Prevalence and association of Obesity and Knee Pain among women of Karachi

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ABSTRACT

Background: Knee pain is more prevalent among adult women and is linked to central obesity, which is marked by an accumulation of excess abdominal fat.

Objective: The purpose of this study was to determine the prevalence and association of central obesity and knee pain among women.

Methods: This cross-sectional study with ethical approval number - SBBDU/DIRS/Misc/2023/78 was conducted from May 2023 to September 2023 and consisted of participants from Government Hospitals and Educational Institutes of Karachi Sindh, Pakistan. Data was collected from the sample of 150 women, included through convenient sampling technique. Nordic Musculoskeletal Questionnaire and Numeric Pain Rating Scale was used to collect data regarding knee pain whereas central obesity was determined by measuring waist circumference.

Results: Of the total 150 participants, 63.3 % had knee pain during the last 12 months and 36.7 % women has functional limitations due to knee pain, while 63.3 % women reported no activity limitation due to knee pain. Additionally, 43.3 % women had knee pain during last 7 days, with 36% describing the pain as moderate. A significant negative association was found between waist circumference and knee pain over the last 12 months ($p = 0.003$) and the last 7 days ($p = 0.001$).

Conclusion: The study highlights a high prevalence of knee pain among women in Karachi, with many reporting knee pain over the past year. A significant negative association was observed between central obesity and knee pain, indicating that as waist circumference increases, knee pain tends to decrease.

Keywords: Abdominal obesity, central obesity, knee pain, osteoarthritis, women.

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Introduction:

The word obesity means "excess adipose tissue contributing to the dysfunction of the body and its associated components," which is enough to adversely affect health.(1,2) The impact of obesity on health can be assessed by examining its effects on lifespan and the onset of premature diseases.(3) According to the World Health Organization (WHO), obesity is defined as having a BMI over 30 kg/m², affecting more than 300 million adults globally.(4,5). Moreover, abdominal adiposity evaluated by an increase in waistline is a key marker of obesity-related health complications. (6) According to the WHO, obesity causes millions of deaths annually.(7) Universal data by WHO from 2014 revealed that 11% of men and 15% of women aged 18 and above reported being obese.(8) Obesity around the abdomen increases the risk of hypertension, diabetes, and cardiac disease.(9) In addition, obesity has been linked to several musculoskeletal conditions that can cause pain in the joints.(10) Obesity often affects the knees in obese individuals, causing joint pain because of an increase in fat mass.(11) Another study reported that obese individuals experiencing frequent knee pain tend to experience higher levels of knee pain than their non-obese counterparts.(12)

The underlying mechanisms to understand how obesity increases the risk of knee pain were proposed as mechanical overload and activation for metabolic factors that contribute to joint damage.(13) Excess weight places significant strain on the knees, creating shear forces that limit daily activities and decrease quality of life.(11) Knee pain prevalence ranges from

10% to 60%, depending on factors such as age and occupation.(14,15) It may also be associated with social, emotional, and other demographic factors; however, obesity is a significant factor that is related to knee pain because of its profound effects on the structure of the soft tissue.(11) The rise in knee pain cases over the past two decades has been significant, with a 65% increase leading to an additional 4 million doctor visits annually.(16) In fact, knee pain is now the 10th most common reason for outpatient care.(16) Research further shows that 25% of people aged 50 and older experience knee pain.(17) This widespread prevalence, coupled with the associated decline in physical function, imposes a significant burden on individuals and healthcare systems worldwide.(13,18) Knee pain complaints were also reported as an indicator of poor functional prognosis. The significance of its prevention for the subsequent functional decline and impairment has been highlighted.(19)

Initially, the link between obesity and musculoskeletal pain was attributed to increased pressure on joints, leading to arthritis and subsequent pain.(18) However, recent findings have recognized lipocytes as an endocrine organ, producing adipokines leading to persistent, low-grade systemic inflammation.(20) Although knee problems are common in older adults, knee pain is more prevalent in younger women and tends to worsen with age.(21) Factors contributing to knee pain in women include raised bone mineral density (BMD), osteoarthritis, hormonal changes, and biomechanical differences such as a wider pelvis, which increases the Q-angle and places additional pressure on the knee.(22,23) A few studies have found a strong correlation between women's knee discomfort and their fat mass since women are shown to have a higher inflammatory response than men.(13,18)

Various studies showed that excess weight is a contributing factor for knee pain.(24,25) A study of 407 individuals revealed that central obesity was significantly associated with knee pain, even after adjusting for comorbid conditions such as osteoarthritis and neuropathy.(26) Another study reported that increased fat weight was significantly associated with knee pain in women.(27) In addition, a strong, consistent longitudinal association between knee pain and obesity has been identified among women of both elderly and middle-aged.(28)

Furthermore, excess body weight is considered a key predictor of knee pain.(29) Numerous researchers, particularly in developed countries, have extensively explored the relationship between obesity and knee pain, highlighting the growing interest in understanding the mechanisms underlying this association.(21,30) To the best of our knowledge, there is a paucity of this data, particularly women among Karachi. Therefore, this study aimed to examine the prevalence and association of central obesity and knee pain among women in Karachi.

Methods:

This cross-sectional study was conducted at a Jinnah hospital, Karachi, from May 2023 to September 2023. Non-Probability convenience sampling technique was used. The study included 150 women aged 30-60 years who participated voluntarily. Women who were pregnant, had recent knee surgery or knee arthroplasty, previous knee joint infection or a history of inflammatory joint disease were excluded from the study. Ethical approval was obtained from the institutional committee SBBDU/DIRS/Misc/2023/78, and all participants provided informed consent after being informed about the study verbally and through a participation sheet. The data's confidentiality and anonymity were assured.

The central obesity of participants was assessed by measuring waist circumference using a flexible measuring tape, held horizontally around the waist without skin indentation. Measurements were repeated twice for accuracy. According to the International Diabetes Federation's recommendation for the Asian population, the cut-off value for waist circumference for women was set at 80 cm.(31)

Data collection included the Nordic Musculoskeletal Questionnaire and the Numeric Pain Rating Scale to assess the prevalence of knee pain among participants. The Nordic Musculoskeletal Questionnaire, a standardized tool for screening musculoskeletal problems, was used with permission obtained from the author. The general version of the questionnaire, which includes 12 questions about symptoms in nine body regions, was utilized, but only knee pain-related questions were included in this study.(32) The Numeric Pain Rating Scale (NPRS), which ranges from 0 to 10, was used to measure pain intensity.(33) The researcher guided the participants on how to fill out the self-administered questionnaire, which took approximately 15-20 minutes to complete.

Data were entered into Microsoft Excel 2013 and analyzed using SPSS version 20. Categorical variables were presented as frequencies and percentages, while continuous variables were expressed as mean ± standard deviation. To assess the relationship between quantitative variables, Pearson's correlation coefficient

was employed, with a significance level set at $p < 0.01$.

Results:

There was a total of 170 women approached; all of them were invited to participate, of whom 150 participants completed the questionnaire. Out of 150 respondents, 126 (84%) women were married, 17 (11%) were single, 3 (2%) were separated, and 4 (2.7%) were divorced. The mean age of the participants was 42.21±7.90 years (range: 30-60 years). As far as education was concerned, 82% of participants were postgraduate. A total of 89% of women had central obesity (Table 1).

Knee pain is a frequent distressing concern among elder women; in total, 95 (63.3%) women reported having knee pain during the last 12 months. Moreover, 55 (36.7%) women experienced activity limitation due to knee pain. On the other hand, 95 (63.3%) reported no activity limitation due to pain. And 65 (43.3%) reported knee pain during the last 7 days, and the severity of the pain reported was moderate (36%) (Table 2).

Furthermore, in the present study Over the last 12 months, a weak but significant negative correlation was observed between waist circumference and the prevalence of knee pain ($r = -0.240$, $p = 0.003$). Similarly, over the past 7 days, waist circumference was also negatively correlated with the prevalence of knee pain, with a slightly stronger correlation ($r = -0.264$, $p = 0.001$) (Table 3). These findings indicate that higher waist circumference is associated with a lower prevalence of self-reported knee pain.

In the present study, a weak negative correlation was observed between waist circumference and the prevalence of knee pain over the last 12 months ($r = -0.240$, $p = 0.003$). A negative correlation was found between these variables over the past 7 days ($r = -0.264$, $p = 0.001$). While the correlation coefficient is slightly higher for the past 7 days, both correlations fall within the range of weak negative correlations according to the Pearson scale.

Table 1: Demographic Characteristics of study subjects

Variable	Category	Frequency	Percentage
Educational level	Metric	3	2%
	Intermediate	3	2%
	Undergraduate	21	14%
	Post graduate	123	82%
Marital status	Married	126	84%
	Single	17	11%
	Separated	3	2.0%
	Divorced	4	2.7%
Waist Circumference (cm)	Above	16	10%
	Below	134	89%
Age(yrs)	Range	Mean	Std. dev.
	30-60	42	7.90

Table 2: Demographic Characteristics of study subjects

Variable	Category	Frequency	Percentage
Prevalence of knee pain during last 12 months	Yes	95	63.3%
	No	55	36.7%
Activity limitation due to knee pain	Yes	55	36%
	No	95	63.3%
Prevalence of knee pain during last 7 days	Yes	65	43.3%
	No	85	56%
Severity of pain	No Pain	53	35%
	Mild	17	11%
	Moderate	55	36%
	Severe	25	16%

Table 3: Correlations of central obesity with knee pain

Variable	Waist circumference	
	r value	**p value**
Prevalence of knee pain during last 12 months.	-.240**	0.003
Prevalence of knee pain during last 7 days.	-.264**	0.001

**. Correlation is significant at the 0.01 level

Discussion:

Obesity is becoming a global epidemic due to its harmful effects on a variety of medical issues, including musculoskeletal disorders. In the current study, 10% of women had waist circumferences above the threshold for central obesity, while the majority (89%) were below this threshold. Despite this, 63.3 % of the participants reported knee pain in the previous 12 months, and 43 % reported knee pain in the past 7 days.

These outcomes correlate with a Swedish study that indicated 40–41% of participants reported knee pain.(34) These findings have been confirmed by another study, which found that 48% of Tasmanian women complained of knee pain.(25) Previous reports of knee discomfort have been made in a variety of Caucasian populations. Among UK elderly people, 25% reported having knee pain.(35,36) In contrast, 10% of US people between the ages of 45 and 74 reported having knee pain, while 52% of Australian women aged 70 reported knee discomfort.(36) Of Chinese citizens above the age of 70, 48% of women reported knee pain.(40%), whereas 41% of Japanese women aged 60 to 79 reported knee discomfort.(37) These differences could be influenced by cultural practices such as kneeling and squatting, which are common in Asian lifestyles, as well as genetic and environmental factors.

Interestingly, our study found a weak but significant negative correlation between waist circumference and knee pain, both over the last 12 months (r = -0.240, p = 0.003) and over the past 7 days (r = -0.264, p = 0.001). This contrasts with existing literature that predominantly demonstrates a positive association between central adiposity and knee pain. For instance, previous studies have consistently shown a strong correlation between obesity and knee pain or osteoarthritis.(21,25) On the other hand, some studies have reported no substantial association, and our findings further complicate this narrative with a significant negative correlation.

The discrepancy in the results could be attributed to

variables like aging and hormone fluctuations, as these are significant risk factors for the development of knee discomfort, particularly in women.(24) Additionally, the limited sample size, which may be considered non-representative of the general population, might provide another explanation for the negative connection. This study highlights the need for further investigation into the relationship between central obesity and knee pain, particularly in under-researched populations such as women in Pakistan. Given the global burden of obesity and its potential to exacerbate musculoskeletal pain and functional limitations, future studies should aim to include larger, more diverse samples to better understand the complex interplay of factors influencing knee pain. Such studies will help clarify the apparent discrepancies and guide targeted interventions for obesity-related musculoskeletal disorders.

Conclusion:

The prevalence of knee pain was found to be high among women in Karachi. This study identified a significant but negative association between central obesity (measured by waist circumference) and knee pain. Contrary to general expectations, the findings suggest that central obesity may not be directly related to the occurrence of knee pain in women. Knee pain remains a critical cause of functional limitations and disability in adulthood, contributing significantly to healthcare visits. Therefore, it is essential to implement preventive strategies targeting musculoskeletal health to reduce the burden of knee pain and associated disabilities in women.

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