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Original Research Paper

Surgery

RELATIONSHIP BETWEEN ERYTHROCYTE SEDIMENTATION RATE AND NUMBER OF LESIONS ON THE VERTEBRA IN PATIENTS WITH TUBERCULOUS SPONDYLITIS AT HAJI ADAM MALIK GENERAL HOSPITAL.

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ABSTRACT

Introduction: Early recognition for tuberculous spondylitis is necessary to minimize residual spinal deformity and / or permanent neurological sequelae. Hematological parameters are useful indicators of severity in TB infection, therefore its changes associated with TB infection have been incompletely investigated.ESR is generally increased in tuberculous spondylitis. Involvement of one vertebral body represents an early stage of disease whereas involvement of three or more vertebral bodies indicates advanced stage. This study is aimed at the relationship between erythrocyte sedimentation rate and the number of spinal lesions which was confirmed with MRI in patients with tuberculous spondylitis at Haji Adam Malik General Hospital Medan.

Methods : This is retrospective observational analitic study

Result: There were 48 patients who met inclusion criteria. 25 (52.1%) were male and 23 (47.9%) were female. Most of the subjects were young under 40 years old (40 people, 83%). MRI was used as a radiological examination in this study with both thoracic and lumbar regions were the sites most frequently involved (16 patients, 33.33%).More than one third of patients had ≥4 vertebral involvement (18 patients, 37.5%). This was as much as 2 vertebral involvement (18 patients, 37.5%). Spearman's Correlation Test showed there was no significant association between ESR values and the number of vertebral lesions in patient with tuberculous spondilitis .

Conclusion: There is no significant relationship between erythrocyte sedimentation rate and the number of lesion on vertebrae involved.

KEYWORDS : erythrocyte sedimentation rate, number of lesions on the vertebra, tuberculous spondilitis

1. INTRODUCTION

Tuberculous spondylitis is an infection caused by Mycobacterium tuberculous which attacks the vertebral bodies, causing serious morbidity, in the form of neurological deficits and permanent spinal deformities (Garg, 2011). Epidemiologic tuberculous spondylitis accounts for 15% of total extra-pulmonary TB cases and approximately 2% of all TB cases. (WHO, 2017).

Clinically tuberculous spondylitis has distinctive signs and symptoms, included back pain, spinal tenderness and paraplegia, with radiological findings of intervertebral disc and vertebral body damage and spinal deformity. The location of the spine most often involved is the lower thoracic followed by the lumbar spine (Agrawa. 2010; Singh, 2016). Involvement of one vertebral body indicates the early stage of disease, moreover involvement of three or more vertebral bodies indicates an advanced stage, and it occurs in 50% of cases (Khalequzzaman. 2012).

Hematological parameters are useful indicators of severity in TB infection, therefore its changes associated with TB infection have been incompletely investigated. ESR is generally increased in tuberculous spondylitis. Wang's study showed a mean reported elevation of 41.2 mm / hour ranging from 1 to 145 ml / hour. The elevated sedimentation rate is due to increased blood viscosity due to an increase in immunoglobulins, especially IgG and IgA (Wang, 2012).

The increasing incidence of tuberculous spondylitis makes the need for rapid diagnosis of the disease so that patient management can be provided immediately. This study aims to assess whether there is a relationship between the sedimentation rate and the number of spinal lesions in patients with tuberculous spondylitis at Haji Adam Malik General Hospital Medan.

2. METHODS

This was a retrospective observational analitic study based on medical record. All cases of tuberculous spondylitis in outpatients and inpatients at the Orthopedic and Traumatology Division of H. Adam Malik Hospital over 3 year period from 2016-2018 were reviewed. Only those with histological, microbiological, and MRI radiologic result confirmation were included. There must be also results of Hb, Leukocyte and LED examinations before treatment in the patient's medical record. We excluded any cases with previous TB treatment and patient with other comorbid (e.g. diabetes, renal or liver disease, and HIV/AIDS). We collected data of age, sex, mycobacterium cultures and smear, histopathology study,vertebral involvement from MRI result, and ESR value. Data were analyzed using Shapiro-Wilk and Spearman's Correlation.

3. RESULTS

Total 48 patients were included in this study. Distribution of subject characteristic was shown in table 1

Table 1 Demographic characteristics of 48 patients with tuberculous spondylitis.

Characteristics	Value
Age (years)	23* (1-62)
Age distribution (people)	24.98**
<40 years old	40 (83%)
≥40 years old	8 (17%)
Gender, M / F	25/23

Data was presented as medians with minimum and maximum ranges because the data are not normally distributed.

* Median age values
** Mean age

Of the 48 patients, 25 (52.1%) were male and 23 (47.9%) were female. The median value of the patient's age was 23. In this study, most of the subjects were young under 40 years old (40 people, 83%) and the largest gender was male (25 people, 52.1%).

The Laboratory characteristics, included leucocyte, ESR and NLR in all cases of tuberculous spondylitis in our study were presented in table 2

Table 2 Laboratory characteristics of 48 patients with tuberculous spondylitis.

Hematological Data	
Leukocytes (/ uL)	9565 (1779-22610)
ESR (mm/hour)	21 (4-123)
≤20	24 (50%)
>20	24 (50%)
NLR*	2.595 (0.52-35.28)

*Neutrophyl Lymphocyte Ratio

Based on haematological data, the number of patients who experienced an increase in ESR (> 20mm / hour) was 24 people, which means 50% of the sample. The median value of the patient's leukocytes was 9565 and the median NLR was 2,595.

MRI was used as a radiological examination in this study. The thoracic and lumbar regions were the most frequently involved sites (16 patients, 33.33%) respectively and the sacral region was the least affected (1 patient, 21%). The radiological features are presented in table 3.

Table 3 Radiological characteristics of 48 patients with tuberculous spondylitis

	N (%)
Location	
Thoracal	16 (33.3)
Thoracolumbal	13 (27.1)
Lumbal	16 (33.3)
Sacral	1 (2.1)
Skip Lesion	2 (4.2)
Number of vertebral involved	
1	2 (4.2)
2	18 (37.5)
3	10 (20.8)
≥4	18 (37.5)

Data was presented as N (%)

The number of vertebrae involved per patient ranged between 3 and 4 (mean = 3.6). More than one third of patients had ≥4 vertebral involvement (18 patients, 37.5%). This was equivalent to 2 vertebral involvement (18 patients, 37.5%). The minimum number of lesions is 1 and the highest number of lesions is 10.

Using Spearman's Correlation test, we identified relationship between the ESR value and the number of spinal lesions. We found that there is no statistically significant relationship between the ESR value and the number of spinal lesions (p>0,05)

4. DISCUSSION

In endemic countries, tuberculous spondylitis is more common in children and young adults. Research conducted by Wang (2012) examined the characteristics of patients with tuberculous spondylitis in China where the most age was under 40 years (59%). Another study by Alavi (2010) found that the average age of the subjects studied in his study was 43.7 ± 18.3 years. This is consistent with this study, where most of the subjects were young under 40 years (40 people, 83%).

The sedimentation rate (ESR) in tuberculosis can increase to more than 100 mm / 1 hour, because blood viscosity increases in line with the increase in immunoglobulins, especially IgG and IgA. 10. In a study conducted by Wang (2010) in Taiwan regarding the characteristics of the haematological results of 38 patients with tuberculous spondylitis, the mean LED value of patients was 62 mm / hour with most patients (89%) experiencing an increase in ESR> 20 mm / hour. Research on haematological changes carried out by Muzaffar (2008) in Malaysia with a sample of 17 people found that all subjects studied had increased ESR ranging from 21 mm / hour to 123 mm / hour. In this study, the patient LED results ranged from 4 mm / hr to 123 mm / hr, but half of the samples had normal LED values.

Magnetic resonance imaging (MRI) is the modality of choice for evaluation of spinal infections. Involvement of one vertebral body indicates the early stage of disease. If the infection continues and spreads, the surrounding vertebrae will be affected because of the hematogenous and subligamentous spread. The location of the spine that is most often involved is the lower thoracic followed by the lumbar spine (Agrava, 2010; Singh, 2016). Research by Weng (2010) found that the lumbar area was the most affected location. While Wibowo's research (2018) at RS M Djamil Padang is based on radiological findings, the location of the lesions is mostly in the thoracic than in the lumbar. Research by Weng (2010) found that the average vertebra involved was ≥3 in one-third of the sample size. In this study the number of vertebrae involved per patient ranged between 3 and 4 (mean = 3.6). More than one third of patients had ≥4 vertebral involvement (18 patients, 37.5%).

The elevation of ESR levels in this study was related to the severity of the disease as indicated by the number of spinal lesions. The statistical test results regarding the relationship between the ESR value and the number of spinal lesions obtained the sig (2-tailed) or p value was 0.391 (P> 0.05), so it can be concluded that there is no significant relationship between the ESR value and the number of spinal lesions.

5. CONCLUSION

The elevation of ESR levels in this study was related to the severity of the disease as indicated by the number of spinal lesions. However statistical test results regarding the relationship between the ESR value and the number of spinal lesions obtained p value was 0.391 (P > 0.050),which concluded that there is no significant relationship between the ESR value and the number of spinal lesions.

Study limitations

Our study has limitation as this was a retrospective study. Sample size of 48 patients was small for calculating the appropriate rates or comparing the variables. Future prospective study in larger scale is recommended.

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