Effect of obesity in osteoarthritis patients in Diyala province

Done by:

Aymen Mohamed Salman

Supervised by :

Dr . Moaed Kadhim Rasheed

Abstract

Backgrounds: A degenerative disorder that can cause discomfort in one or more joints is called osteoarthritis, or OA. Weight-bearing joints, such as the ankle, knee, hip, and spine, are frequently impacted by the disease process.

Aims of the study: Identify the effect of obesity in osteoarthritis patients in Diyala province.

Methodology: A cross sectional study done at Baquba teaching hospital to convenient sample of 40 patients with OA.,rom November 2023 to February 2024.

Results: Female were 32(80%) and male with percentage 8(20%). Mean age were [60.375±8.4] years, 6(15%) were less than 50 years, 9(22.5%) were between 50-59 years age group, 13(32.5%) were 60-69 years age group and 12(30%) were more than 70 years age group. 38 (95%) were not smoking and 2(5%) were smoking. 23(32.5%) of the sample were normal weight, 23(32.5%) of the sample were overweight, 10(25%) of sample were obesity class I, 2(5%) of sample were obesity class II, 2(5%) of sample were obesity class III.

Conclusion: We conclude that there association between obesity and osteoarthritis which found the majority of the sample was obesity and overweight. Gender and age also effect on osteoarthritis.

Keywords: Osteoarthritis, BMI , Obesity , Overweight.

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.(1)

One of the most adjustable risk factors for OA in terms of activity moderation and weight reduction is the mechanical pressures placed on the joints.(2)

The obesity pandemic in the US is getting out of control, and carrying more

weight puts more strain on the weight-bearing joints. One of the main causes of impairment as the population has gotten older and heavier is osteoarthritis (OA). Losing weight is crucial to decreasing the course of osteoarthritis, even if it's not always simple.(3)

The long-term degenerative joint condition known as osteoarthritis (OA) is brought on by both systemic and mechanical causes that increase the strain across the joint. In the gait cycle, a force three to six times the body weight is transferred across the knee joint when in the single-leg stance. Similarly, three times the body weight is applied across the hip.(4)

Consequently, any increase in weight may be roughly multiplied by these parameters to reveal the additional force across the knee when an overweight person walks. These forces are enhanced several times over during high-impact activities.(5)

This force increase puts more strain on the articular cartilage, eventually leading to its disintegration. This, in turn, promotes the growth of periarticular bone, which distributes the increasing pressures and ultimately results in less joint space.(6) This vicious cycle keeps on until the joint space is completely destroyed if left untreated.

Numerous investigations have specifically looked at the mechanical alterations brought on by obesity that affect the knee and articular cartilage in general. The findings of a gait study by Gushue et al.(7) indicate that overweight children may not be able to compensate for changes in the frontal plane during gait, which could result in higher medial compartment joint loads. The group of overweight children "showed a significantly higher peak internal knee abduction moment in early stance.

Over the past 30 years, the results of several well-designed research have demonstrated a statistically significant correlation between the prevalence of OA and obesity.

Three distinct health districts in England were the sites of a population-based case-control research carried out by Coggon et al. (8). 525 men and women (over 45) on the surgical waiting list for total knee arthroplasty (TKAs) were compared to 525 controls who were matched for age, gender, and primary care physician. When BMI was less than 20, the chances ratio for developing OA was 0.1 (95% CI 0.0-0.5), however when BMI was greater than 36, the odds ratio was 13.6 (95% CI 5.1-36.2). Additionally, there was an additive interaction between BMI and other important risk

variables, such as the history of knee injuries, meniscectomy history, and the presence of Heberden nodes; when these risk factors were combined, the odds ratio rose to 78. Plotting a graph revealed that OA increased exponentially with weight.Furthermore, the author came to the conclusion that while the patterns of interaction between risk variables were comparable in the two sexes, women tended to be more at risk for obesity than males.

Cooper and associates carried out a population-based case-control study.(9) In a manner similar to how participants were matched by Coggon and colleagues, 611 patients (210 males and 401 women) were matched with case controls.Sixth, waiting lists for total hip arthroplasty (THAs) included enrolled patients. Patients with a BMI over 28 had a 1.7-fold increased risk of developing hip OA compared to those with a BMI under 24.5. "Obesity and hip injury are important risk factors for OA that might be amenable to primary prevention," Cooper and colleagues found.

Using interviews, Dawson et al. (10) evaluated 50–70-year-old women who were waiting for total knee arthroplasty in a matched case–control study. "Weight gain in early adult life was particularly pronounced among cases of OA," in contrast to earlier findings. A higher BMI between the ages of

36 and 40 was statistically substantially linked to a higher risk of developing knee OA later in life.

After reviewing Finland's social security registry, Manninen et al. (11) discovered 6647 farmers between the ages of 40 and 64 who had applied for disability pensions. They concluded that there was a linear relationship between the incidence of disabling knee OA and BMI, with an adjusted relative risk of 1.4 (95% CI, 1.2-1.5) per standard deviation of the index (3.8 kg/m2). Bilateral knee OA carried the highest relative risk, and both men and women saw a positive correlation between relative weight and OA.

According to March et al. (12), for every 2 units of BMI (5 kg) of weight gain, there was a 36% increase in the probability of developing knee OA. A BMI of above 30 roughly threw off the chance of developing knee OA.

Aims of the study

We aimed to identify the effect of obesity in osteoarthritis patients in Diyala province.

Methodology

Study type

A cross sectional study

Study place

Done at Baquba teaching hospital

Study time

From November 2023 to February 2024.

The sample

Convenient sample of 40 patients with OA.

Data collection

The data were collected by researcher using questionnaires include demographic data gender and age , also it include Smoking. We computed BMI, which is derived by dividing body weight (in kilograms) by height (in

meters), using the WHO's standards to determine obesity. Measurements taken with a rigid tape measure and an electronic scale. For every measurement, two measurements were obtained, and the total value was calculated by averaging them.

Standard BMI categories

BMI	Weight status
< 18.5	Underweight
18.5-24.9	Normal weight
25-29.9	Overweight
30-34.9	Obesity class I
35-39.9	Obesity class II
> 40	Obesity class III

Ethical Clearance

All experimental protocols were approved under the Diyala Medical College, Iraq and all experiments were carried out in accordance with approved guidelines.

Statistical analysis

The SPSS program version 20 used for computerized statistical analysis. Frequency and percentage were calculated for qualitative variables, while mean and standard deviation (SD) calculated for quantitative variables.

Results

Data were collected from 40 patients with osteoarthritis, female were the majority of the samples 32(80%) followed by male with percentage 8(20%) as shown in table 1.

Table (1): Gender distribution among the samples.

Gender	Patients number	Percentage
Male	8	20%
Female	32	80%

Gender

Male   Female

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%٨٠
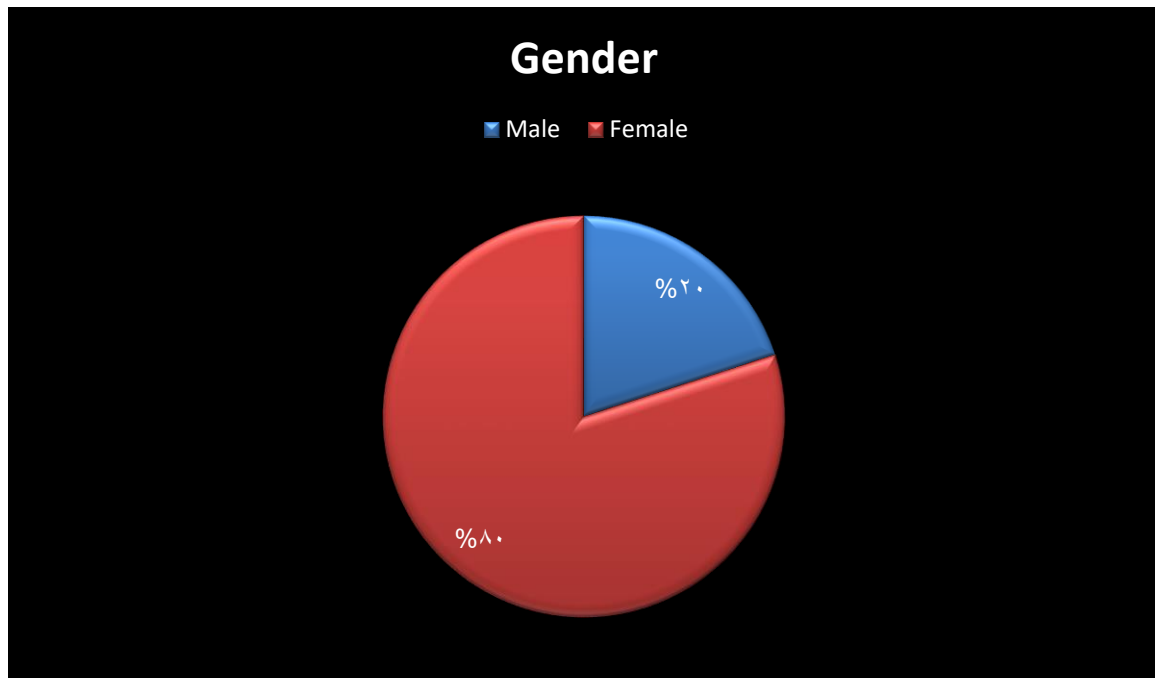
About the age, Mean age were [60.375±8.4] years, 6(15%) of the sample were less than 50 years, 9(22.5%) of the sample were between 50-59 years age group, 13(32.5%) of included sample were 60-69 years age group and 12(30%) of the sample were more than 70 years age group as shown in table 2.

Table(2): Age group distribution of included patients.

Age group	Patients number	Percentage
< 50 years	6	15%
50-59 years	9	22.5%

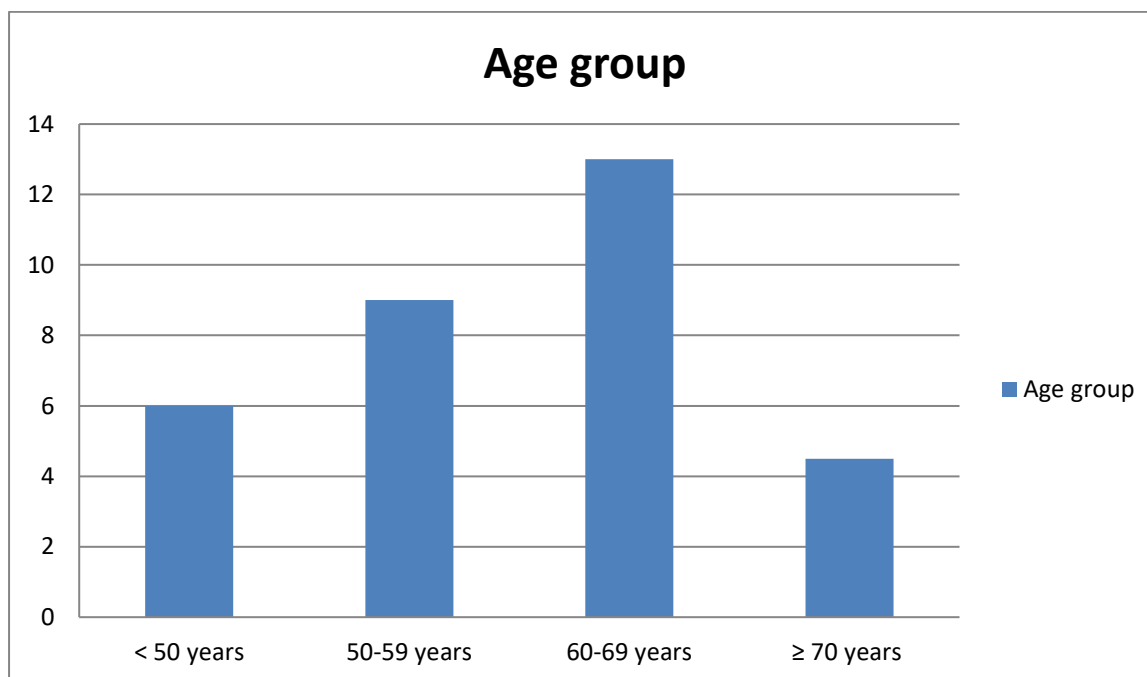|		
60-69 years	13	32.5%
≥ 70 years	12	30%

Table three show that the majority of the sample were not smoking 38 (95%) while 2(5%) of the sample were smoking.

Table (3): Smoking distribution among the sample.

Smoking	Patients number	Percentage
Yes	2	5%
No	38	95%

Table 4 show the BMI distribution among the sample, we found that 23(32.5%) of the sample were normal weight, 23(32.5%) of the sample were overweight, 10(25%) of sample were obesity class I, 2(5%) of sample were obesity class II, 2(5%) of sample were obesity class III.

Table(4): BMI distribution of included patients.

BMI	Patients number	Percentage
Normal weight	13	32.5%
Over weight	13	32.5%
Obesity class I	10	25%
Obesity class II	2	5%
Obesity class III	2	5%
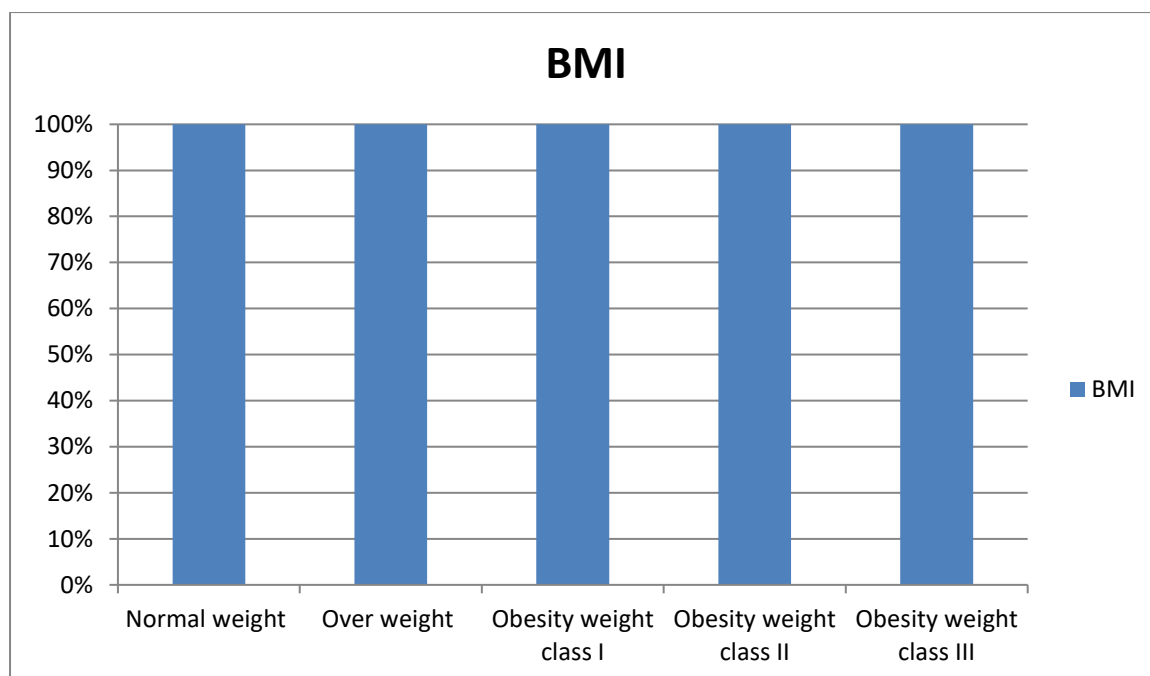
Discussion

The burden of obesity is thought to be the worst issue in the world, and it has been increasing at an alarming rate. Three to six times the body weight is applied over the knee joint in a single stance. Therefore, in obese people, extra body weight may place an additional strain on the joint.(13)

Numerous research investigations have documented a noteworthy association among obesity and musculoskeletal diseases, suggesting that

bone density may play a crucial role in the development of osteoarthritis.(14)

A higher BMI may increase the size of the knee's subchondral bones, and the joint surface area may enlarge to accommodate the increased stresses.() Additionally, the mechanical forces placed on the cartilage in weight-bearing joints that constrict the joint space may be increased by denser subchondral bone. Likewise, the fact that over 44% of the patients in the research were obese lends credence to the possibility that obesity is a significant risk factor for OA.(15)

Those who are obese bear a risk that is around three times greater than that of those whose BMI is less than 25 kg/m2. But in addition to body mass, metabolic processes and joint biomechanics may also be important factors in the acceleration of osteoarthritis.(16)

In our study, we found the majority of sample were female and the male were few. It might be brought on by the faster deterioration of cartilage during menopause. Because a lack of estrogen hormone in women after menopause slows down the process of cartilage turnover, it raises their chance of developing diseases as they age.(17)

Messier et al.(18) found that the risk of osteoarthritis is significantly correlated with feminine gender. After age adjustment, the gender-based risk climbed to three times, indicating a three times greater illness risk in older females. The gender-based risk was more than twice as high.

Aging is the main risk factor for osteoarthritis, a multifactorial illness. But an old joint and an OA joint are really different from one another. When additional OA risk factors are also present, the aging changes seen in the cells and extracellular matrix of joint tissues probably make older persons more susceptible to OA.(19)

Aging probably plays a role in the imbalance between catabolic and anabolic activity in the joint, which is a characteristic of osteoarthritis (OA). Older chondrocytes are unable to keep the articular cartilage in a state of homeostasis because they react poorly to growth factor stimulation. It also seems significant that chondrocytes be lost as a result of an increased vulnerability to cell death. (20)

In our study we found that about two –third of patients were more than 60 years , half of them were more than70 years.(21)

Jiang et al.(22) found that in the 55–64 age range, the prevalence of radiographic OA grew to 26.2%; in the 75+ age group, it exceeded 50%. In

the same age group, the prevalence of symptomatic knee OA also increased, rising from 16.3% to 32.8%.

We found the majority of the sample were not smoking and this disagree with several studies which suggest that smokers have a lower than expected prevalence of osteoarthritis (OA) than nonsmokers.

 In our study, we found the majority of the sample were obesity and overweight and this agree with study done by Brandt et al.(23) which found that the risk of OA was 73.4% higher for groups with BMIs $\geq$ 30.0 kg/m2 and 30.1% higher for groups with WCs $\geq$ 100 cm in men and $\geq$ 95 cm in women.

 Franklin et al.(24) found that When patients were categorized by age, the adjusted prevalence rate of osteoarthritis in class III obese patients was approximately two times greater than in overweight individuals (21.9% vs. 12.7%, respectively).

A large, population-based prospective study following 823 patients for 22 years found that BMI was strongly associated with the risk of developing osteoarthritis of the knee. Incidence of knee osteoarthritis was 7 times

greater for people with BMI C30 compared to the control of people with BMI\25. (25)

Teichtahl et al.(26) said in their meta-analysis that, as compared to those of normal weight, the pooled odds ratios for obese adults developing OA were 2.63.

It has also been shown that obesity reduces the expected health benefits of joint replacement surgery.(27)

Conclusion

We conclude that there association between obesity and osteoarthritis which found the majority of the sample was obesity and overweight. Gender and age also effect on osteoarthritis.

Recommendations

It is recommended to consider the following risk factors in order to prevent osteoarthritis (OA): avoiding joint stressors such as lifting heavy objects, sustaining injuries, prolonged sitting in one position, eating small meals five to six times a day, maintaining an active lifestyle (daily walking on flat terrain at a moderate pace for thirty to sixty minutes, regular health-improving gymnastics, swimming), quitting smoking, and using hormone replacement therapy (HRT) for women as directed. The current study confirms the need for more epidemiological and interventional research to identify novel strategies for delaying the onset and progression of OA.