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Systematic Review

Prevalence of knee osteoarthritis in Saudi Arabia: A systematic literature review

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ABSTRACT

Knee osteoarthritis (KOA) is the most affected joint and a leading cause of pain and functional limitation in the older population. Multiple studies have investigated the prevalence of KOA worldwide. However, research is very limited on this matter in Saudi Arabia. This review aimed to investigate the prevalence of KOA in Saudi Arabia and assess its prevalence. A standardized, systematic search strategy was conducted to identify observational studies that reported on the prevalence of KOA in Saudi Arabia. The search included published studies between January 2000 and April 2023. Six eligible studies were included for analysis. This included 1952 participants. The prevalence in these studies showed wide variability throughout the past two decades and was reported to range between 13% and 41%. Individuals above 40 had an average reported prevalence of 67.8% (16.2–71.4%). A significant association between KOA and an increased body mass index and female sex was found. Studies on KOA prevalence are limited in Saudi Arabia. Despite this, it is evident that the prevalence of KOA is high based on the available literature. Establishing a database registry, lifestyle modifications, and public awareness efforts may help reduce this disease's impact on our population.

Keywords: Knee, Osteoarthritis, Prevalence, Saudi Arabia, Review

INTRODUCTION

In the category of musculoskeletal diseases, osteoarthritis (OA) is considered the most prevalent.[1] OA is a chronic disease that affects several body regions and is defined by cartilage degradation, arthritic bone hyperplasia, and subchondral bone sclerosis.[2] The knee is the most commonly affected joint and the leading cause of pain and functional limitation in the older population.[3] Prior joint injury, weight, sex, genetic factors, and anatomical variables linked to joint shape and alignment may all play a role in developing knee OA (KOA).[4] The most frequently utilized case definitions are symptomatic KOA, radiographic KOA, and self-reported KOA. KOA is considered symptomatic when both radiographic and joint symptoms associated with the disease are present.[5] Only pathologic signs of joint disease seen on radiographic images are considered in the radiographic definition.[6] In recent times, Saudi Arabia has witnessed a surge in the prevalence of obesity rates and alterations in lifestyle and dietary patterns.[7] Unfortunately, as a result, the general population has become more susceptible to KOA. Multiple studies reported the prevalence of KOA worldwide, including other Gulf countries, Europe, China, and the United States of America (USA).[8-10] However, research is very limited about this matter in Saudi Arabia.

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With a growing population and medical advancement, it is imperative to understand the burden of KOA and what challenges it poses to the health-care system. In some cases, early identification and management can reduce the accelerated progression. The primary objective of this review was to investigate the prevalence of KOA and its associations in Saudi Arabia.

MATERIALS AND METHODS

Preferred reporting items for systematic reviews and meta-analysis criteria were followed for conducting this review.

Search strategy

PubMed and Google Scholar were electronically searched by the two authors to identify studies published from January 2000 to April 2023. The search terms included "Knee osteoarthritis," "prevalence or incidence or epidemiology," and "Saudi Arabia." The search phrases were combined in several ways to find relevant literature, and the search strategies were customized to suit each database. To find relevant studies, reference lists of eligible articles were also retrieved.

Inclusion criteria

The following criteria were included in the study:

1. Studies involving patients with KOA in Saudi Arabia
2. Studies recording data on the prevalence by sex, age, diagnostic criteria, and year
3. The type of study: random or cluster sampling.

Exclusion criteria

Studies conducted in special groups (e.g., pregnant women), published before the year 2000 and studies whose full texts were unavailable and could not be retrieved were excluded from the study.

Data extraction

Two reviewers independently assessed each study's titles and abstracts against the inclusion and exclusion criteria. Articles that did not fit the inclusion requirements were removed. Further, analysis was performed in cases of doubt during any screening stage, and issues were addressed through consensus discussion. The prevalence was defined as the number of existing cases in a population during each study. Articles in the full text were assessed for eligibility. The remaining studies were included in the systematic review. One investigator extracted the data, which included (1) first author, (2) study year, (3) study design, (4) average age, (5) sex, and (6) diagnostic criteria of KOA.

RESULTS

The database search yielded 5150 papers; after removing duplicates, 5086 publications were reviewed by titles/abstracts, and 5076 were eliminated. After that, seven of these papers were reviewed in full text, and one was excluded, yielding six included publications [Figure 1].

Characteristics of studies

A total of six papers were included in the review [Table 1]. The majority were cross-sectional (n = 5) studies, with one study conducted as a retrospective records review. In three studies, the diagnostic criteria for KOA were the American College of Rheumatology (ACR) criteria. Radiographic diagnoses were only used in two studies.

Prevalence

The prevalence of KOA for each study is shown in [Table 1]. Individuals above 40 had an average reported prevalence of 67.8% (16.2–71.4%).[11-14] It was noted that the average prevalence between 2002 and 2011 was 34.83%, and between 2012 and 2021 was 35.25%. Overall, the prevalence in these studies showed wide variability in prevalence throughout the past two decades.

Sex discrepancies

When a bivariate analysis was done between KOA and sex, two studies showed a statistically significant relationship between females and KOA ($P < 0.01$).[13,15]

Body mass index (BMI)

Only two studies considered BMI as a variable and further analyzed it with KOA [Table 1]. The studies revealed a significant relationship between higher BMI and KOA ($P < 0.01$).[11,13]

DISCUSSION

The prevalence of KOA in Saudi Arabia appears to be high. Three studies reported a significantly higher prevalence in the older population, ranging from 41% to 79%.[12,15,16] In contrast, the prevalence of KOA in some neighboring countries in the Gulf region was reported to range between 6.5% and 94.2%.[17,18] This is considered higher than in some Asian and European countries. A systematic review and meta-analysis done in 2020 concluded a pooled prevalence of 14.6% in China,[9] while a study in Sweden revealed a prevalence of 24.5%. However, the prevalence of KOA in the USA was comparable to our findings and was found to be 37.4%.[8,10]

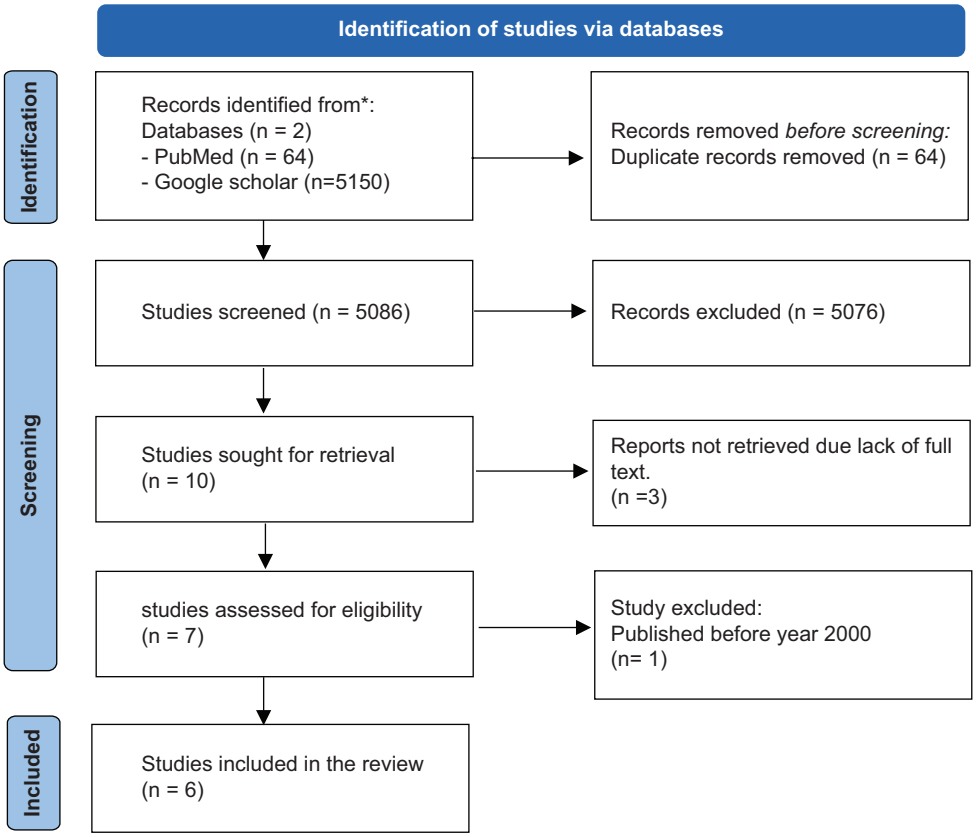

Figure 1: Search and screening flow chart.

KOA is multifactorial, but one important modifiable variable is BMI. The global prevalence of obesity is increasing. A recent study in Saudi Arabia in 2021 showed that the national weighted prevalence of obesity (BMI ≥ 30) was 24.7%.[19] When compared to a study published in China, the prevalence was found to be 7.9%.[20] However, the Centers for Disease Control and Prevention reported the overall obesity prevalence in the USA as 36.5% in 2015.[21] The prevalence of obesity is significantly higher in Saudi Arabian and American populations compared to China, which may explain the high prevalence of KOA in both countries. One of the core drivers of the high prevalence of obesity in Saudi Arabia is the change in lifestyle and eating patterns in the past decades.[7] Saudi Arabia is second in the percentage of insufficient physical activity in adults and the top ten in processed meat consumption, according to the Global Obesity Observatory.[7] Furthermore, comorbidities such as hypertension, hypercholesterolemia, and diabetes play a significant role in obesity. A study in 2023 highlighted the increasing prevalence of these diseases in the Saudi population.[22] Awareness events about KOA and obesity as risk factors are required to help reduce such prevalence.

In two studies, KOA predominantly affected females ($P < 0.01$).[13,15] This finding was similar to a neighboring country (Qatar) where female predominance was also found.[17] Other Asian countries, such as Iran and China, concluded that females were the most prevalent in their analysis.[9,23] This is unsurprising as it is well known that females are more prone to presenting with KOA. It could be due to differences in knee anatomy, hormonal changes, and other individual factors such as genetic factors.[24]

We found wide variation in the prevalence of KOA over the past two decades. It is possible that differences in diagnostic criteria of KOA among the studies have contributed to such findings. Three studies used the ACR criteria for diagnosing KOA, which is based on the patient's clinical symptoms to diagnose.[12,13,16] On the other hand, two studies opted to use the radiographic criteria.[14,15] The previous studies have discussed which criterion is preferable. It is believed that the radiographic definition has a propensity to exaggerate the incidence of OA. Some authors found that the incidence of KOA can be higher (twice as high) in the same participant when only the radiographic definition is utilized while ignoring the clinical symptoms.[25] This could explain the drastic change in prevalence between the two studies published in 2002 and 2003,[14,16] wherein the first study reported a 56.67% prevalence using the radiographic criteria. The study published the following year reported

Table 1: Characteristics of studies included in the review.

Author	Year	Study design	Diagnostic criteria	Cases with OA	Region (City)	Mean age	Males (%)	Females (%)	Prevalence rate	Association with Sex	Association with *BMI
Althomalia *et al.*[13]	2023	Cross-sectional study	*ACR	425	All	-	56 (12.9)	369 (20.25)	Overall 18.9% By Age 18–30: 6.8% 31–49: 20.2% 50<: 45.7%	*P*<0.01	<0.01
Al-Arfaj and Al-Boukai.[14]	2002	Cross-sectional study	Radiographic	170	Central (Riyadh)	-	89 (53.3)	81 (60.9)	(56.67%)	-	-
AlKuwaity *et al.*[11]	2018	Cross-sectional study	-	238	Northern (Arar)	70.4 (±9.3)	115 (48.3)	123 (51.7)	Overall 24.5% By Age >60: 24.7% >70: 32.3% >80: 21.7%	*P*>0.05	0.041
Thigah and Khan.[12]	2020	Cross-sectional study	*ACR	200	Western (Makkah)		129 (64.5)	71 (35.5)	Overall 41.5%	*P*=0.889	-
Al-Arfaj *et al.*[16]	2003	Cross-sectional study	*ACR	766	Central (Alqaseem)	-	-	-	Overall 13% By Age 16–25: 1.1% 26–35: 4.8% 36–45:16.2% 46–55: 30.8% 56–65: 47.8% 66–75: 60.6% 76–85: 58.8% >86: 42.9%	-	-
Alrowaili.[15]	2019	Records review	Radiographic	163	Northern (Arar)	<40: 70 >40: 93	102 (31)	61 (74.4)	Overall 39.75% By age <40: 25.6% 40–50: 60% 51–60: 79.2% 61–90: 71.4%	<0.0001	

*ACR: American College of Rheumatology, *BMI: Body mass index

13% when ACR criteria were implemented. We believe that future studies should focus on merging both clinical and radiographic criteria to diagnose KOA. Confident diagnosis can be made in adults with knee pain, functional limitation, and one or more typical examination findings (restricted movement, bony enlargement, and crepitus).[26] In addition, radiographs can serve as an objective tool for KOA pathophysiological findings.[27]

This review was limited by the scarcity of papers published about KOA prevalence in the country and the heterogeneity of diagnostic tools used to identify KOA. This may be due to our hospital's lack of a database that reports diagnostic codes. The availability of such databases can be beneficial for researchers to investigate this topic. Therefore, this reported prevalence cannot be extrapolated to all regions in Saudi Arabia. However, our review showed a pattern of potential increased prevalence throughout the past two decades, which is critical for the health-care system, physicians, and researchers. Second, the study provided a brief review of the state of the disease in Saudi Arabia. It opens the door for future researchers to investigate this disease's prevalence more comprehensively and methodologically.

CONCLUSION

Studies on KOA prevalence are limited in Saudi Arabia. Despite this, a high prevalence of KOA was found, with female sex and high BMI being significant associations. Public awareness events about the risk of obesity and lifestyle modifications are required. A nationwide study and establishing a data registry for patients will be extremely helpful in evaluating the burden of this disease.

AUTHOR CONTRIBUTION

AMM conceived and designed the study, AMM and OAB conducted research, provided research materials, and collected and organized the data. AMM and OAB analyzed and interpreted data. All authors have critically reviewed and approved the final draft and are responsible for the manuscript's content and similarity index.

ETHICAL APPROVAL

An ethics statement is not applicable, because this study is based exclusively on published literature.

USE OF ARTIFICIAL INTELLIGENCE (AI)-ASSISTED TECHNOLOGY FOR MANUSCRIPT PREPARATION

The authors confirm that there was no use of artificial intelligence (AI)-assisted technology for assisting in the writing or editing of the manuscript and no images were manipulated using AI.

DECLARATION OF PATIENT CONSENT

Patients' consent is not applicable, because this study is based exclusively on published literature.

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CONFLICTS OF INTEREST

There are no conflicting relationships or activities.

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