

Comparison of Serum MMP-1 Value Levels in Spondylitis Tuberculose with Degenerative Spine Disease

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Keywords: Matrix metalloproteinase; MMP-1; spondylitis tuberculose; degenerative spine disease.

Abstract: The purpose of this study was to determine differences in serum MMP-1 values in tuberculous spondylitis with degenerative diseases of the spine. Eighteen (18) subjects were divided into 2 groups, with nine (9) subjects of spondylitis tuberculose and 9 subjects of degenerative spine disease in the period from December 2017 to November 2018 who were included in the inclusion criteria included in this study and blood sampling was taken for examination of serum MMP-1 levels. Distribution of samples of spondylitis tuberculose and degenerative spine diseases with total 18 subjects, with 10 women (55.6%) and men as many as 8 subjects (44.4%), with the youngest age of the study subject 13 years old and the oldest age is 73 years old research subjects with mean and standard deviation of 43.72 ± 15.88 years. There were significant differences in serum MMP-1 levels between spondylitis tuberculose and degenerative spine diseases with a significance value of 0.016 (p<0.05) with mean serum MMP-1 levels in the spondylitis tuberculose study group 1055.56 ± 390.86 and mean in the control group 666.67 ± 250.00. Patients suffering from spondylitis tuberculose have higher serum MMP-1 levels than patients with degenerative spine disease, although MMP-1 is not a specific marker examination for spondylitis tuberculose, the results of this study can be suggestive into that can help to evaluate enzyme activity in patients with spondylitis tuberculose disease.

1 INTRODUCTION

Tuberculosis (TB) is one of the long-known diseases and is still the leading cause of death in the world. The prevalence of TB in Indonesia and other developing countries is quite high. In 2006, new cases in Indonesia amounted to > 600,000 and most people suffer from productive age (15–55 years).

About 20% of pulmonary TB infections will spread out of the lungs (extrapulmonary TB). Eleven percent of extrapulmonary TB is osteoarticular TB, and about half of patients suffer from spinal TB infection. Half have lesions in the spine with neurologic deficits 10% - 45% of sufferers

Matrix metalloproteinase (MMP) is a zinc-dependent protease, which plays a role in the process of degradation of the extracellular matrix and modulates the inflammatory response by facilitating and inhibiting different cytokines. Research shows that MMP-1 is the main collagenase in TB patients,

and the expression of MMP-1 is suppressed by p-aminosalicylic acid, which is an anti-tuberculous agent that has been used for 70 years.

Two gelatinases, MMP-2 and MMP-1, have the ability to reduce original IV collagen and denaturation of type I collagen (gelatin). Both circulation and resident inflammatory cells have the capacity to synthesize MMP-1. Research into experimental studies has provided evidence that the MMP-1 level was significantly higher in the bronchoalveolar fluid of patients with active cavitary tuberculosis, and lung extract of mice infected with *M. tuberculosis*, compared to the control group. An increased significance of MMP-1 was also observed in cerebrospinal fluid (CSF) in tuberculous meningitis patients and also compared with people suffering from viral meningitis, where usually these enzymes are not usually found in cerebrospinal fluid.

There are previous studies shown that *M. tuberculosis* can stimulate the expression of MMP-1

in the lungs of infected organisms, but no studies have examined how the expression of MMP-1 in tuberculous spondylitis when compared with the control group, therefore researchers are interested in trying evaluating and comparing the expression of MMP-1 in tuberculous spondylitis using serum levels in the blood of patients suffering from tuberculous spondylitis and compared to the control group, in this case the control group in this study were patients with degenerative diseases of the spine.

2 PRELIMINARY

Before discussing the results of the study, because this

study had never been done before, it was conducted with a small scale preliminary study using 8 balanced subjects with 4 subjects (4 subjects with tuberculous spondylitis, 4 subjects with the degenerative spine) to obtain a mean and standard deviation from each one group.

Table 1. Shows that the distribution of tuberculous spondylitis samples and spinal degenerative diseases in the preliminary study was as many as 8 subjects with 5 women (62.5%) and men as many as 3 (37.5%). With a mean and standard deviation of 38.63 ± 18.24 years. It shows that the mean of subjects with spinal degenerative disease 750 ± 288.67 and mean tuberculous spondylitis 1125 ± 629.15 .

Table 1: ST, Spondylitis Tuberculosis; DSD, Degenerative Spine Disease;

Variable	Type of Disease	
	ST	DSD
Gender M/F	2/2	1/3
MMP-1	1125 ± 629.15	750 ± 288.67
Mean Age	38.63 ± 18.24	

3 METHOD

The sample size is calculated based on the categorical numerical unpaired analytic formula, the minimum sample size can be obtained as many as $17.04 \sim 18$ subjects. All data are processed and presented in a table form and then further classified into 1) general description, 2) demographic description of the subjects of the serum MMP-1 value in tuberculous spondylitis with degenerative disease in the spine 3) normality test data on serum MMP-1 values tuberculous spondylitis with degenerative diseases of the spine, 4) analysis of the influence of whether there are differences in serum MMP-1 values in tuberculous spondylitis with degenerative diseases of the spine.

4 RESULTS

From the results of the statistical analysis of the comparison of serum MMP-1 values in tuberculous spondylitis (ST) with degenerative spine disease (DSD), the results were significant that the serum MMP-1 value was greater and this was indicated by a

p-value of 0.016 ($p < 0.05$). Table 3. Distribution of the results of serum MMP-1 levels in tuberculous spondylitis and spinal degenerative diseases 18 subjects, diagnosed with 9 tuberculosis spondylitis (50%) and 9 degenerative spinal diseases (50%) with mean and standard deviation of the serum MMP-1 tuberculosis spondylitis level was 1055.56 ± 390.86 while the mean and standard deviation of serum MMP-1 values in spinal degenerative diseases was 666.67 ± 250.00 . From the results of the statistical analysis of the comparison of serum MMP-1 values in tuberculous spondylitis (ST) with degenerative spine disease (DSD), the results were significant that the serum MMP-1 value was greater and this was indicated by a p-value of 0.016 ($p < 0.05$).

Table 2: ST, Spondylitis Tuberculosis; DSD, Degenerative Spine Disease.

Variable	Type of Disease	
	ST	DSD
Mean MMP-1 (nm/ml)	1055.56	666.67
SD	± 390.86	± 250.00
p-Value	0.016	
Older Age	13 years	43 years
Younger Age	62 years	73 years
TB Drug Consumption	8.89 ± 4.70 weeks	0

5 DISCUSSION

The main objective of this study was to determine whether there was a difference between serum MMP-1 levels in spondylitis tuberculosis and degenerative diseases of the spine. In a previous study conducted by Hrabec et al., 2002 also found that serum MMP-1 levels in patients with active pulmonary tuberculosis had significantly higher levels of the control group. This finding is in accordance with the study conducted that there were significant differences in MMP-1 levels in patients with spondylitis tuberculosis with the control group.

6 CONCLUSION

MMP-1 values in spondylitis tuberculosis were significant and greater compared to degenerative spine disease and this was indicated by a p-value of 0.016 (p <0.05).

CONFLICT OF INTEREST

Non declared in this study.

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