

Identification Of Most Common Extra-Pulmonary Tuberculosis In Population Of East Uttar Pradesh

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Abstract

Background: Tuberculosis (TB) remains a major public health problem, with extra-pulmonary tuberculosis (EPTB) contributing substantially to the overall disease burden. The present study evaluated the distribution and demographic characteristics of EPTB cases.

Methods: A total of 300 confirmed TB cases were included. Cases were categorized as pulmonary tuberculosis (PTB) or EPTB. Among EPTB cases, sex, age, and anatomical site of involvement were analyzed descriptively.

Results: Of 300 TB cases, 210 (70.0%) were PTB and 90 (30.0%) were EPTB. Among EPTB cases, males accounted for 54 (60.0%) and females for 36 (40.0%), giving a male-to-female ratio of 1.5:1. Lymph node tuberculosis was the most common presentation (27; 30.0%), followed by pleural (20; 22.2%), abdominal (12; 13.3%), and bone and joint tuberculosis (10; 11.1%). CNS tuberculosis accounted for 4 (4.4%) cases, while 17 (18.9%) involved other sites. The highest proportion of EPTB was observed among patients aged 41–50 years (25; 27.8%), followed by 31–40 years (22; 24.4%).

Conclusion: EPTB represented 30.0% of all TB cases, with male predominance and lymph node involvement as the most frequent presentation. Adults aged 31–60 years constituted the major affected group. These findings emphasize the importance of considering EPTB in patients with atypical or site-specific manifestations of TB.

Keywords: Tuberculosis; Extra-pulmonary tuberculosis; Pulmonary tuberculosis; Lymph node tuberculosis; Epidemiology.

Introduction

Tuberculosis (TB) remains a major global public health problem and continues to cause substantial morbidity and mortality, particularly in low- and middle-income countries. Although the disease predominantly affects the lungs, *Mycobacterium tuberculosis* can involve organs outside the respiratory system, resulting in extra-pulmonary tuberculosis (EPTB) (1). EPTB occurs when *M. tuberculosis* spreads from the primary site of infection through lymphatic or hematogenous routes and establishes infection in other organs. It can affect almost any anatomical site, with lymph nodes, pleura, abdomen, bones and joints, and the central nervous system among the commonly involved sites (2). The clinical presentation of EPTB varies according to the organ involved and may be nonspecific, making diagnosis more challenging than pulmonary tuberculosis. Obtaining appropriate specimens from extra-pulmonary sites may also be difficult, and microbiological confirmation is not always possible (3). Tuberculous lymphadenitis is one of the most frequently reported forms of EPTB and commonly presents with painless enlargement of lymph nodes, particularly in the cervical region. Pleural tuberculosis is another important manifestation and may present with pleural effusion, while abdominal, skeletal and CNS tuberculosis can produce organ-specific clinical manifestations (4). The occurrence of EPTB is influenced by several host and epidemiological factors. Immunosuppression, particularly HIV infection, increases the risk of extra-pulmonary and disseminated tuberculosis because of impaired cellular immunity [4]. However, EPTB also occurs in immunocompetent individuals and therefore remains an important clinical manifestation of tuberculosis in the general population (5).

Methodology

Study Design and Setting: A hospital-based observational study was conducted at a private hospital in Lucknow, Uttar Pradesh, India, over a period of 1.5 years during 2025–2026. The study was undertaken among patients diagnosed with tuberculosis and receiving treatment under the Directly Observed Treatment, Short-course (DOTS) programme. The study was designed to determine the proportion of extra-pulmonary tuberculosis (EPTB) among diagnosed tuberculosis cases and to identify the most frequently involved anatomical sites.

Study Population: The study population comprised all patients diagnosed with tuberculosis and treated at the study centre during the study period. A total of 300 tuberculosis cases were included in the study population. Based on the documented diagnosis, patients were classified into pulmonary tuberculosis (PTB) and extra-pulmonary tuberculosis (EPTB). Among the total study population, 90 patients diagnosed with EPTB constituted the primary population for further analysis.

Inclusion Criteria: Patients were included if they:

- had a documented diagnosis of tuberculosis;
- were diagnosed and treated under the DOTS programme at the study centre during the study period;
- had sufficient clinical and demographic information available for analysis; and
- were diagnosed with extra-pulmonary tuberculosis for inclusion in the site-specific analysis.

Exclusion Criteria: Patients were excluded if:

- the diagnosis of tuberculosis was uncertain or subsequently ruled out;
- relevant clinical or demographic records were incomplete;
- the patient was referred to another centre before adequate diagnostic documentation was available; or
- duplicate records of the same patient were identified.

Data Collection: Relevant demographic and clinical information were collected from patient records using a structured data collection format. The variables assessed included age, sex, overall type of tuberculosis, and anatomical site of EPTB. For analysis, patients were categorized into the following age groups: 0–10, 11–20, 21–30, 31–40, 41–50, 51–60, and >60 years. Among patients with EPTB, the anatomical site of involvement was recorded and classified into lymph node, pleural cavity, abdomen, bone and joints, CNS, and other sites. Lymph-node tuberculosis included documented cervical and submandibular lymph-node involvement, whereas CNS tuberculosis included meningitis and tuberculoma, according to the clinical records.

Study Variables and Outcome Measures: The primary outcome of the study was the proportion of EPTB among all diagnosed tuberculosis cases. Secondary outcomes included the distribution of EPTB according to sex, age group, and anatomical site of involvement. The most common form of EPTB was determined based on the highest frequency of cases among the recorded anatomical sites.

Statistical Analysis: Data were entered, coded, and analyzed using descriptive statistical methods. Categorical variables were summarized as frequencies and percentages. The proportion of pulmonary and extra-pulmonary tuberculosis was calculated using the total number of tuberculosis cases ($n=300$) as the denominator. For sex-, age-, and site-wise analysis, percentages were calculated using the total number of EPTB cases ($n=90$) as the denominator. Results were presented in tabular and graphical forms. A P-value was not calculated, as the present analysis was primarily descriptive.

Results

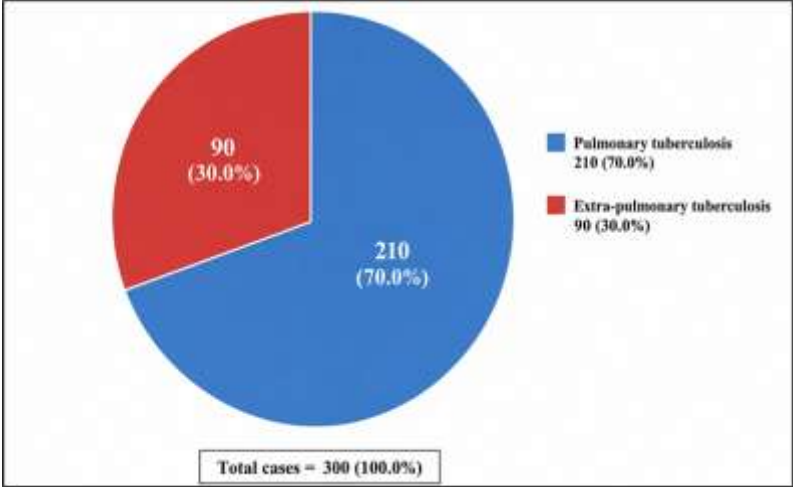
A total of 300 TB cases were included in the present study. Of these, 210 (70.0%) were PTB cases, whereas 90 (30.0%) were extra-pulmonary tuberculosis (EPTB) cases. Thus, nearly one-third of the diagnosed TB cases in the study population had extra-pulmonary involvement. The overall distribution of pulmonary and extra-pulmonary TB is presented in Table 1 and illustrated in Figure 1.

Table 1. Distribution of pulmonary and extra-pulmonary tuberculosis cases

Type of tuberculosis		Number of cases	Percentage
1	Pulmonary tuberculosis	210	70 %
2	Extra-pulmonary tuberculosis	90	30%
3	Total	300	100%

Values are expressed as mean $\pm$ standard deviation (SD).

Figure 1. Distribution of pulmonary and extra-pulmonary tuberculosis cases.



Sex-wise distribution of extra-pulmonary tuberculosis

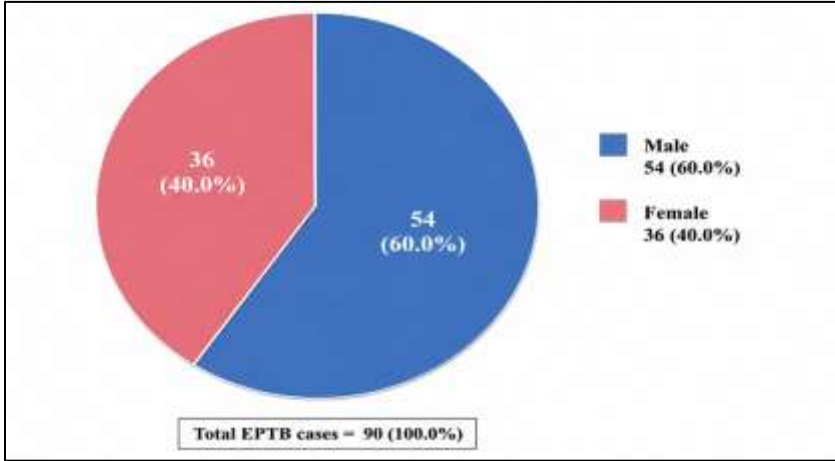
Among the 90 patients with EPTB, males constituted the majority, with 54 (60.0%) cases, while females accounted for 36 (40.0%) cases. Thus, the male-to-female distribution among EPTB patients was approximately 1.5:1. The sex-wise distribution of EPTB cases is presented in Table 2 and shown graphically in Figure 2.

Table 2. Sex-wise distribution of extra-pulmonary tuberculosis cases

S. No.	Sex	Number of cases	Percentage (%)
1	Female	36	40.0
2	Male	54	60.0
Total		90	100.0

Values are expressed as mean ± standard deviation (SD).

Figure 2. Sex-wise distribution of extra-pulmonary tuberculosis cases.



Distribution according to anatomical site of extra-pulmonary tuberculosis

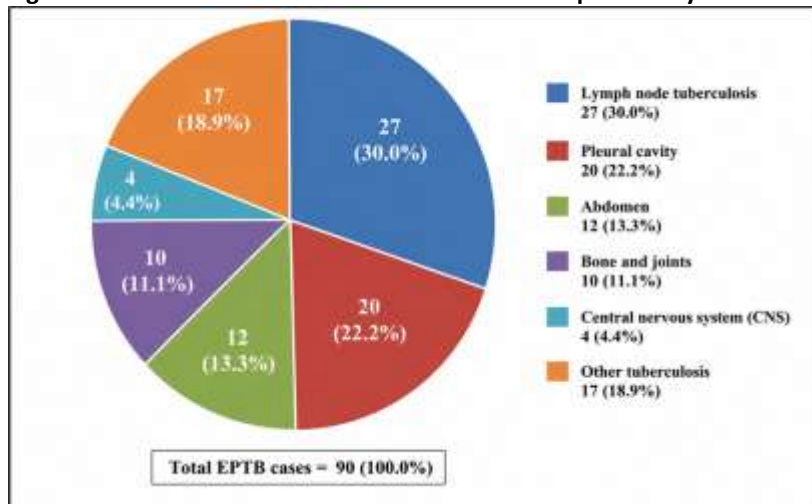
The anatomical distribution of EPTB revealed that lymph node tuberculosis was the most common site, accounting for 27 (30.0%) cases. This group included cervical and submandibular lymph-node involvement. The second most common site was the pleural cavity, observed in 20 (22.2%) cases, followed by abdominal tuberculosis in 12 (13.3%) cases and bone and joint tuberculosis in 10 (11.1%) cases. CNS tuberculosis, including meningitis and tuberculoma, was identified in 4 (4.4%) cases. The remaining 17 (18.9%) cases were classified under other forms of EPTB. The site-wise distribution is summarized in Table 3 and presented in Figure 3.

Table 3. Distribution of extra-pulmonary tuberculosis according to anatomical site

S. No.	Site of extra-pulmonary tuberculosis	Number of cases	Percentage (%)
1	Lymph node tuberculosis	27	30.0
2	Pleural cavity	20	22.2
3	Abdomen	12	13.3
4	Bone and joints	10	11.1
5	Central nervous system (CNS)	4	4.4
6	Other tuberculosis	17	18.9
Total		90	100.0

Values are expressed as mean $\pm$ standard deviation (SD).

Figure 3. Anatomical site-wise distribution of extra-pulmonary tuberculosis.



Age-wise distribution of extra-pulmonary tuberculosis

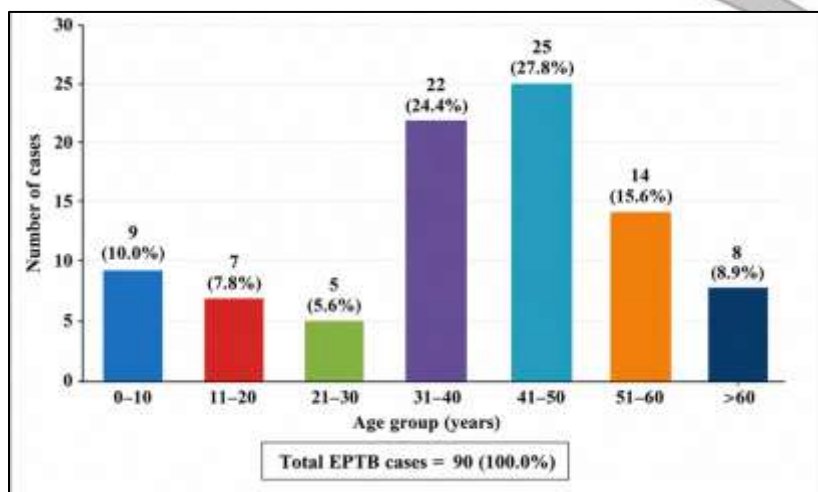
The age-wise distribution of the 90 EPTB cases showed that the highest proportion was observed in the 41–50-year age group, comprising 25 (27.8%) cases, followed by the 31–40-year age group with 22 (24.4%) cases. The 51–60-year age group accounted for 14 (15.6%) cases, while 8 (8.9%) cases were observed among individuals aged >60 years. Among younger patients, 9 (10.0%) cases occurred in the 0–10-year age group, 7 (7.8%) cases in the 11–20-year age group, and 5 (5.6%) cases in the 21–30-year age group. Overall, the findings indicate that EPTB was more frequently observed among adults aged 31–60 years, with the 41–50-year age group representing the largest proportion. The age-wise distribution is presented in Table 4 and illustrated in Figure 4.

Table 4. Age-wise distribution of extra-pulmonary tuberculosis cases

S. No.	Age group (years)	Number of cases	Percentage (%)
1	0–10	9	10.0
2	11–20	7	7.8
3	21–30	5	5.6
4	31–40	22	24.4
5	41–50	25	27.8
6	51–60	14	15.6
7	>60	8	8.9
Total		90	100.0

Values are expressed as mean $\pm$ standard deviation (SD).

Figure 4. Age-wise distribution of extra-pulmonary tuberculosis cases.



Discussion

The present study included 300 TB cases, of which 210 (70.0%) were PTB and 90 (30.0%) were EPTB. The proportion of EPTB observed in the present study is comparable with a recent large Indian study from Ambala, which reported EPTB in 29.7% of all TB cases, indicating that EPTB constitutes a substantial component of the overall TB burden in India (6). EPTB may involve multiple anatomical sites and can occur either in isolation or in association with pulmonary disease, often making diagnosis more challenging than PTB (7). In the present study, males accounted for 60.0% of EPTB cases, while females constituted 40.0%, giving a male-to-female ratio of approximately 1.5:1. A similar male predominance was reported by Miiro et al. (2023) who observed males in 54.2% of 636 EPTB cases (8). However, sex distribution varies between populations and anatomical forms of EPTB. The present male predominance may therefore reflect differences in the study population, healthcare-seeking behaviour, and distribution of disease sites. Lymph node tuberculosis was the most common anatomical presentation (30.0%), followed by pleural (22.2%), abdominal (13.3%), and bone and joint tuberculosis (11.1%). The predominance of lymph-node involvement is consistent with previous literature, in which lymph-node TB has frequently been reported as one of the major forms of EPTB. Ilgazli et al. (2004) reported lymph-node TB in 56.3% of EPTB cases, followed by pleural TB in 31.1% (9). In contrast, a recent Indian study from Ambala identified pleural TB as the most common EPTB presentation (27%), demonstrating that the anatomical distribution can vary considerably between study populations (3). The differences may be related to geographical variation, referral patterns, diagnostic practices, and differences in the populations studied. The present study also demonstrated that 41–50 years was the most frequently affected age group (27.8%), followed by 31–40 years (24.4%) and 51–60 years (15.6%). Thus, EPTB was predominantly observed among adults aged 31–60 years. This finding differs from the study by Ilgazli et al. (2004), in which a substantial proportion of EPTB cases occurred among younger individuals (9). Similarly, Prakasha et al. (2013) reported that approximately half of EPTB cases occurred among adults of productive age (10). Such variation may be explained by differences in demographic composition, study setting, disease detection, and referral characteristics. Overall, the findings indicate that EPTB accounted for nearly one-third of all TB cases, with lymph-node and pleural involvement representing the major anatomical presentations. The observed differences in age and sex distribution compared with previous studies highlight the heterogeneous epidemiology of EPTB. Therefore, appropriate clinical, radiological, microbiological, and histopathological evaluation of suspected extra-pulmonary disease remains important for achieving timely and accurate diagnosis.

Conclusion

The present study demonstrated that extra-pulmonary tuberculosis constituted 30.0% of all tuberculosis cases, highlighting its substantial contribution to the overall TB burden. EPTB showed a male predominance (60.0%), with lymph node tuberculosis (30.0%) being the most common anatomical presentation, followed by pleural and abdominal involvement. The highest proportion of cases occurred in the 41–50-year age group (27.8%), with most patients belonging to the 31–60-year age range. The varied anatomical and demographic distribution of EPTB emphasizes the need for early clinical suspicion and appropriate site-specific diagnostic evaluation to ensure timely diagnosis and management of extra-pulmonary disease.

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