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Original Article

Obesity associated low back pain and knee osteoarthritis: a cross-sectional hospital-based study

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Abstract

Background: Obesity is associated with an increased risk of diseases, including low back pain and knee osteoarthritis. **Methods:** This was a cross-sectional study that was conducted at the surgical outpatient department (SOPD) of the Usmanu Danfodiyo University Teaching Hospital (UDUTH), Sokoto, from October to December 2024. Data collection was conducted through a self-administered questionnaire and a face-to-face interview, following the random selection of patients. Data comprises demographics and variables such as height, weight, Body Mass Index (BMI), presence or absence of low back pain (LBP), and presence or absence of knee osteoarthritis (KOA). The BMI was obtained from the patient's weight and height, and it was categorised into either normal (< 29.9kg/m2) or obese (> 30kg/m2). **Results:** The mean age of presentation was 46.49±14.23, and the most frequent age range was 40-59 years (48.2%). The male-to-female ratio was 1:1.02. The majority of the study subjects 78 (46.4%) were unemployed, with 61 (73.5%) being female. There were 73 (43.4%) obese subjects and 95 (56.5%) non-obese subjects. Those who presented with LBP were 75 (44.6%), KOA were 71 (42.3%), and those with both LBP and KOA were 30 (17.9%). Presence of obesity was statistically significant for females (p = 0.002; OR = 2.67), those with LBP (p = 0.007; OR = 2.299), KOA (p = 0.0001; OR = 3.43), and for the presence of both LBP and KOA (p = 0.001; OR = 3.86). **Conclusions:** The study findings are consistent with a high prevalence of low back pain and knee osteoarthritis among the obese subjects. Weight reduction improves symptoms and reduces the risk of complications.

Keywords: Obesity, body mass index, low back pain, knee osteoarthritis, cross-sectional study

Introduction

Obesity is a growing global public health concern as the number of obese individuals is on the increase [1]. There was an annual 0.48% increase in obesity-related disability-adjusted life years (DALYs) from 2000 to 2019, and a 39.8% increase is predicted from 2020 to 2030. The Eastern Mediterranean and middle socio-demographic index countries have been recorded to have the highest obesity-related DALYs [2]. In sub-Saharan Africa, obesity is forecasted to increase by 254.8%. Meanwhile, in Nigeria, the number of adults overweight and obese is predicted to reach 141 million by the year 2050 [3]. Obesity significantly contributes to comorbidities, including chronic medical conditions that incur huge economic costs to the patients [4]. These chronic medical conditions were said to be more common and severe when associated with obesity, according to many research findings [5]. Both low back pain (LBP) and Knee osteoarthritis (KOA) are common occurrences in obesity [6]. There is a direct and indirect link between obesity and the risk of developing both LBP and KOA, as mentioned in various literature sources [6,7].

Aside from obesity, behaviours and socio-demographic factors such as female gender, age, physically demanding activities, prolonged sitting, smoking and psychosocial conditions are also influential for LBP [8]. Several studies reported that increased weight or high body mass index (BMI) was a weak factor in

the aetiology of LBP [9]. Other studies showed an increased incidence of LBP among men with obesity but not women [10]. These findings form one of the bases to further investigate the role of obesity in different sexes on the development of LBP. The association between obesity and KOA has become clearer and consistent as weight reduction is one of the main treatment modalities in patients with KOA [11]. The KOA is as a result of cartilage loss leading to pain, stiffness and impaired movement. The cartilage loss is accelerated in the presence of more loading, such as increased body weight, particularly in the presence of obesity. Obese individuals were shown to have subchondral bone densification according to some studies [12].

With the aetiological link between obesity and the risk of developing LBP and KOA being established, there is a paucity of research that associates the two comorbidities with obesity in one study. This is important because the patient could be counselled on the risk of developing one after presenting with either the LBP or KOA. Additionally, the sex, age and occupational distribution of these disorders are equally important components of the study for a better understanding of appropriate preventive and treatment options.

The study aims to explore the association between obesity and both LBP and KNOA, with special consideration of gender differences.

Materials and methods

This was a cross-sectional study that was conducted at the surgical outpatient department (SOPD) of the Usmanu Danfodiyo University Teaching Hospital (UDUTH), Sokoto, from October to December 2024. Following the ethical clearance (Ref no. UDUTH/HREC/2025/1489/V2) from the health research and ethics committee; data was then collected at the SOPD, UDUTH. Previous study showed the prevalence of obesity in the North-Western part of Nigeria was 21% [13], and with a level of precision of 5%, the required sample was calculated to be 162. The inclusion criteria were patients aged 18 years or more who attended the SOPD for orthopaedic consultation. The exclusion criteria were patients less than 18 years old and patients who are unable to walk and with serious orthopaedic problems and/or comorbidities, refusal to consent or previous major orthopaedic operative procedures. Subjects were recruited using convenience sampling technique in consecutive manner till the desired sample size was attained. Data collection was via a self-administered questionnaire and face-to-face interview following a random selection of the patients. There were total 168 patients enrolled in the study. The data comprise demographic features such as Age, gender, and occupation, and variables such as height, weight, Body Mass Index (BMI), presence or absence of low back pain (LBP), and presence or absence of knee osteoarthritis (KOA). The occupation was divided into civil servants, business people, and the unemployed. The BMI was calculated from the patient's weight and height and categorised as normal (< 29.9kg/m2) or obese (> 30kg/m2). The presence of LBP was identified from the patient's persistent complaint of pain with or without radiological evidence of lumbar spondylosis. Patients with KOA were either on follow-up or newly diagnosed through clinical and radiological assessment.

Table 1. Details of variables.

S/N	n = 168	
	Variable	**Frequency (%)**
1	**Age** (years)	
	18-39	56 (33.3)
	40-59	81 (48.2)
	60-79	28 (16.7)
	80-99	3 (1.8)
2	**Gender**	
	Male	85 (50.6)
	Female	83 (49.4)
3	**Occupation**	
	Civil Servants	50 (29.8)
	Business	40 (23.8)
	Unemployed	78 (46.4)
4	**Obesity status**	
	Obese	73 (43.5)
	Non-Obese	95 (56.5)
5	**Symptoms/Diagnosis**	
	Low back pain (LBP)	75 (44.6)
	Knee Osteoarthritis (KNOA)	71 (42.3)
	Both LBP & KNOA	30 (17.9)

Statistical analysis

Data analysis was done using SPSS version 23.0. Descriptive statistics described the numerical variable (age) into mean and standard deviation for normally distributed data, while the median and interquartile range were used for skewed distributed data. Chi-square analysis was used to test for differences in the proportions of categorical variables between the two groups. The multivariate logistic regression analysis was used to analyse the effect of various categorical variables (gender, obesity, and occupation) and numerical variables (age) on the outcome variables (presence or absence of LBP and KOA). The significance level was set at $p< 0.05$.

Results

The demographic and clinical characteristics of the study subjects are shown in Table 1. There were a total of 168 patients, with a mean age of presentation of 46.49 ± 14.23, and the most frequent age range was 40-59 years (48.2%). The male-to-female ratio was 1:1.02. The majority of the study subjects 78 (46.4%) were unemployed, with 61 (73.5%) representing the female gender (Figure 1). There were 73 (43.4%) obese subjects and 95 (56.5%) non-obese subjects. Those who presented with LBP were 75 (44.6%), KOA were 71 (42.3%), and both LBP and KOA were 30 (17.9%). Presence of obesity was statistically significant for females ($p = 0.002$; OR = 2.67), those with LBP ($p = 0.007$; OR = 2.299), KOA ($p = 0.0001$; OR = 3.43), and for the presence of both LBP and KOA ($p = 0.001$; OR = 3.86) (Table 2).

Discussion

The study shows a high prevalence of obesity (43.5%) among the 168 study subjects that attended the SOPD, with a female preponderance (27.4%). The presence of LBP, KOA, or both was significant among the obese subjects, indicating positive associations (Table 2). The almost equal proportion of both

Table 2. Obesity and gender, low back pain (LBP) knee osteoarthritis (KNOA).

	Obese	Non-Obese	p-value	OR	95% CI
Gender					
Female	46 (27.4%)	37 (22.0%)	0.002	2.671	1.424-5.010
Male	27 (16.1%)	58 (34.5%)			
LBP					
Present	41 (24.4%)	34 (20.3%)	0.007	2.299	1.231-4.291
Absent	32 (19.0%)	61 (36.3%)			
KNOA					
Present	43 (25.6%)	28 (16.7%)	0.0001	3.43	1.805-6.516
Absent	30 (17.9%)	67 (39.9%)			
Both LBP & KNOA					
Present	21 (12.5%)	9 (5.4%)	0.001	3.859	1.644-9.059
Absent	52 (31.0%)	86 (51.2%)			

CI = Confidence Interval

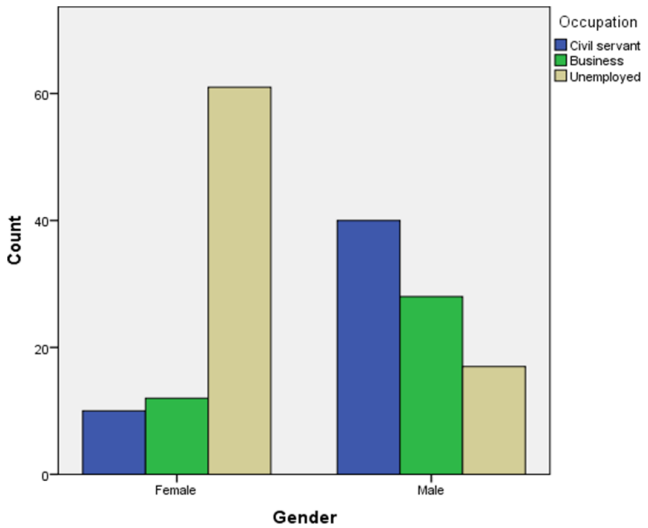

Figure 1. Gender distribution of occupational status.

genders in the study may be explained by the orthopaedic consultation needs of the patients and the common condition present in that study area. The majority of the unemployed patients were females who were living as housewives without significant physically demanding activities. It is known that sedentary life and inactivity lead to more adipose tissue deposition. This may be one of the reasons for high obesity prevalence among them reflecting less activity while staying at home [14]. This is in contrast with a recent study that refutes this and reported higher obesity prevalence among men than women, indicating that in obesity, there is a difference in body fat distribution or lean body mass proportion between the 2 genders [15]. High prevalence of obesity-associated low back pain in women has been reported to be due to hormone-related factors present in them [10]. In men, the increased BMI is largely contributed by high muscle mass as opposed to women, where adipose tissue content predominates. Women of childbearing age who presented with LBP may have previously experienced the pain during pregnancy due to mechanical load to the spine, which can persist or become recurrent. This pregnancy-related low back pain has multiple aetiological pathways, including pregnancy-related hormonal changes [16].

The mechanism for the development of KOA in obesity is largely biomechanical. There is increased weight transmitted to the knee joint during the single-leg stance during the gait cycle, and this is more pronounced in individuals with increased BMI [17]. This, combined with genetic and environmental factors, plays a major role in KOA among obese people. As in the case of LBP, the increased adiposity is usually associated with abnormal levels of hormones and growth factors that lead to increased cartilage breakdown [10,18]. Obesity is a risk factor for both LBP and KOA, largely due to the aforementioned biomechanical factor. Therefore, it's not unusual to see patients having two presentations at the same time. This finding is also reported by similar researches that relate obesity to both LBP and KOA [6,7,19].

This study was hospital-based and may not be ideal to represent the population because those who visited the clinic comprised people who were more health-conscious and could afford to pay for the services. The design of this study was a cross-sectional one with limitations in ruling out the alternative explanation that obesity may precede LBP and KOA or vice versa. This can effectively be addressed by prospective studies, such as Cohort studies. However, in both causal pathways, obesity-associated LBP and KOA tend to increase symptoms and exaggerate morbidities with the potential to add more cost and increase complications during disease management [20]. This calls for obesity prevention and treatment, which includes weight reduction via lifestyle modification. Dietary control and physical therapy, especially targeted at vulnerable groups of young adults through advocacy and health guidance, can effectively address obesity-associated morbidities and mortality. Obesity resistant to conventional treatment may benefit from bariatric surgery, which reports encouraging success with significant symptom relief in both LBP and KOA.

Conclusion

The study findings are consistent with the high prevalence of low back pain and knee osteoarthritis among the obese subjects. Women were more obese than men. Adopting a healthy lifestyle to reduce weight in obese individuals could significantly reduce the symptoms and complications related to low back pain and knee osteoarthritis in obesity.

Author contributions

All authors contributed to the study conception and design. Material preparation, data collection and analysis were performed by all authors. All authors commented on previous versions of the manuscript. All authors read and approved the final manuscript.

Statements and declarations

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Conflict of Interest

The authors declare that they have no conflict of interest.

Ethical statement

The ethical approval was obtained from the Hospital Clinical Research Ethics Committee of the Usmanu Danfodio University Teaching Hospital, Sokoto, Nigeria (Ref no. UDUTH / HREC/2025/1489/V2). Informed consent was obtained from each patient, and the study was conducted in accordance with the principles of the Declaration of Helsinki.

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