



Epidemiological Profile of Musculoskeletal Tuberculosis Cases at Tertiary Care Hospital in Mandya: A Retrospective Descriptive Study

¹Dr Akshay S, Post-graduate, Department of Orthopaedics, Mandya Institute of Medical Sciences, Mandya

²Dr Manjappa C N, Professor & HOD, Department of Orthopaedics, Mandya Institute of Medical Sciences, Mandya

Corresponding Author: Dr Akshay S, Post-graduate, Department of Orthopaedics, Mandya Institute of Medical Sciences, Mandya.

How to citation this article: Dr Akshay S, Dr Manjappa C N, “Epidemiological Profile of Musculoskeletal Tuberculosis Cases at Tertiary Care Hospital in Mandya: A Retrospective Descriptive Study”, IJMACR- June - 2025, Volume – 8, Issue - 3, P. No. 112 – 118.

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Type of Publication: Original Research Article

Conflicts of Interest: Nil

Abstract

Background: Musculoskeletal tuberculosis (MSK-TB) is a less common yet clinically significant form of extrapulmonary tuberculosis (EPTB), often characterized by insidious onset and diagnostic delays. In India, where tuberculosis remains highly endemic, region-specific data on MSK-TB is limited, particularly from rural tertiary care centres. Thus, this study evaluated the demographic, clinical, and epidemiological profile of MSK-TB cases treated at a tertiary care centre.

Methods: A retrospective descriptive study was conducted at Mandya Institute of Medical Sciences from January 2020 to December 2024. Data from 84 patients diagnosed with MSK-TB were extracted from hospital records, the DOTS registry, and the Nikshay portal. Variables assessed included age, sex, site of TB involvement (spinal or extraspinal), clinical presentation, comorbidities, behavioral risk factors, treatment

modality, and outcomes. Descriptive statistics were used for analysis.

Results: The mean age was 45.9 ± 18.4 years, with 53.6% male patients. Comorbidities included diabetes (27.4%), HIV (15.5%), and past pulmonary TB (19%). Localized pain (92.9%), swelling (65.5%), and restricted movement (59.5%) were the predominant symptoms. Spinal TB was observed in 48.8%, while extra spinal TB accounted for 51.2%. Surgery was required in 16.7% of cases. Treatment outcomes were favorable, with 91.7% showing improvement, 2.3% mortality, and 5.9% lost to follow-up.

Conclusion: MSK-TB demonstrates a near-equal distribution of spinal and extra spinal involvement in rural South India. Pain and joint dysfunction are key presenting features. Early diagnosis and standard anti-tubercular therapy can lead to favourable outcomes.

Keywords: Extrapulmonary TB, Musculoskeletal-TB, Spinal-TB, Epidemiology, Rural Health.

Introduction

Tuberculosis (TB) continues to be a significant global public health concern, ranking as the leading cause of death from a single infectious agent, surpassing even HIV/AIDS in its global impact ¹. In 2022, an estimated 10.6 million people were infected with TB globally, with 1.3 million deaths attributed to the disease². A disproportionate burden of TB cases occurs in low- and middle-income countries, with India alone contributing approximately 27% of the global TB burden ².

While pulmonary TB is the most common form, extrapulmonary tuberculosis (EPTB) constitutes about 24% of all notified TB cases in India, as reported in the India TB Report 2023³. Among the EPTB manifestations, musculoskeletal tuberculosis (MSK TB) stands as the fourth most common form, presenting a unique set of diagnostic and therapeutic challenges. MSK TB typically affects the spine (in 50%–69% of cases), followed by major joints such as the hip, knee, and ankle ⁴. Its insidious onset, non-specific clinical symptoms, and low index of suspicion often contribute to significant delays in diagnosis and initiation of treatment ^{5,6}.

Delayed recognition of MSK TB can result in irreversible skeletal deformities, chronic pain, and significant functional disability, thereby severely compromising patients' quality of life ^{7,8}. Moreover, misdiagnosis and inappropriate management increase the financial burden on both patients and the healthcare system.

Despite being a notable subset of extrapulmonary TB, region-specific data on the epidemiology and clinical characteristics of musculoskeletal TB remains limited,

particularly in tier-2 and tier-3 cities and rural Indian settings. A decade-long retrospective study in South India by Hazra et al. emphasized the predominance of spinal involvement (72%), a male predominance (57%), and frequent surgical interventions required in spinal TB cases (80%)⁹. Given this context, the present study aims to analyze the epidemiological and clinical profile of MSK TB cases treated over a four-year period at a tertiary care center in Mandya. By evaluating variables such as age, sex, infection site, this study seeks to provide insights that could guide early diagnosis, optimize management strategies, and improve prognosis in similar healthcare settings.

Methodology

Study Design

This is a retrospective descriptive study conducted to assess the epidemiological and clinical profile of musculoskeletal tuberculosis (MSK TB) cases managed at a tertiary care hospital in Mandya, Karnataka, India. The study was conducted at the Mandya Institute of Medical Sciences (MIMS), a tertiary care teaching hospital catering to a large population in the Mandya district and adjoining rural areas. The study was conducted in accordance with the ethical guidelines of the Indian Council of Medical Research (ICMR, 2017) and the New Drugs & Clinical Trials Rules (2019). Institutional Ethics Committee approval was obtained prior to initiation of the study.

Study Duration

This retrospective study aims to collect data of patients diagnosed with MSK-TB from medical records from January 2020 to December 2024. Data collection and analysis will be performed post-approval by the Institutional Ethics Committee.

Data Sources

Data were retrieved from the DOTS registry, Nikshay portal, & Medical Records Department (MRD) of MIMS, Mandya

Inclusion/exclusion criteria

Patients of all age groups and both sexes diagnosed with musculoskeletal tuberculosis between January 2020 and December 2024, diagnosis confirmed through clinical, radiological, histopathological, or microbiological evidence, & patients registered in the DOTS program and recorded in either the Nikshay portal or MRD were included in the study. Meanwhile, cases with incomplete or missing data, & patients who expired shortly after presentation or before initiation of treatment were excluded.

Sampling Method

Convenience sampling was employed. All eligible and complete cases during the study period that fulfilled the inclusion criteria were included for analysis.

Data Collection Procedure

Data was extracted using a pre-structured proforma developed for this study. The variables collected included: Demographic details (age, gender), Site of infection (spinal or extra-spinal). Clinical presentation and symptomatology at the time of diagnosis, past

Table 1 Patient Demographics

Parameter	Frequency (n=84)	Percentage (%), (n=84)
Gender (Male/Female), n (%)	45/39	53.6/46.4
Age (Years), Mean \pm SD	45.9 \pm 18.46	-
Family history of TB	8	9.5
No. of patients given ATT	84	100
Alcoholic	22	26.2
Smoker	18	21.4

history of pulmonary tuberculosis, family history of tuberculosis, presence of co-infections or comorbidities (e.g., diabetes, HIV), behavioral risk factors (e.g., alcohol or tobacco use), treatment modalities (pharmacological, surgical), treatment outcomes were recorded. All data were anonymized and handled with strict confidentiality following ethical standards.

Data Analysis

Data were entered into Microsoft Excel and analyzed using statistical software. Descriptive statistics were used: Categorical variables were expressed as frequencies and percentages (e.g., sex, site of involvement, presence of comorbidities), continuous variables such as age were summarized using means and standard deviations.

Results

The study included data of 84 patients with musculoskeletal tuberculosis. The mean age was 45.9 ± 18.46 years, with a slight male predominance (53.6% male, 46.4% female). All patients received ATT. Family history of TB was noted in 9.5%. Comorbidities included diabetes mellitus (27.4%), hypertension (19.0%), past pulmonary TB (19.0%), and HIV (15.5%). Alcohol use and smoking were reported in 26.2% and 21.4%, respectively (Table-1).

Comorbidities		
Diabetes mellitus	23	27.4
Hypertension	16	19.0
Past history of pulmonary TB	16	19.0
HIV	13	15.5

The most common symptom was localized pain (92.9%), followed by swelling (65.5%), restricted movement (59.5%), and constitutional symptoms like weight loss, fever, and night sweats. Detailed list of symptoms is mentioned in (Table-2).

Spinal TB accounted for 48.8% and extra spinal TB for 51.2% of cases. Surgery was required in 16.7% of patients (10.7% spinal, 5.9% extra spinal). Treatment outcomes showed 91.7% improvement, with 2.3% mortality and 5.9% lost to follow-up (Table-3).

Table 2: Clinical presentation

Symptom	Frequency (n=84)	Percentage (%) (n=84)
Localized pain	78	92.9
Swelling	55	65.5
Restricted movement	50	59.5
Weight loss	40	47.6
Low-grade fever	38	45.2
Night sweats	35	41.7
Fatigue	32	38.1
Sinus formation/discharge	18	21.4
Neurological symptoms (paraparesis)	14	16.7
Gibbus deformity/spinal deformity	10	11.9

Table 3: Epidemiological profile of Musculoskeletal Tuberculosis

Site of TB	Frequency (n=84)	Percentage (%) (n=84)
Spinal TB	41	48.8
Extra spinal MS-TB	43	51.2
MS-TB requiring Surgery	14	16.7
Spinal TB	9	10.7
Extra-spinal TB	5	5.9
Outcomes		
Improved	77	91.7
Died	2	2.3
Lost to follow-up	5	5.9



Figure 1 and 2: TB right HIP joint on MRI and POTT'S spine on X-RAY images of female patients respectively

Discussion

In the present study, the mean age of participants was 45.9 ± 18.4 years, with a slight male predominance (53.6% male), consistent with several Indian studies that report peak MSK-TB incidence in the third to fifth decades of life, likely reflecting the highest occupational and physical activity age groups^{10,11}. A study by Hazra et al. from South India reported a similar mean age (46 years) and male: female ratio¹². Additionally, comorbidities were prevalent—diabetes (27.4%), hypertension (19%), and HIV (15.5%)—emphasizing the role of immunosuppression and systemic diseases in predisposing to skeletal TB, findings mirrored in studies by Barik et al. and Gupta et al.^{13,14}. Notably, 21.4% were smokers and 26.2% consumed alcohol, both contributing factors for TB reactivation and poor immune response.

Clinically, MSK-TB continues to pose diagnostic challenges due to its insidious and nonspecific presentation. In our cohort, localized pain was the most common symptom (92.9%), followed by swelling (65.5%), restricted movement (59.5%), and constitutional symptoms such as weight loss (47.6%), low-grade fever (45.2%), and night sweats (41.7%).

These findings align closely with Sharma et al. and Held

et al., who emphasized that constitutional symptoms often lag behind joint or spinal involvement, contributing to diagnostic delays^{10,16}. Importantly, neurological symptoms (16.7%) and gibbus deformity (11.9%) were reported in spinal TB cases, highlighting the advanced disease state at presentation. Compared to urban datasets, our rural-based cohort showed a higher frequency of severe presentations, potentially due to delayed access to care.

The distribution of TB within the musculoskeletal system revealed nearly equal proportions of spinal (48.8%) and extra spinal TB (51.2%). Historically, spinal TB has accounted for more than half of MSK-TB cases globally¹⁷. However, recent Indian studies such as those by Hazra et al. and Rajasekar et al. report increasing identification of extra spinal sites, likely due to improved imaging and awareness^{11,12}. In our cohort, common extra spinal sites included hip, wrist, ankle, and elbow, consistent with literature from Barik et al. and Gupta et al.^{13,14}. Surgical intervention was needed in 16.7% of patients, mainly for spinal decompression or abscess drainage. The treatment success rate of 91.7% in our study, with only 2.3% mortality, reinforces the efficacy of early ATT initiation and surgical intervention when necessary.

However, the study had certain limitations, being hospital-based, the sample may over represent more severe or referred cases, potentially skewing the spectrum of MSK-TB toward late-stage presentations. Imaging modalities like MRI were not uniformly applied, which may have affected diagnostic accuracy, particularly in early extra spinal lesions. Additionally, the study lacked a comparative control group or stratified outcomes by site and severity.

Conclusion

Musculoskeletal tuberculosis remains a significant extrapulmonary form of TB in endemic regions, with an almost equal distribution of spinal and extra spinal forms. Pain, swelling, and restricted mobility were the most common clinical presentations. Most cases responded well to ATT, with a small subset requiring surgery. Early suspicion, appropriate imaging, and prompt therapy are key to preventing long-term disability. Strengthening peripheral surveillance and early referral pathways can further improve outcomes in rural populations.

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