SRIWIJAYA JOURNAL OF MEDICINE

Relationship between Degree of Radiological Disability and Degree of Pain in Osteoarthritis at Southeast Sulawesi

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Abstract

Introduction. Osteoarthritis (OA) is a degenerative disease with slow progressive which has a characteristic pathological sign of joint deterioration as a result of biochemical, metabolic, physiological, and pathological changes. Pain is a complaint that is generally felt by people with osteoarthritis and has a different degree in each patient. The purpose of this study determines the correlation between radiological abnormalities staging and pain level with osteoarthritic of the knee joint of Kendari general hospital.

Methods. This research is an observational analytic study with cross-sectional approach. Thirty-seven samples were acquired through total sampling. Data were analyzed using the Spearman correlation test (p-value <0,05).

Result. The univariate analysis shows that most patients have a moderate radiological abnormality that was 12 (32.43%), and most of the patient have severe pain level that was19 (51.35%). Based on the bivariate statistical test, a positive correlation was obtained between radiological abnormalities staging and pain level with osteoarthritis of knee joint with p=0,000 and r=0,831.

Conclusion. There was a significant correlation between radiological abnormalities staging and pain level with osteoarthritis of the knee joint of Kendari general hospital.

Keywords. Cross-sectional studies, knee joint, osteoarthritis, pain.

INTRODUCTION

Osteoarthritis (OA) is one of the top 10 causes of joint movement disorders [1]. Osteoarthritis can cause a lack of quality of life in people with OA, and it is estimated that OA will be the fourth most common in 2020 as a disease that causes disability in the world [2]. Osteoarthritis is one of the most common forms of arthritis, affecting 15% of the world's population and usually affects the support joint (knee joint) [3].OA patients generally complain of pain during daily activities, work or if there is a load on the affected joints. [4,5]

In a more severe degree, the pain can be felt continuously, so it dramatically disturbs the mobility of the patient. The high prevalence of OA, which is chronic progressive in nature and causes joint pain, causes OA to have significant social and economic impacts, both in developed and developing countries.[6]

According to the American College of Rheumatology, the diagnosis is based on knee pain and X-rays have found osteophytes and at least one sign and symptom from the age of more than 50 years, joint stiffness in the morning less than 30 minutes and crepitus found on physical examination.[6]

Pain in these joints is usually the chief complaint that makes patients come to the doctor. Radiographic classification of OA according to the Kellgren-Lawrence criteria. Grade 0 normal, no and abnormal radiographs. Grade 1 is dubious, showing small osteophytes. Minimum grade 2, seen osteophytes, standard joint gap. Moderate 3rd degree, pronounced osteophyte, joint space narrowing: grade 4 severe, severe joint space narrowing and sclerosis.[6]

Genu osteoarthritis is the leading cause of morbidity, inhibition of physical activity and reduced quality of life for someone with osteoarthritis, especially in someone over 45 years of age, and osteoarthritis has a significant impact on social and economic life.[7]

The prevalence of OA in Indonesia reaches 5% at the age of 61 years. According to Riskesdas 2013, the prevalence of joint disease based on diagnosis by health workers in Indonesia is 11.9% and based on symptoms is 24.7%. There were also more female OA sufferers, namely 27.5% compared to OA in men, namely 21.8%. [8]

Based on data obtained from the medical records of outpatients at the Kendari City General Hospital in 2018, it is estimated that the number of outpatients with osteoarthritis examined was 266 in 2017 and in 2018 January to August there were 211 patients [9]. The purpose of this study was to determine the relationship between the degree of radiological abnormalities and the degree of pain in patients with osteoarthritis of the knee joint at the Kendari General Hospital.

METHODS

The type of this research is analytic observational with the cross-sectional approach. This research was carried out from November to December 2018 at the Orthopedic Clinic of the Kendari City Regional General Hospital and the respondent's house. The sampling technique in this study was a total sampling of 37 respondents from 37 respondents who were diagnosed with osteoarthritis in orthopaedic poly at the Kendari City Hospital.

Primary data collection was carried out by filling in the research form and pain assessment instruments to the respondents. Data analysis was performed using the Spearman statistical test, with a p-value <0.05 with the help of SPSS 16. This study has received approval from the Health Research Ethics Committee of the Institute for Research and Community Service at Universitas Halu Oleo, Kendari, Indonesia.

RESULTS

Based on Table 1, this study shows the results of research regarding the frequency distribution of the components of the study including gender, age, BMI, degree of pain and degree of radiological abnormalities with the number of samples in this study were 37 respondents.

Of the total sample, 10 (27%) male gender and 27 (73%) female sample. Thus it is known that the majority of the study samples were female. And, the most age group suffering from osteoarthritis of the knee joint is the late elderly 56-65 years (48.6%).

In the measurement of BMI, respondents who had a risky BMI were 19 respondents (51.35%), and respondents who had a non-risk BMI were 18 respondents (48.65%). Thus the majority of the study sample experienced a risky BMI.

In measuring the degree of pain, it is known that the sample who experienced mild pain was 6 (16.2%) people, 12 (32.4%) people had moderate pain, and 19 (51.4%) people had severe pain. Thus it is known that the majority of the study sample experienced severe pain.

In measuring the degree of radiological abnormality of patients with osteoarthritis of the knee joint, the results showed that 10 (27.0%) samples with dubious radiological abnormalities (grade 1), 9 (24, 9) samples with minimal radiological abnormalities (grade 2). 3%) people, samples with moderate radiological abnormalities (grade 3) were 12 (32.4%) people, samples with severe radiological abnormalities (grade 4) were 6 (16.2%) people. Thus the majority of the study sample had a moderate degree of radiological neglect.

Table 1. Participant characteristics

Variables	Frequency (n)	Percentage (%)
Gender		
Male	10	27%
Female	27	73%
Pain scale		
Mild = NRS 1-3	6	16,2%
Moderate = NRS 4-6	12	32,4%
Severe = NRS 7-10	19	51,4%
Radiological abnormality		
Grade 1= doubt	10	27,0%
Grade 2= Minimal	9	24,3%
Grade 3= Moderate	12	32,4%
Grade 4=Severe	6	16,1%
Total	**37**	**100%**

Based on Table 2 it shows the relationship between the degree of radiological abnormalities and the degree of pain in patients with osteoarthritis of the knee joint. There were 5 (50%) samples who had dubious radiological abnormalities (grade 1) and mild pain. There were 5 (50%) samples who had questionable radiological abnormalities (grade 1) and moderate pain. Samples who experienced a minimum degree of radiological abnormalities (grade 2) and a degree of mild pain were 1 (11.1%) people. There were 6 (66.6%) samples with minimal radiological abnormalities (grade 2) and moderate pain. There were two samples (22.2%) of the sample who experienced minimal radiological abnormalities (grade 2) and severe pain. There were 1 (8.3%) samples who had moderate radiological abnormalities (grade 3) and moderate pain. There were 11 samples (91.6%) of the sample who experienced moderate radiological abnormalities (grade 3) and severe pain. There were 6 (100%) samples who experienced severe radiological abnormalities (grade 4) and severe pain.

Table 2. Analysis of the relationship between the degree of radiological abnormalities and the degree of pain in patients with osteoarthritis of the knee joint in Kendari General Hospital

Bivariate Analysis		Pain grade						Total		Spearman test
		Mild		Moderate		Severe				
		n	%	n	%	n	%	n	(%)	
Radiological abnormality grade	Doubt (grade 1)	5	50	5	50	0	0	10	100	P=0,000 r=0,831
	Minimal (grade 2)	1	11,1	6	66,6	2	22,2	9	100	
	Moderate (grade 3)	0	0	1	8,3	11	91,6	12	100	
	severe (grade 4)	0	0	0	0	6	100	6	100	
total		6	16,2	12	32,4	19	51,3	37	100	

Based on table 2, the relationship between the degree of radiological neglect and the degree of pain in patients with osteoarthritis of the knee joint at Kendari City General Hospital was tested using the Spearmen test with the results in the form of a significance value of p = 0.000 and r = 0.831.

The significance value is smaller than the specified limit of significance, which is 0.05 or (0.000 <0.05) with a correlation coefficient of r = 0.831, which indicates a positive correlation. Thus it can be interpreted that there is a relationship between the degree of radiological abnormality with the degree of pain in patients with osteoarthritis of the knee joint.

DISCUSSION

This study shows that there are more female patients with osteoarthritis of the knee joint than male patients with osteoarthritis of the knee joint. The results of this study are in line with the study before, [11] which stated that 68.3% more OA patients were female than male OA patients as much as 56.8%. From this figure, it can be seen that the incidence of knee OA tends to be experienced by women. This is in line with the theoretical concept which states that overall at the age above 50 years,

the frequency of OA is more common in women (after menopause) which indicates that hormonal factors play a role in the incidence of OA.

This study showed that the majority of knee joint OA patients experienced severe pain, namely as much as 51.4%. The results of this study were in line with research [12] which stated that knee OA patients with severe pain were 50.5% more than moderate pain, namely 48.5. %. This study shows that the highest degree of radiological abnormalities is moderate grade 3 (32.4%), followed by grade 1 doubt (27%), minimum grade 2 (24.4%), grade 4 severe (16.2%). [13]

This study shows that there is a relationship between the degree of radiological abnormalities and the degree of pain in patients with osteoarthritis of the knee joint, which has a significance value of p = 0.000 (<0.05) with a correlation coefficient of r = 0.831 which indicates a positive correlation. The results of this study are in line with research conducted [10] which states that the Chi-Square test results show a p-value = 0.000 (<0.05) and research conducted[12] which states that the results with the Spearman test show a correlation coefficient (r) of 0.58 with probability (p) = 0.001. So the higher the radiological degree, the higher the degree of pain.

This is following the theory that there are osteophytes that cause periosteal reactions and pressure on the nerves causing pain and a decrease in the size of the femorotibial joint gap from a standard size, an increase in intramedullary pressure, the subchondral fracture can also cause pain [10].

Osteoarthritis is a degenerative joint disease with slow progressive development which has a characteristic pathological picture of worsening of joint cartilage as the result of changes in biochemistry, metabolism, physiology and pathology [14]. The pain felt in people with osteoarthritis includes non-neurogenic musculoskeletal pain, often referred to as arthralgia, which is pathogenic pain in the joints. The pain mechanism in OA occurs due to a pathological condition affecting the cartilage and joints, in which osteophyte formation occurs in cartilage joints and subchondral tissue which causes a decrease in elasticity of the joints. It also affects the areas around the joints such as the subchondral bone, the ligament capsule that encloses the joint and the muscles attached to the joint. The changes that occur at the joint surface (hyaline cartilage) are associated with biochemical changes below the surface of the cartilage that increase thymidine and glycine synthesis **[15].**

This initial lesion is followed by the process of progressive destruction of the cartilage. As a result of the imbalance between regeneration and degeneration, there will be softening, splitting and

peeling of the cartilage layer of the joint which will be released as the corpus Libera which can cause locking when the joint moves. [15]

In patients with OA, there is also an increase in fibrinolytic activity. This process causes the accumulation of thrombus and lipid complexes in the subchondral vessels leading to ischemia and subchondral tissue necrosis. So this causes the release of chemical mediators such as prostaglandins and interleukins which in turn cause bone angina through the subchondral which is known to contain sensible nerve endings which can deliver pain because the tissue will release K + and intracellular protein.[6]

The increase in extracellular K + levels will cause depolarization of nociceptors, while the protein in some circumstances will infiltrate microorganisms, causing inflammation. As a result, released pain mediators such as leukotriene, prostaglandin E2, and histamine will stimulate the nociceptors so that a transduction process occurs. Namely, the afferent nerve process translating the stimulus into nociceptive impulses then continued with the transmission process. Namely, the impulses are channelled to the dorsal horn of the spinal cord then along the sensory tract to the brain and then continue the amplification process. Pain-related neural signals and perceptual processes occur in the brain.[6]

In the subchondral bone, repair occurs in the form of sclerosis, with increased bone activity and the formation of spurs at the joint edges, which can limit movement. The bone under the cartilage becomes hard and thick, and changes in the shape and fit of the joint surface. If the damage continues then, the shape of the joint is irregular with joint space narrowing, osteophytes, instability and deformity.[6]

With the formation of osteophytes, it will irritate the synovial membrane, where there are many pain receptors. It will cause hydrops [16,17] due to the exposure of polymodal nerve endings around the joints due to the formation of osteophytes that press the periosteum and nerve roots originating from the spinal cord. In line with swelling and thickening of the soft tissues around the joints, it will increase intramedullary pressure due to intra-medullar venous static due to the remodelling process of the trabeculae and subchondral, giving rise to tenderness and pain in motion.[10]

CONCLUSION

There is a significant relationship between the degree of radiological abnormalities and the degree of pain in patients with osteoarthritis of the knee joint at the Kendari City General Hospital.

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