International Journal of Neurology Sciences

ISSN Print: 2664-6161
ISSN Online: 2664-617X
IJNS 2025; 7(1): 84-87
www.neurologyjournal.in
Received: 09-06-2025
Accepted: 11-07-2025

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Prevalence of spinal tuberculosis observed in northern areas of Bangladesh

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DOI: https://www.doi.org/10.33545/26646161.2025.v7.i1b.42

Abstract
Background: Tuberculosis (TB) remains a primary global health concern, particularly in low- and middle-income countries like Bangladesh, which ranks among the top 30 high-burden nations. Despite national control efforts, regional disparities in TB prevalence persist, especially in northern Bangladesh. This region, marked by rural poverty, limited healthcare access, and social stigma, may face underreporting and undiagnosed Spinal TB cases. Contributing factors include malnutrition, comorbidities, and seasonal migration. Regional epidemiological insights are vital to guide targeted interventions and support Bangladesh's alignment with the WHO End TB Strategy goals for 2030.
Aim of the study: This study aims to assess the prevalence of spinal tuberculosis in the northern areas of Bangladesh through a cross-sectional observational approach.
Methods: This retrospective observational study assessed Spinal TB prevalence among 45 suspected cases at Shaheed Ziaur Rahman Medical College and Hospital, Bogura, from January 2020 to December 2023. Patients of all ages and sexes who underwent diagnostic evaluations for Spinal TB were included, while incomplete records or non-TB diagnoses were excluded. Data were extracted from patient records using a structured checklist covering socio-demographic, clinical, and diagnostic information. Diagnostic methods included X-ray Spine, MRI of Spine, CT scan of spine, Image guided FNAC or Biopsy, GeneXpert, and culture. TB status and classification were noted. Data were entered into Excel and analyzed in SPSS v26.0 using descriptive statistics to determine the proportion of confirmed Spinal TB cases.
Results: Among 45 suspected Spinal TB patients, 48.89% were confirmed cases. Most participants were aged 25–44 years (44.44%) and male (62.22%), with primary or no formal education. Farmers and laborers were the predominant occupations, and 60% lived in rural areas. Clinically, the most commonly reported symptom was a motor weakness were (66.67%), followed by Sensory deficit (60.0%), Bladder dysfunction (40.0%), and Bowel dysfunction (56.6%). A smaller proportion reported hemoptysis (22.22%) or had a history of TB (15.56%). Notably, 28.89% had close contact with known TB patients, and 75.56% showed a BCG vaccination scar. Culture was performed in 15 participants, of which 66.67% were culture-positive. Overall, 37 participants (82.22%) were confirmed to have TB, while 08 (17.88%) were TB-negative.
Conclusion: This study reveals a significant TB burden in northern Bangladesh, especially among rural, low-educated young males. The high prevalence of pulmonary and MDR-TB stresses the urgent need for improved diagnostics, targeted public health strategies, and strengthened treatment programs to reduce TB transmission and drug resistance in the region effectively.

Keywords: Spinal Tuberculosis, Prevalence, Pulmonary TB.

Introduction
Spinal Tuberculosis (TB), caused by Mycobacterium tuberculosis, continues to be one of the leading infectious causes of morbidity and mortality globally, particularly in low- and middle-income countries (LMICs) [1]. Despite concerted global efforts and the implementation of directly observed treatment, short-course (DOTS), the disease remains a significant public health challenge. In 2022, the World Health Organization (WHO) reported approximately 10.6 million new cases of TB worldwide, with an estimated 1.3 million TB-related deaths among HIV-negative individuals and an additional 167,000 deaths among HIV-positive individuals [2].

Bangladesh ranks among the top 30 high-burden TB countries, accounting for approximately 3.6% of the global TB burden in 2022 [3]. Geographically, the prevalence of Spinal TB within Bangladesh varies across regions and is influenced by socioeconomic, environmental, and health system-related factors [4]. The northern areas of Bangladesh, characterized by rural landscapes, limited access to advanced healthcare facilities, and low literacy levels, may have unique epidemiological patterns of Spinal TB compared to more urbanized regions. Historically underserved and prone to underreporting, these areas warrant detailed epidemiological investigation to inform regional Spinal TB control strategies [5]. Despite several national reports on Spinal TB incidence, regional and sub-regional analyses remain sparse or inadequately represented in the literature, especially from the northern zones. Multiple studies have emphasized that poverty, malnutrition, overcrowding, and lack of awareness contribute significantly to Spinal TB transmission and hinder timely diagnosis and treatment [6, 7]. In northern Bangladesh, these factors are often exacerbated by seasonal unemployment, low healthcare accessibility, and stigma associated with infectious diseases. Additionally, the presence of comorbid conditions such as diabetes mellitus and chronic obstructive pulmonary disease (COPD), which are prevalent in rural Bangladesh, may further increase susceptibility to Spinal TB [8]. Furthermore, migratory labor patterns typical in the north may act as a conduit for spreading TB within and outside the region [9]. There is a growing concern that these regions may harbor a substantial number of undetected or unreported cases due to diagnostic challenges, weak surveillance, and socio-cultural barriers [10]. Recent studies in other regions of Bangladesh, such as Dhaka, Chattogram, and Khulna, have shown varying prevalence rates depending on population density, urbanization, and healthcare availability [11, 12]. However, the actual burden in the northern districts remains underexplored. Baseline prevalence data from this area is crucial for policymakers and health officials to allocate resources effectively and develop region-specific intervention strategies. Such information would also support the country's alignment with the End TB Strategy, which aims to reduce TB incidence by 80% and deaths by 90% by 2030 [2]. Therefore, this study aims to assess the prevalence of Spinal tuberculosis in the northern areas of Bangladesh through a cross-sectional observational approach.

Methodology and Materials

This study employed a retrospective observational design to assess the prevalence of spinal tuberculosis (TB) in northern Bangladesh. The study population included 45 patients who presented with clinical features suggestive of TB and underwent diagnostic testing from January 2020 to December 2023. The study was conducted in Shaheed Ziaur Rahman Medical College and Hospital (SZMCH), Bogura, Bangladesh, a public tertiary care hospital serving as a referral center for the northern region.

Inclusion Criteria:

- Patients of all age groups and both sexes.
- Patients who underwent diagnostic evaluation for suspected TB (e.g. X-ray Spine, MRI of Spine, CT scan of spine, Image guided FNAC or Biopsy, GeneXpert, and culture.).
- Records containing sufficient demographic, clinical, and diagnostic data.

Exclusion Criteria

- Incomplete or missing medical records.
- Patients whose final diagnosis was not tuberculosis and had no relevant TB-related symptoms or test results.

Data Collection:

Data were collected using a structured checklist designed to systematically capture key information, including socio-demographic details (age, sex, education, occupation, residence, smoking status, and family size), clinical characteristics (such as pain, neurological symptoms, fever, weight loss, , history of tuberculosis, presence of BCG vaccination scar, and TB contact history), diagnostic findings (X-ray Spine, MRI of Spine, CT scan of spine, Image guided FNAC or Biopsy, GeneXpert, and culture.) This information was manually reviewed and extracted from patient registers, laboratory reports, and electronic health records where available.

Data Analysis:

All data were entered into Microsoft Excel 2024 and analyzed using SPSS version 26.0. Descriptive statistics, including frequencies and percentages, were calculated for all categorical variables. Spinal TB prevalence was calculated as the proportion of confirmed Spinal TB cases among the total suspected cases included in the study.

Ethical Considerations:

The ethical standards of retrospective clinical research conducted the study. Approval was obtained from the Institutional Review Board (IRB) of Shaheed Ziaur Rahman Medical College, and administrative permissions were taken from the respective hospitals. Since the study involved the analysis of anonymized secondary data, individual patient consent was not required. Confidentiality and data privacy were strictly maintained throughout the research process.

Results

A total of 45 individuals suspected of having spinal tuberculosis (Spinal TB) were evaluated in this study. The majority of participants were in the 25-44 years age group (44.44%), followed by those aged ≥45 years (33.33%) (Table 1). Males represented a larger proportion of the study population (62.22%) than females (37.78%). Most participants had primary education (33.33%) or no formal education (26.67%). Farmers (31.11%) and laborers (22.22%) were the largest occupational groups. A greater percentage resided in rural areas (60.00%) than urban areas (40.00%). Regarding smoking status, 33.33% were current smokers, while 44.44% had never smoked. More than half of the participants (57.78%) had family sizes over four. Clinically, the most commonly reported symptom was a motor weakness were (66.67%), followed by Sensory deficit (60.0%), Bladder dysfunction (40.0%), and Bowel dysfunction (56.6%) (Table 2). A smaller proportion reported hemoptysis (22.22%) or had a history of TB (15.56%). Notably, 28.89% had close contact with known TB patients, and 75.56% showed a BCG vaccination scar. Culture was performed in 15 participants, of which 66.67% were culture-positive. Overall, 37 participants (82.22%) were confirmed to have TB, while 08 (17.88%) were TB-negative.

Table 1: Socio-demographic Characteristics of the Study Participants (n = 45)

Categories	Frequency (n)	Percentage (%)
Age Group (years)		
<15	2	4.44
15–24	8	17.78
25–44	20	44.44
≥45	15	33.33
Sex		
Male	28	62.22
Female	17	37.78
Educational Level		
No formal education	12	26.67
Primary	15	33.33
Secondary	10	22.22
Higher	8	17.78
Occupation		
Farmer	14	31.11
Laborer	10	22.22
Housewife	9	20.00
Student	6	13.33
Others	6	13.33
Residence		
Urban	18	40.00
Rural	27	60.00
Smoking Status		
Current	15	33.33
Former	10	22.22
Never	20	44.44
Family Size		
≤4	19	42.22
>4	26	57.78

Table 2: Distribution of Clinical Features and Risk Factors among Suspected TB Cases

Clinical Feature / Risk Factor	Frequency (n)	Percentage (%)
Local pain	45	100.0
Motor weakness	30	66.67
Sensory deficit	27	60.00
Bladder dysfunction	18	40.0
Bowel dysfunction	12	56.6
History of TB	7	15.56
Close contact with TB patient	4	8.8
BCG Scar Present	34	75.56

Table 3: Diagnostic Test Results for Tuberculosis Detection

Diagnostic Method	Frequency (n) (X-ray spine)	Percentage (%)
Positive	20	44.4
Negative	25	55.6
MRI of Spine		
Positive	37	82.22
Negative	08	17.88
GeneXpert MTB/RIF		
Detected	07	15.5
Not detected	04	8.8
Not done	34	75.5
Rifampicin Resistance		
Resistant	4	8.89
Sensitive	18	40.00
Not Done	23	51.11
Histopathology (n=31)		
Positive	26	83.8
Negative	5	16.2

Discussion

This cross-sectional observational study aimed to assess Spinal tuberculosis (TB) prevalence and characteristics among suspected cases in the northern areas of Bangladesh. The overall Spinal TB prevalence in this study was 48.89%, which aligns with previous reports from Bangladesh and other high-burden countries in South Asia [13, 14]. The predominance of TB in the 25–44 years age group (44.44%) reflects the higher vulnerability of the economically productive population, consistent with global epidemiological trends where TB primarily affects young and middle-aged adults [15]. Gender distribution showed a male predominance (62.22%), similar to findings from other regional studies, which attribute this to socio-behavioral factors such as higher smoking rates and increased occupational exposure among males [16, 17]. The high proportion of farmers and laborers, as TB suspects, suggests that occupational risk factors, including poor working conditions and low socioeconomic status, may contribute to increased susceptibility [18]. Education level and rural residence were notable demographic features in this cohort. The majority had primary or no formal education and lived in rural areas, highlighting the persistent challenges of TB control in less educated and rural populations, where awareness and access to health services may be limited [19]. Similar trends have been reported in studies from Bangladesh and neighboring countries, underscoring the need for tailored community-based interventions to improve early diagnosis and treatment adherence [20]. Clinically, the most common symptoms prolonged cough, fever, weight loss, and night sweats are classic presentations of active TB and consistent with WHO diagnostic criteria [15]. Clinically, the most commonly reported symptom was a motor weakness were (66.67%), followed by Sensory deficit (60.0%), Bladder dysfunction (40.0%), and Bowel dysfunction (56.6%). However, the relatively lower proportion of hemoptysis (22.22%) reflects variability in symptom expression, possibly influenced by disease stage or site. A smaller proportion reported hemoptysis (22.22%) or had a history of TB (15.56%). Notably, 28.89% had close contact with known TB patients, and 75.56% showed a BCG vaccination scar of participants aligns with national immunization coverage data but reinforces that BCG does not confer complete protection against pulmonary TB, particularly in adults [21]. The diagnostic performance showed that MRI of spine detected TB in a higher percentage of cases (60%) compared to X-ray spine (44.40%), corroborating the increased sensitivity of molecular testing methods documented in multiple studies [22, 23]. The detection of rifampicin resistance in 8.89% of cases highlights the ongoing threat of drug-resistant TB, consistent with previous reports from Bangladesh, where MDR-TB prevalence ranges from 3% to 10% among new and retreatment cases [24, 25]. Histopathology was performed in 31 participants, of which 68.8% were positive. Overall, 37 participants (82.22%) were confirmed to have TB, while 08 (17.88%) were TB-negative. The 18.18% MDR-TB rate among confirmed cases in this study, though slightly higher, may reflect local epidemiological variations or referral bias in tertiary care settings. Pulmonary TB accounted for most cases (81.82%), which is typical given its higher transmissibility and more frequent clinical detection than extrapulmonary forms [25].

Limitations of the study

Limitations of this study include the small sample size and selection bias toward symptomatic individuals attending health facilities, which may overestimate prevalence relative to community-based screening. Additionally, incomplete drug susceptibility testing in over half of the participants limits the comprehensive assessment of resistance patterns.

Conclusion and Recommendations

In conclusion, this study highlights the substantial burden of Spinal TB in northern Bangladesh, particularly among young males in rural, low-education settings with occupational risks. Spinal TB and cases underscores the need for strengthened diagnostic capacity, targeted public health interventions, and robust treatment programs to curb transmission and drug resistance in this region.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee.

References

1. World Health Organization. Global tuberculosis report 2013. Geneva: World Health Organization; 2013.
2. World Health Organization. The End TB Strategy. Geneva: World Health Organization; 2015 [Internet]. 2015.
3. National TB Control Programme (NTP), Bangladesh. Annual TB Report 2023. Dhaka: NTP; 2023.
4. Kundu S, Marzan M, Gan SH, Islam MA. Prevalence of antibiotic-resistant pulmonary tuberculosis in Bangladesh: a systematic review and meta-analysis. Antibiotics. 2020;9(10):710.
5. Akhtar S, White F, Hasan R, Rozi S, Younus M, Ahmed F, Husain S, Khan BS. Hyperendemic pulmonary tuberculosis in peri-urban areas of Karachi, Pakistan. BMC Public Health. 2007; 7:70.
6. Bhargava A, Chatterjee M, Jain Y, Chatterjee B, Kataria A, Bhargava M, Kataria R, D'Souza R, Jain R, Benedetti A, Pai M. Nutritional status of adult patients with pulmonary tuberculosis in rural central India and its association with mortality. PLoS One. 2013;8(10):e77979.
7. Barakat M, Al-Qudah RA, Akour A, Al-Qudah N, Dallal Bashi YH. Unforeseen uses of oral contraceptive pills: exploratory study in Jordanian community pharmacies. PLoS One. 2020;15(12):e0244373.
8. Sarker M, Barua M, Guerra F, Saha A, Aftab A, Latif AM, Islam S, Islam A. Double trouble: prevalence and factors associated with tuberculosis and diabetes comorbidity in Bangladesh. PLoS One. 2016;11(10):e0165396.
9. Ahmed SM, Evans TG, Standing H, Mahmud S. Harnessing pluralism for better health in Bangladesh. The Lancet. 2013;382(9906):1746–1755.
10. Zaman K, Yunus M, Arifeen SE, Baqui AH, Sack DA, Hossain S, Rahim Z, Ali M, Banu S, Islam MA, Begum N. Prevalence of sputum smear-positive tuberculosis in a rural area in Bangladesh. Epidemiology and Infection. 2006;134(5):1052–1059.
11. Chowdhury AS, Ahmed MS, Ahmed S, Khanam F, Farjana F, Reza S, Islam S, Islam A, Khan JA, Rahman M. Estimating catastrophic costs due to pulmonary tuberculosis in Bangladesh. Journal of Epidemiology and Global Health. 2021;11(1):83–91.
12. Leela FR. Assessing TB infection control and preventive measures in TB patients in Chattogram metropolitan area [dissertation]. Chattogram: Chattogram Veterinary & Animal Sciences University; 2020.
13. Banu S, Rahman MT, Uddin MK, Khatun R, Ahmed T, Rahman MM, Husain MA, van Leth F. Epidemiology of tuberculosis in an urban slum of Dhaka City, Bangladesh. PLoS One. 2013;8(10):e77721.
14. World Health Organization. Global tuberculosis report 2021: supplementary material. Geneva: World Health Organization; 2022.
15. Sreeramareddy CT, Qin ZZ, Satyanarayana S, Subbaraman R, Pai M. Delays in diagnosis and treatment of pulmonary tuberculosis in India: a systematic review. The International Journal of Tuberculosis and Lung Disease. 2014;18(3):255–266.
16. Ahsan G, Ahmed J, Singhasivanon P, Kaewkungwal J, Okanurak K, Suwannapong N, Akarasewi P, Majid MA, Begum V, Belayetali K. Gender difference in treatment-seeking behaviors of tuberculosis cases in rural communities of Bangladesh. Southeast Asian Journal of Tropical Medicine and Public Health. 2004; 35:126–135.
17. Lönnroth K, Jaramillo E, Williams BG, Dye C, Raviglione M. Drivers of tuberculosis epidemics: the role of risk factors and social determinants. Social Science & Medicine. 2009;68(12):2240–2246.
18. Uplekar M, Weil D, Lonnroth K, Jaramillo E, Lienhardt C, Dias HM, Falzon D, Floyd K, Gargioni G, Getahun H, Gilpin C. WHO's new End TB Strategy. The Lancet. 2015;385(9979):1799–1801.
19. Sarker M, Mohammad D, Paul S, Akter R, Islam S, Biswas G, Hossain A, Islam A. Lost in care pathway: a qualitative investigation on the health system delay of extrapulmonary tuberculosis patients in Bangladesh. BMC Health Services Research. 2017;17:240.
20. Fine PE. Variation in protection by BCG: implications of and for heterologous immunity. The Lancet. 1995;346(8986):1339–1345.
21. Li S, Liu B, Peng M, Chen M, Yin W, Tang H, Luo Y, Hu P, Ren H. Diagnostic accuracy of Xpert MTB/RIF for tuberculosis detection in different regions with different endemic burden: a systematic review and meta-analysis. PLoS One. 2017;12(7):e0180725.
22. Geleta DA, Megerssa YC, Gudeta AN, Akalu GT, Debele MT, Tulu KD. Xpert MTB/RIF assay for diagnosis of pulmonary tuberculosis in sputum specimens in remote health care facility. BMC Microbiology. 2015; 15:26.
23. Hossain ST, Isaakidis P, Sagili KD, Islam S, Islam MA, Shewade HD, Kamal SM, Husain A. The multi-drug-resistant tuberculosis diagnosis and treatment cascade in Bangladesh. PLoS One. 2015;10(6):e0129155.
24. Stephanie F, Saragih M, Tambunan US. Recent progress and challenges for drug-resistant tuberculosis treatment. Pharmaceutics. 2021;13(5):592.
25. Sharma SK, Mohan A. Extrapulmonary tuberculosis. Indian Journal of Medical Research. 2004;120(4):316–353