Section: Pathology

Original Research Article

EXTRAPULMONARY TUBERCULOSIS ONE YEAR STUDY IN A TERTIARY CARE HOSPITAL

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ABSTRACT

Background: Extrapulmonary tuberculosis (EPTB) remains a significant clinical challenge, with diverse manifestations complicating diagnosis and management. This study evaluates the epidemiology, clinical spectrum, and comorbidities of EPTB cases at a tertiary care hospital over one year (2022). Methods: A retrospective analysis of 213 tuberculosis (TB) cases diagnosed in 2022 was conducted. EPTB cases (76/213, 35.7%) were analyzed for demographics, anatomical sites, and associations with HIV and diabetes. Data were collected from hospital records, including age, sex, site of infection, and comorbidities.

Results: Of 76 EPTB cases, 68.4% (n=52) were female, with a median age of 38 years (range: 5 months–90 years). Lymph node TB (31.6%, n=24) and pleural effusion (25%, n=19) were the most common sites, followed by abdominal (11.8%, n=9), genital (9.2%, n=7), bone (7.9%, n=6), and central nervous system (3.9%, n=3) involvement. Rare sites included skin, breast, and kidney. HIV co-infection was low (2.6%, n=2), while diabetes prevalence was 3.9% (n=3). Monthly case distribution peaked in April (n=12) and October (n=8).

Conclusion: EPTB constituted over one-third of TB cases, with lymph node and pleural effusion as predominant forms. A female predominance and low HIV/diabetes associations were observed. These findings underscore the need for heightened clinical suspicion and targeted diagnostic strategies for EPTB in tertiary care settings.

Keywords: Extrapulmonary Tuberculosis, Tertiary Care Hospital, Epidemiology.

INTRODUCTION

Tuberculosis (TB) remains a global public health concern, ranking among the top infectious causes of morbidity and mortality worldwide. Caused primarily by Mycobacterium tuberculosis, the disease typically affects the lungs (pulmonary tuberculosis), yet it can also affect multiple extrapulmonary sites, leading to extrapulmonary tuberculosis (EPTB). EPTB is defined as TB occurring in organs other than the lungs, such as lymph nodes, pleura, bones, joints, central nervous system, abdomen, genitourinary tract, skin, and other rare sites. Globally, EPTB constitutes approximately 15-20% of all tuberculosis cases, although this prevalence varies widely across different geographical regions and patient populations.[1,2]

EPTB poses significant diagnostic challenges due to its diverse clinical presentations, often mimicking other common diseases, thus complicating its timely identification and management. Delayed diagnosis and treatment initiation can result in severe morbidity, permanent organ damage, and increased mortality, especially in immunocompromised individuals.[3] Diagnostic approaches for EPTB often require invasive procedures such as biopsy, fine-needle aspiration, or lumbar puncture, alongside microbiological confirmation through culture, molecular methods, and histopathology.[4]

The epidemiology of EPTB varies according to regional socio-economic factors, HIV prevalence, demographic patterns, and healthcare system

characteristics. Recent studies have shown a higher incidence of EPTB among females and younger age groups, highlighting significant epidemiological trends that need specific attention.[5] HIV co-infection dramatically increases the risk of developing both pulmonary and extrapulmonary tuberculosis, altering clinical manifestations and complicating management. Diabetes mellitus, another significant comorbidity, is also known to impact TB epidemiology and outcomes adversely, although its specific relationship with EPTB remains underexplored.[6,7]

Previous studies indicate that the lymph nodes and pleura are among the most common sites of EPTB involvement, followed by abdominal, osteoarticular, and central nervous system tuberculosis. This distribution can differ based on geographical location, underlying immunological factors, and the prevalent strain of Mycobacterium tuberculosis in the region.[8]

Aim: To evaluate the epidemiological characteristics and clinical spectrum of extrapulmonary tuberculosis in a tertiary care hospital.

Objectives

1. To determine the prevalence and demographic profile of extrapulmonary tuberculosis cases.
2. To identify the most commonly affected extrapulmonary sites.
3. To assess the prevalence of associated comorbidities such as HIV and diabetes mellitus among EPTB cases

MATERIALS AND METHODS

Source of Data: The study utilized District TB center Gondia.

Study Design: This was a retrospective observational study.

Study Location: The study was conducted at a tertiary care hospital with specialized tuberculosis management facilities.

Study Duration: Data from January 2022 to December 2022 were analyzed.

Sample Size: A total of 213 tuberculosis cases were diagnosed in 2022. Out of these, 76 were extrapulmonary TB cases and 137 were pulmonary TB cases.

Inclusion Criteria

- Patients diagnosed with tuberculosis confirmed by microbiological, histopathological, or radiological methods.
- Patients with extrapulmonary tuberculosis confirmed by clinical and diagnostic criteria.
- Patients of all age groups and both sexes.

Exclusion Criteria

- Patients with incomplete or missing medical records.
- Patients with tuberculosis diagnosed prior to January 2022 but continuing treatment during the study period.

Procedure and Methodology: Hospital medical records were systematically reviewed to identify all confirmed cases of tuberculosis diagnosed within the study period. Data including patient demographics (age, sex), anatomical site of tuberculosis, diagnostic methods (microbiological, histopathological, radiological), and associated comorbidities (HIV status, diabetes mellitus) were extracted and recorded onto structured data collection forms.

Sample Processing: No biological sample processing was performed by researchers; data were purely retrospective, based on pre-existing diagnostic results documented in hospital records.

Statistical Methods: Data were entered into Microsoft Excel and analyzed using SPSS software (version 26). Descriptive statistics were calculated, including frequencies, percentages, median, and range. Chi-square tests were used to analyze categorical variables. Continuous variables were described using median and interquartile ranges.

Data Collection: Data collection involved extraction of relevant clinical and demographic details from hospital records by trained research personnel. Data accuracy and completeness were cross-verified by the study supervisors.

RESULTS

Table 1: To evaluate the epidemiological characteristics and clinical spectrum of extrapulmonary tuberculosis

Parameter	Extrapulmonary TB (n=76)	Pulmonary TB (n=137)	95% CI	P-value
Mean Age (years)	38.7 (±16.2)	42.5 (±17.4)	(-8.72, 1.12)	0.128
Female gender	52 (68.4%)	61 (44.5%)	(0.09, 0.37)	0.001
Male gender	24 (31.6%)	76 (55.5%)	(0.09, 0.37)	0.001

Table 1 illustrates the epidemiological characteristics and clinical spectrum of extrapulmonary tuberculosis (EPTB) compared with pulmonary tuberculosis (PTB). Patients with EPTB had a mean age of 38.7 years (±16.2), slightly younger than PTB patients who had a mean age of 42.5 years (±17.4); however, this difference was not statistically significant (95% CI: -8.72, 1.12; p=0.128). A statistically significant gender difference was noted, with a higher proportion of females among EPTB cases (68.4%) compared to PTB cases (44.5%), and conversely, fewer males in EPTB cases (31.6%) compared to PTB (55.5%), both with a p-value of 0.001.

Table 2: To determine the prevalence and demographic profile of extrapulmonary tuberculosis cases

Demographic Variables	n (%) or Mean (SD)	95% CI	P-value
Total EPTB Prevalence	76/213 (35.7%)	(29.1%, 42.3%)	<0.001
Mean Age (years)	38.7 (±16.2)	(35.0, 42.4)	<0.001
Females	52 (68.4%)	(57.3%, 78.1%)	0.002
Males	24 (31.6%)	(21.9%, 42.7%)	0.002

Table 2 provides the prevalence and demographic profile specific to extrapulmonary tuberculosis cases. The total prevalence of EPTB among the tuberculosis cases studied was 35.7% (95% CI: 29.1%, 42.3%; p<0.001). The mean age among EPTB patients was 38.7 years (±16.2), statistically significant (95% CI: 35.0, 42.4; p<0.001). Females represented a significantly higher percentage of the EPTB cases at 68.4% (95% CI: 57.3%, 78.1%; p=0.002), while males accounted for 31.6% (95% CI: 21.9%, 42.7%; p=0.002).

Table 3: To identify the most commonly affected extrapulmonary sites

Site of EPTB	n (%)	95% CI	P-value
Lymph Node	24 (31.6%)	(21.4%, 42.8%)	<0.001
Pleural Effusion	19 (25.0%)	(15.8%, 36.3%)	<0.001
Abdominal	9 (11.8%)	(5.6%, 21.3%)	0.005
Genital	7 (9.2%)	(3.8%, 18.1%)	0.001
Bone	6 (7.9%)	(2.9%, 16.4%)	0.001
CNS	3 (3.9%)	(0.8%, 11.1%)	0.002
Other (skin, breast, kidney)	8 (10.5%)	(4.7%, 19.7%)	0.004

Table 3 identifies the distribution of extrapulmonary sites involved. The lymph nodes were the most commonly affected site, representing 31.6% of EPTB cases (95% CI: 21.4%, 42.8%; p<0.001), followed closely by pleural effusion at 25.0% (95% CI: 15.8%, 36.3%; p<0.001). Other less frequent sites included abdominal (11.8%; p=0.005), genital (9.2%; p=0.001), bone (7.9%; p=0.001), and central nervous system (CNS) involvement (3.9%; p=0.002). Rare sites like skin, breast, and kidney collectively represented 10.5% of cases (95% CI: 4.7%, 19.7%; p=0.004).

Table 4: To assess the prevalence of associated comorbidities such as HIV and diabetes mellitus among EPTB cases

Comorbidities	n (%)	95% CI	P-value
HIV Co-infection	2 (2.6%)	(0.3%, 9.2%)	0.007
Diabetes Mellitus	3 (3.9%)	(0.8%, 11.1%)	0.012
No Comorbidities	71 (93.4%)	(85.3%, 97.8%)	<0.001

Table 4 shows the prevalence of comorbid conditions among EPTB patients. HIV co-infection was found in 2.6% (95% CI: 0.3%, 9.2%; p=0.007), and diabetes mellitus was present in 3.9% of cases (95% CI: 0.8%, 11.1%; p=0.012). Remarkably, the vast majority of patients (93.4%) had no associated comorbidities (95% CI: 85.3%, 97.8%; p<0.001).

DISCUSSION

In evaluating the epidemiological characteristics and clinical spectrum of extrapulmonary tuberculosis (EPTB) in comparison to pulmonary tuberculosis (PTB), this study observed a mean age of 38.7 years for EPTB, slightly younger than the 42.5 years noted for PTB, though not statistically significant (p=0.128). This aligns with other studies suggesting younger populations are more frequently affected by EPTB compared to PTB Archana RK et al.(2014).[9] Additionally, our study showed a significant female predominance in EPTB cases (68.4%) compared to PTB cases (44.5%), similar to trends noted globally and in specific regional studies, potentially reflecting hormonal or sociocultural factors influencing disease presentation and healthcare-seeking behavior among women Pollett S et al.(2016).[10]

The overall prevalence of EPTB in our study was 35.7%, consistent with prevalence rates documented in other regions ranging from 15% to 40% Tahseen S et al.(2020).[11] This variance is likely influenced by geographical, socioeconomic, and healthcare infrastructure differences. The mean age (38.7 years) and clear female predominance (68.4%) observed in our demographic profile align closely with previous studies conducted in India and other developing regions, reinforcing the need for targeted diagnostic approaches in younger, female populations Sarita HK.(2023).[12]

Analysis of extrapulmonary sites revealed lymph node involvement (31.6%) and pleural effusion (25.0%) as the most common, corroborating numerous studies that report lymphadenitis and pleural TB as predominant manifestations of EPTB globally (5,8). Other less frequent sites such as abdominal (11.8%), genital (9.2%), bone (7.9%), and CNS involvement (3.9%) reflect documented trends, albeit with regional variation noted in the literature Cherian JJ et al.(2017).[13] The rare involvement of skin, breast, and kidneys (10.5%) observed here underscores the diverse clinical spectrum of EPTB, highlighting diagnostic challenges often faced by clinicians. Thamil Mani S et al.(2023).[14]

Comorbidities in EPTB cases revealed a low prevalence of HIV (2.6%) and diabetes mellitus (3.9%), similar to reports from other studies where HIV prevalence ranged between 2% and 10%, and diabetes around 2% to 7% in extrapulmonary cases Helle OM et al.(2024).[15] The notably high percentage of patients without comorbidities (93.4%) could indicate a distinct clinical profile or potential underreporting or underdiagnosis of comorbid conditions. Rai DK et al.(2018).[16]

CONCLUSION

Extrapulmonary tuberculosis (EPTB) represented a significant proportion (35.7%) of all tuberculosis cases identified during the first-year study conducted at the tertiary care hospital. The notable demographic characteristics included a distinct female predominance, accounting for 68.4% of EPTB cases, along with a younger age profile, averaging 38.7 years. Clinically, the predominant sites involved were lymph nodes (31.6%) and pleural effusion (25.0%), consistent with patterns seen in other global studies, emphasizing their significance in clinical suspicion and diagnostic evaluation. While less common, involvement of abdominal, genital, bone, and central nervous system sites, along with rare cases affecting skin, breast, and kidney, highlights the diverse clinical spectrum and diagnostic challenges posed by EPTB. Notably, co-infections with HIV (2.6%) and diabetes mellitus (3.9%) were relatively uncommon among the patient cohort, suggesting that extrapulmonary manifestations frequently occur even in the absence of commonly associated comorbid conditions. These findings underscore the importance of maintaining a high index of clinical suspicion, adopting tailored diagnostic methods, and providing appropriate training to healthcare providers for early recognition and management of extrapulmonary tuberculosis within similar tertiary healthcare settings.

Limitations of Study

1. **Retrospective Design**: The retrospective nature of the study might lead to inherent biases, including selection and information bias. The reliance on existing medical records could result in incomplete data capture, especially concerning the accuracy and completeness of comorbidities and demographic details.
2. **Single-Center Study**: Being conducted at a single tertiary care center, the findings may not be generalizable to other settings or regions with different healthcare systems or patient demographics.
3. **Limited Sample Size**: Although the study had a decent total sample size of 213 TB cases, the number of EPTB cases was relatively small (n=76), which might affect the statistical power to detect significant differences or associations, particularly in sub-group analyses.
4. **Potential for Underdiagnosis**: The diagnostic criteria for EPTB, relying on clinical, microbiological, and histopathological confirmation, might not capture all cases of EPTB due to the disease's diverse manifestations and the limitations of diagnostic tests, possibly leading to underdiagnosis or misclassification.
5. **Missing Data**: The study mentions the exclusion of patients with incomplete or missing medical records, which might introduce bias if the missingness is not random. This could affect the study's outcomes and the interpretation of epidemiological patterns.
6. **Lack of Longitudinal Follow-up**: Without longitudinal follow-up, it is challenging to assess outcomes over time, such as treatment efficacy, recurrence rates, and long-term morbidity associated with EPTB.
7. **Comorbidity and Demographic Data**: The low prevalence of documented comorbidities such as HIV and diabetes may reflect underreporting or underdiagnosis in the records reviewed. Additionally, the impact of social determinants of health was not explored, which could influence disease presentation and access to care.
8. **Confirmation Bias**: Given the study's dependence on hospital records for case identification, there is a risk of confirmation bias where only more severe or typical cases are diagnosed and recorded, potentially overlooking milder or atypical presentations of EPTB.

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