

FREQUENCY OF OSTEOARTHRITIS OF KNEE IN OVERWEIGHT PEOPLE

Nabeeha Azhar¹, Naveed Lashari², Javeria Mehtab³, Ayesha Salim⁴, Ammarah Riaz⁵

¹Resident Medicine Department PAF Hospital, Islamabad

²Rheumatologist, Medical specialist, PAF Hospital, Islamabad

³ Resident Medicine Department PAF Hospital, Islamabad

⁴Resident Medicine Department PAF Hospital, Islamabad

⁵Resident Medicine Department PAF Hospital, Islamabad

Correspondence:

Dr Nabeeha Azhar

Email: dr.nabeeha.waqas@gmail.com

Abstract

Background: This study addresses the rising frequency of knee osteoarthritis among overweight individuals. It explores associations with age, BMI and gender with the aim to enhance our understanding of this rising health issue thereby contributing to global research on osteoarthritis and obesity.

Objective: To determine the frequency of osteoarthritis of knee in overweight people reporting at the Outpatient Department of Medicine.

Material and Methods: A total of 300 individuals with BMI ≥ 25 kg/m² aging between 40-70 years reporting for check-ups due to different medical conditions at the out-patient department were included in this study through consecutive sampling.

Results: Mean age of participants in this study was 55.34 $\pm$ 8.99 years with an age range of 40-70 years. Female patients were 159 (53%) while males were 141(47%) of total study population. Diagnosis of osteoarthritis of knee showed that the disease was present in 62 (20.67%) of participants.

Conclusion: Osteoarthritis of knee is frequently prevalent among overweight individuals, with Grade II being the most common stage.

Keywords: Body mass index, Knee, Osteoarthritis, Overweight people.

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Introduction:

Osteoarthritis of knee (KOA) is a degenerative joint disease that occurs due to the damage in the articular cartilage leading to subsequent change in the underlying bone. The progression of the disease varies among individuals, but generally follows a deteriorating pattern which can ultimately increase the risk of disability.¹ The global data extracted in 2020, showed that KOA affected 23% of those aged ≥ 40 , with an approximate total of 654 million individuals in the over 40 years age group. KOA, with an annual incidence rate of approximately 203 cases per 10,000 person-years, is therefore, a leading cause of disability worldwide, primarily affecting individuals aged 40 and older resulting in a significant burden on health system.^{2,3}

The intensity of clinical symptoms in KOA varies among individuals but it becomes more severe and complicated with age and weight which can significantly impact both working capacities and social activities. Common clinical

symptoms of KOA are knee stiffness, swelling and joint pain that worsen with prolonged sitting or doing activity. It is important to mention that KOA often starts to develop without noticeable symptoms, and by the time when the patients experience discomfort typically driven by pain, X-rays or other imaging techniques show already done damage to the joints.^{4,5} Although, multiple risk factors are related with KOA including age, genetic predisposition, and mechanical stress, however, overweight and obesity have been conclusively linked to KOA development showing the strong relationship between increasing body mass and joint deterioration.⁶

At global level, WHO report estimates that around 2.5 billion (43%) adults above age of 18 years are living with overweight and out of these 890 million (16%) people are living with obesity.^{7,8} In a study conducted in Pakistan by Asif M et al, overweight was identified in 22.8% of the total study population, with a higher prevalence in women

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(23.9%) than men (21.1%). Similarly, obesity was present in 5.1% of all study participants, with a higher percentage in women (6.3%) than in men (3.2%).⁹

In overweight and obesity, excess fat is stored in adipose tissue, which acts as an endocrine organ and produces adipokines and pro-inflammatory cytokines. Both of these substances contribute to systemic inflammation, and talking specifically for knee joints, they can accelerate cartilage degradation and the development of osteoarthritis.¹⁰ Moreover, excess body weight increases mechanical stress on the knee joints. The process leads to accelerated wear of articular cartilage resulting in compromised joint mobility and function. Hence, the individuals with excessive weight, face a combination of increased mechanical load and systemic inflammation that contribute to the development and progression of pathologies related to knee joint.¹¹ In chronic KOA, articular cartilage damage is mostly irreversible due to limited regenerative capacity of the cartilage. With the increased age and body weight, the disease progresses and patients may experience a range of symptoms like chronic knee pain, joint stiffness and reduced mobility. There is also increased risk of stress fractures and reports of sleep disturbances in these chronic cases of KOA.¹²

In short, the complications of KOA increases with increasing weight. While early detection of KOA can prevent the patients from long term complications and disability, most of the studies conducted over the topic have focused on the KOA in obese patients, where the disease has already become complicated and mostly irreversible. It is also important that KOA rates vary by country, however, age and gender are always strongly correlated with KOA. This study was therefore planned in our local population to determine the frequency of KOA in patients with BMI ≥ 25 Kg/m². The results of this study will help our clinicians in earlier detection of KOA and suggesting appropriate strategy to minimize the risk of complication.

Material and Method:

Study Design & Setting:

This cross-sectional study was conducted at the Department of Medicine, PAF Hospital Islamabad from March 2024 to August 2024 over a period of 6 months. The approval of conducting the study was taken from the ethical committee of the hospital.

Sample size:

The sample size was calculated as per following assumptions: Precision = 5.00%, Prevalence of KOA in overweight patients = 24.59%.¹³ With 95% confidence interval, the estimated sample size $n = 285$.

Patient's enrolment and sampling Technique:

A total of 300 participants reporting for check-ups due to different medical conditions at the out-patient department were included in this study through consecutive sampling technique.

Inclusion criteria:

Individuals belonging to any gender with BMI ≥ 25 kg/m² aging between 40-70 years were included in this study.

Exclusion criteria:

Patients with a history of knee trauma, knee surgery, rheumatoid arthritis, neurological conditions related to mobility, or recent intra-articular injections were excluded. Written consent forms for inclusion in this research were taken from the participants.

Data collection procedure:

All the demographic data was recorded on predesigned Proforma. Height and weight were noted using standardized equipment for precise accuracy, and BMI was calculated.

Radiographic assessment of KOA was performed with three distinct view techniques. These included weight-bearing anteroposterior views that captured joint space narrowing and structural changes from front to back, lateral views at 30° flexion that provided a side perspective to determine bone alignment and articulation and skyline views for specifically focus on the patellofemoral joint to find cartilage condition, patellar tracking, and arthritic changes in the knee joint region.

The Kellgren-Lawrence (KL) grading system was used to assess the severity of osteoarthritis, with a scale ranging from Grade 0 (no features) to Grade 4 (severe changes), where KOA was declared at Grade 2 or Grade 3, representing moderate changes and advanced disease progression, respectively. Grade 4, if found signified the most severe joint alterations.¹⁴

Confounding factors:

Potential confounding factors included history of knee trauma, knee surgery, rheumatoid arthritis, neurological conditions related to mobility, and recent intra-articular injections, which were addressed by excluding such participants from the study.

Statistical analysis:

Statistical analysis was performed using SPSS version 26.0. Descriptive analysis was done to present the primary outcomes of the study where quantitative variables were expressed in shape of mean and standard deviation, while qualitative variables were calculated as frequency and percentages. The prevalence of knee osteoarthritis was also stratified by age groups, body weight categories, and gender to find the difference of prevalence of the disease among varying demographical characteristics. Chi-square tests was applied to determine the significance of difference where statistical significance was considered at $p < 0.05$ for these analyses.

Results:

Mean age of participants in this study was 55.34 ± 8.99 years with an age range of 40-70 years. Female patients were 53% while males were 47% of total study population. The details of demographics and BMI assessment are shown in Table-I.

Table-1: Demographics and BMI assessment n=300		
Demographics		
Age (Mean±SD) years		55.34±8.99
Gender	Male n (%)	141 (47)
	Female n (%)	159 (53)
BMI assessment		
BMI (Mean±SD) Kg/m2		28.77±2.77
Frequency of participants in different weight categories	Over weight (25-29 Kg/m2) n (%)	212 (70.67)
	Obese (30-34Kg/m2) n (%)	75 (25)
	Severely obese (≥35Kg/m2) n (%)	13 (4.33)

Diagnosis of KOA as per radiographic assessment shows that the disease was present in (62)20.67% of cases. Moreover, grade II was most frequent(46) (15.33%) among these patients diagnosed with KOA as assessed by KL grading system as shown in Table-II.

Table-2: Prevalence and stages of KOA in overweight patients n=300		
Prevalence and stages of KOA		
Prevalence n (%)		62 (20.67)
Severity as per KL grading system	0 (No KOA) n (%)	131 (43.67)
	I (Doubtful) n (%)	107 (35.67)
	II (Definite) n (%)	46 (15.33)
	III (Moderate) n (%)	14 (4.67)
	IV (Severe) n (%)	2 (0.67)

Incidence of KOA in study participants was stratified with age groups, gender and BMI categories which showed significantly higher prevalence in older age group between 55-70 years (p=0.04) and people with higher BMI≥30 Kg/m2 (< 0.00001). There was higher incidence of KOA in females compared to males but this difference was not statistically significant in our study as shown in Table-III.

Table-III: Stratification of KOA as per age, gender and BMI in overweight individuals n=300			
Stratification of KOA as per age, gender and BMI			p-value
Prevalence by Age group n (%)	40-54 years (n=142)	22 (15.5)	0.04
	55-70 years (n=158)	40 (25.3)	
Prevalence by gender n (%)	Male (n=141)	23 (16.3)	0.08
	Female (n=159)	39 (24.5)	
Prevalence by BMI category n (%)	25-29 Kg/m2 (n=212)	25 (11.8)	< 0.000 01
	≥30 Kg/m2 (n=88)	37 (42)	

Discussion:

Mean age of participants in our study was 55.34±8.99 years with an age range of 40-70 years. Female patients were 53% while males were 47% of total study population. Diagnosis of KOA as per radiographic assessment showed that the disease was present in 20.67% of cases. Moreover, KOA of grade II was most frequent (15.33%) among these patients diagnosed with KOA as assessed by KL grading system. Incidence of KOA in these

overweight people was significantly higher in older age group belonging 55-70 years compared to 40-54 years age group (25.3% Vs 15.5%, p=0.04) and people with higher BMI≥30 Kg/m2 compared to <30 Kg/m2 (42 % Vs 11.8%, p < 0.00001). There was higher incidence of KOA in females compared to males but this difference was not statistically significant in our study (24.5% Vs 16.3%, p=0.04).

Prevalence of KOA in relation to increased body weight has been discussed in a number of studies, however, most of them has studies in obese patients and very few have added people having BMI between 25-29 Kg/m2.

In a study conducted in Pakistan to find the incidence of obesity in patients reporting knee pain and incidence of KOA in obese patients showed that 44.83% of the patients with knee pain were obese, and 10.34% of these obese patients were actually diagnosed with KOA. It is important to mention that this study only used a questionnaire for the assessment of KOA and didn't employed the radiographic assessment for diagnosis, which may be the reason of less reported prevalence compared to the findings of our study.¹⁵

Pacca DM studied 141 morbidly obese patients in Brazil and reported KOA prevalence as strikingly high at 63.1%, with 73.2% reporting knee pain. The female cohort was predominant in this study (mean age 40, mean BMI 46) which demonstrated that obesity was significantly correlated with knee joint degeneration, highlighting KOA as a critical health concern in the morbidly obese population.¹⁶

A cohort study arranged in Saudi Arabia involving 267 participants, with a median age of 60 years, and majority of females, the high prevalence of KOA was observed among overweight and obese individuals. The median BMI in this study was 29.14 and average weight was 77 kg. The study found that 90% of KOA cases occurred in overweight (45.7%) and obese (44.2%) patients. Furthermore, 79.4% of participants were diagnosed with bilateral knee involvement, underscoring the strong association of excess weight with degeneration of knee joint.¹⁷

In a recently published Chinese study, the mean weight was higher in people diagnosed with KOA compared to those without the disease. The prevalence of KOA among overweight individuals was 24.59% and 3.59 times higher than those with normal body weights. Moreover, the incidence reached up to 48.80% in obese people which was 1.98 times compared to overweight cohort. While examining the prevalence in different study cohorts including gender and age, KOA was markedly higher in women (32.04%) compared to men at (13.75%), representing a 2.33-fold increased occurrence in females. Age stratification revealed a progressive escalation in KOA prevalence with age which was 17.75% among 50-59 year-olds, 25.93% in the 60-69 age group, and 31.00% in individuals aged 70 and above.¹³

A review published over the topic of obesity and osteoarthritis also demonstrated that obesity significantly increases the risk of KOA and the global incidence of KOA

and knee arthroplasty is on rise with the rise in the incidence of overweight and obesity.¹⁸ Similar association was reported in a retrospective study carried out in Korea using large scale data of 139463 people aging above 50 years, (Hazard ratio [HR] 1.281). Importantly, this incidence of KOA was independently reported both in central obesity and general obesity.¹⁹ A comprehensive meta-analysis of 14 studies conducted by Zheng H and Chen C also established a strong association between overweight and obesity, and increased risks of KOA. Overweight individuals had a 2.45-fold increased risk, while this risk was 4.55-fold in obese individuals. Importantly, a 5 kg/m² increase in BMI was linked to a 35% higher KOA risk. The study concluded that obesity is a significant risk factor for KOA and emphasized the importance of weight reduction strategy for managing this risk.²⁰

The results of our study are in line with the studies and analysis discussed above and highlight the high prevalence of KOA in people with above than normal body weight. These results suggest our clinicians for timely investigation of overweight people for the possibility of KOA and thereby suggest early management strategies. The primary limitation of our study is that this was a single center study, and the results cannot be generalized for global Pakistani population. Future studies on this topic involving multicenter cohort may be useful in adding up to this data regarding incidence of KOA in overweight people.

Conclusion:

The study revealed that KOA is prevalent among overweight individuals, with Grade II being the most common form. Incidence of the disease increases significantly with advancing age and higher body mass index, underscoring the critical role of weight in the progression of disease. These findings highlight the importance of weight management, early screening, and targeted prevention strategies to address KOA in overweight populations, particularly in older age groups, to improve outcomes.

Disclaimer:

No

Conflict of interest:

No

References:

1. Hsu H, Siwec RM. Knee Osteoarthritis. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2024 [updated 2023 Jun 26; cited 2024 Nov 20]. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK507884/>.
2. Cui A, Li H, Wang D, Zhong J, Chen Y, Lu H. Global, regional prevalence, incidence and risk factors of knee osteoarthritis in

- population-based studies. *EClinicalMedicine*. 2020;29-30:100587. doi: 10.1016/j.eclim.2020.100587.
3. Li E, Tan J, Xu K, Pan Y, Xu P. Global burden and socioeconomic impact of knee osteoarthritis: a comprehensive analysis. *Front Med (Lausanne)*. 2024;11:1323091. doi: 10.3389/fmed.2024.1323091.
4. Kandasamy G, Almaghaslah D, Almanasef M, Almeleebia T, Vasudevan R, Siddiqua A, et al. An evaluation of knee osteoarthritis pain in the general community-Asir region, Saudi Arabia. *PLoS One*. 2024;19(1):e0296313. doi: 10.1371/journal.pone.0296313.
5. Thirumaran AJ, Deveza LA, Atukorala I, Hunter DJ. Assessment of Pain in Osteoarthritis of the Knee. *J Pers Med*. 2023;13(7):1139. doi: 10.3390/jpm13071139.
6. Chen L, Zheng JJY, Li G, Yuan J, Ebert JR, Li H, et al. Pathogenesis and clinical management of obesity-related knee osteoarthritis: Impact of mechanical loading. *J Orthop Translat*. 2020;24:66-75. doi: 10.1016/j.jot.2020.05.001.
7. World Health Organization. WHO acceleration plan to stop obesity [Internet]. Geneva: WHO; 2022 [cited 2024 Nov 23]. Available from: <https://www.who.int/publications/b/69195>
8. OECD, WHO. Overweight and obesity. In: *Health at a Glance: Asia/Pacific 2020: Measuring Progress Towards Universal Health Coverage*. Paris: OECD Publishing; 2020. <https://doi.org/10.1787/a47d0cd2-en>.
9. Asif M, Aslam M, Altaf S, Atif S, Majid A. Prevalence and Sociodemographic Factors of Overweight and Obesity among Pakistani Adults. *J Obes Metab Syndr*. 2020;29(1):58-66. doi: 10.7570/jomes19039.
10. Wang T, He C. Pro-inflammatory cytokines: The link between obesity and osteoarthritis. *Cytokine Growth Factor Rev*. 2018;44:38-50. doi: 10.1016/j.cytogfr.2018.10.002.
11. Sobieh BH, El-Mesallamy HO, Kassem DH. Beyond mechanical loading: The metabolic contribution of obesity in osteoarthritis unveils novel therapeutic targets. *Heliyon*. 2023;9(5):e15700. doi: 10.1016/j.heliyon.2023.e15700.
12. Geng R, Li J, Yu C, Zhang C, Chen F, Chen J, Ni H, Wang J, Kang K, Wei Z, Xu Y, Jin T. Knee osteoarthritis: Current status and research progress in treatment (Review). *Exp Ther Med*. 2023;26(4):481. doi: 10.3892/etm.2023.12180.
13. Shao W, Hou H, Han Q, Cai K. Prevalence and risk factors of knee osteoarthritis: a cross-sectional survey in Nanjing, China. *Front Public Health*. 2024;12:1441408. doi: 10.3389/fpubh.2024.1441408.
14. Steenkamp W, Rachuee PA, Dey R, Mzayiya NL, Ramasuvha BE. The correlation between clinical and radiological severity of osteoarthritis of the knee. *SICOT J*. 2022;8:14. doi: 10.1051/sicotj/2022014.
15. Queen S, Tanveer F, Arshad HS. Prevalence of Obesity in Patients with Knee Osteoarthritis. *South Asian J Med Sci*. 2016;2(1):22-4.
16. Pacca DM, DE-Campos GC, Zorzi AR, Chaim EA, DE-Miranda JB. Prevalence of joint pain and osteoarthritis in obese Brazilian population. *Arq Bras Cir Dig*. 2018;31(1):e1344. doi: 10.1590/0102-672020180001e1344.
17. Altowijiri AA, Alnadawi AA, Almutairi JN, Almutairi AK, Alhawiti MS, Abu Sinah AK, Alhassun JA. The Prevalence of Knee Osteoarthritis and Its Association With Obesity Among Individuals in Saudi Arabia. *Cureus*. 2023;15(11):e49625. doi: 10.7759/cureus.49625.
18. Kulkarni K, Karssiens T, Kumar V, Pandit H. Obesity and osteoarthritis. *Maturitas*. 2016;89:22-8. doi: 10.1016/j.maturitas.2016.04.006.
19. Park D, Park YM, Ko SH, Hyun KS, Choi YH, Min DU, et al. Association of general and central obesity, and their changes with risk of knee osteoarthritis: a nationwide population-based cohort study. *Sci Rep*. 2023;13(1):3796. doi: 10.1038/s41598-023-30727-4.
20. Zheng H, Chen C. Body mass index and risk of knee osteoarthritis: systematic review and meta-analysis of prospective studies. *BMJ Open*. 2015;5:e007568. doi: 10.1136/bmjopen-2014-007568