



ORIGINAL RESEARCH PAPER

General Surgery

CORRELATION OF SUBJECTIVE MEASURES OF KNEE INJURY AND OSTEOARTHRITIS OUTCOME SCORE (KOOS) WITH OBJECTIVE MEASURES IN KNEE OSTEOARTHRITIS PATIENTS IN H. ADAM MALIK GENERAL HOSPITAL MEDAN AND PIRNGADI GENERAL HOSPITAL MEDAN

KEY WORDS: Osteoarthritis, KOOS, 6-WMT

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ABSTRACT <p>Osteoarthritis is a condition that is often found in orthopedic cases. KOOS is a questionnaire to assess patient opinions about knee problems. 6-WMT is a simple clinical outcome measurement tool. This study aimed to discuss the relationship between subjective reference using KOOS questionnaire with objective reference using 6-WMT. This was a clinical trials study with cross-sectional design. The study was conducted at the Department of Surgery in the Division of Orthopedic Surgery at Haji Adam Malik Hospital in Medan and Pirngadi General Hospital in Medan. The sample of this study were all patients diagnosed with knee osteoarthritis from January to April 2019 who met the inclusion and exclusion criteria. The type of data collected in this study were primary data from questionnaires and secondary data obtained from medical records. Statistical analysis were carried out using the Pearson test using a significance level of 0.05 ($\alpha = 5\%$). A total of 53 samples were included in this study, consisted of 25 male patients (47.2%) and 28 female patients (52.8%). Age had a stronger correlation than the sports & recreation KOOS subscale ($r = -0.475$) and the weakest correlation with the KOOS subscales QoL ($r = -0.384$). While body weight and BMI had stronger correlation with the KOOS QoL subscale ($r = -0.499$ and -0.419). In addition, body weight and BMI had the weakest correlation to ADL subscales, namely $r = -0.371$ and $r = -0.281$. For the 6-MWT parameter, a slightly higher positive correlation was seen in the sports & recreation KOOS subscale ($r = 0.491$); As for the pain subscale $r = 0.382$; symptoms of $r = 0.402$; ADL $r = 0.432$; and the last was the QoL subscale with $r = 0.407$. There was a negative relationship of the KOOS subscale on age, body weight, and body mass index. While the positive correlations were found on the KOOS subscale of the 6-MWT. While for the height, no correlation was found with the subscale of KOOS.</p>	

INTRODUCTION

OA is a non-inflammatory process and can affect all synovial joints, especially the knee joint. OA is progressively slow, chronic in nature, often not inflamed or only causes mild inflammation. OA is mostly a primary case, because the physiological process 'wear and tear' or too much use. Secondary OA is caused by trauma, infection, or congenital (Willmott, 2016).

Prevalence reports vary, depending on the evaluation method used. Autopsy studies show OA in almost all people over 65 years. Radiological surveys show that prevalence increases by 1 percent in people before 30 years to 50 percent in people over 60 years (Solomon, et al. 2010). The prevalence of knee OA in Indonesia is quite high, reaching 15.5% in men and 12.7% in women of all osteoarthritis sufferers (Johns Hopkins Arthritis Center, 2017 and KOOS, 2017).

The impact caused by OA is the reduced ability of the body to carry out certain activities that affect the function and quality of life of sufferers. The degree of functional impairment in OA is influenced by several things, namely the presence of pain, symptoms that appear, symptoms of daily activities (ADL function), sports and recreation functions, and quality of life of individuals (Quality of Life). In the practice of physiotherapy, relieving pain, other symptoms, increasing daily activities and quality of life of the patient are the main goals. In order to achieve this physiotherapy goal subjective assessment is used using questionnaires such as the Knee Injury and Osteoarthritis Score (KOOS) and performance tests such as the six minute walk test (6-WMT) to monitor the severity of functional disorders (Sivachidambaran et al, 2014).

6-WMT or a test run within 6 minutes is a simple clinical outcome measurement tool, this test is often used to assess functional performance in various groups of patients. This 6-

minute walking test measures the maximum distance a patient can pass within 6 minutes (Jakobsen et al, 2013).

To get more valid results, subjective judgments must always be linked to performance tests. Until now there is still little research linking KOOS with 6-WMT (Sivachidambaran et al, 2014).

This study aims to determine the relationship between subjective assessment using the Knee Injury and Osteoarthritis Outcome Score (KOOS) questionnaire with an objective assessment using the 6-Minute Walk Test (6-WMT), age, height, weight, and body mass index in osteoarthritis patients knee.

METHODS

This research is a retrospective analytic study using correlation test. The study was conducted at the Department of Surgery in the Division of Orthopedic Surgery, Haji Adam Malik Hospital, Medan and Pirngadi General Hospital, Medan. The sample in this study were all knee osteoarthritis patients who met the clinical and radiological criteria of knee osteoarthritis based on the American College of Rheumatology, and Kellgren and Lawrence grade II criteria or more, and had not yet undergone surgery.

Primary data were obtained by asking patients to fill out the Knee Injury and Osteoarthritis Outcome Score (KOOS) questionnaire, perform a 6-Minute Walk Test (6-WMT), measure height and weight, and calculate the body mass index directly. Secondary data obtained by looking at the patient's medical record.

The Pearson test was used to determine the relationship between subjective assessment using the Knee Injury and Osteoarthritis Outcome Score (KOOS) questionnaire and objective assessment using the 6-Minute Walk Test (6-WMT), age, height, weight, and body mass index in osteoarthritis

patients' knee. Statistical tests use significance levels of 0.05 ($\alpha = 5\%$).

RESULTS

Of 53 study samples, 25 patients were male patients (47.2%) and 28 others were female patients (52.8%). Patients included in the study sample had a mean age of 55.91 years, with a standard deviation of 8.68 years and an age range from 26 to 73 years. For height, a mean height of 162.87 cm was obtained with a standard deviation of 7.10. From weight measurements, the average sample size of 64.11 (± 11.05) kg is obtained, or ranges from 40-96 kg. Based on data from weight and height, a mean IMT yield of 24.27 kg / m² with a standard deviation of 4.53 kg / m², and a range of BMI from 16.65 to 35.56 kg / m².

Table 1. Sample Characteristic

Characteristic	Mean	SD
Usia (Tahun)	55,91	8,68
Tinggi (cm)	162,87	7,10
Berat (kg)	64,11	11,05
IMT (kg/m ²)	24,27	4,53

In the KOOS assessment with pain subscale, the average values of 56.13 were obtained with minimum and maximum values of 14 and 100, respectively. In the KOOS assessment data symptoms were classified as normal with a mean value of 57.08 and a standard deviation of 23.26. For the ADL KOOS

Table 3. Correlation of KOOS and Other Objective Parameter

	Age	Height	Wight	BMI	6-MWT
KOOS paina	-0,438**	-0,037	-0,412**	-0,341*	0,382**
KOOS symptomb	-0,454**	-0,041	-0,413**	-0,352**	0,402**
KOOS ADLa	-0,450**	-0,123	-0,371**	-0,281*	0,432**
KOOS sports & recreationa	-0,475**	-0,017	-0,417**	-0,391**	0,491**
KOOS QoLb	-0,384**	-0,077	-0,499**	-0,419**	0,407**

^aUsing the Spearman correlation test because the data are not normally distributed

^bUsing the Pearson correlation test because the data is normally distributed

** Indicates a value of p < 0.01

* Indicates a value of p < 0.05

Age has a tendency to be stronger towards the KOOS subscale of sports & recreation and the weakest correlation with the KOOS subscales QoL. Whereas body weight and BMI have a stronger correlation to the KOOS subscales QoL. In addition, weight and BMI had the weakest correlation with the ADL subscale. For the 6-MWT parameter, a slightly higher positive correlation was seen in the KOOS sports & recreation subscale; while for the pain subscale; symptom; ADL; and the last is the QoL subscale.

DISCUSSION

In this study, the average age of the patients was 55.91 years with the youngest age was 26 years. Based on sex, it is estimated that about 9% of men compared to 18% of women will have symptomatic OA even above the age of 60 years (Grazina, 2018). Different things were obtained from this study, where of the 53 total patients included in this study, 25 patients were male patients (47.2%) and 28 patients were female patients (52.8%). This can occur because the number of samples is relatively small, so it may not be representative in showing the proportion of this disease based on sex.

A study from Sabiri, et al in 2012 listed the results of their KOOS values based on their subscales, and obtained values for KOOS pain, symptoms, ADL, sports, and Quality of Life, respectively, 37.35 (0-91.67) ; 49.39 (7.14-92.86); 37.21 (0-86.78); 14.44 (0-100); and 26.40 (0-93.75) (Sabiri, 2012). Another study from Sivachidambaram, et al in 2014 also reported the results of the mean (minimum-maximum) KOOS subscale, namely for the pain subscale 62.90 (11-94); symptoms 69.15 (32-96); ADL 67.27 (9-97); sports & recreation 36.31 (0-95); and QoL 46.58 (13-94). From these two studies,

subscale and sports & recreation data including abnormal distribution with each mean, minimum, and maximum values in order are 59.66 (19-100) and 41.79 (5-100). Furthermore, the KOOS measurement of QoL subscale obtained normal distribution data with an average value of 53.71, standard deviation of 22.69, and a minimum-maximum value of 6-100. One other measurement is the 6-minutes walking test (6-MWT) and in this study, a mean of 390.38 meters was obtained with a standard deviation of 67.99 meters.

Table 2. Knee Injury and Osteoporosis Outcome Score (KOOS) and 6-Minute Walk Test (6-MWT)

Parameter	Mean	SD
KOOS pain	56,13	22,89
KOOS symptoms	57,08	23,26
KOOS ADL	59,66	20,72
KOOS sport & recreation	41,79	24,98
KOOS QoL	50,71	22,69
6-MWT (meter)	390,38	67,99

Based on the analysis of the correlation test from the KOOS subscale, there was no correlation between height and KOOS. For KOOS pain towards height, r = -0,037 is obtained; KOOS symptom r = -0,041; while for KOOS ADL; sports & recreation; and QoL r = -0,123; -0,017; and -0,077.

the lowest value of the KOOS sports & recreation subscale was compared with the other subscale values. This is also in accordance with the findings of this study, which obtained the KOOS subscale mean value for sports & recreation 41.79 (5-100). There is one other objective parameter assessed in this study, namely the 6-minute walk test (6-MWT). The average value of this 6-MWT is 390.38 meters with a standard deviation of 67.99 meters where the minimum recorded value is 270 meters and the maximum value is 510 meters. There are other studies that have seen the results of this 6-MWT measurement in patients with OA, obtained quite different results, which on average, only reached a value of 251.77 meters with a standard deviation of 35.04 meters.

Age is weakly and negatively correlated to all subscales of KOOS but this is different from the findings from Sivachidambaram et al, where no correlation was found between age and KOOS subscale. As for height parameters, there is no correlation from this study, according to the results of research from Sivachidambaram (Sivachidambaram, 2014).

Based on weight parameters, the results of this study are supported by the research findings of Sivachidambaram et al, where the results of each subscale also show a weak and negative correlation with body weight. Each KOOS subscale is r = -0,542; -0,485; -0,333; -0,413; and -0,582 for KOOS pain; KOOS Symptom; KOOS ADL; KOOS sports & recreation; and KOOS QoL. In accordance with body weight, it can also be seen the correlation between KOOS subscales with body mass index (BMI). In this study from Sivachidambaram also showed a strong correlation or very strong and negative. From the KOOS pain subscale, r = -0.683; symptom r = -0.641; ADL r = -0.523; sports & recreation r = -0.640; and QoL r = -0.816 (Sivachidambaram, 2014). The results were quite different in the ADOS KOOS subscale assessment, where in this study no correlation was found with BMI. The relationship between pain and BMI has also been investigated by Marks, but in that study, using Visual Analog Scale (VAS) as an evaluation of pain. From these studies, no correlation was found between

VAS and BMI ($r = 0.265$) (Marks, 2007). Another study from Aoyagi, also found BMI to be a risk factor for pain in osteoarthritis patients. (Aoyagi, 2002).

The last parameter assessed from this study is the 6-MWT which is related to the subscale value of KOOS. Based on the results of this study, we get a weak correlation between each KOOS subscale and 6-MWT, while from Sivachidambaram research there is a fairly varied correlation that is KOOS $r = 0.578$; KOOS ADL $r = 0.461$; KOOS sports & recreation $r = 0.536$; and finally KOOS QoL $r = 0.733$.

CONCLUSION

Based on the results of data analysis obtained from this study, it is seen that there is a negative correlation between the KOOS (Knee Injury and Osteoporosis Outcome Score subscales) on age, body weight, and body mass index. While a positive correlation was found on the KOOS subscale against the 6-MWT (6-Minute Walk Test). As for height, no correlation was found with the subscale of KOOS.

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