

Clinical profile and outcome of patients with extrapulmonary tuberculosis attending a dots centre in a tertiary care centre: A prospective observational study

Gopika Shanavas¹, Unni R Baby², Supriya Adiody³

ABSTRACT

Background: Extrapulmonary tuberculosis (EPTB) represents a significant and increasingly recognized component of the tuberculosis burden in India. Its heterogeneous clinical presentation and paucibacillary nature often result in diagnostic delays. Data from South Indian tertiary care settings remain limited.

Objectives: To study the clinical profile and treatment outcomes of patients diagnosed with EPTB.

Methods: This prospective observational study was conducted over 18 months in a tertiary care centre in South India. Fifty newly diagnosed EPTB patients were enrolled. Diagnosis was based on clinical, radiological, histopathological, and microbiological methods including CBNAAT. Patients were treated as per National Tuberculosis Elimination Programme (NTEP) guidelines and followed until treatment completion. Results: Females constituted 54% of cases, and 56% were aged 18–45 years. Diabetes mellitus was the most common comorbidity (57%), with poor glycaemic control (mean HbA1c 9.92 ± 1.75). Lymph node TB (44%) and pleural TB (22%) were the most common forms. Clinical diagnosis was made in 66% of cases, while microbiological confirmation was achieved in 34%, with CBNAAT outperforming smear microscopy. Treatment completion rate was 86%, with 8% lost to follow-up. Nearly 48% of patients had persistent symptoms despite therapy.

Conclusion: EPTB predominantly affects younger adults and females, with a strong association with diabetes. Despite good treatment completion rates, residual morbidity is common. Early diagnosis, optimal comorbidity management, and extended follow-up are essential.

Keywords: Extrapulmonary tuberculosis; Diabetes mellitus; Treatment outcomes.

GJMEDPH 2026; Vol. 15, issue 3 | OPEN ACCESS

1*Corresponding: 2. Unni R Baby, MD Respiratory Medicine, Department of Respiratory Medicine, Jubilee Mission Medical College & Research Institute, East Fort, Thrissur, Kerala, India, 680005, Email: unnirbaby@gmail.com, Ph: +91 9744845955, ORCID ID: 0000-0002-6180-8375; 1. Gopika Shanavas, MBBS, Post Graduate Junior Resident, Department of Respiratory Medicine, Jubilee Mission Medical College & Research Institute, East Fort, Thrissur, Kerala, India, 680005, Email: gopikashanavas@gmail.com, Ph: +91 8606266646, ORCID ID: 0009-0007-5215-9952; 3. Supriya Adiody, MD Respiratory Medicine, Department of Respiratory Medicine, Jubilee Mission Medical College & Research Institute, East Fort, Thrissur, Kerala, India, 680005, Email: adiodysupriya337@gmail.com, Ph: +91 9895864528, ORCID: 0000-0003-1683-9348

Conflict of Interest—none | Funding—none

© 2026 The Authors | Open Access article under CC BY-NC-ND 4.0

INTRODUCTION

Tuberculosis (TB), caused by *Mycobacterium tuberculosis*, remains a major global health problem, particularly in low- and middle-income countries [1]. Although pulmonary TB is the most common form, extrapulmonary tuberculosis (EPTB) contributes significantly to morbidity and poses diagnostic challenges due to its varied presentation. Globally, TB continues to affect millions, with India accounting for nearly one-quarter of the global burden [2,3]. In India, EPTB constitutes approximately 15–25% of all TB cases, with increasing trends in recent years [3,4]. The rise in EPTB has been attributed to improved diagnostics, increased awareness, and the growing prevalence of risk factors such as diabetes mellitus. EPTB involves organs outside the lungs, including lymph nodes, pleura, abdomen, bones, central nervous system, and genitourinary system [1]. Its diagnosis is challenging due to its paucibacillary nature, resulting in low sensitivity of conventional microbiological tests [5]. Consequently, diagnosis often relies on a combination of clinical, radiological, and histopathological findings. South India presents a unique epidemiological context, characterized by demographic transition, high prevalence of diabetes, and improved healthcare infrastructure [6]. These factors influence disease patterns, diagnostic pathways, and outcomes. However, prospective data from tertiary care centres in this region remain limited.

This study was undertaken to evaluate the clinical profile and treatment outcomes of EPTB patients in a tertiary care setting.

OBJECTIVES

1. To study the clinical profile of patients diagnosed with extrapulmonary tuberculosis
2. To evaluate treatment outcomes in patients receiving anti-tubercular therapy (ATT)

METHODOLOGY

This study was designed as a prospective observational study conducted in the Department of Respiratory Medicine at Jubilee Mission Medical College, Thrissur, over a period of 18 months. A total of 50 patients were included in the study, with the sample

size calculated based on prior prevalence estimates and adjusted for expected attrition. Patients were recruited using a consecutive sampling method.

Eligible participants included newly diagnosed cases of extrapulmonary tuberculosis (EPTB) who were willing to participate in the study. Patients with pulmonary tuberculosis, those who were HIV-positive, pregnant women, and individuals with a known diagnosis of malignancy were excluded from the study.

The diagnosis of EPTB was established using a combination of clinical, radiological, histopathological, and microbiological evidence, including acid-fast bacilli (AFB) smear, cartridge-based nucleic acid amplification test (CBNAAT), and biopsy where indicated. All patients underwent a structured clinical evaluation using a predefined questionnaire to document presenting symptoms and relevant history, followed by appropriate laboratory investigations and imaging studies.

All enrolled patients were initiated on anti-tubercular therapy (ATT) in accordance with the National Tuberculosis Elimination Programme (NTEP) guidelines and were followed up regularly until completion of treatment. Treatment outcomes were assessed at the end of therapy and categorized as cure, treatment completion, treatment failure, death, or loss to follow-up, as per standard programmatic definitions.

Statistical analysis:

Data were entered into Microsoft Excel and analysed using the Statistical Package for the Social Sciences (SPSS) version 26. Continuous variables were assessed for normality using the Shapiro–Wilk test. Normally distributed variables were expressed as mean $\pm$ standard deviation (SD), while non-normally distributed variables were presented as median with interquartile range (IQR). Categorical variables were summarised as frequencies and percentages.

Associations between categorical variables were analysed using the Chi-square test. When expected cell counts were less than 5, Fisher's exact test was applied. For comparison of continuous variables between two groups, the independent samples t-test

was used for normally distributed data, while the Mann–Whitney U test was employed for non-normally distributed data. Where more than two groups were compared, one-way analysis of variance (ANOVA) was used for normally distributed variables, and the Kruskal–Wallis test was applied for non-parametric data.

Correlation between continuous variables was assessed using Pearson's correlation coefficient for normally distributed data and Spearman's rank correlation test for non-parametric data. Treatment outcomes were analysed descriptively according to National Tuberculosis Elimination Programme (NTEP) definitions. Subgroup analyses were performed to explore associations between

demographic factors, comorbidities, disease characteristics, and treatment outcomes. All statistical tests were two-tailed, and a p-value of <0.05 was considered statistically significant.

RESULTS

A total of 50 patients with extrapulmonary tuberculosis (EPTB) were included in the study. Females constituted 54% of the study population, while males accounted for 46%. The majority of patients (56%) belonged to the 18–45-year age group, followed by 24% in the 45–60-year group and 20% aged above 60 years. Half of the participants (50%) had an educational status of up to 10th standard, and most patients (72%) belonged to the middle socioeconomic class (Table 1).

Table 1: Demographic Characteristics of Study Participants (N = 50)

Variable	Category	Frequency (n)	Percentage (%)
Gender	Male	23	46
	Female	27	54
Age group (years)	18–45	28	56
	45–60	12	24
	≥60	10	20
Education	≤10th standard	25	50
	12th standard	7	14
	Undergraduate	17	34
	Postgraduate	1	2
Socioeconomic status	Lower middle	14	28
	Middle	36	72

Diabetes mellitus was the most common comorbidity, present in 57% of patients, followed by hypertension, thyroid disorders, and dyslipidemia, each observed in approximately 10% of cases. Among diabetic patients, glycaemic control was poor, with a mean HbA1c of 9.92 ± 1.75 . The most common presenting symptom was weight loss (90%), followed by fever (78%) and pain (62%). Other

symptoms were reported in 66% of patients, while loss of appetite (18%) and night sweats (4%) were less frequent. The median duration of symptoms prior to presentation was 4 weeks (IQR: 2–8 weeks). A past history of tuberculosis was noted in 4% of patients, and 8% reported a family history of tuberculosis (Table 2).

Table 2: Clinical Profile and Risk Factors

Variable	Category	Frequency (n)	Percentage (%)
Comorbidities	Diabetes mellitus	28	57
	Hypertension	5	10
	CAD	4	8
	Thyroid disorder	5	10
	Dyslipidemia	5	10
HbA1c (n=24)	Mean $\pm$ SD	9.92 $\pm$ 1.75	—
Symptoms	Weight loss	45	90
	Fever	39	78
	Pain	31	62
	Other symptoms	33	66
	Loss of appetite	9	18
	Night sweats	2	4
Duration of symptoms	Median (IQR), weeks	4 (2–8)	—
Past history of TB	Yes	2	4
	No	48	96
Family history of TB	Yes	4	8
	No	46	92

With respect to the site of involvement, lymph node tuberculosis was the most common form (44%), followed by pleural tuberculosis (22%). Genitourinary tuberculosis accounted for 10% of cases, while spinal and abdominal

tuberculosis each constituted 8%. Central nervous system involvement was observed in 6% of patients, and bone tuberculosis in 2% (Table 3).

Table 3: Site of Extrapulmonary Tuberculosis

Site of TB	Frequency (n)	Percentage (%)
Lymph node	22	44
Pleural	11	22
Genitourinary	5	10
Spinal	4	8
Abdominal	4	8
CNS	3	6
Bone	1	2

Diagnosis was predominantly based on clinical methods in 66% of cases, while microbiological confirmation was achieved in 34% of patients. Among diagnostic modalities, CBNAAT demonstrated a higher

yield, being positive in 26% of patients, compared to AFB smear positivity of 10%. Histopathology and radiological assessment were commonly used in clinically diagnosed cases (Table 4).

Table 4: Diagnostic Methods

Variable	Category	Frequency (n)	Percentage (%)
Method of diagnosis	Clinical	33	66
	Microbiological	17	34
CBNAAT result	Positive	13	26
	Negative	30	60
	Not done	7	14
AFB smear	Positive	5	10
	Negative	24	48
	Not done	21	42
AFB culture	Positive	2	4
	Negative	1	2
	Not done	47	94

Regarding treatment, the majority of patients (70%) received the standard 6-month anti-tubercular therapy regimen, while 26% required extended treatment of 9–12 months, particularly in cases involving the central nervous system or spine. Adverse drug reactions were observed in 45% of patients,

with drug-induced liver injury (16%), gastritis (16%), dermatitis (10%), and ethambutol toxicity (2%) being the most commonly reported. Treatment outcomes were favourable, with 86% of patients completing treatment and 6% classified as cured, while 8% were lost to follow-up (Table 5).

Table 5: Treatment Profile and Outcomes

Variable	Category	Frequency (n)	Percentage (%)
Treatment duration	6 months	35	70
	9 months	6	12
	12 months	7	14
	3 months	1	2
Adverse effects	None	27	55
	DILI	8	16
	Gastritis	8	16
	Dermatitis	5	10
	Ethambutol toxicity	1	2
Treatment outcome	Completed	43	86
	Cured	3	6
	Lost to follow-up	4	8

Despite successful treatment completion, complete symptom resolution was achieved in only 46% of patients, while 48% continued to experience residual symptoms. The most common persistent symptoms included pain (24%), swelling (14%), dyspnea (12%), and urinary incontinence (8%). Nutritional recovery was evident, with a mean weight gain of 6.0 ± 2.5 kg, corresponding to an average increase of 11.3% in body weight (Table 6).

Table 6: Post-treatment Outcomes

Variable	Category	Frequency (n)	Percentage (%)
Symptom resolution	Yes	23	46
	No	24	48
Persistent symptoms	Pain	12	24
	Swelling	7	14
	Dyspnea	6	12
	Incontinence	4	8
Weight gain	Mean $\pm$ SD	6.0 ± 2.5 kg	—

Sex-wise analysis of site distribution revealed notable differences in the pattern of extrapulmonary involvement. Females showed a higher proportion of lymph node tuberculosis (63.6%), central nervous system tuberculosis (66.7%), genitourinary tuberculosis (100%), spinal tuberculosis (75%),

and bone tuberculosis (100%). In contrast, males predominantly presented with pleural tuberculosis (90.9%) and abdominal tuberculosis (75%). These findings suggest a sex-specific predilection in the anatomical distribution of EPTB in this cohort (Table 7).

Table 7: Sex Distribution by Site of EPTB

Site	Female n (%)	Male n (%)	Total
Lymph node	14 (63.6)	8 (36.4)	22
Pleural	1 (9.1)	10 (90.9)	11
Genitourinary	5 (100)	0	5
Spinal	3 (75)	1 (25)	4
Abdominal	1 (25)	3 (75)	4
CNS	2 (66.7)	1 (33.3)	3
Bone	1 (100)	0	1

DISCUSSION

This prospective observational study provides important insights into the clinical profile and treatment outcomes of extrapulmonary tuberculosis (EPTB) in a tertiary care setting in South India. The findings highlight evolving

epidemiological trends, the growing influence of metabolic comorbidities, and the persistent challenges in diagnosis and post-treatment recovery. The present study demonstrated that EPTB

predominantly affects younger adults, with more than half of the patients belonging to the 18–45-year age group. This observation is consistent with previous studies, which have reported a higher burden of extrapulmonary disease among individuals in the economically productive age group [7,15]. This distribution may reflect increased exposure, better healthcare-seeking behaviour, and early referral patterns in tertiary care settings. A slight female predominance was observed, which aligns with earlier reports suggesting that extrapulmonary forms, particularly lymph node tuberculosis, are more common among females [9,15]. Biological susceptibility, hormonal influences, and differences in immune response have been proposed as contributing factors.

A notable finding of this study was the high prevalence of diabetes mellitus, affecting more than half of the study population. This is substantially higher than that reported in earlier Indian studies but is consistent with emerging evidence from South India, where the burden of metabolic diseases is rapidly increasing [6,10]. Poor glycaemic control, as reflected by elevated HbA1c levels, likely contributes to impaired host immunity, facilitating extrapulmonary dissemination and atypical presentations. These findings underscore the need for integrated management of tuberculosis and diabetes, particularly in endemic regions.

The clinical presentation in this cohort was dominated by constitutional symptoms such as weight loss and fever, which are consistent with previous reports [13,15]. The nonspecific nature of these symptoms often contributes to diagnostic delays, especially in extrapulmonary disease where early organ-specific manifestations may be absent. Lymph node tuberculosis emerged as the most common form, followed by pleural tuberculosis, which is in agreement with multiple studies across different populations [7,11,16]. The wide distribution of disease sites further reflects the heterogeneous nature of EPTB.

Diagnosis remains a major challenge in EPTB, as demonstrated by the predominance of clinically diagnosed cases in this study. The

low yield of smear microscopy is well recognized and is attributable to the paucibacillary nature of the disease [5]. The relatively higher diagnostic yield of CBNAAT observed in this study reinforces its role as a valuable tool in the evaluation of extrapulmonary specimens, particularly in resource-limited settings [12]. However, certain forms such as central nervous system and pleural tuberculosis continue to rely heavily on clinical and radiological diagnosis. Treatment outcomes in this study were favourable, with a high proportion of patients completing therapy, consistent with previous reports [7,11]. However, a significant proportion of patients experienced persistent symptoms despite treatment completion. This highlights an important but often under-recognized aspect of EPTB—that clinical recovery may lag behind microbiological cure. Residual symptoms may be attributed to ongoing inflammation, fibrosis, or irreversible tissue damage, particularly in sites such as the spine and central nervous system.

Overall, this study underscores the complex clinical spectrum of EPTB in a tertiary care setting, influenced by demographic factors, comorbidities, and diagnostic limitations. The high burden of diabetes and the persistence of post-treatment morbidity highlight the need for a more comprehensive approach to management, including early diagnosis, optimization of comorbid conditions, and structured post-treatment follow-up focusing on functional recovery and quality of life.

CONCLUSION

Extrapulmonary tuberculosis in this tertiary care setting predominantly affects younger adults and females and is strongly associated with diabetes mellitus. Diagnosis remains challenging due to low microbiological yield, necessitating reliance on clinical and radiological evaluation. Although treatment completion rates are high, residual morbidity is common, highlighting the need for extended follow-up and supportive care. Early diagnosis, better glycaemic control, and improved diagnostic strategies are essential to enhance outcomes.

REFERENCES

- Murray JF, Nadel JA. Murray and Nadel's textbook of respiratory medicine. 5th ed. Philadelphia: Saunders; 2010.
- World Health Organization. Global tuberculosis report 2024. Geneva: WHO; 2024. Available from: <https://www.who.int>
- Central TB Division. India TB report 2023. New Delhi: Ministry of Health and Family Welfare, Government of India; 2023.
- VidyaRaj CK, Vadakunnel MJ, Mani BR, Anbazhagi M, Pradhabane G, Venkateswari R, et al. Prevalence of extrapulmonary tuberculosis and factors influencing successful treatment outcomes among notified cases in South India. *Sci Rep*. 2025;15(1).
- Gopalswamy R, Dusthacker VNA, Kannayan S, Subbian S. Extrapulmonary tuberculosis—an update on diagnosis, treatment and drug resistance. *J Respiration*. 2021;1(2):141–64.
- Shamseeda A, K JA. Epidemiological profile of extrapulmonary tuberculosis and its association with diabetes in a tertiary care center in Northern Kerala. *Int J Community Med Public Health*. 2022;9(6):2590–5.
- Kolaparthi R, Rama Krishna C, Pranavi V. Trends and distribution of extrapulmonary tuberculosis: a 5-year retrospective study. *Int J Med Pharm Res*. 2025;6(5):1791–7.
- Sabu SKS, Paul V, Mathew DJE, Jacob TM, Celine TM. Changing trends in incidence and clinical spectrum of extrapulmonary tuberculosis: a 10-year retrospective study in a rural teaching hospital in South India. *Int Surg J*. 2019;6(1):220–6.
- Patel BM, Cheguri V, Duddilla VS, Chakravarti CH, Shah AD. Clinical profile of pulmonary and extrapulmonary tuberculosis cases at a tertiary care center. *Natl J Physiol Pharm Pharmacol*. 2023;13(10):2122–6.
- Prakaash A, Murali G, Priyamalini D, Raman E, Chandra Mouli, Vikram VJ. Clinical and radiological profile of extrapulmonary tuberculosis in elderly patients attending a tertiary care hospital: a prospective cohort study. *Cureus*. 2025;17(9):e91779.
- Cherian JJ, Lobo I, Sukhlecha A, Chawan U, Kshirsagar NA, Nair BL, et al. Treatment outcome of extrapulmonary tuberculosis under revised national tuberculosis control programme. *Indian J Tuberc*. 2017;64(2):104–8.
- Tortoli E, Russo C, Piersimoni C, et al. Clinical validation of Xpert MTB/RIF for diagnosis of extrapulmonary tuberculosis. *Eur Respir J*. 2012;40(2):442–7.
- Dhali A, Das K, Dhali G, Ghosh R, Sarkar A, Misra D. Abdominal tuberculosis: clinical profile and outcome. *Int J Mycobacteriol*. 2021;10(4):414–8.
- Krishna S, Kaiwar S, Selvarajan C, Mascarenhas AA, Flynn A. Diagnostic challenges and clinical profile of spinal tuberculosis. *SAARC J Tuberc Lung Dis HIV/AIDS*. 2020;18(1):1–7.
- Sahukar SB, Palani VK, Ranganathan R, Kumpthala S. Clinical profile of extrapulmonary tuberculosis: a retrospective South Indian study. *IP Arch Cytol Histopathol Res*. 2022;7(2):117–21.
- Prakasha SR, Suresh G, D'Sa I, Shetty SS, Kumar SG. Mapping the pattern and trends of extrapulmonary tuberculosis: a retrospective study. *J Glob Infect Dis*. 2013;5(2):54–63.
- Utaal MS, et al. Clinical profile of abdominal tuberculosis in rural North India. *Int Surg J*. 2019;6(3):836–42.
- Karthik K, et al. Diagnosis and treatment outcome of tuberculous meningitis in a tertiary care hospital. *J Acad Med Pract*. 2025;5(6):174–8.
- Garg B, Mehta N, Mukherjee RN, Swamy AM, Siamwala BS, Malik G. Epidemiological insights from spinal tuberculosis. *Asian Spine J*. 2022;16(2):162–72.
- Khan AH, Sulaiman SAS, Laghari M, Hassali MA, Muttalif AR, Bhatti Z, et al. Treatment outcomes and risk factors of extrapulmonary tuberculosis in patients with comorbidities. *BMC Infect Dis*. 2019;19(1).
- Siddeswaraswamy P, Shubhakara K, Gnanendra DM, Hoolageri MS, Indushree T. Clinical profile and treatment outcome of extrapulmonary tuberculosis under RNTCP. *J Evol Med Dent Sci*. 2014;3(40):10174–83.
- Thomas L, Chacko B, Jupudi S, Mathuram A, George T, Gunasekaran K, et al. Clinical profile and outcome of critically ill tuberculosis patients. *Indian J Crit Care Med*. 2021;25(1):21–7.
- Singh S, Gupta S, Jha A, Dhamnetiya D, Jha RP, Singh S, et al. Epidemiological profile and treatment outcomes of tuberculosis patients in North India. *Cureus*. 2023;15(10).
- Ksoo R, et al. Clinical profile of pediatric tuberculosis in a tertiary hospital. *J Clin Tuberc Other Mycobact Dis*. 2022;28:100285.
- Merza MA. Demographic and clinical profile of extrapulmonary tuberculosis and treatment outcomes. *SAGE Open Med*. 2020;8:205031212092105.
- Bukhary ZA, Alrajhi AA. Extrapulmonary tuberculosis: clinical presentation and outcome. *Saudi Med J*. 2004;25(7):881–5.
- Mani ST, Deshmukh H, Jadhav S, Deshmukh A, Kasat S. Clinical profile and treatment outcome of tuberculosis patients. *Int J Res Med Sci*. 2023;11(3):977–81.
- Advani J, Verma R, Chatterjee O, Pachouri PK, Upadhyay P, Singh R, et al. Whole genome sequencing of Mycobacterium tuberculosis isolates from India. *Front Microbiol*. 2019;10:309.

29. Centers for Disease Control and Prevention. Clinical overview of tuberculosis disease. Atlanta: CDC. Available from: <https://www.cdc.gov>
30. Ade S, Harries AD, Trébucq A, Ade G, Agodokpessi G, Adjonou C, et al. National profile and treatment outcomes of extrapulmonary tuberculosis in Benin. PLoS One. 2014;9(4):e95603