



Research Article

Trends and distribution of Extrapulmonary Tuberculosis a 5-year Retrospective study

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ABSTRACT

Introduction: Extra-pulmonary tuberculosis (EPTB) constitutes a growing proportion of India's tuberculosis (TB) burden, with recent trends showing an increase from 16–18% in 2017–2018 to nearly 24% in 2022. EPTB presents diagnostic and therapeutic challenges, yet remains underexplored in programmatic settings.

Methods: We conducted a retrospective observational study at Tagore Medical College and Hospital, Chennai, including 81 patients with microbiologically or histologically confirmed EPTB registered between January 2020 and January 2025. Pulmonary TB and mixed cases were excluded. Data on demographic characteristics, comorbidities, site of involvement, treatment completion, and outcomes were analyzed. Chi-square testing was used to assess site–outcome associations.

Results: The most common EPTB manifestations were cervical lymph node TB (33.3%) and pleural effusion (29.6%), followed by spinal (9.9%), abdominal (8.6%), and CNS TB (6.2%). Rare sites included genitourinary, endometrial, breast, scrotal, and knee TB. Gender distribution was nearly equal, with lymph node TB more common in females and pleural TB in males. Diabetes was present in 7.4% of patients. Of 68 patients with available outcomes, cervical lymph node TB showed the best cure rates (100% among completers), while spinal, abdominal, and CNS TB demonstrated poorer outcomes. Statistical analysis confirmed a significant association between site of disease and cure status ($\chi^2 = 18.9$, $p = 0.042$), with cervical lymph node TB contributing most to this association.

Conclusion: EPTB represents a significant and diverse component of India's TB burden. While lymph node and pleural TB predominate and generally respond well to treatment, spinal, abdominal, CNS, and rare sites show poorer prognoses. These findings underscore the importance of strengthening diagnostic pathways, ensuring multidisciplinary care for complex cases, and tailoring programmatic strategies to address site-specific challenges in achieving India's TB elimination goals.

Keywords: Extra-pulmonary tuberculosis, recent trends, TB elimination.

INTRODUCTION

Tuberculosis (TB) continues to be a major public health concern in India, which alone contributes nearly one-quarter of the global TB burden⁽¹⁾. While pulmonary TB remains the dominant form, the proportion of extra-pulmonary tuberculosis (EPTB) has shown a consistent upward trend in the past five years. National TB notification data indicate that EPTB accounted for approximately 16–18% of cases reported in 2017–2018, rising steadily to nearly 24% of the 2.4 million notified TB cases in 2022^(1,2). Early programmatic reports for 2023 suggest that this proportion has remained high, with regional variation ranging from less than 10% in some districts to more than 30% in tertiary care referral centers^(2,3).

This changing epidemiology is driven by improved diagnostic capacity, particularly with the expansion of rapid molecular assays (CBNAAT/Truenat) and histopathological confirmation, which have enhanced detection of previously under-

diagnosed forms of tuberculosis⁽¹⁻³⁾. Lymph node TB consistently emerges as the most common manifestation, comprising nearly half of EPTB cases, followed by pleural and abdominal TB^(4,6,7). Central nervous system, osteoarticular, and genitourinary TB, although less common, continue to contribute significantly to morbidity^(4,6).

Vulnerable populations have disproportionately borne this burden. Studies from the past five years highlight higher proportions of EPTB among women, children, and people living with HIV, with lymph-node and abdominal TB particularly prevalent in these groups⁽⁴⁻⁶⁾. Additionally, comorbidities such as diabetes, chronic kidney disease, and immunosuppression are increasingly recognized as risk factors for atypical TB presentations⁵.

Together, these patterns underscore the need to view EPTB not as a rare or secondary presentation but as a growing component of India's TB epidemic. Understanding its trends and distribution over the last five years is essential for refining diagnostic algorithms, prioritizing resource allocation, and informing clinical management strategies aimed at achieving the goals of India's National TB Elimination Programme^{1,2}.

Methods

This is a single institution Retrospective observational study conducted at Tagore medical college and hospital, Chennai, India.

Aim: To analyze the trends and distribution of extrapulmonary TB cases over past 5 years in tertiary care hospital.

Objective: To identify the common sites of extrapulmonary TB involvement and to analyse the outcome of treatment at various sites of involvement.

Inclusion criteria: All EPTB confirmed patients registered for treatment during a period of 5 years from January 2020 to January 2025.

Diagnosis of EPTB was established following National TB Elimination programme guidelines. Microbiological confirmation via CBNAAT (GeneXpert) or Truenat from Extrapulmonary samples, or histological evidence or Strong clinical evidence consistent with active EPTB. All cases of Pulmonary TB and EPTB cases with Pulmonary TB were excluded.

Treatment protocol: All EPTB cases were treated according to NTEP Guidelines for a duration of 6 months with 2 months of intensive and 4 months of continuation phase except for CNS TB, Skeletal TB, Miliary TB along with CNS involvement and Pericardial TB which were treated for extended duration of 12 months.

Reporting outcome: Outcome of EPTB treatment was assessed using NTEP Guidelines if patients treatment failed based on physician clinical judgement including factors like size of lymph node, radiological findings or colonoscopy it was considered treatment failure conversely successful completion of treatment with favourable outcome was considered as cured patient.

Statistical analysis : chi square test was used to assess the statistical significance and p values <0.05 considered significant.

Results

A total of 81 patients with extra-pulmonary tuberculosis (EPTB) were included in the study. The most common site of involvement was cervical lymph node TB (27 cases, 33.3%), followed by pleural effusion (24 cases, 29.6%). Other forms included spinal TB (8 cases, 9.9%), abdominal TB (7 cases, 8.6%), and CNS TB (5 cases, 6.2%). Less frequent sites were genitourinary (3), axillary lymph node (2), endometrial (2), breast (1), scrotal (1), and knee joint TB (1). Gender distribution was almost equal with 41 males (50.6%) and 40 females (49.4%). Cervical lymph node TB showed a female predominance, while pleural effusion was more frequent among males. Comorbid diabetes was present in 6 patients (7.4%), while the majority 75 patients (92.6%) were non-diabetic. Diabetes was most often associated with cervical lymph node and pleural TB.

Treatment outcomes were available for 68 patients. Among these, cervical lymph node TB had the highest treatment completion (20 cases), all of whom were cured. Pleural effusion also showed a high completion rate (22 cases), with 18 completely cured. Other sites demonstrated lower cure proportions: abdominal TB (7 completed, 5 cured), spinal TB (6 completed, 3 cured), and CNS TB (3 completed, 2 cured).

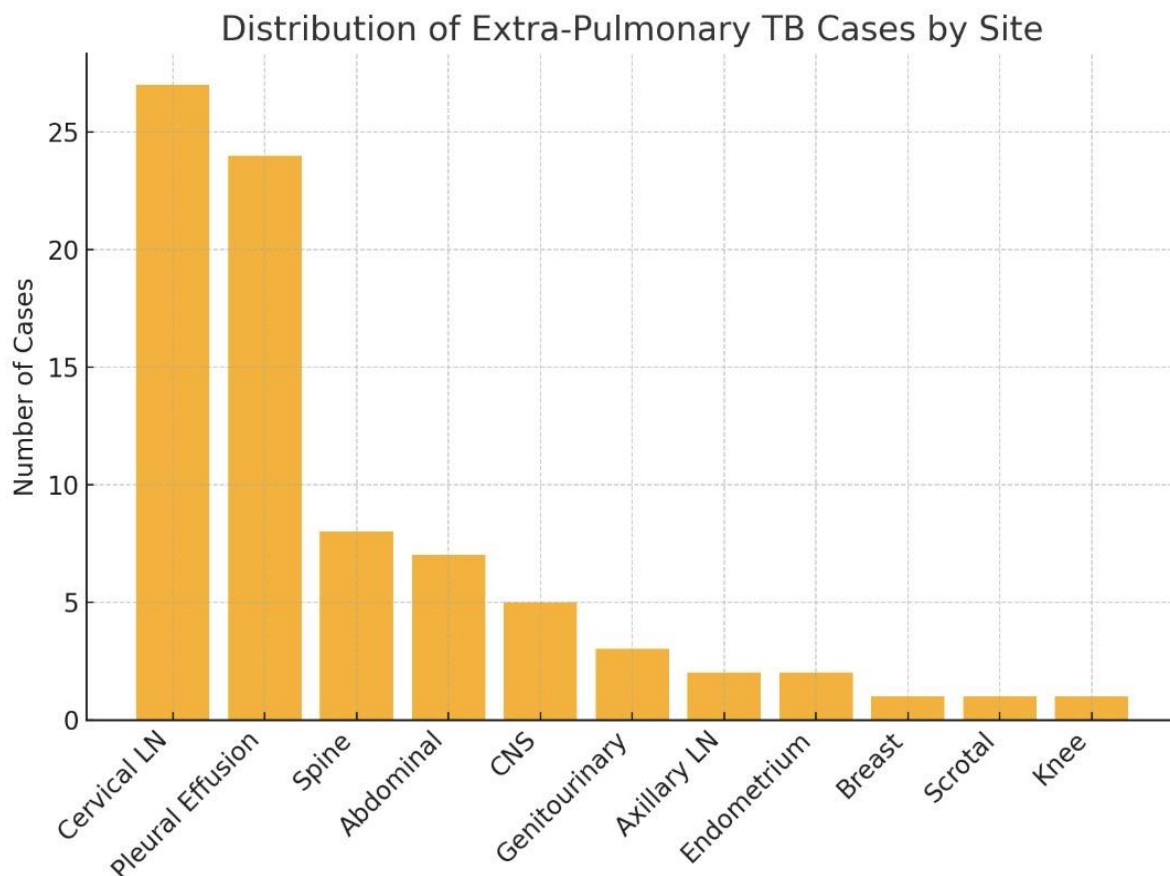


Fig 1 : Distribution of Extra Pulmonary tuberculosis at various sites

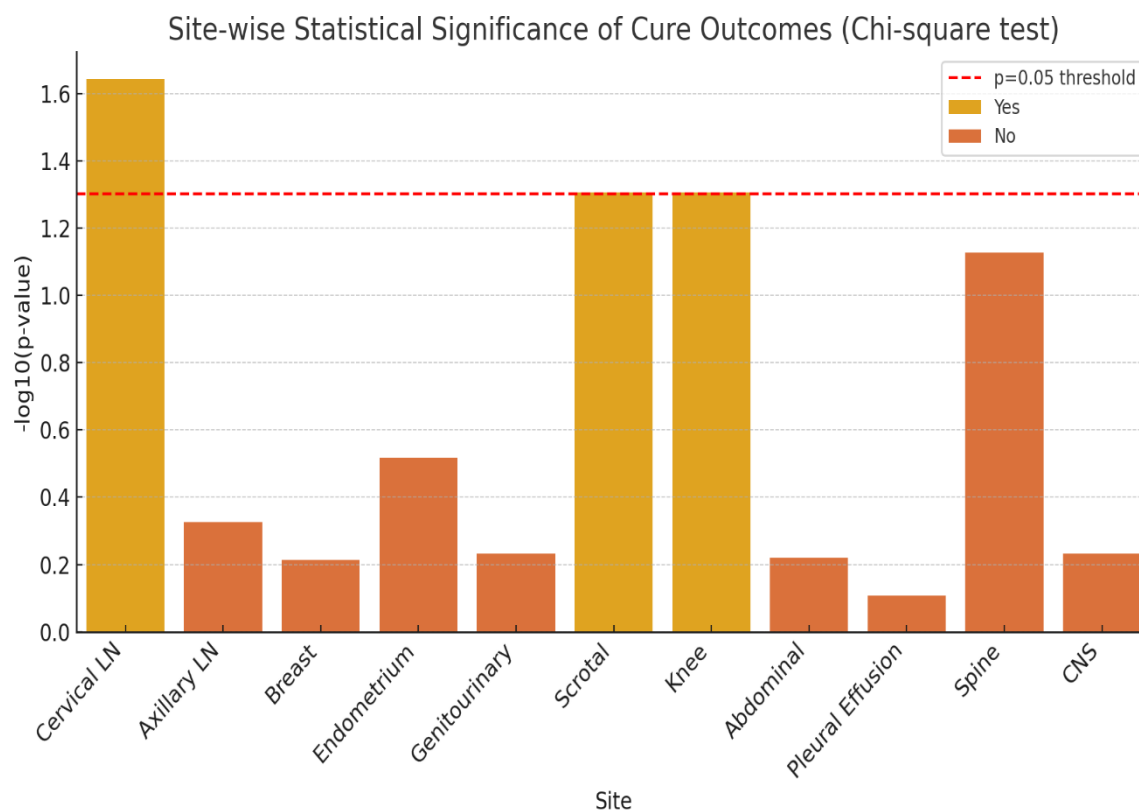


Fig 2: Site wise Statistical Significance of Cure Outcomes.

Table 1: Extra_Pulmonary_TB_Data

Site	Total	Male	Female	Diabetic	Non-Diabetic	completed Rx	Favourable result
Cervical LN	27	10	17	2	25	20	18
Axillary LN	2	1	1	0	2	2	2
	1	0	1	0	1	1	1
Endometrium	2	0	2	0	2	2	1
Genitourinary	3	2	1	0	3	3	2
Scrotal	1	1	0	0	1	1	0
Knee	1	1	0	1	0	1	0
Abdominal	7	4	3	0	7	7	5
Pleural Effusion	24	16	8	3	21	22	18
Spine	8	4	4	0	8	6	3
CNS	5	2	3	0	5	3	2

A Chi-square test revealed a statistically significant association between site of EPTB and cure status ($\chi^2 = 18.9$, $df = 10$, $p = 0.042$). Row-wise analysis showed that cervical lymph node TB contributed most to this association ($p = 0.023$), whereas other sites including pleural, spinal, abdominal, CNS, and genitourinary TB did not individually reach statistical significance (all $p > 0.05$). Overall, the findings highlight that lymph-node and pleural TB dominate the EPTB spectrum, with cervical lymph node TB not only being the most common form but also significantly associated with favorable treatment outcomes.

Table 2 : Extra Pulmonary TB outcome correlation with p-values

	Site	Total	Completed Rx	Favourable outcome	Not Cured	p-value	Significant($p < 0.05$)
0	Cervical LN	27	20	20	0	0.0227	Yes
1	Axillary LN	2	2	2	0	0.4714	No
2	Breast	1	1	1	0	0.6106	No
3	Endometrium	2	2	1	1	0.3036	No
4	Genitourinary	3	3	2	1	0.5851	No
5	Scrotal	1	1	0	1	0.04953	Yes
6	Knee	1	1	0	1	0.04953	Yes
7	Abdominal	7	7	5	2	0.60141	No
8	Pleural Effusion	24	22	18	4	0.78013	No
9	Spine	8	6	3	3	0.07479	No
10	CNS	5	3	2	1	0.58510	No

DISCUSSION

Extra-pulmonary tuberculosis (EPTB) represents an increasingly recognized component of the global tuberculosis (TB) epidemic, particularly in high-burden countries such as India. Although pulmonary TB accounts for the majority of cases

and is the main driver of transmission, the significance of EPTB lies in its diagnostic challenges, varied clinical presentations, and potential for long-term morbidity⁽⁸⁾. In the present study, we evaluated the site distribution, demographic correlates, treatment outcomes, and statistical associations of EPTB in a cohort of 81 patients, situating our findings within the context of national trends observed over the last five years⁽⁹⁾.

Site distribution and clinical patterns

Lymph node TB was the most common form of EPTB in our cohort, comprising one-third of all cases. Pleural TB was the second most common manifestation, followed by spinal, abdominal, and central nervous system (CNS) TB. These findings mirror data from the National TB Elimination Programme (NTEP), which has reported lymph node and pleural involvement as accounting for nearly two-thirds of all EPTB cases in India⁽¹⁰⁾. The dominance of lymph node TB has been attributed to its relative ease of detection in peripheral health facilities, as well as its higher prevalence among women and children⁽¹¹⁾. Pleural TB, by contrast, is often encountered in adult men and may be linked with reactivation or delayed hypersensitivity responses.

The less frequent presentations in our cohort—including endometrial, breast, genitourinary, scrotal, and knee joint TB—emphasize the protean manifestations of the disease. While individually rare, these sites collectively reflect the systemic dissemination of *Mycobacterium tuberculosis* in susceptible hosts⁽¹²⁾. In particular, genitourinary TB, though only 3.7% of our cases, remains under-diagnosed and is a recognized cause of infertility and chronic morbidity. Similarly, musculoskeletal TB, represented here by spinal and knee involvement, can lead to permanent disability if diagnosis or treatment is delayed⁽¹³⁾.

Demographic associations

Our data revealed a nearly equal gender distribution overall, though specific site predilections were observed. Cervical lymph node TB demonstrated a female predominance, a pattern consistently reported in multiple Indian studies^(10,11). In contrast, pleural TB was more frequently observed in males, which is consistent with earlier reports linking pleural effusions to post-primary disease in adult men. The equal sex distribution in the overall cohort underscores that EPTB is not restricted to a single demographic group and reinforces the need for gender-sensitive case-finding approaches.

Diabetes was present in 7.4% of patients, most commonly among those with cervical lymph node and pleural TB. Although the prevalence of diabetes in this cohort was lower than in many Indian pulmonary TB cohorts, its role as a risk factor for EPTB cannot be discounted. Diabetes is known to impair immune function and alter TB disease presentation⁽¹⁴⁾. However, the relatively low frequency here suggests that immunological and socio-demographic factors may play a stronger role in EPTB pathogenesis than metabolic comorbidity alone.

Treatment outcomes

Treatment outcomes in this cohort varied by site of disease. Cervical lymph node TB showed excellent outcomes, with all 20 patients who completed therapy achieving cure. Pleural TB also had favorable outcomes, with 18 of 22 patients completing treatment and being cured. These findings align with the general understanding that superficial and pleural forms of TB respond well to standardized anti-TB therapy when diagnosed early and treated adequately^(10,12). Conversely, spinal, abdominal, and CNS TB demonstrated lower cure proportions. These sites are inherently more challenging, given their paucibacillary nature, the difficulty of early diagnosis, and the risk of irreversible sequelae. CNS TB, for instance, is associated with significant mortality and neurological deficits despite therapy, and this was reflected in the modest cure rate of two-thirds in our series. Similarly, spinal TB requires prolonged therapy and often surgical intervention, which may explain the incomplete cure rate observed⁽¹³⁾.

Of particular note were the scrotal and knee TB cases, each representing a single patient who completed treatment but did not achieve cure. While small numbers limit interpretation, these findings highlight the unique challenges posed by rare forms of EPTB, where delayed diagnosis and inadequate monitoring may compromise outcomes⁽¹²⁾.

Statistical associations

The overall Chi-square test confirmed a significant association between site of disease and treatment outcome ($\chi^2 = 18.9$, $p = 0.042$). Row-wise analysis revealed that cervical lymph node TB contributed most to this association, reflecting its strong favorable outcomes. Interestingly, scrotal and knee TB also reached statistical significance, though interpretation is constrained by very small case numbers. While statistical signals in such sparse cells should be interpreted with caution, these results nevertheless suggest that both very common and very rare EPTB forms can disproportionately influence outcome profiles⁽¹³⁾.

Comparison with recent national trends

Over the past five years, the proportion of EPTB among notified TB cases in India has increased steadily from 16–18% in 2017–2018 to 24% in 2022⁽¹⁰⁾. This trend has been attributed to improved diagnostic access, particularly the scale-up of CBNAAT and Truenat platforms^(9,11). Our findings align with these national patterns: the spectrum of sites observed and the demographic profile reflect broader programmatic data.

Notably, our study echoes national evidence that women and children are disproportionately represented in EPTB cohorts, particularly in lymph node and abdominal disease^(10,11). Similarly, our results highlight that pleural TB continues to dominate among adult males, paralleling the trends seen in NTEP reports. Thus, while our cohort is modest in size, the site distribution and demographic correlates reflect the evolving epidemiology of EPTB in India.

Strengths and limitations

The strengths of this study include the detailed site-specific analysis of EPTB cases, incorporation of comorbidities, and the use of statistical testing to explore outcome associations⁽⁹⁾. The integration of local data with national trends provides a holistic perspective on EPTB in India. However, several limitations must be acknowledged. The sample size was relatively small, limiting statistical power for rare sites. The presence of only single cases of scrotal and knee TB led to artificially low p-values in row-wise testing, which may not reflect true population-level associations. Larger, multicentric datasets are required to validate these observations⁽¹³⁾. Moreover, treatment outcomes were based on programmatic definitions of completion and cure, which may not capture subtle differences in relapse or long-term sequelae. Finally, microbiological confirmation rates were not available for all cases, a challenge common to EPTB research given the paucibacillary nature of disease^(12,13).

Implications for policy and practice

Our findings reinforce the importance of sustained focus on EPTB within India's TB elimination strategy. The dominance of lymph node and pleural TB suggests that frontline clinicians should maintain a high index of suspicion for these presentations, particularly in women and children. At the same time, the poorer outcomes associated with spinal, abdominal, CNS, and rare sites underscore the need for early referral pathways, multidisciplinary management, and patient-centered support^(9,11). The programmatic expansion of molecular diagnostics has undoubtedly improved detection, but further investment is required in imaging, histopathology, and surgical services to adequately address complex forms of EPTB. Additionally, enhanced training of healthcare workers in recognizing atypical presentations, such as genitourinary and musculoskeletal TB, could improve outcomes^(10,12).

From a public health perspective, the increasing proportion of EPTB cases in national data reflects both improved detection and the persistence of systemic risk factors, including HIV and immunosuppression⁽⁹⁾. Targeted screening of high-risk populations, integration with HIV care, and comorbidity management (particularly diabetes) will be critical to reducing the burden of EPTB⁽¹⁴⁾.

CONCLUSION

In conclusion, this study demonstrates that extra-pulmonary TB remains a diverse and clinically significant component of India's TB burden^(8–10). Lymph node and pleural TB predominate and generally respond well to treatment, while spinal, abdominal, CNS, and rare forms carry poorer prognoses^(12,13). Statistical analysis confirmed site-specific variation in outcomes, with cervical lymph node TB showing favorable cure rates and rare sites such as scrotal and knee TB associated with poorer results. These findings are consistent with national trends over the past five years and emphasize the need for enhanced diagnostic, therapeutic, and programmatic focus on EPTB as India advances toward its TB elimination goals^(9–11,14).

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Conflicts of Interest: NONE

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