

Correlation between severity of knee osteoarthritis with gender of patients in Secondary Referral Hospital in Indonesia

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ABSTRACT

Aim Knee osteoarthritis is a common osteoarthritis, which limits individual's activity and affects aspects of daily life and quality of life. The prevalence of osteoarthritis in Indonesians is still high, reaching 12.7% in women and 15.8% in men. Based on the WHO, the prevalence of osteoarthritis in the world is still high, with 18% in women and 80% in men. This study aimed to determine the relationship between gender and the severity of knee osteoarthritis at Baptis Hospital, Batu City.

Methods This cross-sectional study involved 27 female patients and 10 male patients who suffer from knee osteoarthritis at Baptis Hospital, Batu City. Data on gender and the severity of osteoarthritis were collected from medical records. The severity of knee osteoarthritis was assessed using the Kellgren-Lawrence system.

Results Among 27 female (73%) and 10 male patients (27%), seven patients suffered from osteoarthritis grade 1, 13 from osteoarthritis grade 2, 16 from osteoarthritis grade 3, and one patient suffered from osteoarthritis grade 4. There was no significant relationship ($p > 0.05$) between the severity of knee osteoarthritis and patients gender.

Conclusion There was no significant relationship between the severity of knee osteoarthritis between males and females.

Key words: grade osteoarthritis, joint, Kellgren-Lawrence, quality life, severity

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Original submission:

26 March 2022;

Revised submission:

21 April 2022;

Accepted:

25 April 2022

doi: 10.17392/1494-22

Med Glas (Zenica) 2022; 19(2): 224-228

INTRODUCTION

Osteoarthritis is a disease of degenerative joints and considerable impact on individual patients, resulting in pain, disability, and on society (1) that affects >25% of the population over 18 years of age (2). Osteoarthritis preferentially affects the knee, hand, hip and spine (1). Based on the WHO, the prevalence of osteoarthritis in the world is still high, with 18% in females and 80% in males. As a result, of the population total, it is estimated that 80% will suffer from the limitation of movement and another 20% will have a decreased quality of life (3).

Knee osteoarthritis accounts for as much as 80% of the total burden of osteoarthritis caused by the breakdown of joint tissues from mechanical loading and inflammation, but deeper causes of the high prevalence of knee osteoarthritis are still unclear, which hinders efforts to prevent and treat knee osteoarthritis grade 1 and 2 (4) but this assumption has not been tested using long-term historical or evolutionary data. We analyzed long-term trends in knee OA prevalence in the United States using cadaver-derived skeletons of people aged ≥ 50 y whose BMI at death was documented and who lived during the early industrial era (1800s to early 1900s; $n = 1,581$). A study by Rollo et al. (5) showed that regardless of the treatment that has been done, the complication level of knee osteoarthritis is still high. The surgeons on patients with knee osteoarthritis grade 3 and 4 must focus on decreasing complications when treating serious injuries. There are some elements that need to be considered in the management of osteoarthritis, such as site, number and extent of lesions, functional degree, level of activity, age, and previous trauma experienced by the patient. Therefore, the surgeon must be able to select and consider an appropriate treatment for each patient (6).

There were around 654.1 million individuals (40 years and older) with knee osteoarthritis in 2020 worldwide. The ratios of prevalence and incidence in females and males were 1.69 and 1.39 million, respectively (7). The prevalence of osteoarthritis in Indonesian females reached 8.5% and 6.1% in males according to 2018 data (8). Oboirien et al. (9) study showed that increasing age, female and increased BMI (body mass index) are risk factors associated with the development of knee osteoarthritis. A study by Mahajan and Pat-

ni (10) mentioned that menopause is associated with the onset and progression of osteoarthritis, because of deficiency of estrogen that influences the activity of joint tissues. While risk factors including obesity, injury, genetics profile, and age have been identified, the role of gender in osteoarthritis has been understated, even sex/gender difference has been noted in prevalence, severity and severity of osteoarthritis for many years (11) but there is still much to be researched.

The aim of this study was to determine the relationship between gender and the severity of knee osteoarthritis at Baptis Hospital, Batu City. Methods for diagnosing osteoarthritis include radiography and assessing the severity of knee osteoarthritis using Kellgren-Lawrence technique (12).

PATIENTS AND METHODS

Patients and study design

This retrospective cross sectional research study conducted from April to July 2020 involved patients of Orthopaedic and Traumatology in Baptis Hospital, Batu City, East Java, who suffered from knee osteoarthritis.

The inclusion criteria were patients who suffered from knee osteoarthritis, and the exclusion criteria were patients who suffered from pain in the knees that was not caused by knee osteoarthritis but another disease and patients who suffered from osteoarthritis in another part of their body.

This research proposal has been reviewed and approved by the Ethical Committee from the Faculty of Medicine, Universitas Brawijaya, (No: 73/EC/KEPK/03/2020).

Methods

Data about gender (and age) of patients who suffer from knee osteoarthritis were collected from medical records. Kellgren & Lawrence system (12) used to assess the severity of knee osteoarthritis. Grade 0 - no osteophyte formation or joint narrowing, grade 1 - osteophyte lip and suspected joint space narrowing, grade 2 - a few osteophytes and joint space narrowing, grade 3 - quite severe osteophytes, marked by joint space narrowing, sclerosis, and deformities at the ends of the bones, and grade 4 - severe osteophytes, joint space narrowing, severe sclerosis, and deformities at the ends of the bones. Knee osteoarthritis was confirmed by radiological examination.

Statistical Analysis

The data were analysed using the χ^2 test. The $p < 0.05$.

RESULTS

Among 37 patients with knee osteoarthritis, 10 (27%) were males and 27 (73%) were females. Twenty-three (62.2%) patients were <65 years old and 14 (37.8%) were >65 years. Seven (18.9%) patients suffered from knee osteoarthritis grade 1, 13 (35.1%) from grade 2, 16 (43.2%) from grade 3, and one (2.7%) suffered from knee osteoarthritis grade 4.

Among 10 male patients, three (30%) aged <65 years were suffered from knee osteoarthritis grade 1, and four (40%) patients aged >65 years from knee osteoarthritis grade 3. No male patients with grade 4 knee osteoarthritis were found. There was no significant relationship between the grade of knee osteoarthritis and age in male patients ($p = 0.091$).

Among 27 females, knee osteoarthritis grades 2 and 3 were the most frequent in both: <65 years, seven (25.9%) and six (22.2%), respectively, and >65 years, four (14.8%) and five (18.5%) respectively. There was no significant relationship between the severity of knee osteoarthritis and age in the female patients (0.351) (Table 1). The-

Table 1. Relationship between gender and severity of knee osteoarthritis according to age

Grade of osteoarthritis	Number (%) of patients				Total	p
	< 65		> 65			
Males						
Grade 1	3	30	0	0	3	30
Grade 2	1	10	1	10	2	20
Grade 3	1	10	4	40	5	50
Grade 4	0	0	0	0	0	0
Total	5	50	5	50	10	100
Females						
Grade 1	4	14.8	0	0	4	14.8
Grade 2	7	25.9	4	14.8	11	40.7
Grade 3	6	22.2	5	18.5	11	40.7
Grade 4	1	3.7	0	0	1	3.7
Total	18	66.7	9	33.3	27	100

Table 2. Relationship analysis between gender and severity of osteoarthritis

Grade of osteoarthritis	No (%) of patients				Total	p
	Males		Females			
Grade 1	3	8.1	4	10.8	7	18.9
Grade 2	2	5.4	11	29.7	13	35.1
Grade 3	5	13.5	11	29.7	16	43.2
Grade 4	0	0	1	2.7	1	2.7
Total	10	27	27	73	37	100

re was no significant relationship between the severity of knee osteoarthritis between males and females ($p = 0.531$) (Table 2).

DISCUSSION

The result of this research shows that knee osteoarthritis was mostly found in patients aged less than 65 years. This result coincides with an American study, where of the 81 million population, 6.1 million aged 45–65 years and 6 million people aged >65 years suffered from symptomatic knee osteoarthritis. However, this number changed 3 years later to 6.6 million people aged 45–65 and 6.8 million, respectively (13). Research conducted by Sanglah Hospital, Denpasar, Indonesia according data to 2018 have shown that out of 43 patients, 27 were <60 years and 16 patients >60 years of age suffered from osteoarthritis (14). Age-related changes that occur in tissue other than articular cartilage may contribute to the development of osteoarthritis. Joint pain can contribute to osteoarthritis in joint tissues such as synovium, bone (including osteophytes), joint capsule, ligaments, and meniscus. Changes in these tissues can play an important role in the early stage of osteoarthritis (15). Based on this research, age less than 65 years can be interpreted as the age at which the onset of the early stages of osteoarthritis can be expected.

The prevalence of knee osteoarthritis will increase with age. The increase in life expectancy in the United States since the early 20th century is thought to have led to high rates of knee osteoarthritis among the elderly, assuming that as the joint tissue ages, their ageing joints accumulate more wear and tear than they can load. Knee osteoarthritis is associated with load-bearing damage to the joint tissues, either due to abnormal loading or structurally weak tissues. Trauma may also predispose some individuals to knee osteoarthritis (4) but this assumption has not been tested using long-term historical or evolutionary data. We analyzed long-term trends in knee OA prevalence in the United States using cadaver-derived skeletons of people aged ≥ 50 y whose BMI at death was documented and who lived during the early industrial era (1800s to early 1900s; $n = 1,581$).

Furthermore, the result of this research showed that females suffer from osteoarthritis more frequently than males. In vitro studies have shown that

sex differences arise at the molecular level and in the gene expression of inflammatory cytokines and hormone receptors. Women had higher levels of stimulators and inflammatory mediators, including inflammatory interleukins, and higher estrogen receptor expression when compared to men (11). Several experimental studies have shown that estrogen is involved in the regulation of cartilage metabolism (10). Soeryadi et al. (16) study showed that 19 (out of 27) patients were females with osteoarthritis. Another study conducted by Rahmadyanti et al. (17) revealed no significant relationship between severity of knee osteoarthritis and age in the female patient who showed the same results in this study.

Our results have shown no relationship between gender and severity of knee osteoarthritis. This research result, from the study by Rahmadyanti et al. (17) also showed no significant relationship between gender and age. Hong et al. (18) study conducted in Korea found that females over the age of 50 were twice as likely as males to develop progressive osteoarthritis, and this number then increased when the age reached >80 years, becoming 9 times the risk of developing progressive knee osteoarthritis compared to the age below. Age-related factors can also determine the severity of knee osteoarthritis. This is related to the degenerative process in the joints where cartilage destruction is caused by a decrease in the number of chondrocytes in the joints (19).

There are still some limitations to this research, including incomplete medical record data and the total of samples is small because the research was conducted during the Covid-19 pandemic. Nonetheless, this study can be used as a guideline

for the treatment of osteoarthritis that can help the activity and movement of patients aged under and over 60 years. The treatment for grade 1 and 2 knee osteoarthritis can be done in several ways. One such method is polynucleotide injection treatment. Research conducted by Meccariello et al. (20) showed that polynucleotides can be considered a valid alternative, as is the case with hyaluronic acid injections for the treatment of knee osteoarthritis. Hyaluronic acid injections into the joints relieve pain and stiffness in osteoarthritis. Likewise, polynucleotide injections were also able to reduce pain, and the KOOS (Knee Osteoarthritis Outcome Score) results were comparable to hyaluronic acid injections up to the sixth month, suggesting that both hyaluronic acid injection and polypeptide can be used for the treatment of knee osteoarthritis in grade 1 and 2. In addition, research by Ripani et al. (21) has shown that maintaining a balance of vitamin C is very beneficial for people with grade 2 knee osteoarthritis and can reduce pain.

In conclusion, there was no significant relationship between gender and severity as well as between age and severity of knee osteoarthritis.

ACKNOWLEDGEMENTS

The author thanks Baptis Hospital for facilitating this research.

FUNDING

No specific funding was received for this study.

TRANSPARENCY DECLARATION

Conflict of interest: None to declare.

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