoabdominal Flap Coverage after Excision of Locally Advanced Breast Carcinoma, (CS), **121(6):** 57-9.
Bhadoria A: Family Physicians : Have we lost them? **(C), 121(7)**: 80.
Bhadoria AK: Say No To Charity, (C), **121(1)**: 56.
Bhagat S: see **Tiwaskar M**.
Bhakat B: see **Baul SN**.
Bhanat R: see **Kabra R**.
Bhardwaj A: see **Nasare NV**.

Bhargava G: see **Saluja M**.
Bharti OK: Feasibility of WHO Recommended 3 visit fractional dose Intra-dermal Rabies Vaccine Regimen (IPC) and only Wound Infiltration of RIG in Rabies Post Exposure Prophylaxis to I,84,955 Patients — Evidence from India, (OA), **121(8):** 46-8.
Bhat B: see **Firos JRB**.
Bhatia G: see **Goyal N**.
Bhatiya KKC: see **Shah HH**.
Bhattacharya A, Ghosh A: Dengue & Platelets, **(**C**), 121(7)**: 81-2.
Bhattacharya K: see **Bhattacharya S**.
Bhattacharya K: see **De U**.
Bhattacharya N: see **Bhattacharya S**.
Desai A: see **Ruke M**.
Ruke M, Desai A, Anand S, Nair S: Real World Evidence Study to Evaluate the Effectiveness and Tolerability of Oral Lincomycin in the Treatment of Surgical Site Infection (SSI) and Skin & Soft Tissue Infection (SSTI), (DC), **121(12)**: 74-7.
Ruke M: see **Desai A**.
Bhattacharya P: see **Mukhopadhyay P**.
Bhattacharya S, Bhattacharya K, Bhattacharya N: Dubious Medical Literature Publications during COVID-19 — Another 'Epidemic' ! (VP), **121(12)**: 71-3.
Bhattacharyya M: see **Choudhury BN**.
Bhattacharyya R, Gupta P, Mandal S, Banik K: Assessment of Mortality of Admitted Patients having Nicotine Dependence in a Tertiary Care Hospital and its Relationship with Other Clinical Variables, (OA), **121(9):** 33-8.
Bhattacharyya S, Barik S, Samashaptak, Saha S: Contemporary Knowledge on the Genetic Basis of Polycystic Ovarian Syndrome, (OA), **121(9):** 54-9.
Bhojak AA: see **Asari WA**.
Bhoomkar N: see **Sreekumar K**.
Bhureddy S: see **Thacker H**.
Bhushan B: see **Quazi ZA**.
Bhutia GP: see **Lucksom PG**.
Bhuvaneswari K, Murugesan J, Mohamed MS. Aathira S: Drug Utilization in Resistant Hypertension, (OA), **121(12):** 21-3.
Bhuyan J: see **Choudhury BN**.
Biswas A: see **Roy S**.
Biswas K: see **Pramanik S**.
Biswas NM: see **Saha B**.
Biswas PK: see **Saha B**.
Biswas U, Ray S, Raychaudhuri P, Dey AK: A Series of Ocular Tuberculosis Cases from A Rural Tertiary Care Center in West Bengal, (CS), **121(3):** 55-8.
Bodhankar SB: see **Rathod NR**.
Borah N: see **Johnson S**.
Borker S: see **Mutyala SCVS**.
Brahmachari RK, Chakraborty S, Nandi S: The Prevalence of Isolated Systolic Hypertension at a Tertiary Care Hospital in Eastern India : An Observational Study, (OA), **121(3):** 43-7.
Britto R: see **Vignesh NJ**.

C

Cacodcar J: see **Mutyala SCVS**.
Chakrabarti A: see **Ali SH**.
Chakrabarti A: see **Roy Chowdhury S**.
Chakrabarti S: see **Chowdhury N**.
Chakraborty A: see **Pradhan R**.
Chakraborty B, Divakaran A: Free of Cost Operation with Trans Obturator Tape (TOT) in Stress Urinary Incontinence among Poor Women – A Hospital-based Prospective Trial, (OA), **121(12):**24-8.
Chakraborty N: see **Pati AK**.
Chakraborty P: see **Roy S**.
Chakraborty S: see **Brahmachari RK**.
Chalasani VK: see **Vajrapu K**.
Chand JT, Tharakan GG, Sebastian GM, Paulose A: A Rare Surgical Cause of Chronic Diarrhoea and Malabsorption, (CR), **121(5):** 53-5.
Chandrasekaran S: see **Karthiga PJ**.
Chandrasekharan A: see **Rishadha A**.
Chandravanshi SL, Jain S, Tripathi D, Ramraika D: Hydrophilic Intraocular Lens Opacification — A Case Report, (CR), **121(2):** 73-4.
Chatterjee A: see **Ansar M**.
Chatterjee C: see **Ghosh D**.
Chatterjee D: see **Chatterjee S**,
Chatterjee M: see **Sikdar S**.
Chatterjee N: Authorship : Mere Names on the Byline? (Ed), **121(2):** 13-4.
Chatterjee N: Challenges in Tropical Infections, (Ed), **121(11)**: 12-3.
Chatterjee N: Online Learning — Boon or Bane, (Ed), **121(8):** 13-4.
Chatterjee N: Reflections on the Decade of Healthy Ageing (2021-2030) — are we ready? (Ed), **121(10):** 12-3.
Chatterjee N: Revival of the Case Series in Publication Circuitry, (Ed), **121(3):** 13-4.
Chatterjee N: Rising from the Ashes — The Health Phoenix, (Ed), **121(4):** 12-3.
Chatterjee N: see **Das S**.
Chatterjee N: Snake Bite — An Emergency Shrouded in Myths, (Ed), **121(9):** 12-4.
Chatterjee N: Substance use among Students — The Road to Oblivion, (Ed), **121(7):** 13-4.
Chatterjee N: The Changing Face of Malaria, (Ed), **121(5):** 12-3.
Chatterjee N: The Inheritence of Clarity, (Ed), **121(6):** 12-3.
Chatterjee N: The Journey of Scientific Publication, (Ed), **121(12)**: 13-4.
Chatterjee N: The Realm of Scientific Citation, (Ed), **121(1)**: 13-4.
Chatterjee P, Barman D, Das SK, Sengupta A, Kundu S: Post COVID Rhino Orbital Mucormycosis with Pulmonary Mucormycosis : A rare case report, (CR), **121(6):** 64-6.
Chatterjee P: see **Das SK**.
Chatterjee S, Ghiya R, Chatterjee D: Suspected Tigecycline and Levetiracetam induced raised Creatine Kinase (CK) and Rhabdomyolysis, (CR), **121(11)**: 45-7.
Chatterjee S: see **Pradhan R**.
Chatterjee T, Maisnam I, Kundu PK, Bandyopadhyay S, Ray A, Mukherjee AK: Study of the Prevalence of Type 2 Diabetes Mellitus in Patients with Heart Failure in a Tertiary Care Hospital in Eastern India, (OA), **121(4):** 28-31.
Chaturvedi A: see **Gopinath PM**.
Chaubey D: see **Hasan Z**.
Chaudhari NK: see **Patel S**.
Chaudhary H: see **Singh J**.
Chaudhuri GR: see **Bera A**.
Chauhan A: see Kumar KA.
Chauhan P, Naik S, Wardhan N, Debnath E, Singh HR, Kundra P, Jain S, Basu DK, Das PK: COVID-19 Pandemic and the Role of Control Room in the Tertiary Care Hospital, (RA), **121(4):** 59-62.
Chavda SR: see **Shah SJ**.
Chhaniara RA: see **Patel RV.**
Chittora S: see **Saluja M**.
Chopra J: see **Suthan MS**.
Choudhry PN: see **Puri S**.
Choudhury BN, Baruah BJ, Gandhi N, Bhattacharyya M, Deka

UJ, Nanda J, Medhi P, Sen A, Sarma P, Kalita B, Hazarika SJ, Bhuyan J: A Clinical Study of Dyselectrolytemia in Patients with Cirrhosis of Liver and its Association with Severity of Disease and Development of Complications, (OA), **121(8):** 22-6.
Choudhury TA, Lahkar B, Rasul RA: Hemoadsorption (CytoSorb®) in the Management of Septic Shock : our Experience from North East India, (CS), **121(9):** 60-2.
Chowdhury DK: see **Datta J**.
Chowdhury N, Chakrabarti S, Ghosh A: An Unusual Case of Bisalbuminemia in a 61-year-old Male Patient, (CR), **121(6):** 60-1.
Contractor A: see **Mehta KK**.

D

Dagra R: see **Bera A**.
Das A, Ghosh S, Ghosh S, Sur TK: An Effective Management for Thalassaemic Patients during Pregnancy, (OA), **121(4):** 45-8.
Das A: see **Debnath R**.
Das A: see **Debnath R**.
Das Bakshi S: see **Pati AK**.
Das Biswas K: see **Das SK**.
Das M, Dasgupta MK: Outcome of Early Continuous Positive Airway Pressure (CPAP) in Preterm Newborns with Respiratory Distress Syndrome, (OA), **121(5):** 28-31
Das N: see **Ajagunde JN**.
Das N: see **Lal NR**.
Das NK: see **Mukhida S**.
Das NK: see **Mukhida S**.
Das PK: see **Chauhan P**.
Das S, Chatterjee N, Mandal A, Datta PK: A Study on Restless Legs Syndrome in Patients with Chronic Kidney Disease in a Tertiary Care Hospital. (OA), **121(12):** 37-40.
Das S, Mondal S, Mandal PK: A Study on Sexually Transmitted Infections Using Syndromic Approach among Patients Attending Suraksha Clinic at a Tertiary Care Hospital of West Bengal, (OA), **121(2):** 49-51.
Das S: see **Bera A**.
Das SK, Barman D, Samaddar S, Chatterjee P, Mondal AR, Das Biswas K, Mondal S, Das SK: New Onset Facial Nerve Palsy : A Part of Post COVID Mucormycosis Disease Spectrum — A Descriptive Observational Study, (OA), **121(1)**: 28-32.
Das DCK, Subitha K, Jose L, Prasad PH: Somatic Neoplasm Arising from Teratoma Ovary with Peritoneal Recurrence, (CR), **121(12)**: 64-5.
Das SK: see **Chatterjee P**.
Das SK: see **Das SK**.
Das VK: see **Khan V**.
Dasgupta MK: see **Das M**.
Datta J, Chowdhury DK, Roy A: A Case of Cosmetic Poisoning : Minoxidil, (CR), **121(10):** 62-3.
Datta J: see **Mahapatra U**.
Datta PK: see **Das S**.
Datta S: see **Mukhopadhyay P**.
Datta S: see **Puri S**.
Dave A: see **Shrimal PJ**.
Dave VK: see **Parekh D**.
Dave VK: see **Parekh D**.
De D: see **Ghosh D**.
De P: see **Sengupta S**.
De R: see **Baul SN**.
De U, Bhattacharya K, Agrawal R: "Tunnel of Love" in Whipple — In the Pursuit of the Proposer, (VP), **121(6):** 67-8.
Debnath A: see **Mandal (Kayal) M**.
Debnath E: see **Chauhan P**.
Debnath R, Das A, Das A, Ghosh M, Mukhopadhyay J: Dancing Feet Syndrome in Diabetes : Para-ballism and Para-chorea in a Diabetic Patient with Diaphragmatic Myoclonus, (CR), **121(2):** 69-70.
Deka UJ: see **Choudhury BN**.
Dengri C: see **Suthan MS**.
Desai A: see **Anand A**.
Desai A: see **Gopinath PM**.
Desai A: see **Gupta MS**.
Desai A: see **Kalra S**.
Desai A: see **Kamilya R**.
Desai A: see **Ruke M**,
Desai A: see **Ruke M**.
Desai A:see **Pahuja V**.
Desai H: see **Kabra R**.
Deshpande AS: see **Navgale SS**.
Deshpande S: see **Pandya J**.
Devanathan V: see **Sundaram S**.
Devarajan A, Jayashankar LKK, Arun P, Barman MH, Barman H, Kumpatla S, Viswanathan V: Effect of Tocotrienol on Liver Enzymes, Fatty Liver and Liver Stiffness in People with Type 2 Diabetes and NAFLD : A Pilot Study Based on Biochemical and Transient Elastography Parameters, (OA), **121(6):** 14-8.
Dey AK: see **Biswas U**.
Dhanaki G: see **Mehta KK**.
Dharap SB: see **Navgale SS**.
Dharmalingam V, Fredrick N, Nirmal S: Effectiveness of Intravitreal Ranibizumab in a Postmenopausal Hypertensive Women with Branch Retinal Vein Occlusion (BRVO), (CR), **121(10):** 64-6.
Dhok A: see **Laturkar N**.
Dhok AP: see **Rathod NR**.
Dhondge S: see Kumar KA.
Dhore M: see **Tiwaskar M**.
Dhore MR: see **Mehta KK**.
Dhore MR: see **Thacker H**.
Dikshit N, Basu A, Prasad GH: Warm Autoimmune Haemolytic Anaemia due to IgA and IgG — A Rare Clinical Scenario, (CS), **121(3):** 59-61.
Dileep JE: see **Takharya R**.
Divakaran A: see **Chakraborty B**.
Dixit R: see **Verma N**.
Doctor NM: see **Patel OB**.
Dolai TK: see **Baul SN**.
Dutta A: see **Saha AK**.
Dutta DK, Dutta I, Dutta I: Reproductive Tract Infection : Challenges to Health Policy and Education, Research and Impact on the Socio-economic Situation of Indians, (OA), **121(4):** 49-51.
Dutta G: see **Nanda R**.
Dutta I: see **Dutta DK**.
Dutta I: see **Dutta DK**.
Dutta S: see **Bera A**.

F

Faizee F: see **Hitawala G**.
Fatima S: see **Anees A**.
Firos JRB, Shruthi S, Bhat B, Patil S: Personal Protective Equipment Associated Symptoms amongst Frontline Health Care Workers in COVID-19 Pandemic — A Cross Sectional Study, (OA), **121(3):** 25-9.
Fredrick N: see **Dharmalingam V**.

G

Gaba S: see **Jesrani G**.
Gaikwad N: see **Konjeti OR**.

Gajjar R: see **Kabra R**.
Gala M: see **Thacker H**.
Gala MYN: see **Mehta KK**.
Gala MYN: see **Tiwaskar M**.
Ganatra SY: see **Shah HH**.
Gandhi N: see **Choudhury BN**.
Ganguly D: see **Mahapatra U**.
Ganguly G: see **Sinha B**
Gaunkar R: see **Sreekumar K**.
Gehlot RK: see **Hitawala G**.
George EV: see **Pargal P**.
Gera R: see **Goel A**.
Gharei RM: see **Nanda R**.
Ghiya R: see **Chatterjee S**,
Ghosh A: see **Bhattacharya A**.
Ghosh A: see **Chowdhury N**.
Ghosh A: see **Sengupta S**.
Ghosh B: see **Ghosh D**.
Ghosh Chatterji D: see **Patel S**.
Ghosh D, Palit S, Mukhopadhyay K, Ghosh B, De D, Chatterjee C: Comparison of Substance Abuse among Medical Students in Eastern India with Other Undergraduates : An Analytical Study, (OA), **121(7):** 49-53.
Ghosh K: Personal Physician to His Holiness, Lord Buddha, (S Comm), **121(7):** 71-2.
Ghosh M: see **Debnath R**.
Ghosh PK: see **Sengupta S**.
Ghosh R: see **Lal NR**.
Ghosh S: see **Das A**.
Ghosh S: see **Das A**.
Ghosh S: see **Mahapatra U**.
Ghosh UC: see **Ray A**.
Gnanadurai KR: see **Leelakrishnan D**.
Goel A, Wason R, Gera R: Variation in COVID Mortality with Different Demographic Factors in Districts of India, (OA), **121(3):** 48-51.
Goel A: see **Suthan MS**.
Goel P, Kumar A: Oral and Systemic Symptoms of COVID-19 among Patients Vaccinated and Unvaccinated against SARS-CoV-2, (OA), **121(8):** 54-7.
Gogia A: see **Mehta KK**.
Gonsalves WA: see **Mutyala SCVS**.
Gopinath PM, Chaturvedi A, Desai A: Coenzyme Q10 in Male and Female Infertility, (DC), **121(1)**: 50-4.
Gosalia HJ: see **Patel OB**.
Govani D: see **Anthony FM**.
Goyal N, Bhatia G: ER, PR HER2-neu Study in Breast Cancer Patients of Southern Rajasthan, (OA), **121(7):** 29-32.
Goyal VV: see **Pandey S**.
Grover AK: see **Puri S**.
Grover RA, Vaidya H, Rajatiya H, Moitra M: A Study of the Urethral and Stretched Penile Lengths in the Adult, Indian, Male Population, (RA), **121(2):** 64-6.
Guha SK: see **Mandal (Kayal) M**.
Guha SK: see **Mondal A**.
Gulati A: see **Singh J**.
Gupta A, Pandey A, Bansal P, Kaur A, Prakash P: Health Care Systems during Pandemic : Role of Government and Regulatory Authorities, (Comm), **121(8):** 88-90.
Gupta M: see **Jesrani G**.
Gupta M: see **Mer JK**.
Gupta MS, Grover KS, Bedi G, Desai A: Specific Collagen Peptide — A Missing Piece in the Management of Osteoporosis, (DC), **121(12)**: 78-81.
Grover KS: see **Gupta MS**.
Gupta NA: see **Shah A**.
Gupta P: see **Bhattacharyya R**.
Gupta R: see **Nasare NV**.
Gupta S: see **Jesrani G.,**
Gupta S: see **Anees A**.
Gupta S: see **Sinha B**

H

Haldar A, Satpathy C, Mohanty NK, Routray SN: A Study of Left Ventricular Global Longitudinal Strain in ST-segment Elevation Myocardial Infarction after Extended Pharmaco-invasive Therapy, (OA), **121(5):** 23-7.
Halder A: see **Saha AK**.
Harindranath HR: see **Abdul Razack GS**.
Harsh P: see **Phadnis NA**.
Hasan Z, Chaubey D, Prasad R, Kumar S: Types of associated Anomalies with Ano-rectal Malformation: An Institutional Retrospective Cohort Study, (OA), **121(12):** 29-33 .
Hassan Y: see **Anees A**.
Hazarika SJ: see **Choudhury BN**.
Hindocha SC, Raval R, Shah K, Patel R: Analysing the Ocular Emergencies Presenting at a Tertiary Eye Hospital in Western India During the Second Wave of COVID Pandemic, (OA), **121(10):** 14-7.
Hitawala G, Kherada S, Gehlot RK, Faizee F, Raiger LK: High Fear & Stress in the Quarantine Population of COVID-19 in Southern Rajasthan : A Survey, (OA), **121(2):** 22-6.
Hurmath S Anandh U.

I

Ishwariya, Raja M, Jude V: Angina Ludovici — A Rare Case Report, (CR), **121(8):** 86-7.
Iyer C: see **Patel S**.

J

Jadav V: see **Palal D**.
Jadhav SL: see **Palal D**.
Jadhav SS: see **Kandle AA**.
Jain H, Sarraf S, Shah BA, Julka A: A Unique Case of Pulmonary and Hepatic Hydatidosis, (CR), **121(6):** 62-3.
Jain S: see **Chandravanshi SL**.
Jain S: see **Chauhan P**.
Jankharia B: see **Angirish B.**
Jankharia B: see **Angirish B**.
Jankharia B: see **Angirish B**.
Jankharia B: see **Angirish B**.
Jankharia B: see **Angirish B**.
Jankharia B: see **Angirish B**.
Jankharia B: see **Angirish B.**
Jankharia B: see **Angirish B.**
Jankharia B: see **Angirish B.**
Jankharia B: see **Angirish B**.
Jankharia B: see **Angirish B.**
Jankharia B: see **Angirish B.**
Jannati F: see **Jannati M**.
Jannati M, Jannati F: Off-Pump Coronary Artery Bypass Grafting Surgery : A Narrative Review, (RA), **121(2):** 56-61.
Jayaraman S: see **Sundaram S**.
Jayashankar LKK: see **Devarajan A**.
Jesrani G, Gupta M, Gupta S, Gaba S: One-hour Post load Hyperglycemia : A Powerful but Underestimated Marker of Incident Diabetes and Related Complications, (RA), **121(6):** 51-6.
John RP: see **Tirkey SR**.
Johnson S, Borah N, Thakur KN, Verma P: Variants of Concern

of SARS CoV2: Overview, (C), **121(3)**: 72.
Johnson S: see **Palal D**.
Jose A: see **Kumar SSV**.
Jose L: see **Das DCK**.
Joshi S: see **Mukherjee S**.
Jude V: see **Ishwariya**.
Julka A: see **Jain H**.

K

Kabra R, Desai H, Rao K, Shah S, Gajjar R, Patel A, Bhanat R: Pseudomyopia : Is it an Underdiagnosed Cause of Asthenopia? (OA), **121(5):** 41-3.
Kadian S, Pathak S, Banerjee A, Agrawal S: Transverse Venous Stenting in Medically Refractory Idiopathic Intracranial Hypertension — A Case Report, (CR), **121(9):** 63-4.
Kalavadia UN: see **Shah HH**.
Kalita B: see **Choudhury BN**.
Kaliyaperumal D: see **Takharya R**.
Kalra S, Desai A: Omega-3 Fatty Acids Combined with Statins in Atherogenic Dyslipidemia : A Comprehensive Review, (DC), **121(10):** 67-71.
Kamat S: see **Mutyala SCVS**.
Kamilya R, Desai A: Clinical Effectiveness and Tolerability of 2% Menthol in Musculoskeletal Pain : A Pilot Observational Real-world Evidence Study, (DC), **121(3)**: 67-70.
Kandle AA, Sarawade SS, Jadhav SS: A Study of Efficacy of Intralesional Injection Triamcinolone Acetonide in the Treatment of Chalazion, (OA), **121(5):** 32-5.
Kanna V: see **Sundaram S**.
Kannan R: see **Mageshwari M**.
Kannuri S: see **Mukhida S**.
Kant S, Rais J, Pandey AK: Diet and Cancer Prevention : An Evolving Picture, (RA), **121(5):** 47-52.
Kant S: see **Tirkey SR**.
Kar JK: see **Mahapatra U**.
Kar PK: In Memorium, **121(4):** 74.
Karthiga PJ, Chandrasekaran S, Sen M: Ovarian Torsion in Postmenopausal Women with varied Clinical Presentations — A case series, (CS), **121(11)**: 40-2.
Karuppusamy S: see **Subramani HP**.
Kataruka M: see **Mukhopadhyay P**.
Kattamreddy AR, Allu JDK: Constitutional Ends Through Unconstitutional Means : A Doctor's View on Rajasthan Right to Health Care Act 2023, (C), **121(11**): 57-8.
Kattamreddy AR: Truth Unveiled : ICMR Guidelines Debunks Common Misconceptions about Umbilical Cord Blood Banking, (C), **121(4):** 72.
Kaur A: see **Gupta A**.
Keerthi N: see **Pagadala S**.
Kerketta P, Ray K, Basu M: Falls – Its magnitude, Influencers and Associated Complications among the Elderly of a Block, West Bengal, (OA), **121(11)**: 30-4.
Keshtkaran Z: see **Vizeshfar F.**
Khadapkar R: see **Tiwaskar M**.
Khade AM, Wahane JM: Critical Analysis of Teaching Learning Methods Used in Teaching Professionalism to Medical Students, (RA), **121(5):** 44-6.
Khaladkar SM: see **Konjeti OR**.
Khan J: see **Mukhopadhyay P**.
Khan S: see **Mukhida S**.
Khan S: see **Mukhida S**.
Khan S: see **Singla K**.
Khan V, Sanghai AA, Rajan J, Sharma AK, Nayak S, Das VK: Clusters of Varicella Zoster in the Tribal-dominated District of Western India : An investigation Report, (OA), **121(10):** 18-22.
Khari S: see **Singh J**.
Khatri P: see **Aggarwal G**.
Kherada S: see **Hitawala G**.
Khokhar AK: see **Bassi S**.
Khokhariya R: see **Patel S**.
Kolwalkar JP: see **Mutyala SCVS**.
Konjeti OR, Gaikwad N, Mehta K, Khaladkar SM, Saini M: Solitary Diaphragmatic Hydatid Cyst, (CR), **121(12):** 66-
Kosambiya JK: see **Verma M**.
Kotak B: see **Mehta KK**.
Kotak B: see **Thacker H**.
Kotak B: see **Tiwaskar M**.
Kotru M: see **Suthan MS**.
Kumar A: see **Goel P**.
Kumar KA, Kumar SV, Ahooja S, Chauhan A, Dhondge S, Marwaha V, Nair AS, Surendran S, Roy S, Arora A: Knowledge about COVID-19 Infection and Stress Levels among Ambulance Drivers during COVID-19 Pandemic — A Cross Sectional Study, (OA), **121(1)**: 37-41.
Kumar M: see **Singh DP**.
Kumar M: see **Singla K**.
Kumar S: see **Hasan Z**.
Kumar S: see **Sundaram S**.
Kumar SSV, Shekhli S, Jose A: Epidemiological Study on Mandibular Fracture and Its Association with Anatomical Location Presenting to Emergency Department, (OA), **121(11)**: 35-9.
Kumar SV: see Kumar KA.
Kumari M, Nair SV, Balasubramanian K: A Young Female with Renal Cortical Necrosis Treated with Intravenous Immunoglobulin in a Resource Poor Setting : A Case Report: (CR), **121(7):** 65-7.
Kumpatla S: see **Devarajan A**.
Kundra P: see **Chauhan P**.
Kundu PK: see **Chatterjee T**.
Kundu S: see **Chatterjee P**.
Kushwaha S: see **Nasare NV**.
Kuzhandai VV: see **Mageshwari M**.

L

Lagoo JY: see Palve SS.
Lahkar B: see **Choudhury TA**.
Lal NR, Das N, Ghosh R: Dermatophytosis in paediatric population : A study on clinicoepidemiological and mycological profile from eastern India, (OA), **121(10):** 32-6.
Lal T, Sivaraman VK, Singh PJ, Sanniyasi S: Evaluation of Risk Factors of Postoperative Urinary Retention in Male Patients Undergoing Surgery Under Spinal Anaesthesia : A Prospective Study, (OA),**121(3):** 35-8.
Laturkar N, Dhok A: Quintessence Case of Adrenal Gland Neuroblastoma, (PCME), **121(5):** 67.
Leelakrishnan D, Gnanadurai KR: Profile of Patients with Hypoglycemia Presenting to the Emergency Medicine Department of a Tertiary Care Hospital, (OA), **121(2):** 44-8.
Leelakrishnan D: see **Sowkarthick KS**.
Lekshmi R: see **Ajagunde JN**.
Lekshmi R: see **Mukhida S**.
Lele J: see **Vora A**.
Lotliker SS: see **Mutyala SCVS**.
Lucksom PG, Thatal A, Sharma BK, Bhutia GP, Sinha D: Mullerian Anomaly with Large Ovarian Mass — Where Two Worlds Collide, (CR), **121(1)**: 45-7.

M

Madan A: see **Vora A**.
Mageshwari M, Kannan R, Singh Gaur BP, Kuzhandai VV: Constraints of the Palliative Care Patients during Pandemic — A Cross-sectional Study, (OA), **121(6):** 29-32.
Mahajan R: see **Mehta KK**.
Mahanta P: see **Singh J**.
Mahapatra U, Ganguly D, Sen S, Ghosh S: Idiopathic Intracranial Hypertension Presenting with Multiple Cranial Nerve Palsy, (CR), **121(5):** 59-61.
Mahapatra U, Singh DT, Datta J, Seth BC, Mandal PK, Kar JK: Clinico-epidemiological Profile of Snake Bite in a Rural Tertiary Care Hospital of West Bengal, (OA), **121(9):** 44-9.
Maharana S: see **Shrimal PJ**.
Mahesh BN: see **Thacker H**.
Maheshwari D: see **Quazi ZA**.
Maheshwari PK: see **Singh G**.
Maisnam I: see **Chatterjee T**.
Makharia S: see **Vora A**.
Malaisamy M: see **Vajrapu K**.
Mandal (Kayal) M, Basu S, Roy D, Debnath A, Guha SK: Changes in Serum Levels of IL-6, TNF-á and CRP in People Living with HIV Following Initiation of Antiretroviral Therapy — A Longitudinal Cohort Study from a Tertiary Hospital In Eastern India, (OA), **121(9):** 20-4.
Mandal A: see **Das S**.
Mandal PK: see **Das S**.
Mandal PK: see **Mahapatra U**.
Mandal PK: see **Mondal M**.
Mandal S: see **Bera A**.
Mandal S: see **Bhattacharyya R**.
Manhas M: see **Singh M**.
Mani D: see **Takharya R**.
Maniar S: see **Mehta KK**.
Marwaha V: see Kumar KA.
Mashru A: see **Mehta KK**.
Mayur N, Mondal S: Prolonged Stay in Intensive Care Unit and Its Predictors in a Tertiary Care Centre of West Bengal, India. (OA), **121(4):** 19-22.
Medhi P: see **Choudhury BN**.
Meena D: see **Saluja M**.
Meenakumari PB, Rekha R, Neena PS, Suresh R: Burkholderia Pseudomallei Infection in a Diabetic Patient Presenting as Multiple Splenic Abscesses — A Case Report, (CR), **121(4):** 63-5.
Mehta K: see **Konjeti OR**.
Mehta K: see **Vora A**.
Mehta KK, Contractor A, Maniar S, Mashru A, Singh MK, Gogia A, Mahajan R, Mittal H, Gala MYN, Dhore MR, Muchhala S, Dhanaki G, Sanghavi A, Rathod R, Kotak B: Evaluation of Organoleptic Properties and Compliance with Marketed Cough Syrups : A Cross Sectional Consumer Survey in Indian Patients, (OA), **121(8):** 75-80.
Mehta NH: see **Shah SJ**.
Mehta RJ: see **Shah A**.
Mehta S: see **Verma M**.
Mehta VV: see **Patel S**.
Mer JK, Mulla FI, Gupta M: Establishment of Haematological Reference Intervals for Healthy Adults in Karamsad at Shree Krishna Hospital, (OA), **121(7):** 40-3.
Metgud MC: see **Shekhar R**.
Mishra A: see **Pati AK**.
Mishra J: see **Nanda R**.
Mishra K, Mishra M: Epidemiological Trend of Paediatric COVID-19 in First and Second Wave of Corona Pandemic — An Observational Study, (RA), **121(1)**: 42-4.
Mishra M: see **Mishra K**.
Mittal H: see **Mehta KK**.
Modak D: see **Mondal A**.
Modi G: see **Vora A**.
Mohamed MS: see **Bhuvaneswari K**.
Mohan C: see **Srivastava A**.
Mohanty NK: see **Haldar A**.
Moitra M:see **Grover RA**.
Mondal A, Modak D, Guha SK: Prevalence of Rheumatological Manifestations in HIV Infected Patients in a Tertiary Care Centre In Eastern India : A Prospective Observational Study, (OA), **121(7):** 20-3.
Mondal AR: see **Das SK**.
Mondal GP: see **Anton DX**.
Mondal K: see **Baul SN**.
Mondal M, Mandal PK, Basu R, Sinhamahapatra TK: Clinical Spectrum and Laboratory Parameters in Scrub Typhus in Children : Experience from a Tertiary Care Centre in West Bengal, India, (OA), **121(10):** 23-7.
Mondal PK: see **Mukherjee S**.
Mondal S: see **Das S**.
Mondal S: see **Ali SH**.
Mondal S: see **Ali SH**.
Mondal S: see **Das SK**.
Mondal S: see **Mayur N**.
Mondal S: see **Pradhan R**.
Mondal SS: see **Ray A**.
Mondal T: see **Mukherjee S**.
Muchhala S: see **Mehta KK**.
Muchhala S: see **Thacker H**.
Muchhala S: see **Tiwaskar M**.
Mukherjee A: see **Santra T**.
Mukherjee AK: see **Chatterjee T**.
Mukherjee PP: see **Santra T**.
Mukherjee R: see **Bera A**.
Mukherjee S, Samajdar SS, Mondal PK, Mondal T, Pal J, Joshi S, Tripathi SK: Outcome of COVID-19 in Type 2 Diabetics : A Cross Sectional Study, (OA), **121(7):** 61-4.
Mukhida S , Khan S , Das NK , Patil R , Lekshmi R: Manuscript Writer : Are they Eligible for Authorship in Scientific Article ? If yes then which place ? (C), **121(2):** 76.
Mukhida S, Khan S, Das NK, Kannuri S: Is there any Vaccine available which does have Zero side effect? (C), **121(9):** 70.
Mukhopadhyay J: see **Debnath R**.
Mukhopadhyay K: see **Ghosh D**.
Mukhopadhyay M: see **Pramanik S**.
Mukhopadhyay P, Khan J, Banerjee P, Bhattacharya P, Kataruka M, Datta S: Post Mortem Renal Pathological Changes in Snake bite Patients and Association with Clinical Features, (OA), **121(8):** 71-4.
Mulla FI: see **Mer JK**.
Munshi S: see **Samajdar SS**.
Murugesan J: see **Bhuvaneswari K**.
Murugesan M, Ramamurthy S: Monkeypox as a Global Health Emergency — A Threat after COVID-19 Pandemic, (C), **121(2):** 78.
Mutyala SCVS, Vaggar JN, Borker S, Kamat S, Lotliker SS, Cacodcar J, Kolwalkar JP, Gonsalves WA: Acute Kidney Injury among Post Cardiac Surgery Patients : A Retrospective Study, (OA), **121(3):** 15-20.

N

Nagarathna R: see **Shrimal PJ**.
Naik S: see **Chauhan P**.
Nair AS: see Kumar KA.

Nair AS: see **Raja S**.
Nair S: see **Ruke M**,
Nair S: see **Ruke M**.
Nair S: see **Ruke M**.
Nair SV: see **Kumari M**.
Nanda J: see **Choudhury BN**.
Nanda R, Dutta G, Gharei RM, Mishra J: Utility of Fine Needle Aspiration Cytology on Evaluation of Lymphadenopathy, (OA), **121(9):** 39-43.
Nanda S: see **Pati AK**.
Nandi S: see **Brahmachari RK**.
Nandi S: see **Sengupta S**.
Nasare NV, Bhardwaj A, Bablani V, Gupta R, Kushwaha S, Sharma S: Antimicrobial Utilization Study in a Neurology Setting, (OA), **121(4):** 41-4.
Nashwath KKH: see **Abdul Razack GS**.
Navgale SS, Deshpande AS, Agarwal S, Dharap SB, Patil R: Validation of Glasgow-Blatchford Score in Predicting Management of Upper Gastrointestinal Bleeding, (OA), **121(3):** 39-42.
Nayak B: see **Smitha SG**.
Nayak S: see **Khan V**.
Neena PS: see **Meenakumari PB**.
Nigam P: see **Pargal P**.
Nirmal S: see **Dharmalingam V**.
Nugraheni SA: see **Widodo S**.

O

Onimi S: see **Rishadha A**.
Onkar DP: see **Rathod NR**.
Onkar P: see **Rathod NR**.

P

Pagadala S, Keerthi N, Behera SK, Shweshikaa K, Prabha RB: Guillain-Barre Syndrome Following Covishield Vaccine : A Case Report,(C), **121(5):** 75-6.
Pahuja V, Desai A: A Review on the Role of 21st Century Vitamin E : Tocotrienol in Nonalcoholic Fatty Liver Disease, (DC), **121(7):** 74-8.
Pal A: see **Roy S**.
Pal J: see **Mukherjee S**.
Pal S: see **Sikdar S**.
Palal D, Rathod H, Jadhav SL, Verma P, Jadav V, Johnson S: Sample Size Calculation using Free Softwares – Part 1 : Prevalence Studies, (S Comm), **121(11)**: 48-50.
Palit S: see **Ghosh D**.
Palve SB: see Palve SS.
Palve SS, Lagoo JY, Palve SB: Effect of Online Formative Assessment Feedback on Learning Outcomes among Medical Under Graduates, (OA), **121(10):** 37-41.
Pandey A: see **Gupta A**.
Pandey AK: see **Kant S**.
Pandey AK: see **Tirkey SR**.
Pandey S, Bajaj S, Goyal VV: Dyslipidemia in Patients with Tuberculosis and Diabetes Mellitus, (OA), **121(2):** 41-3.
Pandey SK: see **Sheena DM**.
Pandya J, Ambre SR, Deshpande S: Effects of Neo-adjuvant Chemotherapy on Locally Advanced Breast Cancer (LABC) and Its Correlation with Hormone Profile, (OA), **121(9):** 15-9.
Panigrahy S: see **Sheena DM**.
Parekh D, Shah TG, Dave VK: Effect of Lifestyle Modification in Control of Hypertension, (Spl C), **121(5):** 62-6.
Parekh D, Shah TG, Dave VK: Evaluating Contraceptive Use among Women in Gujarat, India, (C), **121(10):** 74.
Pargal P, Verma J, George EV, Nigam P: Maternal Occupational Exposure and Risk for Orofacial Clefts : A Prospective Study, (OA), **121(6):** 47-50.
Parmar V: see **Patel S**.
Patel A: see **Kabra R**.
Patel DM: see **Shah A**.
Patel ED: see **Patel S**.
Patel J: see **Patel S**.
Patel J: see **Patel S**.
Patel OB, Shah HM, Gosalia HJ, Doctor NM: Study of Thyroid Dysfunction in Metabolic Syndrome Patients, (OA), **121(11)**: 14-7.
Patel R: see **Anthony FM**.
Patel R: see **Anthony FM**.
Patel R: see Hindocha SC.
Patel RV, Anthony FM, Chhaniara RA, Trambadia RA: Left Basilar Pneumonia Simulating Perforated Appendicitis with Peritonitis in a Child, (CR), **121(4):** 66-7
Patel S, Khokhariya R, Tarani G, Rathod J, Ghosh Chatterji D, Patel J: Association between Reverse Osmosis Water and Heart Diseases, Back Pain and Joint Pain, (OA), **121(8):** 37-40.
Patel S, Mehta VV, Chaudhari NK, Patel ED: A Study of Knowledge, Attitude and Practice among the Mothers Regarding Management of Childhood Diarrhoea, (OA), **121(6):** 23-8.
Patel S, Parmar V, Iyer C, Patel J: Role of Counselling and its Impact on the Dietary Habits, Glycemic Control and Diabetic Awareness of Newly Diagnosed Type 2 Diabetes Mellitus Patients, (OA), **121(2):** 15-21.
Pathak S: see **Kadian S**.
Pathak SP: see **Puri S**.
Pati AK, Nanda S, Chakraborty N, Das Bakshi S, Mishra A: A Study of Laboratory Determinants and Clinico-pharmacological Correlates of Vasculotoxic Snake Bites in a Tertiary Care Hospital in West Bengal, (OA), **121(7):** 24-8.
Patil R : see **Mukhida S**.
Patil R: see **Navgale SS**.
Patil S: see **Firos JRB**.
Paul R: Rash on the Face, (PCME), **121(7):** 70.
Paulose A: see **Chand JT**.
Pawar JG: see **Saikumar GV**.
Phadnis NA, Shiddapur G, Harsh P, Rana N: An Unusual Cause of Jaundice in the Tropics, (CR), **121(11)**: 43-4
Pillai AV: see **Raja S**.
Pillai N: see **Smitha SG**.
Pilli GS: see **Shekhar R**.
Prabha RB: see **Pagadala S**.
Pradhan R, Chatterjee S, Chakraborty A, Mondal S: Histomorphological Changes in Breast Cancer following Neoadjuvant Therapy and its Prognostic Implication for Patient Management — Study of 36 Cases in a Tertiary Care Hospital, (OA), **121(7):** 44-8.
Prajapati MK: see **Asari WA**.
Prajapati RB: see **Shah A**.
Prakash P: see **Gupta A**.
Pramanik S, Ray S, Biswas K, Bandyopadhyay T, Mukhopadhyay M: Management of Steroid-induced Hyperglycemia, (RA), **121(10):** 52-6.
Prasad GH: see **Dikshit N**.
Prasad PH: see **Das DCK**.
Prasad R: see **Hasan Z**.
Praveen S: see **Vignesh NJ**.
Puri S, Grover AK, Choudhry PN, Saurabh S, Datta S, Pathak SP: A Case Report of Ischemic Stroke in an Adult Patient of Dengue Fever with Thrombocytopenia, (CR), **121(1)**: 48-9.

Q

Quazi ZA, Maheshwari D, Sardana V, Bhushan B: Intricacy of Post Covid Mucormycosis leading to Garcin Syndrome, (CR), **121(5):** 56-8.

R

Raiger LK: see **Hitawala G**.
Rais J: see **Kant S**.
Raizada A: see **Suthan MS**.
Raj D: see **Singh M**.
Raja M: see **Ishwariya**.
Raja S, Pillai AV, Nair AS, Ramachandran R: A Prospective Observational Study on Anthropometric Correlation with Severity of Chronic Venous Disease in the Indian Population, (OA), **121(10):** 48-51.
Rajan J: see **Khan V**.
Rajatiya H: see **Grover RA**.
Rajesh KP, Post COVID Central Retinal Vein Occlusion in a Young Woman with Well-controlled Diabetes, (CR), **121(10):** 59-61.
Rajesh KP: Prevalence of Undiagnosed Diabetes and Impaired Glucose Tolerance in a Semi-urban Population from Calicut City, (OA), **121(1)**: 24-7.
Rajeswaran R: see **Rishadha A**.
Ramachandran R: see **Raja S**.
Ramamurthy S: see **Murugesan M**.
Ramasamy S: see **Subramani HP**.
Ramraika D: see **Chandravanshi SL**.
Rana N: see **Phadnis NA**.
Rani U: see **Rishadha A**.
Ranjit P: see **Santra T**.
Rao AL, Vishnu PS: Aesthetic Reconstruction of Scrotum after Founiers Gangrene using Laterally based Medial Thigh Fasciocutaneous Flap, (OA), **121(2):** 52-5.
Rao K: see **Kabra R**.
Rao KSSR: see **Saikumar GV**.
Rasul RA: see **Choudhury TA**.
Ratan V: A Study of the Epidemiology of Childhood Blindness and Plan of Action in Bihar, (RA), **121(2):** 62-3.
Rathod AN, Rathod VN, Shahane SM: Atypical Presentation of Anti-phospholipid Syndrome with Triple Antibody Positive (ATAP) Syndrome Presented as Non-healing Foot Ulcer in a Middle-aged Adult Female, (CR), **121(2):** 71-2.
Rathod H: see **Palal D**.
Rathod J: see **Patel S**.
Rathod NR, Onkar DP, Onkar P, Dhok AP, Bodhankar SB, Yadav TS: Biometry of the Submandibular Salivary Glands in Indian Population Using Computed Tomography : A Retrospective Study, (OA), **121(4):** 32-5.
Rathod R: see **Mehta KK**.
Rathod R: see **Tiwaskar M**.
Rathod VN: see **Rathod AN**.
Raval R: see Hindocha SC.
Raveendran JK: see **Smitha SG**.
Ray (Ghosh) R: see **Sikdar S**.
Ray A, Saha M, Roy T, Ray J, Ghosh UC, Mondal SS: Study of Cardiac Dysfunction in Non-alcoholic Cirrhotic Patients in a Tertiary Care Hospital, (OA), **121(8):** 64-7.
Ray A: see **Chatterjee T**.
Ray J: see **Ray A**.
Ray K: see **Kerketta P**.
Ray K: see **Roy S**.
Ray S: see **Biswas U**.
Ray S: see **Pramanik S**.
Raychaudhuri P: see **Biswas U**.
Reddy LJ: Efficacy and Safety of Human Placental Extract (HPE) in Women with Cervical Erosion, (DC), **121(12)**: 82-3.
Rekha R: see **Meenakumari PB**.
Rishadha A, Onimi S, Rani U, Chandrasekharan A, Rajeswaran R, MR Imaging in Eclampsia, (OA), **121(4):** 14-8.
Rodrigues M: see **Sreekumar K**.
Routray SN: see **Haldar A**.
Roy A: see **Bera A**.
Roy A: see **Datta J**.
Roy A: see **Saikumar GV**.
Roy Chowdhury S, Chakrabarti A: The Road not Taken : A Perspective of a Medical Professional's Inability to Choose between Clinical Practice or Postgraduation Degree after Internship, (C), **121(2):** 77-8.
Roy Chowdhury S: see **Ansar M**.
Roy D: see **Mandal (Kayal) M**.
Roy H: see **Roy S**.
Roy S, Roy H, Biswas A, Pal A, Ray K, Chakraborty P: Study of Hindrances in Sustaining — Body Donation Programme in COVID-19 Era, (OA), **121(2):** 38-40.
Roy S: : see Kumar KA.
Roy S: see **Vora A**.
Roy T: see **Ray A**.
Ruke M, Desai A, Anand S, Nair S: A Clinical Study to Evaluate the Efficacy and Safety of Lincomycin Tablet in the Treatment of Surgical Site Infection (SSI) and Skin & Soft Tissue Infection (SSTI), (DC), **121(9):** 65-8.
Ruke M, Desai A, Anand S, Nair S: Real World Evidence Study to Evaluate the Effectiveness and Tolerability of Lincomycin Injectable and Oral in the Treatment of Surgical Site Infection (SSI) and Skin & Soft Tissue Infection (SSTI), (DC), **121(11)**: 51-4.

S

Sachdev S: see **Singh M**.
Saha AK, Halder A, Dutta A: Balanced Robertsonian Translocation in 15 and 22 Chromosome in a Child with Down's Syndrome, (CR), **121(12)**: 68-70.
Saha B, Biswas NM, Biswas PK: A Study on Prevalence of Different Causes of New Onset Seizures in Adults Presenting in a Tertiary Care Hospital with their Neuroimaging and EEG Findings, (OA), **121(5):** 19-22.
Saha M: see **Ray A**.
Saha S: see **Anton DX**.
Saha S: see **Baul SN**.
Saha S: see **Bhattacharyya S**.
Sahu K: see **Yadav PK**.
Saikumar GV, Rao KSSR, Roy A, Pawar JG: Diagnostic Utility of Percutaneous FNAC in the Evaluation of Hepatic Masses, (OA), **121(9):** 25-32.
Saini B: see **Shah HH**.
Saini M: see **Konjeti OR**.
Saluja M, Sharma P, Sharma S, Chittora S, Meena D, Bhargava G: Study of Effectiveness of Convalescent Plasma-therapy in Moderate to Severely ill COVID-19 Patients. (OA), **121(2):** 33-7.
Samaddar S: see **Das SK**.
Samajdar SS, Munshi S: Fostering Competent Medical Graduates : The Imperative of Medically Trained Teachers in Medical Education, Inspired by Dr Frances Oldham Kelsey, (C), **121(11)**: 58.
Samajdar SS: see **Mukherjee S**.
Samashaptak: see **Bhattacharyya S**.
Sanghai AA: see **Khan V**.
Sanghavi A: see **Mehta KK**.

Sanghavi A: see **Tiwaskar M**.
Sanghvi A: see **Thacker H**.
Sanniyasi S: see **Lal T.**
Santhosh S: see **Vignesh NJ**.
Santra T, Mukherjee A, Ranjit P, Mukherjee PP: Mirtazapine Induced Acute Pancreatitis with Hypertriglyceridemia — a case report, (C), **121(11)**: 56.
Sarawade SS: see **Kandle AA**.
Sardana V: see **Quazi ZA**.
Sardessai M: see **Sreekumar K**.
Sarma P: see **Choudhury BN**.
Sarraf S: see **Jain H**.
Satarkar E: see **Sreekumar K**.
Satpathy C: see **Haldar A**.
Saurabh S: see **Puri S**.
Sebastian GM: see **Chand JT**.
Selvapriya J: see **Vignesh NJ**.
Sen A: see **Choudhury BN**.
Sen M: see **Karthiga PJ**.
Sen S: see **Mahapatra U**.
Sen S: see **Sinha B**
Sengupta A: see **Chatterjee P**.
Sengupta S, Ghosh A, De P, Ghosh PK, Nandi S: A Hospital based Cross-sectional Study Measuring the Psychological Comorbidities Associated with Alopecia Areata in Indian Patients, (OA), **121(11)**: 18-21.
Senthilnathan S: see **Vignesh NJ**.
Seth BC: see **Mahapatra U**.
Setiawan H: see **Widodo S**.
Shah A, Sivanandan S, Agrawal A, Prajapati RB, Gupta NA, Mehta RJ, Patel DM: Testicular Volume of Boys Aged 5-17 Years in Relation to Sexual Maturity Rating and Clinical Onset of Puberty in an Urban Setting in Gujarat, India, (OA),**121(3):** 30-4.
Shah BA: see **Jain H**.
Shah BS: see **Shah HH**.
Shah H: see **Ajagunde JN**.
Shah HH, Ganatra SY, Shah BS, Saini B, Bagavadiya RM, Bhatiya KKC, Kalavadia UN: Study of TOPS Score as a Predictor of Survival in Transported Neonates in a Tertiary Care Centre, (OA), **121(9):** 50-3.
Shah HM: see **Patel OB**.
Shah K: see Hindocha SC.
Shah S: see **Kabra R**.
Shah SJ, Chavda SR, Mehta NH, Suthar RS: Anaemia in Patients with Acute Heart Failure with Reduced Ejection Fraction - A Hospital-Based Study, (OA), **121(12):**15-20.
Shah SN: see **Asari WA**.
Shah TG: see **Parekh D**.
Shah TG: see **Parekh D**.
Shahane SM: see **Rathod AN**.
Sharma A: see **Baul SN**.
Sharma AK: see **Khan V**.
Sharma AK: see **Suthan MS**.
Sharma BK: see **Lucksom PG**.
Sharma D: see **Wadhawan G**.
Sharma P: see **Saluja M**.
Sharma S: see **Nasare NV**.
Sharma S: see **Saluja M**.
Sheena DM, Pandey SK, Panigrahy S, Ankani BTS, Thotakura TM: Evaluating MBBS Students Perception on Transition from Classroom to Online Teaching during COVID-19 Pandemic — A Cross Sectional Survey, (OA), **121(7):** 15-9.
Shekhar R, Pilli GS, Wani RV, Metgud MC: Role of D-dimer and CA-125 in the Detection of Ovarian Malignancy, (OA), **121(10):** 28-31.
Shekhli S: see **Kumar SSV**.
Shiddapur G: see **Phadnis NA**.
Shrimal PJ, Maharana S, Dave A, Nagarathna R, Shrimal S: Immediate Impact of Tele Yoga Intervention on Physiological and Psychological Variables of COVID-19 Mild Symptomatic Patients : Two Groups Randomized Controlled Cross Over Study, (OA), **121(12):** 41-6.
Shrimal S: see **Shrimal PJ**.
Shriram T: see **Vajrapu K**.
Shruthi S: see **Firos JRB**.
Shweshikaa K: see **Pagadala S**.
Sikdar S, Pal S, Ray (Ghosh) R, Ballav A, Chatterjee M: Clinico-mycological Profile of Dermatophytoses in a Tertiary Care Hospital in Kolkata : A Cross Sectional Study, (OA), **121(8):** 49-53.
Singh BP: see **Singh DP**.
Singh DP, Kumar M, Sinha AK, Singh BP: Cardiovascular Diseases Risk Assessment of Healthcare Professionals, (OA), **121(6):** 38-40.
Singh DT: see **Mahapatra U**.
Singh Gaur BP: see **Mageshwari M**.
Singh HR: see **Chauhan P**.
Singh J, Gulati A, Khari S, Chaudhary H, Mahanta P, Verma A, Sirohi TR: Stroke — Next Wave of Complications from COVID-19, (CR), **121(2):** 67-8.
Singh M, Sachdev S, Manhas M, Raj D: Association between Sleep Quality and Different Aspects of Memory along with Assessment of Post Exercise and Post Meditation Effects, (OA), **121(1)**: 19-23.
Singh MK: see **Mehta KK**.
Singh PJ: see **Lal T.**
Singh R: see **Wadhawan G**.
Singh S, Srivastava MK: Dengue — The Remedial Steps. **(C), 121(8):** 92.
Singh S, Srivastava MK: What is Essential to know in Heart Failure Patients, (C), **121(2):** 76-7.
Singla K, Khan S, Kumar M: Assessment of Seminar-based Teaching in Medical Education : Students' Point of View, (OA), **121(10):** 42-3.
Singla K: see **Verma N**.
Sinha A, Sinha R: Prevalence, Clinical Features and Risk Factors of Ectopic Pregnancy in a Tertiary Care Hospital in Bangalore, (OA), **121(11)**: 22-5.
Sinha AK: see **Singh DP**.
Sinha B, Gupta S, Sen S, Ganguly G: Study of Sensory Nerve Conduction Study Parameters in Upper & Lower Limb & their Maturation Pattern in Infants & Children in a Tertiary Health Care Institute of West Bengal, (OA), **121(12):**47-50.
Sinha D: see **Lucksom PG**.
Sinha R: see **Sinha A**.
Sinhamahapatra TK: see **Mondal M**.
Sirohi TR: see **Singh J**.
Sivanandan S: see **Shah A**.
Sivaraman VK: see **Lal T.**
Smitha SG, Pillai N, Raveendran JK, Nayak B: A Cross Sectional Study of Prevalence of COVID-19 and ENT Manifestations among Health Care Workers in Our Centre, (OA), **121(1)**: 33-6.
Sorathiya BP: see **Asari WA**.
Sowkarthick KS, Vishnu R, Leelakrishnan D, Varghese L: A Common Complication in an Uncommon Circumstance, (CR), **121(7):** 68-9.
Sreekumar K, Bhoomkar N, Gaunkar R, Sardessai M, Rodrigues M, Satarkar E: Patient Safety Attitude among Indian Medical Students — A Comparative Cross-sectional Questionnaire Study, (RA), **121(4):** 52-8.

Srinivasan S: see **Subramani HP**.
Srivastava A, Mohan C: Postoperative Comfort Score after Septoplasty among Patients Undergoing Nasal Packing versus Suturing of the Septal Flap by Modified Technique without Packing : A Randomized Controlled Trial, (OA), **121(4):** 23-7.
Srivastava MK: see **Singh S**.
Srivastava MK: see **Singh S**.
Stanley S: see **Vignesh NJ**.
Subitha K: see **Das DCK**.
Subramani HP, Srinivasan S, Ramasamy S, Karuppusamy S: A Study of Knowledge, Attitude and Practices on Use of Personal Protective Equipments among Sanitary Workers in Erode Corporation Area, Tamilnadu, (OA), **121(5):** 14-8.
Sundaram S, Devanathan V, Kanna V, Kumar S, Jayaraman S: Etiological Profile of New Onset Seizures above 60 Years of Age, (OA), **121(5):** 36-40.
Sur TK: see **Das A**.
Surendran S: see **K AK.**
Suresh R: see **Meenakumari PB**.
Suthan MS, Dengri C, Chopra J, Aggarwal A, Raizada A, Kotru M, Sharma AK, Goel A: Health Decline in Older Adults, (OA), **121(6):** 33-7.
Suthar RS: see **Shah SJ**.
Suwandono A: see **Widodo S**.

T

Takharya R, Mani D, Dileep JE, Kaliyaperumal D: Topical Timolol Drops in the Management of Pyogenic Granuloma of Lip, (CR), **121(10):** 57-8.
Tanna KJ, Unadkat KM: Socio-economic and Psychological Correlates of Postpartum Depression at Six Months, (OA), **121(3):** 21-4.
Tarani G: see **Patel S**.
Thacker H, Dhore MR, Muchhala S, Gala M, Sanghvi A, Bhureddy S, Mahesh BN, Kotak B: Antiviral Effect of Doxycycline against Dengue 2, Influenza A (H1N1), Influenza *B, Human Rhinovirus 17, Human Adenovirus, and Human Respiratory Syncytial* Virus : An In-vitro Study, (OA), **121(6):** 41-6.
Thakur KN: see **Johnson S**.
Tharakan GG: see **Chand JT**.
Thatal A: see **Lucksom PG**.
Thotakura TM: see **Sheena DM**.
Tirkey SR, John RP, Pandey AK, Verma AK, Kant S: Effectiveness of Nursing Care Bundles in Hospitalized Patients with Chronic Obstructive Pulomnary Disease (COPD), (OA), **121(8):** 58-63.
Tiwaskar M, Khadapkar R, Gala MYN, Muchhala S, Dhore M, Bhagat S, Sanghavi A, Rathod R, Kotak B: Antibiotic Susceptibility Pattern of Common Organisms against Doxycycline, (OA), **121(7):** 54-60.
Toora B: see **Verma N**.
Trailokya AA: Hypoglycaemia is the most common and most neglected complication of diabetes mellitus, (C), **121(12**): 85.
Trambadia RA: see **Patel RV**.
Tripathi D: see **Chandravanshi SL**.
Tripathi SK: see **Mukherjee S**.

U

Uday C: see **Abdul Razack GS**.
Udigiri R: see **Yankanchi SG**.
Unadkat KM: see **Tanna KJ**.

V

Vadgama P: see **Vora A**.
Vaggar JN: see **Mutyala SCVS**.
Vaidya H: see **Grover RA**.
Vajrapu K, Malaisamy M, Shriram T, Chalasani VK: Clinical and Ultrasonographic Assessment and Analysis of Liver Span in Children, (OA), **121(12):**34-6.
Varghese L: see **Sowkarthick KS**.
Vaswani B: see **Anandh U**.
Verma A: see **Singh J**.
Verma AK: see **Tirkey SR**.
Verma J: see **Pargal P**.
Verma M, Kosambiya JK, Balusamy D, Mehta S: Causality Assessment of Different Set of Variables using Time Series Data Analysis — A Prospective Cohort Study, (OA), **121(8):** 15-21.
Verma N, Singla K, Toora B, Dixit R: Implementation of an Interactive Teaching Session using 'Snowball Technique' for Introducing 1st Professional MBBS Students to Clinical Correlation in Biochemistry, (OA), **121(8):** 32-6.
Verma P: see **Johnson S**.
Verma P: see **Palal D**.
Vignesh NJ, Britto R, Santhosh S, Senthilnathan S, Praveen S, Stanley S, Selvapriya J: Footwear Usage and Practice in Indian Healthcare Centres, (RA),**121(3):** 52-4.
Vishnu PS: see **Rao AL**.
Vishnu R: see **Sowkarthick KS**.
Viswanathan V: see **Devarajan A**.
Vizeshfar F, Zare M, Keshtkaran Z: Academic Honesty and Dishonesty in Different Disciplines and Degrees at the University of Medical Sciences : A Descriptive Cross- Sectional Study, (OA), **121(1)**: 15-8.
Vora A, Madan A, Modi G, Lele J, Mehta K, Wankhedkar M, Vadgama P, Waghray P, Asokan RV, Roy S, Makharia S: Role of Antihistamine in Allergic Disorders : A Review and Consensus Statements by Indian Medical Association, (Assoc N Suppl), **121(3)**: 74-80.

W

Wadhawan G, Sharma D, Singh R: Case of Left Inguinal Hernia with an Unknown Syndrome, (CR), **121(3)**: 65-6.
Waghray P: see **Vora A**.
Wahane JM: see **Khade AM**.
Wani RV: see **Shekhar R**.
Wankhedkar M: see **Vora A**.
Wardhan N: see **Chauhan P**.
Wason R: see **Goel A**.
Widodo S, Suwandono A, Nugraheni SA, Setiawan H: Implementation of Interventions Using School-based Posbindu Module and Applications to Prevent the Risk of Non-communicable Diseases to High School Students in Jakarta, (OA), **121(7):** 33-9.

Y

Yadav PK, Sahu K: Clinical Profile of Drug Induced Parkinsonism in Eastern India, (OA), **121(8):** 41-5.
Yadav TS: see **Rathod NR**.
Yankanchi SG, Udigiri R: Morbidity Pattern among the Farm House Residents in Vijayapur District, Karnataka — A Cross Sectional Study, (OA), **121(2):** 27-32.

Z

Zare M: see **Vizeshfar F**.

JIMA Editorial Advisory Board Members (National and International)

JOURNAL OF THE INDIAN MEDICAL ASSOCIATION :
Sir Nilratan Sircar IMA House, 53, Sir Nilratan Sarkar Sarani (Creek Row), Kolkata - 700 014
Phone : (033) 2237- 8092, Mobile : +919477493027; E-mail : jima1930@rediffmail.com
Website : https://onlinejima.com ; www.ima-india.org/ejima
Head office : Indian Medical Association, IMA House, Indraprastha Marg, New Delhi - 110 002
Telephones : +91-11-2337 0009, 2337 8680, Email : hsg@ima-india.org : Website : www.ima-india.org

Registration No. KOL RMS / 476 / 2023 - 2025

RNI Regd. No. 2557/1957
Vol. 67, No. 12, December 2023, Kolkata

Date of Publication : 20th December, 2023

If not delivered please return to
Journal of the IMA (JIMA)
53, Sir Nilratan Sarkar Sarani,
(Creek Row), Kolkata - 700014

Printed and Published by **Dr Jyotirmoy Pal** on behalf of Indian Medical Association and printed at Prabaha, 45, Raja Rammohan Sarani, Kolkata - 700009 and Published from Sir Nilratan Sircar IMA House, 53, Sir Nilratan Sarkar Sarani (Creek Row), Kolkata 700014, Editor : **Dr Tamonas Chaudhuri**