SPECIAL EDITION ON TUBERCULOSIS

TNJPHMR

Tamil Nadu Journal of Public Health and Medical Research

www.tnjphmr.com

A Quarterly Journal from
Directorate of Public Health and Preventive Medicine
(Government of Tamil Nadu)

E-ISSN : 2583-1771

INDEXED WITH GOOGLE SCHOLAR AND INDIAN CITATION INDEX

TNJPHMR
TAMILNADU JOURNAL OF PUBLIC HEALTH AND MEDICAL RESEARCH

Letter from the Editor's Desk

We are happy to bring out the special edition on Tuberculosis through Tamil Nadu Journal of Public health and medical research commemorating with World Tb day 2024 to bring back the focus the Tb control measures needed.

It is very unfortunate that even with availability of sensitive diagnostic tools and effective treatment we continue to have mortality because of TB. We need an end to end solutions covering all the aspects of Tb care integrated with health systems.

Further we have ambitious plan in India to achieve SDG 3 through NSP 2015 to end Tb epidemic by 2025 ahead of global target planned in 2030, for which we need to make several leading strategies and this special issue trying to address in this endeavour.

With our experience in conducting district level prevalence study through NIRT we could learn various aspects of Tb infection, diagnosis and control. We could prove the agreement of primary health centres medical officers X ray interpretation with specialist which has huge potency in closing the diagnostic gaps.

Psycho social support to health care providers and affected persons along with caregivers related to Tb Stigma, Nutrition and medication adherence etc. are very much essential in Tb control.

Diagnosing paediatric cases continue to be challenge and number of paediatric cases diagnosed is less than the expected prevalence. Various haematological parameters in establishing paediatric Tb diagnosis is being discussed in this issue.

Letter from the Editor's Desk

Diagnosing paediatric cases continue to be challenge and number of paediatric cases diagnosed is less than the expected prevalence. Various haematological parameters in establishing paediatric Tb diagnosis is being discussed in this issue.

The interesting aspect of using paediatric TB cases as an index case and doing contact tracing will enable to interrupt transmission.

The article on population attributable risk for TB will enable us to plan our intervention to prevent the emergence of tuberculosis cases in future through targeted interventions.

The provision of therapeutic nutrition using the existing provisions will bring down mortality in TB cases.

Simple airborne infection control measures, particularly in hospital settings and crowded atmosphere will bring down further infection.

I personally like to extend my sincere thanks to Dr Padma Priyadarshini, Director NIRT in bringing out this special edition.

Dr. T.S.Selvavinayagam MD., DPH., DNB.,

Director of Public Health & Preventive Medicine

Contents

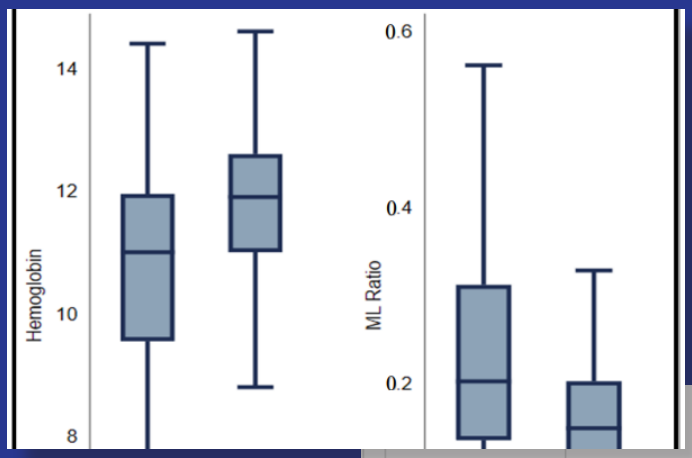
Original Article

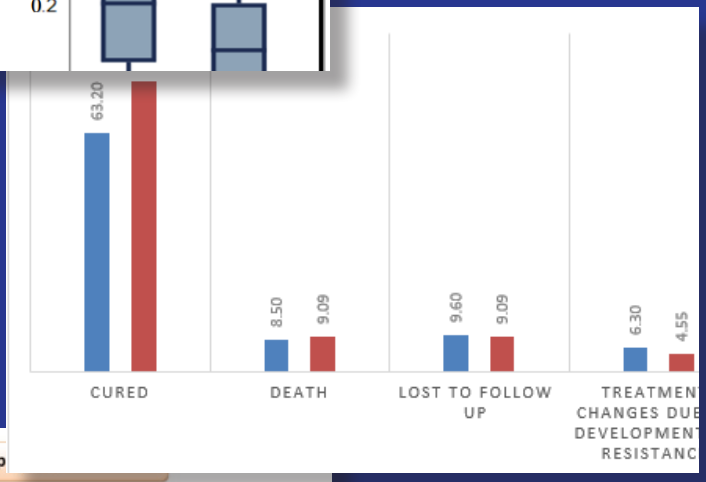
Contents

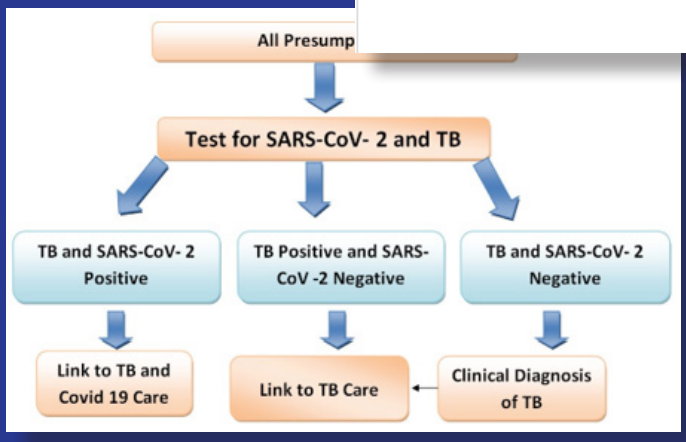
Scientific Letter

Miscellaneous

Why do we do basic research? To learn about







RESEARCH IS TO SEE WHAT EVERYBODY ELSE HAS SEEN, AND TO THINK WHAT NOBODY ELSE HAS THOUGHT.

ORIGINAL ARTICLE - PUBLIC HEALTH

SARS COV-2 AND TB CO-INFECTION AMONG CURRENT TB PATIENTS IN CHENNAI, NIRT, INDIA

Bershila Preysingh [(1)], Michel Premkumar [(1)], Radha Gopalaswamy [(1)], Ashok Kumar Shanmugavel [(1)], Lavanya J [(2)], Jagadeesan M [(3)], Asha Frederick [(4)], Chandrasekaran Padmapriyadarsini [(1)], Sivakumar Shanmugam [(1)]

(1) ICMR-National Institute for Research in Tuberculosis, Chennai, India

(2) District TB Officer, Chennai

(3) City Health Officer (Public Health Department) Greater Chennai Corporation

(4) State TB Officer, Tamil Nadu

Abstract

ABSTRACT: During the COVID-19 pandemic, bidirectional screening of patients was recommended among TB and COVID-19 patients owing to the overlap of the respiratory symptoms. In this study, we studied the co-existence of COVID-19 along with TB among the TB patients who visited NTEP clinics in Chennai. Of the 384 bacteriologically confirmed TB cases, 22 of them were tested positive for SARS-CoV2 by Standard Q COVID-19 Antigen test. In this study, we also compared the treatment outcomes for both co-infected and only TB groups along with comparison of their baseline characteristics. Among the limited cases of TB-COVID-19 co-infection, we did not observe any significant differences between the two groups in treatment outcomes and/or clinical characteristics. As a high TB burden country with infant BCG vaccination program in place, more studies are required to validate the effect of COVID-19 infection among bacteriologically confirmed TB cases.

INTRODUCTION

Before the arrival of the COVID-19 pandemic, tuberculosis (TB) continued its rank as the primary cause of death with contagious conditions everywhere.[1] The development of the novel corona virus (COVID-19) has bestowed a significant challenge in the 21st century, developing weak impacts on health, demographics, and public aspects.[2] The symptoms of COVID-19 closely resemble those of TB and other extensive infections. Consequently, co-infection of SARS-CoV-2 with other viruses, bacteria, and fungi frequently complicates the prevention, diagnosis, and control strategies for COVID-19. Both COVID-19 and TB primarily affect the human respiratory tract, specifically the bronchi, and are transmitted through aerosol droplets from an infected person to a healthy individual.[3,4] COVID-19 pandemic, resulting from the novel corona virus SARS-CoV-2, varies from a mild cold to more severe cases such as pneumonia.[5,6] Human-to-human transmission primarily occurs through droplet infections, either by inhaling respiratory droplets or touching surfaces contaminated with the virus.

Tuberculosis (TB) continues to be widespread in various regions worldwide, standing as a significant contributor to mortality in India.[7] India grapples with the simultaneous challenges posed by both COVID-19 and TB. The concern lies in the possibility that, as attention and resources are diverted to address the immediate health crisis of COVID-19, there could be a setback in the treatment of TB patients. This setback might lead to a surge in TB cases once lockdown restrictions are eased. It is imperative to effectively manage the response to the COVID-19 pandemic while ensuring the uninterrupted continuity of essential national TB programmes.[8]

The World Health Organization (WHO) has issued recommendations on managing the effects of COVID-19 on tuberculosis (TB).[9] WHO proposes utilizing the capabilities of National TB Elimination Programme (NTEP) to promptly conduct testing and contact tracing in response to COVID-19. Additionally, WHO advocates for the adoption of digital technologies to provide remote care and assistance to individuals with TB. In 2018, the United Nations pledged to eradicate the global tuberculosis (TB) epidemic by 2030 through the "End TB" strategy. This initiative aimed at an 80% reduction in TB incidence, a 90% decrease in deaths, and the elimination of catastrophic costs for households affected by TB. India declared its commitment to achieving

Please Scan this QR Code to View this Article Online
Article ID: 2024:04:01:01
Corresponding Author: Sivakumar Shanmugam
e-mail : shanmugam.sk@icmr.gov.in

TB elimination within its borders by 2025, surpassing the UN's target by five years.[10] Lockdowns and periods of elevated COVID-19 prevalence and hospital strain have been associated with a decline in the case notification ratio. This ratio represents the primary and immediate impact of the spread of COVID-19 on tuberculosis (TB) transmission dynamics.[11] To control the spread of SARS-CoV-2, countries worldwide enforced lockdowns, mandating people to stay indoors. This resulted in several repercussions. The similarity in symptoms between TB and COVID-19 might have led to a delay in considering TB, as many individuals could have linked comparable symptoms to COVID-19 and chosen to wait it out. Moreover, the existing stigma associated with TB, combined with the additional stigma surrounding COVID-19, and could have discouraged people from seeking testing, even when experiencing symptoms shared by both diseases.[12,13] The present study will carry out SARS-CoV-2 screening among TB patients in sputum samples transported to ICMR-NIRT as part of TB diagnostics.

METHODOLOGY

STUDY DESIGN: Anonymized, non-interventional study on TB and SARS-CoV-2 co-infection.

STUDY POPULATION: Stored sputum samples for a period of three months (February 2021 to April 2021) were included in the study form the NTEP sites under ICMR-NIRT. Our study examines the impact of COVID-19 on tuberculosis (TB) in Tamil Nadu, specifically focusing on five districts of Chennai.

ELIGIBILITY CRITERIA: All sputum samples received at ICMR-NIRT as part of NTEP algorithm for TB diagnostics. (Fig: 1)

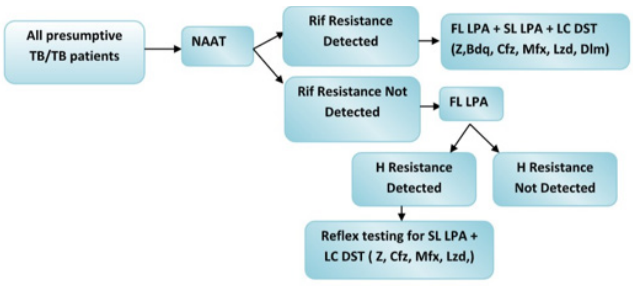


Figure 1: NTEP algorithm for TB diagnostics.

Diagnostic laboratories for tuberculosis (TB) are being upgraded to NAAT. This enhancement enables the provision of NAAT for all individuals suspected of having TB right from the initial diagnostic stage. Based on the NAAT result subsequent tests will be conducted to gather additional information or refine the diagnostic process as needed.

TB: Tuberculosis, NAAT: Nucleic Acid Amplification Test, Rif: Rifampicin, FL LPA: First Line -Line Probe Assay, SL LPA: Second Line –Line Probe Assay, LC DST: Liquid Culture Drug Susceptibility Test, Z: Pyrazinamide, Bdq: Bedaquiline, Cfx: Clofazimine, Mfx: Moxifloxacin, Lzd: Linezolid, Dlm: Delamanid, H: Isoniazid

STUDY PROCEDURES: All newly diagnosed TB patients were tested for SARS-CoV-2 infection(Fig:2). The data relating to date of TB diagnosis and Nikshay number was recorded for the request form.

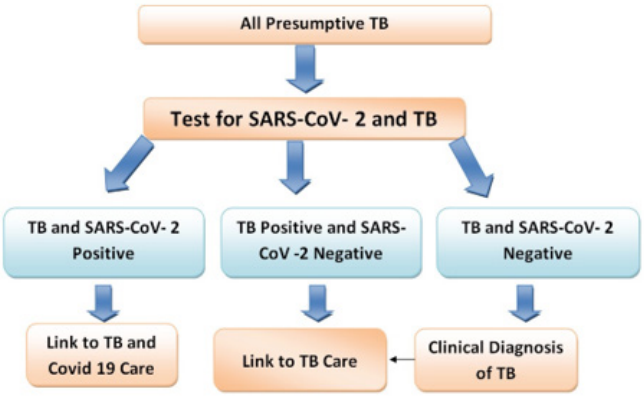


Figure 2: Algorithm for testing of SARS-CoV-2 among TB patients in NIRT Chennai, India.

STANDARD Q COVID-19 Ag Test was used in the study for screening sputum samples for the SARS-CoV-2 infection. STANDARD Q COVID-19 Ag Test is a rapid chromatographic immunoassay for the qualitative detection of specific antigens of SARS-CoV-2 present in human nasopharyngeal specimens. This product is intended for healthcare professionals at the clinical setup and point of care sites, as an aid to early diagnosis of SARS- CoV-2 infection in patient with clinical symptoms of SARS-CoV-2 infection. It provides only an initial screening test result. STANDARD Q COVID-19 Ag Test has two pre-coated lines, “C” Control line, “T” Test line on the surface of the nitrocellulose membrane. Both the control line and test line in the result window are not visible before applying any specimens. Mouse mono-clonal anti-SARS-CoV-2 antibody is coated on the test line region and mouse mono-clonal anti-Chicken IgG antibody is coated on the control line region. Mouse mono-clonal anti-SARS- CoV-2 antibody conjugated with color particles are used as detectors for SARS-CoV-2 antigen device. During the test, SARS-CoV-2 antigen in the specimen interacts with mono-clonal anti-SARS-CoV-2 antibody conjugated with color particles making antigen-antibody color particle complex. This complex migrates on the membrane via capillary action until the test line, where it

will be captured by the mouse monoclonal anti-SARS-CoV-2 antibody. A colored test line would be visible in the result window if SARS-CoV-2 antigens are present in the specimen. The intensity of colored test line will vary depending upon the amount of SARS-CoV-2 antigen present in the specimen. If SARS- CoV-2 antigens are not present in the specimen, then no color appears in the test line. The control line is used for procedural control and should always appear if the test procedure is performed properly and the test reagents of the control line are working. All positive and faint bands with the screening test were tested by RT- PCR as a gold standard test for comparison.

STATISTICAL CONSIDERATIONS

Sample size: The study population consists of all TB positive sputum samples received from 2021 February to April and stored at ICMR-NIRT, Chennai. We will collect basic demographic, epidemiological, microbiological and clinical information (including outcomes) on TB and COVID-19 patients during the study period from available NTEP database. The prevalence of TB among Covid-19 patients has been found to be 0.37 - 4.47 % among different studies. Considering this reference and assuming that 95% confidence level and 20% relative precision, a minimum sample size required would be 384 TB positive patients.

Data collection and Analysis: We have included all reported TB cases in the samples sent to us and stored from February 2021 to April 2021. COVID-19 cases were confirmed with positive real-time reverse transcription polymerase chain reaction (RT-PCR) from ICMR certified laboratory. Information on TB confirmed cases was collected from Nikshay and filled out electronically in an Excel sheet.

Ethical considerations: This protocol was submitted for review and approval to the ICMR-NIRT Ethical Review Committee for ethical clearance and started once the approval was in place (NIRT-IEC: 2021 030). This was laboratory study and was carried out on the de-identified by name.

RESULTS

Of these 384 patients (i.e., 88 females, 296 males), the population of men was almost three times that of women. Except for patients whose mean age was not reported (8 patients) and non-adult ones (4 patients), the mean age of adult patients was 53.59 years for the TB-Covid group and 45.36 years for the only TB group (Table 1).

All the samples were tested by Gene Xpert and were included if positive, no rifampicin resistance was detected, INH resistance was seen in one TB with Covid. In the TB alone group 19 patients had rifampicin resistance was detected (11 MDR-TB and 8 Mono Rif resistance-TB), INH mono resistance was seen 19 patients.

Table 1: Baseline Demographic and Clinical Characteristics of Study Participants

Characteristics		Tuberculosis and COVID-19 (22)	Tuberculosis (362)
Age (Mean/Median)		53.59/53	45.36/47
Height		45.13/48	46.6/45
Weight		156.59/156	155.38/155
Gender	Male	18 (81.8%)	278 (76.8%)
	Female	4 (18.2%)	84 (23.2%)
Socio-economic status	APL	0.0	4 (1.1%)
	BPL	16 (72.7%)	285 (78.7%)
	Unknown	6 (27.3%)	73 (20.2%)
Diabetes	Diabetic	11 (50%)	135 (37.3%)
	Non-Diabetic	11 (50%)	221 (61.0%)
	Unknown	0.0	6 (1.65%)
Smoking	Smoker	7 (31.8%)	94 (26.0%)
	Non-Smoker	15 (68.2%)	232 (64.1%)
	Unknown	0.0	36 (9.9 %)
Alcohol	Alcoholic	9 (40.9%)	119 (32.9%)
	Non-Alcoholic	13 (59.1%)	199 (54.9%)
	Unknown	0.0	44 (12.2%)
HIV Status	Non-Reactive	22 (100%)	335 (92.5%)
	Reactive	0.0	6 (1.7%)
	Unknown	0.0	21 (5.8%)

Data is presented both in number and percentage as indicated. APL: Above Poverty Level BPL: Below Poverty Level, HIV: Human Immunodeficiency Virus

OUTCOME BASED ANALYSIS: A total of 17 (77.27%) patients were cured in the TB with covid patient group and 5 patients show unfavorable outcome ranging from death (2, 9.1%), lost to follow up (2, 9.1%), and treatment changes due to development of resistance (1, 4.5%). The distribution of diabetic patients in the TB with covid patient group was diabetic (8, 47.05%) and non-diabetic (9, 52.9%) among the cured patients and there was no association of diabetic patients with unfavorable outcome as both the patient died of TB was nondiabetic.

A total of 230 (63.2%) patients were cured in the only TB patient group and 132 patients show unfavorable outcome ranging from death (31, 8.5%), lost to follow up (35, 9.6%), treatment changes due to development of resistance (23, 6.3%) and not traceable (43, 11.8%). (Fig:3) The distribution of diabetic patients in the only TB patient group was diabetic (135, 37.3%) and non-diabetic (221, 61.0%) among the patients with unfavorable outcome (132, 36.5%) and there was no association of diabetic patients with unfavorable outcome (Death 31, 8.5%) as both the diabetic (12, 3.2%) and non-diabetic (18, 4.9%) has no significant difference.

The TB-COVID-19 patients with higher rate of coinfection were seen in male, belonged to older age groups and with more co-morbidity. These determinants of death are similar to those described for mono-disease TB.

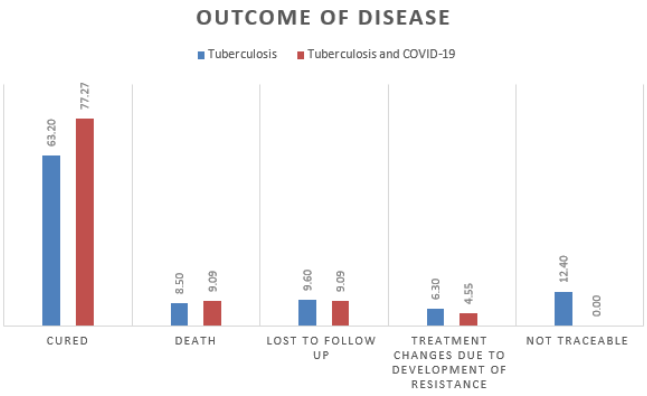


Figure 3: Shows outcome of the Tuberculosis group alone and Tuberculosis and COVID-19 group.

DISCUSSION

The data on the impact of COVID-19 severity on treatment outcome of TB is unclear and literature reports are often conflicting. The management of co-infected patients is complicated as there are pharmacokinetic interactions between several drugs used for the therapy of SARS-CoV-2 infection and the treatment of TB.[14] There is a moderate level of evidence indicating that individuals co-infected with COVID-19 and TB are at a higher risk of experiencing severe disease or mortality compared to those solely affected by COVID-19. As a precautionary measure, it may be advisable to incorporate routine screening for TB among suspected or confirmed cases of COVID-19 in countries facing a high burden of TB.[15]

Various research studies have delved into the consequences of the COVID-19 pandemic on tuberculosis (TB). According to a previous report, the shock triggered by COVID-19 may significantly influence the occurrence and mortality associated with tuberculosis, with a prolonged timeline for a return to normalcy in these aspects.[16] Changes in blood cell parameters are linked to an adverse treatment outcome. COVID-19/TB co-infection is correlated with a higher mortality rate, particularly among individuals of older age, those with a history of smoking or current smokers, individuals with a history of drug abuse, and those with co-existing non-communicable diseases.[17]

Our study observed 22 cases of TB-COVID-19 co-infection among 384 TB patients with symptoms who were tested positive by NAAT. A lower incidence of COVID-19 was observed in regions with higher tuberculosis (TB) incidence and widespread Bacillus Calmette-Guérin (BCG) vaccine coverage. This finding encourages additional exploration into the pathogenesis and immune response of COVID-19.[18] While combating the COVID-19 pandemic, it is crucial not to overlook the importance of vigilance and proper management of tuberculosis (TB). TB remains a significant infectious cause of mortality globally, and addressing it appropriately is imperative.[19] In a previous study, an annual decline of approximately 2% in the prevalence and incidence of tuberculosis (TB) from 2020 to 2025, both in the presence and absence of COVID-19. While an overall reduction is observed, it lacks statistical significance, suggesting that COVID-19 has not significantly influenced TB in Tamil Nadu.[20]

Our study compared the gender, age, co-morbidities, social habits, socioeconomic status between the two groups but we did not find any significant differences. This could be due to the limited co-infection cases observed in our study. Statistically significant factors contributing to the severity of disease in patients with COVID-19/TB include female gender, presence of fever, dyspnea, pulmonary bilateral TB lesions, and the presence of three or more co-morbidities. To accurately differentiate between COVID-19 and TB, it is crucial to conduct rapid molecular testing and computed tomography, especially given the similar clinical characteristics of both diseases. Additionally, bilateral pulmonary TB lesions and the presence of co-morbidities should be recognized as risk factors for the development of severe COVID-19.[21]

Concerning the risk of morbidity and mortality, various risk scores for COVID-19, as well as independent risk factors for tuberculosis (TB), have been identified. These factors include, age, poverty, malnutrition, and co-morbidities such as HIV co-infection and diabetes. Ongoing global TB/COVID-19 studies are anticipated to furnish additional evidence and insights into the interplay of these factors, further contributing to our understanding of the risks associated with these diseases.[22] Research findings indicate that common symptoms in COVID-19/TB co-infection include fever, cough, hypotension, altered blood cell count, and abnormal liver enzymes, along with lower hemoglobin levels. Unfavorable treatment outcomes are associated with alterations in blood cell parameters. However, no significant differences in treatment outcomes were observed in the TB-COVID-19 co-infection group in comparison to only TB group. In previous study, a higher death rate was observed COVID-19/TB co-infection, particularly among individuals of older age, those with a history of smoking, drug abuse, and co-morbidity of non-communicable diseases. Conversely, HIV patients exhibit a lower death rate, possibly attributed to the impact of antiviral drugs. Further investigations into immune cell function in HIV patients are warranted for a comprehensive understanding.[17]

Individuals at a heightened risk of experiencing severe COVID-19 or facing a higher likelihood of mortality often share specific characteristics. These include advanced age, male sex, and the presence of underlying health issues like cardiovascular disease (CVD), obesity, and either type 1 diabetes mellitus (T1DM) or type 2 diabetes mellitus (T2DM).[23, 24] Diabetes Mellitus elevates the risk of contracting Tuberculosis (TB) disease by approximately threefold, doubling the likelihood of death during TB treatment and contributing to other unfavorable treatment outcomes. Additionally, diabetes may heighten the risk of latent infection with Mycobacterium tuberculosis (LTBI).[25] In contrast to other research, our study reveals no statistically significant association between co morbidities and SARS-CoV-2 or tuberculosis (TB).

CONCLUSION

The study showed a rate of co-infection with COVID-19 and tuberculosis to be 5.7%, there was no significant difference in the favorable treatment outcome of patient with TB alone and TB plus COVID-19 group.

As patients reported similar symptoms, it advisable for health services to screen patients for both diseases whenever possible, taking advantage of the possibility to obtain imaging rapidly and stimulating adoption of rapid molecular testing for TB and COVID-19. Although our study does not provide specific data on this, it seems clinically advisable to treat both conditions as soon as possible following international recommendations.

REFERENCES

1. World Health Organization. Global tuberculosis report 2021. Geneva: World Health Organization., 2021. ISBN 978-92-4-003702-1.

2. Cheval, S.; Mihai Adamescu, C.; Georgiadis, T.; Herrnegger, M.; Piticar, A.; Legates, D.R. Observed and Potential Impacts of the COVID-19 Pandemic on the Environment. Int. J. Environ. Res. Public Health 2020, 17, 4140.

3. Rawson TM, Moore LSP, Zhu N, Ranganathan N, Skolimowska K, Gilchrist M, et al. Bacterial and Fungal Coinfection in Individuals With Coronavirus: A Rapid Review To Support COVID-19 Antimicrobial Prescribing. Clin Infect Dis (2020) 71:2459–68. doi: 10.1093/cid/ciaa530

4. Tadolini M, Codecasa LR, Garcıa-Garc´ ıa JM, Blanc FX, Borisov S, Alffenaar´ JW, et al. Active Tuberculosis, Sequelae and COVID-19 Co-Infection: First Cohort of 49 Cases. Eur Respir J (2020) 56:2001398. doi: 10.1183/ 13993003.01398-2020.

5. World Health Organisation Dashboard Coronavirus. 2020. https://experience. arcgis.com/experience/685d0ace521648f8a5beeeee1b9125cd. [Accessed 10 July 2020]. Accessed.

6. Zhu N, Zhang D, Wang W, Li X, Yang B, Song J, Zhao X, Huang B, Shi W, Lu R, Niu P, Zhan F, Ma X, Wang D, Xu W, Wu G, Gao G. A novel coronavirus from patients with pneumonia in China.

7. Government of India. Central tuberculosis division. India TB report 2020. Available from: https://tbcindia.gov.in. Accessed July 5, 2020.

8. Iyengar K, Upadhyaya GK, Vaishya R, Jain V. COVID-19 and applications of smartphone technology in the current pandemic [published online ahead of print, 2020 May 26]. Diabetes Metab Syndr. 2020;14(5):733e737. https://doi.org/10.1016/j.dsx.2020.05.033.

9. Lee, Y.; Raviglione, M.C.; Flahault, A. Use of Digital Technology to Enhance Tuberculosis Control: Scoping Review. J. Med. Internet Res. 2020, 22, e15727.

10. Global tuberculosis report 2023 - World Health Organization (WHO)

11. World Health Organization. Global Tuberculosis Report 2022; World Health Organization: Geneva, Switzerland, 2022.

12. Visca D, Ong CWM, Tiberi S, et al. Tuberculosis and COVID-19 interaction: a review of biological, clinical and public health effects. Pulmonology 2021; 27: 151–165.

13. Meo SA, Abukhalaf AA, Alomar AA, et al. Impact of lockdown on COVID-19 prevalence and mortality during 2020 pandemic: observational analysis of 27 countries. Eur J Med Res 2020; 25: 1–7.

14. Zamparelli, S.S.; Mormile, M.; Zamparelli, A.S.; Guarino, A.; Parrella, R.; Bocchino, M. Clinical impact of COVID-19 on tuberculosis. Infez. Med. 2022, 30, 495–500.

15. Khanna, A.; Saha, R.; Ahmad, N. National TB elimination programme—What has changed. Indian J. Med. Microbiol. 2023, 42, 103–107.

16. Bhargava, A.; Shewade, H.D. The potential impact of the COVID-19 response related lockdown on TB incidence and mortality in India. Indian J. Tuberc. 2020, 67, S139–S146.

17. Mollalign H, Chala D, Beyene D. Clinical Features and Treatment Outcome of Coronavirus and Tuberculosis Co-Infected Patients: A Systematic Review of Case Reports. Infect Drug Resist. 2022 Jul 27;15:4037-4046. doi: 10.2147/IDR.S370837.

18. Madan M, et al. TB infection and BCG vaccination: are we protected from COVID-19. Public Health. 2020. PMID: 32590235.

19. Khurana AK, Aggarwal D. The (in)significance of TB and COVID-19 co-infection. Eur Respir J. 2020 Aug 20;56(2):2002105. doi: 10.1183/13993003.02105-2020. Print 2020 Aug.

20.Muniyandi.M et.al. The Predicted Potential Impact of COVID-19 Pandemic on Tuberculosis Epidemic in Tamil Nadu, South India. Trop. Med. Infect. Dis. 2024, 9(1), 12; https://doi.org/10.3390/tropicalmed9010012.

21. L Parolina, N Pshenichnaya, I Vasilyeva, I Lizinfed, N Urushadze, V Guseva, O Otpushchennikova, O Dyachenko, P Kharitonov. Clinical characteristics of COVID-19 in patients with tuberculosis and factors associated with the disease severity. International Journal of Infectious Diseases. Volume 124, Supplement 1, November 2022, Pages S82-S89

22. D. Visca, C.W.M. Ong, S. Tiberi, R. Centis , L. D'Ambrosio, B. Chen, J. Mueller, P. Mueller, R. Duarte, M. Dalcolmo, G. Sotgiu, G.B. Migliori, D. Goletti. Tuberculosis and COVID-19 interaction: A review of biological, clinical and public health effects. Pulmonology .Volume 27, Issue 2, March–April 2021, Pages 151-165.

23. Holman, N. et al. Risk factors for COVID-19-related mortality in people with type 1 and type 2 diabetes in England: a population-based cohort study. Lancet Diabetes Endocrinol. 8, 823–833 (2020).

24. Grasselli, G. et al. Baseline characteristics and outcomes of 1591 patients infected with SARS-CoV-2 admitted to ICUs of the Lombardy region, Italy. JAMA 323, 1574–1581 (2020).

25. R v Crevel, J A Critchley. The Interaction of Diabetes and Tuberculosis: Translating Research to Policy and Practice. Trop. Med. Infect. Dis. 2021, 6(1), 8; https://doi.org/10.3390/tropicalmed6010008.

ORIGINAL ARTICLE - PUBLIC HEALTH

CONTACT SCREENING AND YIELD OF TUBERCULOSIS FROM PEDIATRIC TB INDEX CASES

Pooranagangadevi Naveneethapandian [(1)], Banurekha Velayutham [(1)], Mahalakshmi Rajendran [(1)], Prabhakaran Rathinam [(2)], ZufireHassan MohamedKhan [(3)]

(1) ICMR- National Institute for Research in Tuberculsois, Chennai, India

(2) Department of TB and Respiratory Diseases, Government Rajaji Hospital, Madurai

(3) District TB Officer

Abstract

BACKGROUND: Contact tracing helps in identifying new Tuberculosis (TB) cases in house hold contacts and thus interrupting the transmission. Our Objective was to determine the proportion of paediatric TB cases started on Anti Tuberculosis Treatment (ATT) under NTEP in Madurai district and to screen and estimate the prevalence of Latent TB Infection (LTBI), active TB disease among the household contacts of paediatric TB index cases.

METHODS: A prospective cross sectional study was conducted where 108 household contacts (HHC) of 37 paediatric TB cases were evaluated for any symptoms suggestive of TB and screened for TB using chest X-ray, mantoux test, sputum AFB. To determine the factors associated with active TB, Pearson's Chi-square test/Fisher's exact test was performed.

RESULTS: A total of 108 HHC with mean age of 28.6 years were screened. Six of them had previous history of ATT, Mantoux was positive in 10 of them. Chest X-Ray was abnormal in 8 of them. 2(1.9%) HHC were diagnosed on basis of Chest X-Ray changes while 1(0.9%) was diagnosed based on clinical features .2.8% HHC were diagnosed as new TB cases among adults and children

CONCLUSION: This was one of the few studies in India that evaluated the yield of contact investigation from Paediatric TB Index cases and indicates the possibility of contact investigation and the possible contribution towards the national objective of early and improved TB case detection.

KEYWORDS : Contact tracing, Humans, Pediatric, tuberculosis

INTRODUCTION

Breaking the cycle of tuberculosis (TB) infection requires both treatment and prevention. Contact tracing helps in identifying new TB cases in house hold contacts and thus interrupting the transmission.

An estimated 10 lakh children became ill with TB and 2,50,000 children died of TB in 2017 (including children with HIV associated TB) (1). In 2017, Paediatric TB cases accounted for 6% of the total TB burden due to under diagnosis, while the actual paediatric burden is closer to 8%. About 2,24,000 incident cases of paediatric TB are estimated to occur every year accounting for 22% of global burden. In 2018, a total of 1,32,711 paediatric TB patients (only 59% of estimated) were notified in India, which included new and relapse paediatric TB patients.[1] However, because the majority of children are sputum microscopy smear negative, these data underestimate the true burden of childhood TB.

Contact investigation has been recommended internationally as a promising approach for identifying persons at high risk for developing tuberculosis (TB) and offers an opportunity for early case detection.[2,3] However, in many low-resource, high-TB burden countries, contact investigation is not often conducted despite national policy.[4,5]

NTEP has recommended the contact tracing of sputum smear positive adult TB cases.[6] Children, who are less infectious due to paucibacillary disease, most often contract TB from infectious adult household contacts with active TB.[7] Diagnosing a paediatric TB case therefore strongly suggests the presence of an untreated TB case at home. Kubaisy et al.[8] reported a case yield of 17.4% among contacts of children with latent tuberculous infection in Iraq; Eckhoff [9] reported a case yield of 8.3% among contacts of paediatric index cases in Haiti; however, on excluding those with known TB, the yield dropped to 1.8%.

No study has yet examined the yield of contact tracing using paediatric index cases in our setting. So we had conducted a study to describe the case yield of TB contact tracing using paediatric index cases in Madurai district, Tamilnadu.

Our Objective was to screen and estimate the prevalence of LTBI, active TB disease among the household contacts of

Please Scan this QR Code to View this Article Online
Article ID: 2024:04:01:02
Corresponding Author: Poorana Ganga Devi N
e-mail : drpooranadevi@yahoo.co.in

paediatric TB index cases upon determining the proportion of paediatric TB cases started on ATT under NTEP in Madurai district.

METHODOLOGY

STUDY DESIGN AND STUDY SETTING : A cross sectional study was conducted in the NTEP centres located in Madurai district during the period July 2019 to December 2019 where children ≤ 14 years were registered and started on TB treatment.

STUDY POPULATION : Our Study population included the Household contacts of Paediatric TB cases (aged 0-14 yrs) started on ATT in the NTEP centers in Madurai district over a period of 6 months.

CASE DEFINITION : An Index TB case in our study was defined as the children aged ≤ 14 years who were registered for TB treatment at the NTEP centres.

Household contact (HHC) was defined as a person living with and sharing food from the same kitchen as the index patient for a minimum of three months prior to diagnosis of TB disease of the index case. An index case at these centers are diagnosed as having TB by considering suggestive clinical features, the history of TB contact, positive TST (≥ 10mm was considered positive), and evidence of TB in chest X-ray (CXR), sputum microscopy (mostly children greater than 7 years) for pulmonary TB (PTB). For diagnosis of EPTB at these centres, diagnostic tests were performed depending on the sites involved.

STUDY PROCEDURES : The study was approved by our NIRT Ethics Committee. After necessary ethical approval, the NTEP staffs of Madurai district were trained on study related procedures before the study initiation. Index case details were obtained both from the patient (demographic details, personal habits) and the NTEP treatment card (method of diagnosis and type of TB). Their HHC were registered at the study sites and their demographic details were noted after written informed consent. Written informed consent was obtained for HHCs aged > 18 years. Parent / guardian consent was obtained for HHCs aged <18 years. Assent was obtained from children aged >7 years. HHCs were evaluated for any symptoms suggestive of TB (cough ≥ 2 weeks, fever and weight loss) and screened for TB using a CXR and Mantoux testing. A spot sputum specimen was collected for those who were symptomatic for AFB smear examination.

STATISTICAL ANALYSIS : All data were entered in Excel 2010 and statistical analysis was performed using the statistical software SPSS 25.0. Data were described as frequency (with percentages), mean values (with standard deviations) and median (with IQR). To determine the factors associated with active TB, Pearson's Chi-square test/Fisher's exact test was performed. Results were defined as statistically significant when the P value (2-sided) was less than 0.05.

RESULTS

INDEX CASES: Out of 52 index cases, the household contacts of thirty seven Index cases were willing to participate in the study and were registered. Table 1 shows the demographic and clinical characteristics of the Paediatric Index cases. The median age of the Index cases was 9 and most of them were females (62.2%) and with primary level education. Exposure to biogas fuel was minimal (13.9%). Four of them had previous history of ATT. Sputum examination was done for 13 of them and Mycobacterium Tuberculosis (M.Tb) was detected in 6 of them (46.2%). Chest X ray abnormality was detected in 13 (44.8%) with infiltrations being the major findings. Sputum positivity and CXR abnormality was found in 4 of the Index cases. Extra pulmonary investigations done included Ultrasound, MRI, and CT scan of the concerned site, biopsy and FNAC of the sample for AFB detection. Final diagnosis of the index cases were pulmonary TB in 18 and extra pulmonary TB in 18 of the total index cases. Lymph node TB (33.3%) was the most common extra pulmonary TB in these cohorts. One of these index case was HIV positive.

HOUSEHOLD CONTACTS : There was a median 4 household contacts for these index paediatric cases. Table 2 shows the demographic and clinical characteristics of the household contacts of Paediatric Index cases. There was a total of 108 household contacts with a mean age of 28.6 years. They were mostly females (52.8%) and with primary school education level (26.3%). Of these eighteen contacts had either of the chest symptoms suspicious of TB with cough being the predominant one in 94.4% of them but their sputum smear was negative. Six of the household contacts had history of previous ATT intake and seven had co-morbid conditions such as Diabetes, hypertension and others. Smoking history was present in 4 of these contacts (3.7%). Mantoux was positive in 10 and Chest x-ray was abnormal in 8 of them. Seven of the household contacts had Mantoux positive without any symptoms and with normal Chest X ray. During screening, 2 (1.9%) HHC were diagnosed on the basis of CXR changes and TST positivity, while 1 (0.9%) was diagnosed on the basis of clinical features and seven were diagnosed as TB infected. None of the TB symptom status, Mantoux positivity or abnormal CXR of the household contacts was found associated with TB in Index cases (Table 3 and Table 4).

Table 1: Demographic and clinical characteristics of paediatric TB index cases

Index cases	
	n (%)
Total	37
Female sex	23 (62.2)
Age, years, median [IQR]	9 (5.5 – 10.5)
Range	1 – 14
Age ≤5 years	9 (24.3)
Educational Status	
Not attending the School	5 (13.5)
Palvadi	2 (5.4)
Primary School	21 (56.8)
Upper Primary School	6 (16.2)
Secondary School	3 (8.1)
Type of Indoor heating/cooking fuel	
Gas	31 (86.1)
Wood	5 (13.9)
Type of family	
Nuclear	29 (78.4)
Joint	8 (21.6)
Previous H/O of ATT	
Yes	4 (10.8)
No	33 (89.2)
Sputum Result	
MTB detected	6 (46.2)
MTB not detected	7 (53.8)
CXR	
Normal	16 (55.2)
Abnormal	13 (44.8)
Diagnosis	
PTB	18 (50.0)
EPTB	18 (50.0)
HIV status	
Positive	1 (3.3)
Negative	29 (96.7)
ATT Regimen	
CAT I	35 (94.6)
CAT II	2 (5.4)
Number of household contacts, median [IQR]	4 (4 – 5)

Table 2 : Demographic and clinical characteristics of household contacts of paediatric TB index cases

	Household contacts n (%)	Asymptomatic contacts n (%)	Symptomatic contacts n (%)
Total	108	90	18
Female sex	57 (52.8)	49 (54.4)	8 (44.4)
Age, years, mean ± SD	28.6 ± 17.5	29.1 ± 17.9	26.1 ± 15.1
Range	2, 72	3, 72	2, 52
Age ≤5 years	7 (6.5)	5 (5.5)	2 (11.1)
Educational Status			
Palvadi	3 (3.2)	2 (2.6)	1 (5.9)
Pre-Primary	4 (4.2)	2 (2.6)	2 (11.8)
Primary School	25 (26.3)	23 (29.5)	2 (11.8)
Upper Primary School	17 (17.9)	15 (19.2)	2 (11.8)
Secondary School	21 (22.1)	16 (20.5)	5 (29.4)
Higher Secondary School	14 (14.7)	12 (15.4)	2 (11.8)
Diploma	3 (3.2)	3 (3.8)	-
Graduate/Postgraduate	8 (8.4)	5 (6.4)	3 (17.6)
Symptoms present			
Cough	17 (15.7)	-	17 (94.4)
Fever	1 (0.9)	-	1 (5.6)
Weight loss	1 (0.9)	-	1 (5.6)
Loss of appetite	3 (2.8)	-	3 (16.7)
Previous History of ATT	6 (5.6)	4 (4.4)	2 (11.1)
Co-morbid conditions	7 (6.5)	5 (5.5)	2 (11.1)
H/O Alcohol Intake	10 (9.3)	7 (7.8)	3 (16.7)
H/O Smoking	4 (3.7)	4 (4.4)	-
Mantoux (≥10 mm)	10/107 (9.3)	9/89 (10.1)	1/18 (5.6)
Abnormal CXR Finding	8/104 (7.7)	5/88 (5.7)	3/16 (18.8)

Table 3 : Association between the sputum status of Index cases with Household contacts Characteristics

	Sputum Results of Index Case			
	MTB Detected n (%)	MTB Not Detected n (%)	Total n (%)	P-value
Symptom Diagnosis				
Asymptomatic	15 (100.0)	75 (80.6)	90 (83.3)	0.070
Symptomatic	-	18 (19.4)	18 (16.7)	
X-ray Findings				
Normal	13 (86.7)	83 (93.3)	96 (92.3)	0.325
Abnormal	2 (13.3)	6 (6.7)	8 (7.7)	
Mantoux-Reading (in mm)				
≥10	4 (26.7)	6 (6.5)	10 (9.3)	0.032
<10	11 (73.3)	86 (93.5)	97 (90.7)	

Table 4 : Association between the X-ray status of Index cases with Household contacts Characteristics

	X-ray findings of Index Case			
	CXR Normal n (%)	CXR Abnormal n (%)	Total n (%)	P-value
Symptom Diagnosis				
Asymptomatic	60 (81.1)	30 (88.2)	90 (83.3)	0.417
Symptomatic	14 (18.9)	4 (11.8)	18 (16.7)	
X-ray Findings				
Normal	64 (91.4)	32 (94.1)	96 (92.3)	1.000
Abnormal	6 (8.6)	2 (5.9)	8 (7.7)	
Mantoux-Reading (in mm)				
≥10	6 (8.2)	4 (11.8)	10 (9.3)	0.723
<10	67 (91.8)	30 (88.2)	97 (90.7)	

DISCUSSION

In the current study, 2.8% household contacts were diagnosed as new TB cases among adults and children. The secondary cases diagnosed presented with minimal disease. Two HHC adults (1.9%) was diagnosed as TB by chest X ray and Tuberculin skin test and 1 child contact (0.9%) diagnosed clinically. These disease states represent early TB disease with high risk of TB progression and are likely to contribute to continued transmission.[10] These results are comparable to recently published study from India.[11,12] Our results are in

agreement with the study from India where majority of the source cases were identified for adults.[13] In this study 37 index cases were taken, totally 108 HHC were screened, this proportions are low, this should be improved for best results. Typically, contact tracing is initiated after TB is confirmed in an index case—usually an adult with infectious TB. Tracing the contacts of a smear positive index adult case, such as household contacts is the usual screening technique in countries with high prevalence of tuberculosis and is an important strategy in the tuberculosis control programme. However, when the index case is a young child with suspected (rather than confirmed) tuberculosis, contact tracing (variously known as source case investigation, reverse contact tracing or ascending surveys.[8, 13-15] is reported on less frequently.

Screening of the targeted risk group is more practical and cost effective. In areas of high prevalence, tuberculosis carries a social stigma and a positive family history is often denied until pursued repeatedly. Similarly finding adult tuberculous contact source is an important way of diagnosing paediatric tuberculosis A source case investigation for children with TB disease in Pune, India also showed that opportunities for TB prevention and control were being missed because contact tracing is poorly implemented in India.[13]

In this study, proportions of HHC of TB children was very low, these numbers should be improved in future studies to get more accurate results. The limitations of our study was that the number of Index paediatric cases and their household contacts were low as the study was done only for a six months' time period and only six of these index patients were infectious cases, hence any statistical application could not be used to evaluate the significance of individual risk factors for transmission of disease. A minimum of 2 appointments needed to complete screening, transport and time costs for the patients and their families have all been identified as barriers to screening in our study also.[16] The symptomatic HHC were asked to give sputum sample on the spot for AFB smear examination and overnight specimens was not collected for them for improved TB case detection.[17,18]

HHC tracing is an important component to end TB in high prevalence areas. Through systematic and active case finding among household contacts, we found additional TB cases beyond passive contact screening (becoming symptomatic and later attending the clinic) which is an encouraging approach towards improving access to early diagnosis of TB. So, improving screening tools for TB will help to early detection in HHC contacts.

CONCLUSION

This was one of the few studies in India that evaluated the yield of contact investigation from paediatric index TB cases and indicates the possibility of contact investigation and the possible contribution towards the national objective of early and improved TB case detection. Larger-scale implementation is needed to determine the generalizability of the findings.

DECLARATIONS

- Ethics approval and consent to participate- The study was approved by our NIRT Ethics Committee and written informed consent was obtained from the participants
- Competing interests- The authors declare there are no competing interests
- Funding- The authors received no funding for the present study.
- Authors' contributions- Conceived and designed the experiments: PN, BV, MR. Performed the experiments: PN, PR, ZM, MR. Analyzed the data: PN, MR. Wrote the paper: PN, BV, MR. All the authors reviewed the draft.
- Acknowledgements- We would like to acknowledge the immense cooperation and support received from all our collaborators: staff at the Chest Clinic, Government Rajaji hospital, Madurai and the NTEP Madurai District. The authors also thank all the patients and their household contacts for participation in the study, Rajalaxmi for assistance in patient recruitment at the National Institute for Research in Tuberculosis.

REFERENCES

1. India TB Report 2019. Revised National TB Control Programme Annual Report. Central TB Division. Ministry of Health and Family welfare. https://tbcindia.gov.in/WriteReadData/India%20TB%20Report%202019.pdf

2. Tuberculosis Coalition for Technical Assistance, International Standards for Tuberculosis Care (ISTC), Tuberculosis Coalition for Technical Assistance, The Hague, The Netherlands, 2006, http://www.who.int/tb/publications/2006/istc_report.pdf.

3. World Health Organization, "Global tuberculosis control report," Tech. Rep. WHO/HTM/TB 2013.6, World Health Organization, Geneva, Switzerland, 2014.

4. K. C. Chang, C. C. Leung, and C. M. Tam, "Household contact investigation of tuberculosis in low-income and

middle-income countries: public-health impact," The Lancet Infectious Diseases, vol. 9, no. 1, pp. 3–4, 2009.

5. G. J. Fox, S. E. Barry, W. J. Britton, and G. B. Marks, "Contact investigation for tuberculosis: a systematic review and meta-analysis," European Respiratory Journal, vol. 41, no. 1, pp. 140–156, 2013.

6. RNTCP. National Guidelines on diagnosis and treatment of Paediatric Tuberculosis February 2012.http://tbcindia.nic.in/Paediatric%20guidelines_New.pdf

7. Marks S M, Taylor Z, Qualls N L, Shrestha-Kuwahara R J, Wilce M A, Nguyen C H. Outcomes of contact investigations of infectious tuberculosis patients. Am J RespirCrit Care Med 2000; 162: 2033–2038.

8. Eckhoff C T. Evaluation of a clinical index among adult contacts of children with tuberculosis in rural Haiti. Int J Tuberc Lung Dis 2000; 4: 1143–1148.

9. Al Kubaisy W, Al Dulayme A, Hashim D S. Active tuberculosis among Iraqi schoolchildren with positive skin tests and their household contacts. Eastern Mediterr Health J 2003; 9: 675– 688

10. Drain PK, Bajema KL, Dowdy D, Dheda K, Naidoo K, Schumacher SG, et al.
Incipient and Subclinical Tuberculosis: a Clinical Review of Early Stages and
Progression of Infection. Clin Microbiol Rev. 2018;31(4)

11. Gupta M, Saibannavar A, Kumar V. Household symptomatic contact screening of newly diagnosed sputum smears positive tuberculosis patients - an effective case detection tool. Lung India. 2016;33(2):159–62.

12. Laghari M, Sulaiman SAS, Khan AH, Talpur BA, Bhatti Z, Memon N. Contact screening and risk factors for TB among the household contact of children with active TB: a way to find source case and new TB cases. BMC Public Health. 2019;19(1):1274. Published 2019 Sep 18. doi:10.1186/s12889-019-7597-0

13. De D, Kinikar A, Adhav P, Kamble S, Sahoo P, Koli H, et al. Source case investigation for children with TB disease in Pune. India Tuberculosis research and treatment. 2014;2014:1–8

14. Dahiwale N, Rao S, Singh J, Rawat AK. Significance of family survey of index case for detection of tuberculosis. Indian Pediatr. 2011;48:387–389.

15. Puryear S, Seropola G, Ho-Foster A, Arscott-Mills T, Mazhani L, Firth J, et al. Yield of contact tracing from paediatric tuberculosis index cases in Gaborone, Botswana. Int J Tuberc Lung Dis. 2013;17:1049–1055. 10.5588/ijtld.12.0933

16. Rutherford M, Hill P, Triasih R, Sinfield R, van Crevel R, Graham S. Preventive therapy in children exposed to mycobacterium tuberculosis: problems and solutions. Trop Med Int Health. 2012;17(10):1264–73.

17. Ssengooba W, Kateete DP, Wajja A, Bugumirwa E, Mboowa G, Namaganda C, Nakayita G, Nassolo M, Mumbowa F, Asiimwe BB, Waako J, Verver S, Musoke P, Mayanja-Kizza H, Joloba ML. An Early Morning Sputum Sample Is Necessary for the Diagnosis of Pulmonary Tuberculosis, Even with More Sensitive Techniques: A Prospective Cohort Study among Adolescent TB-Suspects in Uganda. Tuberc Res Treat. 2012;2012:970203. doi: 10.1155/2012/970203. Epub 2012 Dec 4. PMID: 23304491; PMCID: PMC3529437.

18. Mpagama SG, Mtabho C, Mwaigwisya S, Mleoh LJ, Boer IM, Heysell SK, Houpt ER, Kibiki GS. Comparison of overnight pooled and standard sputum collection method for patients with suspected pulmonary tuberculosis in northern Tanzania. Tuberc Res Treat. 2012;2012:128057. doi: 10.1155/2012/128057. Epub 2012 Jan 19. PMID: 22567273; PMCID: PMC3335725.

ORIGINAL ARTICLE - PUBLIC HEALTH

WINGS OF SUPPORT (UDHAVUM SIRAGUGAL) : A HOLISTIC PSYCHO-SOCIAL INTERVENTION FOR TB PERSONS AND CAREGIVERS IN A TERTIARY CARE FACILITY IN TAMIL NADU, AN IMPLEMENTATION RESEARCH APPROACH

Karikalan N[1], Ramesh P M [2], Vinod Kumar Viswanathan [3], Kaleshwari M [4], Chandra Suresh [1], Murugesan P [1], Sellappan S [1], Dhanalakshmi A [1], Rani S [1], Stephen A [1], Priscilla B [1], K Karthikeyan [5], Chandrasekaran Padmapriyadarsini [1], Asha Federick [6]

(1) Department of Social and Behavioural Research, ICMR –National Institute for Research in Tuberculosis, Chennai, Tamil Nadu

(2) Government Hospital of Thoracic Medicine, Tambaram, Tamil Nadu

(3) Rajiv Gandhi Government General Hospital, Chennai, Tamil Nadu

(4) National Tuberculosis Elimination Programme

(5) Karnataka Health Promotion Trust, Bengaluru

(6) Directorate of Medical and Rural Health Services, Tamil Nadu, India

Abstract

CONTEXT: Patient-centric care recognizes the psycho-social needs of Tuberculosis (TB) patients. Integrating psycho-social interventions to improve the resilience of persons with TB and their caregivers during the TB care cascade is a need.

AIMS : We share the field experiences and outcomes of implementing a participatory patient-centric psycho-social intervention for persons with TB in a selected tertiary TB care facility in Tamil Nadu.

SETTINGS AND DESIGN : We used co-creation methods to develop a psycho-social intervention module based on the self-efficacy constructs used in chronic disease management. Participants consisted of persons with TB admitted to the Government Hospital of Thoracic Medicine, Tambaram, and their family caregivers.

METHODS AND MATERIAL: Participatory and game-based intervention (designated as Wings of Support sessions) was conducted in group mode (n =10-12) (both patients and caregivers) for 45-60 minutes once weekly. Each session focused on TB stigma, medication adherence, nutritional issues, unhealthy behaviors like alcoholism, stress, anxiety, and other related issues. Each session employed specific concepts and techniques involving motivation, goal setting, psycho-education, problem-solving, mindfulness, normalization, behavioral activation, and cognitive coping.

RESULTS : Between March 2023 to January 2024, 44 sessions were conducted by healthcare providers and social workers on different themes related to TB disease, medication, and its management. A total of 450 persons with TB and their caregivers attended. Group Sessions related to TB stigma, nutrition, medication adherence, and family caregiving were co-created and implemented in an iterative and tailored manner by the study team, making it more adaptable and flexible. The intervention was found more receptive, and was perceived as highly relevant and useful by the participants, and in terms of techniques employed in the sessions, game-based activities, artistic recreation, and mindfulness techniques had the most acceptance and participation.

CONCLUSIONS : Post-intervention feedback highlighted the usefulness of Wings of Support sessions in improving their treatment resilience and helped identify potential TB champions. The intervention led to demand generation among other TB persons, caregivers, and healthcare workers in the same facility. Group-based participatory psycho-social interventions hold the potential to address a range of psycho-social and treatment needs of the person with TB and their caregivers in an efficient and program-friendly manner. The intervention is being proposed for evaluation in NTEP program settings using an experimental study design to test its efficacy

KEYWORDS : person-centric, psycho-social, wings of support, motivation, TB persons, caregivers, treatment

INTRODUCTION

TB patients experience a range of physical and psycho-social challenges which are complex. While the disease's status deteriorates the patient's physical and mental health status, on the other hand, TB treatment-related difficulties themselves amplify their existing challenges and adherence to TB medications.[1,2] Patients and caregivers suffer fear, emotional distress, and anxiety, due to disease denial, perceived fear of death, and infection risk.[3] Patients suffer stigma, hopelessness, and suicidal thoughts at diagnosis and early treatment phase.[4] Further, at the time of treatment, the patient's negative psycho-social (including depression, anxiety, stress, and low self–esteem) and life experiences get compounded by treatment burden, medication intolerance,

Please Scan this QR Code to View this Article Online
Article ID: 2024:04:01:03
Corresponding Author: Priscilla B
e-mail : pricillarebeca.b@icmr.gov.in

physical deterioration, and other concerns.[5] The perceived burden of treatment and infection risk-related concerns affect the mental health of patients and intolerance towards caregivers.[6]

Significant psycho-social and economic burden of the disease and treatment of the patient is shared by family caregivers who also face the risk of infection during the caring process.[7,8] Such a wide spectrum of issues that prospectively arise for TB patients and caregivers, which in turn affects their treatment adherence and outcomes remains unaddressed to date. TB elimination goals to achieve a 92% treatment success rate by 2025 require an effective patient-centric intervention that could improve the treatment uptake self-efficacy and motivation of patients and caregivers to a substantial level. At present there is a lack of psycho-social interventions that would be effective, acceptable, and scalable in improving the treatment self-efficacy and thereby addressing the multi-dimensional challenges and needs faced by TB patients and their caregivers in an integrated and patient-centric way under the TB program conditions.

SUBJECTS AND METHODS

CONCEPTUALIZATION OF INTERVENTION IN THE FORMATIVE PHASE : The proposed intervention is developed based on the past research findings which were conducted among DS-TB patients and DR-TB patients by ICMR-NIRT in the past in different states of India including Tamil Nadu, Karnataka, and Telangana in past years. The intervention was developed based on the insights and feedback from TB patients, caregivers, and healthcare care providers' views on the barriers to TB treatment completion and also the positive enabling factors (positive deviance) that enabled them to complete the TB medication and related life barriers. We found the following thematic factors at the individual patient level and caregiver level which defined the resilience of the patients which are, self-efficacy, "self-adaptation," and "learning and motivation , and "Care & support". It was found that of all the driving factors behind the patient's completion of treatment was the construct of "Self -Efficacy" in which the patients attained a belief state or attitude to overcome the barriers he/she experienced which was followed by behaviour change (as defined by Albert Bandura's theory 1977). Thus, intervention to inculcate self-efficacy is required in addition to the routine counselling or Information, Education, and Communication (IEC) interventions which is routinely provided for the patients. Self-efficacy as a trait in this study would be inculcated by exposing the patients to peer experiences, participatory activities, resilience building, and motivational exercises. In addition, the family caregivers of patients would be involved in the intervention with equal importance to the patients thus making them an active agent of the intervention. The intervention manual was formatively developed and piloted in a TB care hospital in the Kancheepuram district of Tamil Nadu.

We used an implementation research approach to develop a psycho-social intervention module based on the self-efficacy constructs. We have used the PRODUCES framework (Problem, Objective, and Design, (end-) Users, Co-creators) for developing this intervention.[9]

Table 1 : We have used the PRODUCES framework (Problem, Objective, and Design, (end-) Users, Co-creators) for developing this intervention.

Problem	Addressing the poor self-efficacy, psycho-social issues, health-seeking gaps, and treatment challenges of patients and caregivers
Objective,	Developing a comprehensive intervention to improve self-efficacy toward treatment uptake and infection prevention among patients and family caregivers
Design, end-Users,	Co-creation, TB patients, caregivers, program stakeholders' workers, community stakeholders, researchers
Co-creators	TB persons, caregivers, program stakeholders, student's community stakeholders, researchers
Evaluation	Hybrid implementation study to assess efficacy and implementation issues in different socio-cultural settings where it was co-created
Scale up	Will be sustained in the implementation districts based on the study outcomes

Of the six stages of the production framework, the stage till co-creation has been completed and the evaluation stage is being taken up through the present study. We propose to conduct a two-arm non-randomized cluster intervention study for this objective of evaluation.

We utilized a co-creation exercise among TB patients, caregivers, and healthcare workers based on which a self-efficacy drive intervention manual and operating procedures have been developed.

RESULTS

Participants consisted of persons with TB admitted to the Government Hospital of Thoracic Medicine, Tambaram, and their family caregivers. Participatory and game-based interventions (designated as Wings of Support sessions) were conducted in group mode (n=10-12) for 45-60 minutes weekly. Each session focused on TB stigma, resilience building, mindfulness, medication adherence, nutritional issues, unhealthy behaviour stress, anxiety, and other related issues. Each session employed specific concepts and techniques involving motivations, goal setting, psycho-education, problem-solving, mindfulness, normalization,

behavioral activation, and cognitive coping based on the theory of self-efficacy (Figure 1). The sessions were conducted interactively over 10 months with inputs and participation from TB persons, caregivers, and all stakeholders, and sessions were enriched and tailored to the needs and preferences of the affected population.

Table 1 : Co-created intervention manual content and schedule for improving self-efficacy and treatment outcomes of persons with tuberculosis and their caregivers

Visit Number	Time Point & Duration	Type of session	Topics to be covered	Methods
1	**Intensive Phase** **0-15 Days** Max -45 Minutes	**Individual Session**	• Introduction and purposes of the session. • Understanding about TB • Medication adherence, infection control, nutrition etc. • Risky behavior related to TB	Individual counseling
2	**16-30 Days** Max -50 Minutes	**Individual Session**	• Stigma & Discrimination • Mental wellbeing & Life purpose clarification exercise • Caregiver roles and responsibilities • Recap and follow up on medication adherence	Individual counseling
1	**16-45 days** 45- 60 minutes	**Group session**	. • Practicing healthy diet and infection control, limiting risky behavior. • information on routine medication adherence and continuation	**Activity** - Co-creation activity using pictures on diet and infection control
2	**45-60 Days** Max -30 Minutes	**Group session**	• Peers role model identification for normalization, positive attitude, and building self-efficacy • Identifying patient attributes, needs, and preferences	**Activity ---** Expressions using Emoji to trigger positive attitude and role model generation
3	**Continuation Phase 3rd Month** 45- 60 Minutes	**Group session**	• lifestyle modification for better TB management • Routine medication adherence & continuation	**Activity** --- Using cognitive anchoring methods & number games
4	**3rd Month** 45- 60 minutes	**Group session**	• Appraising the value of life, family, and life purpose clarification overcoming stigma, and building self-efficacy • Routine medication adherence & continuation	**Activity** --- Storytelling and relationship valuing activity
5	**4th Month** 45- 60 minutes	**Group session**	• Building problem-solving skills, coping behavior, and self-efficacy • Routine Medication adherence & continuation	**Activity** - Collaboration conquest to achieve goals by solving hurdles as teams
6	**5th Month** 45- 60 minutes	**Group session**	• Medication adherence & continuation. • Stress relaxation	**Activity**- Mindfulness activity and art (painting)
7	**6th Month** 45- 60 minutes	**Group session**	• Building communication between patients and caregivers • Routine medication adherence & continuation	**Activity ---** Converse and connect activity
8	**6th Month** 45- 60 minutes	**Group session**	• Building resilience among patients • Lifestyle modification • Routine medication adherence & continuation	**Activity**-Resilience wheel activity

INTERVENTION IMPLEMENTATION & ACCEPTANCE:

Between March 2023 to January 2024, 44 sessions were conducted by healthcare providers and social workers on different themes related to TB diseases, medications, and its management. A total of 450 persons with TB and their caregivers attended. Sessions related to TB stigma, nutrition, medication adherence, and family caregiving were found more receptive and perceived as highly relevant and useful by the participants, and in terms of techniques employed in the sessions, game-based activities, artistic recreation, and mindfulness techniques had the most acceptance and participation. Post-intervention feedback highlighted the usefulness of Wings of Support sessions in improving their treatment resilience and helped identify potential TB champions. The intervention leads to demand generation among other TB persons, caregivers, and healthcare workers in the same facility. Group-based participatory psycho-social interventions were able to address a range of psycho-social and treatment needs of the person with TB and their caregivers in a program-friendly manner. The evolved intervention has been termed a Self-Efficacy Driven Intervention for TB patients and is given below

DISCUSSION

The self-efficacy-driven intervention is further proposed for evaluating its efficacy in program conditions using an experimental study in program settings. The proposed intervention will be the first integrated, theory-driven, and evidence-based psycho-social intervention for persons with TB patients and is aimed at positively impacting their treatment acceptance and uptake, self-care, and underlying psycho-social issues in a holistic way. Evidence of efficacy from this study may lead to the scaling up of self-efficacy interventions pragmatically under the NTEP program in India. The co-created intervention would generate substantial benefits to the participants as it will provide urgently needed answers to what may be feasible and holistic psycho-social intervention for addressing poor treatment self-efficacy, treatment adherence, and poor mental health status at the level of TB patients. This could lead to advances in care that could eventually improve treatment outcomes for TB patients in India and other low- and middle-income countries. The study will also provide evidence that a targeted intervention at the level of patients and caregivers could help improve infection control self –management which is crucial for cutting the transmission of diseases.

ACKNOWLEDGMENT

We acknowledge Dr. Radhika, Resident Medical Officer (RMO), and other staff at the Government Hospital for their support and contribution in conducting the wings of support group sessions. We also acknowledge the student interns from the School of Public Health of SRM College of Science and Technology, Master of Social Work (MSW) student interns from Madras School of Social Work, Madras Christian College, Loyola College and Anna Adarsh College for Women.

REFERENCES

1. Thomas BE, Shanmugam P, Malaisamy M, et al. Psycho-Socio-Economic Issues Challenging Multidrug-Resistant Tuberculosis Patients: A Systematic Review. PLoS One. 2016;11(1): e0147397. Published 2016 Jan 25. doi: 10.1371/journal.pone.0147397

2. Nagarajan, Karikalan, et al. "A Dual Perspective of Psycho-Social Barriers and Challenges Experienced by Drug-Resistant TB Patients and Their Caregivers through the Course of Diagnosis and Treatment: Findings from a Qualitative Study in Bengaluru and Hyderabad Districts of South India." Antibiotics (Basel, Switzerland) vol. 11,11 1586. 10 Nov. 2022, doi:10.3390/antibiotics11111586

3. Karikalan Nagarajan*a, Karthikeyan Kumaraswamy b, Rehana Begum b, Vikas Panibatla et al Self-driven solutions and resilience adapted by people with drug-resistant tuberculosis and their caregivers in Bengaluru and Hyderabad, India: a qualitative study. Lancet Regional Health South East Asia- Accepted, February 2024

4. Karthikeyan K, Nagarajan N, et al. Understanding self-adaptive behaviours and practices of people with DR-TB to cope with drug side effects: findings from qualitative positive deviance study in South India. November 17, 2023, UNIONCONF 2023 Abstract Book Volume 27 Supplement 1, Oral Presentation.URL https://theunion.org/our-work/conferences/history-of-the-union-world-conference-on-lung-health/conference-abstract-books

5. Karikalan et al. Wings of Support -A field report on psycho-social support for TB persons and caregivers to build resilience- NACPCON, Nov-Dec 2023, Hyderabad. Poster presentation

6. Daftary, Amrita, et al. "Dynamic needs and challenges of people with drug-resistant tuberculosis and HIV in South Africa: a qualitative study." The Lancet. Global health vol. 9,4 (2021): e479-e488. doi:10.1016/S2214-109X(20)30548-9

7. Choudhary G. Caring of Tuberculosis Patients: A Study of Psychosocial Factors. Int. J. Innov. Knowl. Concept. 2019; 7(2):98-104.

8. Agbeko CK, Mallah MA, He B, Liu Q, Song H, and Wang J (2022) Mental Health Status and Its Impact on TB Treatment and Its Outcomes: A Scoping Literature Review. Front. Public Health 10: 855515. doi: 10.3389/fpubh.2022.855515

9. Leask, C.F., Sandlund, M., Skelton, D.A. et al. Framework, principles, and recommendations for utilizing participatory methodologies in the co-creation and evaluation of public health interventions. Res Involv Engagem 5, 2 (2019). https://doi.org/10.1186/s40900-018-0136-9

ORIGINAL ARTICLE - PUBLIC HEALTH

CALL FOR PROVISION OF THERAPEUTIC NUTRITION AND INPATIENT CARE FOR ADULTS WITH TB WITH VERY SEVERE UNDERNUTRITION IN INDIA

Hemant Deepak Shewade [(1)], Prabhadevi Ravichandran [(1)], S Kiran Pradeep [(1)]

(1) Division of Health Systems Research, ICMR-National Institute of Epidemiology (ICMR-NIE), Chennai, India

Abstract

BACKGROUND: In India, 34% of annual estimated incident TB are attributed to undernutrition and the burden of very severe undernutrition among adults with TB is high. Patients with very severe undernutrition should not be provided and cannot tolerate high protein solid diet (called as TB diet in some hospitals). If we are to achieve the SDG 2030 targets to reduce TB deaths by 90% (when compared to 2015), we call for investment in facilities for therapeutic nutrition and inpatient care for those with very severe undernutrition at TB diagnosis. Therapeutic nutrition involves liquid formula feeds that can be prepared in hospital kitchen using available ingredients and is in line WHO and Central TB Division recommendations. This should be done in medical college hospitals and district head quarter hospitals. We have also used this opportunity to share the information and tools required for provision of therapeutic nutrition.

KEYWORDS : Adults with TB, adult TB patients, formula feed, very severe undernutrition, India

INTRODUCTION

Adults with a body mass index (BMI) less than 18.5 kg/m² are considered undernourished, those with BMI less than 16 kg/m² (or mid upper arm circumference (MUAC) less than 19 cm) are considered severely undernourished and those with BMI less than 14 kg/m² (or MUAC less than 16 cm) are very severely undernourished. Severely undernourished (BMI 14-15.9 kg/m² or MUAC 16-18.9 cm) adults along with inability to stand without support or bilateral pedal oedema or poor appetite are also classified as very severely undernourished.[1,2] MUAC is used for nutritional assessment only if BMI cannot be relied upon (patient not able to stand).[2]

Undernutrition is prevalent among general population in India, 18.7% of women and 16.2% of men are undernourished.[3] Globally, India also has the highest tuberculosis (TB) burden. Undernutrition is closely related to TB, creating a bidirectional relationship. Globally, undernutrition stands out as the predominant risk factor for TB, accounting for nearly 21% of annual estimated incident TB (34% in India).[4,5] Undernourished people with TB are also more likely to have unfavourable outcomes.[6]

The 2030 Sustainable Development Goal (SDG) targets for TB include 90% reduction in TB-related deaths (reference year 2015).[7] The crucial step to achieve this is to enhance the nutritional status of people with TB thereby reducing mortality associated with TB. Most of TB deaths occur during the first two months of intensive phase of TB treatment.[8] For every one-unit increase in baseline BMI, the incidence of TB deaths decreased by 23%.[8] Weight gain, particularly in the first 2 months (at least 5% weight gain from baseline weight), was associated with a substantially decreased hazard of tuberculosis mortality.[8]

Way back in 2013, the WHO recommended to integrate nutritional assessment and care into standard TB treatment and the same was re-iterated recently by The Union Nutrition-TB Working Group.[6,9] In the southern Indian state of Tamil Nadu, since April 2022, the Tamil Nadu Kasanoi Erappila Thittam (TN-KET, meaning TB death-free initiative in Tamil) has implemented a system of triaging adult TB patients at diagnosis for severe illness in routine health system settings. Those with very severe undernutrition, respiratory insufficiency or poor performance status (called as tirage-positive, see Box) are identified and prioritized for comprehensive clinical assessment and inpatient care.[10,11] Among 11,599 adults assessed in the first quarter of implementation (April to June 2022), 25% had severe undernutrition, while 6.3% had very severe undernutrition (BMI < 14 kg/m² or <16 with leg swelling) at TB diagnosis.[11] As nutritional assessment (BMI measurement at TB diagnosis) and TN-KET like triaging based differentiated TB care picks up as a part of routine TB care in other states of India, we

Please Scan this QR Code to
View this Article Online
Article ID: 2024:04:01:04
Corresponding Author: Hemant Deepak Shewade
e-mail : hemantjipmer@gmail.com

will have routinely generated information on burden of very severe undernutrition at TB diagnosis in other states. When compared to national figures, Tamil Nadu has relatively lower levels of undernutrition among adults in general population.[3] Hence, the burden of very severe undernutrition among people with TB in other states is expected to be higher than Tamil Nadu. In 2023, based on a nationally representative study, the burden of very severe undernutrition at diagnosis among adults with TB from high-risk (marginalised and vulnerable) populations was 15% (unpublished data).

ISSUE OF INTEREST

Considering the high burden, if India is to achieve the SDG 2030 targets of reducing TB deaths by 90% (when compared to 2015), one of the many strategies should be to identify (at diagnosis), admit and provide therapeutic nutrition (orally or using Ryle's tube) along with other medical management for adults with very severe undernutrition.[1,2,7] Post-discharge, this should be followed by other steps like food baskets and doubling of monthly family rations through the public distribution system.[2]

Therapeutic nutrition involves liquid formula feed F75 to stabilize the patients in the first week followed by rehabilitation using F100 or high protein diet.[1,2] Most patients with very severe undernutrition should not be provided and cannot tolerate high protein solid diet (called as TB diet in some hospitals) or any solid diet. TB diet should be used among TB patients without very severe undernutrition. Therapeutic nutrition involves liquid formula feeds that can be prepared in hospital kitchen using available ingredients and is in line WHO and Central TB Division recommendations.[1,2] Currently, even medical colleges hospitals and district headquarter hospital in states having relatively better public hospital infrastructure lack isolation beds for severely ill people with TB along with facility for therapeutic nutrition for those with very severe undernutrition. We feel that having this facility in medical colleges hospitals and district headquarter hospitals may be preferred over stand-alone TB hospitals (exceptions to this are the centres for excellence for TB care across India) as in former, various specialists are available to guide inpatient management. Most of these hospitals and relevant medical staff are also not aware of the need for therapeutic nutrition among adults with TB with very severe undernutrition. Paediatricians who manage TB among children are already sensitized to this concept as they commonly manage severe acute malnutrition. Hence, the focus in this article is on adults with very severe undernutrition and the need for assessment, classification of undernutrition status followed by therapeutic nutrition for those with very severe undernutrition.

Not only patients with very severe undernutrition but also those with severe undernutrition should be prioritized for food baskets and doubling of rations.[2] They should be closely followed up for weight gain with a target of at least 5% weight gain from baseline at the end of two months.[8] Proportion of patients with very severe and severe undernutrition who do not gain 5% of their baseline weight at two months (those with unfavourable outcome should also be considered in the numerator) should be monitored as a TB program indicator.

Assessment of undernutrition among adults with TB using BMI (and MUAC if required, especially in inpatient setting), classification of undernutrition along with therapeutic nutrition for those with very severe undernutrition should not only be implemented but also be made part of graduate and postgraduate medical training, specifically, included in respiratory medicine and other related postgraduate medical training. For existing physicians managing TB, orientation trainings are required.

Tamil Nadu through TN-KET[10–12] and Delhi through 'Delhi: Triage and Treat TB (D-TAT)' initiative have taken a step in the right direction. For details, see the Supplementary Material: a two-page TN-KET standard operating procedure containing links to the tools used. This includes details on preparations of F75 in hospital kitchen, flow diagram summarising therapeutic nutrition and an F75 clinical tracking tool for use during stabilization phase (Figshare: https://doi.org/10.6084/m9.figshare.24564403).

CONCLUSION

We call for investment in facilities for therapeutic nutrition and inpatient care for those with very severe undernutrition at TB diagnosis in India. We are using this opportunity to bring this to the attention of state health policy makers, state TB program managers and physicians managing TB in India.

ACKNOWLEDGMENT: None

REFERENCES

1. World Health Organization (WHO). Management of severe malnutrition: A manual for physicians and other senior health workers. Geneva, Switzerland; 1999.

2. Central TB Division. Ministry of Health and Family Welfare. Guidance document on nutritional care and support for patients with tuberculosis in India. New Delhi, India; 2017.

3. Indian Institute of Population Sciences (IIPS). National Family Health Survey (NFHS-5), 2019-21 [Internet]. Mumbai, India; 2022 [cited 2022 May 9]. Available from: http://rchiips.org/nfhs/factsheet_NFHS-5.shtml

4. World Health Organization (WHO). Global Tuberculosis Report 2023. Geneva, Switzerland; 2023.

5. Bhargava A, Bhargava M, Beneditti A, Kurpad A. Attributable is preventable: Corrected and revised estimates of population attributable fraction of TB related to undernutrition in 30 high TB burden countries. J Clin Tuberc other Mycobact Dis. 2022 May;27:100309.

6. World Health Organization. Guideline: Nutritional care and support for patients with tuberculosis. Geneva, Switzerland; 2013.

7. World Health Organisation. Health in 2015: from MDGs to SDGs. 2015.

8. Bhargava A, Bhargava M, Meher A, Teja GS, Velayutham B, Watson B, et al. Nutritional support for adult patients with microbiologically confirmed pulmonary tuberculosis: outcomes in a programmatic cohort nested within the RATIONS trial in Jharkhand, India. Lancet Glob Heal. 2023;11(9):e1402–11.

9. Sinha P, Bhargava A, Carwile M, Cintron C, Cegielski JP, Lönnroth K, et al. Undernutrition can no longer be an afterthought for global efforts to eliminate TB. Int J Tuberc Lung Dis. 2022 Jun 1;26(6):477–80.

10. Shewade HD, Frederick A, Kalyanasundaram M, Ravichandran P, Lokesh S, Suma KV, et al. India's 2021 differentiated TB care guidance: Is it feasible to implement and act upon? Indian J Tuberc. 2023 Dec;

11. Shewade HD, Frederick A, Kiruthika G, Kalyanasundaram M, Chadwick J, Rajasekar TD, et al. The First Differentiated TB Care Model From India: Delays and Predictors of Losses in the Care Cascade. Glob Heal Sci Pract. 2023 Mar 31;11(2):e2200505.

12. Shewade HD, Frederick A, Suma K V, Rao R, Selvavinayagam TS, Ramachandran R, et al. Differentiated TB care: Tamil Nadu's achievements, plans and implications for national TB programmes. Int J Tuberc Lung Dis. 2024 Mar 1;28(3):160–2.

13. Shewade HD, Nagaraja SB, Murthy HJD, Vanitha B, Bhargava M, Singarajipura A, et al. Screening people with tuberculosis for high risk of severe illness at notification: Programmatic experience from Karnataka, India. Trop Med Infect Dis. 2021 Jun 15;6(2):102.

14. de Vallière S, Barker RD. Poor performance status is associated with early death in patients with pulmonary tuberculosis. Trans R Soc Trop Med Hyg. 2006 Jul;100(7):681–6.

15. Waitt CJ, Squire SB. A systematic review of risk factors for death in adults during and after tuberculosis treatment. Int J Tuberc Lung Dis. 2011 Jul;15(7):871–85.

16. Horita N, Miyazawa N, Yoshiyama T, Kojima R, Omori N, Kaneko T, et al. Poor performance status is a strong predictor for death in patients with smear-positive pulmonary TB admitted to two Japanese hospitals. Trans R Soc Trop Med Hyg. 2013;107(7):451–6.

Box 1. Triage tool to assess severe illness at diagnosis among adult pulmonary TB patients (13)*

If any one of the following is present, then the person with TB has to consider having severe illness, and refereed for detailed clinical assessment (confirmation of severe illness) and inpatient care

1. Body mass index (BMI) less than or equal to (≤) 14.0 kg/m² ^
2. BMI less than or equal to (≤) 16.0 kg/m² with leg swelling ^
3. Respiratory rate more than (>) 24 per minute **
4. Oxygen saturation less than (<) 94% **
5. Not able to stand without support (standing with support / squatting / sitting / bed ridden) ^^

*Reprinted with permission from Shewade HD and Nagaraja SB et al(13) under a CC BY licence; Very severe undernutrition (indicator 1, 2)^, respiratory insufficiency (indicator 3,4)** and poor performance status (indicator 5)^^ are known risk factors for death and have a strong association with TB mortality (1,2,14–16)

ORIGINAL ARTICLE - PUBLIC HEALTH

PALLIATIVE CARE FOR PATIENTS WITH TUBERCULOSIS : NEED OF THE HOUR

Jefrilla Nancy [(1)], V V Meenakshi [(1)], Vinod Kumar Viswanathan [(2)], C Padmapriyadarsini [(3)]

(1) Cancer Institute (WIA), Chennai Tamilnadu
(2) Institute of Thoracic Medicine, Chennai, Tamilnadu
(3) National Institute for Research in Tuberculosis, Chennai, Tamilnadu

Abstract

BACKGROUND : Palliative care (PC) is a specialized medical care that aims to relieve suffering and improve the quality of life for patients and their families facing life-threatening illnesses, including tuberculosis (TB). Palliative care can be provided alongside disease-directed treatment, beginning at diagnosis and continuing until end of life. A multidisciplinary team is necessary for Palliative care for Tuberculosis patients , including doctors, nurses, psychologists, social workers, nutritionists, and physiotherapists. Palliative care opportunities in TB include managing physical symptoms such as dyspnea, pain, cough, hemoptysis, respiratory secretions, insomnia, anorexia-cachexia, and fatigue. Psychological support is also crucial, as the diagnosis of TB can cause feelings of rage, despair, grief, anxiety, and dread. Social support, provided by TB social workers, can assist patients with TB in treatment compliance, linking to healthcare centers, and financial assistance. Spiritual concerns can also affect coping, and spiritual activities have shown to improve emotional control in TB patients. Nutritional support plays a crucial role in recovery from TB, and co-morbidities such as diabetes and immunosuppression can increase the need for PC. End of life care is provided during the final hours, days, or months of a person's life, and palliative care services extend beyond death to bereavement services for families. Challenges in providing PC in TB include a lack of awareness and misconceptions about PC, the need for advocacy for primary palliation, and the limited availability of medical practitioners with palliative care training. Further studies are needed to guide physicians in the role of PC in TB.

KEYWORDS : Airborne infection control, Tuberculosis, Prevention, Implementation

INTRODUCTION

Palliative care (PC) is a specialized medical care delivered by a multidisciplinary team aimed at relieving suffering and improving the quality of life (QoL) for patients and their families facing life-threatening illnesses.[1] There is a common misconception that PC is meant for patients who have exhausted all treatment options or are terminal.

However, PC can be provided alongside disease directed treatment regardless of the age and prognosis, beginning at diagnosis of the illness right until end of life and beyond. PC encompasses identification and treatment of pain and other physical, psychosocial and spiritual symptoms experienced by patients and their caregivers.

Palliative care is well established in oncology and in other life-limiting diseases like neurological conditions, heart failure, end stage liver disease, chronic kidney disease and respiratory diseases.[2] Utilization of palliative care in infectious diseases like tuberculosis, malaria and rabies is evolving and not well accepted.

The goal of palliative care is to relieve suffering which aligns with the vision of the end TB strategy i.e to zero suffering due to TB.[3]

Even though tuberculosis can be cured, drug-resistant tuberculosis (DR-TB), which includes multidrug-resistant(MDR-TB) and extensively resistant TB (XDR-TB), is becoming more common and is prone to longer treatment duration and potential treatment failure. Palliative care demands may arise even in patients with drug-susceptible tuberculosis, patients with several co-morbidities and extra-pulmonary tuberculosis deserve specific attention.[4]

They often require palliative care due to their significant symptom burden. A trained multidisciplinary team made up of doctors, nurses, psychologists, social workers, nutritionists, and physiotherapists is necessary for many reasons, including symptom control, sensitive communication to establish disease understanding, managing drug side effects, maintaining adherence to treatment, minimizing social stigma associated with TB, education on nutritional requirements, and facilitating pulmonary rehabilitation.(5)The following sections elaborate upon the PC opportunities in patients suffering from TB in the physical and non-physical domains.

Please Scan this QR Code to View this Article Online
Article ID: 2024:04:01:05
Corresponding Author: Jefrilla Nancy
e-mail : jefrilla@gmail.com

PHYSICAL SYMPTOMS :

Patients with tuberculosis experience respiratory symptoms like dyspnea, cough, hemoptysis and chest pain and non-specific symptoms like fever, insomnia, anorexia, fatigue, night sweats etc.

1. Dyspnea : It is a common complaint as a result of lung parenchymal damage, spontaneous pneumothorax, or pleural TB presenting with effusion. Reversible causes like pleural effusion can be managed with thoracocentesis. Non pharmacological techniques like handheld fan directed to face decreases the sensation of breathlessness, pursed lip breathing, propped up position or forward leaning position can aid in reducing dyspnea. Conventional techniques like bronchodilators help when obstructive airway features co-exist. Opioids for refractory dyspnea can be used to decrease respiratory drive. Low dose morphine tablet 2.5 mg three times a day can be used. Associated anxiety can be tackled with anxiolytics I.e benzodiazepines.[6]

2.Pain : In TB, pain can occur due to various reasons. The involvement of pleura can give rise to chest pain, while the presence of back pain should raise suspicion of Pott's spine. TB meningitis can provoke headaches while TB arthritis can lead to joint pain. Insertion of an intercostal drainage (ICD) tube is a source of procedure-related pain . Identifying the type of pain is crucial for effective management. While ICD pain, and bone pain respond to non- steroidal anti-inflammatory drugs, severe pain may warrant use of opioids.[4]

3. Cough : is a distressing symptom, can significantly impact quality of life by disrupting sleep. It not only induces nausea itself but also leads to loss of appetite, resulting in weight loss. Non-pharmacological approaches include sipping water and consuming warm fluids. Additionally, educating patients about effective coughing techniques is crucial for infection control.[4] Furthermore, low-dose morphine has been recognized for its ability to suppress the cough reflex, alongside traditional anti-tussive medicines.

4.Hemoptysis : a serious complication of tuberculosis (TB), often results from bronchial artery involvement. It can occur due to various factors, including bleeding from a cavity, post-TB sequelae such as bronchiectasis or aspergilloma, or even a ruptured "Rasmussen's aneurysm". [7] Whether it presents as minor hemoptysis, a single major episode, or a potentially fatal event, it can be profoundly distressing for patients and their families. Effective management involves providing anticipatory guidance to address the bleeding and reduce panic.

5. Respiratory secretions : Increased secretions in TB can be attributed to over-production or difficulty in elimination. Pooling up of secretions can in turn increase dyspnea and cough. Hence the main goals of management revolve around promoting expectoration, increasing clearance of secretions to upper airways and improving cough effectiveness.[8] Saline nebulization can be used to loosen the mucus. Mucolytics and anticholinergics can also be used to reduce secretions.

6. Insomnia : A number of reasons can cause insomnia ranging from physical factors such as orthopnea, cough to psychosocial factors pertaining to the disease. Identifying the root cause and addressing it is imperative to the management.[9]

7. Anorexia-cachexia : TB is a hypercatabolic state characterized by accelerated protein degradation, muscle wasting causing weight loss.[10] Nutritional support plays a vital role in weight gain and facilitating early recovery.

8. Fatigue : It is determined by the nutritional status of the patient, their quality of sleep and depression.[11] Preventing and managing the above symptoms reduce the chances of developing fatigue or it effects.

9.Others : According to the site of TB, specific symptoms have to be managed. For e.g. seizure-related to TB meningitis requiring anti-epileptics.

PSYCHOLOGICAL SUPPORT :

Uncertainty of curability can cause feelings of rage, despair, grief, anxiety, and dread. Therefore, during the duration of the illness, honest communication with the precise facts pertaining to the disease and response to treatment should be shared.

It is also essential to respond to their questions and concerns. Some of the concerns expressed by patients include losing their role as a parent or breadwinner, being dependable, feeling like a burden to the family, fearing for their future financial security, feeling helpless, and fearing that they will spread the disease to other family members.

The term "tuberculosis" still carries a lot of social stigma in our society.[12] The diagnosis itself causes anxiety and has a wide range of psychological and social ramifications. The idea that it is a death sentence is false.

On the other hand, the family could want clarifications regarding infection management and duration of treatment. There is need for educating the patient and family about the necessity of adherence and compliance to avoid problems like resistance, and recognition and reporting of adverse effects which may call for modifying the dosage or regimen. Patients may experience depression due to isolation.

This is misdiagnosed because it overlaps with physical symptoms.[13]

It might be beneficial to use antidepressants in some patients. The psychological issues can be navigated by early recognition of the suffering , communicating effectively, and providing emotional and supportive counseling.

SOCIAL SUPPORT :

A TB social worker assists patients with TB and patients at risk of developing TB. As a part of the interdisciplinary team they increase the treatment compliance among these patients. They aid in linking the TB patients to healthcare centers. Financial assistance includes raising awareness of the availability of insurance or welfare schemes. The TB social worker can help by locating homeless patients, assist them with permanent lodging, and coordinating transportation to ensure patients get to their required TB appointments. During active tuberculosis patients require medical isolation which interferes with going to their jobs, which in turn results in inability to pay for home rent, utilities and food. Here a social worker can advocate to complete the necessary procedures for signing up for community agencies.(14) The involvement of patient support groups, non-governmental organizations, community or faith-based organizations can take care of the social isolation patients might face and make them feel as a part of a community.

SPIRITUAL CONCERNS :

Spirituality refers to the way an individual seeks and expresses meaning and purpose and the way they experience their connectedness to self, the moment, others, nature and the significant or sacred through beliefs, values, tradition and practices.[15] Factors influencing coping are age, hope and social support. Hope is built through trusting relationship with others which includes God. Lack of hope can lead to depression, anxiety etc. Culture and spirituality can affect the way an individual thinks. And when channeled appropriately can optimise, support and accelerate healing through realising the meaning and purpose of life. Meditation has shown to improve emotional control in TB patients. Spiritual activities coupled with physiological activities reduced stress giving patients the resilience to face the illness. High spiritual intelligence was associated with reduced anxiety levels. [16]

NUTRITIONAL SUPPORT-AN ESSENTIAL ARENA OF CARE :

Malnutrition predisposes a person to develop tuberculosis likewise it hampers recovery when not managed. Appropriate supplementation of micro and macro nutrients hence plays a crucial role in recovery.[17] This is adequately taken care of by governmental schemes yet when complex might require the help of a nutritionist to intervene to provide individualized care.

CO-MORBIDITIES-A MAJOR DECIDING FACTOR :

When determining if palliative care is necessary, patients with tuberculosis may also have additional co-morbidities. As, diabetes mellitus is a common condition in the general community, 1 in 4 persons who have tuberculosis also have diabetes.[18] Patients with diabetes have a higher risk of developing tuberculosis disease from a latent tuberculosis.

A complete cure necessitates constant monitoring and good glycemic control. Diabetes, co-morbidities such heart problems, kidney failure, and liver dysfunction add to the burden and raise the need for palliative care.

Immunosuppression can result from a variety of internal and external factors, including HIV infection, chronic kidney disease, autoimmune diseases, malnutrition, liver cirrhosis, and the use of immunosuppressants. The compromised immunity increases the risk of developing extrapulmonary sites of tuberculosis or disseminated illness.[19]

Tuberculosis is the most common opportunistic illness in people living with HIV. One of the main causes of death for HIV-positive individuals is tuberculosis. Fever is the most common symptom of an unspecific clinical appearance.

Dialyzed patients have a significant morbidity rate from TB because of immunosuppression brought on by uraemia.

END OF LIFE AND BEYOND :

End of life care is provided during a time period of hours, days or month before a person dies. The services of palliative care in end of life is important in complex symptom management. Deciding if a person should continue TB treatment during end of life is an ethical dilemma requiring a joint decision made with the person suffering from TB, family and the treating physician.[20]

Palliative care services extend beyond death of the patient. Bereavement services to families who have lost their loved ones will help them cope with the loss. Giving a good quality of death should be the aim of palliative care during end of life. As quoted by Atul Gawande in his book "Being Mortal: Medicine and what matters in the end", "Endings matter, not just for the person but perhaps even more for the ones left behind."

CHALLENGES IN PROVIDING PALLIATIVE CARE :

One big disadvantage is that not everyone is aware of palliative care. There is a misconception that PC is only limited to end-of-life. That primary care physicians, who are actively involved in a patient's treatment can offer primary palliation necessitates advocacy. The use of palliative care in infectious diseases such as tuberculosis, rabies, malaria, and other illnesses is a new area that requires development.[21] Only limited information is available about the benefits of palliative care, its guiding principles, and its use in tuberculosis. To increase palliative care engagement in tuberculosis, it is necessary to empower primary healthcare providers and identify trigger tools for the integration of specialist palliative care provider. There are but a few medical practitioners with palliative care training. Despite receiving training in palliative care, understanding the application of tuberculosis necessitates specific knowledge and skills in the disease. The provision of community-based palliative care at the primary health care center level, and teaching pulmonologists and respiratory medicine specialists to provide primary palliative care, will help close this gap and promote patient care as a holistic undertaking. Due to the complexity of procuring, storing and dispensing opioids there is problem in accessing them in TB facilities for pain and dyspnea. Utilization when available is also less due to unfamiliarity of the indication for use, fear of respiratory depression, weaning when not required and possibility of dependence, addiction and drug seeking behavior.

CONCLUSION

Palliative care in tuberculosis is underexplored and this article introduces the scope of PC in tuberculosis. It describes the potential benefits of a palliative care approach provided through a multidisciplinary team for a patient and family suffering from TB.

RECOMMENDATIONS

Capacity building in PC for tuberculosis has to be undertaken by conducting training programs for healthcare professionals in TB centres in a time bound manner. Creating awareness among providers to extend PC even to drug susceptible patients is imperative. Also, of importance is developing a trigger tool for specialized palliative care referral. Experts in both fields can work together in designing a consensus document about PC in tuberculosis for guiding primary physicians. Further research to understand patient experiences and identify specific palliative care needs of patients with TB across various domains must be carried out. Creating awareness among providers to extend PC even to drug susceptible patients is imperative. Also, of importance is developing a trigger tool for specialized palliative care referral.

REFERENCES

1. World Health Organisation. National cancer control programmes: policies and managerial guidelines. 2nd ed. Geneva: World Health Organization; 2002.

2. Palliative Care By World Health Organisation Year: 2020 Container: World Health Organization Publisher: World Health Organization[Published 5 Aug 2020 Available from https://www.who.int/newsroom/factsheets/detail/palliative-care]

3. Uplekar M, Weil D, Lonnroth K, Jaramillo E, Lienhardt C, Dias HM, et al. WHO's new end TB strategy. Lancet. 2015;385(9979):1799-801.

4. Rai DK, Sharma P. Palliative Care in Drug Resistance Tuberculosis: An Overlooked Component in Management. Indian J Palliat Care. 2023;29(4):388-93.

5. Guidelines for programmatic management of drug resistant tuberculosis in India. 2021 [Available from: https://tbcindia.gov.in/showfile.php?lid=3590].

6. Parshall MB, Schwartzstein RM, Adams L, Banzett RB, Manning HL, Bourbeau J, Calverley PM, Gift AG, Harver A, Lareau SC, Mahler DA. An official American Thoracic Society statement: update on the mechanisms, assessment, and management of dyspnea. American journal of respiratory and critical care medicine. 2012 Feb 15;185(4):435-52.

7. Vaishnav B, Bamanikar A, Rathore VS, Khemka VK. Fatal hemoptysis due to ruptured peripheral pulmonary artery pseudoaneurysm. Lung India. 2017;34(1):106-7.

8. Arcuri JF, Abarshi E, Preston NJ, Brine J, Pires Di Lorenzo VA. Benefits of interventions for respiratory secretion management in adult palliative care patients—a systematic review. BMC Palliative Care. 2016 Dec;15:1-1.

9. Renom-Guiteras A, Planas J, Farriols C, Mojal S, Miralles R, Silvent MA, Ruiz-Ripoll AI. Insomnia among patients with advanced disease during admission in a Palliative Care

Unit: a prospective observational study on its frequency and association with psychological, physical and environmental factors. BMC palliative care. 2014 Dec;13:1-2.

10. Zheng Y, Ma A, Wang Q, Han X, Cai J, Schouten EG, et al. Relation of leptin, ghrelin and inflammatory cytokines with body mass index in pulmonary tuberculosis patients with and without type 2 diabetes mellitus. PLoS One. 2013;8(11):e80122.

11. Thedthong W, Puwarawuttipanich W, Saneha C, Rongrunguang Y. Factors Predicting Fatigue in Pulmonary Tuberculosis Patients Receiving Anti-Tuberculosis Drugs. Southern Medical Journal. 2021;73:167-73.

12. Emami H, Modarressi T, Najmi K, Radmand G, Monjazebi F, Tabarsi P, Richter J. Psychological symptoms before and after a 14-day initial inpatient treatment in tuberculosis patients compared with their primary caregivers and healthy controls. Tanaffos. 2015;14(3):182.

13. Duko B, Bedaso A, Ayano G. The prevalence of depression among patients with tuberculosis: a systematic review and meta-analysis. Annals of general psychiatry. 2020 Dec;19:1-1.

14. Sandesh KS, SV S, Baliga K, OR R. The essential role of social work in the treatment of tuberculosis. Global Journal for Research Analysis.2020:1-3.

15. Ghaderi A, Tabatabaei SM, Nedjat S, Javadi M, Larijani B. Explanatory definition of the concept of spiritual health: a qualitative study in Iran. Journal of medical ethics and history of medicine. 2018;11.

16. Widyastuti M, Hastuti P, Kirana S, Farendita N. The Correlation of Spiritual Status and Anxiety Level in Patients with Pulmonary Tuberculosis. Jurnal Ners. 2020;15:67-71.

17. Gupta KB, Gupta R, Atreja A, Verma M, Vishvkarma S. Tuberculosis and nutrition. Lung India. 2009 Jan 1;26(1):9-16.

18. TB and Diabetes [updated October 26 2023. Available from: https://www.cdc.gov/tb/topic/basics/tb-and-diabetes.html.

19. Guedes G. Tuberculosis and immunosuppression. Journal of Microbiology & Experimentation. 2018;6.

20. World Health Organization. Companion Handbook to the WHO Guidelines for the Programmatic Management of Drug-Resistant Tuberculosis. Geneva: World Health Organisation; 2014.

21. Bruera E, Higginson, I.J., von Gunten, C.F., & Morita, T. Textbook of Palliative Medicine and Supportive Care 3rd ed ed: CRC Press; 2021. 974 p.

SCIENTIFIC LETTER - PUBLIC HEALTH

POPULATION ATTRIBUTABLE FRACTION FOR UNDER NUTRITION IN TB, IN THE SELECTED DISTRICTS OF TAMIL NADU; THE STATE TB SURVEY

Prathiksha Giridharan [(1)], Ariarathinam Newtonraj [(1)], Sriram Selvaraju [(1)], Kannan Thiruvengadam [(2)], Nimmakanty Ramadas Ashok [(1)], Asha Federick [(3)]

(1) ICMR- National Institute for Research in Tuberculsois, Chennai, India

(2) ICMR- Regional medical research centre, Port Blair, India

(3) Directorate of Medical and Rural Health Services, Tamil Nadu, India

Abstract

ABSTRACT: A population based state wide TB survey was conducted in 2021-2022 in Tamil Nadu, India, among the participants aged 15 and above, to identify the microbiologically confirmed pulmonary TB cases. Population attributable fraction (PAF) was calculated for the state and the districts. In total 130,932 participants were screened across the state and 244 participants were diagnosed with microbiologically confirmed pulmonary TB. PAF for the risk factors for TB with under nutrition (BMI<18.5 Kg/m2) was 39(32-46), alcohol use was 38(30-46), smoking was 31(24-39), and age >60 years was 27(20-34). Krishnagiri 78(23 - 97), Pudukkottai 72(14 -96) and Vellore 71(37–90) districts were having higher PAF values for under nutrition. Wide range was observed due to low sample size. Population attributable risk factors for TB in Tamil Nadu state was higher for under nutrition. Public health interventions could be planned to address this issue accordingly, during TB elimination activities.

KEYWORDS : Population attributable fraction; TB Survey; Tamil Nadu; Tuberculosis.

MAIN CONTENT

Tuberculosis is a global public health problem of low and middle income countries, leading to a significant morbidity and mortality. Worldwide, 10.6 million people developed TB and 1.3 million succumbed to TB in 2022 as per Global TB Report 2023.[1]

India is the highest contributor of global burden of TB with 27% of burden, followed by other countries like Indonesia, China and Philippines.[1] Apart from this about 31.3% of the Indian population was infected with TB and in this 5-10% develop the disease in course of a lifetime.[2,3]

The United Nations Sustainable Development Goal-3 (SDG-3) has targeted to end the TB epidemic by 2030 with the aim to reduce the TB incidence and TB death by 80% and 90%, compared to 2015, respectively.[4]

However, the India's National Strategic Plan-2015 has ambitiously set to achieve these Global targets of 2030 in 2025 itself, which is five years ahead of SDG-3.[5] Tamil Nadu is the only South Indian state having TB prevalence higher than the national average.[2]

Tamil Nadu state is taking leading steps in combating this deadly disease by various strategies. One of the major steps taken was the performance of state wide district level prevalence survey for TB with the support of National Institute for Research in Tuberculosis.

We intended to analyse the population attributable fraction as a sub analysis from the main to study to understand public health importance of risk factors associated with TB, so that appropriate interventions could be planned at the state and district level.

Population attributable fraction is defined as the fraction of cases that would have not occurred if the exposure has been eliminated.[6]

This cross sectional survey was conducted in all the thirty two districts of Tamil Nadu, among participants aged 15 years and above, to identify microbiologically confirmed pulmonary TB, from February 2021 to July 2022.

There were 180 clusters and 800 population per cluster were enumerated for screening. Participants with symptoms suggestive of TB or any Chest X-Ray abnormality were further assessed with sputum examination.

Cartridge based nucleic acid amplification test (CBNAAT), Sputum smear and Liquid Culture were done to confirm the diagnosis. Data in the field were collected electronically and analysed using STATA/MP version 15.1. Population attribution fraction (PAF) was calculated using Levin's formula.[7] The study protocol was approved by the

Please Scan this QR Code to View this Article Online
Article ID: 2024:04:01:06
Corresponding Author: Ariarathinam Newtonraj
e-mail : newtonraj.a@icmr.gov.in

Institutional Human Ethics Committee of NIRT (National Institute for Research in Tuberculosis) (017/NIRT-IEC/2021).

In total 130932 participants were screened across the state and 244 participants were diagnosed with microbiologically confirmed TB. PAF for the risk factors for TB with under nutrition ((BMI<18.5 Kg/m2)) was 39(32-46), alcohol use was 38(30-46), smoking was 31(24-39), and age >60 years was 27(20-34).

Low BMI is the modifiable risk factor which has higher PAF. When individual districts were taken into consideration for PAF analysis for under nutrition, it was observed that Krishnagiri 78(23 - 97), Pudukkottai 72(14 -96) and Vellore 71(37–90) districts were having higher PAF values for under nutrition.

While considering the TB elimination activities, addressing the under nutrition, especially in these districts could be prioritized. In the world TB report 2023, under nutrition was considered as the major risk factor when comparing with other risk factors.[1]

Recent RATIONS study in India has shown that there is significant reduction in the incident TB among the households of Index TB cases with the nutritional intervention.[8] Reduction in the mortality among the Index cases was also observed in this study.[9]

Even though this is a population based study with huge sample size and high coverage across the state, there are few limitations in the PAF results.

Table 1: Population attributable fraction of under nutrition (BMI<18.5Kg/m2) for TB in the Districts of Tamil Nadu - Prevalence survey in 2021-2022

S.No	Name of District	Total survey population (N)	TB cases n(%)	Under nutrition n(%)	PAF attributed to Under nutrition in TB (95% CI)
	Tamil Nadu State	**1,30,932**	**244 (0.19)**	**16898 (12.91)**	**39 (32, 46)**
1	Krishnagiri	3547	5 (0.14)	380 (11)	78 (22, 97)
2	Pudukkottai	3002	4 (0.13)	339 (11)	72 (14, 96)
3	Vellore	7321	12 (0.16)	946 (13)	71 (37, 90)
4	Erode	4519	11 (0.24)	544 (12)	69 (33, 90)
5	Sivaganga	2278	3 (0.13)	322 (14)	61 (1, 95)
6	Salem	6268	13 (0.21)	800 (13)	56 (25, 81)
7	Cuddalore	4417	10 (0.23)	689 (16)	53 (17, 81)
8	Thoothukkudi	3068	5 (0.16)	524 (17)	52 (4, 88)
9	Coimbatore	5980	7 (0.12)	744 (12)	51 (12, 84)
10	Thiruvarur	2218	5 (0.23)	434 (20)	50 (1, 88)
11	Thiruvallur	6341	17 (0.27)	617 (10)	48 (23, 71)
12	Thanjavur	4505	8 (0.18)	700 (16)	41 (5, 76)
13	Dindigul	3740	14 (0.37)	454 (12)	35 (10, 64)
14	Chennai	7246	10 (0.14)	632 (09)	34 (8, 67)
15	Viluppuram	6659	12 (0.18)	1046 (16)	31 (3, 64)
16	Tiruchirappalli	5082	11 (0.22)	618 (12)	28 (2, 61)
17	Madurai	5994	24 (0.40)	738 (12)	24 (6, 47)
PAR for Ariyalur, Dharmapuri, Kancheepuram, Kanniyakumari, Karur, Nagapattinam, Namakkal, Perambalur, Ramanathapuram, The Nilgiris, Theni, Tirunelveli, Tirupur, Thiruvannamalai, Virudhunargar districts were unable to calculate due to low sample size to estimate PAR.					

First, many of the PAF has wide range of CI due to lower sample size at district level, second, the PAF of a particular risk factor was not adjusted for other risk factors and hence the sum of PAF could be more that 100 and the third, PAF for some of the districts were unable to calculate due to low sample size.

Caution should be taken while interpreting the results. However the PAF gives us a preliminary idea on the risk factors to be considered during TB elimination activities.

To conclude, population attributable fraction for TB in Tamil Nadu state was high for under nutrition, alcohol use and smoking. Under nutrition in TB was higher in few districts of Tamil Nadu. Public health interventions should be considered accordingly.

ACKNOWLEDGEMENT

The authors like to acknowledge all the DDHS, DTOs and Medical officers involved in the study. We thank the National Health Mission, Government of Tamil Nadu for funding this study.

REFERENCES

1. World Health Organization. Global Tuberculosis Report 2023. 2023.

2. Ministry of Health and Family Welfare Government of India. National TB Prevalence Survey in India [Internet]. 2021 [cited 2023 Jul 23]. Available from: https://tbcindia.gov.in/showfile.php?lid=3659

3. Central TB Division of Ministry of Health and Family Welfare under Government of India. Tuberculosis Preventive Treatment in India. In New Delhi; 2021. Available from: https://tbcindia.gov.in/showfile.php?lid=3625

4. World Health Organization. Implementing the end TB strategy: the essentials. Geneva: World Health Organization; 2015.

5. Revised national tuberculosis control programme (RNTCP); Central TB division; Ministry of Health and Family Welfare; Government of India. National Strategic Plan for Tuberculosis Elimination 2017-2025 [Internet]. [cited 2018 Jan 24]. Available from: https://tbcindia.gov.in/WriteReadData/NSP Draft 20.02.2017 1.pdf

6. Mansournia MA, Altman DG. Population attributable fraction. BMJ [Internet]. 2018 [cited 2024 Feb 16];360. Available from: https://pubmed.ncbi.nlm.nih.gov/29472187/

7. Lewin, S. (1950). Population attributable fraction. American Journal of Epidemiology, 52, 283-298.

8. Bhargava A et al. Nutritional supplementation to prevent tuberculosis incidence in household contacts of patients with pulmonary tuberculosis in India (RATIONS): a field-based, open-label, cluster-randomised, controlled trial. Lancet (London, England) [Internet]. 2023 Aug [cited 2023 Aug 16]; Available from: https://pubmed.ncbi.nlm.nih.gov/37567200/

9. Bhargava A et al. Nutritional support for adult patients with microbiologically confirmed pulmonary tuberculosis: outcomes in a programmatic cohort nested within the RATIONS trial in Jharkhand, India. Lancet Glob Heal [Internet]. 2023 Aug 7 [cited 2023 Aug 16]; Available from: https://pubmed.ncbi.nlm.nih.gov/37567210/

SCIENTIFIC LETTER - PUBLIC HEALTH

CHEST X-RAY INTERPRETATION: AGREEMENT BETWEEN SPECIALIST IN TERTIARY CARE AND MEDICAL OFFICERS FROM PRIMARY HEALTH CENTRES IN THE STATE TB SURVEY IN TAMIL NADU

Prathiksha Giridharan [(1)], Sriram Selvaraju [(1)], Kannan Thiruvengadam [(2)], Asha Federick [(3)]

(1) ICMR- National Institute for Research in Tuberculsois, Chennai, India
(2) ICMR- Regional medical research centre, Port Blair, India
(3) Directorate of Medical and Rural Health Services, Tamil Nadu, India

Abstract

ABSTRACT: The state-wide TB prevalence survey in Tamil Nadu was conducted in 2021- 2022. The Chest X-rays (CXR) used for screening were read by independently field level medical officers deputed from primary health centres (PHCs) and by a central panel of pulmonologists at the each district. The survey showed a very good agreement between the field medical officers and the expert panel in terms of reporting the CXR. The adjusted kappa (95% CI) was 83.4% (83.0 - 83.7) Medical officers from the PHCs can be trained to read and report survey/ ACF survey CXRs to get earlier and reliable results for further action at field level, considering the availability of resources especially in remote areas.
KEYWORDS : Chest X –ray; TB survey; Agreement; Tamil Nadu

MAIN CONTENT

CHEST X-RAY INTERPRETATION: AGREEMENT BETWEEN PULMONOLOGIST AND FIELD MEDICAL OFFICER IN THE STATE TB SURVEY IN TAMIL NADU: The state-wide TB prevalence survey was conducted in the general population in Tamil Nadu during 2021-2022 with the primary objectives of estimating the prevalence of microbiologically confirmed pulmonary TB (MCPTB) disease among individuals 15 years and above. A door-to-door census was conducted within the selected cluster and all eligible and above who stayed there for more than a month were included. All eligible participants (except pregnant women) underwent digital chest x-ray (CXR) in the mobile X-ray unit. The survey warranted trained medical officer in the field to read the CXR in real time in the field to classify them into "normal" and "abnormal" in each cluster (village/ward). Those with abnormal CXR were eligible for sputum testing. The medical officers were deputed from the nearby primary health centres for the survey activities form the department of public health. Online trainings were conducted by ICMR- National institute for research in Tuberculosis for the medical officers to read and classify the CXRs. In addition, trainings were provided by the local District TB officers/ pulmonologist. For Quality assurance, the digital CXRs were uploaded to the server and were also read by a panel consisting of two pulmonologists at the district level and if there were any discrepancy then a third umpire reading was done within 48 to 72 hrs to capture abnormality and thereby decide on the sputum eligibility. X rays classified as "abnormal" by either the medical officer or the expert panel were eligible for sputum examination in addition to eligibility by symptom screening. The observed agreement (95%CI) between the field medical officers and the expert panel in terms of reporting the X-ray was very good [91.7% (91.5 - 91.8)] in the survey (Table). The prevalence adjusted, bias adjusted kappa (95% CI) was 83.4 (83.0 - 83.7) indicating a strong agreement between the pulmonologist and field medical officer.

Timely reporting of X-ray reading is a crucial factor for good conduct of any TB survey. Many surveys across the world have reported major challenges in CXR reading and have a lot of incomplete reporting due to lack of expertize in CXR reading.[1,2] Some countries were able to make radiologist read only specific categories of X-rays and in some surveys they had a huge backlog of X-rays which had to be completed after the survey operations.[3,4] TB surveys as well as active case findings largely rely on CXR screening. The survey also reported various challenges in CXR reading by the expert panel in the district level.[5] Despite, these challenges,

Please Scan this QR Code to
View this Article Online
Article ID: 2024:04:01:07
Corresponding Author: Prathiksha Giridharan
e-mail : prathiksha.g@icmr.gov.in

we successfully completed all CXR readings within 48 to 72 hours. Due to the delay in CXR reporting by a few days, the survey team faced many challenges with sputum collection because some participants had travelled out of town. Relying on CXR readers at the local level can avert such issues provided the local medical officers are trained in that aspect. Of late, artificial intelligence are in place to report CXR in active case finding activities, but this is not available throughout the state. Considering the availability of the resources, the survey results adds evidence that it is possible to implement quality assured CXR reporting in the field by doctors in the primary care similar to the expert pulmonologist in tertiary care with proper training.

Table 1: Agreement between the Chest X-ray Reading by the Field Medical officer with the Readers panel

MO	Readers Panel		Total
	Normal	Abnormal	
Normal	114000 (90.6)	1769 (1.4)	115769 (92)
Abnormal	8709 (6.9)	1410 (1.1)	10119 (8)
Total	122709 (97.5)	3179 (2.5)	125888 (100)

The Agreement calculation is based on the observation with valid(i.e. Normal or Abnormal) from both the readers

Observed Agreement 91.7% (91.5 - 91.8)

PABAK Prevalence Adjusted, Bias Adjusted Kappa Agreement

83.4 (83.0 - 83.7)

ACKNOWLEDGEMENT

The authors like to acknowledge all the DDHS, DTOs and Medical officers who were involved in X-ray reading for the survey.

REFERENCES

1. National tuberculosis prevalence survey: the Philippines, 2016. Republic of Philippines. https://ntp.doh.gov.ph/download/national-tuberculosis-prevalence-survey-2016/#. Accessed on 15th February 2024.

2. National tuberculosis prevalence surveys 2007-2016. World Health Organization. https://www.who.int/publications/i/item/9789240022430. Accessed on 15th February 2024.

3. Report on the population-based survey of prevalence of tuberculosis disease in Uganda 2014–15. Kampala, Uganda: Makerere University School of Public Health 2018. http://library.health.go.ug/publications/tuberculosis/uganda-national-tuberculosis-prevalence-survey-2014-2015-survey-report. Accessed on 15th February 2024.

4. Kenya Tuberculosis Prevalence Survey 2016. Survey Report. National Tuberculosis, Leprosy and Lung Disease Program, Ministry of Health, Republic of Kenya. https://www.chskenya.org/wp-content/uploads/2018/04/Final-TB-Prevalence-Survey-Report.pdf. Accessed on 15th February 2024.

5. Giridharan P, Murugesan H, Selvarauju S, et al. Operational challenges in conducting a subnational TB prevalence survey in India: lessons learned for resource-limited high-burden settings. Glob Health Sci Pract. 2024;12(1):e2300284.

SCIENTIFIC LETTER - PUBLIC HEALTH

AIRBORNE INFECTION CONTROL: MUCH NEEDED COMPANION FOR TB PREVENTION

Bella Devaleenal [(1)], Dina Nair [(1)], Lavanya Jeyabal [(2)]

(1) Department of Clinical Research, ICMR-National Institute for Research in Tuberculosis

(2) Programme Officer, NTEP – Greater Chennai Corporation, Chennai

Abstract

BACKGROUND : Tuberculosis (TB) transmission prevention is one of the four pillars of TB elimination strategy. Airborne infection control (AIC) is of the preventive strategies. Though international and international AIC guidelines are in place for more than a decade, implementation is very minimal and given least priority. TB transmission is airborne and evidences show that nosocomial transmission of TB is common in congested hospital settings with poor infection control. Evidences show that simple interventions like improvement in natural ventilation, identification, fast tracking and segregation of respiratory symptomatic minimizes the air bone pathogen transmission risk. Strong political will, health care providers training, patient education, facility specific recommendations improve the implementation. There are substantial lessons to be learnt from simple infection control measures such as appropriate mask usage, hand hygiene etc. practiced on a larger scale during Covid19 pandemic. All stones including AIC practices should be turned to achieve the goal of TB elimination.

KEYWORDS : Airborne infection control, Tuberculosis, Prevention, Implementation

INTRODUCTION

Airborne infection control (AIC) is one of the key identified strategies for tuberculosis (TB) prevention. Nosocomial transmission of drug resistant tuberculosis (DRTB) has already been documented.[1] Prolonged hospital stay, poor infection control practices, crowded inpatient wards are some of the factors favouring transmission of drug resistant strains of M. tuberculosis.[1] Guidelines on AIC in healthcare and other settings in context to TB and other airborne diseases was released by Government of India in 2010.[2] The three hierarchical levels of AIC include administrative/managerial control with focus on identification, fast tracking, segregation of respiratory symptomatic, environmental control for improving the ventilation and use of personal protective equipment's. The implementation of these guidelines in health care settings in a larger way is yet to be achieved even after a decade. Some of the challenges observed in implementation include non-functioning/non availability of infection control committees, lack of awareness of the health care staff and patient education, inappropriate infrastructure, inadequate funds, non-availability of personal protective equipments (PPE), its improper usage and lack of political will. [3]

Evaluations of health care facilities in three Indian states between 2009 and 2011 showed that administrative control measures such as segregation, fast tracking and provision of masks to respiratory symptomatics were followed in none of the centres. However, interventions to improve the awareness of the guidelines and provision of facility specific recommendations were shown to improve the implementation of the AIC policy and practices.4 Comprehensive interventions at different levels including facility assessments and specific recommendations, training of the health care staff and patient education were found be effective in improving the AIC practices in primary health care centres in a study done in Chennai, Tamil Nadu.[5] Health care staff awareness of AIC practices tend to improve the overall AIC practices in the health care centres as well as improve awareness of TB patients and their practices.[5] These studies show that implementation of AIC practices at different levels of health care settings is feasible. Gimenne Zwama et al in their systematic review suggested a whole system approach including health system pillars such as policy decisions, guidelines, socio political context, funds, organizational structure, human resources, health centre infrastructure, information, technology and human relationships for the successful implementation of infection control for TB prevention in low and middle income countries.[6]

Simple interventions such as identification and fast tracking of respiratory symptomatic, provision of masks to them, respiratory hygiene education to patients, keeping the

Please Scan this QR Code to View this Article Online
Article ID: 2024:04:01:08
Corresponding Author: Bella Devaleenal D
e-mail : belladevalleenal.d@icmr.gov.in

windows open are some of the easily implementable and effective practices to begin with. Usage of masks by patients has shown to reduce the risk of TB infection and disease.[7] Environmental control interventions such as opening of the windows for cross ventilation, well ventilated waiting rooms for respiratory symptomatic etc. reduces the risk of airborne pathogen transmission. Simpler interventions in the existing infrastructure done for improving the natural ventilation could almost facilitate almost three fourth reduction in the risk of TB transmission.[8] There are lessons to be learnt from the successful implementation of various infection control practices such as mask usage, hand hygiene, social distancing etc. during Covid19 pandemic and adaptation by the community at large for prevention of its transmission. Continuous mass media communication regarding the mechanism of transmission of Covid19, importance of mask usage and appropriate method of its wearing and hand hygiene practices facilitated the adaption by the population. Similarly, strengthening the knowledge of the health care providers and the community regarding TB and its infection control by using the latest electronic communication methods continuously for a behaviour change may favour the awareness and adaption of practices. Strong political will, inclusion of TB-IPC in the health policy and programme implementation plan, allocation of resources including funds, necessary manpower and supplies are essential for sustainability of AIC practices implementation. Supportive supervision and monitoring and evaluation are some of the health system factors which need to be focussed for successful implementation for TB and other airborne pathogen transmission prevention and epidemic preparedness. Research priorities include innovative strategies to improve the implementation of various AIC components, simple cost effective technologies in health settings for disinfection etc.

ACKNOWLEDGMENT

We thank Dr. C. Padmapriyadarsini, Director, ICMR-NIRT for her technical support in writing this manuscript.

REFERENCES

1. Crudu V, Merker M, Lange C, Noroc E, Romancenco E, Chesov D, Günther G, Niemann S. Nosocomial transmission of multidrug-resistant tuberculosis. Int J Tuberc Lung Dis. 2015 Dec;19(12):1520-3. doi: 10.5588/ijtld.15.0327. PMID: 26614195.

2. Guidelines on Airborne Infection Control in Healthcare and Other Settings – In the context of tuberculosis and other airborne infections – April 2010 [Provisional]. New Delhi: Directorate General of Health Services – Ministry of Health & Family Welfare, Nirman Bhawan; 2010.\

3. Devaleenal Daniel B, Baskaran A, Baskaran D, Hephzibah M, Padmapriyadarsini C, Mercy A. Addressing the challenges in implementing airborne infection control guidelines and embracing the policies. indian-journal-of-tuberculosis.

4. Parmar MM, Sachdeva KS, Rade K, Ghedia M, Bansal A, Nagaraja SB, Willis MD, Misquitta DP, Nair SA, Moonan PK, Dewan PK. Airborne infection control in India: Baseline assessment of health facilities. Indian J Tuberc. 2015 Oct;62(4):211-7.

5. Devaleenal DB, Jeyapal L, Thiruvengadam K, Giridharan P, Velayudham B, Krishnan R, Baskaran A, Mercy H, Dhanaraj B, Chandrasekaran P. Holistic Approach to Enhance Airborne Infection Control Practices in Health Care Facilities Involved in the Management of Tuberculosis in a Metropolitan City in India–An Implementation Research. WHO South-East Asia Journal of Public Health. 2023 Jan 1;12(1):38-44.

6. Zwama G, Diaconu K, Voce AS, O'May F, Grant AD, Kielmann K. Health system influences on the implementation of tuberculosis infection prevention and control at health facilities in low-income and middle-income countries: a scoping review. BMJ Global Health. 2021;6(5).

7. Greg J Fox, Lisa Redwood, Vicky Chang, Jennifer Ho, The Effectiveness of Individual and Environmental Infection Control Measures in Reducing the Transmission of Mycobacterium tuberculosis: A Systematic Review, Clinical Infectious Diseases, Volume 72, Issue 1, 1 January 2021, Pages 15–26, https://doi.org/10.1093/cid/ciaa719

8. Escombe AR, Ticona E, Chávez-Pérez V, Espinoza M, Moore DA. Improving natural ventilation in hospital waiting and consulting rooms to reduce nosocomial tuberculosis transmission risk in a low resource setting. BMC infectious diseases. 2019 Dec;19:1-7.

9. Zwama G, Diaconu K, Voce AS, O'May F, Grant AD, Kielmann K. Health system influences on the implementation of tuberculosis infection prevention and control at health facilities in low-income and middle-income countries: a scoping review. BMJ Global Health. 2021 May 1;6(5).

SCIENTIFIC LETTER - PUBLIC HEALTH

POTENTIAL USE OF HAEMATOLOGICAL DATA IN THE DIAGNOSIS OF TUBERCULOSIS IN CHILDREN

Aishwarya Venkataraman [(1)], Banu Rekha V V [(1)], Kannan Thiruvengadam [(1)], Syed Hissar [(1)], Kannan Muthuramalingam [(1)], Luke Elizabeth Hanna [(1)]

(1) ICMR- National Institute for Research in Tuberculosis, Chennai.

Abstract

ABSTRACT: Bacteriological/microbiological diagnosis of tuberculosis (TB) is often difficult in children and despite many recent advances in TB management, we have been unable to identify biomarkers predictive of disease. Previous studies have shown that haematological abnormalities especially anaemia is frequently found in children with TB and few recent studies have found that the ratio of monocytes to lymphocytes (ML ratio) and neutrophil to lymphocyte ratio (NL ratio) are associated with risk of TB disease. In this study we evaluated the haematological parameters of children with TB disease. In addition we describe the relationship between anaemia, ML ratio, NL ratio and clinical status of children with TB.

KEYWORDS : anaemia, ML ratio, haemoglobin, Tuberculosis

MAIN CONTENT

Diagnosing TB in children is often challenging due to paucibacillary nature of disease and the operational constraints of obtaining specimens from children who are unable to generate sputum.[1,2] Haematological indicators such as haemoglobin and other blood indices such as platelet and white blood cell (WBC) counts have been used to as diagnostic and prognostic markers in management of tuberculosis.[1,3,4] The blood monocyte-to-lymphocyte ratio (ML Ratio) and neutrophil to lymphocyte ratio (NL ratio), which are calculated from blood counts has been found to predict progression to TB in both children and adults.[5,6] Given the difficulty of diagnosing tuberculosis in children, we propose that a review of available haematological profiles serve as supplemental investigations and give useful information regarding the child's TB condition. We therefore, analysed the haematological parameters of children with TB disease and investigate the association between anaemia, ML ratio, NL ratio and clinical status. Between 2014 and 2019, we evaluated HIV-negative children aged 15 and under who had either confirmed or clinically diagnosed TB, from two hospitals in Chennai, Tamil Nadu, south India. The haematological indices [haemoglobin, total white cell count (WBC), total lymphocytes, total monocytes, total neutrophils], ML ratio, and NL ratio were analysed between children with TB disease and control children. Control children (n=393) had similar median age (6 years, IQR: 3 months – 15 years) and sex (male: 57%), had no signs and symptoms suggestive for TB disease and had negative Tuberculin skin test (TST). These children presented to hospital for elective surgeries or non-infective/ non-autoimmune conditions. We screened 2078 children of which 593 children were included in the analysis. The median age was 5.8 years (range 3 months–15 years) and 55% of children were under 6 years of age. 59% were males. Among the 593 children, 33.7% (200/593) were diagnosed with TB, of which 38% (76/200) were bacteriologically confirmed and 62% (124/200) were diagnosed clinically (radiological features and/or clinical features suggestive of TB). 32.4% (192/593) were anaemic. We found anaemia (Figure 1) was more common in children with TB [49% (98/200)] in comparison to children without TB [24% (94/393)] (p value <0.001). TB children also had elevated neutrophil count, monocyte count and lower lymphocyte count. (Table 1) Significant difference ($p < 0.001$) was also noted in Median ML ratio [0.2 (0.14 - 0.31) in TB disease and 0.15 (0.11 - 0.2) in controls] and NL ratio [1.43 (0.86 - 2.2) in TB disease and 0.86 (0.61 - 1.33) in controls] (Table 1). Other haematological parameters are shown in Table 1.

Table 1: Haematological profile

Haematological Parameter	Controls (n=393)	TB (n=200)	p-Value
Haemoglobin *median (IQR)*	11.9 (11 - 12.6)	11 (9.55 - 11.95)	<0.001
WBC *median (IQR)*	10.1 (8 - 12.3)	10.35 (8.5 - 12.9)	0.061
Lymphocytes *median (IQR)*	4.01 (3.19 - 5.44)	3.65 (2.71 - 4.8)	0.001
Monocytes *median (IQR)*	0.64 (0.48 - 0.86)	0.73 (0.53 - 1)	<0.001
Neutrophils *median (IQR)*	3.8 (2.72 - 5.34)	4.81 (3.6 - 6.52)	<0.001
M:L Ratio	0.15 (0.11 - 0.2)	0.2 (0.14 - 0.31)	<0.001
N:L Ratio	0.86 (0.61 - 1.33)	1.43 (0.86 - 2.2)	<0.001

Please Scan this QR Code to View this Article Online
Article ID: 2024:04:01:09
Corresponding Author: Aishwarya Venkataraman
e-mail : venkataraman.a@icmr.gov.in

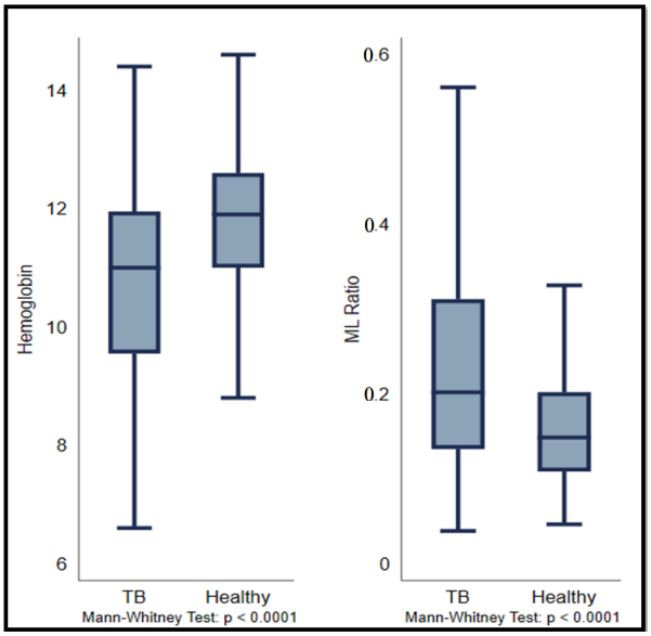


Figure 1 : Anaemia among TB and healthy children

Our findings demonstrate significant haematological abnormalities in children with TB, implying that these indices might be useful as additional tools in determining if a child has TB disease. This work further adds to the growing body of research on the ML and NL ratios as adjunct biomarkers for tuberculosis diagnosis in children, which is critical given the difficulty of obtaining respiratory samples for microbiologic diagnosis in children with Tuberculosis.[5-7] The ML and NL ratios, which may be easily calculated from standard differential complete blood counts, may be useful in the diagnosis of children with TB disease.

Our findings may not be applicable to all paediatric populations because our group was confined to children who presented to the hospital with any disease. We also excluded those with CNS tuberculosis. However, our ability to detect variations in haematological indices between the TB and unlikely TB groups was strong. Furthermore, including children with clinically diagnosed TB allowed us to investigate the efficacy of these markers in children with unconfirmed or presumptive TB.

In conclusion, haematological analysis, particularly ML ratio and NL ratio, might be a valuable adjunct diagnostic and predictive tool for TB disease in contexts where bacteriological confirmation is difficult to acquire.

ACKNOWLEDGEMENT

The authors thank the staff of Department of Clinical Research and Department of HIV, ICMR-National Institute for Research in Tuberculosis (ICMR-NIRT) for their valuable assistance. We also thank the Director, ICMR-NIRT for timely support and encouragement.

REFERENCES

1. Wessels G, Schaaf HS, Beyers N, Gie RP, Nel E, Donald PR. Haematological abnormalities in children with tuberculosis. J Trop Pediatr. 1999 Oct;45(5):307–10.

2. Perez-Velez CM, Marais BJ. Tuberculosis in children. N Engl J Med. 2012 Jul;367(4):348–61.

3. Gao Z, Liu Q, Deng Q, Kong L, Liu Y. Growth and anemia among children with tuberculosis infection at different sites in Southwest China. Front Pediatr [Internet]. 2023;11(June):1–9. Available from: https://doi.org/10.3389/fped.2023.1188704

4. Shah AR, Desai KN, Maru AM. Evaluation of hematological parameters in pulmonary tuberculosis patients. J Fam Med Prim Care [Internet]. 2022;11(8). Available from: https://journals.lww.com/jfmpc/fulltext/2022/08000/evaluation_of_hematological_parameters_in.47.aspx

5. Choudhary RK, Wall KM, Njuguna I, Pavlinac PB, LaCourse SM, Otieno V, et al. Monocyte-to-Lymphocyte Ratio Is Associated With Tuberculosis Disease and Declines With Anti-TB Treatment in HIV-Infected Children. J Acquir Immune Defic Syndr. 2019 Feb;80(2):174–81.

6. Adane T, Melku M, Ayalew G, Bewket G, Aynalem M, Getawa S. Accuracy of monocyte to lymphocyte ratio for tuberculosis diagnosis and its role in monitoring anti-tuberculosis treatment: Systematic review and meta-analysis. Medicine (Baltimore). 2022 Nov;101(44):e31539.

7. Naranbhai V, Hill AVS, Abdool Karim SS, Naidoo K, Abdool Karim Q, Warimwe GM, et al. Ratio of monocytes to lymphocytes in peripheral blood identifies adults at risk of incident tuberculosis among HIV-infected adults initiating antiretroviral therapy. J Infect Dis. 2014;209(4):500–9.

MISCELLANEOUS - PUBLIC HEALTH

GOVERNMENT HOSPITAL OF THORACIC MEDICINE (GHTM), TAMBARAM SANATORIUM, A BRIEF HISTORY THROUGH TIME.

Vinod Kumar Viswanathan (1)

(1) Institute of Thoracic Medicine Madras Medical College

Abstract

BACKGROUND : Government hospital of thoracic medicine (GHTM), Tambaram sanatorium is a tertiary care centre for patients with lung diseases which has been functioning since its inception in 1928. It was declared as a centre of excellence for HIV care in 2007 and centre of excellence for treatment of drug resistant TB cases by the Government of India in 2022. The article describes the history of the institute in detail.

KEYWORDS : Tambaram sanatorium, Centre of excellence; HIV; TB; drug resistance

Government hospital of thoracic medicine, Tambaram sanatorium – A brief History through time

Government hospital of Thoracic Medicine (GHTM) is a tertiary care centre for patients with lung diseases which has been functioning since its inception in 1928. It was declared as a centre of excellence for HIV care in 2007 and centre of excellence for treatment of drug resistant TB cases by the Government of India in 2022.

Brief note on historical significance of Government hospital of thoracic medicine.

Thambaram sanatorium was started on 9th April 1928 by Dr. David Chowry Muthu at the foothills of Pachamalai for the treatment of Tuberculosis patients with 12 beds initially over a 240 acres campus. Dr. David Chowry Muthu, who was an Associate Physician at Kings college, London and the chief Physician of Mendip Hills Sanatorium,Somerset was inspired by Gandhiji's teachings and established this sanatorium for a holistic care of Tuberculosis patients.

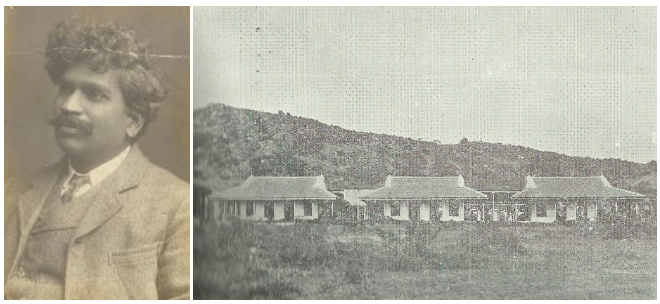


Photo of Dr. David Chowry Muthu & Tambaram sanatorium taken on the day of it's inauguration

It was acquired by the Government of Madras in 1937 and functioning of the sanatorium for treating TB patients was continued uninterrupted since then.

This sanatorium was the site of the famous "Madras Study" for Tuberculosis conducted by Indian council of Medical Research (ICMR) in the 1950s which paved the way for the domiciliary treatment of Tuberculosis.

An unique rehabilitation centre for TB patients was started in the 1950s due to the efforts of the first union health minister Rajakumari Amrit Kaur and the then Chief minister of Madras, C. Rajagopalachari which has since been named Amrit Nagar colony. Here post TB destitute patients are employed and involved in various activities like book binding, wiring of chairs, kitchen gardening and this rehabilitation centre continues to function till date.

The sanatorium grew with the addition of more and more wards which were constructed in the 1950s and 1960s by various organisations including the armed forces, NCC etc in addition to the Government of Madras.

The last increment of beds strength to 776 was in 1976. With increasing awareness of other lung diseases, this hospital was renamed Government hospital of Thoracic medicine in 1980.

This hospital was among the first hospitals to admit HIV patients in 1993 and was among the first 8 hospitals across India to initiate anti retroviral therapy in 2004 by the Government of India, and has saved several lakh lives by this therapy. In this background this hospital was declared as centre of excellence for HIV care by the Government of India in 2007.

Please Scan this QR Code to View this Article Online
Article ID: 2024:04:01:10
Corresponding Author: Vinod Kumar Viswanathan
e-mail : drvinodkumar76@gmail.com

Starting from various therapies for Tuberculosis before the era when medicines were used for therapy and sanatorium with its fresh air and clean environment was the mainstay of treatment, this hospital houses records of treatment of Tuberculosis from the days before medicines were started for Tuberculosis, which will be of historical interest for researchers in the future.

This hospital was one of the first six centres to start the drug, Bedaquiline for treatment of TB by the Government of India. It is also the site for various collaborative studies with national research institutes like National institute for research in Tuberculosis (NIRT) and National institute of epidemiology (NIE), together being involved in various researches and trials in the treatment of both TB and HIV.

Given the background of its rich history, sustained patient load, infrastructure and mentoring activities this hospital recently became one of the five **centres of excellence for Drug resistant TB care declared by the Government of India.**

Brief note on the infrastructure facilities of this hospital

This hospital, which started as a sanatorium for TB patients, is designed with 33 wards spread currently over 74 acres, so as to avoid airborne infections and spread of Tuberculosis. As said earlier this 33 wards, were mostly constructed during the period from 1928 to the 1970s and are still functioning and serving the needs of the poor and needy patients. These wards serve inpatients admitted with various forms of TB, HIV patients and patients with various other lung ailments like asthma, COPD, lung malignancy etc.

Three intensive care units are functioning in the campus and cater to the needs of patients with respiratory failure.

A BSL3 level laboratory for serving the needs of both HIV and TB patients with state of the art laboratory is functioning with the goal of achieving Tuberculosis elimination as envisaged by the national strategic plan of the Government of India.

An out patient unit is functioning with infrastructure including CT scan and rehabilitation services for both post TB and post Covid patients. Following Government of India norms of integrated medicine, a yoga unit is also functioning in this campus.

Clinical work load at Government hospital of Thoracic medicine

This hospital caters to around 1.5 lakh Out patients per year with daily out patient attendance being about 500 to 700 patients per day. The average inpatient admission every year is around 15,000.

Every year 3000 to 4000 drug sensitive TB cases and 200 to 300 drug resistant TB cases are diagnosed and treated in this hospital and 4000 HIV patients are under the care of this instituition. It is imperative to point here that this hospital caters not only to patients of Tamilnadu but also neighbouring states like Puducherry, Kerala, Andhra Pradesh etc. Recently we have started receiving patients from other states like Jarkhand, Bihar, etc and neighbouring countries like Burma. Recently a team from Timor Leste had visited this sanatorium to study and implement the best of care practices in TB being followed here in their country.

It was in recognition of the sustained services delivered by this hospital that the Government of India accorded the status of centre of excellence for both HIV and drug resistant TB care, the only such institution across this country.

Even during the Covid pandemic this hospital had admitted and treated 6000 Covid cases.

Academics at Government hospital of Thoracic medicine.

GHTM , attached to Government Stanley medical college, is serving as a post graduate training centre for post graduates of Pulmonary medicine, General medicine, community medicine and for respiratory therapy students. Students, not only from Tamilnadu but from various states across India, come here to learn management of various diseases including TB, HIV and various lung ailments.

GHTM has qualified professionals and faculty in the field of Pulmonary medicine, General medicine, Microbiology, Radiology and HIV medicine involved in academic training activities and also carrying out research in various department including Pulmonary medicine, General medicine and Microbiology.

Various conferences and learning activities are conducted here regularly with about 120 such programs having been conducted over the last five years alone.

This institution organised the 74th National TB conference in 2019 in which more than 700 delegates from various countries and Central TB division, Ministry of health and family welfare, Government of India participated.

Research activities of Government hospital of Thoracic Medicine

This instituition has been at the forefront of research activities since the 1940s.

The famous Madras study which paved the way for home based treatment of Tuberculosis was done here.

Many colloborative research activities with various national institutes like national institute of research in Tuberculosis, National institute of epidemiology, national institute of Virology are currently under progress in the field of HIV and TB. Various research projects are also being carried out in airway disorders, intervention pulmonology and occupational lung diseases in this instituition. Among the studies of note carried out in recent years is the Bedaquiline Conditional Access program of the Government of India's central Tb division, of which this instituition was one of the partners and the results of this study revolutionised the treatment of Tuberculosis across the world and saved many a life of patients suffering from the deadly drug resistant form of Tuberculosis. Collaborative activities done with ICMR include the Madras study on domiciliary treatment of Tuberculosis, various clinical trials on newer drugs and regimens in both Tuberculosis and People living with HIV (PLHIV). One study of interest in recent times is the Cohorts of HIV resistance and progression in children and adults (COHRPICA) wherein GHTM is a member of consortium of ICMR institutes involved with the objective of establishing a biorepository of HIV samples for future research needs and vaccine development.

In addition to colloborative research , other areas of collaboration include patient care and service delivery such as the program " Wings of Support " in collaboration with ICMR – National Institute of Research in Tuberculosis, wherein counselling sessions are conducted for both drug sensitive and resistant patients addressing various issues in TB treatment including adherence, tolerance of drugs, addressing side effects and adverse events, managing comorbidities, counselling on substance abuse etc.

GHTM is also involved in setting up a model palliative care centre and has partnered with Central Tb division, ICMR – NIRT and UNION in creating a centre of excellence for palliative care.

In summary, it is to be said that Government hospital of Thoracic medicine is a time honoured instituition of historical and utmost public importance to the nation since 1928 and has been at the forefront of the battles against both TB and HIV and the amount of life and livelihood saved is immeasurable .

Guidelines to Authors

TNJPHMR | TAMILNADU JOURNAL OF PUBLIC HEALTH AND MEDICAL RESEARCH

AIMS AND SCOPE:

Tamil Nadu Journal of Public Health and Medical Research , is an official publication from It publishes original Research articles/ Case Reports /Scientific papers focusing on Anatomy , Physiology , Pharmacology , Pathology , Biochemistry , Opthalmology , ENT , Community Medicine, General Medicine , Surgery , Orthopaedics, Obstetrics & Gynaecology , Paediatrics , Cardiology and other specialties ; and invites annotations, comments, and review papers on recent advances, editorial correspondence, news and book reviews. Tamil Nadu Journal of Public Health and Medical Research is committed to an unbiased, independent, anonymous and confidential review of articles submitted to it. Manuscripts submitted to this Journal, should not have been published or under consideration for publication in any substantial form in any other publication, professional or lay. All manuscripts will become the property of the Tamil Nadu Journal of Public Health and Medical Research.

ADDRESS FOR SUBMISSION:

Submit article typed in double space (including references), with wide margins as electronic copy through online manuscript submission system at our website **www.tnjphmr.com** We have an online unbiased processing system and the authors can login any time to view the status of any submitted article. Authors need to register as a new author for their first submission.

THE EDITORIAL PROCESS:

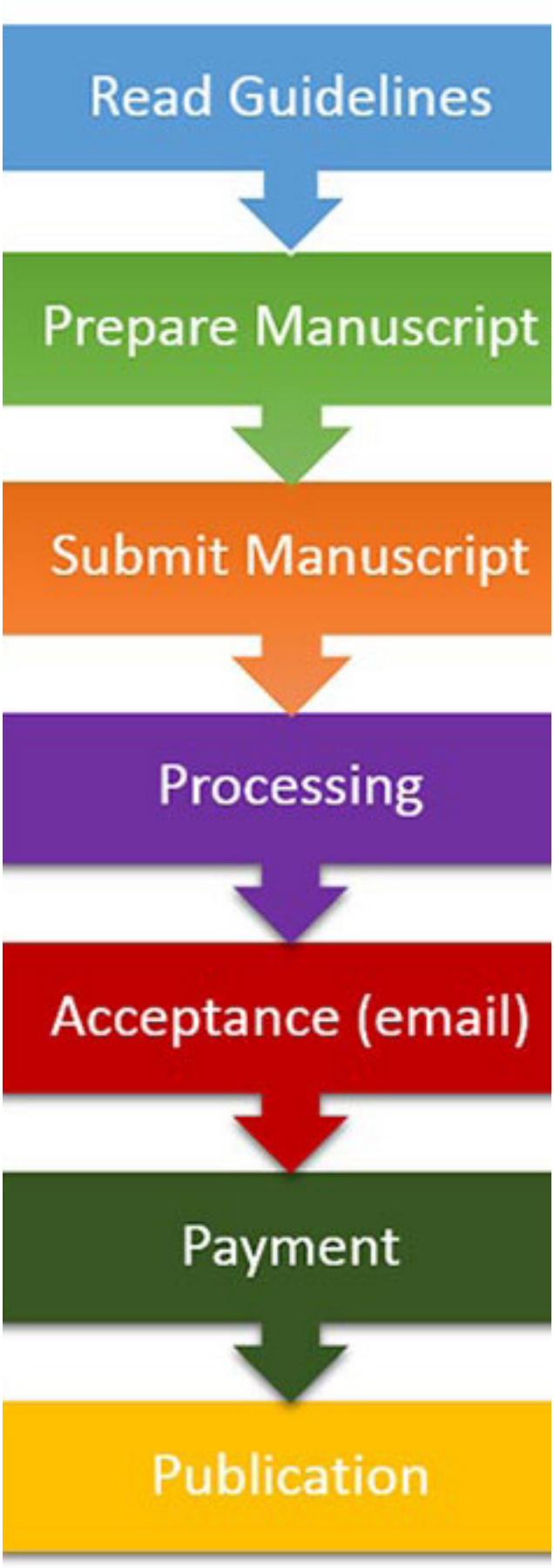
Manuscripts submitted at our website **www.tnjphmr.com** will be reviewed for possible publication with the understanding that they are being submitted to one journal at a time and have not been published earlier or under simultaneous consideration for publication by any other journal. Upload the text of the manuscript, tables and individual figures as separate files. All manuscripts submitted will be duly acknowledged, however the journal will not return the unaccepted manuscripts. Each manuscript received will be assigned a manuscript number, which must be used for future correspondence. All articles (including invited ones) will be usually evaluated by peer reviewers who remain anonymous. The authors will be informed about the reviewers' comments and acceptance/rejection of the manuscript. Accepted articles would be edited to the Journal's style. Proofs will be sent to the corresponding author which has to be returned within one week. Accepted manuscripts become the permanent property of the Journal and may not be reproduced, in whole or in part, without the written permission of the editor.

MANUSCRIPT PREPARATION:

American spellings should be used. Authors are requested to adhere to the word limits. Editorial/viewpoint should be about 1500 words, and continuing medical education/review articles should be limited to 4500 words. Original articles should limit to 3000 and short articles to 1500 words, letters and book review should be limited to 750 and 500 words respectively. This word limit includes abstract, references and tables etc. Articles exceeding the word limit for a particular category of manuscript would not be processed further. All articles should mention how human and animal ethical aspect of the study was addressed. Whether informed consent was taken or not? Identifying details should be omitted if they are not essential. When reporting experiment on human subjects, authors should indicate whether the procedures followed were in accordance with the Helsinki Declaration of 1975, as revised in 2000. Each of the following sections should begin on a separate page. Number all page in sequence beginning with the title page.

Title Page:

This should contain the title of the manuscript, the name of all authors, a short title (not more than 20 words) to be used as the running title, source of support in the form of grants, equipments, drugs etc., the institution where the work has been carried out and the address for correspondence includ-



ing telephone, fax and e-mail. One of the authors should be identified as the in-charge of the paper who will take responsibility of the article as a whole.

Abstract:

This should be a structured condensation of the work not exceeding 250 words for original research articles and 150 words for short articles. It should be structured under the following headings: background, objectives, methods, results, conclusions, and 5-8 keywords to index the subject matter of the article. Please do not make any other heading.

Text:

It must be concise and should follow the IMRAD format: Introduction, Material and Methods, Result, Discussion. The matter must be written in a manner, which is easy to understand, and should be restricted to the topic being presented. If there is no separate paragraph of conclusion, the discussion should end in conclusion statement. Each Table and Figure/Picture should be on a separate page and should be given at the end of the manuscript. Please do not insert tables etc within the text.

FORMAT :

Font : Times New Roman
Font Size : 11 pt - Main text; 18 pt - Headings

COST OF PUBLICATION :

Online Publication + PDF - Rs.1500
Extra Hard Copy (Authors only) - Rs.750

WORD LIMIT :

Original Article - 8000 words
Case Report - 4000 words
Abstract - 250 words

ACKNOWLEDGMENT:

These should be placed as the last element of the text before references. Written permissions of persons/agency acknowledged should be provided.

Conflict of interest:

A brief statement on source of funding and conflict of interest should be included. It should be included on a separate page immediately following title page.

Contribution of Authors:

Briefly mention contribution of each author in multi author article.

REFERENCES

In citing other work only reference consulted in the original should be included. If it is against citation by others, this should be so stated. Signed permission is required for use of data from persons cited in personal communication. ANSI standard style adapted by the National Library of Medicine (NLM) should be followed. Consult http://www.nlm.nih.gov/bsd/uniform_requirements.html. References should be numbered and listed consecutively in the order in which they are first cited in the text and should be identified in the text, tables and legends by Arabic numerals as superscripts in brackets. The full list of reference at the end of the paper should include; names and initials of all authors up to six (if more than 6, only the first 6 are given followed by et al.); the title of the paper, the journal title abbreviation according to the style of Index Medicus (http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?db=journals), year of publication; volume number; first and last page numbers. Reference of books should give the names and initials of the authors, book title, place of publication, publisher and year; those with multiple authors should also include the chapter title, first and last page numbers and names and initials of editors. For citing website references, give the complete URL of the website, followed by date of accession of the website. Quote such references as - author name, title of the article, the website address, and date of accession.

Journals:

Mehta MN, Mehta NJ. Serum lipids and ABO Blood group in cord blood of neonates. Indian J Pediatr. 1984; 51:39-43.

Book:

Smith GDL. Chronic ear disease. Edinburgh: Churchill Livingstone; 1980.

Chapter in the Book: Malhotra KC. Medicogenetics problems of Indian tribes. In: Verma IC, editor. Medical genetics in India. vol. 2. Pondicherry: Auroma Entrprises; 1978. p. 51-55.

Papers accepted but not yet published should be included in the references followed by 'in press'. Those in preparation, personal communications and unpublished observations should be referred to as such in the text only.

Illustration/Pictures:

These should be of the highest quality. Graphs should be drawn by the artist or prepared using standard computer software. Number all illustrations with Arabic numerals (1,2,3….) and include them on a separate page on the document.

Legends:

A descriptive legend must accompany each illustration and must define all abbreviations used therein.

Tables:

These must be self–explanatory and must not duplicate information in the text. Each table must have a title and should be numbered with Arabic numerals. Each table should be typed in double space, on a separate sheet of paper. No internal horizontal or vertical lines should be used. All tables should be cited in the text.

Abbreviation:

As there are no universally accepted abbreviations authors should use familiar ones and should define them when used first in the text.

TEMPLATES

Ready to use templates are made to help the contributors write as per the requirements of the Journal. You can download them from www.smj.org.in save the templates on your computer and use them with a word processor program to prepare the draft.

For any queries contact :

Dr.Aravintharaj. S
Associate Editor
Mobile : 9489009804
Email : editor.tnjphmr@gmail.com

PUBLISHER

THE DIRECTORATE OF PUBLIC HEALTH AND PREVENTIVE MEDICINE
NO.359, ANNA SALAI, TEYNAMPET, CHENNAI - 600 006.