Scientific Research

University of Baghdad\ AL-Kindy college of medicine

TITLE:

THE RELATION BETWEEN OBESITY AND OSTEOARTHRITIS OF KNEE JOINT AT AL-KINDY TEACHING HOSPITAL.

The research submitted by:

Ali Al-sajad Hussein Jabbar

Hassan Badri Abbas

Taha Mohammed Abdullah

Murtaja Mohammed Khalaf

Supervised by:

Dr. Ghadeer Hikmat

Abstract:

Background: Osteoarthritis the most common joint disease and one of the most common causes of disability, Although osteoarthritis can affect any joint, There are joints that affected more commonly than the others, The knee joint is one of the most common sites of this disorder because it is a weight-bearing joint, Therefore obesity is considered as a risk factor of this disorder, Because it is believed that being obese increases the load placed on the joint which increases stress that could accelerate the cartilage breakdown.

Aim: To estimate the impact of obesity on osteoarthritis of the knee through measuring the body mass index [BMI] of osteoarthritis patients to acknowledge the risks of obesity on musculoskeletal system.

Methods: A descriptive cross-sectional study conducted at Al-Kindy teaching hospital. The sample size was 120 and was collected by non-probability convenience sampling method.

Results: From a total sample of 120 obese participants (BMI>30) we found that (45.8%) of them suffer from knee pain while (31.7%) of them suffer from knee osteoarthritis.

We found that developing of knee osteoarthritis is directly proportional with increasing of BMI. In grade I obesity (30-35) only (6.9%) suffer from

knee osteoarthritis whereas (14%) of grade II obesity (35-40) and this percentage is up to (62.5%) in grade III obesity (>40).

We also found that knee osteoarthritis prevalence increased with age in which only (12.3%) of young adults (<40 years) suffer from knee osteoarthritis the percentage increases to (43.6%) in middle aged (40-60 years) and up to (87.5%) in old aged (>60 years) participants.

Conclusion: This study suggests that there is a relation between obesity and prevalence of knee osteoarthritis. And also the prevalence of knee osteoarthritis increases with age.

Recommendation: People should be educated about obesity risks since it is a risk factor for many disorders including musculoskeletal disorders.

Introduction:

Osteoarthritis (OA) is a painful degenerative condition that can affect one or more of the joints. Weight-bearing joints (eg, spine, hip, knee, ankle) are often involved in the disease process. Mechanical forces exerted on the joints are a significant cause of OA and one of the most modifiable risk factors. The knee is the most frequently affected joint ، Globally, knee OA are the 11th highest contributors to global disability. [1]

Knee OA affects the 3 compartments of the knee joint (medial and lateral tibiofemoral and patellofemoral compartment) which work together to form a modified hinge joint that allows the knee to bend and straighten, and to rotate slightly from side to side. [2]

The hyaline cartilage that lines synovial joints consists of chondrocytes and an extracellular matrix. A normal extracellular matrix is 75% water held by long proteoglycan chains. With age these chains shorten, and the number of chondrocytes decrease. With progressive disease, chondrocyte numbers and proteoglycan content fall, as does water content. This results in damage to the articular cartilage and the release of chondral debris and inflammatory mediators. This triggers the innate immune system and starts a chronic inflammatory cycle that further damages the join. [3,4,5]

Strenuous physical activity, especially activities requiring kneeling, knee-bending, squatting, and Excess weight on the knee can adversely affect the functional capacity of the knee joint, Fat mass, rather than skeletal muscle mass, is a risk factor for cartilage defects; so one of the most significant preventable risk factors for developing knee osteoarthritis is obesity.

obesity is defined as abnormal or excessive fat accumulation that may impair health. classified by Body mass index (BMI) defined as a person's weight in kilograms divided by the square of his height in meters (kg/m2).

More than half of the world's population is considered to be overweight, Furthermore the International Obesity task force estimates that at present at least 1.1 billion adults are overweight, including 312 million who are obese. [7]

Obesity is part of the diagnostic criteria for metabolic syndrome, which is linked with a chronic low-grade pro-inflammatory state This may provide a biochemical explanation for the link between obesity and OA. [6,11]

Adipokines are cytokines that are predominantly released by adipose tissue into the bloodstream so have been implicated as a potential mediator of this effect. Adiponectin is one of these adipokines and its concentration is increased in patients with OA, especially in obese females. [12]

also obesity increases the risk of knee OA by Increased joint loading; changes in body composition, with negative effects related to inflammation; and behavioral factors, such as diminished physical activity and subsequent loss of protective muscle strength. The additional mass can stress articular cartilage beyond biological capabilities, therefore causing degenerative changes. [8,9,10]

Some studies have shown a reduction in BMI to reduce the risk of development of radiographic knee OA, with a large population study finding a reduction in BMI of ≥2 kg/m2 over 10 years decreased the odds for developing knee OA by over 50%. [14]

Patients with a BMI >35 kg/m2 are recognize ed to undergo surgery for OA an earlier age. The reasons for this are multifactorial but in part may be that obese patients with OA are more likely to seek a surgical solution than those of a normal BMI. [13]

Change from an individual's baseline BMI may confer greater risk, with an increase in 1 kg/m2 of BMI from baseline shown to yield a significant 10.5% increased lifetime risk of TKA, and a 5 kg/m2 BMI increase to nearly double the risk of TKA. By 2030, the global incidence of TKA is forecast to increase by 67%, compared with 2005 levels. [15].

Methodology:

A descriptive cross-sectional study was conducted among patient at

Al-Kindy teaching hospital and obesity research and therapy unit at

Al-Kindy medical college.

The sample was collected during the period from 20th of November 2022 to 1st of February 2023.

The sample size was 120 and was collected by non-probability convenience sampling method.

We use statistical package for social science (SPSS) and Excel for numbering and analyzing the data.

The data was that was collected from each participant include the following:

1. Age
2. Gender
3. Height
4. Weight
5. BMI
6. If the participant has knee pain
7. If the participant has Osteoarthritis

Results:

Table (1): Demographic data

		Count	Column N %
Gender	Male	60	50.0%
	Female	60	50.0%
Age	young	57	47.5%
	middle	55	45.8%
	old	8	6.7%
BMI	Obese I	29	24.2%
	Obese II	43	35.8%
	Obese III	48	40.0%

We have a total sample of 120 participants (60) of them are males and (60) females. We classified them according to their age into three groups:

1. Young adults (<40 years) 57 participants
2. Middle-aged (40-60 years) 55 participants
3. Old-aged (>60 years) 8 participants

We also classified them according to their BMI into three categories:

1. Grade I obesity (BMI=30-35) 29 participants
2. Grade II obesity (BMI=35-40) 43 participants
3. Grade III obesity (BMI>40) 48 participants

Table (2): participants suffer from knee pain

Knee pain

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no pain	64	53.3	53.3	53.3
	pain	56	46.7	46.7	100.0
	Total	120	100.0	100.0	

In the study of table (2) from a sample of 120 we found that 56 of participants (53.3%) suffer from knee pain while 64 of participants (46.7) do not suffer from knee pain.

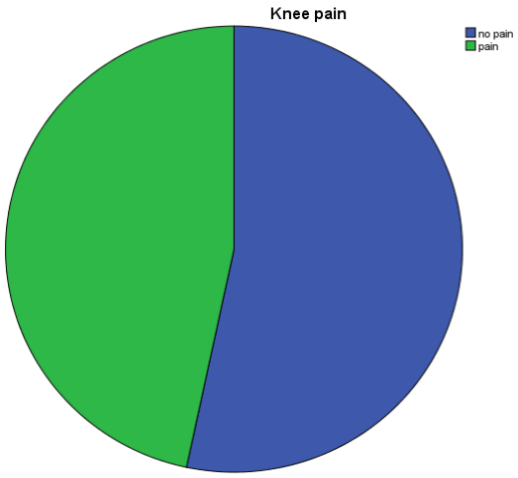


Table (3): participants suffer from Osteoarthritis

Osteoarthritis

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no osteoarthritis	81	67.5	67.5	67.5
	osteoarthritis	39	32.5	32.5	100.0
	Total	120	100.0	100.0	

In study of table (3) from a sample of 120 we found that 39 of participants (32.5%) suffer from Osteoarthritis while 81 of them (67.5%) do not suffer from Osteoarthritis.

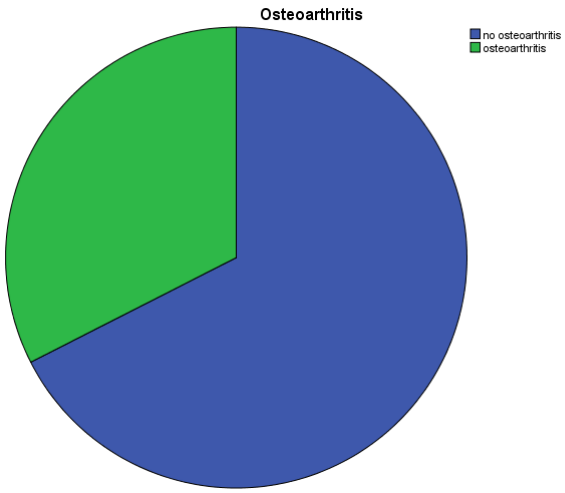


Table (4): Classification of participants suffering from knee pain according to their BMI.

				Count	Column N %
BMI	Obese I	Knee pain	no pain	25	86.2%
			pain	4	13.8%
	Obese II	Knee pain	no pain	25	58.1%
			pain	18	41.9%
	Obese III	Knee pain	no pain	15	31.3%
			pain	33	68.8%

In study of table (4) there are 29 participants in grade I obesity only 4 of them (13.8%) have knee pain while 25 of them (86.2%) do not. And there are 43 participants in grade II obesity in which 18 of them (41.9%) suffer from knee pain while 25 of them (58.1%) do not have knee pain. In Grade III obesity there are 48 participants 33 of them (68.8%) suffer from knee pain whereas 15 of them (31.3%) do not have knee pain.

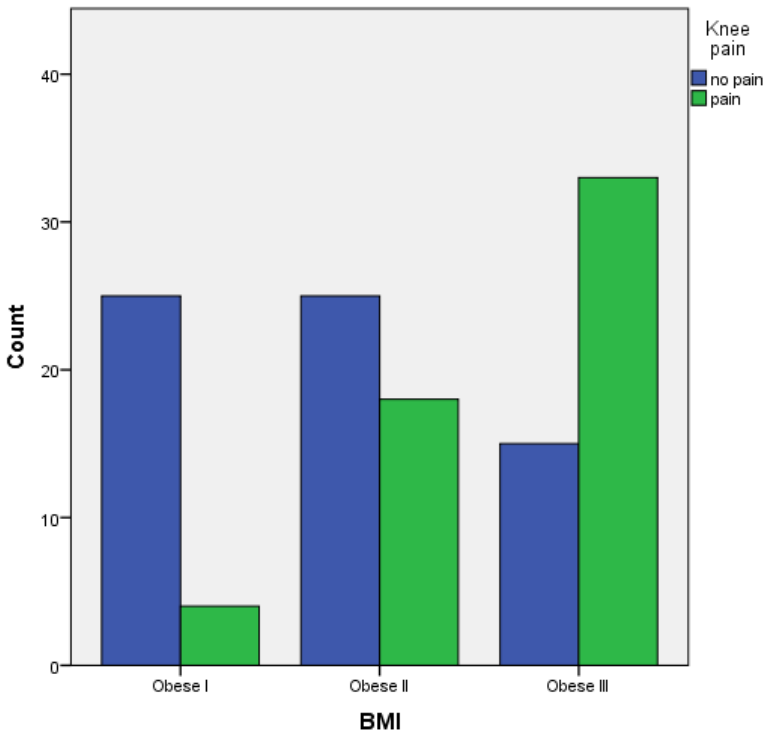
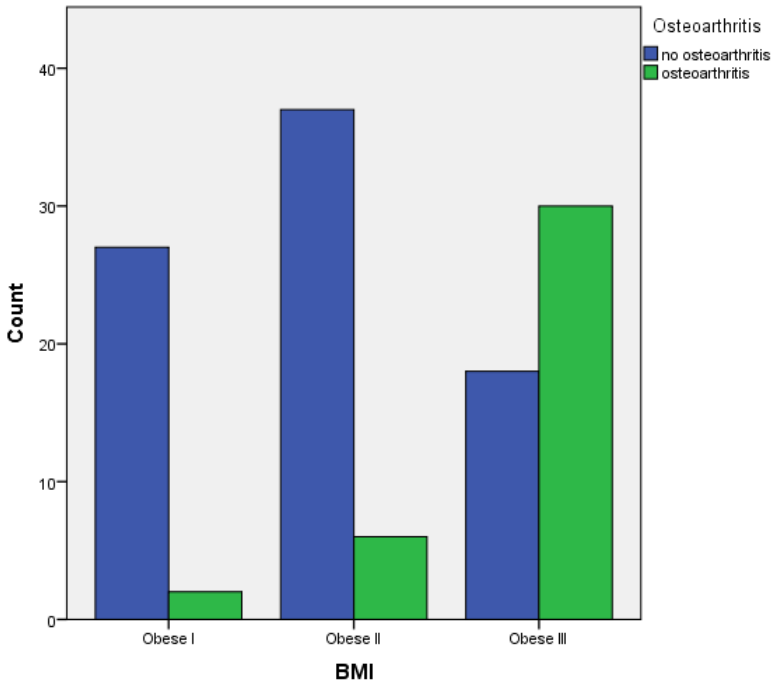


Table (5): classification of participant suffering from Osteoarthritis according to their BMI.

				Count	Column N %
BMI	Obese I	Osteoarthritis	no osteoarthritis	27	93.1%
			osteoarthritis	2	6.9%
	Obese II	Osteoarthritis	no osteoarthritis	37	86.0%
			osteoarthritis	6	14.0%
	Obese III	Osteoarthritis	no osteoarthritis	18	37.5%
			osteoarthritis	30	62.5%

In study of table (5) there are 29 participants in grade I obesity 2 of them (6.9%) have knee osteoarthritis while 27 of them (93.1%) do not. And there are 43 participants in grade II obesity in which 6 of them (14%) suffer from knee osteoarthritis while 37 of them (86%) do not have knee osteoarthritis. In Grade III obesity there are 48 participants 30 of them (62.5%) suffer from knee osteoarthritis whereas 18 of them (37.5%) do not have knee osteoarthritis.


Osteoarthritis
no osteoarthritis
osteoarthritis
Count
40
30
20
10
0
Obese I
Obese II
Obese III
BMI

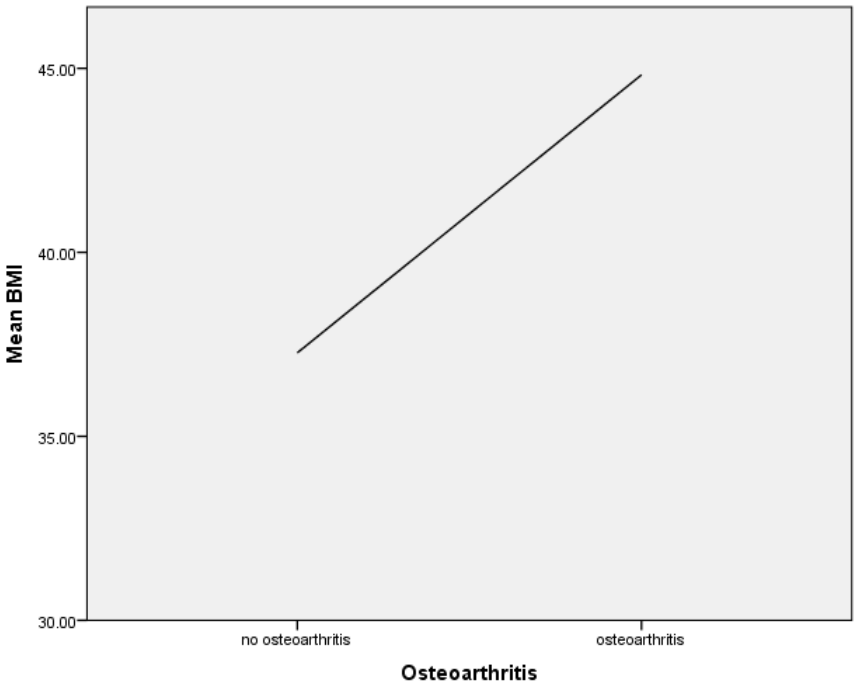

Mean BMI
45.00
40.00
35.00
30.00
no osteoarthritis
osteoarthritis
Osteoarthritis

Table (6): classification of participants suffering from Osteoarthritis according to their gender.

				Count	Column N %
Gender	Male	Osteoarthritis	no osteoarthritis	43	71.7%
			osteoarthritis	17	28.3%
	Female	Osteoarthritis	no osteoarthritis	39	65.0%
			osteoarthritis	21	35.0%

In study of table (6) shows that there are (17) of the (60) male participants (28.3%) suffer from Osteoarthritis while (43) of them (71.1%) do not have Osteoarthritis. And there are (21) out of (60) female participants (35%) suffer from osteoarthritis while (39) of them (65%) do not have osteoarthritis.

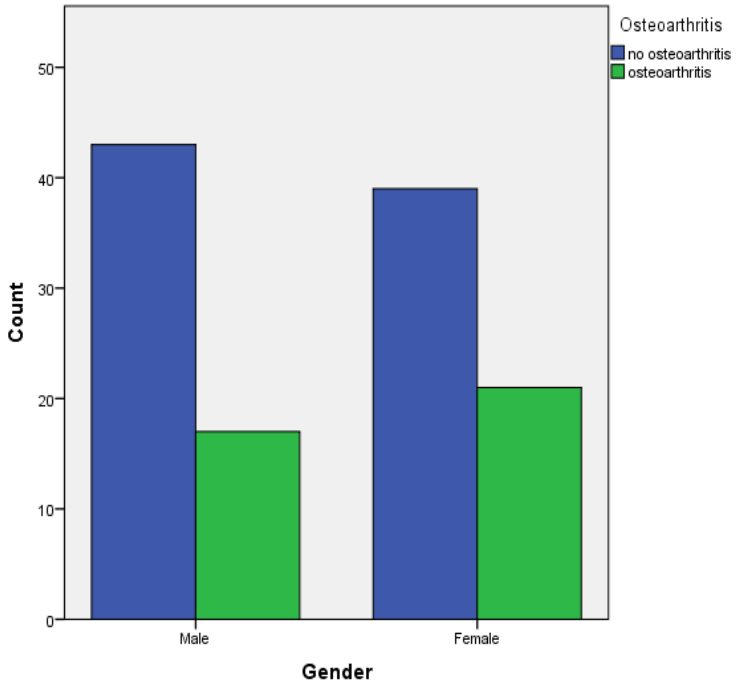
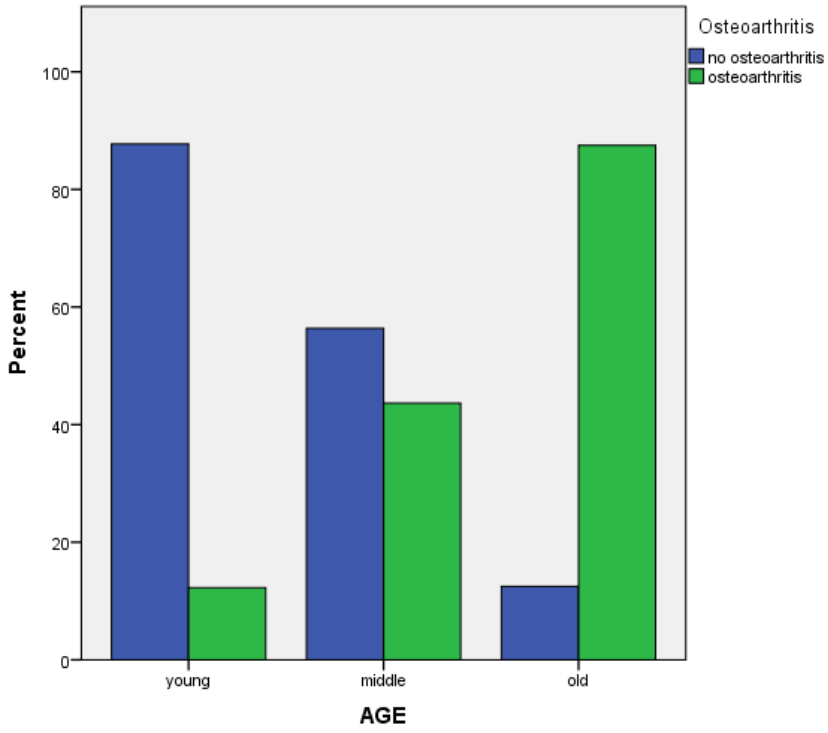


Table (7): classification of participants suffering from Osteoarthritis according to their age group.

				Count	Column N %
Age	young	Osteoarthritis	no osteoarthritis	50	87.7%
			osteoarthritis	7	12.3%
	middle	Osteoarthritis	no osteoarthritis	31	56.4%
			osteoarthritis	24	43.6%
	old	Osteoarthritis	no osteoarthritis	1	12.5%
			osteoarthritis	7	87.5%

In table (7) we split the sample into 3 groups according to their age:

1- Young adult participants (<40 years) they are (57) participants that represent (47.5%) of the total sample only (7) of them suffer from osteoarthritis while the rest of them (50) do not.
2- Middle aged participants (40-60 years) they are (55) participants that represent (45.8%) of the total sample (24) of them suffer from osteoarthritis while (31) of them do not.
3- Old aged participants (>60 years) they are (8) participants that represent (6.7%) of the total sample (7) of them suffer from osteoarthritis and (1) of them do not.



The graph above shows the percentage of osteoarthritis prevalence in each age group.

Discussion:

This study was designed to assess the prevalence of knee osteoarthritis among obese people and also to evaluate other risk factor associated with it. The results of this study show that obese people are at higher risk of developing knee osteoarthritis than non-obese people and these results agree with many studies around the world.

According to table (2) from a sample of 120 participants 56 of them (46.7%) have knee pain which may be a sign for developing of osteoarthritis or other joint disorder in the future however in table (3) we found that 39 out of the 120 participants (32.5%) suffer from knee osteoarthritis which is similar to a subset of the Framingham study in which 468 participants where included (33%) of them suffer from knee osteoarthritis. [15]

In the results of table (4) and (5) we found that the prevalence of knee pain and osteoarthritis increases with increasing of BMI. In grade I obesity we found (13.8%) suffer from knee pain and (6.9%) have knee osteoarthritis whereas in grade II obesity there are (41.9%) have knee pain and (14%) suffer from knee osteoarthritis while in grade III we found that (68.8%) suffer from knee pain and (62.5%) have knee osteoarthritis. And this result can be seen in many studies in which they found a strong

association between obesity and knee osteoarthritis [16,17], also some studies suggest that the risk for knee osteoarthritis increases 35% with each 5 units increased in BMI. [18]

In study of table (6) we found 17 out of 60 male participants suffer from osteoarthritis. And 21 out of 60 female participants suffer from osteoarthritis. And these results agree with studies that suggest that females are more susceptible for developing osteoarthritis. [19]

In table (7) we found that with increasing of the age the percentage of osteoarthritis prevalence increases, in young adult participants (<40 years) only 7 out of 57 participants (12.3%) suffer from osteoarthritis whereas in middle aged participants 24 out of 55 (43.6%) have osteoarthritis, and in the old aged participants 7 out of 8 (87.5%).
These results similar to many studies in which the prevalence of osteoarthritis increases with age increasing. [20,21]

Conclusion:

The study revealed that there is strong relation between obesity and knee osteoarthritis and obesity is one of the main risk factor regarding this disorder among other risk factors like age that also has great impact regarding knee osteoarthritis but obesity could be considered more important since it is modifiable.

Recommendation:

Obesity is considered a risk factor for many disorders especially musculoskeletal disorders so people should take a healthy lifestyle through exercise and healthy diet so they can live their lives normally.

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