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An Observational Study on Presentation, Diagnosis and Management of Cases of Osteoarticular Tuberculosis in North Indian Population

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ABSTRACT

Introduction: Osteoarticular tuberculosis (OA TB), a form of extrapulmonary TB, predominantly affects bones and joints, with patients often experiencing significant pain and functional impairment. **Aim and Objectives:** This study examined the presentation, diagnosis, and management of OA TB at MMIMSR, Mullana, from April 2022 to September 2024. **Materials and Methods:** This study examined the presentation, diagnosis, and management of OA TB in 22 patients at MMIMSR, Mullana.The age distribution ranged from 10 to 65 years, with higher concentrations in middle-aged groups (25-30, 35-40 and 50-55 years), each accounting for approximately 14.29% of cases. Females represented 68.18% of the sample, indicating a higher prevalence among women. **Results:** The thoracic lumbar region was the most commonly affected area (31.82%), followed by the thoracic spine, hip, knee, and lumbar spine regions (13.64% each). The predominant symptom was pain (100%), with swelling (27.27%) and weight loss (22.73%) also reported. Most patients had no significant past TB history (81.82%), suggesting OA TB often presents as a primary infection. Diagnosis was primarily clinico-radiological (77.27%), with additional tools like CBNAAT, ZN stain, and histopathology used in complex cases. The duration of antitubercular therapy (ATT) varied, with the most common being 15 months (36.36%). However, adherence challenges were noted, with some patients lost to follow-up. Neurovascular deficits were present in 45.45% of patients, ranging from mild to severe motor weakness, predominantly affecting the lower limbs. **Conclusion:** This study underscores the importance of early detection, accurate diagnosis, and individualized treatment plans to improve patient outcomes in OA TB. Addressing diagnostic and treatment disparities globally, especially in high-burden regions, and enhancing patient adherence to therapy are crucial for effective TB management. The findings provide valuable insights into the epidemiology, clinical manifestations, and treatment outcomes of OA TB, informing strategies to mitigate its impact on public health.

INTRODUCTION

Tuberculosis (TB), an age-old scourge of humanity, continues to impose a significant toll on global health, characterized by substantial morbidity and mortality. Despite optimistic outlooks six decades ago, when the fight against TB seemed winnable with existing tools, the disease has proven resilient, particularly aided by its association with HIV, and has developed into drug-resistant strains, including multidrug-resistant (MDR) and extensively drug-resistant (XDR) TB [1]. MDR-TB is defined by resistance to two crucial first-line drugs, while XDR-TB extends this resistance further, complicating treatment protocols [2]. Despite concerted efforts led by the World Health Organization (WHO) and various international bodies, the global burden remains staggering, with 10 million reported cases in 2018. However, TB's impact is not uniformly distributed, with disproportionately higher prevalence rates in low-income countries, especially across Africa and Southeast Asia. Conversely, incidence rates are relatively lower in regions like the United States and Europe, though some high-income countries are observing an increase attributed to significant migration from TB-endemic regions [1].

Within the spectrum of TB manifestations, osteoarticular tuberculosis (OA TB) constitutes a modest percentage of cases, ranging from 1% to 3% of the TB-affected population. However, the incidence significantly varies between endemic and non-endemic regions, leading to differing approaches in diagnosis and treatment [3]. In countries like India, where the TB burden is high and resources are limited, clinicians often rely on clinical and imaging findings to initiate empirical anti-tubercular treatment (ATT), a practice known as "clinico-radiological" diagnosis [4]. This method is driven by factors such as high patient volume, easy access to imaging technology like MRI, and delays in laboratory testing. However, it carries the risk of overlooking TB mimics and drug-resistant strains [5]. Conversely, in wealthier nations, there's a tendency to underinvestigate for mycobacterial diseases, resulting in diagnostic delays and the perception of TB as a challenging diagnostic puzzle [3]. Hence, the imperative lies in harmonizing diagnostic and treatment practices globally. Endemic regions could benefit from implementing protocol-based approaches to diagnosis and treatment, reducing reliance on empirical methods and enhancing sensitivity to TB mimics and resistance patterns [6]. Conversely, in non-endemic areas, there's a need to raise awareness and improve diagnostic vigilance to prevent delays in TB diagnosis and treatment initiation, thereby demystifying TB as a diagnostic challenge. By bridging these gaps in perception and practice, a more unified and effective global response to TB can be achieved, ultimately stemming the tide of this persistent infectious disease [3].

Osteoarticular tuberculosis presents a significant global health issue, often resulting in functional impairment and potential severe disabilities, especially in children. Timely detection and treatment are crucial, as proper management can lead to complete recovery. This form of secondary tuberculosis develops from the formation of tuberculous lesions in bones, joints, or both. Typically, osteoarticular lesions occur following hematogenous dissemination, with mycobacterial colonies establishing themselves within active bone marrow. Mechanisms such as retrograde lymphatic spread, from mediastinal or mesenteric lymph nodes to locations like the spine or joints, highlight the varied pathogenesis of osteoarticular tuberculosis [3].

Manifesting in various bone and cartilage structures, osteoarticular tuberculosis can impact both weight-bearing and non-weight-bearing areas. Research, such as the study by Hopewell et al. (1979), has highlighted its distribution across different anatomical sites, with the spine, hips, and knees being common locations, along with other areas like the ribs, pelvis, and hand and foot bones [7]. Pigrau et. al. 2013 has been identified that the age at which dissemination occurs influences the predilection for certain sites, with younger individuals more prone to spondylitis and small bone involvement, while delayed dissemination, often seen in older individuals, tends to affect larger pelvic joints [8]. Historically associated with pediatric cases of pulmonary tuberculosis, osteoarticular tuberculosis now predominantly affects the elderly in developed regions like Europe and America, though it continues to afflict children in developing countries, with peak incidence typically around 30 years of age.

Osteoarticular tuberculosis progresses through several stages, each characterized by specific pathological changes and clinical presentations. These stages may overlap, and not all individuals may exhibit symptoms at each phase. Initially, the infection begins with the introduction of Mycobacterium tuberculosis into the bone or joint, typically via hematogenous spread from a primary source such as pulmonary tuberculosis [9]. Patients may initially remain asymptomatic as the infection incubates within the affected bone or joint, entering a latent phase. As the infection progresses, an early inflammatory stage ensues, characterized by mild joint symptoms such as pain, swelling, and stiffness. Subsequently, granuloma formation occurs, leading to more pronounced inflammatory responses and worsening joint symptoms. Radiographic changes may manifest, indicating bone destruction and periarticular alterations. Understanding the sequential stages of osteoarticular tuberculosis aids in early detection and appropriate management to prevent irreversible joint damage and disability [9].

During the early inflammatory stage of osteoarticular tuberculosis, the immune system reacts to the presence of Mycobacterium tuberculosis, initiating inflammatory changes within the affected joints. Patients typically present with mild joint symptoms including pain, swelling, and stiffness, often accompanied by systemic manifestations such as lowgrade fever, malaise, and night sweats [10]. Radiographically, initial signs may appear as soft tissue swelling and periarticular osteoporosis, aiding in the diagnostic process and highlighting the evolving pathology of the disease.

MATERIAL AND METHODS

The study focused on the presentation, diagnosis, and management of osteoarticular tuberculosis cases. After receiving approval from the institutional review board, the observational study was conducted in the Department of Orthopaedics at MMIMSR, Mullana. Spanning from April 2022 to September 2024, it provided a comprehensive overview. Ethical approval was obtained from the institutional Ethical Committee for the study.

Study Population:

The study included 22 patients diagnosed with osteoarticular tuberculosis who were either receiving or had recently commenced antitubercular therapy (ATT) at MMIMSR, Mullana. Patients were selected based on specific inclusion and exclusion criteria through purposive sampling. Inclusion Criteria-Patients eligible for the study met at least one of the following conditions: a) A clinicoradiological diagnosis of osteoarticular tuberculosis, b) Positive results for CBNAAT or ZN stain testing, c) New cases or those already undergoing treatment, d) Informed consent duly signed by the patient.

Data Analysis:

Collected data were used to observe and analyze the diagnosis, progression, and outcomes of patients either newly initiated on ATT or already on ATT for osteoarticular tuberculosis. All information was entered into a Microsoft Excel worksheet and statistically analyzed using SPSS software.

RESULTS

The age distribution data from the study on osteoarticular tuberculosis illustrates that the disease affects a diverse range of ages, from 10 to 65 years. The middle age groups, particularly those between 25 to 30, 35 to 40 and 50 to 55 years, show a higher concentration of cases, each accounting for approximately 14.29% of the total cases. The data provides an overview of the gender composition of the study participants. The total participants, 15 were female, representing 68.18% of the sample, while 7 were male, accounting for 31.82%. This distribution indicates a higher prevalence of females in the study population, suggesting that osteoarticular tuberculosis

Table 1: Frequency of the Complaints Body Part of the Patients.

Complaints Body Part	Count	Percentage (%)
Thoracic Lumbar Region	7	31.82
Thoracic Spine Region	5	13.64
Hip	3	13.64
Knee	3	13.64
Elbow	1	4.55
Clavicle Region	1	4.55
Lumber Spine Region	3	13.64

The data about the Complaints Body Part," provides a distribution of the body parts affected by osteoarticular tuberculosis among the study participants. The thoracic lumbar region is the most commonly affected area, with 7 cases accounting for 31.82% of the complaints. This is followed by the thoracic spine region, hip, knee, and lumbar spine region, each with 3 cases, representing 13.64% each. The elbow and clavicle regions are the least affected, with 1 case each, making up 4.55% of the complaints. This distribution indicates that the spine, particularly the thoracic lumbar and thoracic spine regions, is the most frequently involved site in osteoarticular tuberculosis.

Table 2: Various Symptoms Experienced by Patients with Osteoarticular Tuberculosis

Symptoms	Count	Percentage (%)
Weight Loss	5	22.73%
Pain	22	100%
Fever	3	13.64%
Swelling	6	27.27%
Loss of Appetite	3	13.64%
Inability to Walk	3	13.64%

The data outlines the frequency and percentage of various symptoms experienced by patients with osteoarticular tuberculosis. The most prevalent symptom is pain, reported by all 22 patients, accounting for 100% of the cases. Swelli-

-ng is the second most common symptom, observed in 6 patients (27.27%). Weight loss affects 5 patients (22.73%), while fever, loss of appetite, and inability to walk each occur in 3 patients, each representing 13.64% of the cases. This symptom distribution underscores that pain is a universal symptom among osteoarticular TB patients, highlighting the need for effective pain management strategies in these patients. Other symptoms, while less frequent, indicate the systemic impact of the disease, suggesting the importance of comprehensive care addressing both local and systemic manifestations.

Table 3: Past History of the TB Patients

Past History	Frequency	Percentage
Not Significant	18	81.82%
Chickengunya 6 Months back	1	4.55%
Past History of Pulmonary Tuberculosis and Patient Had ATT 4 Years Back	1	4.55%
Past History of Pulmonary Tuberculosis and Patient Had ATT 10 Years Back	1	4.55%
Past History of TB Spine and Patient Had Taken ATTFor 9 Months 20 Years Back	1	4.55%

The table 3 provides an overview of the past medical history of patients with osteoarticular tuberculosis. The majority of patients, 18 out of 22 (81.82%), reported no significant past medical history related to TB or other major illnesses. Among the remaining patients, one had a history of Chikungunya six months prior (4.55%), while three patients had previous instances of tuberculosis: one with pulmonary TB treated with anti-tubercular therapy (ATT) 4 years ago (4.55%), another with pulmonary TB treated with ATT 10 years ago (4.55%), and one with a history of TB spine treated with ATT for 9 months 20 years ago (4.55%). This distribution indicates that most patients with osteoarticular TB do not have a significant prior history of TB, suggesting that osteoarticular TB may often present as a primary infection rather than a relapse.

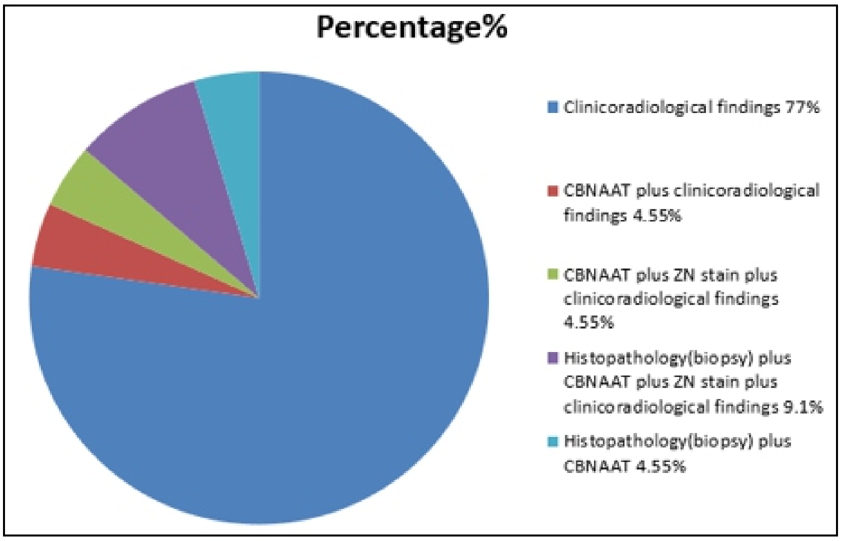

Figure 1: Basis of Diagnosis

The pie chart illustrates the distribution of different diagnostic approaches in a clinical setting, with the majority (77%) relying solely on clinicoradiological findings. Other methods combine various diagnostic tools: Histopathology (biopsy) plus CBNAAT plus ZN stain plus clinicoradiological findings make up 9.1%, while smaller portions (each 4.55%) involve combinations of CBNAAT with clinicoradiological findings, CBNAAT plus ZN stain plus clinicoradiological findings, or histopathology plus CBNAAT. This suggests a strong reliance on clinicoradiological findings, with a minority of cases requiring more comprehensive diagnostic methods.

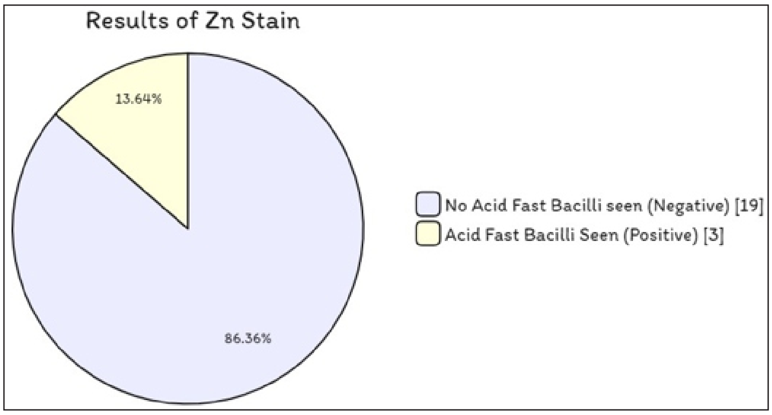

Figure 2: Zn (Ziehl-Neelsen) Staining, Which is Used to Detect Acid-Fast Bacilli (AFB)

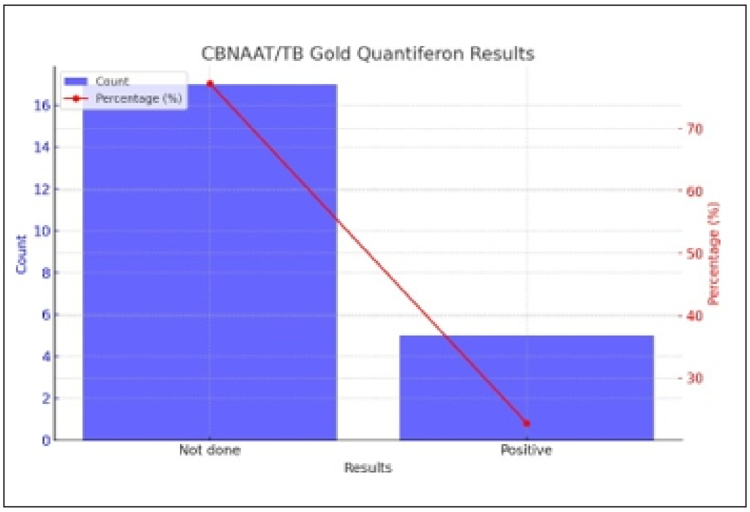

Figure 3: CBNAAT/Tb Gold Quantiferon

The fig 2 illustrates the CBNAAT (Cartridge Based Nucleic Acid Amplification Test) and TB GOLD Quantiferon, which are utilized to detect tuberculosis infection. The results demonstrate that a substantial portion of the patients, 77.27%, did not undergo these tests, as indicated by the "Not done" category.

Table 4: Distribution of Osteoarticular Tuberculosis Diagnosis

Diagnosis	Count	Percentage (%)
TB Dorsal Spine	8	36.36
TB Right Hip Joint	2	9.09
TB Lumbar Spine	6	27.27
TB Pelvic Bone (Right Pubic Bone)	1	4.55
Tb Knee	2	9.09
TB Dorsolumbar Spine	1	4.55
TB Right Elbow Joint	1	4.55
TB Clavicle	1	4.55
Total	**22**	**100.00**

Table 4 details the distribution of osteoarticular tuberculosis diagnoses among various anatomical sites in the study population. The most frequently affected site is the dorsal spine, with 8 cases (36.36%), followed by the lumbar spine with 6 cases (27.27%). Other sites include the right hip joint and the knee, each with 2 cases (9.09%). Less common sites of infection are the pelvic bone (right pubic bone), dorsolumbar spine, right elbow joint, and clavicle, each with 1 case (4.55%). This data indicates a predilection for spinal involvement, particularly the dorsal and lumbar regions, in osteoarticular TB.

Table 5: Duration of ATT Among TB Patients

Duration	Count	Percentage (%)
Completed 15 Months of ATT	8	36.36
Completed 10 Months of ATT	2	9.09
Completed 12 Months of ATT	2	9.09
Completed 4 Months of ATT	2	9.09
Completed 14 Months of ATT	1	4.55
Completed 6 Months of ATT	1	4.55
Completed 9 Months of ATT	1	4.55
Completed 5 Months of ATT	1	4.55
Loss on Follow Up After 7 Months of ATT	1	4.55
Loss on Follow Up After 7 Months of ATT	1	4.55
Completed 2 Months of ATT	1	4.55
Completed 1 Months of ATT	1	4.55

The table 5 outlines the duration of anti-tubercular therapy (ATT) among TB patients, showing the varied lengths of treatment completed by the patients. The majority of patients, 8 out of 22 (36.36%), completed 15 months of ATT, indicating a common treatment duration for this group. Two patients (9.09%) each completed 10 months, 12 months, and 4 months of ATT. Single cases (4.55% each) are seen for completed durations of 14, 6, 9, 5, 2, and 1 months of ATT. Patients were followed up every one month after initiation of ATT. Additionally, there were cases of loss to follow-up: one patient after 7 months and another after 6 months of ATT, each accounting for 4.55%. This distribution highlights the variability in treatment adherence and completion, with the most common duration being 15 months. The presence of loss to follow-up cases underscores the challenge in maintaining patient adherence over extended treatment periods.

Table 6: Distribution of Neurovascular Deficit

Neurovascular Deficit	Count	Percentage(%)
Not Present	12	54.55
Power Lower Limb 3/5	2	9.09
Power Lower Limb 2/5 And Ankle Clonus Present	1	4.55
Power right lower limb3/5	1	4.55
Power B/L Lower Limb 3/5, Sensations Reduced Over L3 to S2	1	4.55
Power B/L Lower Limb 1/5	1	4.55
Power Upper Limb 4/5 and Lower Limb 3/5	1	4.55
Power Lower Limb 4/5	1	4.55
Power Lower Limb 2/5	1	4.55
Not Present (With A Space After the Text)	1	4.55

Table 6 presents the distribution of neurovascular deficits among the patients studied. The majority of patients, 12 out of 22 (54.55%), did not exhibit any neurovascular deficits. Among those with deficits, two patients (9.09%) had a power lower limb rating of 3/5. Several specific deficits were noted in individual patients, each accounting for 4.55%: one patient had power lower limb 2/5 with ankle clonus, another had power right lower limb 3/5, and others had power b/l lower limb 3/5 with reduced sensations over L3 to S2, power b/l lower limb 1/5, power upper limb 4/5 and lower limb 3/5, power lower limb 4/5, and power lower limb 2/5. Additionally, one entry noted "Not present" with a space at the end, also at 4.55%. This distribution indicates that while more than half of the patients did not have neurovascular deficits, a significant portion experienced varying degrees of motor weakness, particularly in the lower limbs, highlighting the impact of osteoarticular tuberculosis on neurovascular function.

DISCUSSION

Osteoarticular tuberculosis, a variety of extrapulmonary tuberculosis, represents a chronic infectious ailment mainly targeting the bones and joints. It is induced by Mycobacterium tuberculosis, the identical bacterium causing pulmonary tuberculosis, yet it appears chiefly in the skeletal framework [1]. This ailment can involve any bone or joint within the body, though it frequently impacts the spine (vertebral column), hips, knees, and ankles. The pathogenesis of osteoarticular tuberculosis generally starts with the inhalation of infectious droplets harboring Mycobacterium tuberculosis. From the lungs, the bacteria may disseminate through the bloodstream or lymphatic system to invade the bones and joints. Alternatively, direct spread from adjacent infected areas, such as lymph nodes or the spine, can also happen. Once the bacteria reach the bones or joints, they can trigger a range of symptoms, from asymptomatic infection to severe damage of the affected structures. The clinical manifestation of osteoarticular tuberculosis can vary considerably based on the site and degree of involvement. Common indicators include localized pain, swelling, stiffness, and restricted joint movement. In severe cases, patients might encounter deformities, abscess formation, and even neurological issues in instances involving the spine [2]. Diagnosing osteoarticular tuberculosis can be tough due to its nonspecific symptoms and the necessity for specialized investigations. Bomanji et. al. 2015 identified that imaging studies like X-rays, CT scans, and MRI scans are often employed to identify characteristic signs such as bone damage, joint involvement, and soft tissue irregularities [11]. Additionally, laboratory tests such as culture and polymerase chain reaction (PCR) assays can help verify the presence of Mycobacterium tuberculosis in affected tissues. Treatment of osteoarticular tuberculosis typically comprises a multidrug antitubercular regimen including isoniazid, rifampicin, pyrazinamide, and ethambutol, administered for an extended duration generally spanning several months. In certain instances, surgical intervention might be required to drain abscesses, remove necrotic tissue, or stabilize affected bones or joints [3]. Despite advances in diagnosis and treatment, osteoarticular tuberculosis remains a substantial cause of morbidity, particularly in regions with a high prevalence of tuberculosis and limited healthcare access. Early detection and swift initiation of suitable therapy are crucial for preventing complications and enhancing outcomes in affected individuals.

Our research discusses the age distribution statistics from a study on osteoarticular tuberculosis, focusing on the diversity of age demographics affected by this condition. The investigation identifies specific age ranges with a higher density of cases, suggesting potential susceptibility or increased exposure to risk factors within these populations. The absence of instances in very young children and lower presence in elderly adults prompt considerations regarding differential age groups [5]. The research conducted by Agada CA et al.; 2015 represents a significant portion of EPTB cases, with prevalence rates ranging from 1% to 4.3% of total TB cases and accounting for 10% to 15% of all EPTB instances. Despite progress in TB control measures, Western countries have seen a decline in bone and joint TB, while India continues to struggle with skeletal TB, showing no apparent reduction in incidence rates. This disparity highlights the persistence of TB as a substantial public health concern, particularly in regions with high prevalence rates such as Central India. A notable percentage of patients in the second and third decades of life suggests that TB disproportionately affects young, economically active individuals, potentially impacting productivity and socioeconomic well-being. Additionally, a higher incidence of OATB among females, especially in urban slum populations, underscores the socio-economic challenges and inequalities contributing to TB transmission and healthcare access [12].

Our studies highlight the importance of understanding the clinical manifestations and management strategies for TB affecting various musculoskeletal regions [9]. The wrist TB study emphasizes the need for early identification and comprehensive management to optimize patient outcomes. Procopie et al.; 2017 highlights key findings in understanding the epidemiology and clinical characteristics of extra-spinal articular tuberculosis (TB) in urban settings, particularly in the context of migration and ethnicity. The preference for large joints as the primary site of involvement underscores the distinct clinical features of articular TB and emphasizes the importance of considering TB in the differential diagnosis of joint diseases, especially in high-risk populations such as migrants from TB-endemic regions [9]. Furthermore, the low burden of immunosuppression among articular TB cases suggests that factors other than immunocompromised status may be driving the observed increase in TB incidence, with migration emerging as a key determinant. These findings collectively underscore the importance of targeted TB control strategies that address the unique challenges faced by migrant populations, including improved access to TB screening, diagnosis, and treatment, as well as culturally sensitive healthcare interventions to mitigate the burden of TB in urban settings characterized by diverse ethnicities and migration patterns [11].

Feldman et. al; 2024 comparison on age as a risk element for skeletal tuberculosis (STB) highlights the complexity and variability in results across various studies and populations [12]. While both investigations, including ours, identified older age groups as being impacted by STB, with some patients even being over 60 years old, conflicting evidence exists regarding age distribution as the primary risk element for peripheral tuberculous arthritis. Our study aligns with findings from Schmid et al. 2005, which reported a mean age of 66 years in a Danish cohort, indicating consistency in age patterns across diverse geographic regions. However, other studies suggest that patients under 40 years old are at the highest risk for STB, emphasizing the variability in age distribution and the necessity for further research into age-related risk factors [15]. Additionally, the predisposing factors for STB show discrepancies among different investigations. While our study and others reported the presence of predisposing factors in around 30–40% of STB patients, contradictory results have been observed in other series, showing no identifiable predisposing factors [14]. Furthermore, the identification of previous pulmonary tuberculosis or compatible radiological findings in a substantial proportion of STB cases in our study, along with a concurrent pulmonary tuberculosis rate of 23%, underscores the importance of considering pulmonary TB as a potential risk element for STB [15].

Kori et. al; 2013 highlights the challenges involved in diagnosing bone and joint TB, emphasizing the prolonged delays between symptom onset, referral, and treatment initiation. It underscores the importance of maintaining a high level of clinical suspicion and optimizing diagnostic strategies, particularly through the use of rapid diagnostic tests like PCR-based testing [4]. Conversely, our study focuses on the specific diagnostic methods utilized in diagnosing osteoarticular tuberculosis, revealing a tiered approach that combines clinical and radiological assessments with advanced molecular and pathological tests. A comparative analysis uncovers several key points. Our study underscores the significance of timely and precise diagnosis in improving patient outcomes and reducing the burden of skeletal TB. It emphasizes the necessity for rapid diagnostic tests to hasten treatment initiation. The second discussion delves into the specific diagnostic methodologies employed, showcasing a comprehensive approach that integrates various diagnostic tools based on the complexity of the cases. Additionally, the first discussion highlights missed opportunities for prompt diagnosis, while the second discussion provides a statistical breakdown of the diagnostic methods used, shedding light on the distribution and utilization of these diagnostic approaches in clinical practice. The comparison between the two sets of data from Tables 9, 10, and 11 offers valuable insights into the epidemiology, treatment, and clinical outcomes of osteoarticular tuberculosis (TB), emphasizing the significance of these findings in informing clinical practice. Starting with the distribution of TB across different anatomical sites outlined in Table 9, it is evident that the spine, particularly the dorsal and lumbar regions, is the most commonly affected area, accounting for the majority of cases (63.63%).

This underscores the susceptibility of spinal regions to TB infection, likely due to their structural complexity and proximity to neural components. Conversely, other major weight-bearing joints such as the hip and knee are also significantly impacted, reflecting the debilitating effects of TB on mobility and quality of life [19]. Furthermore, the involvement of less common sites such as the pelvic bone, clavicle, and elbow highlights the broad range of skeletal areas vulnerable to TB, underscoring the necessity for comprehensive clinical assessments to ensure timely diagnosis and appropriate management. Moving on to the duration of anti-tuberculosis therapy (ATT) detailed in Table 10, the data reveal a wide range of treatment durations, indicating variability in treatment responses and clinical decisions based on individual patient conditions. The most common duration for completing ATT is 15 months (36.36%), suggesting a tendency towards longer treatment periods, possibly for cases with more severe or complex disease presentations. However, there are also notable percentages for shorter treatment durations, reflecting individualized treatment plans based on factors such as disease severity and treatment response. Instances of loss to follow-up further highlight the challenges associated with treatment adherence and the importance of diligent monitoring to optimize therapy outcomes. Finally, Table 11 provides insights into neurovascular deficits associated with osteoarticular TB. While the majority of patients do not exhibit significant deficits (54.55%), various degrees of impairment are observed in the remaining cases, indicating the potential for TB to cause neurological complications, particularly in cases involving the spine or major joints. The presence of deficits underscores the importance of comprehensive clinical assessments and tailored interventions to manage and mitigate the impact of TB on neurovascular functions effectively. In summary, the comparative discussion highlights the multifaceted nature of osteoarticular TB, emphasizing the need for comprehensive clinical evaluations, individualized treatment approaches, and vigilant monitoring to optimize patient outcomes. These findings provide valuable insights into the epidemiology, treatment, and clinical outcomes of osteoarticular TB, underscoring their significance in informing clinical practice and guiding efforts to improve TB management strategies [16].

CONCLUSION

In conclusion, this study underscores the critical need for early detection, accurate diagnosis, and effective management of osteoarticular tuberculosis to prevent severe morbidity and improve patient outcomes. The comprehensive analysis of patient data highlights the importance of integrating rapid diagnostic tests, thorough clinical assessments, and individualized treatment plans. The findings also reveal significant age-related and socio-economic disparities in OA TB prevalence, emphasizing the necessity for targeted public health interventions, especially in high-burden regions. By harmonizing diagnostic and treatment practices globally and addressing specific challenges faced by vulnerable populations, we can significantly enhance TB management strategies and reduce the global burden of osteoarticular tuberculosis.

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