Journal of Ideas in Health

e ISSN: 2645-9248 Journal homepage: www.jidhealth.com Open Access

Original Article

Assessment of obesity and central obesity among patients with knee osteoarthritis in Al-Sadder Hospital, Baghdad, Iraq

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Abstract

Background: Obese individuals are at increased risk for many chronic and life-threating conditions. The most significant burden on the musculoskeletal system resulted from osteoarthritis, mainly knee osteoarthritis. This study aimed to determine the prevalence of obesity and central obesity among a group of patients with knee osteoarthritis, analyze the effect of demographic variables, and examine the relationship between these two types of obesity.

Methods: A cross-sectional study was conducted in Al-Sadder hospital in Baghdad from June through September 2017. A convenience sample of 200 patients with knee osteoarthritis was collected. Those with body mass index (BMI) equal to or more than (30 kg/m2) considered obese. The cutoff point for central obesity was the waist-hip ratio (WHR) above (0.9) for men and above (0.85) for women. The risk ratio and 95% confidence interval (95% CI) calculated to determine the strength of the relationship. P-value ≤ 0.05 was considered statistically significant.

Results: The number of obese patients, according to BMI, was 163 (81.5%). For central obesity, the men and women with unhealthy WHR were 53 (96.4%) and 131 (10.3%), respectively. No significant difference in the rate of obesity among age groups (p= 0.986). Central obesity is significantly lower in those less than 45 years (p=0.023). In men, the risk of obese to have central obesity is (1.06) with no significant association (95% CI = 0.89 - 1.27, P = 0.481). In women, risk ratio = 1.56 and association is significant (95% CI = 1.03 - 1.36, P = 0.037).

Conclusion: The increasing age was associated with a rise in the rate of central obesity, but not with obesity. The overlap between the two types of obesity was evident and significant only in women.

Keywords: Knee osteoarthritis, obesity, central obesity, body mass index, waist-hip ratio. Baghdad, Iraq.

Background

Regardless of the nature of societies, osteoarthritis (OA) described as the most common disability-related musculoskeletal disorder among old age people in the world. The uncontrolled progress loss of the balance between synthesis and degradation of joint cartilage ending with its destruction. OA often leads to pain and loss of mobility in the affected joints. The long-term disability coupled with impairment in quality of life are the common outcomes of OA [1-3]. Additionally, OA put a substantial financial burden on the health care system and makes a devastating socioeconomic effect on patients, their family as well as on whole society [3-5]. The knee joint is the most vulnerable joint to be affected by osteoarthritis, and those with disabling knee OA is rapidly increasing day by day.

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Around 25% of individuals aged more than 55 years report having at least one attack of knee pain annually, which is clearly due to underlying OA [6-8]. Knee OA is of disabling nature, because it leads to difficulty in stair climbing, rising from a chair, picking up items from the floor, standing, and walking [9]. Obesity has become a significant global public health concern responsible for increased morbidity and mortality. In 2013, it was estimated that one-third of adult individuals in the world suffer from overweight or obesity; and in some regions, the prevalence of adults' obesity exceeded 50% [10]. The risk for many chronic and life-threatening conditions double when the bodyweight increase.

The sequels on the musculoskeletal system involve both degenerative and inflammatory disorders, with the most significant burden, resulted from osteoarthritis, mainly knee OA [11]. The biomechanical effect of excess body weight thought to have a substantial role in the relationship between knee OA and obesity [12]. The extra weight causes more loads and forces on weight-bearing joints, which can lead to damage to joint tissue [13]. However, the impact of obesity expected now to be

also mediated through a systemic metabolic effect resulted from the released inflammatory mediators by truncal and visceral adipocytes. Additionally, these cells release hormone leptin, which has been found to have a tremendously damaging effect on chondrocytes of joints [14–16]. Currently, the Leptin hormone is responsible for nearly half of the entire impact of obesity on knee OA [17]. Researches and studies within this field can help in updating knowledge, establishing required skills, and adopting a positive attitude by concerned health care personnel and the general population. So, the researchers conduct this study in Al-Sadder hospital in Baghdad with the primary aim to determine the prevalence of obesity and central obesity among patients with knee osteoarthritis and to analyze the effect of personal demographic variables. This study also aims to examine the relationship between obesity and central obesity and to test if the occurrence of one of them can predict the appearance of the other or not.

Methods

Study design and sample collection

A cross-sectional study conducted among patients presented with knee OA at the outpatient rheumatologic units, Al-Sadder hospital in the Al-Russafa region of Baghdad, Iraq. A convenience sampling technique recruited to collect the data from June through September 2017. Patients with confirmed clinical and radiological diagnosis of OA and willing to participate have been included. However, patients with associated severe comorbidities, cognitive impairments, or problems in communication were excluded.

Study tool

A structured paper-based questionnaire used for data collection. It was prepared by reviewing previous similar researches and filled through direct face to face interviews with patients. The survey contained questions about patients' demographics (age and sex) and clinical data. In the second part of the interview, anthropometric measurements (i.e., height, weight, waist circumference, and hip circumference) were obtained.

Definition of variables

The World Health Organization criteria used as a guideline for definitions. The body mass index (BMI) calculated by dividing body weight (in kilogram) on the square of the height (in meter). Those with BMI equal to or more than (30 kg/m2) considered obese [18]. The waist to hip ratio (WHR) is the ratio of waist circumference to the hip circumference, measured at a level parallel to the floor. The cutoff point for abdominal obesity is WHR above (0.9) for men and above (0.85) for women [19]. Measurements made by utilizing an electronic scale and a stiff tape measure. Double readings were taken for each measurement and averaged together for the final value.

Statistical analyses

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. The Chi-square test used for the analysis of association. For expression of the relationship between obesity and central obesity, 2 x 2 tables constructed (a separate table used for each sex). Risk ratio (RR) and 95% confidence (95% CI) interval calculated to determine the strength of the relationship, defined as the risk of having central obesity for obese patients. P-value equal to or less than 0.05 considered statistically significant.

Results

Characteristics of the study sample

The mean age of two hundred patients involved in this study was 50.2 (± 8.4 years) in the range of 34 to 65 years. Most of them were within the fifth and sixth decades of life. The female gender constituted nearly three-quarters (145, 72.5%) of the sample. Regarding body weight (as measured by BMI), obese patients represented about 81.5% of the study sample. Among the obese patients, 120 (73.6%) were females compared to 43 (26.4) males. However, among the same gender, women were slightly more than men when classified as obese; 82.7% (n=120) vs. 78.2% (n=43), respectively. For central obesity, the reverse is true if compared with the same gender, the men and women with unhealthy WHR were 53 (96.4%) and 131 (10.3%), respectively (Table 1).

Table1: Basic characteristics of study sample (n=200)

Variables	Values
Number of patients	200
Age, *mean (SD)*	50.2 (± 8.4) year
Sex, *n (%)*	
Men	55 (27.5%)
Women	145 (72.5%)
Weight status according to BMI, *n (%)*	
Obese	163 (81.5%)
Non-obese	37 (18.5%)
Central obesity status according to WHR, *n (%)*	
In men	
Yes	53 (96.4%)
No	2 (3.6%)
In women	
Yes	131 (90.3%)
No	14 (9.7%)

Figure 1 designed to show the percentage and frequency of those with obesity and central obesity in different age groups. For obesity, there is no significant difference among age groups (p= 0.986). However, central obesity is significantly lower in those less than 45 years old (p=0.023).

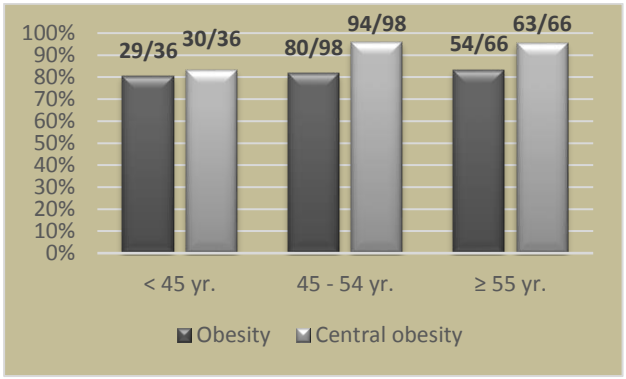

Figure1: Proportion of patients with obesity and central obesity among different age groups

The relationship between obesity and central obesity clarified in Table 2 and Table 3. In men, the risk of obese patients to have central obesity is slightly more than one. The association is not significant as 95% CI includes one and P = 0.481. In women, the opposite is true. The risk of obese women to have central obesity is more than one and a half. The association is significant as 95% CI does not pass through one and P = 0.037.

Table2: Relationship between obesity (by BMI) and central obesity (by WHR) among study participants men (n=55)

Variable		Central obesity n (%)		Total
		Yes	No	
Obesity	Yes	42(76.4%)	1(1.8%)	43
	No	11(20.0%)	1(1.8%)	12
Total		53	2	55
RR=1.06		95% CI = 0.89 - 1.27		*P* = 0.481

RR: Risk Ratio

Table3: Relationship between obesity (by BMI) and central obesity (by WHR) among study participants women (n=145)

Variable		Central obesity n (%)		Total
		Yes	No	
Obesity	Yes	112(77.2%)	8(5.5%)	120
	No	9(6.2%)	6(4.1%)	15
Total		131	14	145
RR=1.56		95% CI = 1.03 - 1.36		*P* = 0.037

RR: Risk Ratio

Discussion

The prevalence of knee OA continues to increase, properly due to the aging of the population and the accelerated increment in its major risk factor (obesity) [10,20]. In the current study, most of the participants were middle-aged individuals and elderlies. There is a global consensus that increasing age is a significant risk factor for the occurrence of knee OA as this disease is a part of the aging process [21,22]. Moreover, aging and malnutrition often coincide with the emergence of chronic diseases [23]. Jarvholm et al. [21] "suggested a 'nonlinear' relationship between age and knee OA incidence". In males, the age period of fifty to seventy-five years described as the stage of the sharp increase in the onset of knee OA. However, the rise of OA knee among males aged more than seventy-five years will be limited [21]. The higher proportion of women in our study runs in agreement with previous studies, which reported that the incidence and severity of OA are higher in women compared to their counterpart [24,25]. A well-known variable, such as social issues or physiological and hormonal differences are more likely to contribute significantly to gender differences.

The prevalence of obesity (as measured by BMI) within our study sample is much higher than the prevalence in the general adult Iraqi population of 33.5%, according to a wide survey conducted in 2015 [26]. Several extensive studies and reviews have demonstrated a direct correlation between knee OA and obesity [2,12,27-31]. Blagojevic et al. [2] reported in their meta-analysis that pooled odds ratios for obese people to develop OA was 2.63 in comparison with normal-weight individuals. In the Framingham knee study, a high body mass index found to predict the development of this disease in later life. Furthermore, the analysis of females in the same study has revealed that "the incidence of knee OA was lower in obese women who lose weight than in those who do not", suggesting that controlling body weight can reduce the risk of knee OA [27-28]. Many current medical guidelines and protocols, e.g., NICE Osteoarthritis guidelines and Osteoarthritis Research Society International (OARSI) guidelines, emphasize on losing and maintaining lower weight level as a management option for OA [32-33]. Coggon et al. [29] suggested that if all overweight and obese people reduce their weight by 5 kg or until their BMI was within recommended normal range, around one-fourth of all surgical cases of knee OA, might be avoided. Obesity also was reported to decrease the desired health outcomes from joint replacement surgery [30]. According to WHO, a tremendous proportion of study participants in both sexes classified as having central obesity. Although we did not find a reference value for percentages of central obesity in the general Iraqi population, a large case-control study conducted by Holliday KL et al. [34] at the Nottingham City Hospital in England found that WHR in those with knee OA were higher than in control group. However, the same study reported that the association of knee OA with WHR was weaker than that with BMI. Literature indicated that weight gain and rate of obesity among general adult people are progressive increases over a lifetime until it leveled out in middle age [35]. Nevertheless, in the current study, the rate of obesity among people younger than 45 years was similar to other age groups which may explain the cause of the occurrence of knee OA in those young people, although this disease is considered primarily to be a part of the aging process and affects mainly older individuals [2]. The significant rise in the rate of abdominal obesity in the middle age and elderly groups of the study sample thought to be a related consequence to the aging process in which there will be a change in body fat distribution and metabolism [35]. Like the finding of our study, Holliday et al. [34] also reported the significant association between general obesity and central obesity among only the female participants. Authors attributed this finding to the fact that women hold fat more around the hips and thighs. In contrast, men hold fat at the level of the abdomen [34]. Abdominal adipose tissues considered metabolically active and responsible for metabolic stress-induced joint inflammation and osteoarthritis, while fat accumulated in lower extremities is metabolically protective by improving glucose tolerance and lipid profile [36-37]. The most important strength of this study is its originality. Up to our knowledge, this is the first study in Iraq which investigates both obesity and central obesity in patients with knee OA. However, certain limitations should be notified; first; because of the cross-sectional nature of the study, it is not clear whether all measured cases of obesity have occurred before the onset of knee OA, or the decrease inability to walk and movement due to knee OA had put on weight in some patients and participated in the exaggeration of the prevalence of obesity. Second, the conduction of study in one place may limit the ability to generalize the findings in other sites. Third, the recruited sample may not be fully representative of all patients within the selected geographical area because some patients may not come to the hospital and prefer treatment in private clinics. However, patients with knee

OA who attend the private clinics are expected to constitute a small portion of those eligible for entry in our study. Despite all these limitations, the findings of this study provide a better understanding of the role of obesity in knee OA, particularly among Iraqi patients.

Conclusion

A large proportion of the study sample suffered from obesity and central obesity, and their prevalence is higher than that reported in the general population. Increasing age was associated with a rise in the rate of central obesity, but no association presented between age and general obesity. The overlap between the two types of obesity was evident and significant only in women. Patients with knee OA should routinely be screened for obesity and central obesity due to the high prevalence of these problems. Health care providers should discuss weight loss actions and obesity prevention strategies with patients to return and maintain an average weight. These may include the adoption of an educational program to improve knowledge and promote changes in lifestyle. Further studies are advised to improve understanding of the relationship between obesity and osteoarthritis in Iraq. These studies should involve a larger sample from different places and investigate the effect of other clinical- epidemiological characteristics on this relation. Additionally, these studies could examine the impact of obesity on OA of other joints (e.g., hip joint) or search for the prognosis of the disease.

Abbreviations

OA: Osteoarthritis; BMI: Body Mass Index; WHR: Waist-Hip Ratio

Declarations

Acknowledgement

The authors want to thank all patients involved in this study.

Funding

The author (s) received no financial support for the research, authorship, and/or publication of this article.

Availability of data and materials

Data will be available by emailing dr_berq@yahoo.com

Authors' contributions

All authors participated equally in the study concept, design, writing, reviewing, editing and approving the manuscript in its final form. All authors read and approved the final manuscript.

Ethics approval and consent to participate

We conducted the research following the Declaration of Helsinki, and the protocol was approved by the Ethic Committee of the Al-sadder Hospital, Al-Russafa Health Directorate, Baghdad, Iraq. (Ref: Number: 2161 in 25/ 4/ 2017). Moreover, written informed consent was obtained from patient willing to participate after explanation of the study objectives and guarantee of secrecy.

Consent for publication

Not applicable

Competing interest

The authors declare that they have no competing interests.

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Article Info

Received: 14 October 2019
Accepted: 12 November 2019
Published: 20 December 2019

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