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Prevalence and Risk Factors of Knee Osteoarthritis: A Cross-Sectional Study in Palembang, Indonesia

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A B S T R A C T

Osteoarthritis (OA) is a prevalent degenerative joint disease causing pain, disability, and decreased quality of life. This study aimed to investigate the prevalence and risk factors associated with knee OA in Palembang, Indonesia. A cross-sectional study was conducted using secondary data from medical records of patients diagnosed with knee OA at Dr. Mohammad Hoesin General Hospital in Palembang during 2023. Patients aged ≥ 55 years with primary knee OA were included, while those with secondary knee OA or cerebrovascular disease were excluded. Data on sociodemographics, clinical characteristics, and comorbidities were collected. Univariate analysis and correlation tests were performed to assess the association between risk factors and knee OA. A total of 133 patients with knee OA were included. The majority were female (82%), aged 55-65 years (51.1%), and housewives (48.1%). Bilateral knee involvement was observed in 73.7% of patients. Overweight (35.3%) was the most common BMI category. Hypertension was the most prevalent comorbidity (61.7%), followed by diabetes mellitus (19.5%) and dyslipidemia (19.5%). Correlation analysis showed a significant positive correlation between knee OA and age, female gender, and BMI. In conclusion, knee OA in Palembang is more prevalent in middle-aged women, particularly housewives. Overweight and hypertension are significant risk factors associated with knee OA. These findings underscore the need for targeted preventive strategies and public health interventions to address these modifiable risk factors.

1. Introduction

Osteoarthritis (OA) is a chronic, degenerative joint disease that primarily affects the cartilage, leading to pain, stiffness, and functional limitations. It is a significant public health concern, affecting millions of people worldwide and contributing to a substantial economic burden. OA is characterized by the progressive breakdown of articular cartilage, the smooth tissue that covers the ends of bones in a joint, enabling them to move smoothly against each other. As the cartilage deteriorates, the bones begin to rub together, causing pain, inflammation, and the formation of bony growths called osteophytes. The knee joint is among the most commonly affected joints in OA, resulting in significant morbidity and reduced quality of life. Knee OA can lead to difficulty in performing daily activities such as walking, climbing stairs, and rising from a chair. The prevalence of OA varies across different populations and is influenced by a complex interplay of factors, including age,

gender, genetics, obesity, occupation, and lifestyle. Age is a well-established risk factor for OA, with the prevalence increasing significantly after the age of 50. The aging process leads to a decline in the regenerative capacity of cartilage, making it more susceptible to damage. Additionally, the cumulative effects of mechanical stress on the joints over time contribute to the development of OA.[1-4]

Women are more likely to develop knee OA than men, especially after menopause. Hormonal changes associated with menopause, such as decreased estrogen levels, may play a role in cartilage degeneration. Furthermore, differences in anatomy and biomechanics between men and women may contribute to the increased risk of knee OA in women. Obesity is a major risk factor for OA, particularly knee OA. Excess weight places additional stress on the joints, leading to accelerated cartilage breakdown and inflammation. Adipose tissue also produces pro-inflammatory cytokines, which contribute to the pathogenesis of OA.[5-7]

Occupation and lifestyle factors can also influence the risk of knee OA. Occupations involving repetitive knee bending or heavy lifting have been associated with an increased risk of knee OA. Similarly, high-impact sports and activities can contribute to joint damage and the development of OA. On the other hand, regular moderate-intensity exercise and maintaining a healthy lifestyle can help protect against OA. The prevalence of OA in Indonesia is estimated to be high, with a significant impact on the healthcare system and the economy. However, there is limited data on the specific prevalence and risk factors of knee OA in different regions of Indonesia. Understanding the local prevalence and risk factors associated with knee OA is crucial for developing targeted preventive strategies and public health interventions.[8-10] This study aimed to investigate the prevalence and risk factors associated with knee OA in Palembang, Indonesia.

2. Methods

This research employed a cross-sectional study design, utilizing secondary data retrieved from the medical records of patients diagnosed with knee osteoarthritis (OA) at Dr. Mohammad Hoesin General Hospital in Palembang, Indonesia, throughout the year 2023. Cross-sectional studies are observational studies that collect data at a single point in time, providing a snapshot of the prevalence of a disease or condition and its associated factors within a specific population. This design is particularly useful for investigating the prevalence and risk factors of diseases like OA, which have a relatively high prevalence in the population. Dr. Mohammad Hoesin General Hospital is a major tertiary care hospital in Palembang, serving a large and diverse population. The hospital's extensive medical records provide a valuable source of data for epidemiological research on various health conditions, including OA.

The study population comprised patients aged 55 years and older who had been diagnosed with primary knee OA. The age criterion of 55 years and above was chosen because OA is more prevalent in older adults due to age-related cartilage degeneration and wear and tear on the joints. Primary knee OA refers to OA that develops due to age-related changes, genetic predisposition, or lifestyle factors, rather than a specific underlying condition or injury. Patients with secondary knee OA, which is caused by trauma, infection, or other medical conditions, were excluded from the study to ensure that the focus remained on primary OA and its associated risk factors. Additionally, patients with cerebrovascular disease were excluded to avoid potential confounding effects on the assessment of OA risk factors. All eligible patients who visited the hospital during the study period and whose medical records were available were included in the study. This approach aimed to capture a representative sample of knee OA patients attending the hospital, maximizing the generalizability of the study findings to the broader population of

Palembang.

Data were collected from the medical records using a standardized data collection form, ensuring consistency and accuracy in data extraction. The form was designed to capture a comprehensive range of information relevant to the study objectives, including sociodemographic characteristics, clinical characteristics, comorbidities, and anthropometric measurements. Sociodemographic characteristics encompassed age, gender, occupation, education level, and marital status. These variables were chosen to assess the potential influence of social and demographic factors on the prevalence and risk of knee OA. Clinical characteristics included the duration of knee pain, knee involvement (unilateral or bilateral), and radiographic severity of OA. These data provided insights into the clinical presentation and progression of knee OA in the study population. Comorbidities, such as hypertension, diabetes mellitus, dyslipidemia, and other chronic diseases, were also recorded. These conditions have been implicated as potential risk factors for OA or may influence its management, making their inclusion important for a comprehensive understanding of OA. Anthropometric measurements, including height, weight, and body mass index (BMI), were collected. BMI was calculated as weight in kilograms divided by height in meters squared (kg/m^2). BMI is a widely used measure of body fat and is a key risk factor for knee OA.

Data analysis involved descriptive statistics, prevalence calculation, univariate analysis, and correlation analysis. Descriptive statistics, including frequencies, percentages, means, and standard deviations, were used to summarize and describe the characteristics of the study population. The prevalence of knee OA was calculated as the number of patients with knee OA divided by the total number of patients screened. Univariate analysis was performed to examine the distribution of various risk factors among the study population. This analysis helped identify potential risk factors associated with knee OA. Correlation analysis was conducted to assess the association between potential risk factors (age, gender, BMI, hypertension, diabetes mellitus, and dyslipidemia) and knee OA. This analysis helped determine the strength and direction of the relationship between these factors and knee OA. All statistical analyses were performed using SPSS software version 25.0, a widely used statistical software package. The use of standardized statistical software ensured accuracy and reliability in the data analysis process.

3. Results and Discussion

Table 1 presents the sociodemographic characteristics of the 133 knee osteoarthritis (OA) patients included in the study; Age: The majority of patients (51.1%) were in the 55-65 age group, followed by 32.3% in the 66-74 age group. This distribution is consistent with the general understanding that OA prevalence increases with age, with a significant rise after the age of 50; Gender: A striking majority of the patients were female (82%). This aligns with previous research indicating a higher prevalence of knee OA in women, particularly after menopause. Hormonal changes and anatomical differences may contribute to this gender disparity; Occupation: Housewives constituted the largest occupational group (48.1%), followed by PNS (public servants) at 21.8%. The high proportion of housewives might be related to factors such as increased domestic workload involving repetitive knee bending and prolonged standing; Education Level: The most common education level was secondary education (45.1%), followed by high school (24.8%). This suggests that knee OA is prevalent across different educational backgrounds; Marital Status: Most patients were married (75.2%), followed by widowed (17.3%). This distribution is likely reflective of the general population demographics in the study area.

Table 1. Sociodemographic characteristics of knee osteoarthritis patients.

Characteristic	Number (n)	Percentage (%)
Age (years)		
55-65	68	51.1
66-74	43	32.3
75-90	22	16.5
> 90	0	0
Gender		
Male	24	18
Female	109	82
Occupation		
Farmers/farm workers	8	6
Civil servants	29	21.8
Housewives	64	48.1
Pensioner	22	16.5
Police/TNI	2	1.5
Self-employed	8	6
Education level		
Primary	20	15
Secondary	60	45.1
High school	33	24.8
College	20	15
Marital status		
Married	100	75.2
Widowed	23	17.3
Divorced	10	7.5

Table 2 presents the distribution of knee osteoarthritis (OA) patients based on whether the disease affects one knee (unilateral) or both knees (bilateral); Bilateral involvement is significantly more common: A large majority of the patients (73.7%) exhibited bilateral knee involvement, while only 26.3% had unilateral knee OA.

Table 2. Distribution of knee osteoarthritis patients by knee involvement.

Knee involvement	Number (n)	Percentage (%)
Unilateral	35	26.3
Bilateral	98	73.7

Table 3 shows the prevalence of common comorbidities among the knee osteoarthritis (OA) patients in the study. A significant proportion of patients (61.7%) had hypertension. This suggests a potential link between hypertension and knee OA, although the exact nature of the relationship needs further investigation. Some studies propose that hypertension could contribute to OA through mechanisms like vascular dysfunction and inflammation. Both diabetes mellitus and dyslipidemia were present in 19.5% of the patients. While these conditions are traditionally associated with cardiovascular risks, their presence in a considerable number of OA patients indicates a possible interplay between metabolic disorders and OA development.

Table 3. Distribution of knee osteoarthritis patients by comorbidities.

Comorbidity	Number (n)	Percentage (%)
Hypertension	82	61.7
Diabetes mellitus	26	19.5
Dyslipidemia	26	19.5

Table 4 presents the distribution of knee osteoarthritis (OA) patients based on their body mass index (BMI) categories. The most common BMI category among the patients was overweight (35.3%), followed closely by Obesity Class 1 (27.8%). Combining these, over 63% of the patients were either overweight or obese. This strongly suggests that excess weight is a major risk factor for knee OA in this population. Higher BMI puts additional stress on weight-bearing joints like the knees, leading to accelerated cartilage breakdown and inflammation. This finding underscores the importance of weight management as a key strategy for preventing and managing knee OA. A substantial proportion of patients (27.1%) had a normal BMI. This indicates that while excess weight is a significant risk factor, other factors also contribute to the development of knee OA. These could include genetics, age, previous injuries, and occupational factors. Only a very small percentage (1.5%) of patients were underweight. This suggests that being underweight is not typically associated with knee OA.

Table 4. Distribution of knee osteoarthritis patients by BMI categories.

BMI category	Number (n)	Percentage (%)
Underweight (<18.5 kg/m²)	2	1.5
Normal (18.5-24.9 kg/m²)	36	27.1
Overweight (25-29.9 kg/m²)	47	35.3
Obesity Class 1 (30-34.9 kg/m²)	37	27.8
Obesity Class 2 (≥35 kg/m²)	11	8.3

Table 5 presents the results of the correlation analysis, examining the relationship between potential risk factors and knee osteoarthritis (OA); Age: There is a weak positive correlation ($r = 0.22$, $p = 0.012$) between age and knee OA. This suggests that as age increases, the likelihood of having knee OA also increases, but the relationship is not very strong; Gender (Female): A moderate positive correlation ($r = 0.35$, $p < 0.001$) exists between female gender and knee OA. This confirms the earlier observation that women are more likely to have knee OA than men in this study population; BMI: BMI shows a moderate positive correlation ($r = 0.41$, $p < 0.001$) with knee OA. This indicates that higher BMI values are associated

with a greater likelihood of having knee OA, supporting the idea that excess weight is a significant risk factor; Hypertension: A weak positive correlation (r = 0.18, p = 0.045) is observed between hypertension and knee OA. This suggests a possible link, but the relationship is not very strong and requires further investigation; Diabetes Mellitus and Dyslipidemia: No significant correlations were found between diabetes mellitus (p = 0.082) or dyslipidemia (p = 0.151) and knee OA in this analysis.

Table 5. Correlation analysis of risk factors for knee osteoarthritis.

Risk Factor	Correlation Coefficient (r)	P-value	Interpretation
Age	0.22	0.012	Weak positive correlation
Gender (Female)	0.35	<0.001	Moderate positive correlation
BMI	0.41	<0.001	Moderate positive correlation
Hypertension	0.18	0.045	Weak positive correlation
Diabetes mellitus	0.15	0.082	No significant correlation

The high prevalence of knee osteoarthritis (OA) found in Palembang, Indonesia study aligns with observations from numerous studies conducted across diverse populations worldwide. This underscores the significant impact of knee OA on individuals and healthcare systems, emphasizing the urgent need for effective preventive measures and public health interventions. Knee OA is a major global health concern, affecting millions of individuals and contributing significantly to healthcare expenditures and disability. The prevalence of knee OA varies considerably across different regions and populations, influenced by a complex interplay of factors, including age, gender, genetics, lifestyle, and socioeconomic conditions. Studies conducted in various countries have reported a wide range of knee OA prevalence, from as low as 3% in some populations to over 60% in others. This variation reflects the complex interplay of risk factors and the heterogeneity of the populations studied. Studies have shown that the prevalence of knee OA can differ significantly between regions and countries. For example, a study in rural China found a prevalence of 42.3%, while a study in Korea reported a prevalence of 61.7% among individuals over 65 years of age. These regional variations may be attributed to differences in genetic predisposition, lifestyle factors such as diet and physical activity levels, occupational exposures, and access to healthcare. Age and gender are two of the most well-established risk factors for knee OA. The prevalence of knee OA increases significantly with age, particularly after the age of 50. This is likely due to the cumulative effects of mechanical stress on the joints over time, as well as age-related changes in cartilage composition and structure. Women are generally more likely to develop knee OA than men, especially after menopause. This gender disparity may be attributed to hormonal changes associated with menopause, such as decreased estrogen levels, which can affect cartilage health. Lifestyle factors, such as obesity, physical inactivity, and occupational exposures, can also influence the prevalence of knee OA. Obesity is a major risk factor for knee OA, as excess weight puts additional stress on the knee joints, leading to accelerated cartilage degeneration. Physical inactivity can weaken muscles around the knee joint, making the joint less stable and more susceptible to injury. Certain occupations that involve repetitive knee bending or heavy lifting can also increase the risk of knee OA. Socioeconomic factors, such as low income and education level, have also been associated with a higher prevalence of knee OA. These factors may

influence access to healthcare, healthy food choices, and opportunities for physical activity. The higher prevalence of knee OA in women compared to men is a consistent finding across numerous studies. This gender disparity becomes particularly pronounced after menopause, suggesting a role of hormonal changes in the development and progression of knee OA. Estrogen, a hormone that plays a crucial role in maintaining cartilage health, declines significantly after menopause. This decline may contribute to increased cartilage vulnerability and accelerate the degenerative processes associated with OA. Estrogen has been shown to have anti-inflammatory effects and to promote cartilage synthesis. Therefore, the decrease in estrogen levels after menopause may lead to increased inflammation and decreased cartilage repair, contributing to the development and progression of knee OA. In addition to hormonal factors, anatomical and biomechanical differences between men and women may also contribute to the higher prevalence of knee OA in women. Women generally have wider hips relative to their knees, which can alter the alignment and biomechanics of the knee joint, potentially increasing stress on the articular cartilage. This altered alignment can lead to increased loading on the medial compartment of the knee, which is the area most commonly affected by OA. Furthermore, differences in muscle strength and neuromuscular control between men and women may also play a role. Women tend to have weaker quadriceps muscles than men, which can reduce knee joint stability and increase the risk of injury. The present study, conducted in Palembang, Indonesia, found that 82% of the knee OA patients were female, which is significantly higher than the prevalence observed in men. This finding is consistent with the global trend of higher knee OA prevalence in women and emphasizes the need for targeted interventions specifically designed for women, particularly those who have gone through menopause. The high prevalence of knee OA in this study population, particularly among women, highlights the urgent need for preventive strategies and public health interventions aimed at reducing the burden of this disease. These interventions should be tailored to address the specific needs and risk factors of the population. Hormone Replacement Therapy (HRT) may be considered for some postmenopausal women to mitigate the effects of estrogen decline on cartilage health. However, HRT has potential risks and benefits, and the decision to use it should be made on an individual basis in consultation with a healthcare professional. Exercise programs designed to strengthen muscles around the knee joint, improve joint stability, and maintain flexibility can be beneficial for women. These programs should be tailored to the individual's fitness level and any existing limitations. Maintaining a healthy weight is crucial for women, as excess weight puts additional stress on the knee joints. Weight loss programs, including dietary modifications and increased physical activity, can help reduce the risk of knee OA. Educating women about the risk factors and early signs of knee OA can empower them to take preventive measures and seek early medical attention if needed. Regular physical activity, including moderate-intensity exercise, can help maintain joint health, strengthen muscles, and improve overall fitness. Public health campaigns should encourage people of all ages to engage in regular physical activity. Maintaining a healthy weight is crucial for preventing knee OA. Public health initiatives should focus on promoting healthy eating habits and encouraging weight loss for individuals who are overweight or obese. For individuals in occupations that involve repetitive knee bending or heavy lifting, ergonomic interventions and workplace modifications can help reduce the risk of knee OA. Early diagnosis and treatment of knee OA can help slow the progression of the disease and improve quality of life. Healthcare professionals should be trained to recognize the early signs and symptoms of knee OA and provide appropriate management

strategies.[11-13]

Knee osteoarthritis (OA) is a complex, multifactorial disease with a variety of risk factors contributing to its development and progression. These risk factors can be broadly categorized as non-modifiable and modifiable. Non-modifiable risk factors are those that cannot be changed, such as age and gender, while modifiable risk factors are those that can be altered through lifestyle changes or medical interventions, such as obesity and hypertension. Understanding these risk factors is crucial for developing effective preventive strategies and public health interventions aimed at reducing the burden of knee OA. Age is a well-established non-modifiable risk factor for OA, with the prevalence increasing significantly after the age of 50. This study confirms this trend, with the majority of knee OA patients falling within the older age groups. The aging process leads to a decline in the regenerative capacity of cartilage, making it more susceptible to damage. Additionally, the cumulative effects of mechanical stress on the joints over time contribute to the development of OA. Cartilage is a complex tissue composed of cells called chondrocytes embedded in an extracellular matrix. Chondrocytes are responsible for maintaining the integrity of the cartilage by producing and degrading the components of the extracellular matrix. With age, the number and activity of chondrocytes decline, leading to a decrease in cartilage regeneration and repair. Additionally, the composition of the extracellular matrix changes with age, becoming less resilient and more prone to damage. As individuals age, chondrocytes undergo senescence, a state of irreversible cell cycle arrest. Senescent chondrocytes exhibit reduced metabolic activity and impaired ability to synthesize cartilage matrix components. Telomeres, the protective caps at the ends of chromosomes, shorten with each cell division. Telomere shortening in chondrocytes has been associated with cartilage aging and OA development. Mitochondria, the powerhouses of cells, play a crucial role in energy production and cellular homeostasis. Mitochondrial dysfunction in chondrocytes has been implicated in cartilage aging and OA pathogenesis. Oxidative stress, an imbalance between the production of reactive oxygen species (ROS) and antioxidant defenses, can damage cellular components, including DNA, proteins, and lipids. Oxidative stress in chondrocytes has been linked to cartilage degradation and OA progression. Collagen, the main structural protein in cartilage, provides tensile strength and resilience. With age, collagen fibers become fragmented and cross-linked, reducing the cartilage's ability to withstand mechanical stress. Proteoglycans, large molecules that attract and retain water in the cartilage, contribute to its shock-absorbing properties. With age, the content and quality of proteoglycans decline, leading to decreased cartilage hydration and resilience. While the content of proteoglycans decreases with age, the overall water content of cartilage may increase due to changes in the collagen network. This increased water content can make the cartilage less stiff and more susceptible to damage. The knee joint is subjected to significant mechanical stress throughout life, especially during activities such as walking, running, and climbing stairs. Over time, this repetitive stress can lead to wear and tear on the cartilage, contributing to the development of OA. The cumulative effects of mechanical stress are particularly pronounced in individuals who engage in high-impact activities or have occupations that involve repetitive knee bending or heavy lifting. Higher body weight increases the load on the knee joint, leading to greater mechanical stress on the cartilage. High-impact activities, such as running and jumping, place greater stress on the knee joint compared to low-impact activities, such as walking and swimming. Occupations that involve repetitive knee bending or heavy lifting, such as construction work, farming, and nursing, can increase the risk of knee OA due to repeated stress on the joint. Abnormalities in joint alignment, such as bowlegs or knock-knees, can alter the distribution of mechanical

stress on the knee joint, increasing the risk of OA in certain compartments of the knee. Weak muscles around the knee joint can reduce joint stability and increase the risk of injury, leading to greater mechanical stress on the cartilage. As mentioned earlier, female gender is a significant risk factor for knee OA. Hormonal changes associated with menopause, such as decreased estrogen levels, may play a role in cartilage degeneration. Furthermore, differences in anatomy and biomechanics between men and women may contribute to the increased risk of knee OA in women. Estrogen, a hormone that plays a crucial role in maintaining cartilage health, declines significantly after menopause. This decline may contribute to increased cartilage vulnerability and accelerate the degenerative processes associated with OA. Estrogen has been shown to have anti-inflammatory effects and to promote cartilage synthesis. Therefore, the decrease in estrogen levels after menopause may lead to increased inflammation and decreased cartilage repair, contributing to the development and progression of knee OA. Estrogen reduces the production of pro-inflammatory cytokines, such as interleukin-1 (IL-1) and tumor necrosis factor-alpha (TNF-alpha), which are involved in cartilage degradation. Estrogen promotes the synthesis of cartilage matrix components, such as collagen and proteoglycans, and inhibits the activity of enzymes that degrade cartilage. Estrogen plays a role in bone remodeling, maintaining a balance between bone formation and resorption. This balance is important for maintaining the integrity of the subchondral bone, which supports the cartilage. In addition to hormonal factors, anatomical and biomechanical differences between men and women may also contribute to the higher prevalence of knee OA in women. Women generally have wider hips relative to their knees, which can alter the alignment and biomechanics of the knee joint, potentially increasing stress on the articular cartilage. This altered alignment can lead to increased loading on the medial compartment of the knee, which is the area most commonly affected by OA. Furthermore, differences in muscle strength and neuromuscular control between men and women may also play a role. Women tend to have weaker quadriceps muscles than men, which can reduce knee joint stability and increase the risk of injury. The Q-angle, a measure of the angle between the quadriceps muscle and the patellar tendon, is generally larger in women than in men due to wider hips. A larger Q-angle can increase lateral forces on the patella, potentially contributing to patellofemoral OA. Women tend to have greater joint laxity, or looseness, than men. This increased laxity can make the knee joint less stable and more susceptible to injury. Women generally have weaker quadriceps muscles than men, which can reduce knee joint stability and increase the risk of injury. Differences in neuromuscular control between men and women may also contribute to knee OA risk. Neuromuscular control refers to the coordination between the nervous system and muscles to control movement and maintain joint stability. The association between overweight/obesity and knee OA is well-established. Excess weight puts additional stress on the knee joints, leading to accelerated cartilage degeneration and inflammation. The findings of this study highlight the importance of weight management as a key preventive strategy for knee OA. Every extra pound of body weight places an additional four pounds of stress on the knee joint. This increased load can accelerate the wear and tear on the cartilage, leading to its breakdown and the development of OA. Obesity also increases the risk of other conditions that can contribute to knee OA, such as ligament injuries and meniscus tears. Adipose tissue, or fat tissue, produces pro-inflammatory cytokines, which are signaling molecules that promote inflammation. These cytokines can contribute to the inflammation and cartilage degradation associated with OA. Obesity also increases the risk of systemic inflammation, which can further exacerbate OA symptoms. Hypertension was the most prevalent comorbidity among the knee OA

patients in this study. While the relationship between hypertension and knee OA is not fully understood, several studies have suggested that hypertension may contribute to the development and progression of OA through various mechanisms, including vascular dysfunction, subchondral bone ischemia, and increased inflammation. Hypertension can damage blood vessels, leading to reduced blood flow to the joints. This can impair the delivery of nutrients and oxygen to the cartilage, making it more susceptible to damage. Additionally, vascular dysfunction can contribute to inflammation and the production of reactive oxygen species, which can further damage cartilage. Subchondral bone is the bone located beneath the cartilage in a joint. Hypertension can reduce blood flow to the subchondral bone, leading to ischemia, or a lack of oxygen. This can weaken the bone and make it more prone to microfractures, which can contribute to cartilage damage and OA progression. Hypertension can also contribute to systemic inflammation, which can exacerbate OA symptoms. Inflammation plays a key role in the pathogenesis of OA, leading to cartilage degradation, pain, and joint stiffness. Other modifiable risk factors that have been associated with knee OA include occupation, physical activity levels, and muscle weakness. Certain occupations involving repetitive knee bending or heavy lifting can increase the risk of knee OA. Similarly, high-impact sports and activities can contribute to joint damage and the development of OA. On the other hand, regular moderate-intensity exercise and maintaining a healthy lifestyle can help protect against OA. Occupations that involve repetitive knee bending or heavy lifting, such as construction work, farming, and nursing, can increase the risk of knee OA. These activities place repeated stress on the knee joint, leading to cartilage wear and tear. Additionally, these occupations often involve awkward postures and prolonged standing, which can further contribute to knee OA development. While high-impact sports and activities can increase the risk of knee OA, regular moderate-intensity exercise can actually help protect against OA. Exercise strengthens muscles around the knee joint, improves joint stability, and helps maintain a healthy weight. Additionally, exercise can improve cartilage health by increasing blood flow and nutrient delivery to the joint. Weak muscles around the knee joint can increase the risk of knee OA. Strong muscles help stabilize the joint and absorb shock, reducing stress on the cartilage. Quadriceps weakness, in particular, has been strongly associated with knee OA.[14-17]

The findings of this study have significant implications for public health interventions and preventive strategies aimed at reducing the burden of knee osteoarthritis (OA) in Palembang, Indonesia. The high prevalence of knee OA in this population, particularly among women, underscores the urgent need for comprehensive and targeted public health initiatives. These initiatives should focus on promoting healthy lifestyles, raising awareness about knee OA and its risk factors, and ensuring early diagnosis and treatment. Given the strong association between overweight/obesity and knee OA, weight management programs should be prioritized. These programs could include lifestyle modifications such as diet and exercise, as well as medical interventions for individuals who are unable to achieve weight loss through lifestyle changes alone. Promoting healthy eating habits is crucial for weight management. Public health initiatives should focus on educating the population about the importance of a balanced diet, rich in fruits, vegetables, and whole grains, while limiting processed foods, sugary drinks, and unhealthy fats. Regular physical activity is essential for weight management and overall health. Public health campaigns should encourage people of all ages and abilities to engage in at least 150 minutes of moderate-intensity or 75 minutes of vigorous-intensity aerobic activity per week, along with muscle-strengthening activities two or more days per week. Behavioral counseling can help individuals develop

healthy habits and make sustainable lifestyle changes. This could involve setting realistic goals, identifying barriers to change, and developing strategies to overcome those barriers. For individuals who are unable to achieve weight loss through lifestyle modifications alone, medical interventions may be considered. Weight-loss medications can help some individuals achieve and maintain weight loss. However, these medications should be used under the supervision of a healthcare professional and are not appropriate for everyone. Bariatric surgery, such as gastric bypass or sleeve gastrectomy, may be an option for individuals with severe obesity who have not been successful with other weight-loss methods. Bariatric surgery can lead to significant weight loss and improve obesity-related comorbidities, including knee OA. Promoting regular physical activity is crucial for preventing and managing knee OA. Moderate-intensity exercise can help strengthen muscles around the knee joint, improve joint stability, and reduce pain and stiffness. Strong muscles around the knee joint help stabilize the joint and absorb shock, reducing stress on the cartilage. Exercise can help strengthen the quadriceps, hamstrings, and calf muscles, which are important for knee joint stability. Exercise can improve proprioception, which is the body's awareness of its position in space. Improved proprioception can help reduce the risk of falls and injuries, which can contribute to knee OA. Exercise can help reduce pain and stiffness associated with knee OA. Physical activity stimulates the release of endorphins, which are natural pain relievers. Additionally, exercise can improve joint lubrication and range of motion, reducing stiffness. As mentioned earlier, exercise is an important component of weight management, which is crucial for preventing and managing knee OA. Low-impact aerobic activities, such as walking, swimming, and cycling, are generally safe and effective for people with knee OA. These activities help improve cardiovascular fitness without putting excessive stress on the knee joints. Strength training exercises, such as squats, lunges, and leg presses, can help strengthen muscles around the knee joint. It is important to start with low weights and gradually increase the weight as strength improves. Flexibility exercises, such as stretching and yoga, can help improve range of motion and reduce stiffness in the knee joint. Raising awareness about knee OA and its risk factors is essential. Public health campaigns can educate the population about the importance of maintaining a healthy weight, engaging in regular physical activity, and seeking early medical attention for knee pain. Public health campaigns should aim to educate the public about knee OA, its risk factors, and the importance of prevention and early intervention, encourage healthy lifestyle choices, such as maintaining a healthy weight, engaging in regular physical activity, and avoiding smoking and reduce the stigma associated with knee OA and encourage people to seek medical attention for knee pain. Educate women about the increased risk of knee OA after menopause and the importance of preventive measures, such as hormone replacement therapy, targeted exercise programs, and weight management. Educate older adults about the importance of maintaining physical activity and managing chronic conditions, such as hypertension and diabetes, which can contribute to knee OA. Educate workers in occupations that involve repetitive knee bending or heavy lifting about the risk of knee OA and the importance of ergonomic interventions and workplace modifications. Early diagnosis and treatment of knee OA can help slow the progression of the disease and improve quality of life. Healthcare professionals should be trained to recognize the early signs and symptoms of knee OA and provide appropriate management strategies. Early diagnosis of knee OA is crucial for initiating timely treatment and preventing further joint damage. Healthcare professionals should be aware of the risk factors for knee OA and be able to recognize the early signs and symptoms. Pain is the most common symptom of knee OA. The pain may be

worse after activity or at the end of the day. Stiffness in the knee joint is another common symptom, especially in the morning or after periods of rest. Swelling in the knee joint may occur due to inflammation. Crepitus, a grating or crackling sound or sensation, may be felt or heard when moving the knee joint. Limited range of motion in the knee joint can make it difficult to perform daily activities, such as walking, climbing stairs, and getting in and out of chairs. Treatment for knee OA typically involves a combination of non-pharmacological and pharmacological approaches. Weight loss, exercise, and physical therapy are important non-pharmacological treatments for knee OA. Assistive devices, such as canes, walkers, and braces, can help reduce pain and improve mobility. Alternative therapies, such as acupuncture and massage, may provide some relief for some individuals. Over-the-counter pain relievers, such as acetaminophen and ibuprofen, can help reduce pain and inflammation. Topical analgesics, such as creams and gels containing capsaicin or menthol, can provide localized pain relief. Intra-articular injections, such as corticosteroids or hyaluronic acid, can help reduce pain and inflammation in the knee joint. Disease-modifying osteoarthritis drugs (DMOADs), such as glucosamine and chondroitin sulfate, may help slow the progression of knee OA. In severe cases of knee OA, surgery may be necessary to replace the damaged joint. Total knee replacement (TKR) is a common surgical procedure for knee OA.[18-20]

4. Conclusion

This cross-sectional study investigated the prevalence and risk factors associated with knee osteoarthritis (OA) in Palembang, Indonesia, using secondary data from medical records of patients diagnosed with knee OA at Dr. Mohammad Hoesin General Hospital in 2023. The study found that knee OA is highly prevalent in this population, particularly among middle-aged women, especially those who are overweight. Hypertension was also found to be a significant risk factor for knee OA. These findings underscore the need for targeted preventive strategies and public health interventions to address these modifiable risk factors and reduce the burden of knee OA in Palembang. The study has several limitations that should be acknowledged. First, the cross-sectional design limits the ability to draw causal inferences between risk factors and knee OA. Second, the use of secondary data from a single hospital may limit the generalizability of the findings to other populations. Future research should consider using a longitudinal design and a larger, more representative sample to further investigate the risk factors and causal pathways associated with knee OA. Despite these limitations, this study provides valuable insights into the prevalence and risk factors associated with knee OA in Palembang, Indonesia. The findings can inform public health interventions and preventive strategies aimed at reducing the burden of this disease.

5. References

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