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THE RELATIONSHIP BETWEEN EXERCISE PARTICIPATION AND THE OCCURRENCE OF OSTEOARTHRITIS: A SYSTEMATIC REVIEW

[1]Adel Restasia Cinta, [2] Suryo Saputra Perdana, [3]Amalia Nur Azizah, [4]Retno Soeharto

[1,2,3] Faculty of Public Health, Universitas Muhammadiyah Surakarta, Surakarta, Indonesia
Corresponding author: Suryo Saputra Perdana, e-mail: suryo.saputra@ums.ac.id
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Abstract

Background: *Osteoarthritis* (OA) is one of the most common joint diseases worldwide, affecting millions of adults across various age groups. There are several factors that cause cases *Osteoarthritis* one of them is a factor related to sports participation. The purpose this research is to determine the relationship between sports participation and cases *Osteoarthritis*. Method: The research method uses a system *Systematic review* with the PICO method (*Population/Patient/Problem, Intervention, Comparison, Outcome*). Article searches use 2 databases, namely Google Scholar and Pubmed and determine inclusion and exclusion criteria to determine which articles will be selected and reviewed. Results: Results based on 5 articles that have been reviewed show the results that there is a relationship between sports participation and cases of Osteoarthritis. The highest prevalence is Osteoarthritis cases in the knee in athletes and retired athletes. There are several factors for the occurrence of OA cases, namely age, body mass index (BMI), previous injury, and occupation. Conclusion: The conclusion from the review of the 5 articles can be concluded that there is a relationship between sports participation and cases of Osteoarthritis. Injury is one of the highest risk factors for OA cases. Repetitive injuries are also associated with a greater likelihood of OA.

Keywords: Sports Players, Athletes, Osteoarthritis, Health

Introduction

Osteoarthritis (OA) is one of the most common joint diseases worldwide, affecting millions of adults across various age groups. OA is characterized by damage to the joint cartilage and can result in pain, stiffness, and decreased joint function (Arini, 2020). The main risk factors for OA involve a combination of genetics, aging, and excessive body weight. However, previous studies have also noted that physical activity, including participation in sports, may play a role in the development of osteoarthritis.

The traditional view linking excessive exercise to the risk of osteoarthritis is based on the assumption that intense physical activity can cause damage to the joints, especially in weight-bearing joints such as the knees and hips. Some long-held beliefs state that repetitive stress on joints during sports involving repetitive movements or heavy loads can damage joint cartilage and trigger the development of osteoarthritis (Daud Damsir, Muhammad Idris, 2021).

This contemporary view emphasizes that planned and measured exercise can improve muscle strength, flexibility and joint stability, which in turn can protect joints from excessive wear and tear. Recent studies have also shown that exercise involving aerobic activity, such as walking or swimming, can support healthy weight maintenance, reduce the

risk of obesity, and indirectly reduce joint stress (Evi K. Santoso, 2018). Therefore, a deeper understanding of the types of exercise and their intensities that are most beneficial may guide the development of more appropriate health recommendations for osteoarthritis prevention (Ignatavicius and Workman, 2015).

The concept of the relationship between exercise participation and osteoarthritis risk is becoming increasingly important given the trend towards sedentary lifestyles and increasing cases of obesity in various populations. A sedentary lifestyle and significant weight gain are potential risk factors for osteoarthritis, particularly in weight-bearing joints such as the knees, hips and spine. Sedentary lifestyles tend to trigger overweight and weaken muscles, which can increase pressure on joints and increase the risk of osteoarthritis (Afandi Ahmad, Miftah Azrin, 2019). Exercise and planned physical activity are key in responding to this challenge. Through appropriate exercise, individuals can maintain a healthy body weight and increase muscle strength, particularly around weight-bearing joints. Maintenance of a healthy body weight is an important factor in preventing extra load on the joints, while increased muscle strength can provide structural support and reduce the pressure received by the joint cartilage (Ilyas, 2020).

Furthermore, several factors such as an individual's age group, gender, and physical fitness level may provide significant variation in the relationship between exercise participation and osteoarthritis risk. Age group may have a different impact, given that as we age, the risk of osteoarthritis tends to increase. Gender may also play a role, with some studies showing differences in the predisposition to osteoarthritis between men and women (Tika and Aryana, 2018). An individual's level of physical fitness is a key factor influencing the impact of exercise participation on osteoarthritis risk. Individuals with higher fitness levels may be better able to endure intense physical activity without putting excess stress on the joints. Conversely, those who have low fitness levels or have certain health conditions may require a more cautious approach in choosing the type of exercise and its intensity (Arianti R, 2021).

Specific age groups, gender, or physical fitness levels, provide more accurate guidelines for individuals to choose the type of exercise and intensity level that best suits their condition (Pranata D, 2022). By considering this variability, we can develop more effective osteoarthritis prevention strategies that focus on individual health needs.

Thoroughly understanding how exercise participation can influence osteoarthritis risk, we can formulate more appropriate strategies to encourage a healthy lifestyle and reduce the risk of this disease. Thus, systematic reviews are an important tool in directing health research, policy and practice towards more effective and relevant osteoarthritis prevention. Based on this, the researcher is interested in seeing the relationship between participation in sports and the occurrence of osteoarthritis.

Methods

This research uses a Systematic Review analysis study. Systematic Review research by searching for literature sources through the database to identify the research question, namely the Relationship between Sports Participation and the Occurrence of Osteoarthritis. The database search strategy is carried out in accordance with the PICO formulation that has been compiled. PICO is an abbreviation consisting of P (Patient, Population, Problem), I (Intervention), C (Comparison), and O (Outcame) (Cristanto et al., 2021). This method can make it easier for authors to search for articles and answer questions based on inclusion criteria and exclusion criteria.

Inclusion criteria in this study include: (1) The article is full text, (2) articles published in the last 10 years (3) Articles using the subject of sports players, (4) Articles that discuss the incidence of the relationship between sports

participation and the incidence of OA (5) Research in the form of a cohort study, cross sectional study, (6) Subjects participating in a sport, (7) Branches of sports on land, (8) Discussing the incidence of OA in sports participation. While the exclusion criteria in this study include: (1) requires studies that use non-English languages. (2) Paid articles, (3) Articles are manuscripts of publications.

The searching process in this study will be carried out using 2 databases, namely Google Scholar and Pubmed based on the inclusion and exclusion criteria. The screening or selection process such as full text articles and articles published in the last 10 years. After the search and screening or selection process based on the inclusion and exclusion criteria, then abstract screening is carried out. The article search was carried out based on the inclusion and exclusion criteria determined by the author. Full text studies were retrieved and reviewed thoroughly and independently based on these criteria, so that the final search results were 5 articles that would be used for the final review. The next stage is to perform data extraction to categorize some parts of the data from the article. The following is the prism flowchart.

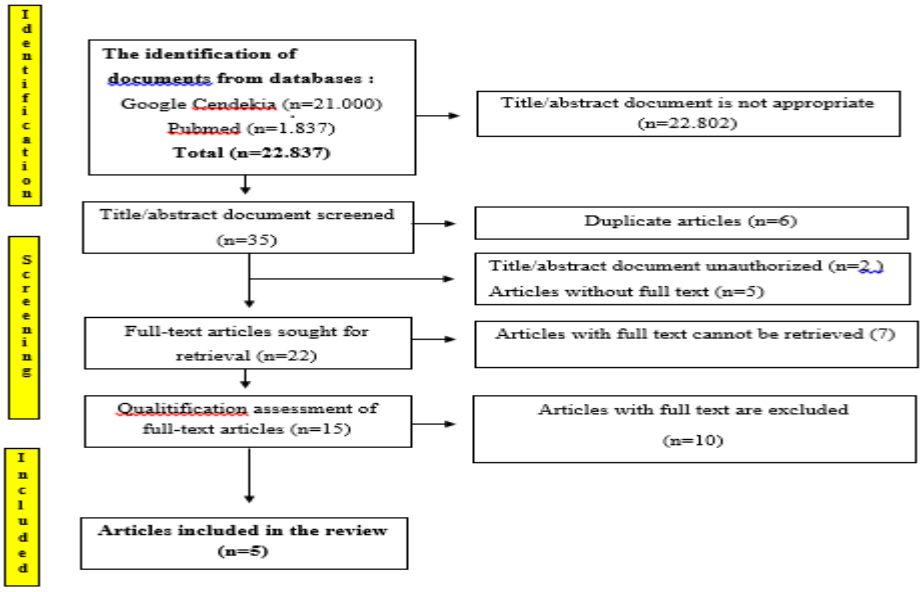

Figure 1. Prism Flowchat

Results

Table 1. Results Presentation

No	Author/ Year	Countries	Outcome Measures	Population / Number of Samples	Results and Discussions
1.	Debbie Palmer et al. (2022)	England	The data was collected using an online questionnaire	The population in this study was 3,357 Olympic athletes and 1,735 general population	The results of this study showed that the prevalence of OA (any joint) in retired Olympic athletes was 23.2%. The prevalence of knee OA (7.5%) in retired Olympic athletes was higher than hip OA. The risk factor for OA cases in athletes is injury. Repetitive injuries were also associated with a greater likelihood of knee OA in retired Olympic athletes. Lower extremity OA and pain did not differ between Olympic athletes and the control group, After significant injury, the odds of knee and hip OA were higher in Olympic athletes compared to the general population.

2.	Lloyd L. Y. Chan et al. (2020)	Australia	Data collection using Questionnaire electronic survey	The respondents in this study were 3053 participants.	The results of this study showed that the prevalence of current knee symptoms was 6.4%. The number of hours spent participating in combat sports, soccer, yoga and basketball participation hours were significantly associated with current knee symptoms. Respondents who regularly engaged in sports activities reported a higher prevalence of current knee symptoms (8.6%) than those who did not (4.7%). There was no significant association between the number of sports participated in regularly and self-assessment of competitiveness in sports.
3.	Sanjay M. Parekh et al. (2021)	England	Data collection using a postal questionnaire	The respondents in this study were 470 participants.	The results of this study showed that age and uric acid were the other 2 risk factors associated with all 3 KOA outcomes. Other risk factors, such as BMI, 2D:4D ratio and family history of OA varied between KOA outcomes. Prolonged knee injury, sufficient to eliminate soccer playing time for at least 3 months, was strongly associated with KOA in this study.
4.	He Cai et al (2019)	England	Data collection using a questionnaire	The respondents in this study were 846 participants.	The results of this study showed the prevalence of cases diagnosed with OA was 38% and knee pain cases were 48%. Cases of joint pain and OA were most common in the knee (23% pain, 22% osteoarthritis), followed by back and hand pain. There was no association between length of playing time and joint pain in former cricketers.
5.	Makena Jean M et al. (2022)	K	Data collection using the KOOS questionnaire	The respondents in this study were 50 participants.	The results of this study showed that the prevalence of knee osteoarthritis was 18%. The main factors associated with knee OA symptoms were the risk of knee injury, BMI and duration of active participation.

The results found from the article search were 22,837 articles. All articles were selected according to the title and abstract so that there were 35 articles. Then select articles based on exclusion and inclusion criteria, so that it becomes 5 articles used for review. The articles that have been obtained are all international articles.

This study shows that the occurrences of OA of the knee joint and hip joint are more common because they are related to the joints that support the weight of the body. The number of occurrences of OA cases in the knee is more prevalent. Knee osteoarthritis is a degenerative disease that can affect anyone with various causative factors. This occurs in the knee joint due to abrasion of the joint cartilage and the formation of new bone on the surface of the joints which will cause muscle and tendon weakness so that it can limit movement and cause pain. The results of this study indicate that there is a relationship between sports participation and cases of Osteoarthritis. The participation of sports from several athletes who are still active and retired athletes.

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Discussion

Cases of osteoarthritis can affect various joints in the body. OA is a major cause of morbidity, limitation of physical activity, physical disability can reduce the quality of life of sufferers, is a source of chronic pain. A person who often does work that requires certain physical movements for a long time and is heavy, for example kneeling, squatting, climbing stairs, standing for a long time and lifting heavy loads can increase the incidence of osteoarthritis cases.

Prevalence of Osteoarthritis Cases

The significant joint injury is a risk factor for future osteoarthritis (OA), and there is emerging evidence in retired athletes from professional soccer. OA has been shown to progress more rapidly in women than in men but no influence of gender has been observed on the development of knee OA. The prevalence of knee OA (7.5%) among a global cohort of retired Olympic athletes was lower compared to previous studies of retired athletes in soccer players (28%), cricketers (22%) and British Olympic athletes (14%). The prevalence of OA (any joint) in retired Olympic athletes was 23.2% with the knee most affected (7.4%). Knee and hip injuries, as well as repetitive knee injuries, in athletes may have greater consequences with regards to the onset of OA.

Continuing to compete while injured is likely to result in delayed recovery and a higher prevalence of re-injury in Olympic athletes compared to the general population, and a greater likelihood of OA after re-injury. Knee pain in children and adolescents is often persistent, and adolescent knee pain or sports-related knee injuries may increase the risk of future knee osteoarthritis, poor quality of life and impaired dynamic balance. The current prevalence rate of knee symptoms is 6.4%.

The Risk Factors of Osteoarthritis

Specific sports were found to increase the risk of knee symptoms. The participation in soccer, basketball, handball, as well as rhythmic gymnastics and falls were independent risk factors for knee injuries. Although musculoskeletal complaints and knee pain are common in older people, these findings suggest that concurrent knee and other joint pain is widespread among university students. As changes in range of motion or motor control in one joint may adversely affect the function/performance of other joints along the kinetic chain in the upper and lower extremities, the presence of knee pain/injury may lead to biomechanical compensation in other joints during exercise or daily activities.

Osteoarthritis (OA) is a common complex disorder with multiple risk factors, including age, body mass index (BMI), previous injury and occupation. Football players are considered to have a greater risk of OA compared to the general population. Retired professional footballers have a higher prevalence of OA. Knee injuries from sports participation are known risk factors for developing knee osteoarthritis due to damage to joint stabilizing structures such as the ACL and meniscus that alter the biomechanics of the knee joint, causing instability, abnormal loading, and ultimately knee OA.

The incidence of OA of the knee joint and hip joint is more common because it is related to the joints that support the weight of the body. The incidence of OA cases in the knee is more common. Knee osteoarthritis is a degenerative disease that can affect anyone with various causative factors. This occurs in the knee joint due to abrasion of the joint cartilage and the formation of new bone on the surface of the joint which will cause muscle and tendon weakness so that it can limit movement and cause pain. The complaint that occurs in cases of knee osteoarthritis is a decrease in functional capacity that occurs due to joint pain, stiffness, and loss of strength of the lower extremity muscles. This will certainly cause daily functional impairment. Cases of osteoarthritis can affect various joints in the body. OA is a major cause of morbidity, limitation of physical activity, physical disability can reduce the quality of life of sufferers, is a source of

chronic pain.

In order to reduce the risk of sports-related knee symptoms/injury, appropriate prevention strategies are needed, such as wearing appropriate protective equipment for sports, screening for knee injury history, and/or sports injury prevention education. Knee symptoms/injuries need to be monitored in order to change the intensity or frequency of training. The high rate of knee symptoms/injuries among competitive athletes highlights the importance of allocating more resources to prevent and rehabilitate knee disorders in high-risk sport athletes.

Conclusion

Based on the review of the 5 articles, it can be concluded that there is a relationship between sports participation and cases of Osteoarthritis. The incidence of OA of the knee joint and hip joint is more common because it is related to the joints that support the weight of the body. The incidence of Osteoarthritis cases in the knee is quite common in athletes and retired sports athletes. There are several factors for this OA case, namely age, body mass index (BMI), previous injury, and occupation. Injury is one of the highest risk factors for OA. Repeated injuries are also associated with a greater likelihood of OA.

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Author Contribution and Competing Interest

All authors contributed collect and analyze data in this research. The author assures that there is no conflict of interest in the activities and preparation of this research.

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