



Assessment of Modifiable and Non-Modifiable Risk Factors for Knee Osteoarthritis Over the Lifespan and Their Association with Poor Lifestyle: Comparative Study

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Abstract: Background: One of the main causes of injury around the world is osteoarthritis (OA) of the knee. Lifestyle factors that can be changed; like being overweight; physical inactivity, smoking, and unhealthy diet, may be very important in deterioration of knee osteoarthritis (KOA), especially when combined with risk factors that can't be modified, like age, sex, genetics, and a history of injury. **Aim:** Our objectives were expression of the risk factors for KOA both modifiable and non-modifiable. We also want to see how these risk factors are linked to a poor lifestyle and the prevalence of KOA among Saudi and Egyptian populations. **Methods:** A cross-sectional survey will be distributed throughout Saudi and Egyptian participants between November 2025 to January 2026. An online questionnaire was designed, it includes informed consent of participants, sociodemographic data, questions about knee osteoarthritis, poor lifestyle, modifiable and non-modifiable risk factors. Data was collected through online questionnaires or interviews with people. Statistical analysis was carried out using the Statistical Package for Social Sciences (SPSS Inc, Chicago, IL, USA, version 25). **Results:** The prevalence of KOA was nearly the same in both nations (29.6% Saudis vs. 31.5% Egyptians). Two thirds of participants from males (65%) from each nation, the average age was 35.0 ± 0.74 (Saudis) and 44.5 ± 2.07 (Egyptians) which was significantly different at p-value 0.001. Most of them from 20-40 years (56% Egyptians vs. 72.2% Saudis), in addition, about 22.5% who were more than 60 years-old from Egyptians vs. 8.6% Saudis. Obese participants were found among Saudis (29.6%) vs Egyptians (23.7%) at p-value = 0.010. The family history of knee pain was more among Saudis (28.6%) vs 11% of Egyptians, also, genetic joint disorder (12.5% Saudis) vs. 6.5% in Egyptians (at p-value = 0.017). The main factor to knee osteoarthritis previous knee injury and aging in Egyptians (28.7% and 14.6%) vs. Saudis (7.3% and 11%) at p-value= 0.023. Egyptians were suffering from knee OA mainly at adult and old age of 31-60 years (24.8%), while Saudi participants suffered from KOA from young age at 20 years ($p = 0.033$). Egyptians was found to perform activities that put stress on the knees in running more than Saudis ($p = 0.037$), while Saudis more in weightlifting and squatting. Sedentary was found more among Saudis, while high level of physical activity such as football and running was found among Egyptians. Consuming fresh vegetables and fruits and whole grains (64.5% Egyptians vs 51.2% Saudis). On the other hand, poor lifestyle, Saudis consumed more sugars, carbohydrates, and fats (74.4%) vs Egyptians (57.7%) at $p = 0.041$. **Conclusion:** This study compared between Saudis and Egyptians in the prevalence of KOA (which not significantly different), and the modifiable and non-modifiable risk factors related to the KOA symptoms. The most effective plans to prevent KOA were some positive changes in lifestyle like encouraging physical exercises and some active duties and decreasing sedentary lifestyle. Also, controlling BMI, through healthy diets like vitamins, vegetables, fruits, and avoiding fast food, more sugars and carbohydrates. Protective policies should be applied at a young age and awareness at schools to prevent obesity in childhood. So, this study provided some respected insights for healthcare providers, physicians and consultants who are dealing with KOA in Saudi Arabia and Egypt.

Key Words: Modifiable and Non-Modifiable Risk Factors, Knee Osteoarthritis, Poor Lifestyle, Saudi Arabia, Egypt

INTRODUCTION

The most prevalent kind of arthritis is osteoarthritis (OA). It is a complicated condition that can affect the synovium, ligaments, bones, and articular cartilage. It contributes to joint inflammation as well as degenerative and reparative processes [1]. Although OA can affect big, medium, and small joints as well as proximal joints, it most often affects the knee joint causing KOA [2].

Several risk factors, which can be separated into modifiable and non-modifiable ones, can raise the chance of developing KOA [3]. Modifiable risk factors include being overweight or obese, in addition to other conditions like diabetes, depression, or cardiovascular disease, being physically inactive, and being exposed to convinced foods. Adjustment of this condition helped to decrease KOA pain [3-5]. The International Classification of Functioning, Disability, and Health framework states that KOA causes body impairment that led to limiting the participation of hard activities that increase the load on KOA [6]. In the general population, KOA is thought to be the main cause of physical disability [7-8] which lowers quality of life and increases the risk of further morbidity. According to global data, KOA affects about 250 million individuals globally. It is one of the most prevalent and rapidly expanding medical conditions in Saudi Arabia and Egypt. The incidence of KOA must be considered to comprehend the disease's effects on society.

Review of Literature

Knee OA is more common in KSA with rising health conditions [9]. Recent studies in found that the prevalence of KOA increased with age to be 60.6% in elderly patients (66–75 years), while 30.8% (46–55 years) [10]. Other studies showed the prevalence of KOA was more in females than males [11]. In Egypt, recent study found increased percentage of primary KOA prevalence which may be due to aging, genetic, family history, and obesity [12].

In 2019, The American College of Rheumatology recommended some guidelines to manage KOA by using exercise, weight control, self-efficacy and self-management programs as non-pharmacological treatment. Also, other pharmacological treatment using nonsteroidal anti-inflammatory drugs (NSAIDs) for KOA either topical or oral, and parenteral intraarticular glucocorticoid [13]. Another study done in 2021 was recommended the use of physical therapy for symptomatic relieving of pain and for reducing its intensity in older patients [14]. The use of pharmacological and non-pharmacological treatment helped to reduce the pain that is associated with KOA [15].

Patients with high level of education aids in the management of OA pain and improving its function in elderly patients [16]. So, this study was done between two Arabic countries: Egypt and Saudi Arabia, which having some culture similarities in their sociodemographic, eating habits and lifestyle. So, we aim to assess and

compare them in the prevalence of KOA, modifiable and non-modifiable risk factors for knee osteoarthritis and their relation to poor lifestyle.

Objectives

Primary Objective: This study aims to assess the modifiable and non-modifiable risk factors for knee osteoarthritis and their association with poor lifestyle and its prevalence among Saudi and Egyptian population.

Specific Objectives

- To assess the prevalence of KOA among Saudi and Egyptian participants
- To assess the modifiable and non-modifiable risk factors for KOA among Saudi and Egyptian participants
- To assess the association of KOA and poor lifestyle among Saudi and Egyptian participants

Study Design and Population

A cross-sectional survey was distributed throughout Saudi and Egyptian population between November 2025 to January 2026 from different regions in both countries. An online questionnaire was distributed among population and others were interviewed (Face to Face) either in physiotherapy clinics, gyms and universities, and asked questions from well-designed questionnaires. The questions about sociodemographic data, knee osteoarthritis and modifiable and non-modifiable risk factors. and adherence to better lifestyle including physical activities and eating habits.

Sample Size Calculation

The Raosoft sample size calculator was used to calculate the sample size, providing a 5% margin of error and a 95% confidence level. To achieve statistical significance, a sample size of at least 200 participants was required (<http://www.raosoft.com/samplesize.html>).

Data Collection Tool

A well-structured questionnaire was used for data collection. The questionnaire was designed in Arabic for Egyptian and Saudi participants and in English for the research manuscript. The questionnaire was divided into four different sections.

- **Sociodemographic Information:** Age, gender and education level, BMI, and employment
- **Non-Modifiable Risk Factors:** Family history of osteoarthritis, genetic disorders of osteoarthritis, knee injury
- **Modifiable Risk Factors for Knee Osteoarthritis:** Serious knee injury, the level of varied activity per day and per week, spending long hours standing during the day
- **Body and Joint Health:** Symptoms of KOA, treatment for arthritis, advice to avoid KOA, following healthy diet

Table 1: Flow Chart of Study Participants

Total number of participants were 738 (338 Saudis and 400 Egyptians).		
	Saudi Participants (338)	Egyptian Participants (390)
Exclusion for age less than 18 years-old	19	17
Exclusion for incomplete data	18	18
Total Exclusion	37	35

Table 1 showed the total number of participants who answered the questionnaire were 728 (338 Saudis and 390 Egyptians). Due to their ages (less than 18 years old) and/or incomplete data, 72 (37 Saudis and 35 Egyptians) participants were excluded, as shown in the flow chart of study participants. Therefore, the number of participants were 656 who are meeting all inclusion criteria, 301 from Saudis Arabia and 355 from Egypt.

Inclusion Criteria

- All people from the two countries (Saudi Arabia and Egypt), their ages 18 years-old and above of both genders

Exclusion Criteria

- People under 18 years of age

Data Management and Statistical Analysis

An online questionnaire was distributed among obese and overweight population and others were interviewed (Face to Face) and asked questions from well-designed questionnaire. Each participant gave their informed consent once the questions were fully explained and they might leave at any time without any problems. All participants' personal and historical data would be kept safe and only used for this research. The principal investigator is responsible for keeping the data on his own computer and will delete it after the paper is published. The questions about sociodemographic data, non-modifiable risk factors, modifiable risk factors for knee osteoarthritis and Body and Joint Health. Any response that does not fulfill inclusion criteria nor missing data was eliminated.

Statistical Analysis

Statistical analysis was done using Statistical Package for Social Sciences (version 25 SPSS Inc, Chicago, IL, USA). Continuous variables were expressed as mean $\pm$ SD and descriptive statistics such as frequencies (n) and percentages (%) were employed for categorical variables. p-value <0.05 was considered statistically significant according to Pearson Chi-Square test.

RESULTS

Table 2 displayed the demographic features of Egyptian and Saudi population. Most of participants were males

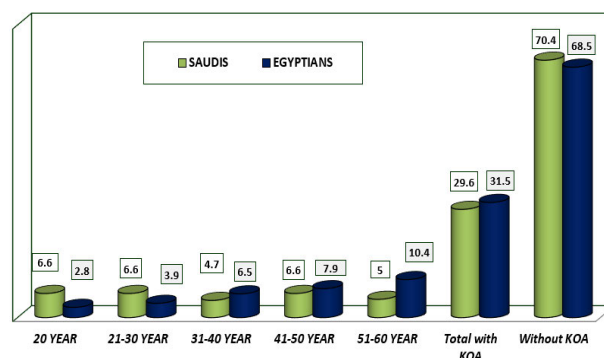


Figure 1: The Age of Suffering from Knee OA (Years) Among Saudi and Egyptian Participants (%)

(about 65%) from both nations. The average age of participants was 35.0 $\pm$ 0.74 (Saudis) and 44.5 $\pm$ 2.07 (Egyptians) which was significantly different at p-value = 0.001. Most of them from 20-40 years in both nations (56% Egyptians vs. 72.2% Saudis), in addition to about 22.5% more than 60 years (Egyptians) at p-value = 0.000.

The prevalence of KOA was nearly the same in both nations (29.6% Saudis vs. 31.5% Egyptians). Elderly

Egyptians were suffering from KOA at age more than 50 years (10.4%), 41-50 years (7.9%), while 68.5% did not suffer from KOA. Saudi participants were suffering from KOA at age of 20-30 (13.2%), 41-50 years (6.6%), while 70.4% did not suffer from KOA which was significantly different at p-value = 0.039 (Figure 1)

Normal BMI was found within Egyptian participants (46.2%) vs. 34.9% (Saudis), while obese participants was found among Saudis (29.6%) vs. Egyptians (23.7%) at p-value = 0.010. About 50.7% Egyptians vs. 43.5% Saudis were employers which was significant difference at p-value = 0.044. In addition, 50.7% of Egyptians were sportsmen vs. 37.5% of Saudis which was significantly different at p-value = 0.011.

No significant difference between the two countries in the level of education (p-value = 0.379). Low percentage of participants with primary education, while more than 50% with university degree and above in both nations, Also, no significant difference was observed regarding smoking (p-value = 0.166).

Table 3 showed a significant difference (at p-value = 0.028) of family history of knee pain (28.6% Saudis vs. 11% of Egyptians, also genetic joint disorder (12.5% Saudis) vs. 6.5% of Egyptians which was significantly different at p-value = 0.017.

Table 2: The Socio-Demographic Characteristics of Egyptian and Saudi Population. (Total N=656, N= 301 (Saudis), N= 355 (Egyptians))

Characteristics (%)	Saudis (301)	Egyptians (355)	Total (656)	p-value
Gender	n (%)	n (%)	n	
Male	191(63.5)	236(66.5)	427	0.418
Female	110(36.5)	119(33.5)	229	
Age (Years)				
(Mean±SE)	35.0±0.74	44.5±2.07	550	0.001*
Age of participants (Years)				
<20	18(6.0)	18(5.1)	36	0.000*
20-30	165(54.6)	125(35.2)	290	
31-40	53(17.6)	74(20.8)	127	
41-50	24(8.0)	28(7.9)	52	
51-60	15(5.0)	30(8.5)	45	
>60	26(8.6)	80(22.5)	106	
The age of suffering from knee OA (Years)				
20	20(6.6)	10(2.8)	30	0.039*
21-30	20(6.6)	14(3.9)	34	
31-40	14(4.7)	23(6.5)	37	
41-50	20(6.6)	28(7.9)	48	
51-60	15(5.0)	37(10.4)	52	
Total suffering from knee OA	89(29.6)	112(31.5)	201	
I do not suffer from knee OA	212(70.4)	243(68.5)	455	
Level of Education				
Primary	11(3.7)	18(5.1)	29	0.379
Middel and Secondary	124(41.2)	151(42.5)	275	
University and above	166(55.1)	186(52.4)	352	
Occupation				
YES	131(43.5)	180(50.7)	311	0.044*
NO	170(56.5)	175(49.3)	345	
Smoking				
YES	59(19.6)	55(15.5)	114	0.166
NO	242(80.4)	300(84.5)	542	
You are sporter				
YES	113(37.5)	180(50.7)	293	0.011*
NO	188(62.5)	175(49.3)	363	
BMI (kg/m ²)				
Normal	105(34.9)	164(46.2)	269	0.010*
Thin	31(10.3)	21(5.9)	52	
Overweight	76(25.2)	86(24.2)	162	
Obese	89(29.6)	84(23.7)84	173	

*Significant difference at p<0.05

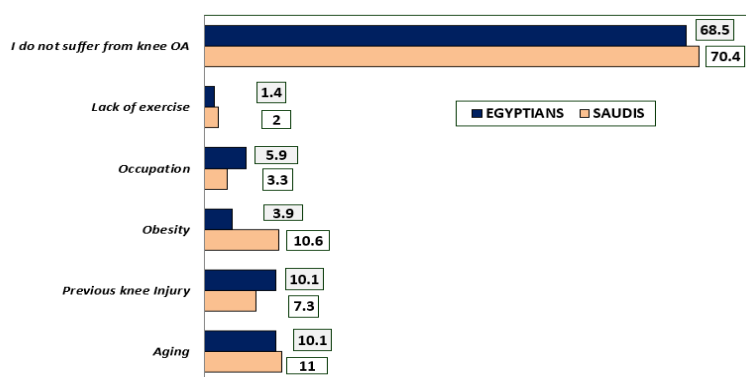


Figure 2: The Main Risk Factor to Knee Osteoarthritis Among Saudi and Egyptian Participants (%)

Figure 2 showed the main factor to KOA were aging and previous knee injury in Egyptians (10.1% and 10.1%), while in Saudis (aging 11% and obesity 10.6%) at p-value= 0.031. In addition, serious knee injury was found to be ligament tears in Egyptians 16.1% vs Saudis 11.3% (p-value = 0.043), followed by meniscus

damage 7.9% vs. 5.9%, and lower percentage was found as fractures 3.1% vs. 2.7%.

High activities such as sports, work, daily exercise were found among Egyptians (25.9%) vs. Saudis (11%), while sedentary was found more among Saudis (29.6%) vs. Egyptians (18.3%) at p-value = 0.018, but the two

Table 3: The Number and The Percentage of Egyptian and Saudi Population About the Risk Factors of KOA. Total N=656, N= 301 (Saudis), N= 355 (Egyptians)

Characteristics n(%)	Saudis (301)	Egyptians (355)	Total (656)	p-value
Family history of knee pain n(%)	n(%)	n		
YES	86(28.6)	39(11.0)	125	0.028*
NO	215(71.4)	316(89.0)	531	
Genetic joint disorder				
YES	38(12.5)	23(6.5)	61	0.017*
NO	263(87.4)	332(93.5)	595	
The main risk factor to Knee osteoarthritis				
Aging	33(11.0)	36(10.1)	69	0.031*
Previous knee Injury	22(7.3)	36(10.1)	58	
Obesity	32(10.6)	14(3.9)	46	
Occupation	10(3.3)	21(5.9)	31	
Lack of exercise	6(2.0)	5(1.4)	11	
I do not suffer from knee OA	212(70.4)	243(68.5)	455	
Do you have serious knee injury				
Ligament tears	34(11.3)	57(16.1)	91	0.043*
Meniscus damage	18(5.9)	28(7.9)	46	
Fractures	8(2.7)	11(3.1)	19	
Other	29(9.6)	16(4.5)	45	
I do not suffer from knee OA	212(70.4)	243(68.5)	455	
The level of varied activity				
Sedentary	89(29.6)	65(18.3)	154	0.018*
Moderate (walking, brisk exercises 3-4 times per week)	179(59.5)	198(55.8)	377	
High (sports, work, daily exercise)	33(11.0)	92(25.9)	125	

*Significant difference at $p < 0.05$

Table 4: The Number and The Percentage of Egyptian and Saudi Population About Causes of Knee Osteoarthritis. Total N=656, N= 301 (Saudis), N= 355 (Egyptians)

Characteristics n(%)	Saudis (301)	Egyptians (355)	Total (656)	p-value
Number of times climbed n (%)	n (%)	n the stairs/day		
Rarely	67(22.3)	37(10.4)	104	0.020*
1-5 times	154(51.2)	177(49.9)	331	
6-10 times	55(18.3)	79(22.3)	134	
>10 times	25(8.3)	62(17.5)	87	
Hours for long standing				
<2 hours	173(57.5)	166(46.8)	339	0.031*
2-4 Hours	95(31.6)	82(23.1)	177	
5-6 Hours	16(5.3)	42(11.8)	58	
>6 Hours	17(5.6)	65(18.3)	82	
Performing activities that put stress on the knees				
Weightlifting	29(9.7)	24(6.8)	53	0.037*
Running	22(7.3)	43(12.1)	65	
Squatting	27(9.0)	19(5.4)	46	
Other	11(3.7)	26(7.3)	37	
I do not suffer from knee OA	212(70.4)	243(68.5)	455	
Playing high-quality sports				
Football	105(34.9)	200(56.3)	305	0.028*
Running	41(13.6)	79(22.3)	120	
Other	38(12.6)	18(5.1)	56	
None	117(38.9)	58(16.3)	175	
How long do you play high-quality sports (Years)				
<10years	106(35.2)	94(26.5)	200	0.024*
10 Years	23(7.6)	25(7.0)	48	
>10years	31(10.3)	63(17.7)	94	
None	141(46.8)	173(48.7)	314	

*Significant difference at $p < 0.05$

countries were similar in moderate activities (walking, brisk exercises 3-4 times per week).

Table 4 clarified a significant difference ($p = 0.020$) between Saudis and Egyptians in the number of times climbed the stairs/day, half of them climbed the stairs from 1-5 times/day.

In addition, significant differences were observed between the two nations in spending hours standing for

long hours ($p = 0.31$). About 57.5% vs. 46.8% (who are spending <2hours) and 31.6% vs 23.1% (spending from 2-4 hours) among Saudis Vs Egyptians.

Egyptians was found to perform activities that put stress on the knees in running more than Saudis ($p = 0.037$), while Saudis more in weightlifting and squatting (Figure 3).

Also, Egyptians playing high-quality sports like football and running more than Saudis (p -value = 0.028).

Table 5: The Number and the Percentage of Egyptian and Saudi Population About the Symptoms, Treatment of Knee Osteoarthritis and Better Lifestyle. Total N=656, N= 301 (Saudis), N= 355 (Egyptians)

Characteristics n (%)	Saudis (301)	Egyptians (355)	Total (656)	p-value
Symptoms of knee osteoarthritis	n (%)	n(%)	n	0.061
Joint pain	32(10.6)	55(15.5)	87	
Difficulty in moving	23(7.6)	24(6.7)	47	
Swelling	25(8.3)	23(6.5)	48	
Joint stiffness	9(3.0)	10(2.8)	19	
I do not suffer from knee OA	212(70.4)	243(68.5)	455	
Types of treatment for Knee OA osteoarthritis				
Physical therapy	58(19.3)	61(17.1)	119	0.267
Injection	31(10.3)	51(14.4)	82	
I do not suffer from knee OA	212(70.4)	243(68.5)	455	
Healthcare Advisors for Knee OA osteoarthritis				
Physician	33(11.0)	44(12.4)	77	0.059
Physical therapist	25(8.3)	26(7.3)	51	
Pharmacist	17(5.6)	14(3.9)	31	
Nurse	2(0.7)	8(2.3)	10	
Other	12(4.0)	20(5.6)	32	
I do not suffer from knee OA	212(70.4)	243(68.5)	455	
Main focus of advice for Knee OA				
Weight control	138(45.8)	159(44.8)	297	0.038*
Doing Exercise	39(13.0)	108(30.4)	163	
Taking Vitamin D and Calcium	26(8.6)	47(18.9)	73	
Avoid more nutritional supplements	12(4.0)	20(5.6)	32	
Other	86(28.6)	68(19.2)	154	
Adherence to treatment				
Always	37(12.3)	38(11.0)	75	0.047*
Sometimes	28(9.3)	59(16.6)	88	
Never	24(8.0)	14(3.9)	38	
I do not suffer from knee OA	212(70.4)	243(68.5)	455	
YES	200(66.4)	248(69.9)	448	0.349
NO	101(33.6)	107(30.1)	208	
YES	154(51.2)	229(64.5)	383	0.026*
NO	147(48.8)	126(57.7)	273	
YES	224(74.4)	205(57.7)	429	0.041*
NO	77(25.6)	150(42.3)	227	

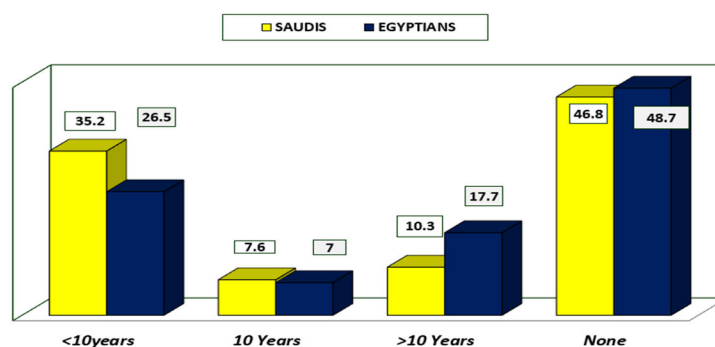
*Significant difference at $p < 0.05$ 

Figure 3: How Long Do You Play High-Quality Sports (Years)

Regarding the duration of playing high-quality sports for less than 10 years (35.2% Saudis vs 26.5% Egyptians), and vice versa for more than 10 years (17.7% of Egyptians more than 10.3% of Saudis) (Figure 3).

Table 5 showed the number and the percentage of Egyptian and Saudi population about the symptoms, treatment of KOA and better lifestyle. We found no significant difference ($p = 0.061$) between Saudis and Egyptians in the symptoms of knee osteoarthritis, about 15.5% Egyptians vs 10.6% Saudis (Joint pain),

6.7% vs 7.6% (difficulty in moving) and 6.5% vs 8.3% (swelling), while joint stiffness present in low percentage (about 3%).

Types of treatment for KOA was varied, 17.1% Egyptians vs 19.3% Saudis used physical therapy and 14.4% Egyptians vs 10.3% Saudis used injection with no significant difference at p -value 0.267. Concerning the healthcare Advisors for KOA was given from physicians (12.4% Egyptians vs 11.0% Saudis), physical therapist (7.3% Egyptians vs 8.3% Saudis), and pharmacist (3.9%

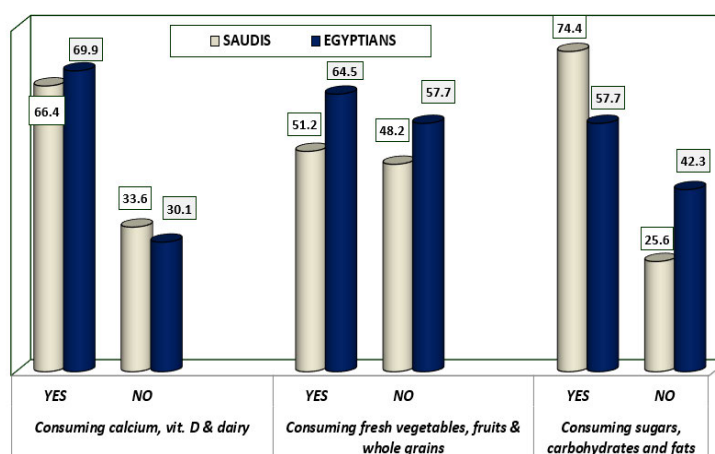


Figure 4: Percentage of Participants Who Are Performing Activities That Put Stress On the Knees and How Long Do You Play High-Quality Sports (Years) Among Saudi and Egyptians

Egyptians vs 5.6% Saudis) which was not significant difference at p-value 0.059.

The focus of advice for KOA was weight control (44.8% Egyptians vs 45.8% Saudis), followed by doing exercise (30.4% Egyptians vs 13.0% Saudis), then taking vitamin D and calcium (18.9% Egyptians vs 8.6% Saudis), and avoid more nutritional supplements (5.6% Egyptians vs 4.0% Saudis) which was significant difference at p-value = 0.038.

Regarding adherence to treatment, 11% Egyptians always good adherence vs 12.3% Saudis, and who are sometimes adhere was 16.6% Egyptians vs 9.3% Saudis and low percentage were never adhere (3.9% Egyptians vs 8.0% Saudis) which was significant difference at p-value = 0.047.

Concerning the better lifestyle, no significant difference was observed among the two nations, about two thirds consumed nutritious foods, calcium, vitamin D, and dairy (p-value = 0.349). but there was a significant difference (p-value = 0.026) in consuming fresh vegetables and fruits and whole grains 64.5% Egyptians vs 51.2% Saudis). On the other hand, poor lifestyle there was a significant difference among the two nations as Saudis consumed more sugars, carbohydrates, and fats (74.4%) vs Egyptians (57.7%) at p-value = 0.041 (Figure 4).

DISCUSSION

Knee OA is one of the most common and developing health problems in Saudi Arabia and Egypt. It is important to analyze the prevalence of KOA to assess the implications of the disorder among the two societies. Knee OA reported to cause severe disability which has a great impact on the quality of life and increased in patients with severe disease [17-19].

In this study, most of participants from males about 65% from the two nations, the average age was 35.0 ± 0.74 (Saudis) and 44.5 ± 2.07 (Egyptians), most of them from 20-40 years in both nations, while 22.5% of Egyptians more than 60 years-old vs. 8.6% Saudis. The

prevalence of knee osteoarthritis was 31.5% among Egyptian participants versus 29.6% of Saudis. Elderly Egyptians were suffering from knee OA at age of >50 years, and less at 41-50 years (7.9%). Saudi participants were suffering from KOA at age of 20-30, 41-50 years (6.6%). Some studies in KSA have indicated that knee OA grows with age, increasing up to 60.6% in persons aged 66-75 years in contrast with 30% - 40% in those aged 46-55 years [10-11]. Recent study in 2023 showed lower level of KOA prevalence in KSA was 18.9% [20], and others found 15.3% in KSA [21], and 16.3% in the Gulf countries [22]. On the other hand, study in KSA showed similar percentage 34.5% according to the American College of Rheumatology (ACR) diagnostic criteria. [23], and in India (34.7%) by ACR diagnostic criteria and 28.7% diagnosis by physicians [24].

In the past two decades, the prevalence of KOA showed great variation. It varied between 13% and 41% (patients above 40 years-old) [25]. The prevalence ranged from 30% to 40% [26,27,28]. Recent study in 2022, KSA, Iran and Kuwait, revealed high percentages of knee OA with highest disability rates. While other nations Yemen and Afghanistan showed the lowest prevalence of knee OA [29]. Magnetic resonance imaging (MRI) among Saudi patients diagnosed 70% of patients with KOA (in age >40 years-old) [19]. In addition, the prevalence of KOA in both genders (35-70 years-old) in Iran was 47.7% [30], and (≥ 18 years-old) in 11.5% in Nigeria [31], 25.8% in Dubai [32], and 14.2% in Sub Saharan Africa [33].

The current study clarified that the Saudis and Egyptians have a significant association between KOA and age, BMI, employment. These results were in line related to participant age with other studies [20,23,34], obesity [20,23,35]. Restricted movement of the knee was associated with higher BMI [36] and high BMI lead to diurnal strains in the articular cartilage of the knee causing KOA [37]. Also, presence of an elevated serum

level of interleukin-6 level was related to KOA pain especially in early and advanced phase [38]. Other studies recommend that control of obesity should be started from childhood [39]. Therefore, reduction in higher BMI was urgent either by using anti-obesity medication or through gastric sleeve operation [40-41].

In our research, there is no significant difference found between the two countries in the level of education or smoking and KOA disease. In our study, increased level of education protects from the risk of knee OA which was in line with other studies and these were the same among Saudis and Egyptians. Higher levels of education (secondary school and university degrees) allowed learning more knowledge about disease prevention, so they could avoid long standing for long duration or wrong sitting down on their knees [20,42]. Other studies showed positive correlation, they said that smoking protects the risk of KOA [20,43], through promoting the proliferation of chondrocytes, improving the expression of cartilage-specific type-2 collagen, and having anti-inflammatory effects. Also, lower prevalence of KOA was observed in smokers compared to non-smokers [44], while others said that smokers have great pain and stiffness of the knees [23,45]. Such comorbidities affect badly on patients' physical function and quality of life [46].

The main risk factor to KOA aging and injury in Egyptians (10.1% and 10.1%), while in Saudis aging and obesity (11% and 10.6%), also previous injury. These results agreed with the study of Snoeker [47]. Most recent international review about KOA found that the two risk factors are overweight/obesity and previous knee injury (prevalence, 14%) of radiographic KOA. Also, modifiable risk factors (occupational physical activity) were donated to radiographic or symptomatic KOA [48]. Other studies investigated the impact of previous knee injuries caused impaired function of walking for ≥ 2 days [47,49,50,51], which may be due to anterior cruciate ligament injuries [50]. Elderly patients significantly became more disable than younger one especially in patients with severe diseases and cause impact on their quality of life [17]. They revealed that knee OA pain, stiffness, and impaired physical function [31].

Concerning the non-modifiable risk factor in this study; family history of knee pain and genetic joint disorder were significantly more among Saudis vs. Egyptians. These results were in line with other study [52]. Other study found more than half of the participants with family history of KOA [23]. Genetic factors may have vital role in primary physical changes in KOA [53]. In addition, pain in the knee, obesity, strength in the muscles, and the size of the medial tibial bone area contribute to controlling the genetic disorder of KOA [54], that can be done through health physical activity guidelines [55].

Concerning the modifiable risk factor in this study; high level of sports, work and daily exercise was found more among Egyptians vs. Saudis, while sedentary was

more among Saudis vs. Egyptians, but they were similar in moderate sports. Serious knee injury such as ligament tears was more in Egyptians vs Saudis. About half of Egyptian participants were sporters vs one third of Saudis. These results were in line with Althomali and co-authors. They observed that moderate physical activity reduced the risk for KOA compared to sedentary lifestyle. Also, high levels of physical exercise increased the risk for KOA [20]. Physical Activity Guidelines for Americans stated that moderate levels of physical exercise about 150 min/week/moderate intensity/10 minutes/sessions, while lower levels of physical exercise (45 mins/week/moderate-intensity) improved KOA function and gait speed. The reverse impact of high levels of physical activity on the KOA might lead to joint destruction [56].

Regarding the causes of KOA, there was a significant increased among Saudis vs. Egyptians in the number of times climbed the stairs/day and spending hours for long standing. Egyptians was found to perform activities that put stress on the knees in running more than Saudis while Saudis more in weightlifting and squatting. Also, Egyptians playing high-quality sports like football and running for more than 10 years more than Saudis. Other study revealed that family history of knee OA, who suffered from flat feet, back pain, hip pain, rheumatoid arthritis, gout, or lupus are predictors to develop knee OA [23]. Regarding the symptoms, treatment of knee OA and better lifestyle, no significant difference between Egyptians and Saudis in suffering from joint pain, difficulty in moving and joint swelling, and slightly joint stiffness, they were suffering nearly at the same level. These symptoms agreed with other studies who found that pain intensity in KOA is associated with sex, age, BMI, physical activity, professional activity [57]. Others clarified that stiffening of the knee and amplified muscle tightening were observed in patients with medial KOA, possibly increasing the risk on joint health [58]. Some signs appeared that KOA develop such clicking, grating, cracking, or popping sounds [59]. Knee stiffness may be happened in the first 30 minutes morning. In addition, prolonged walking could increase knee joint loading that contribute to knee stiffness [60].

Types of treatment used for Knee OA in this research were physical therapy and injection which was not significant difference between the two nations. This result agreed with other study who found that non-pharmacological therapies endure the greatest cost-effective measure to prevent, manage, and treat OA in the knee and hip joints [61]. Many studies suggest that controlling BMI, and increased physical duties, help significantly in reducing pain and an improved quality of life [61-62]. These interventions are most important if they are applied in childhood, such as using healthy diets, avoiding sedentary lifestyle and moderate physical activities

[63-64]. Egyptians always have good adherence to non-pharmacological treatment vs. Saudis. Both outdoor and indoor walking were very important because it was a simple and effective form of exercise. Physiotherapy and massages might be useful to reduce pain from KOA and improve its function [65]. About treatment with local injection therapies, either intra-articular or periarticular that including genicular nerve-targeting therapies are fast rank in management of KOA [66-67]. Physicians, physical therapists, and pharmacists advised patients with KOA to control their weights, doing exercise, taking vitamin D and calcium, which was in line with Bashekah and co-authors, they found that about two thirds of participants said that eating healthy and balanced diet [23]. Consuming fiber-rich diets and doing physical activity are good preventative measures (at younger age) from KOA [27,28,50]. No significant difference was observed among the two nations in consuming nutritious foods, calcium, vitamin D, and dairy, but there was a significant difference in consuming fresh vegetables and fruits and whole grains among Egyptians more than Saudis. While poor lifestyle there was a significant among

Saudis who are consuming more sugars, carbohydrates, and fats when compared to Egyptians. Recent study in 2025 revealed that depression, poor quality of sleep, and eating more processed foods (lead to increased BMI) were linked to elevated risk of incident KOA. On the other hand, drinking green tea, moderate eating of mediterranean diet, dark bread, dietary fiber and cereal, were associated with low risk of knee OA [48, 68].

CONCLUSIONS

This study compared between Saudis and Egyptians in the prevalence of KOA and the modifiable and non-modifiable risk factors related to the KOA symptoms, the prevalence of KOA was found nearly the same among two countries. The study recognized the correlation between KOA and non-modifiable risk factors such as age, gender, and family history of KOA, and modifiable risk factors such as obesity, previous knee injury, the level of physical activity, level of education and smoking. The most effective plans to prevent KOA were some positive changes in lifestyle like encouraging physical exercises and some active duties and decreasing sedentary lifestyle. Also, controlling BMI, through healthy diets like vitamins, vegetables, fruits, and avoiding more sugars and carbohydrates. Inspiring regular exercise and improving eating habits can augment patients' quality of life. Protective and treatment policies should be applied at a young age and awareness at schools to prevent obesity in childhood. These results offer respected insights for healthcare physicians and consultants who are dealing with KOA in Saudi Arabia and Egypt.

Limitations

Limitations of this study were somewhat limited number of participants from limited regions in both countries, Egypt and KSA.

Recommendations

We recommended applying the same study in several regions and interviews more population deep insight either in KSA or in Egypt and increased the number of patients with KOA.

Ethical Considerations

This study followed the guidelines approved by the University of Ha'il Research Ethics Standing Committee (REC) in November 2025. The research protocol and instrument were examined and authorized (Study ID: H-2025-958). The goals of the study, the confidentiality of their answers, and their right to voluntary participation were all explained to the participants. Prior to administering the questionnaire, informed consent was received from each participant. All participant information and their data were anonymized to protect participant privacy.

Data Availability Statement

All data is available within the article.

Conflicts of Interest

The authors declare no conflict of interest. No financial, professional, or personal interests influenced the study's design, data collecting, analysis, or results; the research was carried out freely.

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