

A Correlation of OA Genu Severity and Radiological Description

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Abstract—Osteoarthritis (OA) was a degenerative, chronically progressive disease of the joints. The most common medical condition among older adults was osteoarthritis. The research aimed to find the correlation between the severity of OA and the radiological description. The method of this study was an analytical method using a cross-sectional design involving 46 subjects consistent with the inclusion criteria for orthopedic surgery and radiology at Dustira Hospital. The sampling methodology was consecutive sampling. Firstly, the participants were interviewed using a questionnaire based on the Lequesne index. Secondly, an expertise of the X-ray genu based on the criteria of Kellegren and Lawrence. The result of this study was a highly significant correlation = 0.750 ($p < 0.001$) according to the Spearman classification correlation. Clinical symptoms may be concluded to be correlated with the radiographic description.

Keywords—*kellegren and lawrence, lequesne index, osteoarthritis genu*

I. INTRODUCTION

Osteoarthritis (OA) was a progressive, degenerative disease of joint cartilage [1]. According to the American College of Rheumatology (ACR), arthrosis was a symptom of joint injury characterized by a modification of the joint capsule [2]. Based on the data, Indonesia had 50-60% of the disease known as rheumatism were OA [3]. Balada's research in 2014 resulted in 60.9% of patients with osteoarthritis [4]. The latest research in 2015 Mizan 37.5% of patients with the OA genu and 82.1% was female [5].

The vertebrae, pelvis, knees, and ankles were a joint which may be affected by osteoarthritis. The prevalence of the OA genu based on radiological examinations in Indonesia was relatively high, 15.5% in males and 12.7% in females [3]. Risk factors for osteoarthritis included age, gender, genetics, ethnicity, obesity, metabolic syndrome, joint trauma, exercise,

and work. Patients generally suffer from pain, stiffness, swelling, and limited movement of daily activity [6].

According to the clinical aspect, patients with OA can be diagnosed with the Lequesne index. This index has been studied very well. The Lequesne index is greater than other indices which were easy and fast, follow-up of a disease over a long period of time and can identify effective therapy. Evaluation of the index includes pain or discomfort, maximum walking distance and activities of daily living. The severity of OA genu based on the Lequesne Index is classified into 6 that is normal, mild, moderate, severe, very severe, and extremely severe [7]. Osteoarthritis genu mostly diagnosed by radiological examination and expertise using Kellegren and Lawrence criteria [8]. These criteria were divided into four grades were grade I, II, III, dan IV. Grade I doubtful narrowing of the joint space and possible osteophytic lipping, grade II definite osteophytes and possible narrowing of the joint space, grade III moderate multiple osteophytes, definite narrowing of the joint space, and some sclerosis, and possible deformity of the bone ends. Grade IV large osteophytes marked narrowing of the joint space, severe sclerosis, and definite deformity of the bone ends [9].

Based on this background, this study aims to determine the relationship between the severity of OA genu based on clinical and radiological description. The benefits of this study can assist doctors in monitoring and prognosis of patients with OA genu.

II. METHODS

The method of this research was an analytic method by using a cross-sectional design. This study was conducted to determine the correlation between the severity of OA genu based on the Lequesne index and the radiological description according to the Kellegren and Lawrence criteria at Poliklinik Bedah Ortopedi and Poliklinik Radiologi Rumah Sakit Dustira

Cimahi. The study involved 46 subjects that were compatible with the inclusion criteria, diagnosed with OA gender by the doctor, ready to be researched, the patient was confirmed to have a genu x-ray, age > 50. The exclusion criteria were as follows: the patient was unwilling to be researched, was already taking an analgesic, a serious disease which makes it difficult to conduct an interview, the genetic deformation of the gender, the history of the trauma which causes the change of an intraarticular structure, history of joint inflammation that causes a change in a bone structure like Gout Arthritis and Rheumatoid Arthritis, history of deficiency disorders causes a change in bone structure such as osteomalacia and osteoporosis and the history of bone tumours.

Sampling was done by consecutive sampling. This research conducted in Poliklinik Bedah Ortopedi and Poliklinik Radiologi RS. Dustira Cimahi. The data will be analysed using the nonparametric Rank Spearman, the force of the relation was calculated using the Guilford criteria.

III. RESULTS AND DISCUSSION

This research focuses on the severity of the OA genu based on the Lequesne Index with radiological description according to Kellegren and Lawrence criteria. These were 46 subjects compatible with the inclusion criteria who conducted guided interviews using the Lequesne Index questionnaire. Then the genu x-ray was expertise according to Kellegren and Lawrence criteria in Poliklinik bedah Ortopedi and Poliklinik Radiologi. The result was presented below.

A. Characteristic of Research Subjects

The characteristic for these research subjects was based on age and gender (Table 1). Table-1 showed that most patients who had been diagnosed with OA genu were female, 35 participants (76,1%) while 11 participants (23,9%) were male. The characteristic of the age in this study showed the average age of the patient who had been diagnosed with OA genu was 63,6 years old with a range of 53-82 years old.

TABLE I. CHARACTERISTIC OF RESEARCH SUBJECTS

No	Characteristic	Amount	%
1	Gender		
	Male	11	23.9
	Female	35	76.1
	total	46	100
2	Age (years old)		
	Mean (SD)	63.6 (8.0)	
	Median	64.5	
	Rate	53 – 82	

The relationship between age with gender to the occurrence of OA was closely related, according to the statement of Felson, Roman-blas et al, Hussein, and Sharara, were the most diagnosed of OA was a female with age more than 50 years old (after menopause) because it was related to the role of hormones that affected cartilage metabolism [1,10,11]. The aging of the cartilage causes damage function and structure of

chondrocytes thereby disrupting homeostasis and reducing the quality of the cartilage matrix [1,10,12-14].

B. The Severity Based on Lequesne Index and Kellegren and Lawrence Criteria

The clinical severity of OA genu can be assessed based on the Lequesne index, while radiological description can be assessed based on the Kellegren and Lawrence criteria. The result of this research can be seen in table 2.

TABLE II. THE SEVERITY BASED ON LEQUESNE INDEX AND KELLEGREN AND LAWRENCE CRITERIA

No	The severity based on Lequesne Index and Kellegren and Lawrence criteria	
1	Lequesne Index	Value
	Mean (SD)	5.28 (2.65)
	Median	5.25
	Rate	1.5-12.0
	Mild	19 (41.3%)
	Moderate	19 (41,3%)
	Severe	7 (15,2%)
	Very Severe	1 (2,2%)
	Total	46 (100%)
2	Kellegren and Lawrence criteria	
	Grade I	13 (28.3%)
	Grade II	23 (50.0%)
	Grade III	10 (21.7%)
	Grade IV	0 (0%)
	Total	46 (100%)

The table showed the result of this study based on the Lequesne index of 46 subjects there were 19 participants (41,3%) mild, 19 participants (41,3%) moderate, 7 participants (15,2%) severe, and 1 participant (2,2%) very severe. In this research, data obtained by arrival. The result most clinical severity of OA genu based on Lequesne index were mild and moderate. Felson, Nainggolan, and Major stated that releasing chemical mediators such as kinin and prostaglandin due to acute inflammatory reaction that causes pain. Marginal Osteophytes of the genu can suppress the radix nerve that causes pain too [1,8,13,15].

The severity based on radiological examination according to Kellegren and Lawrence criteria got the result was 13 participants (28,2%) grade I, 23 participants (50,0%) grade II, and 10 participants (21,7%) grade III. The subjects of research did not show by grade IV. The most severity based on radiological was grade II. This result related to Sara's in RS Kariadi Semarang; patient tend to take the medication in grade II [16].

C. Correlation Severity of OA Genu Based on Lequesne Index with Radiological Description According to Kellegren and Lawrence Criteria

Table-3 explained that radiological description according to Kellegren and Lawrence in grade I were 13 participants (28,3%) among of the others based on Lequesne index were 11 participants (57,9%) mild, and 2 participants (10,5%)

moderate. Subjects of research in grade II more had moderate than mild symptoms, there were 8 participants (42,1%) mild and 15 participants (78,9%) moderate. The total grade II was 23 participants (50,0%). Subjects with grade III were 10 participants (21,7%) among the others were 2 participants (10,5%) moderate, 7 participants (100%) severe, and 1 participant (100%) very severe. Based on the arrival of the subjects of research there were no subjects who showed grade IV.

TABLE III. CORRELATION SEVERITY OA GENU BASED ON LEQUESNE INDEX WITH RADIOLOGICAL DESCRIPTION ACCORDING TO KELLEGREN AND LAWRENCE CRITERIA

Lequesne Index	Kellegren and Lawrence Criteria				Total
	I	II	III	IV	
Mild	11 (57.9%)	8 (42.1%)	0 (0%)	0 (0%)	19 (100%)
Moderate	2 (10.5%)	15 (78.%)	2 (10.5)	0 (0%)	19 (100%)
Severe	0 (0%)	0 (0%)	7 (100%)	0 (0%)	7 (100%)
Very Severe	0 (0%)	0 (0%)	1 (100%)	0 (0%)	1 (100%)
Total	13 (28.3%)	23 (50.0%)	10 (21.7%)	0 (0%)	46 (100%)

According to the result of Rank Spearman correlation analysis, it was found that the relationship between Lequesne index with Kellegren and Lawrence in determining the severity of OA genu with $r_s = 0,750$ ($p < 0,001$) was very significant. The correlation-based on Guilford criteria was very strong. This result corresponded with Felson, Moll, Mercier, Sutton, Dieppe, Marsland, Kapoor, Patel, Palmer, Koentjoro, Schiphof, and Zeinstra there were more severe clinical degree of OA genu directly proportional to the severity of radiologi [1,15-23].

IV. CONCLUSION

The highest clinical severity of the OA genu based on the Lequesne Index was mild 19 (41.3%) and moderate 19 (41.3%). Whereas the highest radiological severity of the OA genu according to the Kellegren and Lawrence criteria was Level II 23 (50.0%). The correlation severity of the OA genu based on the Lequesne index with radiological description according to the Kellegren and Lawrence criteria resulted in very significant correlations $r_s = 0.750$ ($p < 0.001$).

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