Rs.10

J I M A

Volume 69 (RNI) ♦ Number 12 ♦ DECEMBER 2025 ♦ KOLKATA

JOURNAL *Of the* INDIAN MEDICAL ASSOCIATION

Official Publication of the Indian Medical Association

Indexed in

Scopus® Embase®

INDEX COPERNICUS INTERNATIONAL

Volume 123 (JIMA) ♦ Number 12 ♦ December 2025 ♦ KOLKATA

Dr ©

Largest Circulated Medical Journal in India

ISSN 0019-5847

96 TH YEAR OF PUBLICATION

Visit us at https://onlinejima.com

All India Medical Conference
IMA NATCON 2025

27th & 28th December 2025

HOSTED BY

IMA Gujarat State Branch & Ahmedabad Medical Association

Dear Doctor,

Seasons Greetings!

The Indian Medical Association Gujarat State Branch & Ahmedabad Medical Association invite you to be a part of **IMA NATCON 2025**, a benchmark annual conference shaping the future of healthcare. This event, scheduled on December 27th and 28th, will feature impactful lectures and skill-enhancing workshops by leading national faculties.

Your participation as a vital member of the healthcare community will undoubtedly enrich the discussions and contribute to the collective knowledge shared. We look forward to welcome you for this prestigious event.

Together, let's make **IMA NATCON 2025** a landmark conference.

With anticipation,
The Organizing Team
IMA NATCON 2025

To Register Scan Here

DR. KETAN DESAI
Chief Patron IMA
Past President IMA, WMA & MCI

DR. DILIP BHANUSHALI
National President,
IMA Hqs

DR. SARBARI DUTTA
Honorary Secretary
General, IMA Hqs

DR. ANILKUMAR J. NAYAK
National President Elect (25-26)
IMA Hqs

DR. R.V. ASOKAN
IMM Past President

DR. JITENDRA B. PATEL
Conference Organizing
Chairman

DR. PARIMAL DESAI
Reception Committee
Chairman

DR. KIRTI PATEL
Finance Committee
Chairman

TEAM IMA (2024-25)

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

National President
Dr. Dilip Bhanushali
Telangana

Imm. Past National President
Dr. R V Asokan
Kerala

National President (Elect)
Dr. Anilkumar J Nayak
Gujarat

Hony. Secretary General
Dr. Sarbari Dutta
Bengal

Hony. Finance Secretary
Dr. Piyush Jain
Delhi

National Vice Presidents

Dr. Gurulingappa B. Bidinahal
Karnataka

Dr. S. Alex Franklin
Kerala

Dr. Hozie Dara Kapadia
Maharashtra

Dr. Nitin K Garg
Gujarat

Honorary Joint Secretaries

Dr. Rajnesh Attam
Delhi

Dr. Vasant Ramraoji Lunge
Maharashtra

Dr. Anand Prakash
Uttar Pradesh

Dr. Sibabrata Banerjee
Bengal

Dr. Srirang Abkari
Telangana

Honorary Assistant Secretaries

Dr. Sandeep Datta
Delhi

Dr. Vinod Tiwari
Chhattisgarh

Honorary Jt. Finance Secretaries

Dr. Rajendra Kumar Yadav
Telangana

Dr. Jyotirmoy Pal
Bengal

IMA COLLEGE OF GENERAL PRACTITIONERS

Dean, IMA-CGP

Dr. V. S. Prasad
Andhra Pradesh

Vice Dean

Dr. Braja Kishore Dash
Odisha

Honorary Secretary

Dr. Amutha Karunanidhi
Tamilnadu

Honorary Joint Secretaries, IMA - CGP

Dr. Aadhar Senthil Kumar
Tamilnadu

Dr. Ujwala Dahiphale
Maharashtra

Dr. Hemanga Baishya
Assam

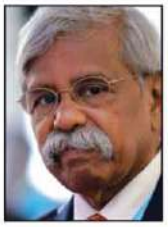
Dr. Vanrajsinh A. Mahida
Gujarat

Dr. Vikas Sharma
Delhi

Dr. D Kesavan
Tamilnadu

IMA ACADEMY OF MEDICAL SPECIALITIES

Chairmperson
Dr. Ramneek Bedi
Chandigarh



Vice Chairman
Dr. V. Amuthan
Tamilnadu

Honorary Secretary
Dr. C. Sai Ram
Telangana

Honorary Joint Secretaries

Dr. Santosh Kadam
Maharashtra

Dr. Asha Satish Khivsara
Telangana

Honorary Editor

Dr. R. K. Nema
Madhya Pradesh

Honorary Executive Editor

Dr. Sandeep Bhaskar Naik
Goa

IMA AKN SINHA INSTITUTE OF CONTINUING MEDICAL AND HEALTH EDUCATION & RESEARCH

Honorary Director
Dr. Munish Prabhakar
Haryana

Honorary Exe. Secretary
Dr. Sunil Kumar
Bihar

Honorary Jt. Secretary
Dr. D. S. Singh
Bihar

Honorary Jt. Secretary
Dr. Dilip B. Gadhavi
Gujarat

JOURNAL OF IMA

Honorary Editor
Dr. Kakoli Sen
Bengal

Honorary Secretary
Dr. Prasanta Kr. Bhattacharyya
Bengal

Honorary Associate Editor
Dr. Asok Kumar Nandi
Bengal

Honorary Associate Editor
Dr. Suman Biswas
Bengal

Honorary Assistant Secretary
Dr. Anirban Dalui
Bengal

YOUR HEALTH OF IMA

Honorary Editor
Dr. Khwaja Alim Ahmed
Bengal

Honorary Associate Editor
Dr. Abul Kasem Molla
Bengal

Honorary Associate Editor
Dr. Shailendra Kumar Singh
Uttar Pradesh

Honorary Secretary
Dr. Sankar Sengupta
Bengal

APKA SWASTHYA

Honorary Editor
Dr. Ritu Garg
Uttar Pradesh

Honorary Associate Editor
Dr. Chandra Prakash Singh
Uttar Pradesh

Honorary Associate Editor
Dr. Arvind Sharma
Uttaranchal

Honorary Secretary
Dr. Arun Kumar Tripathi
Uttar Pradesh

IMA HOSPITAL BOARD OF INDIA

Chairman
Dr. K.M. Abul Hasan
Tamilnadu

Honorary Secretary
Dr. Sanjay Dattaraya Patil
Maharashtra

Treasurer
Dr. Anilkumar Bhaskar Patil
Maharashtra

JIMA COMMITTEE - 2025-26


Dr. Dilip Bhanushali
National President, IMA


Dr. R V Asokan
Imm. Past National President, IMA


Dr. Sarbari Datta
Hony Secretary General, IMA


Dr. Sibabrata Banerjee
Hony. Joint Secretary, Hqs


Dr. Jyotirmoy Pal
Hony. Jt. Finance Secretary, Hqs


Dr Kakali Sen
Hony. Editor,
JIMA


Dr Ranjan Bhattacharyya
Hony. Editor (Elect),
JIMA


Dr Asok Kumar Nandi
Hony. Associate Editor,
JIMA


Dr Suman Biswas
Hony. Associate Editor,
JIMA


Dr. Prasanta Kumar
Bhattacharyya
Hony. Secretary, JIMA


Dr. Anirban Dalui
Hony. Assistant Secretary,
JIMA


Dr Sanjoy Banerjee
Member, JIMA Committee


Dr Sujoy Ghosh
Member, JIMA Committee


Dr. Sekhar Chakraborty
Member, JIMA Committee


Dr. Samarendra Kumar Basu
Member, JIMA Committee


Dr Pritam Roy
Member, JIMA Committee


Dr Debdutta Haldar
Sub Editor, JIMA

JOURNAL
Of the
INDIAN MEDICAL ASSOCIATION

Volume 123 (JIMA)
Number 12
December 2025
KOLKATA
ISSN 0019-5847

Contents

JIMA Editorial Advisory Board Members
(National & International)

Editorial

Sustaining the Gains — India's Long-Term Commitment to End AIDS

India stands at a crucial juncture in its decades-long battle against HIV/AIDS. The decline in new infections and AIDS-related deaths reflects more than just medical success — it is the result of consistent public-health will, community mobilization, and policy continuity. But the battle is far from won.

With over 25 lakh people living with HIV, sheer numbers remind us that HIV remains very much a live epidemic in our country. For every statistic, there is a human story — a family disrupted, dignity threatened, hopes delayed. The low prevalence rate may make headlines, but for the affected individuals, the struggle is deeply personal and ongoing.

The story of HIV/AIDS in India in 2025 is one of hard-won gains, persistent challenges, and a morally imperative call to sustain — and deepen — efforts. While the national numbers offer hope, the ground realities remind us of the fragility of success.

Where India Stands Today :

- According to the latest estimates, around 25.61 lakh (2.56 million) people in India are living with HIV (PLHIV) — making India home to the second-largest population of PLHIV globally.
- Despite this, the adult HIV prevalence rate (age 15–49) remains relatively low and stable at 0.20%.
- The number of new annual HIV infections has dropped dramatically: from 2010 to 2024, new infections declined by roughly 44–49%, leaving current annual new infections at around 66,400.
- Similarly, AIDS-related deaths have plummeted by about 81% over the same period.
- The rate of mother-to-child transmission has also fallen significantly, underscoring progress in prevention and care.

India has succeeded in stabilizing the epidemic, reducing new infections and deaths — a remarkable public-health achievement.

The real test — in the coming years — is not whether we can continue reducing percentages, but whether we can eliminate inequalities, bridge regional gaps, and dismantle stigma. That demands more than pills and clinics. It demands education,

social acceptance, community empowerment, and unfettered access to testing and care.

Programs like NACP, Vihaan, Avahan and many grassroots efforts deserve commendation — but such programmes must be sustained, expanded, and adapted. Efforts must focus especially on marginalized and high-risk groups, where vulnerability is magnified by social exclusion.

Moreover, awareness — around safe behaviour, early diagnosis, and respect for PLHIV — must become widespread. Testing should be normalized, and confidentiality protected. Discrimination — in workplaces, communities, families — must be challenged.

Ongoing Programmes & Interventions :

Much of this success is the result of sustained, multi-pronged efforts — both by the state and civil society. Key among them:

- The national response is coordinated by National AIDS Control Organisation (NACO), under successive phases of the National AIDS Control Programme (NACP), which has systematically rolled out prevention, testing, treatment, and support services across the country.
- Community-level support is expanded through initiatives like Vihaan, which establishes "Care & Support Centres" (CSCs) to assist people living with HIV (PLHIV), improving treatment adherence, reducing stigma, and integrating post-diagnosis care and social support.
- For prevention among high-risk and marginalized groups (e.g. sex workers, injecting-drug users, men who have sex with men), earlier initiatives such as Avahan — funded by the Gates Foundation and later handed over to the government — laid the foundation of targeted outreach, safe-sex education, condom distribution, STI treatment, and community mobilization.
- Public-awareness and decentralized outreach efforts — for example, through mass-media campaigns, community NGOs, and local health drives — remain crucial to destigmatize HIV, encourage testing, and ensure early diagnosis.

The cumulative effect of these programmes is clear: India has harnessed a combination of prevention, early detection, treatment access, and community care in its fight against HIV/AIDS.

Despite the Impressive Macro-progress, Several Worrying Issues Persist :

- The absolute number of PLHIV remains very large. A stable (or low) prevalence rate does not eliminate the challenge — it only slows growth. Twenty-five-plus lakh lives represent millions of families, and many still struggle with stigma, discrimination, and healthcare access.
- Vulnerable and marginalized populations — including sex workers, injecting-drug users, LGBTQ+ individuals — continue to face elevated risk, often compounded by poverty, social exclusion, or lack of awareness. Behavioural risks (unprotected sex, needle sharing) remain.
- Testing rates are uneven. For example, a recent study showed that among Indian men (age 15–54), HIV-testing rates remain sub-optimal, hindering early detection and treatment.
- Regional disparities persist: while many high-prevalence states have shown declines, some low-prevalence states see emerging or increasing trends.
- Social stigma — fear, discrimination, marginalization — continues to be a formidable barrier, deterring many from coming forward for testing or treatment.

West Bengal — Epidemiological Profile & Current Status :

- West Bengal is considered a "low-prevalent" state for HIV overall, but also one with "high vulnerability."
- As per a 2015 assessment, adult (15–49 years) HIV prevalence in West Bengal was estimated at ~ 0.21%.
- That corresponds to roughly 1.29 lakh (129,000) people living with HIV in West Bengal (as of 2015 data).
- Historically, West Bengal accounted for about 6% of India's total HIV burden.
- Over the years, with sustained interventions, there has been a gradual decline in prevalence and reduction in HIV positivity among "key

populations" and people tested at counselling and testing centres.

- More recently (2025), the state government has taken up a major push for a "triple elimination" approach — aiming to eliminate transmission of HIV, syphilis and hepatitis-B from mother to child (vertical transmission) through antenatal services.
- However, as of 2025 in West Bengal, the rate of mother-to-child transmission among HIV-infected mothers reportedly remains around 11 per 100 births — significantly higher than national elimination targets of 2–5 per 100.

Thus, while the overall prevalence is relatively low and appears to be declining, challenges remain — especially for prevention of vertical transmission, and in controlling HIV among key/high-risk populations.

Ending AIDS in India will not be a technocratic victory alone. It will be a moral one. A victory of compassion over prejudice, inclusion over neglect, and collective responsibility over individual fear. Only then can we hope to reach the promise of an AIDS-free generation, where HIV is not a death sentence, but a manageable health condition — treated with dignity, not discrimination.

[1]Hony Editor, JIMA **Kakali Sen[1]**
[2]Hony Sub Editor, JIMA **Debdutta Haldar[2]**

Dear Esteemed Office Bearers and Dear Members of the JIMA Staff,

On behalf of the Editorial Board of the Journal of the Indian Medical Association (JIMA) and on my own behalf, I extend my sincere gratitude to all the Office Bearers and the dedicated staff of JIMA for their unwavering Support, Co-operation and Commitment.

The smooth functioning, academic excellence, and growing stature of JIMA would not have been possible without your constant guidance, administrative efficiency, and meticulous behind-the-scenes efforts. Each publication, initiative and milestone achieved by the journal stands as a testament to the collective hard work and teamwork of the entire JIMA fraternity.

I deeply appreciate the professionalism, patience, and sense of responsibility displayed by the staff, as well as the visionary leadership and encouragement provided by the Office Bearers. Your continued support inspires us to uphold the highest standards of medical publishing and academic integrity.

I look forward to continued collaboration as we strive together to further strengthen JIMA as a respected voice of the medical profession in India and beyond.

With warm regards and sincere thanks,

Dr Kakali Sen
Hony. Editor
Journal of the Indian Medical Association (JIMA)

Original Article

Analysis of the Outcome of Distal Tibia Fracture Treated by Surgical Management with Distal Tibia Locking Plate in Tertiary Care Hospital, Ahmedabad

Janak Mistry[1], Parth Vinubhai Patel[2], Jainil Bharatbhai Patel[3]

Abstract

Background : Fracture through the epi-metaphyseal part at the distal end of tibia is very common. The outcome of such fractures depends on the proximity of the fracture site with the tibia plafond, type of fracture (whether comminute or simple), displacement, if any and injury to the surrounding soft tissue.

Materials and Methods : In this prospective study, conducted between March, 2021 to March, 2023, 30 Patients treated with Distal Tibia Plate Fixation were evaluated. All patients included in this study were operated with a minimal access approach to the distal tibia fractures and fixation was done using distal tibia anatomical plate.

Results : Operated patients were evaluated over a period of 1 year regularly at 6 weeks, 3 months, 6 months and 1 year. The patients were assessed for functional outcome on the basis of Olerud and Molander Functional Evaluation Score.

Discussion : The Functional Ankle score measured by Olerud and Molander Functional Evaluation Scoring in patients treated with distal tibia plating was 82% (Average of 60-90).

Conclusion : It is observed from this study that plate and screw fixation in cases with complex and comminuted fractures provides better alignment, reduction and fixation of such fractures.

Key words : Fracture, Distal Tibia Plate, Outcome, Internal Fixation.

Tibia is the largest of the two bones in the leg and is also the second strongest bone in the body after femur. The subcutaneous nature of the bone along with its weight bearing nature makes it more prone to fracture. One of the most common modes of trauma causing distal tibia fracture is road traffic accident or fall from height. The basic mechanism is either torsional or compressive forces acting on the bone. Treating patients with distal tibia epi-metaphyseal fractures with or without distal articular surface involvement is a surgical challenge[1-4].

With advances in technologies and better understanding of bio-mechanics of the human body, various modalities for surgical management of the distal tibia fractures are available. Traditional method of fixation being osteosynthesis plate fixation. Other methods include intramedullary nail, limited internal fixation with screws and/or Kirschner wire and in some cases external fixation of the bone can be performed. The most recent method being Minimally Invasive Plate Osteosynthesis (MIPO)[5-9]. Each technique has its own merits and demerits and there is no consensus as to which method is the best for treating distal tibia fractures[2,10].

Editor's Comment :

- Distal tibia epi-metaphyseal fractures treated with open osteosynthesis plate and screw provides better alignment in more complex forms of fractures and should be considered as primary appraoch for better outcome.

Despite all the advancements, the outcome is not always excellent and complication rate is approximately 20-50%[2,11,12]. The purpose of this study is to determine radiological and functional outcome of patients treated with MIPO/ORIF Plate Fixation (Figs 1&2).

Materials and Methods

In this prospective study, conducted between March, 2021 to March, 2023, 30 Patients treated with Distal Tibia Plate Fixation were evaluated. Both Antero-

Department of Orthopaedics, GCS Medical College, Hospital and Research Centre, Ahmedabad, Gujarat 380025
[1]MS, Associate Professor and Corresponding Author
[2]MBBS, 2nd Year Resident
[3]MBBS, 1st Year Resident
Received on : 09/09/2023
Accepted on : 12/10/2023

How to cite this article : Analysis of the Outcome of Distal Tibia Fracture Treated by Surgical Management with Distal Tibia Locking Plate in Tertiary Care Hospital, Ahmedabad. Mistry J, Patel PV, Patel JB. *J Indian Med Assoc* 2025; **123(12):** 16-9.

Fig 1 — Distal Tibia and Fibula Fracture X-Ray Lateral and AP view

Posterior and Lateral view X-Rays were analysed to determine the fracture site, type of fracture and the type of plate fixation for the best possible functional outcome. All patients included in this study were operated with a minimal access approach to the distal tibia fractures and fixation was done using distal tibia anatomical plate.

Minimal Access Approach to Distal Tibia :

The patient is placed in supine position with a sandbag under the ipsilateral buttocks to prevent the limb from rotating externally. The patella is kept facing anteriorly. The procedure is performed under torniquet control. After the limb is exsanguinated, fibula is reduced first to achieve stabilization. Fibula fixation is done first following which tibial fixation is done. A linear incision is placed at the most distal part of lateral malleolus. The fracture is reduced and fixed with appropriate size intramedullary nail. Alternatively, in few cases of comminuted fibula fracture, an incision was placed over the posterior border of the lateral malleolus and extended proximally. Final fixation of the fracture by fibular anatomical plate and 3.5mm screw. Medially the most distal part of medial malleolus being the anatomical landmark, a 3-5 cm size incision is placed halfway between the anterior and posterior borders of medial malleolus. Proximally the incision is placed over the subcutaneous surface of the tibia in similar manner. This approach has no internervous plane as this approach is along the subcutaneous surface of tibia and hence the periosteum can be seen once the initial incision is deepened. An Epi-Periosteal plane is created by passing a periosteum elevator. Once exposed, fracture is reduced with the help of traction and Kirschner wire. After achieving reduction, a 3.5mm Anteromedial plate is slid from distal incision proximally. Once desired placement is achieved, the plate is fixed with 3.5mm screws.

Fig 2 — Postoperative X-Ray Distal Tibia Plating Lateral and AP View

Inclusion Criteria :

Skeletally Mature patients with fracture involving distal 5cm of tibia (Based on AO Classification 43 Type A1, A2, A3 and 43 Type B1)[2] and Gustilo-Anderson Classification of Open Fracture Type 1 Fractures[13].

Exclusion Criteria :

Skeletally Immature patients with fracture involving distal articular surface of tibia (Based on AO Classification 43 Type B2, B3 and Type C) and Gustilo-Anderson Classification of Open Fracture Type II and III.

Follow-up of all patients was done at regular pre-decided intervals of 6 weeks, 3 months, 6 months and 12 months (Tables 1 & 2).

Results

In 30 patients operated for distal tibia fracture with osteosynthesis plate fixation. Common age group of the patients in the study was 20-60 years. Most common cause leading to fracture was road traffic accident (18 patients) followed by fall from height (8 patients) and sports injuries (2 patients). Concomitant Fibula Fracture was seen in 24 patients out of the 30 patients evaluated for this study (Tables 3 & 4).

Table 1 — *AO Classification of Distal Tibia Fracture*

AO Classification Type 43 :		
A	A1	Metaphyseal Simple
	A2	Metaphyseal Wedge
	A3	Metaphyseal Complex
B	B1	Pure Split
	B2	Split Depression
	B3	Multi-fragmentary Depression
C	C1	Articular Simple, Metaphyseal Simple
	C2	Articular Simple, Metaphyseal Multi-fragmentary
	C3	Articular Multi-fragmentary

Table 2 — *Gustilo-Anderson Classification of open fractures*

Type I		Wound <1cm
Type II		Wound >10cm
Type III	A	Adequate soft tissue coverage
	B	Inadequate soft tissue coverage
	C	Arterial injury requiring repair

The Average duration of Operation was 92 minutes (Range 60-120 minutes). Intra-operatively difficulties were encountered in achieving favourable reduction in 10 patients. Postoperative stay of the patients was uneventful. Patients were allowed partial weight bearing at an average time of 9.2 weeks (range 8-12 weeks) and full weight bearing was promoted at an average time of 16.8 weeks (range of 14-20 weeks). With the average time for union in operated patient being 24 weeks (Range 18-34 weeks), 3 patients developed non-union who were operated again and autologous bone graft from iliac crest was placed at the site of non-union. These patients showed union of distal tibia by 37 weeks. Superficial surgical sire infection was present in 3 patients who were treated with antibiotics and regular dressing. Recovery of these patients was achieved by 28 weeks. No patient had implant failure among the patients evaluated in this study (Table 5).

Operated patients were evaluated over a period of 1 year regularly at 6 weeks, 3 months, 6 months and 1 year. The patients were assessed for functional outcome on the basis of Olerud and Molander Functional Evaluation Score. Based on the scoring system, most patients had good functional outcome.

Discussion

Among the patients included in this case study, the average age of patients was 38. Most common cause of trauma leading to distal tibia fracture is road traffic accident (60% cases) followed by fall from height (30% cases). Fibula fracture was present in 60% cases and was treated with fibular plating depending on the fracture pattern. The reason behind treating both the fractures is that fixation of fibular provides rotational stability initially and also reduces the chances of developing any valgus or varus deformity[14]. Angular deformity was seen in 2 out of the 30 patients included in the study. Mean angulation was 1.1 degree in patients treated with plate and screw fixation. Another complication of fracture fixation is shortening of the fractured limb. Among the 30 patients treated with plate and screw fixation, 1 patient had postoperative shortening of 0.7cm.

The Functional Ankle score measured by Olerud and Molander Functional Evaluation Scoring in patients treated with distal tibia plating was 82% (Average of 60-90)

Conclusion :

Results of the study indicate that distal tibia epi-metaphyseal fractures treated with open osteosynthesis plate and screw provides better alignment in more complex forms of fractures as it also allows employing additional procedures which may be needed for fracture fixation. With the advent of minimally invasive techniques there is fall in number of patients with wound complications and better bridging of comminuted and complex fractures. Patients operated with plate and screw fixation may require protracted weight bearing for 2-4 weeks after initial immobilization of 6-8 weeks. It is observed from this study that plate and screw fixation in cases with complex and comminuted fractures provides better alignment, reduction and fixation of such fractures

Table 3 — *Mode of Trauma*

Mode of Trauma	Number of Patients
Road Traffic Accident	18
Fall From Height	8
Sports Related Injuries	2
Slip and fall	1
Staircase Injury	1

Table 4 — *Fracture pattern based on AO/OTA Type*

AO/OTA Type	Number of Patients
43 Type A1	8
43 Type A2	6
43 Type A3	14
43 Type B1	2

Table 5 — *Functional outcome of patients operated for Distal Tibia Plating (Olerud and Molander Functional Evaluation Score)*

Function	Number of Patients
Excellent (91-100)	5
Good (61-90)	22
Fair (31-60)	3
Poor (0-30)	0

The number of cases in this study is not sufficient to make a broad and more definitive conclusion and further studies are required to make such statements.

Funding : None.

Conflict of Interest : None.

References

1 Sirkin M, Sanders R — The treatment of Pilon fractures. *Orthop Clin North Am* 2001; **32:** 91-102.
2 Marsh JL, Saltzman CL — Ankle fractures. In: Bucholz RW, Heckman JD, Court-Brown CM (eds) Rockwood & Green2 s fractures in adults, 6th edn. Lippincott Williams & Wilkins, Philadelphia, pp 2147–2247International Orthopaedics (SICOT) 2010; **34:** 583-8, 587.
3 Lau TW, Leung F, Chan CF, Chow SP — Wound complication of minimally invasive plate osteosynthesis in distal tibia fractures. *Int Orthop* 2008; **32:** 697-703
4 Gao H, Zhang CQ, Luo CF, Zhou ZB, Zeng BF — Fractures of the distal tibia treated with polyaxial locking plating. *Clin Orthop Relat Res* 2009; **467:** 831-7.
5 Blauth M, Bastian L, Krettek C, Knop C, Evans S — Surgical options for the treatment of severe tibial pilon fractures: a study of three techniques. *J Orthop Trauma* 2001; **15:** 153-60.
6 Copin G, Nérot C — Recent fractures of the tibial Pilon in adult (Symposium du 66ème Congrès de la SOFCOT). *Rev Chir Orthop* 1992; **78(Suppl-1):** 3-83
7 Leonard M, Magill P, Khayyat G — Minimally-invasive treatment of high velocity intra-articular fractures of the distal tibia. *Int Orthop* 2008; doi:10.1007/s00264-008-0629-5
8 Pugh KJ, Wolinsky PR, McAndrew MP, Johnson KD — Tibial Pilon fractures: a comparison of treatment methods. JTrauma 1000; **47:** 937-41.
9 Zelle BA, Bhandari M, Espiritu M, Koval KJ, Zlowodzki M — Treatment of distal tibia fractures without articular involvement: a systematic review of 1125 fractures. *J Orthop Trauma* 2006; **20:** 76-9.
10 Pollak AN, McCarthy ML, Bess RS, Agel J, Swiontkowski MF — Outcomes after treatment of high-energy tibial plafond fractures. J Bone Joint Surg Am 2003; **85-A:** 1893-1900.
11 McFerran MA, Smith SW, Boulas HJ, Schwartz HS — Complications encountered in the treatment of Pilon fractures. J Orthop Trauma 1992; **6:** 195-200.
12 Teeny SM, Wiss DA — Open reduction and internal fixation of tibial plafond fractures. Variables contributing to poor results and complications. *Clin Orthop Relat Res* 1993; **292:** 108-17.
13 Gustilo RB, Mendoza RM, Williams DN — Problems in the management of type III (severe) open fractures: a new classification of type III open fractures. *J Trauma* 1984; **24:** 742-6.
14 Kumar A, Charlebois SJ, Cain EL — Effect of Fibular Plate Fixation On Rotational Stability of Simulated Distal fractures treated with intramedullary nailing, *J Bone J Surg Am* 2004; **85:** 604-8.

Original Article

Association between Obesity & Dyslipidemia among Master Health Check-up Beneficiaries in a Rural Hospital of Erode District

Hema Priya S[1], Subburam R[3], Sivakumar K[2], N Sangeetha[2], A Arulmani[2], Niresh C[2]

Abstract

Background : According to WHO, Cardiovascular diseases accounts for most Non-communicable Disease (NCD) deaths globally and in India it is responsible for 24% of all deaths, which can be prevented by early screening and timely treatment. Obesity and Dyslipidemia are emerging as major public health problem in South Asian countries. The alarming increase in prevalence of Obesity and cardiovascular risk raises much threatening. The increase in cardiovascular risk depends to a significant changes in lipid profiles as observed in obesity. The aim of the present study was to determine the association between Obesity & Dyslipidemia among Master Health Check-up beneficiaries.

Materials and Methods : It was a Retrospective Descriptive study which was conducted in Master Health Check-up Department, IRT - Perundurai Medical College and Hospital, Perundurai, Erode District, Tamilnadu. 1273 patients were included in the study. Collected data were entered in Microsoft excel sheet analysed using SPSS Version 16. Chi-square test was used in the analysis of data.

Results : The overall prevalence of Dyslipidemia among the study population undergone Master Health Check-up is 65.4%. Elevated level of Total Cholesterol (30% & 10%) observed maximum in Obese people (I & II) when compared to normal total cholesterol (25% & 7%). Same kind of elevation observed in Low Density Lipoprotein (LDL) and triglyceride too. Body Mass Index (BMI) & waist circumference were statistical significant association with dyslipidemia ($p<0.05$).

Conclusion : There was an increased risk of Dyslipidemia among the Obese group compared with the people with normal but at the same time normal BMI also have elevated lipid profile. Regular screening of population (irrespective of their gender and normal BMI and WC status) on periodic basis should be incorporated from health care facilities to combat the risk factors of Dyslipidemia and to reduce the morbidity and mortality due to CVD.

Key words : NCD, Dyslipidemia, Obesity, LDL, HDL,TG, BMI, WC, WHR.

Health is a fundamental right of every individual and protection of health through health promotion is an intrinsic part of health care. Preventive health care is an essential determinant of health, since it helps to avoid or slow down the course of a disease which is essential for maintaining the wellbeing. The emphasis on preventive health check-ups are justified, as early detection of disease in its latent phase itself and it helps in timely therapeutic interventions, thereby significantly reducing the morbidity, mortality and economic burden due to the disease[1].

According to WHO, Cardiovascular diseases accounts for most NCD deaths Globally[2] and in India it is responsible for 24% of all deaths[3], which can be prevented by early screening and timely treatment. Obesity and Dyslipidemia are emerging as major public health problem in South Asian countries. Dyslipidemia is a recognized, major modifiable risk factor for the development and progression of Coronary Artery Disease (CAD), where early diagnosis and therapy can reduce the incidence of Cardiovascular disease events[4].

Globally, prevalence of Obesity has doubled in the last two decades. In 2008, more than 1.6 billion adults over 20 years were overweight, of these, over 200

Editor's Comment :

- Based on our study findings, high BMI & Waist Circumference (WC) were statistical significant association and correlation with dyslipidemia ($p<0.05$) when compared to high Waist Hip Ratio (WHR). So, WC is the easiest method, less time consuming and it gave statistically significant association between dyslipidemia and obesity near similar to BMI, hence it can also be included in routine screening along with BMI.

Department of Community Medicine, Government Erode Medical College & Hospital, Erode, Tamilnadu 638053
[1]MD (Community Medicine), Assistant Professor and Corresponding Author
[2]MD (Community Medicine), Assistant Professor
[3]MD (Community Medicine), Professor
Received on : 02/11/2022
Accepted on : 04/12/2023

How to cite this article : Association between Obesity & Dyslipidemia among Master Health Check-up Beneficiaries in a Rural Hospital of Erode District. Hema Priya S, Subburam R, Sivakumar K, Sangeetha N, Arulmani A, Niresh C. *J Indian Med Assoc* 2025; **123(12):** 20-5.

million men and nearly 300 million women were Obese[5,6]. About 44% of the Diabetes burden and 23% of the CVD burden is attributable to overweight and obesity; and mortality due to Obesity occurs in 2.8 million adults each year[7].

The alarming increase in prevalence of Obesity and Cardiovascular risk raises much threatening. The increase in cardiovascular risk depends to a significant changes in lipid profiles as observed in Obesity. These changes are decreased high-density lipoprotein cholesterol and increased triglyceride levels[8]. Central and/or overall obesity has been related to not only elevated triglycerides, decreased High-density Lipoprotein Cholesterol (HDL-C) but also related to insulin resistance/high insulin levels, Diabetes, Hyperuricemia and Hypertension[9].

Even though Preventive health check-up or screening program is widely adopted by several health care facilities towards this goal, there was a wide debate among policy makers that whether preventive Health Check-up is really a need or mere economic burden to the beneficiaries.

The aim of the present study was to determine the association between Obesity & Dyslipidemia among master health check-up beneficiaries to analyze the need of preventive health check-up in early detection of diseases like CVD.

Materials and Methods

This study was designed to find out the association between Obesity & Dyslipidemia among Master Health Check-up beneficiaries. It was a Retrospective Descriptive study which was conducted in Master Health Check-up Department, IRT - Perundurai Medical College and Hospital, Perundurai, Erode district, Tamilnadu. Individuals who attended the Master Health Check-up section of the hospital for preventive health check-up were included in the study.

Out of which, Socio-demographic characteristics and lipid profile data of 1273 patients not having known Cardiovascular disease, Dyslipidemia status and Obesity status were included for the study purpose from the medical records section.

Collected data were entered in Microsoft excel spreadsheet, compiled and analysed using IBM SPSS Version 16 statistical package. Chi-square test was used in the analysis of data.

Operational Definition:

Dyslipidemia :

Dyslipidemia refers to the derangements of one or many of the lipoproteins; elevations of Total Cholesterol, Low Density Lipoprotein (LDL) cholesterol and/or triglycerides, or low levels of High-density Lipoprotein (HDL) cholesterol[10].

Lipid profile results were categorized as per NCEP-ATP III classification[11].

LDL Cholesterol – Primary Target of Therapy

<100 Optimal
100-129 Near optimal/above optimal
130-159 Borderline high
160-189 High
>190 Very high

Total Cholesterol

<200 Desirable
200-239 Borderline high
>240 High

HDL Cholesterol

<40 Low
>60 High

ATP III Classification of Serum Triglycerides (mg/dL)

<150 Normal
150-199 Borderline high
200-499 High
>500 Very high

Obesity[11]

Obesity refers to Body Mass Index (BMI)-

< 18.5 – underwt
18.5- 22.9 – normal
23-24.9 – overwt
25-29.9 – obese class I
≥ 30 - obese class II

Waist circumference – >90cm in males, >80 cm in females

Waist Hip Ratio (WHR) – >0.9 males, >0.85 in females

Results

Table 1 shows, demographic characteristics among

male female. Majority of the participants (92%) were married, 41% were illiterate, 28% were home maker.

Table 2 shows the lipid profile among the study participants. Among 1273 people 19.9% had high cholesterol, among males and females 20% & 19.3% had high cholesterol respectively. Almost one fourth of the people had low HDL level. Elevated LDL & Triglyceride observed in 48% & 24% respectively. According to ATP classification 65% were dyslipidemic and among males & females 67% & 62% has been observed in this study.

Table 3 explains, obesity assessment among participants. According BMI classification majority of them were males (59%) in class I and female (69%) in class II. In Waist Circumference, obesity in males were 63% and females were 36%. According to WHR 64% & 35% males & female were obese in our study and these male & female differences were statistically significant.

Table 4 explains, Association lipid profile and Body Mass Index (BMI) of study subjects. Among the 1273 people, elevated level of total cholesterol (30% & 10%) observed maximum in obese I & II when compared to normal total cholesterol (25% & 7%). Same kind of elevation observed in LDL and triglyceride too. Likewise, dyslipidemia was observed more in overweight & obese people when compared to normal lipid level people and all these differences between lipid profile and Body Mass Index (BMI) of study subjects were found to be statistically significant ($p<0.001$). But at the same time, we observed among the total people had elevated cholesterol & LDL level, around 30% were normal BMI which cannot be neglected.

Table 5 shows, Association lipid profile and Waist

Table 1 — *Socio demographic characteristics of study subjects among Master Health Check-up beneficiaries (N=1273)*

Socio Demographic characters	Sex		
	Male (%)	Female (%)	Total (%)
Sex	719(56.5)	554 (43.5)	1273(100)
Marital status:			
Married	642 (89.3)	535 (99.6)	1177 (92.5)
Unmarried	77 (10.7)	18 (3.2)	95 (7.5)
Single	0	1 (0.2)	1 (0.1)
Education status :			
Illiterate	204 (28.4)	325 (58.7)	529 (41.6)
Upto middle	299 (41.6)	171 (30.9)	470 (36.9)
Middle-HSS	104 (14.5)	27 (f4.9)	131 (10.3)
College	112 (15.6)	31 (5.6)	143 (11.2)
Occupation :			
Skilled	44 (6.1)	5 (0.9)	49 (3.8)
Unskilled	510 (70.9)	136 (24.5)	646 (50.7)
Professionals	97 (13.5)	11 (2.0)	108 (8.5)
House Maker	2 (0.3)	362 (65.3)	364 (28.6)
No work/Student	66 (9.2)	40 (7.2)	106 (8.3)

Table 2 — *Lipid Profile of study subjects among Master Health Check-up beneficiaries (N=1273)*

Lipid Profile	Sex			p value
	Male (%)	Female (%)	Total (%)	
Total cholesterol :				
Normal	573 (79.7)	447 (80.7)	1020 (80.1)	0.660
High cholesterol	146 (20.3)	107 (19.3)	253 (19.9)	
HDL Cholesterol :				
Normal	527 (73.3)	437 (78.9)	964 (75.7)	0.021
Reduced HDL	192 (26.7)	117 (21.1)	309 (24.3)	
LDL Cholesterol :				
Normal	369 (51.3)	287 (51.8)	656 (51.5)	0.865
Elevated LDL	350 (48.7)	267 (48.2)	617 (48.5)	
Triglyceride :				
Normal	511 (71.1)	457 (82.5)	968 (70.0)	<0.001
Elevated TG	208 (28.9)	97 (17.5)	305 (24.0)	
Dyslipidemia :				
Normal	233 (32.4)	208 (37.5)	441 (34.6)	0.058
Dyslipidemia	486 (67.6)	346 (62.5)	832 (65.4)	

Table 3 — *Obesity assessment of study subjects among Master Health Check-up beneficiaries (N=1273)*

Obesity assessment	Sex		p value
	Male (%)	Female (%)	
Body Mass Index (BMI) :			
≤18.4- underwt	56.1	43.9	< 0.001
18.5-22.9-normal	54.6	45.4	
23-24.9-overwt	66.5	33.5	
25-29.9-obese class I	59.6	40.4	
≥30-obese class II	30.8	69.2	
Waist Circumference (WC) :			
Normal	50.1	49.9	< 0.001
Obese WC	63.5	36.5	
Waist Hip Ratio (WHR) :			
Normal	16.8	83.2	< 0.001
Obese WHR	64.5	35.5	
Total	56.5	43.5	

Table 4 — *Association lipid profile and Body Mass Index (BMI) of study subjects among Master Health Check-up beneficiaries (N=1273)*

Lipid Profile	BMI					p value
	Under wt≤18.5	Normal 18.5-22.9	Overwt 23-24.9	Obese I 25-29.9	Obese II ≥30	
Total Cholesterol :						
Normal	15.4%	32.3%	18.8%	25.7%	7.8%	< 0.001
Elevated TC	2.8%	32.8%	23.3%	30.4%	10.7%	
HDL Cholesterol :						
Normal	15.0%	33.3%	18.6%	25.2%	7.9%	< 0.001
Reduced HDL	6.1%	29.4%	23.3%	31.1%	10.0%	
LDL Cholesterol :						
Normal	16.9%	33.2%	17.5%	25.5%	6.9%	< 0.001
Elevated LDL	8.6%	31.4%	22.0%	27.9%	10.0%	
Triglyceride :						
Normal	15.6%	34.6%	17.9%	24.6%	7.3%	< 0.001
Elevated TG	4.3%	25.2%	25.6%	33.1%	11.8%	

Circumference (WC) assessment among participants. Among 1273 people those who had elevated Total Cholesterol level seems to be high in obese Waist Circumference and vice versa when compared to normal level of Cholesterol. Same differences observed in LDL & triglyceride level and Dyslipidemia and these differences were statistically significant except HDL cholesterol level ($p<0.05$).

Table 6 shows, Association lipid profile and Waist Hip Ratio between study participants. Among 1273 people those who had elevated Total Cholesterol level seems to be slightly high in obese Waist Hip Ratio and vice versa when compared to normal level of Cholesterol. Same differences observed in LDL & triglyceride level. These differences were statistically significant only for Total Cholesterol and Triglyceride level ($p<0.05$).

Table 7 shows, Association of lipid profile and obesity assessment between study participants. Among 1273 people those who were obese seems to be slightly high dyslipidemia level. Among these, BMI & Waist Circumference were statistical significant association with dyslipidemia ($p<0.05$).

Table 8 shows, Correlation Coefficient for Obesity assessment and Lipid levels. Triglycerides showed weak positive correlation (0.220) with Waist Circumference likewise HDL showed negative correlation with BMI & WC and it was found to be statistically significant. Based on this present study findings, BMI and WC were better correlation with lipid levels when compared to WHR and it was statistically significant.

Table 5 — *Association Lipid Profile and Waist Circumference (WC) assessment of study subjects among Master Health Check-up beneficiaries (N=1273)*

Lipid Profile	Waist Circumference (WC)		p value
	Normal	Obese WC	
Total Cholesterol :			
Normal	54.8%	45.2%	0.002
Elevated TC	43.9%	56.1%	
HDL Cholesterol :			
Normal	54.1%	45.9%	0.055
Reduced HDL	47.9%	52.1%	
LDL Cholesterol :			
Normal	57.6%	42.4%	< 0.001
Elevated LDL	47.3%	52.7%	
Triglyceride :			
Normal	56.8%	43.2%	< 0.001
Elevated TG	39.3%	60.7%	
Total	52.6%	47.4%	

Table 6 — *Association Lipid Profile and Waist Hip Ratio (WHR) of study subjects among Master Health Check-up beneficiaries (N=1273)*

Lipid Profile	Waist Hip Ratio (WHR)		p value
	Normal	Obese WHR	
Total Cholesterol :			
Normal	18.1%	81.9%	0.011
Elevated TC	11.5%	88.5%	
HDL Cholesterol :			
Normal	17.9%	82.1%	0.056
Reduced HDL	13.3%	86.7%	
LDL Cholesterol :			
Normal	18.0%	82.0%	0.247
Elevated LDL	15.6%	84.4%	
Triglyceride :			
Normal	19.4%	80.6%	< 0.001
Elevated TG	8.5%	91.5%	
Total	16.8%	83.2%	

Discussion

Dyslipidemia is frequently encountered in obese individuals. The Dyslipidemia associated with Obesity plays a major role in the development of atherosclerosis, CVD and cancer in Obese individuals[12]. All the components of the dyslipidemia, including higher TGs, decreased HDL levels and increased LDL particles have been atherogenic. It has been suggested that BMI should be routinely measured in primary health care clinics for children, adults and elderly people in order to facilitate early identification, evaluation and treatment of obesity and

Table 7 — *Association Lipid Profile and Obesity assessment of study subjects among Master Health Check-up beneficiaries (N=1273)*

Obesity assessment	Lipid Profile		Total	p value
	Normal	Dyslipidemia		
Body Mass Index (BMI) :				
Non obese	315(71.4)	512(61.5)	827(65.0)	<0.001*
Obese	126(28.6)	320(38.5)	446(35.0)	
Total	441 (100)	832 (100)	1273 (100)	
Waist Circumference (WC) :				
Normal	268 (60.8)	402 (48.3)	670 (52.6)	<0.001*
Obese WC	173 (39.2)	430 (51.7)	603 (47.4)	
Total	441 (100)	832 (100)	1273 (100)	
Waist Hip Ratio (WHR) :				
Normal	86 (19.5)	128 (15.4)	214 (16.8)	0.062
Obese WHR	355 (80.5)	704 (84.6)	1059 (83.2)	
Total	441 (100)	832 (100)	1273 (100)	

**Statistically significant*

Table 8 — *Correlation Coefficient for Obesity assessment and Lipid levels*

Lipid Profile	Body Mass Index (BMI)	Waist Circumference (WC)	Waist Hip Ratio (WHR)
Total Cholesterol	0.183*	0.177*	0.019
HDL Cholesterol	-0.067*	-0.086*	-0.025
LDL Cholesterol	0.129*	0.099*	-0.024
Triglyceride	0.159*	0.220*	0.119*

**Statistically significant*

its related complications[13,14].

This study was attempted to understand the association between Dyslipidemia and Obesity.

The overall prevalence of Dyslipidemia among the study population undergone Master Health Check-up is 65.4%, which is higher compare to similar study[15,16] done by Karna SK, *et al* (57.7%) among individuals attending preventive health check-up in Rural Tertiary Care Hospital.

Dyslipidemia in our study was significantly higher in males (67.6%) compared to females (62.5%). Similar results was observed in studies conducted by Estari, *et al*[17] in Warangal.

An Indian study performed by Pandya, *et al*[18] among the Gujarati population mentioned that Obese patients are more prone to develop Dyslipidemias than the non-obese patients. The present study showed that Cholesterol was significantly higher in high BMI people compared with people with normal BMI. These findings correlate well with the findings of Philip, *et al*[19].

Among the 1273 people, elevated level of Total Cholesterol (30% & 10%) observed maximum in obese people (I & II) when compared to normal Total Cholesterol (25% & 7%). Same kind of elevation observed in LDL and triglyceride too. Likewise, dyslipidemia was observed more in overweight & obese people when compared to normal lipid level people in the same way Dyslipidemia was observed less in underweight people and all these differences between lipid profile and Body Mass Index (BMI) of study subjects were found to be statistically significant ($p<0.001$). But at the same time, we observed among the total people had elevated cholesterol & LDL level, around 30 % were normal BMI. So, we cannot avoid screening the lipid profile in normal BMI people because they also had elevated lipid profile.

From this study, it can be inferred that LDL-C was significantly higher in people with high BMI compared with people with normal BMI, while the values of HDL-C did not show any significant association between the two groups (high BMI and normal BMI); these findings correlate well with the study of Grundy[20]. In our study, the TG levels were significantly higher among the high BMI group when compared with the normal BMI group, and the findings are in par with the study performed by Lemieux, *et al*[21].

Conclusion

After analyzing the results of the study conducted, it was concluded that the overall prevalence of dyslipidemia in our study is alarming. The order of statistically significant association with Obesity and dyslipidemia ($p<0.05$) as follows BMI, WC and WHR. Inspite of giving health education on lifestyle modifications through pamphlets, awareness programme and various media, the prevalence of obesity & dyslipidemia is increasing worldwide, and this is being considered as one of the major public health problems, also proven by the present study. There was an increased risk of dyslipidemia among the obese group compared with the people with normal but at the same time normal BMI also have elevated lipid profile. Among the male and female there were approximately 60% of them had dyslipidemia. Based on our study findings, high BMI & Waist Circumference were statistical significant association and correlation with Dyslipidemia ($p<0.05$) when compared to high WHR. So, WC is the easiest method, less time consuming and it gave statistically significant association between Dyslipidemia and obesity near similar to BMI, hence it can also be included in routine screening along with BMI. Hence these highlights the extensive need for regular screening of population (irrespective of their gender and normal BMI and WC status) on periodic basis and awareness programmes on recommended diet should be incorporated from Primary Health Centers to Medical College Hospitals to combat the risk factors of Dyslipidemia and to reduce the morbidity and mortality due to CVD.

Source of Support : Nil.

Conflict of Interest : None declared

References

1 Ramesh R, Gagarin YP, Murugan SR, Rizwan SA, Joena VM, Aravind A — A study on the utility of preventive health check-up in early detection of disease states. *Int J Res Med Sci* 2016; **4:** 4022-5.

2 WHO : Non Communicable fact sheet http://www.who.int/mediacentre/factsheets/fs355/en/

3 Sample Registration System (2007) Million Death Study: Preliminary Report on Causes of Death in India 2001-2003. New Delhi: Registrar General of India.

4 Raj SA, Sivakumar K, Sujatha K — Prevalence of dyslipidemia in South Indian adults: An urban-rural comparison. *Int J Community Med Public Health* 2016; **3:** 2201-10.

5 Misra A, Shrivastava U — Obesity and Dyslipidemia in South Asians. *Nutrients* 2013; **5:** 2708-33.

6 Mathers CD, Loncar D — Projections of global mortality and burden of disease from 2002 to 2030. *PLoS Med* 2006, **3:** e442.

7 Engelgau M, El-Saharty S, Kudesia P, Rajan V, Rosenhouse S, Okamoto K — Capitalizing on the Demographic Transition: Tackling Non-Communicable Diseases in South Asia; World Bank: Washington, DC, USA, 2011

8 Franssen R, Monajemi H, Stroes ES, Kastelein JJ — Obesity and dyslipidemia. *Med Clin North Am* 2011; **95(5):** 893-902. PMID: 21855698.

9 Schmidt MI, Watson RL, Duncan BB, Metcalf P, Brancati FL, Sharrett AR, *et al* — Clustering of dyslipidemia, hyperuricemia, diabetes, and hypertension and its association with fasting insulin and central and overall obesity in a general population. Atherosclerosis Risk in Communities Study Investigators. *Metabolism* 1996; **45(6):** 699-706. PMID: 8637443.

10 Misra A, Luthra L, Vikram NK — Dyslipidemia in Asian Indians : Determinants and Significance. www.japi.org ; *JAPI* 2004; **52**.

11 WHO Report — Waist circumference and waist-hip ratio: report of a WHO expert consultation. Geneva, 8-11 December 2008:1-47. https://www.who.int/publications/i/item/9789241501491

12 Third report of the National Cholesterol Education Program (NCEP) expert panel on detection, evaluation, and treatment of high blood cholesterol in adults (Adult Treatment Panel III). Final report. *Circulation* 2002; **106:** 3143-421

13 Joshi SR, Anjana RM, Deepa M, Pradeepa R, Bhansali A, Dhandania VK, *et al* — Prevalence of Dyslipidemia in Urban and Rural India: The ICMR–INDIAB Study. *PLoS One* 2014; **9:** e96808.

14 Ranganathan S, Krishnan TU, Radhakrishnan S — Comparison of dyslipidemia among the normal-BMI and high-BMI group of people of rural Tamil Nadu. *Med J DY Patil Univ* 2015; **8:** 149-52.

15 Subburam R. Sivakumar K — Prevalence Of Dyslipidemia among Master Health Check-Up Beneficiaries In A Rural Tertiary Care Hospital. *International Journal of Scientific Research* 2018; **7(7):** 51-2.

16 Karna SK — Prevalence of Dyslipidemia among Adults Attending Preventive Health Checkup Program of a Tertiary Care Hospital in Rural Gujarat. *International Journal of Medical and Clinical Research* 2015; **6(1):** 321-5.

17 Estari M, Reddy AS, Bikshapathi T, Reddy MK — The investigation of serum lipids and prevalence of dyslipidemia in urban adult population of Warangal district, Andhra Pradesh, India. *Biology and Medicin* 2009; **1(2):** 61-5.

18 Pandya H, Lakhani JD, Dadhania J, Trivedi A — The prevalence and pattern of dyslipidemia among type 2 diabetic patients at rural based hospital in Gujarat, India. *Indian J Clin Pract* 2012; **22:** 36-45.

19 James PT, Rigby N, Leach R — International Obesity Task Force. The obesity epidemic, metabolic syndrome and future prevention strategies. *Eur J Cardiovasc Prev Rehabil* 2004; **11:** 3-8.

20 Grundy SM, Barnett JP — Metabolic and health complications of obesity. *Dis Mon* 1990; **36:** 641-731.

21 Lemieux I, Almeras N, Mauriege P, Blanchet C, Dewailly E, Bergeron J, *et al* — Prevalence of hypertriglyceridemic waist in Quebec Health Survey: Association with atherogenic risk factors. *Can J Cardiol* 2002; **18:** 725-32.

Original Article

Risk Factors and Outcomes in Ectopic Pregnancy : Insights from a Case-Control Study

Subhayan Das[1], Doyel Pradhan[2], Anusree Aich[3], Rames Ranjan Haldar[4], Runa Bal[5], Pradip Kumar Banerjee[5]

Abstract

Background : Ectopic pregnancy is a major life-threatening complication and identification of its risk is critical for avoiding mortality and morbidity. It is also essential to identify factors that may influence adverse outcomes in Ectopic pregnancies. Although different studies have identified several risk factors that might be associated with Ectopic pregnancy, there is a lack of evidence in perceiving their value as an independent predictor of Ectopic pregnancy and its complications.

Materials and Methods : A case-control study was designed with 65 patients as cases with an equal number of matched controls. Probable risk factors and adverse outcomes have been identified from the literature. Linear and logistic regression analyses were performed to identify independent risk factors for the occurrence of Ectopic pregnancy. Sub-analysis was also conducted to identify independent risk factors for adverse outcomes.

Results : The study identified Hb on Admission, No of PRBC Transfusion, History of Intrauterine Device (IUD) Usage, Previous History of Ectopic Pregnancy, and Previous History of Pelvic Inflammatory Disease (PID) as independent risk factors of occurrence of Ectopic pregnancy. No of PRBC Transfusion, History of IUD Usage and Previous History of Ectopic Pregnancy were identified as the most significant risk factors for adverse outcomes.

Conclusion : This study identified potential risk factors associated with Ectopic pregnancy and adverse outcomes. It also provided a clear guideline to identify the risk factors associated with ectopic pregnancy and to mitigate adverse outcomes. Although further studies are required to reinforce these findings, this study will help identify the crucial risk factors during patient monitoring and reduce adverse outcomes.

Key words : Ectopic Pregnancy, Risk Factors, Adverse Outcomes, Pelvic Inflammatory Disease, Blood Transfusion.

Ectopic pregnancy refers to the complication of pregnancy when the fetus is implanted outside the uterine cavity[1]. The classical triad of Ectopic pregnancy comprises abdominal pain, vaginal bleeding, and amenorrhea. However, symptoms may vary depending on the site[2]. In developed nations, the rate of Ectopic pregnancies is approximately 1-2%, while it might be as high as 20% among people with history of tubal surgery or previous Ectopic pregnancy[3]. In India, there are regional differences in the frequency of ectopic pregnancy. It usually varies between 0.9 to 2.5%, close to the rates reported in developed countries[4]. However, the rate of ruptured Ectopic pregnancies was relatively high in most studies[4-6]. Ectopic pregnancy is the primary cause of maternal morbidity and decreased childbearing potential in women of reproductive ages. It is also the leading cause of pregnancy-related deaths during the first trimester[7]. These findings indicate that identifying the risk factors of Ectopic pregnancy and early diagnosis is crucial in preventing complications arising from Ectopic pregnancy.

Editor's Comment :

- History of IUD use, previous ectopic pregnancy, and prior PID are strong independent predictors of ectopic pregnancy.
- Adverse outcomes such as ruptured ectopic pregnancy and HDU admission are most strongly associated with IUD use, prior ectopic pregnancy, and increased PRBC transfusion requirement.
- The study offers a practical evidence-based framework for early risk identification, which can help clinicians intervene promptly and reduce maternal morbidity.

[1]MBBS, PhD, Associate Professor, Department of Allied Health Sciences, Brainware University, Kolkata 700125 and Corresponding Author
[2]MS, Assistant Professor, Department of Obstetrics and Gynaecology, Tamralipto Government Medical College and Hospital, Purba Medinipur, West Bengal 721636
[3]MS, Senior Resident, Department of Obstetrics and Gynaecology, NRS Medical College & Hospital, Kolkata 700014
[4]MS, Assistant Professor, Department of Obstetrics and Gynaecology, Jhargram Government Medical College & Hospital, Jhargram 721507, West Bengal
[5]MS, Professor, Department of Obstetrics and Gynaecology, NRS Medical College & Hospital, Kolkata 700014

Received on : 07/05/2024
Accepted on : 16/05/2024

How to cite this article : Risk Factors and Outcomes in Ectopic Pregnancy : Insights from a Case-Control Study. Das S, Pradhan D, Aich A, Haldar RR, Bal R, Banerjee PK. *J Indian Med Assoc* 2025; **123(12):** 26-30.

The risk factors for Ectopic pregnancy include Pelvic Inflammatory Disease (PID), intrauterine device use, previous exposure to diethylstilbestrol, tubal or intrauterine surgery, smoking, advanced maternal age, previous Ectopic pregnancy, endometriosis, tubal ligation, history of infertility, and infertility treatment[8]. A history of specific sexually transmitted infections, such as chlamydia, is also associated with Ectopic pregnancy. However, in most cases, the exact risk factors for Ectopic pregnancy remain unclear[9]. The cause of Ectopic pregnancy varies in countries or regions, depending on socio-economic conditions, contraceptive practices, sexual behaviors, and cultural norms[10]. The Eastern region of India has a separate demographic profile from the rest of the country, and disease risk factors vary significantly. However, conclusive evidence does not predict the risk factors for Ectopic pregnancy in Eastern India. Most studies focused on the demographic trends of Ectopic pregnancy in West Bengal[11,12]. All of them identified multigravida as a common risk factor. Barik, *et al* also identified previous cesarean section as a potential risk factor[11]. Therefore, we identified a lack of studies focusing on identifying the risk factors for Ectopic pregnancy in the Eastern region of India. In this study, we attempted to identify various risk factors associated with Ectopic pregnancy through a prospective case-control study conducted in a Tertiary Hospital in West Bengal.

Materials and Methods

Study Design :

This institution-based prospective case-control study was conducted between March, 2021 and July, 2022 in the Department of Obstetrics & Gynaecology of the institution. This study was conducted with ethical approval from the Institutional Ethics Committee.

Study Population :

The study was conducted on patients who were admitted to the Obstetrics and Gynaecology Department of NRS Medical College & Hospital through the Emergency or Outpatient Department after obtaining informed consent from the patients who fulfilled inclusion and exclusion criteria. Ectopic pregnancy was diagnosed by history taking, clinical physical examination, laboratory tests (urine pregnancy test/serum beta HCG) and Ultrasonography.

Sample Size :

The sample size was calculated as 63 subjects at an alpha error of 0.5 and power of 80%, assuming a 5.4 odds ratio of and a 6% prevalence. We conducted this study with 65 patients as cases (with ectopic pregnancy), and for each case of Ectopic Pregnancy, one control, ie, a woman with first-trimester intrauterine pregnancy, was included in the study as a control. The inclusion and exclusion criteria were as follows:

Inclusion Criteria :

(1) Patients who presented with the classic triad in their history included amenorrhea, abdominal pain, and vaginal bleeding.

(2) Positive Urine Pregnancy Test results and absence of Intrauterine Pregnancy in Transvaginal Sonography (TVS).

(3) TVS showing fluid (echogenic) in the Pouch of Douglas.

(4) Lower concentration of β-Human chorionic gonadotropin (β-hCG) compared to normal Intrauterine Pregnancy and a doubling time of more than two days.

Exclusion Criteria :

1. Miscarriage
2. Twisted Ovarian Tumor.
3. Ruptured Chocolate Cyst
4. Corpus luteum Rupture
5. Pelvic Inflammatory Disease
6. Perforated Peptic Ulcer

For each case and control, the following outcomes were considered:

Outcome Definitions :

(A) Risk factors :

(1) Age.
(2) Pulse (Pulse rate)
(3) Diastolic Blood Pressure (DBP)
(4) Systolic Blood Pressure (SBP)
(5) Hb on admission (Hemoglobin on admission)
(6) Number of packed Red Blood Cell transfusions (No of PRBC Transfusion)
(7) Period of Amenorrhea (POA)
(8) Parity
(9) Previous History of (H/O) Ectopic Pregnancy.
(10) Previous H/O Pelvic Inflammatory Disease (PID).

(11) H/O infertility
(12) Use of Intrauterine Contraceptive Devices (IUD).
(13) H/O abortion.
(14) H/O Dilation & Curettage (D&C).

(B) Adverse outcomes:

(1) Ruptured Ectopic
(2) Hemodynamic shock.
(3) Requirement of blood transfusion.
(4) Maternal death.
(5) HDU admission.

Statistical Methods:

The following assumptions were made regarding the data:

(1) Cases of the samples should be independent,

(2) The populations from which the samples are drawn have the same variance (or standard deviation),

(3) Samples were randomly drawn from different populations.

The normality of the data was tested using the Anderson-Darling test, Shapiro-Wilk test, Kolmogorov–Smirnoff test and visually by QQ plot.

Linear regression was used to assess whether quantitative data were associated with Ectopic pregnancy and adverse outcomes. Similarly, logistic regression analysis was performed for ordinal data.

Among the adverse outcomes, hemodynamic shock and maternal death were excluded because there were no cases. All Ectopic pregnancy cases required blood transfusion; therefore, blood transfusion was not considered. Finally, for Ectopic pregnancy, the need for HDU admission and Ruptured Ectopic Pregnancy was considered.

All statistical analyses were performed using Epi Info™ software (Version 7.2, Centers for Disease Control and Prevention (CDC), Atlanta, Georgia, USA, https://www.cdc.gov/epiinfo/pc.html)

Results

Linear Regression Analysis :

Linear regression analysis was performed on the quantitative data (Age, DBP, SBP, Hb on admission, Parity, Pulse, No of PRBC Transfusion and Period of amenorrhea (POA in Weeks) to determine the independent association between the occurrence of Ectopic pregnancy and adverse events [need for High Dependency Unit (HDU)] admission and ruptured Ectopic pregnancy)(Table 1).

In the linear regression analysis, most variables were not significantly associated with any of the outcomes. For the prediction of ectopic pregnancy, Hb levels at admission and No of PRBC Transfusion can be considered an independent predictive factor with a p-value less than 0.05. Even though SBP and POA also have a significant p-value, the coefficient is too low to draw any meaningful correlation with the occurrence of ectopic pregnancy.

Logistic Regression Analysis :

Logistic regression was used to analyze ordinal data and evaluate their association with Ectopic pregnancy and adverse outcomes (Table 2).

In the logistic regression analysis, we find a significant association between IUD usage and past history of

Table 1 — *Linear Regression analysis of nominal data (Three outcomes were evaluated)*

Variable	Coefficient	95% Confidence	STD Error	F-test	P-value*
(A) Ectopic Pregnancy					
Age	0	-0.01	0.005	0.0021	0.963646
DBP	-0.01	-0.017	0.004	8.6357	0.003949
SBP	-0.007	-0.013	0.003	4.7902	0.030542
Hb on admission	0.135	0.064	0.036	14.3207	0.000241
Parity	0.05	-0.001	0.026	3.7035	0.056647
Pulse	0.003	-0.001	0.002	2.7826	0.09788
No of PRBC Transfusion	0.349	0.249	0.05	47.6724	0.00001
POA (Weeks)	-0.033	-0.061	0.014	5.1217	0.025411
(B) Need for HDU admission					
Age	0.002	-0.01	0.007	0.1451	0.703972
DBP	-0.001	-0.01	0.004	0.0912	0.763208
SBP	-0.003	-0.011	0.004	0.6945	0.406291
Hb on admission	0.012	-0.075	0.044	0.0797	0.778199
Parity	-0.01	-0.074	0.032	0.0888	0.766176
Pulse	0.001	-0.004	0.003	0.1298	0.719281
No of PRBC Transfusion	0.335	0.211	0.063	28.5619	0.00001
POA (Weeks)	-0.006	-0.041	0.018	0.1046	0.746923
(C) Ruptured Ectopic					
Age	-0.01	-0.023	0.006	2.4005	0.123912
DBP	0.002	-0.007	0.004	0.1281	0.720991
SBP	-0.007	-0.015	0.004	3.6353	0.058939
Hb on admission	-0.046	-0.131	0.043	1.133	0.289253
Parity	0.056	-0.007	0.032	3.1206	0.07983
Pulse	0.001	-0.004	0.002	0.1508	0.698443
No of PRBC Transfusion	0.278	0.157	0.061	20.629	0.000013
POA (Weeks)	0.016	-0.019	0.018	0.8316	0.363622

**P<0.05 is considered significant.*

Table 2 — *Logistic Regression analysis of original data (Three outcomes were evaluated)*

Term	Odds Ratio	95%	CI	Coefficient	SE	Z-Statistic	P-Value
(A) Ectopic Pregnancy							
H/O D & C (Yes/No)	3.8425	0.8459	17.4538	1.3461	0.7722	1.7433	0.0813
H/O Abortion (Yes/No)	0.6868	0.2617	1.8029	-0.3757	0.4924	-0.763	0.4455
H/O Infertility (Yes/No)	1.5588	0.2581	9.4158	0.4439	0.9176	0.4838	0.6285
IUD Usage (Yes/No)	11.2138	2.3137	54.3507	2.4171	0.8053	3.0016	0.0027
Previous H/O Ectopic (Yes/No)	20.605	2.1561	196.9103	3.0255	1.1517	2.6271	0.0086
Previous H/O PID (Yes/No)	3.9077	1.463	10.4374	1.3629	0.5013	2.7191	0.0065
(B) Need for HDU admission							
H/O D & C (Yes/No)	2.2599	0.5569	9.1706	0.8153	0.7147	1.1408	0.2539
H/O Abortion (Yes/No)	0.6978	0.263	1.8512	-0.3599	0.4978	-0.7229	0.4697
H/O Infertility (Yes/No)	2.3234	0.4073	13.2537	0.843	0.8884	0.9489	0.3427
IUD Usage (Yes/No)	3.8856	1.2441	12.1353	1.3573	0.581	2.3359	0.0195
Previous H/O Ectopic (Yes/No)	6.9993	1.3768	35.5832	1.9458	0.8296	2.3454	0.019
Previous H/O PID (Yes/No)	2.0929	0.8328	5.2593	0.7385	0.4701	1.5709	0.1162
(C) Ruptured Ectopic							
H/O D & C (Yes/No)	2.184	0.5361	8.8975	0.7812	0.7166	1.09	0.2757
H/O Abortion (Yes/No)	0.8172	0.3072	2.1739	-0.2018	0.4992	-0.4044	0.686
H/O Infertility (Yes/No)	2.2439	0.3792	13.278	0.8082	0.9071	0.891	0.3729
IUD Usage (Yes/No)	4.079	1.3099	12.7021	1.4058	0.5796	2.4257	0.0153
Previous H/O Ectopic (Yes/No)	11.6349	1.9523	69.3392	2.454	0.9107	2.6945	0.007
Previous H/O PID (Yes/No)	1.2475	0.4768	3.2639	0.2211	0.4907	0.4506	0.6523

P<0.05 is considered significant.

Ectopic pregnancy in the occurrence of Ectopic pregnancy along with its complications (HDU) admission and ruptured ectopic. A previous history of PID was associated with the occurrence of Ectopic pregnancy but not with its complications.

Discussion

In this study, we aimed to identify the risk factors associated with Ectopic pregnancies in Eastern India. We also attempted to identify the risk factors responsible for adverse outcomes of Ectopic pregnancies in this region. Understanding the risk factors of Ectopic pregnancy can provide a means of early detection and prediction of adverse outcomes. This study evaluated all established risk factors of Ectopic pregnancy and analyzed them using linear or logistic regression to determine the independent risk factors of ectopic pregnancy. We identified Ruptured Ectopic, Hemodynamic shock, Requirement of blood transfusion, Maternal death, and HDU admission as five important adverse outcomes and analyzed their relationship with the risk factors.

Our analysis identified that Hb on Admission, No of PRBC Transfusion, History of IUD Usage, Previous History of Ectopic Pregnancy, and Previous History of Pelvic Inflammatory Disease (PID) are independent risk factors for the occurrence of Ectopic pregnancy. No of PRBC Transfusion, History of IUD Usage, and Previous History of Ectopic Pregnancy were identified as the most significant risk factors for adverse outcomes (Ruptured Ectopic and Need of HDU admission). Among these, No of PRBC Transfusion had the strongest correlation with the occurrence of Ectopic pregnancy and its complications. It had an extremely low p-value, which means that the number of PRBC transfusions is strongly associated with the occurrence of Ectopic pregnancy and its complications. PRBC transfusion is one of the primary management strategies for ectopic pregnancy and its associated complications[13]. Therefore, it is logical that the number of PRBC transfusions was strongly associated with them. However, this finding is of less predictive value since Ectopic pregnancy and its complications are often identified beforehand and PRBC transfusion is administered later. Nevertheless, this proves the validity of the analysis and conclusions of this study.

Conclusion

This study proves that past medical history has a more excellent predictive value in predicting the occurrence of Ectopic pregnancy and its complications. Several studies have previously tried to identify the risk factors

associated with Ectopic pregnancy[14-16]. These studies have mostly identified the history of IUD Usage, Previous History of Ectopic Pregnancy, and Previous History of Pelvic Inflammatory Disease as having a significantly higher association with Ectopic pregnancy. However, none of these studies accounted for all these factors. Risk Factors for ectopic pregnancy are mostly ignored by the Scientific Community and most of the recent meta-analysis mostly focused on the management rather than prevention[17-19]. One recent meta-analysis on Ectopic pregnancy concluded that a history of past Ectopic pregnancy, age, tubal diameter, and infertility had strong association with the occurrence of Ectopic pregnancy[20]. Additionally, they found that Hemoglobin level and beta-HCG levels are associated with high risk of rupture. While the conclusions of recent studies are aligned with our results, we additionally identified the association of adverse outcomes with these risk factors, which makes our study unique. The incidence and risk factors of disease change significantly in different populations, and our study population has significantly different epidemiological characteristics. Very little data is available for our study population, which makes our study more critical for healthcare providers and policymakers.

Funding : None

Conflict of Interest : The authors declare no Conflict of Interest for this article. The manuscript is not published/submitted to any other journal.

References

1 Bouab M, Wajih O, Gotni A, Assal A, Jalal M, Lamrissi A — Spontaneous heterotopic pregnancy: Diagnosis and surgical management. *Int J Surg Case Rep* 2024; **118:** 109582.
2 Garikapati K, Gogineni S, Prasuna NL, Eda V — Ectopic pregnancy: "THE MASQUERADER" -A challenge to medical fraternity. *J Dr NTR Univ Health Sci* 2021; **10(3):** 158.
3 Gerema U, Alemayehu T, Chane G, Desta D, Diriba A — Determinants of ectopic pregnancy among pregnant women attending referral hospitals in southwestern part of Oromia regional state, Southwest Ethiopia: a multi-center case control study. *BMC Pregnancy Childbirth* 2021; **21(1):** 130.
4 Verma ML, Singh U, Solanki V, Sachan R, Sankhwar PL — Spectrum of Ectopic Pregnancies at a Tertiary Care Center of Northern India: A Retrospective Cross-sectional Study. *Gynecol Minim Invasive Ther* 2022; **11(1):** 36-40.
5 Barik S, Malakar A, Laha S — Trends in Ectopic Pregnancy: A Prospective Observational Study from a Tertiary Care Center in Eastern India. *Journal of South Asian Federation of Obstetrics and Gynaecology* 2020; **12(3):** 172-7.
6 Nalini N, Singh KA, S N, Kumari A — Clinical Profile, Risk Factors and Outcomes of Ectopic Pregnancy in a Tertiary Care Hospital: A Prospective Indian Study. *Cureus* 2023; **15(11):** e49483.
7 Gerema U, Alemayehu T, Chane G, Desta D, Diriba A — Determinants of ectopic pregnancy among pregnant women attending referral hospitals in southwestern part of Oromia regional state, Southwest Ethiopia: a multi-center case control study. *BMC Pregnancy Childbirth* 2021; **21(1):** 130.
8 Tan Y, Bu Z qin, Shi H, Song H, Zhang Y le — Risk Factors of Recurrent Ectopic Pregnancy in Patients Treated With in vitro Fertilization Cycles: A Matched Case-Control Study. *Front Endocrinol (Lausanne)* 2020; 11.
9 Lee IT, Barnhart KT — What Is an Ectopic Pregnancy? JAMA 2023; **329(5):** 434.
10 Gerema U, Alemayehu T, Chane G, Desta D, Diriba A — Determinants of ectopic pregnancy among pregnant women attending referral hospitals in southwestern part of Oromia regional state, Southwest Ethiopia: a multi-center case control study. *BMC Pregnancy Childbirth* 2021; **21(1):** 130.
11 Barik S, Malakar A, Laha S — Trends in Ectopic Pregnancy: A Prospective Observational Study from a Tertiary Care Center in Eastern India. *Journal of South Asian Federation of Obstetrics and Gynaecology* 2020; **12(3):** 172-7.
12 Dasgupta A, Pal A, Mondal B, Kumar Dash K, Chakraborty A, Nath Mitra S — Clinical Trends Of Ectopic Pregnancy - A Study In A Tertiary Care Hospital of West Bengal, India. *Int J Adv Res (Indore)* 2022; **10(01):** 505-11.
13 Heavner MS, Cucci MD, Barlow B, Bell CM, Eng CC, Erdman G, *et al* — Caring for two in the ICU: Pharmacologic management of pregnancy related complications. *Pharmacotherapy: The Journal of Human Pharmacology and Drug Therapy* 2023 Jul 23; **43(7):** 659-74.
14 Andola S, Kumar Rr, Desai R, Krutika S — Study of Risk factors and treatment modalities of ectopic pregnancy. *J Family Med Prim Care* 2021; **10(2):** 724.
15 Cirillo F, Paladino I, Ronchetti C, Busnelli A, Morenghi E, Grilli L, *et al* — Ectopic pregnancy risk factors in infertile patients: a 10-year single center experience. *Sci Rep* 2022; **12(1):** 20473.
16 Li PC, Lin WY, Ding DC — Risk factors and clinical characteristics associated with a ruptured ectopic pregnancy: A 19-year retrospective observational study. *Medicine* 2022; **101(24):** e29514.
17 Al Wattar BH, Solangon SA, de Braud LV, Rogoziñska E, Jurkovic D — Effectiveness of treatment options for tubal ectopic pregnancy: A systematic review and network meta analysis. *BJOG* 2024; **131(1):** 5-14.
18 Ozcan MCH, Wilson JR, Frishman GN — A Systematic Review and Meta-analysis of Surgical Treatment of Ectopic Pregnancy with Salpingectomy versus Salpingostomy. *J Minim Invasive Gynecol* 2021; **28(3):** 656-67.
19 Colombo GE, Leonardi M, Armour M, Di Somma H, Dinh T, da Silva Costa F, *et al* — Efficacy and safety of expectant management in the treatment of tubal ectopic pregnancy: a systematic review and meta-analysis. *Hum Reprod Open* 2020; 4.
20 Xu C, Mao Z, Tan M, Mazhari SA, Ghorbani Vajargah P, Karkhah S, *et al* — Prevalence and Related Factors of Rupture among Cases with Ectopic Pregnancy; a Systematic Review and Meta-Analysis. *Arch Acad Emerg Med* 2024; **12(1):** e2.

Original Article

Assessment of Knowledge of Infant Feeding amongst Mothers in Urban Area of Western Maharashtra

Shailaja Mane[1], Devika U Jadhav[2], Shradha Salunkhe[3], Pramila Menon[4], Rashmi Poduval[5]

Abstract

Background : In a developing country like India numerous factors influence the initiation and maintenance of breastfeeding and the introduction of complementary food. This study aimed to assess knowledge and practices of breastfeeding and complementary feeding amongst mothers in urban area of western Maharashtra.

Materials and Methods : Mothers of infants (aged, 6 months to 1 year were enrolled from a tertiary care centre in Western Maharashtra. A preformed (by the UNICEF) and pretested (in local language) questionnaires were administered to assess common knowledge on breastfeeding and complementary feeding practices. The data analysis was done using Epi Info version 7.2.5.0. and categorical variables were expressed in terms of frequency and percentages (with 95% CI).

Results : A total of 315 mothers with an age range of 19-30 years were interviewed. Of these, 69.5% mothers initiated breastfeeding within 1 hour of delivery and 75.5% of the mothers exclusively breastfed their infants for 6 months. Prelacteal feeds were considered healthy by 52.1% of the mothers. External milk sources were given by 51.7% of mothers. A total of 37.5% of the mothers -reported the need to adhere to practises like giving baby tonics /gripe water. Seventy eight percent of mothers initiated complementary feeding after 6 months of age.

Conclusion : The alarming use of prelacteal and external milk sources reported by the mothers in this study highlighted the need for continuous education of mothers with improved clarity of the teachings on exclusive breastfeeding and complementary feeding as per WHO and UNICEF guidelines.

Key words : Breastfeeding, Complementary Feeding, Mothers, Infants.

Breastfeeding is the healthiest feeding method that satisfies the requirements of a child from birth to early infancy. According to the World Health Organization (WHO) “Exclusive breastfeeding” is defined as giving no other food or drink – not even water – except breast milk to the infant[1].

Initiation of breastfeeding, within one hour of birth, protects the newborn from acquiring infection and reduces neonatal morbidity and mortality. According to the NFHS 5 current neonatal mortality rate in India is 24.9/1000 live births. The first milk produced in the first few days, called colostrum, is an important source of immune protection for the newborn[2].

Babies who are breastfed exclusively for the first six months of age have 15 times less probability to die from Pneumonia and 11 times unlikely to die from diarrhea, which are two leading causes of death in children under-five years of age[3]. Breast milk is vital for the development of immune function in the neonate and for reducing permeability of the intestine to bacterial pathogens in their extrauterine life[4].

Editor's Comment :

- A significant knowledge gap exists among mothers regarding breastfeeding and complementary feeding practices.
- Providing regular counselling and hands-on training can help bridge this gap, empowering mothers to improve nutritional status of infants and young children, thus contributing positively to the nation’s overall growth and development.

Cellular and biochemical components of breast milk are associated with long-term benefits, like supporting neurocognitive development, protection against Obesity, Hypertension, Type 2 Diabetes and Atopic disease during later life and thus reducing hospitalization[5,6].

Complementary feeding after 6 months is important due to high risk of micronutrient deficiencies and malnutrition. Even though babies may thrive on breast milk alone during the first 6 months, they become biologically fit to accept semisolids after 4 months[7]. Improper implementation of complementary feeding makes a child prone to malnutrition, diarrhea and its consequences[8].

Department of Pediatrics, Dr D Y Patil Medical College, Hospital & Research Centre, Pune, Maharashtra 411018
[1]MD, Professor and Head
[2]MD, Associate Professor and Corresponding Author
[3]DNB, Professor
[4]MD, Associate Professor
[5]IBCLC, Lactation Consultant
Received on : 22/08/2023
Accepted on : 12/12/2023

How to cite this article : Assessment of Knowledge of Infant Feeding amongst Mothers in Urban Area of Western Maharashtra. Jadhav DU, Mane S, Salunkhe S, Menon P, Poduval R. *J Indian Med Assoc* 2025; **123(12):** 31-33.

In India exclusive breastfeeding rates among children under six months have improved from 54.9% in 2015-16 (NFHS 4) to 65.1% in 2019-21 (NFHS 5) and in Maharashtra-it has improved from 56.6% to 71%. In a developing country like India numerous factors influence the initiation and maintenance of breastfeeding and the introduction of complementary food. Some of the common factors include perception of the mother that she is not producing an adequate amount of milk, inadequate awareness regarding the benefits of breastfeeding. Other factors include community practices and beliefs regarding unhygienic practices like pre-lacteal feeds, top feeds and lack of support and guidance from peers and families[9-11]. So this study was done to assess knowledge and practices of breastfeeding and complementary feeding amongst mothers.

Materials and Methods

This cross-sectional observational study was carried out in Dr DY Patil Medical College, Hospital and Research Centre, Pune. Mothers of infants (aged, 6 months to 1 year) attending Out Patient Department (OPD) were approached by using nonprobability convenient sampling technique and study procedures were explained to them. Those agreed to participate signed an informed written consent.

Preformed and pretested questionnaires practiced by the UNICEF were administered. The questions comprised of assessing knowledge on breastfeeding practices and complementary feeding were translated to local language (Marathi) and were explained by the nurses and postgraduate students to the mothers. The Statistical analysis was done using Epi Info (version 7.2.5.0) and the categorical variables were expressed in terms of frequency and percentages (with 95% CI).

Results

A total of 315 mothers were interviewed. Included mothers had an age range of 19-30 years. In this study, 219 (69.5%) mothers initiated breastfeeding within 1 hour. Prelacteal feeds (Glucose / Sugar / Jaggery / normal Water or Honey) was practiced by 164 (52.1%) of the mothers. External milk sources like cow's/buffalo's milk or infant formula was given by 163 (51.7%) of mothers.

Seventy nine percent mothers felt that after caesarean section, though mother cannot sit comfortably still mother needs to breastfeed her baby and majority, 265(84.1%) of women felt that baby should be kept near mother immediately after delivery. Half (51%) of the women reported that nipple and more of areola should go in the mouth of the baby while feeding (Table 1).

Regarding on how often baby should be breastfed, majority (56.8%) answered for every 2 hours followed by 16.5% for every hour, 2.5% every 3 hours. Majority of women (35.9%) had breastfed at any given feed, for approximately 10-20 mins. Baby tonics /gripe water /balkadhu were regarded as good community practices followed by only 118 (37.5%) mothers. Bottle feeding was practiced by 57.5%(Table 2).

A total of 238 women initiated top feed after 6 months and 246 also initiated complimentary feeds after 6 months. Rice Dal was the preferred complimentary food by majority (n=209) of women. When asked about upto what age the baby should be given breastfeeding, 66% women had breastfed their baby upto 2 years of age.

Discussion

In our study most of the mothers breastfed their babies. Most of them initiated breastfeeding within one hour of birth. Exclusive breastfeeding up to 6 months of age was practiced by most mothers. Although there has been an improvement on the percentage of exclusive breastfeeding, practices like

Table 1 — *Breast feeding experiences and practices*

Question	Responses N (%)
1) After birth baby to be breastfeed within	
1 Hour	219 (69.5%)
2 Hours	81 (25.7%)
4 Hours	3 (1.0%)
2) Before starting breastfeeding new-born baby to be given, glucose water/ sugar water/ Jaggery water/ normal drinking water/honey.	164 (52.1%)
3) First three days of delivery mother gets less milk secretion. During this period baby can be given cow's milk/buffalo's milk/powdered milk.	163 (51.7%)
4) After caesarean section mother cannot sit comfortably. Still mother needs to breastfeed her baby.	249 (79.0%)
5) Baby shall be kept in this place in labour room	
In the baby room	9 (2.9%)
with relatives	22 (7.0%)
near mother	265 (84.1%)
with mother but in cradle	16 (5.1%)
6) Part of the breast to be allowed to go into the mouth of the baby	
only nipples	37 (11.7%)
nipples and little areola	103 (32.7%)
nipple and more of areola	161 (51.1%)
whatever baby can take	9 (2.9%)

Table 2 — *Intervals of breast feeding*

1)	Baby to be breastfed at an interval of	
	1 Hour	52 (16.5%)
	2 Hours	179 (56.8%)
	3 Hours	8 (2.5%)
	as per schedule	6 (1.9%)
	as per baby demand	41 (13.0%)
2)	Baby to be breastfeed at any given feed for	
	5-10 minutes	39 (12.4%)
	10-20 minutes	113 (35.9%)
	20-30 minutes	36 (11.4%)
	>30 minutes	13 (4.1%)
	as long as baby is demanding	96 (30.5%)
3)	Baby to be fed with water or milk needs	
	bottle feed practice	181 (57.5%)
4)	Baby tonics/gripe water/balkadu/somva chautrisi/	
	Kumari aasav etc to be given to baby.	118 (37.5%)

prelacteal feeds still continue within our communities.

In this study 69.5% of mothers initiated breastfeeding in first hour which is high when compared to studies done in South India like Tamil Nadu with 55.4% of children being breastfed within first hour of life. Additionally mothers who underwent caeserian section, 79% answered that breastfeeding is essential for the baby.

Given the traditional beliefs and cultural practices in India (such as giving Glucose / Sugar / Jaggery/Honey or water), our study showed 52.1% still continue the practices which is still high compared to 33.5% from a study done in Rural areas of South India by Joseph N, Unnikrishnan B, *et al.*

In our study, 238 mothers (75.5%) were well aware about the knowledge of exclusive breastfeeding up to 6 months of age which is much higher than a similar study done in Vellore which shows only 22%. The mean duration of exclusive breastfeeding in a study in Mauritius is only 2 months and only 18% of the mothers exclusively breastfed their infants for the first six months.

In this study, 78.7% of mothers started complementary feeding after 6 months of age which is low compared to a similar study done in Pakistan by Khalil Ahmed, *et al* which showed 86% started complementary feeds at 6 months and 93% started at 10-12 months. This study had also enquired mothers on good latching practices and only 51.1% answered correctly ie, nipple and more of areola, 56.8% answered that baby should be breastfed at an interval of 2 hours and a total of 35.9% of the mothers knew that each feed should last for 10-20 minutess. A total of 66% of the mothers breastfed their infants upto two years of age.

Conclusion

In India where there is a growing potential of economic growth whose back bone are its younger generation, all measures are to be taken to promote their health & nutrition. This nutrition starts with breastfeeding and the appropriate inclusion of complementary feeds. This requires strategies aimed at promotion of breastfeeding and complementary feeding practices. There should be periodic surveys and awareness campaigns to assess the contributing factors of breastfeeding and complementary feeding practices. Regular training programs should be prepared for implementation by Obstetric and Pediatric doctors with the help of the nursing staff.

Funding : None

Conflict of Interest : None

References

1 World Health Organization; Geneva, Switzerland: (updated 2003). Community-Based Strategies for Breastfeeding Promotion and Support in Developing Countries. Available from http://www.Linkages project.org/media/publications/Technical 20Reports/ CommunityBFStrategies. Pdfwebcite.
2 Arora S, McJunkin C, Wehrer J — Major factors influencing breastfeeding rates: mother's perception of father's attitude and milk supply. *Pediatrics* 2000; **106(5):** e67. [PubMed: 11061804]
3 Operational Guidelines-Programme for promotion of breast feeding-Ministry of family and healthfare Government of India.
4 Goldman AS. Modulation of the gastrointestinal tract of infants by human milk. Interfaces and interactions. An evolutionary perspective. *The Journal of Nutrition* 2000; **130(Suppl 2):** 426s–31s. [PubMed: 10721920]
5 Hassiotou F, Geddes DT — Programming of appetite control during breastfeeding as a preventative strategy against the obesity epidemic. *Journal of Human Lactation* 2014; **30(2):** 136-42.
6 Kramer MS — Breast is best : the evidence. *Early Human Development* 2010; **86(11):** 729-32.
7 WHO-Early initiation of breast feeding https://www.who.Early%20initiation%20of%20breastfeeding
8 Elizabeth KE — Nutrition and child Development,Section 1 infant and child feeding
9 Nkala TE, Msuya SE — Prevalence and predictors of exclusive breastfeeding among women in Kigoma region,Western Tanzania: a community based cross-sectional study. *Int Breastfeed J* 2011; **6:** 17. 10.1186/1746-4358-6-17
10 Thurman SE, Allen PJ — Integrating lactation consultants into primary health care services: are lactation consultants affecting breastfeeding success? *Pediatr Nurs* 2008; **34:** 419.2018
11 International Institute for Population Sciences (IIPS), ICF. National Family Health Survey (NFHS-4), 2015–16: Tamil Nadu state fact sheets-India[Internet]. Mumbai; 2017 Dec p. 291–342. Available from: http://rchiips.org/NFHS/pdf/NFHS4/TN_FactSheet.pdf.

Original Article

An Observational Study to Analyze Risk Factors for Benign Laryngeal Pathology in Hoarseness of Voice

Nishit Gupta[1], Maharshi Patel[2], Tapan Nagpal[3], Pruthvi Modi[4], Aarjav Shah[2]

Abstract

Aim : To study the correlation of risk factors with various benign laryngeal pathologies (chronic laryngitis) in patients with hoarseness.

Objectives : To study the correlation of risk factors with various different benign laryngeal pathologies in patients with hoarseness of voice.

Materials and Methods : A cross sectional study was conducted among 50 patients who came to ENT OPD with complains of hoarseness of voice. They were evaluated for presence of various known risk factors. History specifically for smoking, tobacco chewing, vocal abuse/misuse, allergies & recurrent URTI due to septic foci in nose/throat was taken. GERD was evaluated with Frequency Scale for Symptoms of GERD (FSSG) questions.

Conclusion : GERD in our study emerged as a very significant risk factor aside from the established risk factors (vocal abuse & smoking) in published literature. Contrary to published literature, Rinke oedema (chronic hypertrophic laryngitis) in our study emerged as the most common laryngeal pathology observed. Smoking and vocal abuse had additive effects on vocal cord pathologies like Reinke's oedema (100%). Vocal cord nodules were significantly associated with vocal abuse. GERD is significantly associated with vocal cord nodules.

Key words : Hoarseness, GERD, Smoking.

Voice serves as a person's identity and powerful method of communication in addition to being a source of sound. The larynx is made of a cartilaginous framework with muscles attached to it. The vocal folds produces the voice when speaking. The pharynx, palate, tongue, and lips alter the tone produced by the vocal folds to create various speech sounds. The larynx's primary roles include providing access to the lower respiratory tract, preventing aspiration during deglutition, and producing voice[1].

Changes in the larynx's anatomical structure can result in functional issues, which can severely impact voice production and lead to vocal disorders with a high recurrence rate[2].

Two types of laryngeal diseases result in speech disorders: temperamental diseases and functional diseases. In clinical practice, speech disorders brought on by benign lesions in the vocal cord mucosa are most frequently seen. The signs and symptoms of benign laryngeal lesions range from throat pain and discomfort to voice changes and stridor.

Editor's Comment :

- GERD and vocal abuse are the most significant and prevalent risk factors for benign laryngeal pathologies causing hoarseness, with smoking further amplifying the severity of lesions such as Reinke's oedema and leukoplakia.
- Reinke's oedema and vocal cord nodules are the most common benign lesions, with clear associations: Reinke's oedema strongly correlated with combined smoking and vocal abuse, while nodules, cysts, and polyps predominantly correlated with vocal abuse.
- Early identification of risk factors through detailed history and laryngoscopic evaluation enables timely diagnosis and improves patient outcomes, highlighting the importance of lifestyle modification and voice conservation strategies in prevention.

"Hoarseness" means an alteration in a person's regular voice. Hoarseness is often the first symptom. The most frequent causes are Upper Respiratory Infections (URI) and short-term vocal abuse[3]. A lifetime prevalence of hoarseness is 30 per cent[4]. A prevalent complaint in today's high-stress life is hoarseness[5]. Hoarseness is more common in India and other developing nations because of factors including low economic status, poor nutrition, poor overall health, varied dietary habits, vocal habits, smoking & drinking habits[4]. Microlaryngoscopy and endolaryngeal microsurgery have already caused a significant improvement in the field of laryngology[4].

Department of ENT, Smt BK Shah Medical Institute & Research Centre, Sumandeep Vidyapeeth Campus, Gujarat 391760
[1]MS (ENT), Associate Professor
[2]MS (ENT), Junior Resident
[3]MS (ENT), Professor and Head
[4]MS (ENT), Assistant Professor and Corresponding Author
Received on : 03/04/2023
Accepted on : 19/07/2023

How to cite this article : An Observational Study to Analyze Risk Factors for Benign Laryngeal Pathology in Hoarseness of Voice. Gupta N, Patel M, Nagpal T, Modi P, Shah A. *J Indian Med Assoc* 2025; **123(12):** 34-8.

The larynx is susceptible to benign and malignant lesions, including infective, inflammatory, traumatic, Neurogenic, Congenital, Functional and benign Neoplasms[7].

Materials and Methods

Study Setting : The study is conducted in the Department of Otorhinolaryngology, Dhiraj Hospital, SBKS Medical Institute and Research Centre, Piparia, Waghodia, Vadodara.

Study Type : An observational study.

Study Duration : One and half years.

Study Participants : Participants who came to ENT OPD of Dhiraj Hospital with complaints of hoarseness of voice were evaluated for the inclusion criteria. A hoarseness of voice questionnaire was used for this purpose.

Inclusion Criteria :

Patients with hoarseness of voice with benign pathology of the larynx.

Exclusion Criteria :

Patients have malignant laryngeal pathology.

Patients who did not give informed consent.

Sample size : The minimal sample size required for the present study was obtained by using the hypothesis testing method based on the following formula –

$$n = \frac{Z^2\, p\,(1-p)}{L^2}$$

Where –
Z = Z value at 95% confidence intervals = 1.96
p = the proportion of hoarseness of voice in benign pathology of larynx= 90% ; 1-p = 10%
L = Margin of error = 10%

The calculated minimum sample was 35, inflated by 10% for anticipated subject non-response. Finally, 50 Individuals were included in the analysis.

Sampling Technique : Eligible participants were acquired purposively for the present study.

Study Tools : Information about the study participants was collected in predesigned proforma (annexure I)

The proforma includes the following details.

Socio-demographic information of study participants Patient ID, age, gender, occupation, marital status and contact details.

History : A comprehensive present, past, personal and family history for the presence of various known risk factors.

History specifically for smoking, tobacco chewing, vocal abuse/misuse, allergies & recurrent URTI due to septic foci in nose/throat.

GERD was evaluated with Frequency Scale for Symptoms of GERD (FSSG) questions.

Examination : General examination, Vitals, Systemic examination

ENT Examination : The laryngoscopic examination was done using a 90'storz rigid laryngoscope under local anaesthesia.

Examination of oral cavity and oropharynx. Examination of Ear, Nose.

Ethical Issues : All participants were given a Participant Information Sheet (PIS) in their native language. Participants were told about the research's nature and aim and the advantages and risks that might be incurred during the study. If participants accepted to participate in the research, they signed an informed consent form. The confidentiality and privacy of the participants were and will be maintained at every level. The Ethics Committee has approved the research at the institution.

Data Collection Procedure : After ethical approval from Institutional Ethical Committee (IEC), the data collection was started. Eligible participants were enrolled purposively in the study. All selected patients were provided participant's information sheet in the language they understand before they consented. Patients with hoarseness of voice with benign laryngeal lesions coming to ENT OPD at Dhiraj Hospital were enrolled. Data were collected on predesigned proforma for this study (Annexure I). They were evaluated for the presence of various known risk factors, namely, GERD, Vocal abuse, Smoking etc.

Discussion

With increasing stress in day-to-day life, changing habits and lifestyle & rising levels of pollution hoarseness and voice disorders are becoming more and more prevalent. Laryngeal pathologies present are due to many causes and risk factors; so proper evaluation of history and correct diagnosis is key to

treating the voice disorders.

Gender : In the present study, 72% of males and 28% of females presented with hoarseness of voice. According to Srirangprasad K, *et al*[9] 63% of the participants were male, and 37% were female. In the study by Rathi A, *et al*[11] 62.69% of patients with hoarseness of voice were males. According to the research conducted by Singh D, *et al*[10] the female-to-male ratio is 2.1:1. They suggested that the requirement for women to use louder voices at home.

Occupation : In the present study, 70% of the study participants were engaged in the occupations with history of vocal abuse while 30% patients had less use of voice in their occupation. Among vocal abusers, maximum – about 1/3rd of the study participants was Vegetable Vendors & about 1/5th (20%) each were Housewives & Teachers.

In the research conducted by Rathi A, *et al*[11] the majority of cases (42.06%) were of Labourers or Farmers, followed by 31.74% of Homemakers.

Risk Factors : In our study, Vocal abuse was seen among 70% of the patients with hoarseness of voice. A gastroesophageal reflux score of more than eight was also observed as a very common risk factor among 70% of the study participants. While only 40% of the study participants had a history of Smoking. This concurs with the study by Pal KS, *et al*[8] wherein Vocal abuse (40%) was the most common predisposing factor.

Vocal Cord Pathologies :

Vocal Nodules : In the present study, 26% of the cases of hoarseness had vocal nodules. Vocal nodules are frequently seen at the middle of the membrane vocal fold, where the mucosal wave has its most significant amplitude and experiences the most phono-traumatic force due to vocal abuse. Similar to the present study, the proportion of vocal nodules seen in the study done by Banjara H, *et al*[12] and Srirangprasad K, *et al*[9] was most common being 11.95% & 12% respectively.

Vocal Cord Polyps : Voice fold polyps are the other most common benign laryngeal lesion, affecting the vocal output and Quality of Life of people afflicted. The proportion of vocal cord polyps was 16% in the present study. Banjara H, *et al*[12] and Srirangprasad K, *et al*[9] reported 3.59% and 5% of the cases with vocal cord polyps, which are pretty low, compared to the present study implying that many vocal abusers in our study presented late.

Vocal Cysts : Vocal cysts are also benign laryngeal lesions which can cause hoarseness and dysphonia.

Banjara H, *et al*[12] and Srirangprasad K, *et al*[9] reported 5.58% and 10% of the cases respectively with vocal cord cysts while this study saw a slightly higher proportion of vocal cord cysts among 14% of the patients.

Reinke's Oedema : Reinke's oedema is a benign vocal fold condition with diffuse polypoid degeneration of one or, more often, both vocal folds. Reinke's oedema was the most common laryngeal pathology observed among 34% of our study participants.

In the study by Srirangprasad K, *et al*[9] & Banjara H, *et al*[12] chronic laryngitis, a precursor to Reinke's oedema was a common aetiology in 22% & 9.35% cases respectively

In present study 18% of patients (9 patients) had history of both vocal abuse & smoking all 100% which patients had Reinke's oedema, which shows additive effect of both risk factors in development of Reinke's oedema.

Leukoplakia : In the present study proportion 6% of the study participants had leukoplakia. Banjara H, *et al*[12] reported 1.20% of the cases in his study with leukoplakia of the vocal cords.

Vocal Cord Palsy : This study saw the proportion of vocal cord palsy in 4% of the patients with hoarseness of voice. Banjara H, *et al*[12] and Ahmmed SU, *et al*[14] reported that 11.16 % and 6.92% of the cases with hoarseness of voice had vocal cord palsy.

Smoking and Hoarseness of Voice : Several negative consequences on the larynx, including a change in voice quality, are well-documented when smoking is involved.

In the research by Krecicki, *et al*[15] 86% of individuals with VF oedema were smokers.

Effat KG, *et al*[16] reported that smokers had more significant vocal fold polypoidal change than non-smokers

In the present study, out of 17 cases of Reinke's oedema, 11 cases (65%) were smokers. Smoking, in our study was significantly related to leucoplakia and Reinke's oedema.

In present study 18% of patients (9 patients) had history of both vocal abuse & smoking all 100% which patients had Reinke's oedema. A combination of smoking with vocal abuse has additive effects.

Vocal Abuse : In the present study, vocal cord nodules were found in significantly high proportions (p-value 0.003) among people with vocal abuse as a predominant risk factor. Vocal cord cysts and polyps also positively correlated with vocal abuse as a risk factor.

In the study by Srirangprasad K, *et al*[9] out of 12 cases of vocal nodules, 11 cases had a history of vocal abuse, while in the case of vocal polyp, out of 5 cases, three patients had a history of vocal abuse.

Milovanovic J[17] reported that. nodule patients were more likely to be lecturers, singers, and actors than polyp patients (p = 0.006), and they had greater occupational voice demands (significant and enormous) than polyp patients.

GERD : Gastroesophageal reflux is an inflammatory illness of the upper aerodigestive tract tissues, Long believed to have a pivotal role in developing benign lesions of the vocal folds like nodules, polyps, Reinke's oedema, sulcus vocalis, and cysts.

Kuhn J, *et al*[18] found that the incidence of pharyngeal acid reflux episodes is much greater in patients with vocal cord nodules than in normal controls, indicating that gastro-esophageopharyngeal acid reflux plays a role in the aetiology of specific vocal cord nodules.

In the study by Koufman, *et al*[19] among the patients with vocal cord nodules, 40% had positive reflux.

Results

The present study of 50 cases was conducted at the Department of Otorhinolaryngology, Dhiraj Hospital, Vadodara. The study included subjects with deviated nasal septum with chronic rhinosinusitis. Observations made from the study are as follows :

Results : 72% of males and 28% of females had hoarseness of voice (Table 1).

Results : 70% of the study participants were engaged in the occupations with history of vocal abuse while 30% patients had less use of voice in their occupation. In present study, among vocal abusers, maximum – about 1/3rd of the study participants was vegetable vendors & about 1/5th (20%) each were housewives & teachers (Table 2).

Results : among 20 smokers 9 (45%) study participants had history of vocal abuse (Table 3).

A gastroesophageal reflux score of more than 8 was observed in the majority - 70% of the study participants. Vocal abuse as a risk factor was present in 70% of the patients with hoarseness of voice. 40% of the study participants had an addiction to smoking.

Table 1 — *Gender distribution among study participants (n=50)*

Gender	Number of Participants	Percentage (%)
Male	36	72%
Female	14	28%

Results : Reinke's oedema and vocal cord nodules were the most common laryngeal pathologies observed in among 34% and 26% of the study participants. Vocal cord polyps and vocal cord cysts were seen in16% and 14%, respectively, of the patients with hoarseness of voice. The proportion of vocal cord palsy and leucoplakia was seen among 4% and 6% of the patients, respectively (Fig 1).

Results : vocal cord nodule was found in significantly high proportions (p value 0.003) among patients with vocal abuse as a predominant risk factor. Vocal cord cyst and polyp also had a positive correlation with vocal abuse as a risk factor. Rest of the vocal cord pathologies had no significant association with vocal abuse (Fig 2).

Conclusion

The mean age of the patients with hoarseness was 45.38 years

Table 2 — *Occupation among study participants*

Occupation	Number	Percentages
Patients with significant vocal abuse	35	70
Vegetable vendor	11	22
Housewife	7	14
Teacher	6	12
Lawyer	2	04
Vendor	4	08
Pandit	2	04
Singer	1	02
Shopkeeper	1	02
Traffic policeman	1	02
Patients without significant vocal abuse	15	30
Carpenter	3	06
Student	2	04
Labourer	5	10
Nurse	1	02
Plumber	1	02
Police	1	02
Electrician	2	04

Table 3 — *Simulataneous history of vocal abuse and smoking among study participants*

Smoking	Vocal abuse		Total
	Not present	Present	
No	04	26	30
Yes	11	09	20

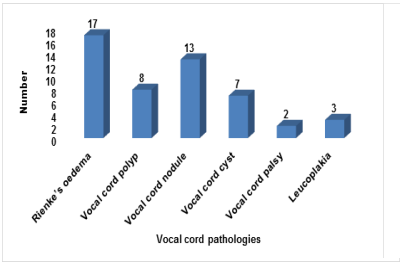


Fig 1 — vocal cord pathologies among study participants.

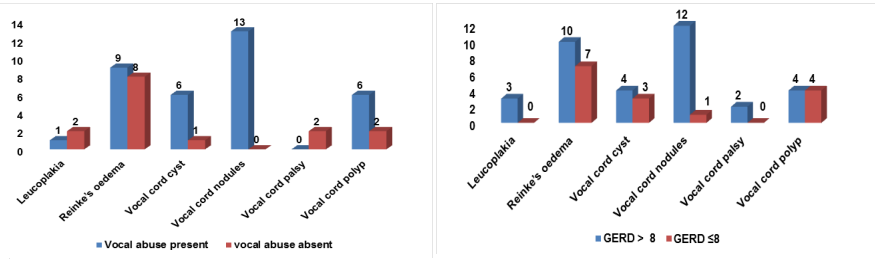


Fig 2 — Relation of vocal abuse to vocal cord pathologies among study participants elation of vocal abuse to vocal cord pathologies among study participants.

72% of males and 28% of females have hoarseness of voice & half of the female study participants were housewives (14%).

70% of the study participants were engaged in the occupations with history of vocal abuse, while 30% of patients had less use of voice. A gastroesophageal reflux score of more than eight was observed in the majority - 70% of the study participants.

Vocal abuse & GERD as a risk factor was present in 70% of the patients with hoarseness of voice. 40% of the study participants had a history of smoking.

Reinke's oedema and vocal cord nodules were the most common laryngeal pathologies observed among 34% and 26% of the study participants respectively.

Leucoplakia (100%) ie, all patients with leucoplakia were smokers and Reinke's oedema (64.7%) are significantly higher in smokers.

Smoking and vocal abuse had additive effects on vocal cord pathologies like Reinke's oedema (100%).

Vocal cord Nodules (100%), vocal cord Cysts (85.7%) and vocal cord Polyps (75%) were significantly associated with vocal abuse.

GERD is significantly associated with vocal cord nodules (92.3%).

Funding : None.

Conflict of Interest : None.

References

1 Dettelbach M, Eibling DE, Johnson JT — Hoarseness from viral laryngitis to glottic cancer. *Postgrad Med* 1994; **95:** 143.
2 Chagnon FP, Moulder DS — Laryngotracheal trauma. *Chestsurg Din North Am* 1996; **6:** 73-8.
3 Alan G Kerr. Michael Gleeson. Scott Brown's otolaryngology. 6th edition. Butterworth-Heineman. 1997; Vol. 1. 12/1-28.
4 Pradhan S — Voice conservative surgery in laryngeal cancer. 1st edition Lloyds publishing house. 1997; 1.
5 Goswami S, Patra TK — A clinico-pathological study of Reinke's oedema. *Indian Journal of Otolaryngology and Head and Neck Surgery* 2003; **55(3):** 160-5. DOI: 10.1007/BF02991943
6 Marcotullio D, Magliulo G, Pezone T — Reinke's oedema and risk factors: Clinical and histopathologic aspects. *American Journal of Otolaryngology* 2002; **23:** 81-4.
7 Sharma DK, Sohal BS, Bal MS, Aggarwal S — Clinico-pathological study of 50 cases of tumours of larynx. *Indian J Otolaryngol Head Neck Surg* 2013; **65(Suppl 1):** 29-35. doi: 10.1007/s12070-011-0420-6. Epub 2011 Dec 13. PMID: 24427612; PMCID: PMC3718963
8 Pal KS, Kaushal AK, Nagpure PS, Agarwal G — Etiopathological study of 100 patients of hoarseness of voice: in a rural based hospital. *Indian J Otolaryngol Head Neck Surg* 2014; **66(1):** 40-5
9 Srirangaprasad K, Mahajan R, Kanithavalli K, Deepa P — A Prospective Study to Determine Clinico-Etiological Factors in Hoarseness of Voice. Journal of Evolution of Medical and Dental Sciences 2020; **9(7):** 374-8.
10 Singh D, Bhandari AM, Shahi S, Shrestha NK — Etiological Spectrum of Hoarseness of Voice in Western Regional Hospital, Pokhara, Nepal. *Medical Journal of Pokhara Academy of Health Sciences* 2020; **3(2):** 249-53.
11 Rathi A, Sharma S — Clinicopathological profile of hoarseness of voice. *Int J Otorhinolaryngol Head Neck Surg* 2020; **6(03):** 484-8.
12 Banjara H, Mungutwar V, Singh D, Gupta A — Hoarseness of Voice: A Retrospective Study of 251 Cases. *International Journal of Phonosurgery and Laryngology*, January-June 2011; **1(1)**: 21-7.
13 Rafii B, Taliercio S, Achlatis S, Ruiz R, Amin MR, Branski RC — Reflux and Dysphonia. *Laryngoscope* 2024; **124:** 1420-4.
14 Ahmmed SU, Asaduzzaman AK, Ahsan MA, Hossain MZ, Azad MA, Alam MI — Hoarseness of Voice: An Etiological Study. *Bangladesh Journal of Otorhinolaryngology* 2017; **23(1):** 47-51.
15 Krecicki T, Zalesska-Krecicka M, Pastuszek P, Rak JE, Morawska-Kochman M, Zatonski M — Treatment of Reincke's edema among different professional groups: presentation of results. International Journal of Occupational Medicine and Environmental Health 2004; **17(2):** 279-84.
16 Effat KG, Milad M — A comparative histopathological study of vocal fold polyps in smokers versus non-smokers. *The Journal of Laryngology & Otology* 2015; **129(5):** 484-8.
17 Milovanovic J, Vukasinovic M, Jotic A, Vlajinac H, Milovanovic A, Pavlovic B, *et al* — Relationship between socio-demographic characteristics and vocal fold nodules, polyps and oedema. *Acta Otorhinolaryngologica Italica* 2018; **38(5):** 424.
18 Kuhn J, Toohill RJ, Ulualp SO, Kulpa J, Hofmann C, Arndorfer R — Pharyngeal acid reflux events in patients with vocal cord nodules. *The Laryngoscope* 1998; **108(8):** 1146-9.
19 Koufman JA, Amin MR, Panetti M — Prevalence of reflux in 113 consecutive patients with laryngeal and voice disorders. *Otolaryngology—Head and Neck Surgery* 2000; **123(4):** 385-8.

Original Article

Association of NAFLD with Metabolic Syndrome : A Hospital Based Study with Rural Catchment Area from Eastern India

Badal Kumar Sahu[1], Satyendra Nath Saha[2], Indranil Khatua[3], Ratnakar Sarkar[4], Mrinal Kanti Ghosh[5], Soumya Ray[6]

Abstract

Background : There is recent emergence of Non-Alcoholic Fatty Liver Disease (NAFLD) & various factors responsible for metabolic syndrome.

Aims and Objective : We have conducted this study to find out degree of association between NAFLD & metabolic syndrome with special emphasis to Rural group of population as the study setting has a Rural catchment area.

Materials and Methods : This hospital based observational, cross-sectional study comprises 100 patients conducted at the Out Patient Department of General Medicine of Burdwan Medical College and Hospital in Purba Bardhaman District (West Bengal) over a period of one & half year ie, February, 2018 - July, 2019. Patients detected as NAFLD meeting the inclusion and exclusion criteria giving informed consent were included in the study. Patients were undergone detailed history taking, anthropometry & laboratory examinations.

Results : Data analysis were done by SPSS. Study subjects of NAFLD with Metabolic Syndrome were suffering more from high plasma glucose, hypertension, triglycerides, low HDL, high waist circumference and these are statistically significant. From simple linear regression analysis, the Waist Circumference, Fasting Blood Glucose, Glycosylated Haemoglobin, Serum Cholesterol, ALT and AST shows significant positive correlation and serum HDL shows significant negative correlation with NAFLD with metabolic syndrome.

Conclusion : Therefore, there is a greater association of Metabolic Syndrome with increasing severity of Fatty Liver Disease. This observation has also emerged into the rural population as our study participants are mostly of rural origin.

Key words : Non-alcoholic Fatty Liver Disease, Metabolic Syndrome.

Non-alcoholic Fatty Liver Disease (NAFLD), characterized by the accumulation of fat in the Liver without a history of alcoholism or known Liver pathology, has emerged as an important health problem in India, with an overall prevalence of 9-32% among adults, being higher in those who are overweight and/or diabetic[1]. Whereas Metabolic Syndrome is characterized by the presence of insulin resistance in association with other Metabolic Abnormalities like Obesity, Diabetes, Hypertriglyceridemia and Hypertension[2].

Editor's Comment :

- Raised waist circumference and visceral obesity drive insulin resistance and dyslipidemia, leading to metabolic syndrome and NAFLD.
- Lifestyle modification and regular follow-up can reduce long-term risks to cardiovascular, endocrine, hepatic and CNS disorders.

Recently have Hyperinsulinemia and Insulin resistance have been pointed out as pathogenic factors in NAFLD. Using the Homeostasis Model Assessment (HOMA) method[3], Marchesini, *et al* showed that insulin resistance was the laboratory finding most closely associated with the presence of NAFLD in a large series of patients[4]. Accordingly, NAFLD might represent another feature of the Metabolic Syndrome, with decreased insulin sensitivity at the Liver[5].

Increasing prevalence in insulin resistance and nearly half of patients with NAFLD have evidence of full-blown Metabolic Syndrome is observed recently. The

[1]MBBS, DPH, MD, Assistant Professor, Department of General Medicine, Nil Ratan Sarkar Medical College & Hospital, Kolkata 700014
[2]MBBS, MD, Assistant Professor, Department of General Medicine, Burdwan Medical College & Hospital, Burdwan, West Bengal 713104
[3]MBBS, MS, Tutor, Department of ENT, Nil Ratan Sarkar Medical College & Hospital, Kolkata, West Bengal 700014
[4]MBBS, MD, Associate Professor, Department of General Medicine, Burdwan Medical College & Hospital, Burdwan, West Bengal 713104
[5]MBBS, MD, Professor, Department of Radiodiagnosis, Burdwan Medical College & Hospital, Burdwan, West Bengal 713104
[6]MBBS, MS, Tutor, Department of Ophthalmology, Bankura Sammilani Medical College & Hospital
Bankura, West Bengal 722102 and Corresponding Author
Received on : 05/04/2023
Accepted on : 09/09/2024

How to cite this article : Association of NAFLD with Metabolic Syndrome : A Hospital Based Study with Rural Catchment Area from Eastern India. Sahu BK, Saha SN, Khatua I, Sarkar R, Ghosh MK, Ray S. *J Indian Med Assoc* 2025; **123(12):** 39-42.

chances of individual having NAFLD and Non-Alcoholic Steatohepatitis (NASH) increase with increasing body weight, with 70-80% of Obese individuals having NAFLD and 15-20% having NASH. Conversely 30-100% of NASH patients have Obesity. Central Obesity is more commonly associated with NASH, also with causal link to Diabetes and Hypertension. In morbidly Obese patients, the risk of Liver disease progressively increases with the number of features of Metabolic Syndrome[6,7]. Metabolic Syndrome was present in 22% of Indian patients with NASH[8].

The study was undertaken to detect the degree of association of NAFLD with Metabolic Syndrome with special emphasis to Rural group of population as the study setting has a Rural catchment area.

Materials and Methods

This hospital based observational, cross-sectional study comprises 100 patients conducted at the Out Patient Department of General Medicine of Burdwan Medical College and Hospital in Purba Bardhaman district (West Bengal) over a period of one & half year ie, February, 2018 – July, 2019. Patients detected as NAFLD meeting the inclusion and exclusion criteria giving informed consent were included in the study.

Inclusion Criteria :

Age above 18 years & NAFLD is defined by USG.

Exclusion Criteria :

Alcoholic Liver Disease (habituated with taking alcohol >30 gms/day in male and >20 gms/day in female), any active or Chronic Liver Disease including Viral Hepatitis, recent GI surgery, Pregnancy & Nephrotic Syndrome, patients taking drugs causing steatohepatitis like Glucocorticoids, Aspirin, Anabolic Steroids, Methotrexate, Synthetic Estrogen, Amiodarone.

Patients not giving consent to participate will be excluded from the study.

All the study participants were undergone detailed history taking, Anthropometric Measurement - (Height, Weight, BMI, Waist and Hip Circumference and Ratio), Clinical Examinations, Imaging evaluation mainly abdominal USG & Laboratory investigations (Fasting & Postprandial blood sugar, Serum urea, Creatinine, HbsAg, anti HCV, LFT, Lipid profile).

Data were analyzed by standard statistical methods by applying SPSS. The study was conducted after obtaining ethical clearance from Institutional Ethics Committee (IEC).

Observations

Study subjects of NAFLD with Metabolic Syndrome were suffering more from High Plasma Glucose, Hypertension, Triglycerides, Low HDL, High Waist Circumference and these are statistically significant (Table 1).

In between two study group NAFLD with Metabolic Syndrome and NAFLD without metabolic syndrome group there is significant statistical difference in Fasting Blood Glucose, Postprandial Blood Glucose and HbA1C level, Cholesterol, Triglyceride, LDL, HDL and VLDL level, ALT, AST and Alkaline Phosphatase level (unpaired 't' test P value is <0.001)(Table 2).

Table 1 — *Comparison of prevalence of variables in patients of NAFLD with metabolic syndrome and NAFLD without Metabolic Syndrome*

Variables	NAFLD with Metabolic Syndrome(N=66)	NAFLD without Metabolic Syndrome(N=34)	P-value
Fasting Plasma Glucose >100 mg/dl	23(63.8%)	10(25.64%)	0.001
Hypertension >130/85 mmHg	17(47.2%)	8(23.5%)	0.034
Triglycerides >150 mg/dl	31(86.1%)	16(47.0%)	0.0005
HDL M<40 mg/dl, F<50 mg/dl	34(94.44%)	16(47.05%)	0.000019
Waist Circumference M>90 cm, F>80 cm	28(77.77%)	13(38.23%)	0.0009

Table 2 — *Biochemical profile of patients of NAFLD with Metabolic Syndrome (MS) and NAFLD without Metabolic syndrome*

Parameters	NAFLD with MS	NAFLD without MS	Sig (p value) (unpaired 't' test)
Fasting blood glucose (mg/dl)	180.8±24.2	74.0±7.2	<0.001
Postprandial blood glucose (mg/dl)	226.2±27.7	109.2±11.2	<0.001
HbA1C (%)	7.9±0.5	4.3±0.6	<0.001
Cholesterol (mg/dl)	282.6±21.3	185.0±23.6	<0.001
Triglyceride (mg/dl)	201.7±30.3	108.1±9.7	<0.001
LDL (mg/dl)	162.9±15.0	100.6±11.8	<0.001
HDL (mg/dl)	30.5±6.5	53.7±6.1	<0.001
VLDL (mg/dl)	47.6±6.2	22.6±3.5	<0.001
ALT (IU/L)	82.3±26.6	34.0±7.5	<0.001
AST (IU/L)	71.4±12.9	30.7±8.9	<0.001
Alkaline phosphatase (IU/L)	114.1±21.3	44.5±9.7	<0.001

Percentage of hypertensive patients increased as grade of NAFLD increased in patients with Metabolic Syndrome ie, 15.15%, 23.34% and 71.42% in grade I, II and III respectively. Majority of grade III Fatty Liver patients had Diabetes ie, 4 (57.14%) while 12 (40%) of grade II and 7 (21.21%) of grade I patients were diabetics (Table 3).

From simple linear regression analysis, the Waist Circumference, Fasting Blood Glucose, Glycosylated Haemoglobin, Serum Cholesterol, ALT and AST shows significant positive correlation and serum HDL shows significant negative correlation with NAFLD with Metabolic Syndrome (Table 4).

Table 4 — *Simple Linear Regression table representing parameters responsible for NAFLD with Metabolic Syndrome*

Dependent Variable : NAFLD with MS	Standardized Coefficients	't'	Signi-ficant	95.0% Confidence Interval	
	Beta			Lower Bound	Upper Bound
(Constant)		-3.476	0.001	-0.835	-0.230
Waist Circumference	0.255	4.416	<0.001	0.008	0.020
FBS	0.380	2.097	0.037	0.001	0.007
HbA1C	0.202	2.601	0.010	0.013	0.095
Cholesterol	0.299	5.401	<0.001	0.002	0.004
HDL	-0.093	-2.216	0.028	-0.007	0.001
ALT	0.088	3.248	0.001	0.001	0.002
AST	0.193	4.814	<0.001	0.002	0.006

Discussion

The central role of insulin resistance as well as degree of insulin insensitivity is well established in several landmark studies. Our study findings are also as per with these results. The unique feature of our study is it involves people from Rural Bengal of India. So, the study findings can be extrapolated to Rural population also. This finding signifies that NAFLD has become an endemic in Rural population also as many as 66% of NAFLD cases had Metabolic Syndrome in our study which is as per with other several studies from India & outside[2,9].

Localized insulin insensitivity only to the liver followed by lipid deposition & peroxidation has been hypothesized regarding raised Liver Transaminases[10,11]. Similarly, in line of other studies deranged ALT and AST was observed in greater percentages in patients of NAFLD with Metabolic Syndrome than those without metabolic syndrome[12].

Insulin resistance seems to have been related to deposition of abdominal fat leading to Central Obesity which further supports our finding that increased Waist circumference is associated with higher grades of fatty liver & also with Metabolic Syndrome. Asians have increased propensity abdominal fat deposition in lower grade of BMI[2]. So, the cut off criteria for increased waist circumference (male >90cm, female >80 cm) has been set for Indians. So, increased waist circumference has been associated with NAFLD with Metabolic Syndrome & this finding is as per with other studies[2].

As insulin makes pivotal role in glucose homeostasis, impaired Fasting glucose & Type 2 Diabetes Mellitus is a major component of Metabolic Syndrome and is associated with higher proportions in patients with both NAFLD & Metabolic Syndrome[4].

Comparison of the mean values of Blood Pressure between the groups with and without NAFLD was insignificant. Hypertension found in 23.34% and 71.42% of grade II and III fatty liver respectively had Metabolic Syndrome[13].

Insulin resistance leads to hypertriglyceridaemia & altered Lipid Metabolism. Dyslipidaemia between the two groups of patients ie, NAFLD with and without Metabolic Syndrome was significant both for prevalence as well as for their respective means. This higher trend in triglycerides indicate that recent shift of dyslipidaemia among Rural population also. The incidence of impairment of various parameters of lipid profile in grade II and III fatty liver is consistently higher in cases of NAFLD with Metabolic Syndrome when

Table 3 — *Distribution of grades of NAFLD with and without Metabolic Syndrome*

Variables	NAFLD with Metabolic Syndrome			NAFLD without Metabolic Syndrome		
	Grade I	Grade II	Grade III	Grade I	Grade II	Grade III
ALT ≥ 41IU	6 (18.18%)	21 (70%)	6 (85.71%)	15 (45.45%)	7 (23.34%)	1 (14.28%)
AST ≥ 38IU	5 (15.15%)	18 (60%)	6 (85.71%)	9 (27.27%)	4 (13.33%)	1 (14.28%)
Central Obesity (WC) (>90 cm - M, >80 cm - F)	6 (18.18%)	18 (60%)	4 (57.14%)	9 (27.27%)	5 (16.67%)	0 (0%)
Impaired fasting glucose (>100 mg/dl)	4 (12.12%)	14 (46.67%)	5 (71.42%)	7 (21.21%)	3 (10%)	0 (0%)
Hypertension (130/85 mmHg)	5 (15.15%)	7 (23.34%)	5 (71.42%)	5 (15.15%)	3 (10%)	0 (0%)
Low HDL (<50 mg/dl-F, <40 mg/dl-M)	7 (21.21%)	19 (63.34%)	6 (85.71%)	11 (33.33%)	4 (13.33%)	1 (14.28%)
Hypertriglyceridaemia (>150 mg/dl)	6 (18.18%)	19 (63.34%)	6 (85.71%)	9 (27.27%)	6 (20%)	1 (14.28%)

compared with those without Metabolic Syndrome[4].

Several limitations of the study as follows : Follow-up could have been useful and relevant if better study design (eg, case-control) adopted & some more diagnostic tests could be done (eg, liver fibro scan, liver biopsy etc.) among the study subjects for better understanding of the morbidity status.

Conclusion

So, from this study it can be concluded that increased Waist Circumference, higher fasting plasma glucose levels, increased HbA1C level, higher serum cholesterol levels, lower levels of serum HDL and higher levels of liver enzymes ALT and AST might be considered as risk indicators of NAFLD with Metabolic Syndrome. Therefore, there is a greater association of Metabolic Syndrome with increasing severity of Fatty Liver Disease. This observation has also emerged into the Rural population also as our study participants are mostly of Rural origin.

Acknowledgement

The author acknowledges the support & active participation of staffs of Department of General Medicine & Biochemistry.

Funding : None.

Conflict of Interest : Nil.

References

1 Duseja A — Nonalcoholic fatty liver disease in India - A lot done, yet more required! *Indian J Gastroenterol* 2010; **29:** 217-25.

2 Duseja A, Singhy PS, Saraswatz AV, Acharya KS, Chawla KY, Chowdhury S, *et al* — Non-alcoholic Fatty Liver Disease and Metabolic Syndrome—Position Paper of the Indian National Association for the Study of the Liver, Endocrine Society of India, Indian College of Cardiology and Indian Society of Gastroenterology. *J Clin Exp Hepatol* 2015; **5(1):** 51-68.

3 Matthews DR, Hosker JP, Rudenski AS, Naylor BA, Treacher DF, Turner RC — Homeostasis model assessment: insulin resistance and b-cell function from plasma fasting glucose and insulin concentrations in man. *Diabetologia* 1985; **28:** 412-9.

4 Marchesini G, Brizi M, Morselli Labate AM, Bianchi G, Bugianesi G, McCullough AJ, *et al* — Association of non-alcoholic fatty liver disease to insulin resistance. *Am J Med* 1999; **107:** 450-5.

5 DeFronzo RA, Ferrannini E — Insulin resistance: a multifaceted syndrome responsible for NIDDM, obesity, hypertension, dyslipidemia, and atherosclerotic cardiovascular disease. *Diabetes Care* 1991; **14:** 173-94.

6 Duseja A, Das A, Das R, Dhiman RK, Chawla Y, Bhansali A — Unconjugated hyperbilirubinemia in nonalcoholic steatohepatitis — is it Gilbert's syndrome? *Trop Gastroenterol* 2005; **26:** 123-5.

7 Kalra N, Duseja A, Das A — Chemical shift magnetic resonance imaging is helpful in detecting hepatic steatosis but not fibrosisin patients with nonalcoholic fatty liver disease (NAFLD). *Ann Hepatol* 2009; **8:** 21-5.

8 Taylor KJ, Carpenter DA, Hill CR, McCready VR — Gray scale ultrasound imaging. The anatomy and pathology of the liver. *Radiology* 1976; **119(2):** 415-23 .

9 Almeda-Valdes P, Cuevas-Ramos D, Aguilar-Salinas CA — Metabolic syndrome and non-alcoholic fatty liver disease. *Ann Hepatol* 2009; **8:** S18-S24.

10 Marchesini G, Brizi M, Bianchi G, Tomassetti S, Bugianesi E, Lenzi M, *et al* — Nonalcoholic Fatty Liver Disease A Feature of the Metabolic Syndrome. *Diabetes* 2001; **50:** 1844-50

11 Day CP, James OFW — Steatohepatitis: a tale of two "hits." *Gastroenterology* 1998; **114:** 842-5.

12 Hye Soon Park, Jee Hye Han, Kyung Mook Choi, Seon Mee Kim — Relation between elevated serum alanine aminotransferase and metabolic syndrome in Korean adolescents. *Am J Clin Nutr* 2005; **82:** 1046-51.

13 Cortez-Pinto H, Camilo ME, Baptista A, De Oliveira AG, De Moura MC: Non-alcoholic fatty liver: another feature of the metabolic syndrome? *Clin Nutr* 1999; **18:** 353-8.

Original Article

Utility of Quantitative Histopathological Criteria in Differentiating Psoriasis from other Psoriasiform Dermatitis : An Observational Study

Tushar Kambale[1], Saurabh Shyamsunder Patil[2], Saloni Bharadwaj[3], Charusheela Gore[4], Shirish Chandanwale[1], Sai Mahesh Vajjala[5]

Abstract

Background : Psoriasis and Psoriasiform Dermatitis Closely mimics clinically and histomorphologically with many overlapping features. By differentiating Psoriasis from other Psoriasiform eruptions, one may modify treatment according to the severity of eruptions and the tissues and comorbidities involved. This conundrum might be resolved with the aid of morphometric examination of histological features.

Aims and Objectives : The aim of this study was to analyse and quantify the diagnostic significant parameters using special microscope with inbuilt advanced software for measurement and to evaluate their significance statistically in diagnosis and differentiating Psoriasis from Psoriasiform dermatitis.

Material and Methods : The 70 cases, 33 of Psoriasis and 37 of Psoriasiform Dermatitis were compared by using measurable morphometric parameters with Lawrence and Mayo LM-52-6000 microscope having mosaic V2.1 computational imaging software with professional digital image measurement system. The results were statistically analysed for significance.

Results : Length of rete pegs, length of dermal papillae and the ratio of length/average width of rete pegs showed statistically significant increases in Psoriasis when compared to Psoriasiform dermatitis while suprapapillary thickness and width at 25%/width at 75% in Psoriasis were significantly lower in Psoriasis as compared to Psoriasiform Dermatitis.

Conclusion : All the parameters studied (Length of rete pegs, suprapapillary thickness, length of dermal papillae, the ratio of length/average width of rete pegs and width at 25%/width at 75%) were statistically significant in differentiating and diagnosing Psoriasis when compared to Psoriasiform Dermatitis and can be used to distinguish Psoriasis and Psoriasiform Dermatitis.

Key words : Morphometric Analysis, Psoriasis, Psoriasiform Dermatitis.

Psoriasis is a chronic, relapsing, Papulosquamous Dermatitis that affects >60 million adults and children Worldwide, characterised by silvery scales covering epidermis[1]. Its prevalence rate varies from 0.1 to 0.3% in various parts of World[2,3]. Incidence is twice in males when compared to females and most patients present in their third and fourth decade[4]. They commonly present as chronic dry erythematous, bilaterally symmetrical, well defined scaly papules and plaques. Grattage test and Auzpit's sign can be used along with clinical findings for diagnosis[5]. The presentation of psoriasis may differ clinically depending on the age of lesions and treatment received. The varieties of treatments (conventional and alternative) may make the condition unstable. In these cases, histopathological examination becomes crucial as clinical diagnosis become difficult[6]. Skin biopsy of Psoriasis shows histopathological features of regular epidermal hyperplasia, downward extension of rete ridges, decrease in granular cell layer, suprapapillary thinning, Munro's micro abscess and/or Kogoj's abscess and dilated blood vessels in dermal papillae. These features have been described to be the most constant or characteristic features in standard test books[7-9]. Psoriasis and Psoriasiform Dermatitis must be differentiated histologically as Psoriasiform Dermatitis are a group of disorders

Editor's Comment :

- Future studies should focus on the overlapping cases of psoriasis and psoriasiform dermatitis with specific cases of psoriasiform disorders and diagnostic values to set the proper cutoffs for the morphometric parameters between these groups.

Department of Pathology, Dr DY Patil Medical College and Research Centre, Pimpri, Pune, Maharashtra 411018
[1]MD (Pathology), Professor
[2]MBBS, Senior Resident and Corresponding Author
[3]MD (Pathology), Junior Resident
[4]MD (Pathology), Professor and Head
[5]MD (Pathology), Junior Resident, Department of Community Medicine

Received on : 02/07/2024
Accepted on : 25/07/2024

How to cite this article : Utility of Quantitative Histopathological Criteria in Differentiating Psoriasis from other Psoriasiform Dermatitis : An Observational Study. Kambale T, Patil SS, Bharadwaj S, Gore C, Chandanwale S, Vajjala SM. *J Indian Med Assoc* 2025; **123(12):** 43-8.

(Seborrheic Dermatitis, Allergic Dermatitis, Nummular Dermatitis, Prurigo Nodularis, Lichen Simplex Chronicus, Devergie's Disease, Atopic Eczema, Pityriasis Rosea, Inflammatory Linear Verrucous, Epidermal Nevus, Mycosis Fungoides) which simulate Psoriasis clinically and or histologically by findings of elongation of rete ridges with long dermal papillae present alternately and presence of perivascular inflammatory infiltrate[10-12].

Only few studies in the past had used quantitative histopathological methods to differentiate between Psoriasis and Psoriasiform Dermatitis. Morphometric analysis using a special microscope (Lawrence and MayoLM526000) with inbuilt software (Mosaic V2.1 computational imaging software with Professional digital image measurement system) gives a more precise quantitative dimension to histopathology.

The aim of this study was to analyse and quantify the diagnostic significant parameters using special microscope with inbuilt advanced software for measurement and to evaluate their significance statistically in diagnosis and differentiating Psoriasis from Psoriasiform Dermatitis.

The objectives of the study were as follows :

(1) To take micro-metric measures of critical histomorphological parameters in skin biopsies from histopathologically proven Psoriasis cases, as well as similar measurements in other dermatoses that may mimic Psoriasis.

(2) To compare the results statistically in order to determine their diagnostic value in psoriasis differentiation.

(3) To compare and contrast the other major clinical features and histological traits that can be used to narrow down the differential diagnosis.

Material and Methods

Place of Study : Dr DY Patil Medical College Hospital and Research Centre, Dr DY Patil Vidyapeeth (Deemed to be University), Pimpri, Pune.

Type of Study : Descriptive cross sectional study.

Study Design : Comparative study

Period of Study : The time period for study was from September 2022 to May 2024

Study Population : Patients clinically diagnosed and histopathologically confirmed as Psoriasis and Psoriasiform Dermatitis in the Department of Dermatology and Pathology.

Inclusion Criteria :

Clinically and histopathologically diagnosed patients of Psoriasis and Psoriasiform dermatitis who had given informed consent to undergo required investigation in the study.

Exclusion Criteria :

(1) Non-consenting patients

(2) Autolysed skin biopsies

(3) Biopsies, which have less than five well defined rete pegs.

Sample size : The sample size was calculated using software WinPepi v11.38. Minimum sample size calculated is 26 biopsies with 13 biopsies in each group. However, all the samples related to our study during the time duration of our study were taken. The study group comprised of skin biopsies of 70 patients clinically diagnosed and confirmed histologically as Psoriasis and Psoriasiform dermatitis were included. Total of 33 constitutes Psoriasis (Class A) and remaining 37 were of Psoriasiform Dermatitis (Class B).

Sampling Method : Consecutive sampling

Ethical clearance : The study was evaluated and approved by the Institute Ethical Committee with research protocol number IESC/PGS/2022/196

Consent : Prior written and informed consent was obtained from all the patients participating in the study. Data was collected and analysed after ensuring the confidentiality of their information.

Method of data collection : Biopsies of patients clinically suspected as Psoriasis and other dermatitis that Mimics Psoriasis were taken by the Dermatologist after prior written and informed consent. The biopsies were sent to Department of Pathology in 10% formalin along with the test requisition form with detailed local examination including the presenting morphological features of the lesion. These presenting morphological features of the lesion were recorded and received biopsies were allowed to fix in 10% formalin for 17 hours before processing and embedding with paraffin wax. The hematoxylin and eosin stained 3-to-4-micron thick section slides were prepared from paraffin blocks and clinical diagnosis of Psoriasis or other Psoriasiform Dermatitis was confirmed histopathologically. The features of

histopathological importance like Hyperkeratosis, Parakeratosis, Munro's Micro Abscess, Acanthosis, Kogoj's Microabscess, Orthokeratosis, Dilated and Tortous Blood Vessels, Inflammatory Cells in the dermis were noted before the slides were examined for the morphometric measurements. The multiple measurements were made in 10 X and 40 X fields in different areas for all the parameters by two different Pathologists separately and the average was calculated. The measurements were made in micrometres (μm) with an inbuilt scale which adjusted automatically with different magnification. The parameters were measured as follows (Fig 1).

(a) The length of rete pegs – the distance from the upper part of the granular layer to the bottom of the dermis.

(b) The length of dermal papillae – the length of dermal papillae was measured from the tip of the dermal papillae to the base at the level of tip of rete pegs.

(c) Suprapapillary thickness – suprapapillary thickness was measured from the tip of dermal papilla to the top of the granular layer.

(d) Width at 25% / width at 75% – the ratio of measurement at upper narrowest and lower widest part of the rete pegs.

(e) Length over average width of rete pegs-The ratio of length to average width of rete pegs were calculated by dividing the length of papillae by average width.

The granular layer thickness was assessed by counting the number of granular cells vertically in the suprapapillary area and at the base of the rete pegs.

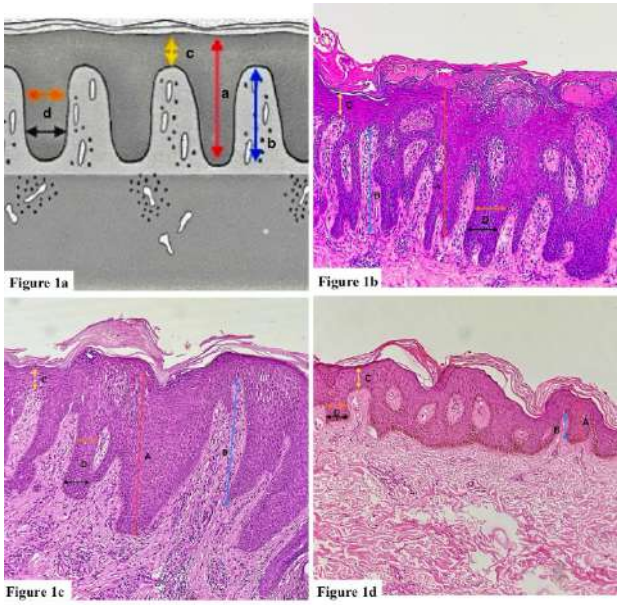


Fig 1 — Schematic diagram showing the measured parameters

Instrument used : Lawrence and Mayo LM52-6000 microscope, having Mosiac V2.1 computational imaging software with professional digital image measurement system.

Statistic analysis : Data collected was subjected for appropriate statistical analysis to perceive valid conclusions. The normality was assisted by using Shapiro-wilk test. The statistical analysis was assessed by using Chi-square Test, Mann-whitney U and P value were calculated.

Results

Examination of the histopathological slides was done by 2 Pathologists independently, and high concordance rate was noted between them. Out of 70 biopsies studied 33(47.14%) were of Psoriasis and 37(52.86%) were of Psoriasiform Dermatitis. The mean age was found to be 36.63 years for Psoriasis and 44.24 years for Psoriasiform dermatitis.

The majority of the patients of Psoriasis were between 30-50 years and that of Psoriasiform dermatitis between 40-50 years. The male preponderance was noted in both classes with male:female ratio of 1.75:1 in Psoriasis and 1.64:1 in Psoriasiform dermatitis. According to the clinical data recorded and provided by the Dermatologist Erythema, Papules, Plaques and Micaceous Scales were Predominant Morphological pattern of presentation in Psoriasis while majority of Psoriasiform dermatitis presented with Papule, Plaque and Erythema. Only the cases of Psoriasis showed the Micaceous scales and positive Auspit'z sign. The histopathological features were recorded in both classes of which Munro's micro abscess and Sponjioform pustules of Kogoj, hypogranulosis, tortous blood vessels were more frequently present in cases of Psoriasis. Tables 1 & 2 shows frequency of important clinical and histopathological features in both classes respectively. The morphometric analysis done revealed that all studied parameters ie, Length of rete pegs ($U=184$, $p\leq0.001$), Suprapapillary thickness ($U=412$, $p=0.02$), Length of dermal papillae ($U=271$, $p\leq0.001$), Length of rete pegs/average width ($U=283$, $p\leq0.001$), width at 25%/width at 75% ($U=157$, $p\leq0.001$) shows significant difference between both the classes. Tables 4 & 5 shows Morphmetric analysis of important histological features between Class A and Class B with their median and statistical significance.

Table 1 — *Histological findings in Psoriasis and Psoriasiform dermatitis*

Histopathological Features	Psoriasis N=33(100%)	Psoriasiform Dermatitis N=37(100%)
Acanthosis	31(93.93%)	25(67.56%)
Hyperkeratosis	21(63.6%)	19(51.35%)
Parakeratosis	32(96.9%)	29(78.37%)
Orthokeratosis	29(87.8%)	04(10.81%)
Munro's Micro abscess	18(54.5%)	0
Sponjioform pustule of kogoj	10(30.3%)	0
Dillated and tortous blood vessels	33(100%)	33(89.18%)
Inflammatory infiltrate in dermis	33(100%)	33(89.18%)

Table 2 — *Clinical findings in Psoriasis and Psoriasiform dermatitis*

Clinical features	Psoriasis N = 33(100%)	Psoriasiform Dermatitis N = 37 (100%)
Macule	5(15.15%)	6(16.21%)
Patch	1(3.03%)	4(10.81%)
Papule	25(75.7%)	24(64.86%)
Plaque	33(100%)	21(56.75%)
Erythematous	30(90.90%)	21(56.75%)
Skin coloured	2(6.06%)	9(24.32%)
Violaceous	Nil	Nil
Hyper pigmented	22(66.66%)	18(48.64%)
Micaceous scale	33(100%)	4(10.81%)
Koebnerisation	6(18.18%)	3(8.10%)
Auspitz' sign	26(78.78%)	2 (5.40%)

Discussion

Psoriasiform Dermatitis is a group of disorders which clinico-histologically resemble Psoriasis either in beginning/course of progression or in the resolution[6].

Table 4 — *Independent Samples T-Test for significance*

Parameters	Test of significance	Statistics (U value)	P value	Signi-ficance
Length of rete pegs	Mann-Whitney U	184	<0.001	+
Supra papillary thickness	Mann-Whitney U	412	0.02	+
Length of dermal papillae	Mann-Whitney U	271	<0.001	+
Length of rete pegs/ average width	Mann-Whitney U	283	<0.001	+
Width at 25%/ width at 75%	Mann-Whitney U	157	<0.001	+

Note. $H_{a\ \mu Psoriasiform\ Dermatitis} \neq \mu_{\ Psoriasis}$

Hence, it is necessary to differentiate Psoriasis from Psoriasiform Dermatitis histopathologically. Morphometric histopathological image analysis has gained immense interest in recent years with digitisation and development of artificial intelligence. In cases where histopathology could not clinch a diagnosis then morphometric analysis along with clinico-histopathological concordance can be considered. In the present study morphometric analysis of major histological features of 70 skin biopsies were studied of which 33 were of Psoriasis is and 37 were of Psoriasiform Dermatitis.

In our study we found that Psoriasis was more common in third decade, followed by fourth decade, and Psoriasiform Dermatitis in 4th decade. Bedi T R also found that Psoriasis was more common in the 3rd to 4th decade[13].

Table 3 — *Morphometric analysis in Psoriasis and Psoriasiform Dermatitis with Mean, Median, SD, IQR, Minimum & Maximum values obtained along with Test for Normality*

Variable/Category	Frequency	Mean in µm	SD	Median in µm	IQR	95% CI Mean	Min in µm	Max in µm	Normality
Length of rete pegs :									
Psoriasiform Dermatitis	37	229.18	99.76	232.13	173.5-268.37	195.92-262.44	62.75	582.07	Rejected
Psoriasis	33	412.95	142.3	425.3	314.99-488.81	362.5-463.41	129.21	638.85	Accepted
Total	70	315.82	152.05	274.35	202.86-429.67	279.56-352.07	62.75	638.85	Rejected
Supra papillary thickness :									
Psoriasiform Dermatitis	37	72.88	24.04	69.62	52.46-89.34	64.87-80.9	37.38	129.65	Rejected
Psoriasis	33	50.52	18.91	46.8	38.83-56.16	43.81-57.22	29.79	107.54	Rejected
Total	70	62.34	24.37	55.17	42.77-79.87	56.53-68.15	29.79	129.65	Rejected
Length of dermal papillae :									
Psoriasiform Dermatitis	37	166.61	75.6	156.94	116.55-188.99	141.4-191.81	35.12	449.1	Rejected
Psoriasis	33	251.22	106.25	225.98	182.98-327.84	213.55-288.9	33.75	457.58	Accepted
Total	70	206.5	100.14	184.26	146.37-260.71	182.62-230.37	33.75	457.58	Rejected
Length of rete pegs / average width :									
Psoriasiform Dermatitis	37	3.58	1.52	3.56	2.53-4.68	3.08 - 4.09	1.22	8.1	Accepted
Psoriasis	33	5.43	2.1	5.14	3.9-6.63	4.69-6.18	2.1	10.8	Accepted
Total	70	4.46	2.03	4.05	2.94-5.49	3.97-4.94	1.22	10.8	Rejected
Width at 25% / width at 75% :									
Psoriasiform Dermatitis	37	1.32	0.36	1.3	1.09-1.6	1.2-1.44	0.44	1.97	Accepted
Psoriasis	33	0.87	0.22	0.82	0.71-0.95	0.79-0.95	0.51	1.45	Rejected
Total	70	1.11	0.37	1.02	0.82-1.4	1.02-1.2	0.44	1.97	Rejected

In our study male as to female ratio of 1.75:1 and 1.64:1 was noted in Psoriasis and Psoriasiform Dermatitis respectively, indicating males were affected more than female in both the classes. Similar observations were made by Icen, *et al* and Chandanwale, *et al*[14,15].

In Psoriasis patients of our study, according to the clinical data provided it was observed that in patients with Psoriasis Plaque (77.14%), Erythematous (58.82%), Micaceous scale (89.19%) and Auspitz sign (92.86%) were significantly higher than patient with Psoriasiform Dermatitis ($p<0.05$) which is in concordance with Veena AB, *et al* and Meier Seth study[6,16].

Among the studied histological features both Psoriasis and Psoriasiform Dermatitis showed Acanthosis, Hyperkeratosis, Parakeratosis, Orthokeratosis along with inflammatory infiltrate in the dermis. Presence of Orthokeratosis ($P\leq0.001$), Munro's Micro abscess ($P<0.001$), spongioform Pustule of kogoj ($P<0.001$) dilated and tortous blood vessels ($P<0.001$) were significant in psoriasis when compared with Psoriasiform Dermatitis. With the loss of granular layer in Psoriasis, Parakeratosis become confluent and there is migration of the neutrophils into parakeratotic scale through epidermis resulting in intracorneal collections called as Munrosp microabscess. Such accumulation in stratum spongiosum are called spongioform pustule of kogoj. The histopathological findings are in close agreement with Venne AB, *et al,* Chandanwale, *et al*, Lal, *et al*, Gordon and Johnson, Mehta, *et al* and Narayankar, *et al*[6,15,17-20].

When morphometric parameters were studied for statistical significance (as data is skewed nonparametric test ie, Mann whitney 'U' test was used) and following results were obtained. Length of rete pegs ($U=184$, $P\leq0.001$), Suprapapillary thickness ($U=412$, $P=0.02$), Length of dermal papillae ($U=271$, $P\leq0.001$), Length of rete pegs/average width ($U= 283$, $P\leq0.001$), width at 25%/ width at 75% ($U=157$, $P\leq0.001$) were found to be statistically significant.

The median length of rete pegs in cases of Psoriasis was 425.3µm and IQR of 314.99 - 488.81µm and in cases of Psoriasiform Dermatitis median calculated was 232.13µm with IQR of 173.5-268.37µm. The median rete pegs length in Psoriasis is 1.83 times greater than in Psoriasiform Dermatitis. The difference in rete pegs length in our study was significant with $U=184$, $P\leq0.001$. Chandanwale, *et al* found that rete pegs length in Psoriasis was 1.74 times greater than Psoriasiform Dermatitis ($t=4.036$ and $P=0.0001$)[15].

The median suprapapillary thickness of epidermis overlying the dermal papilla in cases of Psoriasis was 46.8µm with IQR of 38.83-56.16um while in psoriasiform dermatitis it was 69.62um with IQR 52.46-89.34µm. The difference in them was statistically significant with $U=412$, $P=0.02$. Chandanwale, *et al* also did similar study however it was not statistically significant ($t=1.543$, $P=0129$)[15]. Ghasemi, *et al* did similar study for suprapapillary thickness in cases of Psoriasis and Chronic Dermatitis, they also found that difference between them was statistically significant[21].

The median length of dermal papillae in cases of Psoriasis was 225.98um with IQR 182.98- 327.84µm while in cases of Psoriasiform Dermatitis it was 156.94µm with IQR 116.55-188.99µm. The psoriatic dermal papillae were 1.43 times longer than Psoriasiform Dermatitis. The difference in length of dermal papillae was significant with $U=271$, $P\leq0.001$. Chandanwale, *et al* also found significant difference in length of dermal papillae with dermal papillae of psoriasis being 1.89 times that of Psoriasiform Dermatitis[15].

Shape of rete pegs were demonstrated by the ratio of average length to width of rete pegs. The greater the ratio narrower are the rete pegs. Median ratio with IQR was calculated. In Psoriasis it was 5.14 with IQR 3.9-6.63 µm and in Psoriasiform Dermatitis it was 3.56 with IQR 2.53-4.68 µm. The difference in this ratio between two classes was statistically significant witjh $U=157$, $P\leq0.001$. The higher ratio in psoriatic biopsies favour the histopathological finding of long slender rete pegs in them. Similar findings were observed by Chandanwale, *et al* and Ghasemi, *et al*[15,21].

In Psoriasis club shaped rete pegs are seen. In an attempt to determine the clubbing ratio of width of rete pegs at 25% of length to that at 75% length was calculated. The lower the ratio the more the clubbing of the rete pegs. In cases of Psoriasis the median ratio of 0.82 was obtained with IQR 0.71-0.95 µm and in Psoriasiform Dermatitis ratio of 1.3 with IQR 1.09-1.6 µm was seen. The difference in this ratio was statistically significant with $U=157$, $P\leq0.001$. Chandanwale, *et al* also observed lower ratio in cases of Psoriasis than Psoriasiform Dermatitis however it not statistically significant ($t=0.002$ and $P=0.983$)[15]. Probable reason being that in our study more advance software with precision was used.

9 cases (27%) of Psoriasis showed absence of granular cell layer while remaning 24(73%) cases showed <3 granular cell layer, all cases of Psoriasiform Dermatitis showed ≥3 cell layer. Ghasemi, *et al* made an attempt in calculating the thickness of granular cell layer in Psoriasis and chronic dermatitis[21]. They found that the granular layer in Psoriasis is significantly thinner. Many other studies reported the similar findings[15,18,19].

Limitations

The major limitation of our study is that we examine biopsies that were clinically diagnosed and histologically confirmed as Psoriasis and Psoriasiform Dermatitis, while histopathology is a vital rule and is utmost needed in modern cases. Do we have to start with typical cases considering our study is nearly starting point? Further future research should certainly focus on borderline cases.

Conclusion

Psoriasiform Dermatitis is the major differential diagnosis, clinically and histopathological of Psoriasis. Some histopathological features ie, regular Epidermal Hyperplasia, Munro's Micro Abscess, Spongiform Pustule of Kogoj, Suprapapillary Thinning, Decreased Granular Cell Layer Favours Diagnosis of Psoriasis. However Severity, Disease Duration, Excoriation Related Changes, Site of Biopsy may affect majority of these parameters. Hence, the diagnostic accuracy can be increased by using the quantitative parameters (Length of Rete Pegs, Length of Dermal Papillae, Suprapapillary Thickness, Length over Average width of the Rete Pegs, Ratio of width at 25% Length Over 75% Length of Rete Pegs). More studies with advance measurement system are needed to confirm and substantiate these findings.

Acknowledgement

The local examination and detailed clinical history required for the part of the study was provided by Dr Kirti Deo, Professor and Dr Nishtha Malik, Resident in Department of Dermatology, Dr DY Patil Medical College, Research Centre and Vidyapeeth, Pimpri, Pune.

Funding : None.

Conflict of Interest : None.

References

1 Barr RJ, Young EM — Psoriasiform and related papulosquamous disorders. *J Cutan Pathol* 1985; **12:** 412-25.
2 Baker H — Psoriasis: a review. Part I. *Dermatologica* 1975; **150(1):** 16-25.
3 Lomholt G — Prevalence of skin diseases in a population: a census study from Faroe Islands. *Dan Med Bull* 1964; **11:** 1-7.
4 Dogra S, Yadav S — Psoriasis in India: Prevalence and pattern. *Indian J Dermatol Venereol Leprol* 2010; **76:** 595-601.
5 Chander G — Psoriasis. In: Sacchidanand S, Chetan O, Inamadar AC, eds. IADVL Textbook of Dermatology. Mumbai: Bhalani Publishing House 2015: 1014-89.
6 Venna AB, Chittla S, Malkud S — A clinico- pathological study of psoriasis and psoriasiform dermatitis. *J Evid Based Med Healthc* 2020; **7(51):** 3085-9. DOI: 10.18410/jebmh/2020/629
7 Ackerman B, Chongchitnant N, Sanchez J — Inflammatory disease. In: Ackerman B, Chongchitnant N, Sanchez J, Guo Y, Bennin B, Reichel M, *et al,* editors. Histologic Diagnosis of Inflammatory Skin Conditions. An Algorithmic Method Based on Pattern Analysis. 2nd ed. Philadelphia: Williams and Wilkins; 1997. 663-73.
8 Toussaint S, Hideko K — Non infectious erythematous papular and squamous diseases of the skin. In: Elder D, Elenitsas R, Jaworsky C, Johnson B, editors. Lever's Histopathology of the Skin. 8th ed. Philadelphia: Lippincott-Raven; 1997. 156-63.
9 Pinkus H, Mehregan AH — Psoriasiform tissue reaction. In: Pinkus H, Mehregan AH, editors. A Guide to Dermatohistopathology. 3rd ed. New York: Appleton-Century-Crofts; 1981. 97-108.
10 Altman EM, Kamino H — Diagnosis: Psoriasis or not? What are the clues? *Semin Cutan Med Surg* 1999; **18:** 25-35.
11 Barr RJ, Young EM Jr — Psoriasiform and related papulosquamous disorders. *J Cutan Pathol* 1985; **12:** 412-25.
12 Georgala S, Befon A, Georgala C — Psoriasiform plaques and periodontal infection — quiz case. Diagnosis: Papillon-Lefèvre syndrome. *Arch Dermatol* 2005; **141:** 779.
13 Bedi TR — Clinical profile of psoriasis in North India. *Indian J Dermatol Venereol Leprol* 1995; **61:** 202-5.
14 Icen M, Crowson CS, McEvoy MT, Dann FJ, Gabriel SE, Maradit Kremers H — Trends in incidence of adult-onset psoriasis over three decades: A population-based study. *J Am Acad Dermatol* 2009; **60:** 394-401.
15 Chanadanwale SS, Panicker NK, Kulkarni SP, Shah KR, Kumar H, Sharma YK, *et al* — Morphometry analysis of psoriasis and psoriasiform dermatitis: A retrospective study of 50 cases. *Med J DY Patil Univ* 2015; **8:** 43-7.
16 Meier M, Seth PB — Clinical spectrum and severity of psoriasis. *Curr Probl Dermatol* 2009: **38:** 1-20. 407.
17 Lal S, Sadana SR, Chitkara NL — Histopathology of psoriasis at various stages. *Indian J Dermatol Venereol Leprol* 1965; **31:** 216-222.
18 Gordon M, Johnson WC — Histopathology and histochemistry of psoriasis. I. The active lesion and clinically normal skin. *Arch Dermatol* 1967; **95(4):** 402-7.
19 Mehta S, Singal A, Singh N — A study of clinicohistopatholoical correlation in patients of psoriasis and psoriasiform dermatitis. *Indian J Dermatol Venereol Leprol* 2009; **75(1):** 100.
20 Gopal AP, Shilpa LN — Significance of clinicopathological correlation in psoriasis. Medical Journal of Dr DY Patil Vidyapeeth University 2015; **8(4):** 481-5.
21 Ghasemi Basir HR, Alirezaei P, Hamian Z, Khanlarzadeh E — Are quantitative histopathologic criteria capable of differentiating psoriasis from chronic dermatitis?. *Clin Cosmet Investig Dermatol* 2018; **11:** 239-44, https://doi.org/10.2147/CCID.S160697

Original Article

Kangaroo Mother Care as an Alternate Mode of Transport to Prevent Hypothermia in Low Birth Weight Babies — An Observational Study

Harshitha Chowdary Nadella[1], Sharanabasavesh Mangalgi[2], Akshatha S[3], Pradeep G C Maralusiddappa[4], Krithika M Veerabhadraiah[5]

Abstract

Background : Neonatal Hypothermia is a significant concern Globally, particularly affecting Low Birth Weight (LBW) and premature infants. Despite the recognition of the importance of thermoregulation in newborn care, rates of Neonatal Hypothermia remain high, especially in resource-limited settings. Kangaroo Mother Care (KMC) has emerged as a recommended method for preventing and treating Neonatal Hypothermia.

Aims and Objectives : This study aims to evaluate the effectiveness of KMC positioning during Neonatal transport in preventing Hypothermia and improving thermoregulation in Low Birth Weight infants.

Materials and Method : An observational study was conducted at a Teaching Medical College in Bangalore for over one year. Ethical approval was obtained, and informed consent was obtained from parents. Newborns with birthweights below 2.5kg were included, with exclusion criteria for specific medical conditions. About 120 neonates were randomly assigned to either KMC or conventional transport groups. Vital signs were recorded after transportation in both the groups and statistical analysis was performed using SPSS software.

Results : An equal distribution of participants was achieved between the KMC and non-KMC groups with similar gestational ages and sex distributions observed in both groups. Comparing vital signs between groups, the KMC group showed significantly higher temperatures (98.438±0.41°F *versus* 97.977±0.53°F, p<0.001), Lower Heart Rates (140.97±7.798 bpm *versus* 135.38±7.718 bpm, p<0.001), Lower Respiratory rates (38.42±2.403 breaths/min *versus* 42.15±5.79 breaths/min, p<0.001) and higher Oxygen Saturation levels (97.97±0.92% *versus* 96.02±1.157%, p<0.001) compared to the non-KMC group.

Conclusion : KMC positioning during neonatal transport effectively prevents Hypothermia and improves thermoregulation in Low Birth Weight Infants. The study underscores the importance of KMC in promoting physiological stability, reducing the risk of complications during transport and fostering parent-infant bonding.

Key words : Hypothermia, Kangaroo-Mother Care Method, Low Birth Weight Infants, Neonatal Intensive Care Unit, Neonatal Respiratory Distress Syndrome.

Neonatal Hypothermia is a prevalent issue Globally. It is preventable and significantly contributes to morbidity and mortality. It primarily affects infants with Low Birth Weight (LBW) and those born prematurely[1,2]. Hypothermia in newborns adversely affects various body systems, such as the heart, lungs, immune system and metabolism. It also hinders regular growth and development by diverting calories from bodily growth to producing heat.

Department of Paediatrics, MS Ramaiah Medical College, Bengaluru, Karnataka 560054
[1]MBBS, MD (Paediatrics) and Corresponding Author
[2]MBBS, MD (Paediatrics), Associate Professor
[3]MBBS, MD (Paediatrics), Fellow in Neonatology
[4]MBBS, DCH, DNB (Paediatrics), DM (Neonatology), Professor
[5]MBBS, MD (Pediatrics), DM (Neonatology), Assistant Professor
Received on : 30/03/2024
Accepted on : 24/06/2024

Editor's Comment :

- Kangaroo Mother Care (KMC) during neonatal transport significantly improves vital sign parameters and reduces Respiratory Distress Syndrome (RDS) incidence compared to conventional methods, emphasizing its effectiveness and protective role.
- Despite similar distributions in gestational age and sex, KMC significantly decreases the prevalence of early preterm births, highlighting its benefits in reducing neonatal complications. Moreover, KMC enhances parental bonding and satisfaction, providing emotional support and security during transport.
- Integrating KMC into transport protocols is a cost-effective and family-centered approach, crucial for improving outcomes and promoting healthy development in preterm neonates, especially in resource-limited settings.

Preventing Hypothermia is fundamental for optimizing newborn survival and overall outcome[3]. Newborns Worldwide, regardless of income levels, experience

How to cite this article : Kangaroo Mother Care as an Alternate Mode of Transport to Prevent Hypothermia in Low Birth Weight Babies — An Observational Study. Nadella HC, Mangalgi S, Akshatha S, Maralusiddappa PGC, Veerabhadraiah KM. *J Indian Med Assoc* 2025; **123(12):** 49-54.

hypothermia with reported in-hospital rates ranging from 32% to 85%[4]. Neonatal Hypothermia rates are still high, especially in locations with few resources, even though thermoregulation is an important element of infant care[5]. In resource-limited settings, Kangaroo Mother Care (KMC) is the recommended method for preventing and treating Neonatal Hypothermia[6-8]. KMC involves skin-to-skin contact between the mother and newborn. This approach is becoming more prevalent in Neonatal Intensive Care Units (NICUs), particularly to mitigate the adverse effects of stress on newborns[9]. A significant prevalence of mild Hypothermia was seen in Low-birth-weight newborns getting conventional care during transport, in contrast to those who received KMC, who exhibited heightened thermoregulation[10]. KMC also decreases occurrences of bradycardia and Oxygen desaturation events in preterm infants. This helps in maintaining physiological stability and may offer potential advantages for neuro-developmental outcomes[11]. Clinically acceptable values for mean cardiorespiratory and temperature outcomes were continuously maintained throughout KMC. Severe episodes of bradycardia, periodic breathing, or apnea did not occur during KMC workouts. Further, when contrasted with infants getting conventional NICU care, those experiencing KMC showed an improvement in regular breathing[12].

Parental bonding with an infant strengthens gradually through interactions spanning pregnancy, birth, and the early stages of the infant's life. This bond is expected to develop organically through shared experiences, interactions and mutual acquaintance. A newborn's first and most natural habitat is in close proximity to its mother. The physiological stability of the newborn is enhanced, their crying is reduced, and the likelihood of breastfeeding is increased through early physical contact[13]. The establishment of a stable parent-infant attachment depends on the mother's close physical touch with her newborn. This bond plays a significant role in the cognitive, motor, and social development of the infant, both during hospitalization and beyond[14]. The effect of close proximity in the NICU extends beyond reducing hospital stay, as it also plays a significant role in alleviating parental stress and enhancing the parent-infant relationship[14]. The bond formed through closeness with their infant serves as a powerful source of strength for parents, guiding them through the inevitable periods of separation in the NICU and helping them transition to normal parenthood[15]. Given the aforementioned context, the following study was conducted to evaluate the effectiveness of KMC positioning during neonatal transport compared to the conventional swaddle method (neonate dressed with a Cap, Cotton Clothing, Diapers, Socks, Cap and Gloves and wrapped in a Blanket, then transported in a Crib) in preventing Hypothermia, measured using temperature in degrees Fahrenheit, and improving thermoregulation of low birthweight infants, assessed by measuring heart rate and respiratory rate.

Materials and Methods

Study Settings and Duration :

A cross-sectional analytical study was conducted at a teaching Medical College in Bangalore. The study was conducted over a one-year timeframe, specifically from October, 2022 to September, 2023.

Ethical Consideration :

Approval for conducting this study was obtained through the ethical clearance process of the Institutional Ethics Committee on Human Subjects (Approval No. MSRMC/EC/2016). Following the approval from the Institutional Ethics Committee, data was gathered from parents of neonates whose babies met the inclusion criteria and study protocol, having provided their informed consent through a signed document.

Study Population :

Newborns with birthweights of less than 2.5kg were admitted in the NICU of Teaching Medical College in Bangalore during the study period were included in this study.

Inclusion Criteria :

Mothers willing to take part and capable of practicing KMC comfortably were included. All the LBW neonates (from 1 kg to less than 2.5 kg) who were physiologically stable were enrolled in the study.

Exclusion Criteria :

Infants on ventilation, with septicemia, fever, or congenital cardiac and lung abnormalities were excluded from the study.

Sample Size Calculation :

According to Ludington-Hoe, *et al* study[12], considering the mean and Standard Deviation of Heart rate in KMC group as 152.17±10.84, mean and Standard

Deviation of Heart rate in the Control group as 147.22 ± 6.99 at 95% confidence interval with 80% power, the sample size is calculated as –

$N = (Z_{1-\alpha/2} + Z_{1-\beta})^2 * 2 * \sigma^2 / (m1 - m2)^2$

Z1-α/2 - two tailed probability for a 95% confidence interval = 1.96,

Z1-β - two tailed probability for 80% power = 0.84,

μ1 - mean of Heart rate in KMC group = 152.17,

μ2 - mean of Heart rate in the Control group = 147.22,
σ - average Standard Deviation of Heart rate in KMC group & Heart rate in the Control group = 8.92,

N = (1.96 + 0.84) ^2 * 2 * 8.915^2 / (152.17-147.22) ^2

N = 50.92, Thus, the minimum sample size required for each group is 51 and the total sample size is 102.

Sampling Method :

A total of 120 infants were included in this study. Subjects comprising the study population were categorized into two categories. To ensure fair randomization, sixty infants were assigned at random through sequentially sealed opaque envelopes to either Group 1 (KMC) or Group 2 (No KMC).

Intervention :

Group 1 neonates were provided with KMC while being transported. The neonate was clothed and diapered, then carefully transferred and positioned against the exposed Chest of the caregiver. The head was rotated to one side and held in a slightly extended position, while the arms and legs were flexed and abducted in a "frog" formation. Following appropriate positioning, the neonate was strapped in using the KMC garment that was being put on by the caregiver. The infant was clothed in a Blanket. Subsequently, the attendant was directed to apply manual support to the patient's back and neck.

During transportation, the neonates in group 2 were not administered to KMC. The neonate was dressed in cotton clothing, including a Cap, Baby Diapers, Stockings and Mittens. Additionally, a blanket was used to encase the infant as they were conveyed in the crib.

Data Collection Procedures :

Heart rate, respiratory rate, body temperature, and Oxygen Saturation of participants were recorded by the health worker before and after shifting the baby from the NICU to ward.

Statistical Analysis :

Data was entered into the Microsoft excel data sheet and was analyzed using SPSS 22 version software (IBM SPSS Statistics, Somers NY, USA). Categorical data were represented as frequencies and proportions. The Chi-square test, or Fischer's exact test, was used as a test of significance for qualitative data. Continuous data was represented as mean and Standard Deviation. The independent t test was used as a test of significance to identify the mean difference between two quantitative variables. P value of <0.05 was considered as statistically significant after assuming all the rules of statistical tests.

Results

The participants were allocated into two categories for our study: one group was administered KMC while shifting, and the other group was not provided with KMC during shifting. Each group comprised 60 subjects, allowing us to compare the outcomes of the two groups effectively. This design enabled us to assess the impact of KMC on various parameters during shifting and evaluate its potential benefits compared to standard care methods.

Table 1 describes the general characteristics in each group. Our study included 60 subjects in each group, with 91.7% of participants being less than 37 weeks gestational age. Sex distribution was similar between groups, with no significant difference. While 83.3%

Table 1 — *Comparison of Gestational Age, Sex, Comorbidities Diagnosis between two groups*

Variables	With KMC		Without KMC		P Value
	N	%	N	%	
Gestational age :					
<37weeks	55	91.7	55	91.7	1.000
>37weeks	5	8.3	5	8.3	
Sex of infants :					
Female	28	46.7	23	38.3	0.46
Male	32	53.3	37	61.7	
Diagnosis :					
Early preterm	1	1.7	14	23.3	0.001
Preterm	50	83.3	35	58.3	
Late preterm	9	15.0	11	18.3	
Respiratory Distress Syndrome :					
Yes	27	45.0	14	23.3	0.02
No	33	55.0	46	71.7	
Very Low Birth Weight :					
Yes	28	47.5	23	41.1	0.574
No	32	52.5	37	58.9	
Intra-uterine Growth Retardation :					
Yes	9	15.0	5	8.3	0.394
No	51	85.0	55	91.7	

of the KMC group were preterm, 58.3% were preterm in the non-KMC group, showing a significant difference in diagnosis. Regarding Respiratory Distress Syndrome (RDS), 45% of the KMC group subjects had RDS compared to 23.3% in the non-KMC group, showing a significant difference. However, no significant difference was found between the groups regarding Very Low Birth Weight (VLBW) or Intrauterine Growth Restriction (IUGR).

Table 2 provides a detailed comparison of vital signs between the two groups: one receiving KMC during neonatal transport and the other without KMC. The mean values and Standard Deviations for temperature, Heart rate, Respiratory rate and Oxygen saturation (SpO2) are presented for each group. In the KMC group, the mean temperature was recorded at 98.438°F, Heart rate at 140.97 beats per minute, respiratory rate at 38.42 breaths per minute, and SpO2 at 97.97%. Conversely, in the group without KMC, the mean temperature was slightly lower at 97.977°F, heart rate at 135.38 beats per minute, respiratory rate was higher at 42.15 breaths per minute, and SpO2 was lower at 96.02%. These differences were found to be statistically significant (P<0.001), showing that KMC is associated with more favorable vital sign parameters during neonatal transport. The data suggest KMC plays a crucial role in maintaining physiological stability and promoting optimal outcomes for transported neonates.

Discussion

In our research, we found that KMC effectively prevented Low Birth Weight neonates from getting too cold when they were moved from the NICU to the wards. We noticed that when compared to the traditional method of transport, using KMC helped keep the babies' Heart rate, breathing rate, and Oxygen levels stable. This method of transport, which was studied in Germany, was safe, effective, and cost little. Plus, it improved the bond between parents and their babies. Another study by Sontheimer, *et al*, involving 24 neonates, found that those transported in the KMC position (16 neonates) had similar stability in their vital signs during and even after transport, compared to those transported in an incubator (eight neonates)[16].

Many studies have revealed that in areas where resources are limited, healthcare providers frequently don't have the equipment or training to treat Hypothermia effectively. This results in a lack of concern and insufficient focus on this widespread issue[17,18]. Different research endeavors and training initiatives have showed successful reductions in Hypothermia rates and enhancements in knowledge about the condition. This was achieved by offering education and providing suitable thermoregulatory equipment to supplement KMC[19]. In a systematic review and meta-analysis conducted by Narciso LM, *et al* in 2022, involving 12 studies, it was concluded that KMC is a safe and cost-effective intervention. The review found that KMC has been consistently effective in decreasing the occurrence of Hypothermia and shortening hospital stays for newborns[20]. The study mentioned also sheds light on the crucial aspect of keeping parents and infants together during neonatal transport. This practice is significant, as it allows parents to feel empowered in protecting their newborn and fosters a sense of security. KMC emerged as particularly beneficial as it facilitates increased closeness between parents and infants, offering advantages for both parties in terms of emotional bonding and care provision[21]. The study conducted by Sontheimer, *et al* revealed that parents expressed feelings of safety and happiness when they were present during their infant's transfer. This suggests that allowing parents to accompany their infant during transfer contributes positively to their emotional well-being and satisfaction with the care provided[16].

Transport attributes and mortality determinants among newborns referred to a Tertiary Care Center in North India were the subjects of an investigation by Singh J, *et al*. A decline in the hemodynamic status of neonates and heightened mortality rates were observed throughout the referral and transport processes it was determined. This highlights the critical challenges and risks involved in the transportation of neonates, particularly in resource-limited settings, underscoring the need for effective strategies to improve outcomes during this vulnerable period[22]. Several strategies can enhance outcomes during the transportation of neonates. These include ensuring sufficient stabilization, raising awareness

Table 2 — *Comparison of vitals between two groups*

Vitals	With KMC	Without KMC	P value
Temperature	98.438 ± 0.41	97.977 ± 0.53	0.001
Heart rate	140.97 ± 7.798	135.38 ± 7.718	0.001
Respiratory rate	38.42 ± 2.403	42.15 ± 5.79	0.001
SpO2	97.97 ± 0.92	96.02 ± 1.157	0.001

regarding proper transportation approaches and improving resuscitation abilities. KMC plays a crucial role in this process by preventing mortality and stabilizing neonates during transport. By promoting skin-to-skin contact, warmth, and parental involvement, KMC helps maintain physiological stability, reducing the risk of complications and mortality during transit. Therefore, integrating KMC into neonatal transport protocols can significantly contribute to improving outcomes and ensuring the safety of transported neonates[23]. When certain conditions are met, transporting an infant in the KMC position can be regarded as both a viable mode of transportation and a financially efficient strategy. When the infant meets the set criteria for KMC, such as stable vital signs and weight, using KMC for transport can offer several benefits. Not only does it promote physiological stability and parent-infant bonding during transit, but it can also be more cost-effective compared to traditional transport methods that may require expensive equipment or specialized vehicles. Therefore, when the conditions are suitable, opting for KMC as the mode of transport can be a practical and beneficial choice for both the infant and the healthcare system[24,25]. Indeed, KMC offers several advantages over conventional methods of transport for neonates. Its benefits include promoting physiological stability, reducing the risk of Hypothermia, facilitating parent-infant bonding, and potentially being more cost-effective. By utilizing KMC during transport, infants receive continuous warmth, support, and care from their parents, which can help maintain their well-being throughout the journey. Additionally, KMC encourages active parental involvement in the care of their newborn, fostering a sense of empowerment and emotional connection. Overall, the evidence suggests that KMC is a preferable and helpful mode of transport for neonates compared to conventional methods.

Limitations of the Study :

Although the study included 120 neonates, with 60 in each group, a larger sample size might have provided more robust statistical power and a better representation of the population, potentially enhancing the generalizability of the findings. Conducting the study in a single centre may limit the generalizability of the results to other healthcare settings with different practices, resources, and patient populations. The study employed an observational design, which might introduce bias and confounding variables that could affect the accuracy and reliability of the results compared to randomized controlled trials. While the study focused on vital sign parameters and Respiratory Distress Syndrome (RDS) incidence, other important outcomes such as long-term neurodevelopmental outcomes, duration of hospital stay, and parental satisfaction were not assessed, limiting the comprehensive evaluation of KMC during neonatal transport.

Conclusion

Neonatal Hypothermia presents a significant challenge, particularly in resource-limited medical settings. Maintaining euthermic is crucial for neonatal survival and normal growth and development. Therefore, it's essential to scale up effective interventions to combat Hypothermia, thereby optimizing neonatal outcomes. KMC has emerged as a protective measure against Hypothermia, offering a safe and low-cost intervention without evidence of harm. This approach not only prevents complications associated with preterm birth and low birth weight in full-term newborns, but also stabilizes the newborn's vital signs during transport, including [h]eart rate, Respiratory rate, and Oxygen Saturation. Given its many advantages, including promoting parental bonding and ensuring apparent safety, KMC should continue to promote development and fostering family-centered care for preterm neonates.

Acknowledgment : NIL.

Funding : NIL.

Conflicts of Interest : The authors declare no conflicts of interest.

References

1 Mullany LC, Katz J, Khatry SK, LeClerq SC, Darmstadt GL, Tielsch JM — Risk of mortality associated with neonatal hypothermia in southern Nepal. *Arch Pediatr Adolesc Med* 2010; **164(7):** 650-6.

2 Mullany LC — Neonatal hypothermia in low-resource settings. *Semin Perinatol* 2010; **34(6):** 426-33.

3 World Health Organization. WHO recommendations on newborn health: guidelines approved by the WHO Guidelines Review Committee [Internet]. World Health Organization; 2017 [cited 2023 May 17]. Available from: https://apps.who.int/iris/bitstream/handle/10665/259269/WHO-MCA-17.07-eng.pdf.

4 De Almeida MFB, Guinsburg R, Sancho GA — Hypothermia and early neonatal mortality in preterm infants. *J Pediatr (Rio J)* 2014; **90(4):** 335-9.

5 Beletew B, Mengesha A, Wudu M, Abate M — Prevalence of neonatal hypothermia and its associated factors in East Africa: a systematic review and meta-analysis. *BMC Pediatr* 2020; **20(1):** 148.

6 Hirst JE, Amir LH, Hoffmann T — Effect of early skin-to-skin mother-infant contact during the first 3 hours following birth on exclusive breastfeeding during the maternity hospital stay: a randomized controlled trial. *Int Breastfeed J* 2021; **16(1):** 12.

7 Mwizerwa O, Adejuyigbe EA, Van den Broeck J — Feasibility and acceptability of a low-cost, tailored training program for Kangaroo Mother Care in Nigeria. *BMC Pregnancy Childbirth* 2020; **20(1):** 457.

8 WHO Immediate KMC Study Group, Arya S, Naburi H, *et al* — Immediate "Kangaroo Mother Care" and Survival of Infants with Low Birth Weight. *N Engl J Med* 2021; **384(21):** 2028-38.

9 Hennequin, Y — Skin to skin back transfers provide a feasible, safe and low stress alternative to conventional neonatal transport. *Acta Paediatrica* 2017; **107(1):** 163-64. doi:10.1111/apa.14071.

10 Nimbalkar S — Effect of kangaroo mother care transport in preventing moderate hypothermia in low birth weight babies during transportion to home after discharge: A randomized controlled trial. *Indian Pediatrics* 2023; **60(4):** 272-6. doi:10.1007/s13312-023-2857-1.

11 Mitchell AJ — Effects of daily kangaroo care on cardiorespiratory parameters in preterm infants. *Journal of Neonatal-Perinatal Medicine* 2013; **6(3):** 243-9. doi:10.3233/npm-1370513.

12 Ludington-Hoe SM, Anderson GC, Swinth JY, Thompson C, Hadeed AJ — Randomized controlled trial of kangaroo care: cardiorespiratory and thermal effects on healthy preterm infants. *Neonatal Netw* 2004; **23:** 39-48.

13 Moore ER, Bergman N, Anderson GC, Medley N — Early skin-to-skin contact for mothers and their healthy newborn infants. *Cochrane Database of Systematic Reviews* 2016; 11, CD003519 .

14 Flacking R, Lehtonen L, Thomson G — Closeness and separation in neonatal intensive care. *Acta Paediatrica* 2012; **101:** 1032-7.

15 Mäkelä H — Clinging to closeness: The parental view on developing a close bond with their infants in a Nicu. *Midwifery* 2018; **62:** 183-8. doi:10.1016/j.midw.2018.04.003.

16 Sontheimer D, Fischer CB, Buch KE — Kangaroo transport instead of incubator transport. *Pediatrics* 2004; **113:** 920-3.

17 Kyokan M, Jirapaet V, Rosa-Mangeret F, Pisoni GB, Pfister RE — Clinical detection of 'cold stress' is overlooked: an online survey of healthcare workers to explore the gap in neonatal thermal care in low-resource settings. *BMJ Paediatr Open* 2022; **6(1):** e001606. doi: 10.1136/bmjpo-2022-001606.

18 Belard S, Kojom Foko LP, Tchokoteu PF, Chiabi A, Bojang K — Hypothermia in neonates: a review of risk factors, diagnosis, management and prevention in resource-limited settings. *Pediatric Research* 2021; **89(4):** 871-8. doi: 10.1038/s41390-020-01153-1.

19 Garcia AF — Prevention and treatment of neonatal hypothermia through an implementation science study in Jaltenango Chiapas, Mexico. 2023. doi:10.21203rs-2967486/v1.

20 Narciso LM, Beleza LO, Imoto AM — The effectiveness of Kangaroo Mother Care in hospitalization period of preterm and low birth weight infants: Systematic review and meta-analysis. *J Pediatr (Rio J)* 2022; **98 (2):** 117-25. DOI: 10.1016/j.jped.2021.06.00

21 Lundqvist P — Kangaroo position during Neonatal Ground Ambulance Transport: Parents' experiences. *Nursing in Critical Care* 2021; **27(3):** 384-91. doi:10.1111/nicc.12681.

22 Singh J — Transport characteristics and predictors of mortality among neonates referred to a tertiary care centre in North India: A prospective observational study. *BMJ Open* 2021; **11(7)**. doi:10.1136/bmjopen-2020-044625.

23 Kanodia P, Bora R, Gupta A — Kangaroo mother care- a cost effective and an alternate method to manage hypothermia in low birthweight babies for better clinical outcome. *Value Health* 2016; **19(7):** A405. doi: https://doi.org/10.1016/j.jval.2016.09.338.

24 van den Berg J — Exploring physiological stability of infants in Kangaroo Mother Care Position Versus placed in transport incubator during Neonatal Ground Ambulance Transport in Sweden. *Scandinavian Journal of Caring Sciences* 2021; **36(4):** 997-1005. doi:10.1111/scs.13000.

25 Wahyuningrum AD — Kangaroo mother care in improving thermoregulation of premature babies during the COVID-19 pandemic: A case report. *Kesmas: Jurnal Kesehatan Masyarakat Nasional* 2023; **18(3):** 84. doi:10.21109/kesmas.v18i3.7038.

Original Article

Burden and Factors Influencing Tobacco Use and Other Substance Abuse among Immigrant Construction Workers in Chennai — A Community Based Cross Sectional Study

Hemakairavi R[1], Lovling Aarthy Maria[2], Regan M S[3]

Abstract

Background : Substance abuse, especially Tobacco use, is highly prevalent among migrant construction workers due to stress, weak support systems and easy access. This study aims to estimate the prevalence and assess the influencing factors of substance abuse among this population.

Materials and Methods : This Community based Cross-sectional study was done with a pretested semi-structured questionnaire that was administered among 420 migrants in ten randomly chosen construction sites in Chennai between May 2017 and May 2018, after informed consent in their native language. Logistic regression was applied to find the predictors of substance users using SPSS.

Results : Among 420 participants, 340 (81%) were found to be abusing at least one form of substance. Among the 340 substance abusers, majority were using Tobacco 289 (85%) along with other substances followed by Alcohol 193 (57%), Ganja 41 (12%) & Cough syrup 5 (2%). 154 (53.3%) initiated the habit because of their friends and peers. 56 (19.37%) of them mentioned stress to be the reason. Age, Sex, Residence near the work place, Type of work, Working experience, Working hours were found to be statistically significance (p value <0.05) association with substance abuse using multiple logistic regression.

Conclusion : Awareness programs concerning substance abuse with cessation measures should be implemented for migrant construction in cooperation with employers.

Key words : Migrant Construction Workers, Substance Abuse, Tobacco.

Substance abuse, particularly Tobacco use plagues India causing premature deaths and health problems[1]. Varying values, stress, weak support systems, social norms and easy accessibility to substances exacerbate this issue. Substance abuse burdens individuals and society, particularly vulnerable migrant construction workers due to demanding conditions and misconceptions about its benefits[2]. Addressing these factors through support systems and researches tailored to their needs is crucial for their well-being. This study aims to estimate the prevalence and assess the factors influencing Tobacco and other substance use among migrant construction workers.

Editor's Comment :

- Substance abuse is widespread among migrant construction workers, driven mainly by peer influence, long working hours, and stressful living and working conditions.
- Addressing these factors through workplace-based interventions, strengthened tobacco control and improved living arrangements is essential to protect this high-risk population.

Largely, numerous people are involved in migration, among them, migration for work is frequent in a Globalized World characterized by extreme inequality, vulnerabilities and determinants. In India, there are 30 million migrant labourers, according to a survey by the National Sample Survey Organization (NSSO). Among these around 20 million are construction workers. One of the biggest economic sectors that contributes significantly to the GDP of India is the construction industry.

[1]MD, Associate Professor, Department of Community Medicine, Bhaarath Medical College and Hospital, Chennai, Tamil Nadu 600073
[2]MD, Associate Professor, Department of Communirty Medicine, Vinayaka Missions Kirupananda Variyar Medical College and Hospital, Salem, Tamil Nadu 636308
[3]MD, Associate Professor, Department of Community Medicine, SRM Medical College Hospital and Research Center, Chennai, Tamil Nadu 603203

Received on : 12/12/2024
Accepted on : 21/01/2025

How to cite this article : Burden and Factors Influencing Tobacco Use and Other Substance Abuse among Immigrant Construction Workers in Chennai — A Community Based Cross Sectional Study. Hemakairavi R, Maria LA, Regan M S. *J Indian Med Assoc* 2025; **123(12):** 55-9.

Despite being more vulnerable to a wide range of occupational dangers, very few studies have looked into the issues faced by migrant construction workers. Workers in this sector put in long hours of physical labour while living in subpar conditions. Substance abuse is one of the most important public health concerns among migrant construction workers. The unsanitary working conditions, work schedule, lack of leisure activities, and illicit companions compel them to engage in a variety of abusive behaviours, mostly substance abuse.

According to the World Health Organization (WHO), substance abuse is the continued use of drugs or alcohol in spite of awareness of a persistent or recurring social, occupational, psychological, or physical issue that is brought on by or made worse by the use of drugs or alcohol on a regular basis in physically risky situations. The usage of illegal substances, such as Prescription Medicines, Alcohol, Tobacco, Cocaine, Heroin and Marijuana, is included in the category of substance usage. One of the largest epidemics the World has ever seen is Tobacco use. Tobacco use kills over 6 million people annually Worldwide, most of them in low- and middle-income nations.

A significant region for the production and use of Tobacco is South Asia and India is ranked second. Cigarettes and Beedis are the two most often consumed forms of smoked Tobacco. Smokeless tobacco use is more common than smoked tobacco usage. Any Tobacco used orally, such as by chewing, sucking, or applying to the teeth and gums, that is not heated or burned is referred to as Smokeless Tobacco. Gul, a creamy Snuff Paste, Gutka, Chewable Tobacco, Mishri, Powdered Tobacco, Khaini, Tooth Powder and Tobacco water are some more well-liked smokeless tobacco products. Both the Smoker and those around them suffer negative consequences from Tobacco use resulting in the early death of adults, which would leave many families without a source of income and leave old and young family members desolate[3].

Materials and Methods

This Community based Cross-sectional study was conducted to estimate the prevalence and assess the factors influencing Tobacco use and other substance abuse among the migrant construction workers in Chennai in between 2017-2018.

The sample size of 420 was calculated using the formula $N = [(Z_{1-\alpha/2})^2 p(1-p)] / d^2$

with a 95% confidence level, 5% precision, and a 20% non-participation rate by assuming a 91% (p) prevalence of Tobacco use among construction workers as per the study by Parashar, *et al* in 2016[4].

A multi-stage random sampling design was used as a sampling technique for achieving the sample size of 420. In stage 1, from the 30 active construction sites in Chennai with more than 100 workers, HIV screening was conducted by SRM University under DAPCU and TI programs. Stage 2 involved randomly selecting 10 sites from the 30 active construction sites in Chennai. In stage 3, by applying Probability Proportional to Size (PPS) sampling, individual labourers from 10 selected construction sites were included in the study. The probability of selecting a labourer from a particular site was proportional to the total number of Labourers at that site. If a selected labourer was unavailable or unwilling to participate, they were replaced with the next labourer on the list until a predetermined sample size was achieved.

A pretested, semi-structured questionnaire was used for data collection. It has four parts, Part A- a Socio-demographic profile; Part B- working conditions (occupation, working hours etc,); and Part C- Profile of Addiction to Tobacco products; Part D- Other substance use, which also includes AUDIT for Alcohol use.

The Institution's Ethics Committee approval were sought and obtained from SRM Medical University, Chennai (Ref Id: 1134/IEC/2017). Data was collected from all participants through personal interviews in the workers' native languages after obtaining informed written consent. The anonymity of the study participants was maintained.

The data was analysed using SPSS 20.0 software. The statistics used were descriptive statistics (mean, SD, frequencies, per cent), chi-square test, logistic regression and p value <0.05 were considered significant.

Results

Demographic profile of the study population is shown in Table 1 based on their age, level of education, marital status and social economic class. 173 (47.5%) males were in the age group of 25-39 years.

Table 1 — *Socio-demographic characteristics of the study participants (N=420)*

Variables	Male N (%)	Female N (%)	Total N (%)
Age :			
<25	49 (13.5)	2 (3.6)	51 (12)
25 to 39	173 (47.5)	34 (60.7)	207 (49.3)
>40	142 (39)	20 (35.7)	162 (38.7)
Education :			
No formal schooling (Illiterate)	75 (20.6)	45 (80.4)	120 (28.6)
Up to Primary schooling	120 (33)	9 (16)	129 (30.7)
Up to Secondary schooling	164 (45)	2 (3.6)	166 (39.5)
College/University completed	5 (1.4)	0	5 (1.2)
Marital Status :			
Married	229 (62.9)	49 (87.5)	278 (66.2)
Unmarried	135 (37.1)	7 (12.5)	142 (33.8)
Socio Economic Status :			
Lower	31 (8.5)	7 (12.5)	38 (9.04)
Lower middle	127 (34.9)	22 (39.3)	149 (35.47)
Middle	102 (28)	20 (35.7)	122 (29.04)
Upper Middle	90 (24.7)	7 (12.5)	97 (23.15)
Upper	14 (3.8)	0	14 (3.3)
TOTAL	364(86.7)	56(13.3)	420 (100)

Table 2 shows the Occupational profile of the study population. Out of 420 study participants around 99 (27.2%) males were helpers by occupation, this table also shows 211 (57.96%) male participants were working for more than five years in the area of construction field.

Prevalence of any form of Substance among 420 participants, majority ie, 340 (81%) were found to be abusing at least one form of substance. Among the 340 substance abusers, majority were using Tobacco 289 (85%) along with other substances followed by Alcohol 193 (57%), Ganja 41 (12%) & Cough syrup 5 (2%).

The Reasons for initiating Tobacco Usage among the study participants has been illustrated. 154 (53.3%) initiated the habit because of their friends and peers,

Table 2 — *Occupation Characteristics of the study population (N=420)*

Variables		Male N (%)	Female N (%)
Nature of work	Mason	53 (14.56)	4 (7.1)
	Carpenter	44 (12.09)	0
	Welder	69 (18.95)	0
	Electrician	17 (4.67)	0
	Plumber	13 (3.57)	0
	Helper	99 (27.2)	52 (92.9)
	Others	69 (18.96)	0
Work experience	<1 year	48 (13.19)	10 (17.86)
	1 to 5 years	105 (28.85)	22 (39.28)
	>5 years	211 (57.96)	24 (42.86)

Almost 56 (19.37%) of them mentioned stress to be the reason.

In Table 3, the association of substance abuse with the variables were given. Age, Sex, Residence near work place, Type of work, Working experience, Working hours were found to be statistically significance (p value <0.05) association with substance abuse.

In Table 4, the multiple logistic regression for the associated variables with that of substance abuse were given. Male gender, Residence near work place, Working experience less than 5 years, were significantly (p value <0.05) determining factors for substance abuse among the study participants.

Discussion

Our study shows 340 (81%) of the study participants, had at least experienced; substance abuse. The mean age of our study participants was 29 years, which is similar to the study conducted by Parashar M, *et al*,[4]

Table 3 — *Association of Substance abuse with variables (N=420)*

Substance Use	Any (n=340)	No (n=80)	$\chi 2$	OR (95% CI)	p-value
Age in Years :					
<25	50 (98%)	1 (2%)	12.3	0.12	<0.001*
25 to 39	171 (82.6%)	36 (17.4%)		(0.05-0.6)	
≥40	119 (73.5%)	43 (26.5%)			
Gender :					
Male	306 (90)	58 (72.5)	17.16	4.57	<0.001*
Female	34 (10)	22 (27.5)		(2.16-9.2)	
Marital Status :					
Married	109 (76.8%)	33 (23.2%)	2.5	0.7	0.12
Unmarried	231 (83%)	47 (17%)		(0.4-1.1)	
Literacy :					
Literate	247 (82.3%	53 (17.7%)	1.4	1.3	0.25
Illiterate	93 (77.5%)	27 (22.5%)		(0.8-2.3)	
Residence near Work Place :					
Yes	189 (55.6%)	61 (76.3%)	11.5	0.4	0.001*
No	151 (44.4%)	19 (23.7%)		(0.2-0.7)	
Work Experience in Construction Field :					
<1 year	39 (11.4%)	19 (23.8%)	24.9	4.09	<0.001*
1-5 years	91 (26.8%)	36 (45%)		(2.05-8.13)	
>5 years	210 (61.8%)	25 (31.2%)			
Working hours per day :					
≤8 hours	118 (74.2%)	41 (25.8%)	7.5	0.5	0.006*
>8 hours	222 (64.1%)	39 (15%)		(0.3-0.8)	
Type of Work :					
Manual	193 (76%)	62 (24%)	11.7	0.4	0.001*
Non-manual	147 (89%)	18 (11%)		(0.2-0.7)	
Pre-placement Examination :					
Yes	37 (10.9%)	3 (3.8%)	3.8	3.1	0.051
No	299(87.9)	79(98.8)		(0.9-10.4)	

*p<0.05 taken as Significant, OR - Odds Ratio,
CI - Confidence Interval, $\chi 2$ - Chi square Statistics.

Table 4 — *Logistic regression analysis of significant factors influencing substance use among the study participants (N=420)*

Variables	Adjusted Odds Ratio	95% C.I for Adjusted Odds Ratio		p-Value
		Lower Bound	Upper Bound	
Intercept				0.004
Age in Years :				
<25	7.8	0.9	61.7	0.052
25 - 39	1.1	0.6	1.9	0.86
>40	-	-	-	-
Gender :				
Male	2.6	1.3	5.1	0.007*
Female	-	-	-	-
Residence near work Place :				
Yes	0.5	0.27	0.93	0.027*
No	-	-	-	-
Type of Work :				
Manual	0.6	0.33	1.17	0.14
Non-manual	-	-	-	-
Work Experience :				
<1 Year	0.35	0.16	0.77	0.009*
1-5 Years	0.47	0.24	0.9	0.024*
>5 Years	-	-	-	-
Working Hours :				
≤8 hours	1.02	0.57	1.83	0.94
>8 hours	-	-	-	-

*p<0.05 taken as Significant, CI- Confidence Interval

Laad PS, *et al*,[5] and Akram S, *et al*,[6] where the mean age was between 20 and 35 years. In our study, the participants with substance abuse; who were working for more than 5 years (61.8%) on the construction site had four-times higher risk of substance abuse than those working for less than one year (11.4%), with statistical significance (p<0.001). The participants with substance use working for more than 8 hours per day had higher risk (p value 0.006) of substance abuse than those working for less than 8 hours per day. Similar findings were found in the study done by Amrutha AM, *et al*[7] where working for more than 5 years and working for more than 10 hours a day were associated with a higher risk of substance abuse. Among the substance abusers, tobacco products were 85% but, in a study done by Akram Setal, *et al*[6] where tobacco usage was found to be 54%. While Suhasini V, *et al*[8] found that only 39% were using Tobacco, more than half of the study participants were consumers of Alcohol 57%, which contrasts with the study by Suhasini V, *et al*[8] where only 25% were alcohol consumers. 12% of our study participants had Ganja and 2% abused Cough syrup. This contrasts with the Gavioli A, *et al* study[9] where other forms of substance abuse were inhalant drugs, especially solvents. Age, gender, Residence near work place, Work experience and Working hours showed a statistically significant association with substance use (p<0.05). The reasons cited were Friends (53.3%); Stress (19.4%), and work overload (17.3%). Also, some agreed that the easy availability of these products was a reason for substance abuse. Similar findings were seen in the study done by Amrutha AM, *et al*[7].

Limitations

The research was conducted at only 10 construction sites in South Chennai as a result of the lack of permission to conduct the study. Hence, the prevalence cannot be generalized to the whole population of migrant construction workers. Fear or insecurity may have prevented certain study participants from disclosing their actual substance abuse.

Conclusion

The construction industry often attracts a diverse group of individuals, including many migrant workers who are susceptible to the challenges of workplace Stress, isolation from families, and potential substance abuse. This issue not only imposes a personal burden on the individuals involved but also creates risks that can lead to accidents, decreased productivity, and major implications for both employers and the broader community. This study addressed the critical issue that affects not only the health and well-being of individuals but also the overall safety and productivity of our construction workforce: substance abuse among migrant workers.

Recommendations

Comprehensive Awareness Programs concerning substance abuse specifically tailored for migrant construction workers should be implemented. Such programs should focus on educating workers about the dangers and consequences of substance use, while also providing them with essential resources and support systems. We must also consider creating cessation measures that can help those who are struggling with substance abuse to regain control of their lives. These measures might include confidential counselling services, support groups, and access to rehabilitation programs. I propose that we engage in a partnership involving construction companies, healthcare providers, community organizations, and local Government agencies to develop and implement

these programs. Enforcing Tobacco laws at construction sites would regulate substance abuse among migrant workers. And also arranging quality Residence near to work place especially for the migrant workers with their family who are already away from their home would drastically reduce Stress, unnecessary Absenteeism & substance abuse by increasing quality time with friends & family. This in turn improves their overall quality of life & productivity.

Funding : None.

Conflict of Interest : None.

References

1 World Health Organization. Lexicon of alcohol and drug terms. 1994;65.
2 Refugee and migrant health - Global [Internet]. [Cited 2024 Apr 11]. Available from: https://www.who.int/health-topics/refugee-and-migrant-health#tab=tab_1.
3 Non communicable Disease Surveillance, Monitoring and Reporting [Internet]. [cited 2024 Apr 11]. Available from: https://www.who.int/teams/noncommunicable-diseases/surveillance/systems-tools/global-adult-tobacco-survey.
4 Parashar M, Agarwalla R, Mallik P, Dwivedi S, Patvagekar B, Pathak R — Prevalence and correlates of nicotine dependence among construction site workers: A cross-sectional study in Delhi. Lung India [Internet]. 2016 Sep 1 [cited 2024 Nov 29]; **33(5):** 496. Available from: https://pmc.ncbi.nlm.nih.gov/articles/PMC5006328/
5 Laad Dr P. Prevalence of Substance Abuse among Construction Workers [Internet]. [cited 2024 Apr 11]. Available from: https://www.academia.edu/35195235/Prevalence_of_Substance_Abuse_among_Construction_Workers.
6 Akram S, N A G, Nirgude As, Shetty S. A Study on Tobacco Use and Nicotine Dependence among Plywood Industry Workers in Mangalore City. *J Evol Med Dent Sci* 2015; **4(33):** 5729-35.
7 Proportion of smokers and its determinants among migrant workers in Mysore, Karnataka, India | International Journal of Community Medicine and Public Health [Internet]. [cited 2024 Nov 11]. Available from: ttps://www.ijcmph.com/index.php/ijcmph/article/view/809
8 Suhasini V, S Murthy K — A Study of Substance Use among Construction Workers in Suburban Hyderabad. *MRIMS Journal of Health Sciences* 2016; **4(2):** 126.
9 Risco relacionado ao consumo de drogas em homens trabalhadores da construção civil [Internet]. [Cited 2024 Apr 11]. Available from: https://www.researchgate.net/publication/272562904_Risco_relacionado_ao_consumo_de_drogas_em_homens_trabalhadores_da_construcao_civil.

Original Article

Correlation of Lipid Profile Abnormality in Overt and Subclinical Hypothyroidism : A Hospital based Cross Sectional Observational Study

Sourav Mukherjee[1], Paramita Bhattacharya[2], Arkadeb Maiti[3], Manuj Kumar Sarkar[4], Sujoy Sarkar[5], Salil Kumar Pal[6], Saumik Datta[7]

Abstract

Background : Hypothyroidism is a very common endocrinological disease that often requires lifelong treatment. It can be classified into Subclinical and Overt Hypothyroidism. Obesity and Hypercholesterolemia are very commonly associated with Hypothyroidism. The correlation of Lipid profile abnormality in different presentations of thyroid disorders can help us predict future lipid profile abnormality in such patients, thereby initiating primordial and primary prevention in such patients.

Aims and Objective : To study the association of various lipid profile abnormalities in Overt and Subclinical Hypothyroidism.

Methods and Material : A hospital based cross sectional observational study was done for 1½ years duration on 155 patients fulfilling the Inclusion criteria : (i) age >18 years, (ii) all newly diagnosed patients with Hypothyroidism, who are not on thyroxine therapy, non-pregnant, or not on oral contraceptive pills. Exclusion criteria: (i) Any acute illness, (ii) Grave's Disease and (iii) Familial Dyslipidemia Syndrome.

Results : In our study, out of 155 patients, 103 (66.5%) were Female, 99 (63.9%) had Overt Hypothyroidism and 56 (36.1%) patients had Subclinical Hypothyroidism respectively. The most common age group with Hypothyroidism was 31-40 (40.0% of total patients), closely followed by 21-30 (39.4% of total patients) years. The mean TSH was 12.52 ± 6.05, fT4 was 72.28 ± 16.26, and fT3 was 0.92 ± 0.12 respectively. The mean Total Cholesterol was 215.16± 26.50, Triglyceride was 177.25 ± 43.14, LDL was 106.83 ± 28.06, and HDL was 49.89 ± 6.51, respectively.

The association of age and sex with thyroid was not statistically significant. Similarly, the mean Total Cholesterol and HDL distribution with thyroid disorder was not statistically significant (p=0.7232). but the distribution of mean LDL with overt and subclinical Hypothyroid was statistically significant (p<0.0001).

Conclusion : We concluded that thyroid dysfunction is associated with lipid profile abnormality, and its severity is directly proportional to the severity of thyroid abnormality.

Key words : Overt Hypothyroidism, Subclinical Hypothyroidism, Lipid Profile in Hypothyroidism, Dyslipidemia in Hypothyroidism, Thyroid Dyslipidemia.

The thyroid gland is an endocrinal gland that produces a very important hormone in two forms, Tri-iodo-thyronine (T3) and Tetra-iodo-thyronine (T4), in response to stimulation of Thyroid Stimulating Hormone (TSH) secreted by the anterior pituitary. Hypothyroidism results from hypofunction of the thyroid gland, manifested by decreased levels of thyroid hormone. Hypothyroidism is classified into Overt Hypothyroidism (OH) (high TSH and low free fT4) and Subclinical Hypothyroidism (SCH) (high TSH and fT4 within the reference range) associated with elevated Total Cholesterol (TC), Low-density Lipoprotein Cholesterol (LDL-c) and Triglyceride (TG) levels[1-2]. Obesity and Hypercholesterolemia are

Editor's Comment :

- The prevalence of subclinical Hypothyroidism and overt Hypothyroidism, both are more common in middle aged female patients.
- The lipid profile abnormalities are common in both subclinical Hypothyroidism and overt Hypothyroidism, however, LDL can be significantly raised in overt Hypothyroidism compared with other lipid profile parameters then in subclinical Hypothyroidism.

Department of General Medicine
[1]MD (General Medicine), Senior Resident, Calcutta National Medical College and Hospital, Kolkata 700014
[2]MD (General Medicine), Assistant Professor, College of Medicine and JNM Hospital, Kalyani, West Bengal 741235
[3]MD (General Medicine), Medical Officer, Balurghat District Hospital, Dakshin Dinajpur, West Bengal 733101
[4]MD (General Medicine), Professor and Head, All India Institute of Medical Sciences, Madurai, Tamilnadu 625008 and Corresponding Author
[5]MD (General Medicine), Associate Professor, North Bengal Medical College & Hospital, Susrutanagar, West Bengal 734012
[6]MD (General Medicine), Professor and Head, Calcutta National Medical College & Hospital, Kolkata 700014
[7]MD (General Medicine), Professor and Head, Burdwan Medical College & Hospital, Bardhaman, West Bengal 713104
Received on : 02/12/2024
Accepted on : 30/12/2024

How to cite this article : Correlation of Lipid Profile Abnormality in Overt and Subclinical Hypothyroidism : A Hospital based Cross Sectional Observational Study. Mukherjee S, Bhattacharya P, Maiti A, Sarkar MK, Sarkar S, Pal SK, Datta S. *J Indian Med Assoc* 2025; **123(12):** 60-3.

associated with Hypothyroidism[3-4]. Furthermore, two recent meta-analyses have shown higher LDL Cholesterol levels in the presence of SCH and a significant reduction of such lipid abnormality after administration of thyroxine[5].

The prevalence of thyroid dysfunction is very common in India; it is estimated that 42 million people are suffering from thyroid disorders in India. The incidence of Overt Hypothyroidism is 3.9% and Subclinical Hypothyroidism is 9.4%[6]. Thyroid hormones play an essential role in regulating lipid metabolism, stimulating the mobilization and degradation of lipids and de novo fatty acid synthesis in the Liver[7]. The rate-limiting enzyme for Cholesterol biosynthesis 3-hydroxy-3-methylglutaryl-coenzyme A (HMG-CoA) reductase is induced by thyroid hormone. Cholesterol is converted to cholesteryl esters by Lecithin Cholesterol Acyltransferase (LCAT) and is transferred from High-density Lipoprotein cholesterol (HDL-c) to apolipoprotein B (apo B)-containing lipoproteins by Cholesterol Ester Transfer Protein (CETP)[8]. The enzyme Hepatic Lipase (HL) regulates the hydrolysis of HDL2 to HDL3, whereas the Lipoprotein Lipase (LPL) catabolizes serum triglycerides and transports free cholesterol to HDL[9-10]. The activity of CETP, HL, and LPL is regulated by thyroid hormone; this strongly points to its crucial influence on cholesterol metabolism. Moreover, thyroid hormone increases the flow of Bile Acids (BA), causes depletion of intrahepatic cholesterol and enhances cholesterol synthesis in the Liver, thus maintaining a balance of hepatic cholesterol[11]. In Hypothyroidism, a decline in thyroid hormone results in the slowing of Bile Acid flow, a decrease in cholesterol secretion, and an increase in intrahepatic cholesterol despite the decrease in cholesterol biosynthesis and the decrease in hepatic uptake[12]. T_3 also protects LDL from oxidation[13].Thyroid hormones influence HDL metabolism by increasing Cholesteryl Ester Transfer Protein (CETP) activity[14]. They also stimulate Lipoprotein Lipase (LPL), which catabolizes the TG-rich lipoproteins, and Hepatic Lipase (HL), which hydrolyzes Intermediate-density Lipoproteins (IDL) to LDL and, in turn, LDL to small dense LDL (sd-LDL)[15-16].

It has been reported that even within the normal range of TSH values, there is a linear increase in TC, LDL-c, and TG and a linear decrease in High-density Lipoprotein cholesterol (HDL-c) levels with increasing values of TSH[4]. Although OH is consistently associated with elevated cholesterol levels, increased TG and Remnant Lipoproteins (RLP) levels in both OH and SCH patients have also been reported[3]. It is estimated that 1 to 11% of all patients with Dyslipidemia have SCH, but the effects of SCH on serum lipid values need to be clarified. Some studies have shown that TC and LDL-C levels are increased in patients with SCH; others have shown no effect[6]. So, the current study aims to assess the prevalence of Dyslipidemia in patients with both OH and SCH in Eastern India.

Aims and Objectives

Primary Objective : To study the association of Dyslipidemia in patients with Hypothyroidism. **Secondary Objective :** (1) To identify various lipid profile derangements in Hypothyroidism. (2) To identify any difference in the association of these parameters in Overt and Subclinical Hypothyroidism.

Material and Methods

It is an Institutional Cross-sectional Observational Study, conducted from 1st January, 2020 to 30th June, 2021 in the Department of General Medicine, Calcutta National Medical College, and Hospital (CNMCH), on 155 patients.

Inclusion Criteria :

(i) age >18 years, (ii) all newly diagnosed patients with Hypothyroidism, who are not on thyroxine therapy, non-pregnant, or not on oral contraceptive pills.

Exclusion Criteria :

(i) Any acute illness, (ii) Grave's Disease and (iii) Familial Dyslipidemia Syndrome. Informed consent was obtained from the patients prior to their inclusion in the study. Data was collected by history, clinical examination, and appropriate investigation and recorded in a performed proforma. Data were entered in Microsoft Excel and analyzed by SPSS. The mean and Standard Deviation were used for numerical variables and count, and percentages were used for categorical variables. Two sample t-tests determined statistical significance. One-way analysis of variance (one-way ANOVA) was used to compare the means of three or more samples for numerical data. Unpaired proportions were compared using the appropriate Chi-square or Fischer's exact test. P-value ≤ 0.05 was considered statistically significant.

Analysis and Results

In our study, the most common age group affected by thyroid disorder was 31-40, closely followed by 21-30. The gender distribution of the participants also included female dominance (66% *versus* 34%). 99 (63.9%) and 56 (36.1%) patients had OH and SCH, respectively.

The mean age of patients was 33.40±7.62 years. The mean TSH of patients was 12.52±6.05. The mean fT4 of patients was 72.28±16.26. The mean fT3 of patients was 0.92±0.12. The patient's mean TC was 215.16±26.50. The mean TG of patients was 177.25±43.14. The mean HDL of patients was 49.89±6.51. The mean LDL of patients was 106.83±28.06 (Table 1).

The distribution of parameters in OH & SCH, along with the p-value, which shows that mean LDL was high in OH compared with SCH, which was statistically significant (p<0.0001). it also shows that OH patients had more patients with abnormal LDL levels than SCH, 38 *versus* 12, which was statistically significant (p=0.03). Other parameters mentioned in Table 2 were not statistically significant.

Table 1 — *The Mean Distribution of age, TSH, fT4, fT3, TC, TG, HDL, and LDL are shown in tabular form*

Parameters	Mean ± Standard Deviation
Age	33.40±7.62
TSH	12.52±6.05
fT4	72.28± 16.26
fT3	0.92± 0.12
TC	215.16± 26.50
TG	177.25± 43.14
HDL	49.89± 6.51
LDL	106.83± 28.06

Table 2 — *Distribution of Age, Gender, Mean Age, Mean TC, Mean HDL, Mean LDL, High TC, High TG, and High LDL in Overt Hypothyroidism and Subclinical Hypothyroidism, along with the p-value of each parameter*

Parameters	Subgroup	OH n(%)	SCH n(%)	P Value
Age	21-30	39 (39.4)	22 (39.3)	0.90
	31-40	39 (39.4)	23 (41.1)	
	41-50	19 (19.2)	9 (16.1)	
	>51	2 (2.0)	2 (3.6)	
Gender	Female	63 (63.6)	40 (71.4)	0.32
	Male	36 (36.4)	16 (28.6)	
Mean Age		33.37 ± 7.71	33.44 ± 7.52	0.95
Mean TC		217.82± 26.01	210.46± 26.95	0.72
Mean HDL		50.03± 5.90	49.64± 7.51	0.72
Mean LDL		115.42± 26.69	91.66± 23.82	<0.0001
High TC (n)		69 (69.7%)	36 (64.3%)	0.48
High TG (n)		73 (73.7%)	37 (66.1%)	0.31
High LDL (n)		38 (38.4%)	12 (21.4%)	0.03

Discussion

Our study demonstrated that the distribution of mean LDL with thyroid disorder was statistically significant (p<0.0001). it also showed that there was a statistically significant difference in abnormal LDL in the two groups of thyroid disorder (p=0.03). The two groups are age and sex-matched. So, the cause of statistically significant differences in LDL values or the proportion of patients having raised LDL values can be attributed to the TSH status of the two groups.

A case-control study by Gomo Z, *et al* Showed a significant increase in TC and LDL-C levels in the patient group (p<0.001)[17]. Saxena A, *et al* in their study on the Indian population, found that amongst 88 OH cases, 54 cases were dyslipidemia; amongst 92 SCH cases, 29 had associated Dyslipidemia[18]. In our study, we found that 105 patients out of 155 (67.7%) Total Hypothyroid patients had abnormal TC. In the OH group, 69 (69.7%) patients had abnormal TC.

Unnikrishnan AG, *et al* in their study on the Indian population from 8 cities in India, observed that the prevalence of Hypothyroidism was the maximum in 46-54 years (13.11%) and least in 18-35 years (7.53%)[19]. Gender distribution also predominated in females than males (15.86% *versus* 5.02%; P<0.0001). They also observed that the frequency of SCH was maximum (8.93%) in above 55 years and least in 18-35 years (6.91%), though no statistically significant association was found with age. In our study, we found that the majority of newly diagnosed hypothyroid patients were between 21-40 years old, ie, 123/155 (79%) in this group (Table 2). Therefore, our study showed that the majority of patients were below 40 years old, whereas Unnikrishnan AG, *et al* found that the majority of patients were above 40 years old. However, the pattern of involvement with female predominance and pattern in OH & SCH were similar to the study conducted in India by Unnikrishnan AG, *et al*.

In Overt Hypothyroidism, 63 (63.6%) patients were female, and 36 (36.4%) patients were male. In SCH thyroid disorder, 40 (71.4%) patients were female, and 16 (28.6%) were male. The association of sex with thyroid disorder was not statistically significant (p=0.3236) in our study.

Mushtaq S, *et al* studied the association between Hypothyroidism and lipid abnormalities in 40 patients with SCH and 40 patients with OH and compared it

with 40 healthy adult controls[20]. They observed that mean Total Cholesterol, triglyceride, and Low-density lipoprotein were significantly higher in SCH and OH compared with controls, whereas the mean HDL was significantly lower in cases compared with controls. In our study, we found that mean LDL was significantly higher in the OH group than in the SCH group. We also observed that significantly more patients in the OH group had high LDL compared with the SCH group. Though other parameters of lipid profile, like total cholesterol, HDL, and triglyceride, were higher in the OH group than the SCH group, they were statistically non-significant.

Conclusion

In our study, LDL was significantly increased in patients with OH compared to patients with SCH. In contrast, TC and TG were deranged in both OH and SCH patients. HDL was found to be normal in both groups. Therefore, cholesterol control strategies should be given equal importance in the case of overt Hypothyroidism and Subclinical Hypothyroidism. We concluded that thyroid dysfunction is associated with lipid profile abnormality, and its severity is directly proportional to the severity of thyroid abnormality.

Limitations of the Study :

The study was conducted in a Single Tertiary Care Hospital and possible hospital bias due to the small sample size has further hampered it. The ongoing COVID-19 pandemic and lockdown have also hampered the study.

Funding : None.

Conflict of Interest : None.

References

1 Duntas LH — Thyroid disease and lipids. *Thyroid* 2002; **12(4):** 287-93.doi:10.1089/10507250252949405.

2 Liu XL, He S, Zhang SF, Wang J, Sun XF, Gong CM, *et al* — Alteration of lipid profile in SCH: a meta-analysis. *Med Sci Monit* 2014; **20:** 1432-41. doi: 10.12659/MSM.891163.

3 Duntas LH, Brenta G — A Renewed Focus on the Association Between Thyroid Hormones and Lipid Metabolism. *Front Endocrinol (Lausanne)* 2018; **9:** 511. doi: 10.3389/fendo.2018.00511. PMID: 30233497; PMCID: PMC6129606.

4 Asvold BO, Vatten LJ, Nilsen TI, Bjøro T — The association between TSCH within the reference range and serum lipid concentrations in a population-based study. The HUNT Study. *Eur J Endocrinol* 2007; **156(2):** 181-6. doi: 10.1530/eje.1.02333. Erratum in: *Eur J Endocrinol* 2007; **156(6):** 707. PMID: 17287407.

5 Deschampheleire M, Luyckx FH, Scheen AJ — Dysthyroïdies et dyslipidémies [Thyroid disorders and dyslipidemias]. *Rev Med Liege* 1999; **54(9):** 746-50. French. PMID: 10589270.

6 Unnikrishnan AG, Menon UV — Thyroid disorders in India: An epidemiological perspective. *Indian J Endocrinol Metab* 2011; **15(Suppl 2):** S78-81. doi: 10.4103/2230-8210.83329. PMID: 21966658; PMCID: PMC3169866.

7 Damiano F, Rochira A, Gnoni A, Siculella L — Action of Thyroid Hormones, T3 and T2, on Hepatic Fatty Acids: Differences in Metabolic Effects and Molecular Mechanisms. *Int J Mol Sci* 2017; **18(4):** 744. doi: 10.3390/ijms18040744. PMID: 28362337; PMCID: PMC5412329.

8 De Grooth GJ, Klerkx AH, Stroes ES, Stalenhoef AF, Kastelein JJ, Kuivenhoven JA — A review of CETP and its relation to atherosclerosis. *J Lipid Res* 2004; **45(11):** 1967-74. doi: 10.1194/jlr.R400007-JLR200. Epub 2004 Sep 1. PMID: 15342674.

9 Duntas LH, Brenta G — The effect of thyroid disorders on lipid levels and metabolism. *Med Clin North Am* 2012; **96(2):** 269-81. doi: 10.1016/j.mcna.2012.01.012. Epub 2012 Feb 14. PMID: 22443975.

11 Yamashita S, Sakai N, Hirano K, Ishigami M, Maruyama T, Nakajima N, *et al* — Roles of plasma lipid transfer proteins in reverse cholesterol transport. *Front Biosci* 2001; **6:** D366-87. doi: 10.2741/yamashita. PMID: 11229884.

12 Loeb JN — Metabolic changes in hypothyroidism. In: Braverman LE, editor. Werner and Ingbar's "The Thyroid." 6th ed. Philadelphia, PA: *JP Lippincott Comp* 1991; **26:** 1064-71 .

13 Faure P, Oziol L, Artur Y, Chomard P — Thyroid hormone (T3) and its acetic derivative (TA3) protect low-density lipoproteins from oxidation by different mechanisms. *Biochimie* 2004; **86(6):** 411-8. doi: 10.1016/j.biochi.2004.04.009. PMID: 15283976.

14 Lagrost L — Regulation of cholesteryl ester transfer protein (CETP) activity: a review of in vitro and in vivo studies. *Biochim Biophys Acta* 1994; **1215(3):** 209-36. doi: 10.1016/0005-2760(94)90047-7. PMID: 7811705.

15 Kuusi T, Saarinen P, Nikkilä EA — Evidence for the role of hepatic endothelial lipase in the metabolism of plasma high-density lipoprotein2 in man. Atherosclerosis 1980; **36(4):** 589-93. doi: 10.1016/0021-9150(80)90251-8. PMID: 7417375.

16 Santamarina-Fojo S, González-Navarro H, Freeman L, Wagner E, Nong Z — Hepatic lipase, lipoprotein metabolism, and atherogenesis. *Arterioscler Thromb Vasc Biol* 2004; **24(10):** 1750-4. doi: 10.1161/01.ATV.0000140818.00570.2d. Epub 2004 Jul 29. PMID: 15284087.

17 Gomo Z, Ascott MB. The association of serum thyroid stimulating hormone, lipids, and lipoproteins in patients with suspected hypothyroidism. *Cent Afr J Med* 1994; **40(4):** 94-8. PMID: 7954717.

18. Saxena A, Kapoor P, Saxena S, Kapoor AK. Effect of levothyroxine therapy on dyslipidemia in hypothyroid patients. *Internet Journal of Medical Update-EJOURNAL* 2013; **8(2):** 39-49.

19 Unnikrishnan AG, Kalra S, Sahay RK, Bantwal G, John M, *et al* — Prevalence of hypothyroidism in adults: An epidemiological study in eight cities of India. *Indian J Endocrinol Metab* 2013; **17(4):** 647-52. doi: 10.4103/2230-8210.113755. PMID: 23961480; PMCID: PMC3743364.

20 Mushtaq D, Ishaq D, Rashid T, Rasool S, Bhat AA, Majid, S — Dyslipidemia In Thyroid Disorders. *Indo American Journal of Pharmaceutical Research 2015;* **5:** 3439-43.

Original Article

Epidemiological Profile of Atopic Dermatitis in School Going Children

Sushmita G Hittalamani[1], Sheetal Srinivas[2], Srinivasa S[3]

Abstract

Background : Atopic Dermatitis (AD), also known as eczema, is one of the most common chronic inflammatory skin disorders affecting children Worldwide. Characterized by intense itching, dry skin, and recurrent eczematous lesions, AD has a significant impact on the physical, emotional, and social well-being of affected individuals. Although it often begins in infancy, a substantial number of cases persist into or manifest during the school-going years, making it a major pediatric health concern.

Materials and Methods : This cross-sectional study was conducted to evaluate the epidemiological profile of Atopic Dermatitis (AD) in school-going children. The study was carried out over a period of August, 2023 to July, 2024 in school going children in Devanahalli, Bengaluru Rural. Data on demographics, risk factors, and onset of disease were collected and analyzed using SPSS version 25.

Results : The epidemiological profile of Atopic Dermatitis (AD) among school-going children indicates a higher prevalence in girls (58%) compared to boys (42%). Primary school students (56%) are more affected than high school students (44%), suggesting earlier onset of the condition. Personal history reveals that 33% of children with AD also suffer from allergic rhinitis, 16% have bronchial asthma, and 8% experience both conditions. Family history shows that 44% have relatives with Atopic Dermatitis, 11% with bronchial asthma and 9% with allergic rhinitis, highlighting the genetic predisposition associated with AD. Common aggravating factors include seasonal variations (36%), physical exercise (24%), dust exposure (22%), and certain foods (10%). These environmental triggers play a significant role in the exacerbation of AD symptoms. Regarding the distribution of allergic conditions, 25% of children have only allergic rhinitis, 8% have only bronchial asthma, another 8% have both conditions, while 59% do not exhibit any allergic conditions. This data underscores the importance of considering both genetic and environmental factors in the management and prevention of Atopic Dermatitis among children.

Conclusion : This study affirms that Atopic Dermatitis is a prevalent and multifactorial disease among children, with notable associations with Sex, Age, Co-morbid allergies, environmental triggers, and family history. These insights can inform targeted public health strategies and individualized patient care, ultimately aiming to reduce the burden of allergic diseases in the pediatric population.

Key words : Atopic Dermatitis (AD), Quality of Life (QoL).

Atopic dermatitis (AD), also known as eczema, is one of the most common chronic inflammatory skin disorders affecting children Worldwide. Characterized by intense itching, dry skin, and recurrent eczematous lesions, AD has a significant impact on the physical, emotional, and social well-being of affected individuals. Although it often begins in infancy, a substantial number of cases persist into or manifest during the school-going years, making it a major pediatric health concern.

The prevalence of AD has been steadily rising over the past few decades, particularly in Urban and industrialized regions, likely due to changing environmental and lifestyle factors. In school-aged children, the burden of AD extends beyond physical discomfort – it can interfere with academic performance, sleep, and peer relationships, thereby influencing overall Quality of Life.

Understanding the epidemiological trends of atopic dermatitis in this age group is essential for early diagnosis, effective management and public health planning. This profile aims to explore the prevalence, risk factors, demographic patterns, and implications

Editor's Comment :

- Atopic dermatitis is a common chronic skin condition in children, often starting early in life and linked to a family history of atopy.
- Its severity varies, with flares triggered by environmental factors and skin barrier dysfunction.
- Early recognition and proper management help reduce symptoms and improve Quality of Life.

Department of Paediatrics, Akash Institute of Medical Sciences and Research Centre, Devanahalli, Bengaluru, Karnataka 562110
[1]MBBS, MD (Paediatrics) and Corresponding Author
[2]MBBS, MD, Assistant Professor, Department of Dermatology
[3]MBBS, MD, Professor and Head

Received on : 23/06/2025
Accepted on : 10/07/2025

How to cite this article : Epidemiological Profile of Atopic Dermatitis in School Going Children. Hittalamani SG, Srinivas S, Srinivasa S. *J Indian Med Assoc* 2025; **123(12):** 64-7.

of Atopic Dermatitis among school-going children.

Aims and Objectives

- To determine the prevalence of Atopic Dermatitis in the study population.
- To evaluate the demographic distribution (age, sex, socio-economic status) of affected children.
- To identify common clinical patterns and severity of Atopic Dermatitis using standardized scoring systems (eg, SCORAD or EASI).
- To assess the association of Atopic Dermatitis with family history of atopic diseases.
- To identify potential triggering or exacerbating factors such as allergens, food, environmental conditions, and stress.
- To understand treatment practices and compliance among affected children.

Materials and Methods

Study Design and Setting :

This cross-sectional study was conducted to evaluate the epidemiological profile of Atopic Dermatitis (AD) in school-going children. The study was carried out over a period of August, 2023 to July, 2024 in school going children in Devanahalli, Bengaluru Rural. Data on demographics, risk factors and onset of disease etc were collected and analyzed using SPSS version 25.

Study Population :

The study included school going children in Devanahalli, Bengaluru rural with a clinical diagnosis of Atopic Dermatitis.

Inclusion Criteria :

- Children aged 5 to 14 years.
- Clinically diagnosed with Atopic Dermatitis.
- Attending school regularly.
- Informed consent obtained from parents or guardians.

Exclusion Criteria :

- Children with other chronic dermatological or systemic conditions.
- Children on systemic immuno-suppressive therapy.
- Non-consenting parents/guardians.

Data Collection :

Data were systematically collected using a pre-structured questionnaire administered through interviews with parents/guardians and where appropriate, the children. The questionnaire included:

- Demographic details (age, sex, socio-economic status).
- Family history of atopy (eczema, asthma, allergic rhinitis).
- Onset and duration of the disease.
- Clinical features and distribution of lesions.
- History of exacerbating factors (allergens, climate, food, stress)

A thorough clinical examination was conducted to assess the extent and severity of the disease using the SCORAD index (Scoring Atopic Dermatitis)

Data Analysis :

Collected data were entered into a computer and analyzed using Statistical Package for the Social Sciences (SPSS) version 25. Descriptive statistics were used to summarize the demographic and clinical characteristics of the study population. Frequencies and percentages were calculated for categorical variables.

Ethical Considerations :

The study was conducted in accordance with ethical guidelines, and approval was obtained from the Institutional Ethics Committee. Informed consent was obtained from the parents or guardians of all participating children. Assent was also taken from children above 7 years of age, as per ethical guidelines.

Results

In this study, epidemiological factors of Atopic Dermatitis in children were studied.

The dataset presents the distribution of students by school level (Primary and High School) and sex (Boys and Girls). The total study population includes 100 students, with 42 Boys and 58 Girls.

This chart compares the number of Boys and Girls in Primary School and High School. In Primary School, there are 24 boys and 32 girls and in High School, there are 18 Boys and 26 Girls.

A larger proportion of girls than boys were affected in the overall study population.

Primary school children represented a slightly higher

share, possibly indicating earlier onset or greater awareness/reporting in younger children.

Allergic rhinitis is the most prevalent condition, reported by 33% of children.

Bronchial asthma affects 16% of children.

8% of children suffer from both allergic rhinitis and asthma.

This suggests that upper respiratory allergies are more commonly reported than lower respiratory ones in this group. Let me know if you'd like a bar chart version or need this chart exported.

Atopic Dermatitis (44%) : This high prevalence underscores the strong genetic component of Atopic Dermatitis. Children with a family history of atopic conditions are significantly more likely to develop this skin disorder.

Bronchial Asthma (11%) : A notable proportion of children with a familial predisposition also develop asthma, highlighting the importance of monitoring respiratory symptoms in this group.

Allergic Rhinitis (9%) : While slightly lower, this percentage still indicates a considerable risk, suggesting that nasal allergies are also influenced by hereditary factors.

***Clinical Significance* —** The data illustrates the impact of family history on the prevalence of atopic conditions in children. Early identification and intervention are crucial for managing these conditions effectively.

Seasonal Variation (36%) : The highest reported aggravating factor, indicating that changes in seasons, particularly winter, can exacerbate atopic symptoms. This aligns with studies showing increased flare-with atopic conditions, as sweat is a known irritant for sensitive skin.

Dust (22%) : Exposure to dust, including house dust mites, is a common environmental trigger that can worsen symptoms .

Food (10%) : Certain foods, such as Milk, Eggs, and Fish, have been identified as allergens that can lead to flare-ups in susceptible children.

***Clinical Significance* —** Understanding these aggravating factors is crucial for managing atopic conditions in children. By identifying and minimizing exposure to these triggers, caregivers and healthcare providers can help reduce the frequency and severity of flare-ups, improving the Quality of Life for affected children.

Family History Plays a Crucial Role in the Development of Allergic Conditions :

Children with a family history of atopic diseases are at a higher risk of developing allergic rhinitis and asthma.

The coexistence of Allergic rhinitis and asthma is significantly associated with a family history of atopy, emphasizing the genetic predisposition to these conditions.

Understanding these associations can aid in early diagnosis and management, potentially reducing the burden of allergic diseases in children.

In this study 25% of them had family history of Allergic rhinitis, 8% of children had family history of bronchial asthma and 8% of the children had family history of both allergic rhinitis and asthma, while 59 % of the children did not have any family history of asthma or allergic rhinitis.

Discussion

This study investigates the epidemiological characteristics and contributing factors of Atopic Dermatitis (AD) among school-aged children. Atopic Dermatitis is a chronic inflammatory skin condition with a multifactorial etiology involving genetic, environmental, and immunological components. The study population comprised 100 students, revealing key patterns related to Age, Sex, Co-morbid allergic conditions and Familial predisposition.

The age and sex distribution indicated a higher prevalence of atopic conditions among Girls (58%) compared to Boys (42%). This aligns with prior literature suggesting that sex-related immunological differences may influence susceptibility to atopic diseases during childhood, although prevalence tends to equalize or shift in adolescence and adulthood[1]. The slightly greater representation of Primary school children in the cohort suggests that AD may often manifest earlier in life, which is consistent with existing epidemiological data indicating peak onset of AD in early childhood[2]. Early recognition of symptoms during these formative years can be instrumental in preventing progression to other atopic manifestations such as asthma and allergic rhinitis – a phenomenon known as the "atopic march"[3].

A notable finding in this study is the high prevalence

of Allergic Rhinitis (33%), followed by bronchial asthma (16%) and co-existence of both conditions (8%). These data suggest that upper respiratory allergic conditions are more commonly reported than lower respiratory issues, echoing patterns seen in other pediatric cohorts[4]. The co-occurrence of these conditions reflects the shared pathogenic mechanisms underlying atopy, including Type I hypersensitivity reactions mediated by IgE and a predominance of Th2 immune responses[5].

In relation to Atopic Dermatitis specifically, the prevalence was reported at 44%, a relatively high figure that underscores the significant burden of this condition among children. The strong association with family history – particularly for those with parents or siblings with allergic rhinitis or asthma – further supports the genetic underpinnings of atopic diseases[6]. Genetic factors, such as mutations in the filaggrin gene, have been implicated in compromising skin barrier function, rendering individuals more susceptible to allergen penetration and inflammation[7].

Environmental aggravating factors were also assessed, with seasonal variation (36%) being the most commonly reported trigger. This suggests a climatic influence, where colder temperatures and lower humidity levels during winter months can lead to skin dryness and flare-ups[8]. Dust exposure (22%) was another significant contributor, highlighting the role of indoor allergens such as dust mites, pet dander, and mold in exacerbating AD symptoms[9]. Food allergens accounted for 10%, consistent with the role of dietary proteins like milk, eggs, and seafood as potential triggers in sensitized individuals[10]. These findings reinforce the importance of comprehensive environmental control strategies as part of AD management.

The study also examined familial patterns, revealing that 25% of children had a family history of allergic rhinitis, 8% had a history of bronchial asthma, and another 8% had a combined family history of both conditions. Only 59% reported no relevant family history. This supports previous research indicating that children with a first-degree relative with atopic disease are at significantly higher risk for developing AD and other allergic conditions[11]. Understanding familial patterns can guide anticipatory guidance, early intervention, and possibly genetic counseling.

From a clinical perspective, the findings of this study underscore the importance of early identification and comprehensive management of Atopic Dermatitis. Clinicians should be vigilant for signs of AD in young children, especially those with a relevant family history or co-existing allergic conditions. Early therapeutic interventions – including moisturization, avoidance of known triggers, and possibly immuno-modulatory treatment – may mitigate disease severity and prevent progression along the atopic spectrum.

Conclusion

This study affirms that Atopic Dermatitis is a prevalent and multifactorial disease among children, with notable associations with Sex, Age, Co-morbid Allergies, Environmental triggers and Family history. These insights can inform targeted public health strategies and individualized patient care, ultimately aiming to reduce the burden of allergic diseases in the pediatric population. The findings suggest that Atopic Dermatitis in school-going children is commonly associated with other allergic conditions such as allergic rhinitis and bronchial asthma. The coexistence of these diseases underscores the importance of early diagnosis and comprehensive allergy screening in affected children.

Funding : None.

Conflict of Interest : None.

References

1 Kantor R, Silverberg JI. Environmental risk factors and their role in the management of atopic dermatitis. *Expert Rev Clin Immunol* 2017; **13(1):** 15-26.
2 Williams H, Stewart A, von Mutius E, Cookson W, Anderson HR — Is eczema really on the increase worldwide? *J Allergy Clin Immunol* 2008; **121(4):** 947-54.e15.
3 Spergel JM — From atopic dermatitis to asthma: the atopic march. *Ann Allergy Asthma Immunol* 2010; **105(2):** 99-106.
4 Zhang Y, Zhang L — Prevalence of allergic rhinitis in China. *Allergy Asthma Immunol Res* 2014; **6(2):** 105-13.
5 Galli SJ, Tsai M, Piliponsky AM — The development of allergic inflammation. *Nature* 2008; **454(7203):** 445-54.
6 Bieber T — Atopic dermatitis. *N Engl J Med* 2008; **358(14):** 1483-94.
7 Palmer CN, Irvine AD, Terron-Kwiatkowski A, Zhao Y, Liao H, Lee SP, *et al* — Common loss-of-function variants of the epidermal barrier protein filaggrin are a major predisposing factor for atopic dermatitis. *Nat Genet* 2006; **38(4):** 441-6.
8 Kim JP, Chao LX, Simpson EL, Silverberg JI — Persistence of atopic dermatitis (AD): A systematic review and meta-analysis. *J Am Acad Dermatol* 2016; **75(4):** 681-7.e11.
9 Custovic A, Simpson A — Environmental allergen exposure, sensitization and asthma: From childhood to adulthood. *Allergy* 2015; **70(10):** 1119-27.
10 Sicherer SH, Sampson HA — Food allergy: Epidemiology, pathogenesis, diagnosis, and treatment. *J Allergy Clin Immunol* 2014; **133(2):** 291-307.
11 Thomsen SF — Atopic dermatitis: natural history, diagnosis, and treatment. *ISRN Allergy* 2014; **2014:** 354250.

Case Series

Neuro-cysticercosis Presenting as Obsessive-compulsive Disorder

Subir Bhattacharjee[1], Subrata Das[2], Susenjit Mallick[3], Ranjan Bhattacharyya[4]

Abstract

Background : Neuro-cysticercosis, caused by a parasitic infection of the brain, though commonly present as seizure (70-90%), may present with various psychiatric symptoms, including those of Depression, Anxiety, Psychosis, Dementia, Other Cognitive Dysfunction and Personality Changes. Psychiatric manifestations of Neuro-cysticercosis depend on the location of the infective cyst in the brain. Reports of Neuro-cysticercosis, presenting with Obsessive-compulsive Symptoms, are sparse. We reported four cases of obsessive compulsive disorder of recent onset, found to be associated with Neuro-cysticercosis and later improved with anthelminthic and anti-obsessive treatment.

Key words : Psychiatry, Neuro-cysticercosis, Obsessive-compulsive Disorder.

Neuro-cysticercosis is the most common parasitic infestation of Central Nervous System caused by the pork tapeworm Taenia Solium larva[1]. Parenchymal lesions are most common and may involve Cerebral Hemispheres, Basal Ganglia, Brainstem and Cerebellum. Extra parenchymal lesions may involve ventricles, subarachnoid space and rarely spinal cord. There are 4 stages of NCC ie, Vesicular, Colloidal, Granular and Calcified Nodular Stages of which early 3 stages are active lesions and show signs of inflammation[2]. Patients with Neuro-cysticercosis may remain completely asymptomatic or experience a variety of neurological symptoms ranging from seizure, headache, raised intracranial pressure and hydrocephalus to cognitive dysfunction and dementia[3]. Psychiatric manifestations such as confusion, delirium, changes in Sensory Perception, Anxiety, Psychomotor Agitation, Depression and Personality Changes have also been reported in as high as 15% patients with Neuro-cysticercosis[3]. In fact the very first case of Neuro-cysticercosis in Asia was recorded from the autopsy of an inpatient of a psychiatric asylum in then Madras[4]. Treatment of Neuro-cysticercosis include symptomatic management and if warranted specific treatment with anthelminthic drugs (eg, Albendazole) and steroids (eg, Prednisolone)[5]. Psychiatric symptoms, though not uncommon in Neuro-cysticercosis, have found limited attention in the literature. In this case series we have discussed 4 cases of Neuro-cysticercosis presenting with symptoms of Obsessive-compulsive disorder, and also shared our experience on their course and treatment outcome. Informed and written consents were obtained from all the cases and their legal guardian for the purpose of publishing in Scientific Journal.

Editor's Comment :

- Neuro-cysticercosis can present clinically with various Neuro-psychiatric symptoms.
- Recent onset Obsessive-compulsive Symptoms may be a psychiatric manifestation of Neuro-cysticercosis.
- All such cases must be evaluated with early brain scan and should be treated accordingly.

Case Presentation

Case 1 :

This 17 years old female from Rural, lower socio-economic family, was referred to Psychiatry OPD with a history of recent onset dull headache and a recurrent intrusive thoughts of being touched or licked by dog whenever she passed by one for the past 3 months. She would check for any scratch or bite mark and upon coming back home would take a prolonged and rigorous bath. She could understand that her fear was irrational and excessive but couldn't resist that. Her brain MRI showed vesicular colloidal cysts in frontal region. She was diagnosed with Neuro-cysticercosis and Obsessive-compulsive disorder with good insight. She was prescribed Prednisolone 40mg BD for 5 days, Albendazole 400mg BD for 2 weeks and Fluoxetine 20mg OD which was increased to 40mg daily after 2 weeks. Headache improved in a month and Yale-Brown Obsessive Compulsive Scale

Department of Psychiatry, Deben Mahata Government Medical College and Hospital, Purulia, West Bengal 723147
[1]MD, Associate Professor and Corresponding Author
[2]MD, Assistant Professor
[3]MD, Assistant Professor, Department of Medicine
[4]MD, Professor, Department of Psychiatry, Bankura Sammilani Medical College and Hospital, Bankura, West Bengal 722102
Received on : 03/07/2025
Accepted on : 08/09/2025

How to cite this article : Neuro-cysticercosis Presenting as Obsessive-compulsive Disorder. Bhattacharjee S, Das S, Mallick S, Bhattacharyya R. *J Indian Med Assoc* 2025; **123(12):** 68-70.

(YBOCS) score improved from 19 at baseline to 8 after 2 months. She maintained well and after 1 year Fluoxetine was gradually tapered down and discontinued over next 6 months (Fig 1).

Case 2 :

This 14 years old girl from Rural, lower Socio-economic family, was brought by her parents with recent onset mild headache with recurrent distressing thoughts and images of her parents and friends being dead for past 1 month. She would try to stop those images by thinking of something else or counting back from 100 to 1 but failed to resist them. Her CT scan brain showed multiple Neuro-cysticercoses with different stages of maturity. She was treated with Prednisolone 30mg BD for 5 days, Albendazole 300mg BD for 14 days and Fluoxetine 10mg once daily which was increased to 20mg once daily after 10 days. In the next one month she showed rapid improvement. Her YBOCS score dropped to 6 from baseline 20. We maintained her on Fluoxetine 20mg daily for a year and tapered off over next 3 months (Fig 2).

Case 3 :

This 16 years old male came with his mother with complaints of recent onset occasional diffuse headache and recurrent doubt that he might have stepped on pictures or paintings of God while walking on road for 2 months. He had to take a few steps back to check if there was any picture or painting of God on the street. This would cause him guilt and fear of harm to her family. He would repeatedly pray to God and ask for forgiveness. His brain CT scan showed many Neuro-cysticercoses of varying stages. He received Prednisolone 40mg BD for 5 days, Albendazole 400mg BD for 2 weeks and Fluoxetine 20 mg daily for 2 weeks and raised to 40mg BD thereafter. On follow-up he showed a partial response as YBOCS score dropped to 16 from baseline 22. The dose of Fluoxetine was escalated to 60mg daily and CBT was added. After a month he reported a good response as YBOCS score improved to 9. After 6 months we reduced the dose of Fluoxetine to 40mg daily because of weight gain with no relapse. After a year Fluoxetine was gradually tapered off and he maintained well on CBT alone (Fig 3).

Fig 2 — Showing CT scan Brain

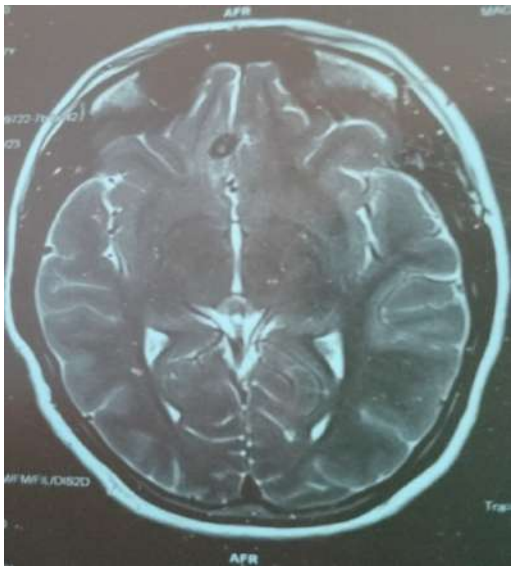


Fig 1 — Showing MRI Brain

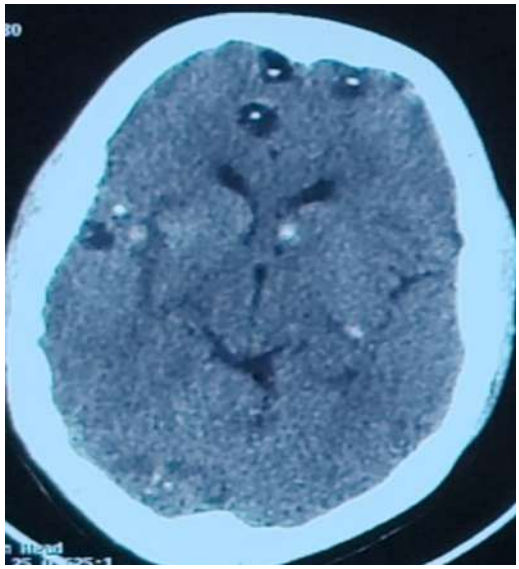


Fig 3 — Showing CT scan Brain

Case 4 :

An 18-year-old male from rural West Bengal was presented with a history of recent onset headache and symptoms of recurrent intrusive thoughts of making mistakes in counting money and locking the house door and repeatedly recounting and rechecking for those mistakes for the last month. His headache was moderate in severity, felt all over his head, and was dull and aching in nature. He was severely distressed regarding his unwanted disturbing thoughts and time wasted in recurrent correcting behavior. He was advised for a CT scan of brain imaging, and it showed multiple neurocysticercosis of varying stages in various brain areas. He was given Prednisolone 40 mg BD for 5 days and Albendazole 400 mg BD for 2 weeks. Fluoxetine 20 mg daily was started and raised to 40 mg OD after 2 weeks. On the first follow-up, his YBOCS score was reduced to 14 from the initial score of 26. After raising Fluoxetine to 60 mg OD, his YBOCS score was further reduced to 8, showing significant improvement. After 9 months of gaining significant remission to treatment, we started to reduce the dose of Fluoxetine gradually, and after another 4 months, it was stopped (Fig 4).

Discussions

Parenchymal Neuro cysticercosis particularly in its vesicular and colloidal stages triggers body's immune system to produce inflammatory responses in the brain. On the other hand, inflammations in the neurocircuitry have been found in a subset of patients with OCD[6]. All the above four cases presented with acute onset OCD with no previous Neuro-psychiatric conditions. To the best of our knowledge this is the first case series of NCC manifested with OCD. All the four cases had headache along with recent onset obsessive compulsive symptoms which warrant for brain imaging and evidence of active parenchymal NCC were established. All four cases responded well to standard serotonergic medication and CBT and achieved early remission unlike OCD in general which shows a longer course and often needs multiple medications in higher doses. Possibly the successful treatment with anthelminthic medication and steroid (anti-inflammatory) contributed to the early and full remission. This is in line with the OCD seen in Pediatric Autoimmune Neuro-psychiatric Disorders Associated with Streptococcal Infections (PANDAS) where also most of the children shows full recovery on early treatments with antibiotics, steroids, intravenous immuno-globulins and immuno-modulatory therapies[7].

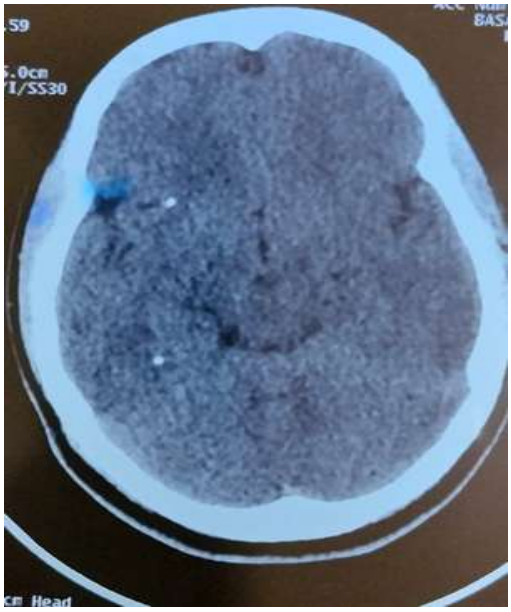


Fig 4 — Showing CT scan Brain

Conclusions

Like many of its known Neuro-psychiatric Symptoms Neuro-cysticercosis in early parenchymal stages may present with symptoms of OCD. A routine brain imaging should be offered to reach an early diagnosis. OCD associated with NCC responds well to standard and concomitant treatment for both OCD and NCC.

Funding : None.

Conflict of Interest : None.

References

1 Carpio A — Neuro-cysticercosis: an update. *Lancet Infect Dis* 2002; **2(12):** 751-62.
2 Zhao JL, Lerner A, Shu Z — Imaging spectrum of neurocysticercosis. *Radiol Infect Dis* 2015; **1:** 94-102.
3 El-Kady AM, Allemailem KS, Almatroudi A, Abler B, Elsayed M — Psychiatric Disorders of Neurocysticercosis: Narrative Review. *Neuropsychiatr Dis Treat* 2021; **17:** 1599-610.
4 Del Brutto OH, García HH — *Cysticercosis of the Human Nervous System*. 1st ed. Springer-Verlag Berlin Heidelberg; 2014. doi:10.1007/978-3-642-39022-7
5 Hamamoto Filho PT, Rodríguez-Rivas R, Fleury A — Neurocysticercosis: A Review into Treatment Options, Indications, and Their Efficacy. *Res Rep Trop Med* 2022; **13:** 67-79 https://doi.org/10.2147/RRTM.S375650
6 Attwells S, Setiawan E, Wilson AA — Inflammation in the Neurocircuitry of Obsessive-Compulsive Disorder. *JAMA Psychiatry* 2017; **74(8):** 833-40. doi:10.1001/jamapsychiatry.2017.1567.
7 Arcilla CK, Singla R — Pediatric Autoimmune Neuropsychiatric Disorders Associated With Streptococcal Infections (PANDAS). 2024 Aug 11. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2025 Jan–. PMID: 39163422.

Letter to the Editor

[The Editor is not responsible for the views expressed by the correspondents]

Beyond The Breeze : Surprising Drawbacks of Hand Dryers

Sir, — Hand hygiene is an essential aspect of infection control in the Intensive Care Unit (ICU), and proper hand drying after washing is a crucial step in this process. Wet skin is more likely to transmit bacteria than dry skin, making adequate hand drying an essential part of hand hygiene[1]. The Epic3: National Evidence-Based Guidelines for Preventing Healthcare-Associated Infections in NHS Hospitals in England emphasises the importance of completely dry hands for effective hand hygiene[2]. A study found that hand drying reduced the translocation of bacteria by up to 99% compared to wet hands[3]. Clear recommendations exist for handwashing with soap and water, but less is known about the relative efficacy of hand-drying methods in reducing contamination[4]. In health care setups, Paper towels, cloth towels, and hot air dryers are commonly used to dry washed hands[1]. Different methods of hand drying have varying levels of efficacy. In healthcare facilities across India, electric hand dryers are prevalent, mainly due to their affordability. However, these hand-drying devices have many disadvantages that need to be considered. Studies have revealed that hand dryers can contribute to the spreading of bacteria. These devices have been found to disperse bacteria up to a distance of 3 feet, which is a cause for concern[1]. Additionally, jet air dryers, a more powerful version of hand dryers, can disperse bacteria even further, up to a distance of 2 meters.[1] They contaminate the clothing and the surrounding environment by dispersing the bacteria, thereby increasing the risk of cross-contamination and spreading to bystanders[1,5]. Studies have shown that using a hand dryer after washing hands may lead to more bacteria on the hands than without using a hand dryer[6]. As found by many studies, paper towels are an effective alternative. However, various studies have found that good-quality paper towels dry hands efficiently, remove bacteria, and prevent environmental contamination[1,2]. Considering the current average cost per sterile paper towel to be around eight rupees, this might not be cost-effective in resource-limited settings. It is imperative that we reconsider the use of hand dryers and explore alternative measures that are both cost-effective and efficient.

References

1 Huang C, Ma W, Stack S — The Hygienic Efficacy of Different Hand-Drying Methods: A Review of the Evidence. *Mayo Clinic Proceedings* 2012; **87(8):** 791-8.

2 Loveday HP, Wilson JA, Pratt RJ, Golsorkhi M, Tingle A, Bak A, *et al* — epic3: National Evidence-Based Guidelines for Preventing Healthcare-Associated Infections in NHS Hospitals in England. *Journal of Hospital Infection* 2014; **86:** S1-70.

3 Patrick DR, Findon G, Miller TE — Residual moisture determines the level of touch-contact-associated bacterial transfer following hand washing. *Epidemiol Infect* 1997; **119(3):** 319-25.

4 Boyce JM, Pittet D — Healthcare Infection Control Practices Advisory Committee, HICPAC/SHEA/APIC/IDSA Hand Hygiene Task Force. Guideline for Hand Hygiene in Health-Care Settings. Recommendations of the Healthcare Infection Control Practices Advisory Committee and the HICPAC/SHEA/APIC/IDSA Hand Hygiene Task Force. Society for Healthcare Epidemiology of America/Association for Professionals in Infection Control/Infectious Diseases Society of America. *MMWR Recomm Rep* 2002; **51(RR-16):** 1–45, quiz CE1-4.

5 Moura IB, Ewin D, Wilcox MH — From the hospital toilet to the ward: A pilot study on microbe dispersal to multiple hospital surfaces following hand drying using a jet air dryer versus paper towels. *Infect Control Hosp Epidemiol* 2022; **43(2):** 241-4.

6 Kouadri F — Microbiological Assessment of the Different Hand Drying Methods and Washroom Environment Cross-Contamination. Falkinham J, editor. *International Journal of Microbiology* 2020; **2020:** 1-7.

Subbaiah Institute of Medical Sciences, Shimoga, Karnataka 577222

Darshan Rajatadri Rangaswamy[1], Niranjan Kamble[2], Kiran Kavatagi[3]

[1]MBBS, MD, DNB, Assistant Professor, Department of Pediatrics
[2]MD, Assosciate Professor, Department of Pediatrics
[3]MD, Associate Professor, Department of Microbiology

How to cite this article : Beyond The Breeze : Surprising Drawbacks of Hand Dryers. Rangaswamy DR, Kamble N, Kavatagi K. *J Indian Med Assoc* 2025; **123(12):** 71.

JOURNAL OF THE INDIAN MEDICAL ASSOCIATION

INDEX TO VOLUME 123

January – December, 2025

ABBREVIATIONS USED

(BR) Brief Report, (Commt) Commentary, (C) Correspondence, (CR) Case Report, (CS) Case Series, (DC) Drug Corner, (Ed) Editorial, (OA) Original Article, (RA) Review Article, (SA) Special Article, (S Comm) Short Communication, (VP) View Point

SUBJECT INDEX

A

B

C

AUTHOR INDEX

C

D

G

H

J

K

L

M

N

P

Q

R

S

T

V

Vajjala SM : See **Kambale T.**
Vakkakula DR, Pradeep V, Mohan A, Vishnubhotla S : Acute Kidney Injury Management — 15 Year Experience at A Tertiary Care Teaching Hospital in South India, (OA), **123(8):** 23-8.
Vangara H : See **Marthandam S.**
Varma A : See **Kaur T.**
Varun A, Kirubhakaran K, Selvam SP, Bashyam SRR : A Study on Association Between Serum Uric Acid and Non-alcoholic Fatty Liver Disease, (OA), **123(3):** 41-5.
Vashi C : See **Kshirsagar S.**
Vavilala S : See **Kadiyala VL.**
Vayaravel CA : See **Monisha M.**
Veerabhadraiah KM : See **Nadella HC.**
Veeraraghavan G : See **Monisha M.**
Veerendranath : See **Kanakapura H.**
Venkatakrishnan RT : See **Ramakrishnan R.**
Venkatesh S : See **Patel N.**
Verma A : See **Aparnavi P.**
Verma AK : See **Singh A.**
Verma M, Kantharia SL : Family Health Survey and e-Mamta : Data Validation Exercise in Districts of Western India, (OA), **123(6):** 20-4.
Verma N : See **Singh A.**
Verma N : See **Tandon A.**
Verma P, Jadav V, Johnson S, Palal D : A Review on "Direct Benefit Transfer" under the National Tuberculosis Elimination Programme in India, (RA), **123(7):** 50-2.
Verma R : See **Chakraborty R.**
Verma S : See **Rathi R.**
Verma SK : See **Meena MC.**
Verma V, Singla S, Das B, Chakravarty A : Prevalence of Vaginitis in Preterm Labour and Its Effect on Fetomaternal Outcome, (OA), **123(4):** 25-9.
Vidyasagar S : See **Shridhar M.**
Vijayakarthikeyan M : See **Sangeetha S.**
Vijayan P : See **Ramakrishnan R.**
Vishnubhotla S : See **Vakkakula DR.**
Vishwapremraj DR : See **Rakshitha C.**
Vora A : See **Lele J.**
Vyawahare C : See **Ajagunde JN.**
Vyawahare CR : See **Ajagunde J.**

W

Wagay BA : See **Hassan Y.**
Wami GN : See **Das JS.**

X

Xavier AP : See **Das JS.**

Y

Yadav A : See **Bose S.**
Yadav A : See **Mehta D.**
Yadav PK, Maurya SK : A Study on Clinico-radiological Profile of Temporal Arteritis in South Bengal, (OA), **123(9):** 18-20.
Yadav R : See **Jain PK.**
Yadavannavar MC : See **Kavimalar T.**

Z

Zala DB : See **Parikh K.**
Zargar SA : See **Prasad VGM.**

We thank all the Hob'ble Referees who contributed a lot during the year 2025

We thank all the Hob'ble Referees who contributed a lot during the year 2025

We thank all the Hob'ble Referees who contributed a lot during the year 2025

All India Medical Conference
IMA NATCON 2025

27th & 28th December 2025
HOSTED BY
IMA Gujarat State Branch & Ahmedabad Medical Association

DELEGATE FEES (Inclusive of G.S.T. 18%)		01/09/2025-31/10/2025	01/11/2025 ONWARDS
Reception Committee		₹ 29,500	₹ 29,500
Delegate IMA Member	Individual	₹ 8,260	₹ 11,800
	Couple	₹ 14,160	₹ 21,240
Corporate		₹ 24,780	₹ 29,500
Foreign Delegates		$ 300	$ 350
IMA, MSN		₹ 5,900	₹ 8,260
IMA, JDN		₹ 7,080	₹ 10,620
Accompanying Person* (Non IMA Member)		₹ 7,670	₹ 11,210
Pre Conference (26-12-25)**		₹ 2,950	₹ 2,950

*Children above 10 years of age should be registered as accompanying persons.
**Only registered conference delegate can register for pre Conference Date 26-12-2025 Friday

GUJARAT ATTRACTIONS

Club O7, The Forum - Celebration & Convention
Off Sardar Patel Ring Road, Shela, Ahmedabad, Gujarat 380058

CONFERENCE SECRETARIAT

DR. MEHUL SHAH +91 98250 51162 | **DR. TUSHAR PATEL** +91 98250 82672 | **DR. URVESH SHAH** +91 92282 33441

AMA HOUSE, OPP. H.K. ARTS COLLEGE, ASHRAM ROAD, AHMEDABAD - 380 009.
Phone: +91 99099 04571 | Email : imanatcon100@gmail.com | Web : www.ahmedabadmedicalassociation.com

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. 69, No. 12, December 2025, Kolkata

Date of Publication : 20th December, 2025

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 Prasanta Kumar Bhattacharyya** 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 Kakali Sen**