

Bone Tuberculosis: Clinical Profile of 40 Patients in Dr. Soetomo General Hospital Surabaya

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ABSTRACT

Introduction: Bone and joint tuberculosis are specific infection inflammation of *Mycobacterium tuberculosis*, mostly affected bone and joint confirmed by acceleration of vascular supply to vertebrae and growth line of long bone. The aim of this study is to know clinical profile of bone and joint tuberculosis' patients.

Methods: This study was conducted using descriptive observational method, samples were tested by observation descriptive test.

Results: The average ages of bone and joint tuberculosis hospitalized patients of RSUD Dr. Soetomo Surabaya are 35-44 years. There are 22 cases on male (55%) and 18 cases on female (45%) with 29 subjects of Hb's abnormal number (72.5%), 15 subjects of abnormal leucocytes (37.5%), 20 subjects of abnormal thrombocyte (50%), 34 subjects of abnormal ESR (94.4%), 20 patients of abnormal C-reactive protein (54.1%), 11 subjects of abnormal serum creatinine (28.9%), 13 subjects of abnormal sodium level (35.1%), 15 patients of abnormal potassium level (40.5%), and 16 patients of abnormal chloride level (43.2%). There are 16 subjects with smoking history (40%), 29 subjects of positive tuberculosis history (72.5%), 6 subjects with positive tuberculosis family history (15%), 30 subjects of pain as main problems (75%), 5 subjects of swelling or pus as main problems (12.5%), 5 subjects of extremities disability as main problems (12.5%). Dominant location of infection is vertebrae (95%) which are suffered by 38 subjects with thoracal as the main level of infection, suffered by 15 subjects (50%). Other levels of infection are lumbal with 12 subjects (40%), cervical with 3 subjects (10%), and pelvis or thigh with 2 subjects (5%).

Conclusion: From 40 subjects, bone and joint tuberculosis mostly suffered by elderly, male risks more than female. Most of hematology tests results were abnormal. Most subjects suffered abnormal C-reactive protein. Most subjects' hematology tests were BUN, creatinine serum, and electrolyte normal. Number of subjects with smoking habits was dominant. Most subjects were having tuberculosis history but negative family history. Most subjects complained about pain with vertebrae level thoracal as dominant location of infection.

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Introduction

Bone and joint TB is a chronic disease with an ever-increasing mortality rate in the last decade because it is a difficult infectious disease to treat.¹ Indonesia is in the 9th of the highest estimated numbers of incident TB cases, ranks 7th out of 20 MDR-TB cases, and ranks out of 20 countries with the highest estimated TB numbers of incident cases among people living with HIV.² Globally, TB is still a major problem, in India there are 26% of TB cases.³ TB bone is not only a problem in developing countries but also in developed countries. This infection can attack any organ with 1-3% involvement of bone lesions.⁴

Of the total cases of extrapulmonary TB, 50% of cases were reported as cases of tuberculosis and joints.⁵ Cases of TB infection in the bones and joints are supported by immunodeficiency in young people with pain and swelling in the extremities.⁶ Children are also at high risk for TB infection as adults.

Based on inpatient data from Orthopaedics and Traumatology Department RSUD Dr. Soetomo, from 2015 to 2018, there were 53 cases (9.23%) of Bone TB. This study aims to determine the clinical profile of bone and joint TB which includes hematological examination results, main complaints, comorbidity, history of smoking patients, history of TB patients, family history of exposure to TB, dominant location of infection, and risk factors that can trigger bone TB infection.

Methods

This study was conducted by descriptive observational using secondary data from medical records of inpatients in RSUD Dr. Soetomo Surabaya starting from 2015-2018 and obtained 40 patients with bone TB.

Results

Distribution of Bone and Joint TB According to Age and Sex

Table 1. Distribution of cases according to age.

Age Group	Age Range	Frequency (n)	Percent (%)
1	0-10 years	3	7.5
2	11-20 years	1	2.5
3	21-30 years	11	27.5
4	31-40 years	10	25.0
5	41-50 years	8	20.0
6	51-60 years	5	12.5
7	61-70 years	2	5.0
	Total	40	100

The average age group of bone TB patients based on the analysis results was 4.05 with a standard deviation of 1.501.

Table 2. Distribution of cases according to sex.

	Frequency (n)	Percent (%)
Men	22	55
Women	18	45
Total	40	100

Distribution by sex stated that there were 22 men and 18 women of a total of 40 inpatient bone and joint TB.

Distribution of bone and joint TB according to Hb, leucocyte, thrombocyte, ESR, C-reactive protein, BUN, creatinine serum, and electrolyte

Table 3. Distribution of cases according to Hb, leucocyte, thrombocyte, ESR, C-reactive protein, BUN, creatinine serum, and electrolyte.

	Frequency (n)	Percent (%)
Hb		
Normal	11	27.5
Abnormal	29	72.5
Leucocyte		
Normal	25	62.5
Abnormal	15	37.5
Thrombocyte		
Normal	20	50.0
Abnormal	20	50.0
ESR		
Normal	2	5.6
Abnormal	34	94.4
C-reactive protein		
Normal	17	45.9
Abnormal	20	54.1
BUN		
Normal	35	92.1
Abnormal	3	7.9
Serum creatinine		
Normal	27	71.1
Abnormal	11	28.9
Sodium		
Normal	24	64.9
Abnormal	13	35.1
Potassium		
Normal	22	59.5
Abnormal	15	40.5
Chloride		
Normal	21	56.8
Abnormal	16	43.2

Based on table 3, there were 29 patients (72.5%) with abnormal Hb, 15 patients (37.5%) with abnormal leukocyte, 20 patients (50%) with abnormal thrombocyte, 2 patients (5.6%) with normal ESR values and 34 patients (94.4%) with abnormal ESR values of a total of 36 patients who had ESR, 17 patients (45.9%) with normal C-reactive protein, 20 patients (20%) with abnormal C-reactive protein and 3 patients did not have C-reactive protein, 3 patients (7.9%) with abnormal BUN, 2 patients who did not have BUN, 11 patients (28.9%) with abnormal creatinine serum, and 2 patients with no creatinine serum.

Based on electrolyte distribution which includes sodium, potassium, and chloride, there were 13 patients (35.1%) with abnormal sodium, 15 patients (40.5%) with abnormal potassium, 16 patients (43.2%) with abnormal chlorides, and 3 patients with no electrolyte examination.

Distribution of Bone and Joint TB According to history of smoking patients, history of TB patients, family history of exposure to TB, Main Complaints, Comorbid Diseases, and Dominant Locations of Infection

Table 4. Distribution of cases according to history of smoking patients, TB patients, family history of exposure to TB, Main Complaints, Co-morbid Diseases, and Dominant Locations of Infection.

	Frequency (n)	Percent (%)
Smoking History		
Nonsmoking	24	60
Smoking	16	40
TB patients History		
TB negative	11	27.5
TB positive	29	72.5
Family history of TB Infection		
TB negative	34	85
TB positive	6	15
Main Complaint		
Pain	30	75
Swelling or pus	5	12.5
Extremity disability	5	12.5
Cold Abscess		
Abscess positive	12	30.0
Abscess negative	28	70.0
Comorbidity		
Others diseases	7	17,5
No comorbidities	33	82.5
Localization		
Vertebra	38	95.0
Limb	2	5.0
Vertebra Level		
Cervical	3	10.0
Thorakal	15	50.0
Lumbal	12	40.0

There were 16 patients (40%) who had history of smoking, 29 patients (72.5%) who had history of positive TB, 6 patients (15%) with positive family history of TB, 30 patients (75%) with major complaints of pain, 5 patients (12.5%) with the main complaint was a lump or pus, and 5 patients (12.5%) with limb weakness. Abscesses occurred in 12 patients (30%), and other diseases such as diabetes and asthma occurred in 7 patients (17.5%). According to the location of infection, *thoracal* is the main attacked location (50.0%) of bone TB infection.

Discussion

Descriptive Analysis Results of Bones and Joints TB According to Age and Sex

The most age group of bone and joint TB patients hospitalized at RSUD Dr. Soetomo Surabaya is 21-30 years old. Distribution of bone TB often occurs in young immigrants (20-35 years) in Europe and one of the risk factors for osteoarticular TB is in line with increasing age and malnourished parents.^{7, 8} There were 3 patients under 10 years old, 2 patients aged 3 years old and 1 patient aged 7 years old. Children have a high incidence of developing TB up to 40% after primary infection.

Children have more dangerous onset because it appears without obvious symptoms in most cases of extrapulmonary TB that is supported by low immunity in

infants. Children and adolescents to be a high risk factor for the development of extrapulmonary TB.⁹

Bone and joint TB increased slightly in men with 22 cases and women with 18 cases of the overall cases. A study at Teerthanker Mahaveer Medical College, India, explained that osteoarticular TB increased slightly in male.¹⁰ This can be explained because there are many factors in the body and the environment that support the occurrence of *Mycobacterium tuberculosis* infection. The study at Xinxiang Medical College Hospital also explained that out of 180 cases, the number of male patients was higher (108 patients) compared to women (72 patients).¹

Descriptive Analysis Results of Bones and Joints TB According to Hb, Leucocyte, Thrombocyte, ESR, C-Reactive Protein, BUN, Creatinine Serum, and Electrolyte

There were 29 patients (72.5%) with anemia, 15 patients (37.5%) with abnormal leukocytes, 20 patients (50%) with abnormal thrombocytes, 2 patients (5.6%) with normal ESR, 34 patients (94, 4%) with abnormal ESR of a total of 36 patients, and 4 patients who did not have ESR. A study of an extrapulmonary TB patient from Eritrea, East Africa, had abnormal hematologic examination, such as anemia, leukocytosis, leukopenia, thrombocytosis, thrombocytopenia, and pancytopenia.¹¹ Anemia, leukocytosis, thrombocytosis, and increased ESR describe the infection reaction of *Mycobacterium tuberculosis* and cause inflammation. In some cases of spinal TB, a marked increase in ESR is also followed by a normal leukocyte value.¹²

ESR examination is one of the routine checks in cases of TB bones and joints. Although not specific, ESR examination is very important because atypical mycobacterium infections show normal ESR values.¹⁰ However, the normal ESR value accompanied by a negative skin test also does not exclude TB diagnosis.¹³

The number of patients with abnormal C-reactive protein values was slightly higher than patients with normal C-reactive protein values from the overall cases. In accordance with the research conducted at Hasan Sadikin Hospital in Bandung, an increase in C-reactive protein values indicates the process of infection, inflammation, burns, and malignancy followed by leukocytosis. C-reactive protein is also used to detect bacterial infections, how acute or serious a disease is, detection of systemic inflammatory processes in the body.¹⁴

ESR and C-reactive protein are markers of acute phase reactions. However, C-reactive protein is more sensitive and can detect changes faster than ESR. C-reactive protein is a useful marker in the acute phase because it reacts quickly to the inflammatory process, both infections, autoimmune diseases, and tissue necrosis.

False positives and false negatives often occur in ESR measurements, because several factors such as kidney disease, female sex, and older age increase the ESR value. There are 2 situations where ESR examination is better than C-reactive protein, which is detecting low grade bone and joint infections and monitoring disease activity in SLE.¹⁵

There were more patients with normal BUN than patients with abnormal BUN. Patients with normal serum creatinine were also more likely than patients with abnormal serum creatinine. BUN and serum creatinine describe kidney function. This is not in accordance with a research which explains that one of the predisposing factors for osteoarticular TB is a renal dysfunction and renal failure.⁸

This study showed only parts of the patients who had abnormal electrolyte values with a total of 40 patients.

Hyponatremia and hypercalcaemia are also found in some patients with abnormal electrolyte values which is in line with the research of Jonaidi Jafari at Baqiyatallah Hospital, Tehran, Iran which explains that hyponatremia and hypercalcaemia are abnormalities that often occur in TB-infected patients.¹⁶

Descriptive Analysis Results of Bones and Joints TB According to History of Smoking patients, history of TB patients, family history of exposure to TB, Main Complaints, Comorbid Diseases, and Dominant Locations of Infection

Number of patients with smoking history is low (40%) which is accordance with the study in a case of an immigrant from Haiti that smoking is also one of the risk factors for TB infection.¹⁷ Someone who smokes is also 3 times more at risk of TB infection than nonsmokers.³

Number of patients with history of TB infection was higher which were 29 patients (72.5%) out of 40 patients. This result is in line with a study that showed TB infection and exposure to TB from surrounding people is one of key diagnoses.⁸ Patients with negative history of TB infection can be infected with TB when interacting with people who are infected with pulmonary TB when coughing, talking, or singing.¹⁸

This difference might occur because of the number of cases in this study is fewer or exposure via inhalation had no significant effect. However, the influence of TB exposure from the surrounding environment is reinforced by a study which stated that one of the key diagnoses of TB infection is the presence of TB exposure from the surrounding environment and history of TB infection.⁸ Extrapulmonary TB also occurs several years after exposure to surrounding people with TB infection supported by low immunity.¹⁹

The main complaints of pain (75%) are more common than other complaints such as lumps or pus and weakness of the extremities. This result is in line with a study which explained that all patients from a total of 58 cases in 2010 in Taiwan had major complaints of pain, 50 patients accompanied by swelling, and 53 patients with neurological symptoms.⁷

Distribution of comorbidities includes abscesses in 12 patients (30%), and 7 patients (17.5%) with other comorbidities such as diabetes mellitus and asthma. In several cases of bone TB, paraspinalgia can be a result of mechanical compression and abscess.¹² In diabetic patients there is a disruption in the response of humoral and cellular immunity, such as deficits in c3, c4, c1 inhibitors, changes in response via tumor necrosis factor (TNF), interleukin (IL) -1 β , IL-2, IL-6, IL-8, and insulin growth factor (IGF) -2 thus supporting TB infection.⁸

Locations that are often infected are vertebrae with 38 patients (95%), and 2 patients (5%) with the location of limb infections. Of the 38 patients with infections in the vertebrae, thoracic levels were most often infected as many as 15 patients (50%). These results are in accordance with a study which explained that out of 140 cases of osteoarticular tuberculosis (OT) in Naples in 1975-2004, 79 cases (56.4%) occurred in the spine.²⁰

Research conducted at Xinxiang Medical College Hospital also explained that of 180 cases, 135 cases were spinal TB and 45 cases of limb tuberculosis.¹ The dominance of vertebrae levels is supported by a study with data from several countries, that predilection of TB bacillus infection in the vertebrae is due to large vascular supply and is a long bone growth plate.⁷

Conclusion

From 40 subjects, bone and joint tuberculosis mostly suffered by elderly, male risks more than female. Most of hematology tests results were abnormal. Most subjects suffered abnormal C-reactive protein. Most subjects' hematology tests were BUN, creatinine serum, and electrolyte normal. Number of subjects with smoking habits was dominant. Most subjects had tuberculosis history but negative family history. Most subjects complained about pain with vertebrae level thoracic as dominant location of infection.

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2. Authors contributed in the discussion and interpretation of the results, and in the drafting and editing the manuscript.

CONFLICT OF INTEREST

The author stated there is no conflict of interest in this study.

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