



Clinical Characteristics of Extrapulmonary Tuberculosis At dr. Zainoel Abidin General Hospital In 2024

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Abstract

Background: Extrapulmonary tuberculosis (EPTB) is an infection caused by *Mycobacterium tuberculosis* (*M. tuberculosis*) that affects organs outside the lungs and is associated with diverse clinical manifestations. This study aimed to describe the clinical characteristics of EPTB at dr. Zainoel Abidin General Hospital in Banda Aceh in 2024.

Method: A descriptive retrospective study was conducted using secondary data obtained from the medical records of patients diagnosed with EPTB between January 2024 and December 2024. Total sampling was employed, and a total of 108 patients met the inclusion criteria.

Results: Most patients were male and aged 19–44 years. The most common site of infection was bone tuberculosis, identified in 44 patients (40.7%), followed by lymph node and pleural involvement. Molecular rapid testing (MRT)/gen expert MTB Rif was performed for 43 patients, with *M. tuberculosis* detected in 19 patients (17.6%). The most frequently performed imaging examination was vertebral MRI (37.5%), which demonstrated lesions consistent with bone tuberculosis. Histopathological examination was performed in 59 patients, with 42 (38.9%) showing histopathological features characteristic of tuberculosis, including granulomas with caseous necrosis, Langhans giant cells, lymphocytic infiltration, or the presence of TB bacilli. Most patients (91.7%) completed their treatment, and diabetes mellitus (17.6%) was the most common comorbidity.

Conclusion: Extrapulmonary tuberculosis at dr. Zainoel Abidin General Hospital in 2024 was more common among males aged 19–44 years, with the bones being the most frequently affected site.

Keywords: clinical characteristics, dr. Zainoel Abidin General Hospital, extrapulmonary tuberculosis

INTRODUCTION

Tuberculosis (TB) is an infectious disease caused by *Mycobacterium tuberculosis* (*M. tuberculosis*) and remains a major global health problem. TB has the potential to become once again the leading cause of death attributable to an infectious disease, after previously being surpassed by COVID-19. Transmission occurs through airborne droplet nuclei measuring approximately 1–5 microns in diameter, which can remain suspended in the air and subsequently enter the respiratory tract.¹

Although TB primarily affects the lungs, *M. tuberculosis* can also infect other organs, resulting in extrapulmonary tuberculosis (EPTB). The host immune response plays an important role in determining whether infection progresses to active disease or remains latent.²

Globally, the World Health Organization (WHO) reported approximately 10.8 million cases of TB and 1.25 million TB-related deaths in 2023.³ Meanwhile, EPTB is known to account for approximately 16% of all TB cases, although the actual proportion may be higher because of underdiagnosis and underreporting. Indonesia itself reported approximately 1,060,000 TB cases, with 92% pulmonary TB and 8% EPTB, with Aceh Province recorded 17,596 cases of pulmonary TB.⁴

Extrapulmonary TB has the capacity to involve various organs, including the pleura, lymph nodes, abdomen, bones, and meninges. The clinical characteristics of this condition are intricate in nature due to

the fact that the symptoms it presents with are frequently non-specific. These symptoms may include fever, weight loss and weakness, and as such, the condition may be erroneously misdiagnosed due to its similarity to other disease.⁵ Diagnosis is often delayed because diagnostic resources are limited and the clinical manifestation of the condition is subject to significant variability. In order to diagnose this condition, a combination of molecular, histopathological and clinical examinations is required.⁴

Lubis et al reported that adults of productive age are known to represent the most affected age group globally, with Indonesia reporting the highest incidence among individuals aged 45–54 years.⁶ The risk of disease progression and poor outcomes increases in patients with comorbidities such as HIV infection and diabetes mellitus (DM). Furthermore, EPTB may occur as a manifestation of advanced HIV infection and AIDS.⁷

The management of EPTB generally follows the same antituberculosis regimen as pulmonary TB, although the treatment duration may be extended to at least 9 months depending on the site and severity of disease.⁸ Wesnawa and Kusmiati, and also Larissa, reported a case involving drug-induced hepatitis in pulmonary TB with multisite extrapulmonary TB. Therapeutic monitoring is also more challenging because treatment response cannot always be assessed through microbiological examination.^{9,10}

The heterogeneity of patient characteristics, the organs affected,

treatment response, and the presence of comorbidities contribute to the complexity of EPTB, necessitating a high level of clinical attention. Therefore, this study aimed to describe of the characteristics of patients with EPTB at dr. Zainoel Abidin General Hospital, Banda Aceh, in 2024.

METHOD

The present study was of a descriptive and quantitative design, using a cross-sectional method. The study was conducted at dr. Zainoel Abidin General Hospital, Banda Aceh, a referral hospital for cases of tuberculosis. The data collection period occurred from June to September 2025. The study population comprised all patients diagnosed with EPTB who were recorded at the DOTS Clinic of dr. Zainoel Abidin General Hospital in 2024.

The study sample consisted of patients who met the inclusion criteria, namely individuals aged ≥ 18 years with a diagnosis of EPTB established based on clinical findings and/or supporting examinations, including laboratory tests, radiological examinations, or histopathological examinations. Patients with both EPTB and pulmonary TB were also included in the study, as were patients who were still receiving antituberculosis therapy and those who had completed treatment. The exclusion criteria were defined as incomplete medical record data.

Purposive sampling was used, whereby all patients in the population who met the inclusion and exclusion criteria were included in the study sample. The

sample size was determined on the basis of the total number of EPTB patients for whom complete medical record data were available in 2024.

The data were secondary data obtained from patients' medical records, including demographic characteristics, the anatomical site of infection, a history of pulmonary TB, MRT results, chest radiographic findings, histopathological findings, other radiological findings, comorbidities, and treatment status. The research instrument was a data collection form developed based on the predetermined operational variables.

Data analysis was performed using univariate analysis to describe the frequency distribution and percentage of each variable, thereby providing an overview of the characteristics of patients with EPTB at dr. Zainoel Abidin General Hospital in 2024.

RESULTS

A total of 108 patients were included in the study. Among them, 63 patients (58.3%) were patients with EPTB, while the remaining patients had both EPTB and pulmonary TB. The mean age of patients with EPTB was 40.13 ± 16.85 years, with the largest proportion belonging to the 19–44 years age group (adults). The distribution by gender was relatively balanced between male and female patients.

Regarding the sites of EPTB involvement, TB of the bone was the most common, affecting 44 patients (40.7%),

followed by pleural TB in 21 patients (19.4%) and TB of the lymph node in 18 patients (16.7%).

Table 1. General Characteristics of Patients (n=108)

Variable	n	%
Tuberculosis		
Extrapulmonary TB	63	58.3
Pulmonary TB+ Extrapulmonary TB	45	41.7
Age, mean±SD	40.13±16.85	
19–44 years (adult)	68	63.0
45–59 years (pre-elderly)	20	18.5
≥60 years (elderly)	20	18.5
Gender		
Male	56	51.9
Female	52	48.1
Affected Organ		
Lymph nodes	18	16.7
Skin	1	0.9
Pleura	21	19.4
Meninges	9	8.3
Intestinal peritoneum	5	4.6
Bone	44	40.7
Oral	1	0.9
Eye	8	7.4
Skin+Pleura	1	0.9

Table 2 shows that MRT results were available for 43 patients (39.8%), in which *M. tuberculosis* was detected in 19 subjects (17.6%). Molecular rapid testing (MRT) was performed on extrapulmonary specimens in only 10 patients, while sputum specimens were used in the remaining patients. The extrapulmonary specimens examined by MRT included ascitic fluid, pus from skin lesions, biopsy tissue, pleural fluid, pleural pus, and cerebrospinal fluid.

Table 2. Characteristics of EPTB Based on MRT Examination (n=108)

MRT	n	%
<i>M. tuberculosis</i> detected	19	17.6

<i>M. tuberculosis</i> not detected	24	22.2
Not performed	65	60.2

Table 3. Description of Extrapulmonary TB Based on Radiological Examination (n=108)

Variable	n	%
Examination Other Than Chest X-rays		
Non-thoracic X-ray	10	9.3
CT scan	21	19.4
MRI	24	22.2
Ultrasound	9	8.3
No data	44	40.7
Examination Based on Chest X-rays		
Apical lung infiltrate	28	25.9
Miliary	1	0.9
Pleural effusion	32	29.6
Fibrotic	2	1.9
Normal	28	25.9

Table 3 shows that types of radiological examinations were performed to support the diagnosis of EPTB, including non-thoracic X-rays, CT scans, magnetic resonance imaging (MRI), and ultrasonography, where the results were available for only 64 patients (59.3%). The MRI, especially vertebral MRI, was the most frequently performed supporting radiological examination aside from chest X-ray, counted for 24 patients (22.2%), with all cases diagnosed with bone TB. Meanwhile, CT scans were performed in 21 patients (19.4%), with head CT performed in 9 patients with TB meningitis, while thoracic CT was performed in 8 patients with pleural TB.

In addition, chest X-rays were also performed as part of the diagnostic evaluation to assess for pulmonary involvement, with the results available for 91 patients (84.3%). Pleural effusion was the most common chest X-ray finding, observed in 32 patients (29.6%), followed by pulmonary infiltrates and normal chest

X-ray findings, each observed in 28 patients (25.9%).

Table 4. Characteristics of Extrapulmonary TB Based on Histopathological Examination (n=108)

Histopathological Examination	n	%
Consistent with TB features	42	38.9
Not consistent with TB features	17	15.7
No data	49	45.4

Histopathological examination, as shown in Table 4, was performed in some patients to support the diagnosis of extrapulmonary TB, with 59 (54.6%) having histopathological examination results. The specimens examined included lymph node biopsy, bone tissue, skin tissue, pleural tissue, oral cavity tissue, ocular tissue, and cerebrospinal fluid, with a total of 42 patients (38.9%) showing histopathological features consistent with TB.

Table 5. Characteristics of Extrapulmonary TB Based on Treatment Status from SITB (n=108)

Treatment Status	n	%
Cured	9	8.3
Completed	83	76.9
Died	6	5.6
Lost to follow-up	1	0.9
Not evaluated	9	8.3

In Table 5, treatment outcomes could be evaluated for 99 patients (91.7%), with 83 patients (76.9%) having completed treatment. Of the total 99 patients whose treatment outcomes could be evaluated, 83 patients (76.9%) had completed treatment. Most patients with EPTB were in the completed treatment category, particularly those with bone, pleural, and lymph node TB. In patients who were declared cured, most of them had pleural and bone TB.

Meanwhile, deaths were most commonly reported among patients with lymph node and meningeal TB. Only one case of loss to follow-up was reported, involving a patient with ocular TB. Patients whose treatment outcomes could not be evaluated were mostly those with bone TB.

Thirty-three patients (30.6%) had comorbidities, as shown in Table 6. HIV testing was performed in 93 patients (86.1%), and 1 patient (0.9%) tested positive. Meanwhile, DM was the most common comorbidity and was found in 19 patients (17.6%).

Table 6. Characteristics of Extrapulmonary TB Based on Comorbidities (n=108)

Comorbidity	n	%
DM	19	17.6
Malignancy	5	4.6
HIV	1	0.9
Severe infection	4	3.7
Hypertension	4	3.7
No data	75	69.4

Note: DM=diabetes mellitus; HIV=human immunodeficiency virus

DISCUSSION

A total of 108 patients with EPTB were analyzed in this study, of whom 63 (58.3%) had isolated EPTB, while 45 (41.7%) had EPTB accompanied by pulmonary TB. These findings indicate that EPTB can occur either as an isolated disease or in combination with pulmonary involvement. Consistent with Fang et al who reported in a large retrospective study conducted in Shanghai that EPTB occurred both as an isolated disease and in combination with pulmonary TB.¹¹

However, the proportion of patients with combined EPTB and pulmonary TB

varied across study populations and clinical settings. Qian et al suggested that these differences may be related to variations in case definitions, referral patterns, and diagnostic practices between healthcare facilities.¹²

The largest proportion of patients in this study belonged to the 19–44-year age group (63.0%), followed by those aged 45–59 years (18.5%) and ≥60 years (18.5%). This finding indicates that EPTB predominantly affected individuals of productive age in this study. This finding aligns with the results of other studies in this field. However, the age distribution of EPTB varies across different populations, as reported by Hailu et al and Niu et al.^{13,14}

A large epidemiological study of EPTB by Li et al in China found differences in age distribution between patients with isolated EPTB and those with both EPTB and pulmonary TB.¹⁵ Shivakumar et al also reported differences in age-related patterns across geographical and demographic groups. Consequently, the preponderance of patients of reproductive age in the present study may be indicative of the characteristics of the hospital population and the local epidemiological pattern, as opposed to a specific age-related predisposition to EPTB.¹⁶

The current data reveal a slight predominance of male patients over female patients, with male patients accounting for 51.9% of the sample and female patients accounting for 48.1%. This finding is consistent with several studies reporting a slight male predominance among patients with EPTB. For instance, Yu et al

documented a male-to-female ratio of 2.03:1 among patients with EPTB in South-Central China.¹⁷

Nevertheless, the correlation between gender and EPTB has proven to be inconsistent across various studies. Yıldız et al reported a higher proportion of EPTB among females, while Devi et al demonstrated gender-specific differences according to the anatomical site involved. These variations may be attributable to biological, behavioural, occupational, environmental, and healthcare-seeking factors. It is also important to note that the distribution of this data may vary according to the specific form of EPTB.^{18,19}

In this study, bone was the most frequently affected site, accounting for 44 patients (40.7%), followed by pleural TB (19.4%) and lymph node TB (16.7%). This finding is in contrast to the results of several previous studies, in which lymph node or pleural TB was the predominant form of EPTB. Djannah et al whom conducted a study in West Nusa Tenggara, Indonesia, which identified cervical lymphadenitis as one of the most prominent extrapulmonary tuberculosis (EPTB) manifestations.²⁰ Meiyanti et al also reported on tuberculosis treatment outcomes and associated factors in West Nusa Tenggara, Indonesia, revealing lymph node and pleural involvement as the most common sites.²¹

Conversely, musculoskeletal involvement manifested as a significant proportion of EPTB in several other populations. The relatively high proportion of bone TB in the present study may be

attributable to the role of Dr. Zainoel Abidin General Hospital as a referral centre and the availability of advanced imaging, particularly MRI. These factors may facilitate the detection of spinal and other musculoskeletal lesions. The anatomical predilection of bone TB may also be related to the hematogenous dissemination of *M. tuberculosis* to skeletal tissues, particularly those of the vertebral column and other areas with high vascularity, as discussed by Sadewo et al.²²

Molecular rapid testing was performed in 43 patients (39.8%), with *M. tuberculosis* detected in 19 patients (44.2%). The relatively limited use of MRT and the proportion of positive results should be considered in light of the diagnostic challenges of EPTB, as reported by the Ministry of Health of the Republic of Indonesia.²³

Unlike pulmonary TB, extrapulmonary specimens often contain a low bacillary burden. Obtaining adequate specimens may also require invasive procedures. Dhestina et al explained that the diagnostic yield of GeneXpert/MRT may vary considerably according to the type of extrapulmonary specimen.²⁴ A study by Akbar et al which also evaluated GeneXpert in EPTB, reporting lower positivity in extrapulmonary specimens than in pulmonary specimens.²⁵

Another study by Nurfan et al found that GeneXpert improved TB detection compared with smear microscopy and culture in several types of extrapulmonary specimens.²⁶ Therefore, a negative molecular test does not necessarily rule out

EPTB when clinical, radiological, or histopathological findings remain suggestive of the disease. This is consistent with the WHO guidance on tuberculosis treatment outcome definitions.²⁷

Radiological examination was important for identifying sites of EPTB involvement. Vertebral MRI was the most frequently performed radiological examination in this study, accounting for 37.5% of all examinations. This finding is consistent with the high proportion of bone TB observed in the study population. Wilmink et al reported that MRI is particularly useful for evaluating vertebral and spinal involvement because it can demonstrate abnormalities of the vertebral bodies, intervertebral discs, paravertebral soft tissues, and possible neurological complications.²⁸

The chest X-ray findings in this study were also found to be variable. The most prevalent finding was pleural effusion, followed by pulmonary infiltrates and normal chest X-ray results. This variation is of clinical significance as EPTB may present with or without pulmonary involvement.

In patients with combined EPTB and pulmonary TB, the presence of pulmonary abnormalities may offer supporting evidence for the diagnosis, as reported by Zürcher et al.²⁹ Conversely, patients with isolated EPTB may exhibit normal chest radiographs. Therefore, a standard chest X-ray does not exclude the presence of EPTB, particularly when clinical manifestations and imaging findings indicate such involvement, as discussed by Kyagulanyi et al.³⁰

Azad and Chowdhury, and also Rukmi et al reported that EPTB can present with variable and sometimes non-specific radiological findings.^{31,32} Imaging therefore remains an important part of the diagnostic evaluation when interpreted together with clinical and laboratory findings, as discussed by Rajagopal et al.³³

Histopathological examination was conducted in 59 patients, showing features consistent with TB in 42 patients (71.2%). These findings included caseating granulomas, Langhans giant cells, lymphocytic infiltration, and/or the presence of TB bacilli. The relatively high proportion of supportive histopathological findings highlights the important role of tissue examination in the diagnosis of EPTB, as Biakto et al explained. This is particularly relevant because microbiological confirmation can be difficult in paucibacillary disease.³⁴

A study by Arega et al also highlighted the diagnostic challenges of EPTB, and Rao et al which evaluated the use of immunohistochemistry for diagnosing EPTB in biopsy tissue specimens, concluded that histopathological examination may provide important diagnostic evidence, particularly when granulomatous inflammation is present.^{35,36} However, histopathological findings may be nonspecific in some cases and should therefore be interpreted alongside clinical, radiological, and microbiological findings, as discussed by Liu and Jiang.³⁷

In this study, the majority of patients had completed treatment (76.9%).

However, the proportion of patients classified as cured was lower, as also reported by Klingmüller et al.³⁸ Aysha et al and Güler et al also explained the difficulties of obtaining bacteriological confirmation in EPTB after treatment. In contrast to pulmonary TB, where the examination of sputum can frequently assess bacteriological conversion, extrapulmonary disease may necessitate the procurement of tissue or fluid specimens that are challenging to obtain repeatedly.^{39,40} Consequently, treatment outcomes in EPTB are often evaluated using a combination of clinical and radiological responses.

In this study, the most prevalent comorbidity identified was DM, affecting 19 patients (17.6%). This finding is clinically relevant because DM is a well-established comorbidity in TB and may affect host immune responses and treatment outcomes. In previous studies, there is a complex interaction between TB and diabetes mellitus (DM), such as studies by Boadu et al and Khattak et al, which present significant challenges in the treatment of patients with both conditions.^{41,42}

In a national TB-DM programme evaluation in Indonesia, 20.8% of TB patients who underwent diabetes testing were diagnosed with diabetes, and more than 90% of detected TB-DM patients received standard TB treatment, as reported by Jiang et al.⁴³ While the study focused primarily on pulmonary TB, its findings support the importance of recognising diabetes as a significant

comorbidity among patients with TB, including those with extrapulmonary manifestations, as discussed by Sharma et al.⁴⁴

Despite DM being the most prevalent comorbidity, the majority of patients in this study did not have a documented comorbid condition. This finding indicates that EPTB can also occur in patients without recognised immunocompromising conditions, as discussed by Tagore et al.⁴⁵

It has been documented that EPTB may occur in individuals without any significant comorbidities. As demonstrated by Chaw et al and Procee et al, the development of *M. tuberculosis* can be influenced by a variety of factors, including host susceptibility, prior exposure, environmental conditions, and the dissemination of the bacterium to different anatomical sites. Consequently, the absence of comorbidity should not be used to exclude the possibility of EPTB.^{46,47}

This study has several limitations. First, its retrospective design relied on medical records, which resulted in some clinical and supporting examination data being incomplete. Second, MRT was not performed in all patients, particularly using extrapulmonary specimens, which may have limited the assessment of microbiological confirmation.

Third, histopathological and radiological examinations were performed based on clinical indications. This resulted in differences in the availability of supporting diagnostic data between patients. Fourth, treatment outcomes could not be evaluated uniformly in all

patients because some patients were transferred between healthcare facilities or did not complete follow-up at the study hospital. These factors may have affected the completeness and consistency of the data and should be considered when interpreting the findings.

CONCLUSION

A total of 108 patients with extrapulmonary TB were included in the study. Most of them had EPTB without pulmonary involvement, in the adult age group (19–44 years) and male patients were slightly more common. Bone TB was the most common site of extrapulmonary TB. Most patients did not undergo TCM examination, but among those who underwent TCM examination, the most common result was MTB not detected.

Among patients who underwent histopathological examination, one-third showed findings consistent with TB. Pleural effusion was the most common chest X-ray finding. Most patients did not have results from radiological examinations other than chest X-ray. Meanwhile, vertebral MRI was the most frequently performed examination.

Among patients whose treatment status was evaluated, completed treatment was the most common outcome. Most patients did not have comorbidities, but DM was the most common comorbidity. After that, future prospective studies with standardized diagnostic examinations and complete treatment follow-up are needed to provide a more comprehensive

description of EPTB characteristics and treatment outcomes.

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