Risk Factors Analysis in Patients with Knee Osteoarthritis at Al-Fauzan General Hospital

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ABSTRACT

One of the degenerative conditions frequently occurring in joints is Osteoarthritis (OA). OA is a common form of joint inflammation, the most prevalent one. Individual factors such as age, gender, body mass indices, occupation, family history, injury history, and body posture can increase the risk of knee OA. Knee OA is distinguished based on etiology, namely primary and secondary. Primary knee OA is often associated with genetic factors and natural aging, while secondary knee OA is caused by injuries, structural abnormalities, or other medical conditions. The purpose is to determine the relationship between risk factors in patients with knee OA. This research employed a cross-sectional design involving 56 patients selected through a total sampling technique at Al-Fauzan Hospital. The findings of the study reveal a significant association between the onset of OA and both age (p=0.000) and body posture (p=0.000). Nevertheless, factors such as gender (p=0.535), body mass indices (p=0.705), occupation (p=0.942), family history (p=0.321), and injury history (p=1.000) exhibit no correlation with knee OA. Age emerges as the most impactful factor linked to the occurrence of OA

(OR=51.358). A notable correlation exists between age and body posture as risk factors for knee OA in patients. The probability of developing OA increases by a factor of 51.358 as individuals grow older compared to their younger counterparts.

Keywords : Knee, Osteoarthritis, Risk factors, Joint inflammation

Introduction

Osteoarthritis (OA) is a degenerative condition that commonly affects joints, especially in the hands, hips and knees. Overall, OA affects about 240 million individuals, with about 10% of men and 18% of women over the age of 60. It causes substantial impact in the form of disability and reduced quality of life.

In Indonesia, the prevalence of OA in individuals under the age of 40 is around 5%, in the age range of 40-60 years it reaches 30% and reaches 65% in individuals over 60 years old[1]. The national prevalence of joint disease in Indonesia is 7.3% based on a doctor's diagnosis, while based on the diagnosis of health workers it reaches 11.9%[2].

Knee OA is classified by etiology as primary (idiopathic) and secondary. Primary OA is called idiopathic OA, where the cause is unknown and has no association with systemic disease. It generally occurs due to age, or aging. As we age, cartilage tends to decrease in quality and elasticity. This makes it more susceptible to damage and inflammation associated with OA. In addition, genetic factors, lifestyle, and environmental factors can also play a role in the development of primary OA.

While secondary OA occurs as a result of an obvious cause or other medical condition. It can be caused by a variety of factors, including joint injuries, such as sports injuries or accidents, congenital or developmental abnormalities of the joints, such as joint dysplasia, or other medical conditions, such as rheumatoid arthritis, joint infections, or excessive obesity. These factors can cause structural changes in the joint, which can then lead to cartilage damage and inflammation similar to primary OA. Secondary OA can also be caused by excessive physical activity or continuous heavy loads on certain joints.

The etiology of primary and secondary OA can be one of the specific differences between the two classifications. Differentiating primary and secondary OA in detail has several clinical and practical benefits that can improve patient care and management.

The incidence of OA is influenced by risk factors, with age being the main cause of OA. As age increases, the risk of developing OA increases. Gender is also a risk factor for OA, where there is a higher incidence of OA in women compared to men. This is due to hormonal

changes in women after menopause, which causes a decrease in the hormone estrogen and results in reduced bone and joint density.

Apart from age and gender, obesity is also a major risk factor for OA, especially in the knee joint. Obesity is not only a risk factor for knee OA but can also worsen the symptoms due to excessive weight bearing on the knee joint[3]. Work also has an impact on the OA of the knee joint, as the performance of job duties often involves physical movements that can affect the condition if performed continuously and under strenuous conditions.

Several studies have shown that injury to the knee is one of the most powerful risk factors for OA. Repetition of impact loads may be a site-determining factor in individuals predisposed to OA and may be associated with the progression and severity of OA[4]. In addition, the risk factors are also considered risk factors for OA of the knee joint. Congenital abnormalities are another risk factor for OA that can cause or contribute to cartilage damage. Congenital abnormalities can cause weakness in the tissues and also affect posture[5]. Abnormalities in posture can result in fatigue and susceptibility to injury when it occurs continuously during strenuous work. Over a long period, this condition can cause damage to the structure of body tissues and limbs[6].

Based on the explanation above, the researcher felt interested in conducting the study. In addition, no literature explains the relationship between body posture and the incidence of OA in the knee joint. The purpose of this study was to analyze risk factors for OA of the knee joint at Al Fauzan General Hospital and it is hoped that the result of this study can provide additional information for the world of medicine, especially in the field of orthopedics.

Methods

Study Design

This study used an observational analytic approach with a cross-sectional design. The purpose of this study was to identify risk factors for knee OA at Al Fauzan General Hospital. The population of this study were all patients diagnosed with knee OA at Al Fauzan General Hospital who met the criteria in the period 2020-2021. The sample in this study that fit the criteria amounted to 56 samples. The study used non-probability sampling data collection techniques with the total sampling method, namely, researchers selected respondents based on subjective and practical considerations. The flowchart in this research is shown in Figure 1.

The Ethics Committee of the UPN Veteran Jakarta has issued a research ethics approval by releasing an ethics number in the form of 368/X/2023/KEP.

Data Collection

The inclusion criteria for this study were patients with a diagnosis of OA who had complete medical record data (name, gender, age, weight, height, occupation, family history, history of knee joint injury and posture) with a minimum age of 25 years. The type of data used in this study is secondary data, obtained from the medical records of knee osteoarthritis (OA) patients at Al Fauzan General Hospital.

Data Analysis

Data analysis used univariate, bivariate, and multivariate analysis. Univariate analysis was performed to observe the frequency distribution and proportion of each independent and dependent variable. The variables used included age, gender, weight, height, occupation, family history, history of joint injury and posture. Bivariate analysis was carried out using the Chi-square test for the 2x2 table if the test was not fulfilled, an alternative test was used, namely the Fisher test, while for the 2xk table using the Chi-square exact test. Multivariate analysis was carried out to determine the greatest influence using the logistic regression test.

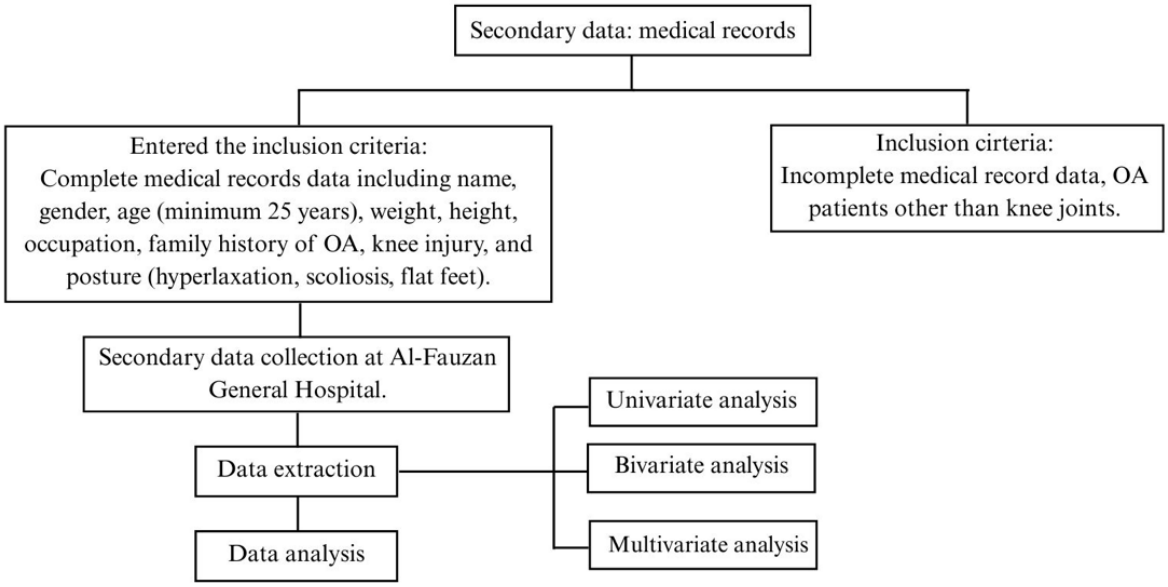

Figure 1. Flowchart in this research.

Results

Univariate Analysis Results

Table 1 shows a total of 56 OA patients with a distribution of primary OA as many as 38 people (67.9%) and secondary OA 18 people (22.1%). Based on age, most were found at the age of >35 years, namely 54 people (96.4%).

In gender characteristics, 39 people (69.6%) were found to be female compared to 17 people (31.4%). Based on BMI, the most overweight category was found to be 27 people (48.2%). In Table 1, the characteristics of the work obtained the most high impact category, namely 32 people (55.4%). In the family history variable, 1 person (1.8%) had a history in his family, while the other 55 people (98.2%) did not have a history in his family. The results of the study on knee injuries obtained 11 people (19.6%) who had knee injuries while those who did not have a history of injury 45 people (98.4%). In the characteristics of posture, 42 people (25%) had asymmetrical posture.

Table 1. Respondent characteristics.

Variable	Total (n)	Percentage (%)
Knee OA		
Primary	38	67,9
Secondary	18	22,1
Age		
<35 years	2	3,6
≥35 years	54	96,4
Gender		
Perempuan	39	69,6
Laki-laki	17	30,4
Body Index Mass (BMI)		
Underweight	1	1,8
Normalweight	13	23,2
Overweight	27	48,2
Obese	15	26,8
Job		
Low Impact	25	44,6

High Impact	31	55,4
Family history of OA		
None	55	98,2
History of knee injury		
Available	11	19,6
None	45	80,4
Posture		
Symmetrical	42	75,0
Asymmetrical	14	25,0

Bivariate Analysis Result

The bivariate result showed the relationship of characteristics with knee OA, which is shown in Table 2. The results explain that the age risk factor had a significant relationship with knee OA with a value of p=0.019 (h<0.05). In addition, body posture also had a significant association with knee OA at p=0.000 (h<0.05), while gender (p=0.535), BMI (p=0.075), occupation (0.0580), family history (p=0.321) and injury history (p=1.000) showed that there was no significant association with knee OA.

Table 2. Relationship between characteristics and knee OA.

Variable	**Osteoarthritis**					
	Primary		**Secondary**		**Total**	**P-value**
	N	%	N	%		
Age						
<35 years	0	0	2	100	2	0.019
≥35 years	38	70,4	16	29,6	54	
Gender						
Female	25	64,1	14	35,9	39	
Male	13	76,5	4	23,5	17	0.535
Body Mass Index (BMI)						
Underweight (<18,5)	1	100	0	0	1	
Normal weight (18,5-24,9)	7	53,8	6	46,2	13	0.705

	Overweight (25,0-29,9)	19	70,4	8	29,6	27	
	Obese (>30,0)	11	73,3	4	26,7	15	
Job							
	Low Impact	18	72,0	7	28,0	25	0.580
	High Impact	20	64,5	11	35,5	31	
Family history of OA							
	Available	8	72,7	3	27,3	11	
	None	30	66,7	15	33,3	45	0.321
History of knee injury							
	Available	0	0	1	100	1	
	None	38	69,1	17	30,9	55	1.000
Posture							
	Symmetrical	35	83,3	7	16,7	42	
	Asymmetrical	3	21,4	11	78,6	14	0.000

Multivariate Analysis Results

The final model of multivariate analysis is presented in Table 3, which fulfills the conditions ($p<0.025$) for multivariate analysis between age and posture. Where the results obtained that the most dominant variable is the age risk factor which has the largest odd Rasio value of 51.368.

Table 3. The final model of multivariate analysis.

Variable	p-value	OR
Age	0.002	51.358
Posture	0.001	23.662

Discussion

In this study, medical record data totaled 56 samples, there were 56 patients (96.4%) who fell into the elderly age category (≥35 tahun), and 2 people (3.6%) from the <35 years age group. This finding is in line with the research of Duha (2019), where most respondents were in the age range of 51-60 years, while the age group 41-50 years was less[7].

The significant relationship between age and knee joint OA at Al Fauzan General Hospital is also supported by the results of Purnamasari's research (2016) which states a significant correlation between age and the incidence of knee OA[8]. Age is the most influential factor in the occurrence of knee joint OA. With increasing age, the risk of developing knee OA also increases. In addition, aging can be identified as a cause of joint laxity, leading to reduced flexibility in the bone cloud, and decreased chondrocyte function. Consequently, it will affect the development of OA in the knee joint[7]. Based on the multivariate results, the Odds Ratio (OR) value was 51.358, indicating that the odds of developing knee OA increased by 51.358 times with each increase in age, when compared to younger individuals.

Of the 56 patient respondents, the majority were female, which is also similar to Azizah's (2019) study, which noted that knee OA is experienced more by women than men. According to the bivariate analysis, the gender variable showed no significant relationship between gender and knee OA. However, this result contradicts Purnamasari's (2016) study, which states that there is a significant relationship between gender and OA of the knee joint[8].

Women or women who enter menopause will experience a decrease in estrogen levels in their body. Estrogen is a hormone that plays a crucial role in maintaining healthy bones and joints. A decrease in estrogen levels can result in the bone formation process becoming less efficient, which in turn can lead to a decrease in bone density. In addition, this can also increase the risk of developing joint diseases such as OA. Finally, it is likely that OA is not only associated with the female sex but can also occur in the male sex. The hypothesis that there is an association between gender and knee OA is not proven.

Based on BMI, overweight dominated in the results of this study. This finding is in line with Azizah's (2019) study, which involved 56 respondents with knee OA showing overweight compared to the idela weight category[9]. Obesity can put additional pressure on joints, especially the knee joint. This pressure has the potential to damage the bone cloud and trigger the inflammation that is the main characteristic of OA. Under these conditions, patients' efforts to lose weight and lead a healthy lifestyle can play a role in reducing the risk of developing knee OA.

Based on the bivariate results, there was no significant association between BMI and the incidence of knee OA. This finding is different from the results of Anggraini and Hendrawati's (2014) study, which found that obesity has a major impact on the likelihood of knee OA[10]. Thus, the prevalence of OA tends to be higher in individuals with excess body weight, especially those categorized as overweight (25.0-29.9), although the disease can also be found in those with ideal body weight.

Of the 56 respondents, the majority had high-impact jobs. These jobs involve strenuous physical activity, such as kneeling, squatting, lifting, climbing, standing, walking and sitting for longer periods. For example, jobs in the agricultural sector, service workers, and household duties. This finding is in line with the results of Azizah's (2019) study, that working as a housewife is a common job found, the majority of respondents have a housewife job[9]. The resulting finding, the absence of a significant relationship between type of work and the incidence of OA in the knee joint, is in line with the results of the Azizah study (2019), that there is no significant relationship between type of work and knee OA[9].

Based on family history, the majority of respondents did not have a family history of the condition under study. In bivariate analysis, the results showed that there was no significant relationship between family history and the incidence of OA in the knee. This result is in line with the results of Azizah's study (2019) which states that there is no significant relationship between a family history of OA and knee OA9. However, another study found the opposite, namely in the results of the study Putri et al. (2022), which showed a significant genetic influence on the incidence of knee OA11. Soeroso et al. (2014) stated that a daughter is three times more likely to inherit OA if the mother has a history of OA. Thus, if a child has a father, grandfather, or grandmother with OA, and the mother does not have OA, then the child may not develop OA[5].

The majority of respondents did not have knee injuries. This is in line with the study of Azizah (2019), which states that there is a significant relationship between the history of knee injury and the incidence of knee OA[9]. Knee injuries, such as meniscus tears, ligament instability, intra-articular fractures, or joint dislocations, can cause mechanical damage that is considered the main trigger for the formation of abnormal molecules and cartilage degradation products in the synovial fluid of the joint. As such, a person's likelihood of developing OA is not influenced by whether or not there is a history of knee injury.

This study showed that most of the respondents had symmetrical posture, and this has a significant relationship between posture and knee OA. Although no studies have been found that explore the relationship between posture and knee OA, research by Putra (2014), suggests the influence of certain postures, such as scoliosis, on the development of knee OA. Suboptimal posture can lead to imbalances in the body, resulting in uneven load distribution[12]. An increased risk of knee OA may occur due to decreased stability and flexibility of body movement due to damage to the body's tissue structure. This process can also lead to a decrease in cellular biochemical activity which in turn can cause a decrease in body function and increase the risk

of disease[6]. Therefore, maintaining good posture and avoiding habits that can put excessive pressure on the joints is important.

Conclusion

An overview of the characteristics of 56 respondents found the highest proportion of knee OA at the age of ≥35 years (96.4%), and the highest incidence of OA in women (69.6%). There is a significant relationship between the risk factors of age and posture with knee OA, while the risk factors of BMI, occupation, family history and injury history have no significant relationship to the incidence of OA. The most influential risk factor was age with an Odds Ration value of 51.358.

Ethics Approval

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Conflicts of Interests

There are no conflicts of interest.

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