

## ORIGINAL ARTICLE

**COMPARISON OF ASSOCIATED FACTORS IN SYMPTOMATIC KNEE OSTEOARTHRITIS AMONG FEMALE POPULATION OF RURAL AND URBAN AREA**Zarafsheen Zia<sup>1</sup>, Suhail Karim<sup>2</sup>, Shafaq<sup>1</sup>, Danish Latif<sup>3</sup>, Rizwana Bhatti<sup>4</sup>, Raeed Mufti<sup>5</sup>**ABSTRACT**

**Introduction:** Osteoarthritis (OA) is a long-term condition that impacts joints, leading to pain and stiffness as a result of ongoing destruction of articular cartilage. As the prevalence of OA is expected to rise, a clearer insight into the factors for disease development and disease progression is required. Although extensive studies have been conducted on knee osteoarthritis and its factors worldwide, but limited data is available in Pakistan, especially concerning rural and urban female population separately.

**Material & Methods:** A total of n=110 female participants (n=55 Rural; n=55 Urban) who fulfilled ACR (American College of Rheumatology) criteria for symptomatic knee osteoarthritis (SKOA) were included in the study. A self-structured questionnaire was used. Data was analyzed using SPSS software version 21.0

**Results:** The results of this study showed that overall, most frequent associated factors for SKOA in both Urban and Rural females were Menopause (91.8%), kneeling/squatting (89.1%), housewives (83.6%). Between Urban females more prevalent associated factors were high BMI (81.8%) and prolonged standing (61.8%) among others. While less education (81.8%) and heavy lifting (80%) were more frequent factors among Rural females. Least associated factors among both populations were quite similar i.e., smoking, family history, use of high heel shoes, and history of previous knee injury. Less education was one of the topmost associated factors in Rural females while least prevalent in Urban females.

**Conclusion:** It was concluded that both the urban and rural females had some common associated factors related to SKOA i.e., Menopause, kneeling, squatting, housewives and High BMI. Urban females had high BMI and prolonged standing whereas Rural females had less education and heavy lifting as more frequent factors.

**Key Words:** joint inflammation, knee osteoarthritis, symptomatic knee

**Authors' Declaration:** The authors declared no conflict of interest and agreed to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. All authors contributed substantially to the planning of research, question designing, data collection, data analysis and write-up of the article.

**Authors' Affiliation**

<sup>1</sup>Student, Shifa Tameer e Millat University

<sup>2</sup>Assistant Professor, Mukabbir College of Physical Therapy, Gujrat

<sup>3</sup>Assistant Professor, PSRD College of Rehabilitation Sciences

<sup>4</sup>Pharmacist, Institute of Pharmaceutical Sciences, People's University of Medical & Health Science for Women

<sup>5</sup>Senior Lecturer, Northwest Institute of Health Sciences, Peshawar

**Corresponding Author**

Suhail Karim

Assistant Professor, Mukabbir College of Physical Therapy, Gujrat

Email: karimsuhail1986@gmail.com

**This article may be cited as:** Zia Z, Karim S, Shafaq, Latif D, Bhatti R, Mufti R. Comparison of associated factors in symptomatic knee osteoarthritis among female population of rural and urban area. Rehman J Health Sci. 2024;6(1). 84-89

Submitted: March 11, 2022 Revisions Submitted: June 25, 2024 Accepted: June 30, 2024

## INTRODUCTION

Osteoarthritis (OA) is a long-term condition that impacts joints, leading to pain and stiffness as a result of ongoing destruction of articular cartilage.<sup>1</sup> It ranks as the sixth leading cause of disability worldwide, contributing to reduced activity levels and a lower quality of life.<sup>2</sup> By 2020, it was expected to become the fourth leading cause of disability.<sup>3</sup> Knee OA affects approximately 3.6% of the global population, approximately equivalent to 250 million individuals.<sup>4</sup> Knee Osteoarthritis has higher prevalence in women than in men.<sup>5</sup> In the last 25 years, the Community Oriented Program for the Control of Rheumatic Diseases (COPCORD) has carried out surveys across the Asia-Pacific region, revealing that 5-13% of adults suffer from knee pain.<sup>6</sup> Research by COPCORD in Indo-Pak region has shown that knee pain is more common in rural areas (13.7%) compared to urban areas (6.0%).<sup>7</sup> Few small studies had reported knee pain rate of about 2% in Pakistanis.<sup>8</sup>

A study done in Harvard Medical School concluded that knees support one-and-a-half of the body weight.<sup>9</sup> Another study showed menopause in women (66.7%), obesity (42.4%), history of OA (43.2%), and previous knee injury (19.5%) are common associated factors.<sup>10</sup> Age and sex are also one of the non-modifiable predictors.<sup>11</sup> The noticeable increase in osteoarthritis around menopause has led to the hypothesis that hormonal factors might contribute to the risk of developing OA.<sup>12</sup> A meta-analysis showed that obese or overweight reported knee OA three times more often.<sup>13</sup> Knee injury is also widely recognized as a significant factor contributing to the development of osteoarthritis.<sup>14</sup> Physical activities that lead to progression of knee OA included kneeling, squatting, prolonged standing, climbing stairs, walking, and lifting heavy loads.<sup>15-17</sup> It is common among agriculture and household work in women.<sup>18</sup> Meta-analysis showed the risk of OA is significant in population suffering from Diabetes.<sup>19</sup> Similarly, an alternative meta-analysis study has indicated that hypertension may also pose a risk factor for knee osteoarthritis.<sup>20</sup> Few studies showed relation between smoking and symptomatic knee OA.<sup>21</sup>

Knee osteoarthritis can lead to increased annual therapeutic costs. With the anticipated

rise in its prevalence, gaining a clearer understanding of the factors contributing to both the development and progression of the disease is crucial. Although extensive studies have been conducted on knee osteoarthritis and its factors worldwide, but limited data is available in Pakistan, specially concerning rural and urban female population separately. The aim of this study was to assess the overall prevalence of associated factors related to symptomatic Knee Osteoarthritis and to compare these associated factors among female population of rural and urban areas.

## MATERIAL AND METHODS

A comparative cross-sectional study was done using non-probability convenience sampling. The study was conducted from August 2017-January 2018. The data was collected from Islamabad Capital Territory and government-based hospitals in Islamabad including Pakistan Institute of Medical Sciences (PIMS), Federal Government Polyclinic and Capital Development Authority (CDA) Hospital.

**Data Collection Procedure:** Data was collected directly from patients after getting an informed consent. Females aged 45 to 75-year-old who fulfilled ACR (American College of Rheumatology) criteria for symptomatic knee OA were included in the study. Exclusion Criteria included females on Hormone Replacement Therapy, Total Knee Replacement (TKR) and Comorbidities like Cancer, TB, Hyperthyroidism and Systemic lupus erythematosus (SLE) and refused participation. Total 200 female subjects were approached out of which 110 participants completed the questionnaire (n=55 Urban and n=55 Rural). A self-structured questionnaire was designed referring to Meta-analysis and systematic reviews.<sup>22</sup> For calculating BMI, participant's weight and height were measured at the spot using weighing machine and measuring tape respectively. Data was analyzed using SPSS software version 21.0

Fig:1 ACR Diagnostic Criteria for Symptomatic Knee Osteoarthritis<sup>23</sup>

## ETHICAL CONSIDERATIONS:

- Both verbal and written consent was taken from the participants of the study.
- Patient confidentiality was maintained.
- The authors declare no conflict of interest.
- The study did not subject the participants to any potential harm.
- Permission from IRB (ethical review board)- STMU was taken.

## RESULTS

The female subjects included in the study were aged 45-75 years. The ages were grouped as 45-54, 55-64, 65-75 years old. There were 52 females from age group 45-54 (47.2%). 38 females were from age group 55-64 (34.5%) and 20 females were from age group 65-75 (18.1%).

The associated risk factors assessed in the female population of Rural and Urban areas were Obesity, Education, Occupation, Menopause, Family History, History of Previous Knee injury, comorbidities including Hypertension and Diabetes, High heels, smoking, Type of toilet used (Squatting or non-squatting), kneeling, climbing stairs, lifting activities and prolonged standing.

Table 1 shows the overall prevalence of associated factors in both urban and rural population.

**Table:1** Prevalence of associated factors among Urban and Rural females.

The top 5 associated risk factors in Urban and Rural populations are depicted in figures 2 and 3, respectively

**Fig:2** Top Associated Factors in Urban Females

**Fig:3** Top Associated Factors in Rural Females

## DISCUSSION

The findings of the present study revealed that most frequent associated factors for symptomatic Knee OA in females are menopause, kneeling/squatting, housewives, higher BMI and heavy lifting.

Menopause emerged as one of the significantly prevalent factors related to symptomatic knee OA. Mahajan et al. and Rajvir et al. previously reported a high prevalence of knee osteoarthritis among women who were in the postmenopausal stage.<sup>24,25</sup> In the current study, kneeling and squatting are identified as common associated factors for the development of symptomatic knee osteoarthritis.

Silverwood et. al and Dahagin et. al reported kneeling and prolonged squatting for >30 minutes/day to be the one of main component associated with the knee OA as well.<sup>3,17</sup>

A considerable prevalence of housewives having symptomatic knee OA became can be noticed in the current study. A previous case-control study also indicated that housewives have a higher risk of developing knee osteoarthritis compared to working women.<sup>17</sup>

A significant frequency between High BMI and Symptomatic Knee OA in the present study is supported by meta-analysis and systemic review done by Blagojevo et al and Jiang L et.al.<sup>13, 26</sup>

In the present study, associated factors more frequent in the Urban females are revealed as; Menopause, Kneeling, High BMI (obesity and overweight), squatting, housewives and prolonged standing. While among Rural females more frequent factors are squatting, kneeling, housewives, menopause, less education and heavy lifting.

A noticeable peculiarity is that higher BMI is a more prevalent associated factor in urban females. It might be so because urban females are believed to be leading more sedentary lifestyle than Rural females in general, which can contribute to more weight gain. A positive association in women was discovered among BMI and knee OA in a cohort study.<sup>26</sup> Prolonged standing appeared to be another dominant associated factor in Urban females. According to a systematic review, it has been identified that prolonged standing for more than 2 hours as a risk factor for the onset of knee OA.<sup>13</sup>

On the other hand, Lesser education surfaced as an associated factor more prevalent in Rural females. A study conducted in Johnston County found that women with lower levels of education have a 65% higher likelihood of developing symptomatic knee osteoarthritis compared to those with higher education levels.<sup>27</sup> Another study conducted in rural and urban areas of Indian Punjab, similarly demonstrated a significant association between knee osteoarthritis and lower educational level.<sup>25</sup> Another associated factor prevailing in Rural females is heavy lifting. In a prior research, Coggon et al. demonstrated that women engaged in heavy lifting activities had an increased risk of knee osteoarthritis.<sup>28</sup>

Overall, the least associated factors in both populations seem to be smoking, family history, heels, history of previous knee injury and family history. This study contributes towards explaining the importance of addressing the urban/rural differences in associated factors related to symptomatic knee osteoarthritis. So that preventive strategies can be developed for both populations according to the factors they are most susceptible to and favor even distribution of health care resources according to requirements of respective populations.

It is important to notice that few limitations of the present study are its small sample size,

unavailability of standardized questionnaire and incapacity to explore every possible associated factor related to symptomatic knee OA. Thus, further research should attempt to extend these findings to larger samples size including variety of population from different areas of Pakistan.

### CONCLUSION

The study concluded that menopause, kneeling, squatting, housewives and high BMI were the most frequent associated factors related to Symptomatic knee OA among female population of both Rural and Urban areas. Furthermore, High BMI and prolonged standing were prevalent associated factors among urban females, while lesser education and heavy lifting were more frequent associated factors among Rural females.

### REFERENCES

1. M-JD NG. Literature Review of Risk Factors, Evaluation Instruments, and Care and Service Interventions for Knee Osteoarthritis. IRSST. October 2015.
2. Bedson J, Jordan K, Croft P. The prevalence and history of knee osteoarthritis in general practice: a case-control study. *Family practice*. 2005;22(1):103-8.
3. Silverwood V, Blagojevic-Bucknall M, Jinks C, Jordan J, Protheroe J, Jordan K. Current evidence on risk factors for knee osteoarthritis in older adults: a systematic review and meta-analysis. *Osteoarthritis and cartilage*. 2015;23(4):507-15.
4. Dillon CF, Rasch EK, Gu Q, Hirsch R. Prevalence of knee osteoarthritis in the United States: arthritis data from the Third National Health and Nutrition Examination Survey 1991-94. *The Journal of rheumatology*. 2006;33(11):2271-9.
5. Cross M, Smith E, Hoy D, Nolte S, Ackerman I, Fransen M, et al. The global burden of hip and knee osteoarthritis: estimates from the global burden of disease 2010 study. *Annals of rheumatic diseases*. 2014; annrhumdis-2013-204763.
6. Zeng QY, Chen R, Xiao ZY, Huang S-B, Liu Y, Xu JC, et al. Low prevalence of knee and back pain in southeast China; the Shantou COPCORD study. *The Journal of Rheumatology*. 2004;31(12):2439-43.
7. Fransen M, Bridgett L, March L, Hoy D, Penserga E, Brooks P. The epidemiology of osteoarthritis in Asia. *International journal of rheumatic diseases*. 2011;14(2):113-21.
8. Gibson T, Hameed K, Kadir M, Sultana S, Fatima Z, Syed A. Knee pain amongst the poor and affluent in Pakistan. *Rheumatology*. 1996;35(2):146-9.
9. Watson S. Know the Warning Signs: Early Symptoms of Osteoarthritis of the Knee. *MedicalNewsToday*. Wed 18 May 2016.
10. Ouédraogo D, Séogo H, Cissé R, Tiéno H, Ouedraogo T, Nacoulma I, et al. Risk factors associated with osteoarthritis of the knee in a rheumatology outpatient clinic in Ouagadougou, Burkina Faso. *Medecine tropicale: revue du Corps de sante colonial*. 2008;68(6):597-9.
11. Srikanth VK, Fryer JL, Zhai G, Winzenberg TM, Hosmer D, Jones G. A meta-analysis of sex differences prevalence, incidence, and severity of osteoarthritis. *Osteoarthritis and cartilage*. 2005;13(9):769-81.
12. Wluka AE, Cicuttini FM, Spector TD. Menopause, oestrogens, and arthritis. *Maturitas*. 2000;35(3):183-99.
13. Blagojevic M, Jinks C, Jeffery A, Jordan K. Risk factors for onset of osteoarthritis of the knee in older adults: a systematic review and meta-analysis. *Osteoarthritis and cartilage*. 2010;18(1):24-33.
14. Lohmander L, Östenberg A, Englund M, Roos H. High prevalence of knee osteoarthritis, pain, and functional limitations in female soccer players twelve years after anterior cruciate ligament injury. *Arthritis & Rheumatology*. 2004;50(10):3145-52.
15. Neogi T, Zhang Y. Epidemiology of osteoarthritis. *Rheumatic Disease Clinics*. 2013;39(1):1-19.
16. Maetzel A MM, Hawker G, Bombardier C. Osteoarthritis of the hip and knee and mechanical occupational exposure--a systematic overview of the evidence. *The Journal of rheumatology*. 1997;24(8):1599-607.
17. Dahaghin S T-BS, Faezi ST, Jamshidi AR, Davatchi F. Squatting, sitting on the floor, or cycling: Are life-long daily activities risk factors for clinical knee osteoarthritis? Stage III results of a community-based study. *Arthritis Care & Research*. 2009;61(10):1337-42.
18. Ajit NE BN, Fernandes RJ, Roga G, Kasthuri A, Shanbhag DN, B Goud R. Prevalence of knee osteoarthritis in rural areas of Bangalore urban district. *IJRCI*. 2014;1(S1).
19. Louati K VC, Berenbaum F, Sellam J. Association between diabetes mellitus and osteoarthritis: systematic literature review and meta-analysis. *RMD Open*. 2015;1(1).

20. Zhang YM WJ, Liu XG. Association between hypertension and risk of knee osteoarthritis: A meta-analysis of observational studies. *Medicine (Baltimore)*. 2017;96(32).
21. Wilder FV HB, Barrett JP. Smoking and osteoarthritis: is there an association? The Clearwater Osteoarthritis Study. *Osteoarthritis and Cartilage (OsteoArthritis Research Society International)*. 2003;11(1):29-35.
22. Syed Atiqul HAQ FD, Saeideh DAHAGHIN, Nazrul ISLAM, Aniruddha GHOSE. Development of a questionnaire for identification of the risk factors for osteoarthritis of the knees in developing countries. A pilot study in Iran and Bangladesh. An ILAR-COPCORD phase III study. *International Journal of Rheumatic Diseases*. 2010;13(3):203-14.
23. Altman R, et al. *Arthritis Rheum*. 1986;29(8):1039-49.
24. Mahajan A TV, Verma S, Sharma S. Osteoarthritis and menopause. *J Indian Rheumatol Assoc*. 2005; 13:21-5.
25. Rajvir Kaur VLS. prevalence of knee osteoarthritis and its correlation in women of rural and urban parts of Hoshiarpur(punjab). *JPMER*. 2015.
26. Jiang L TW, Wang Y, Rong J, Bao C, Liu Y, Zhao Y, Wang C. Body mass index and susceptibility to knee osteoarthritis: a systematic review and meta-analysis. *Joint Bone Spine*. 2012;79(3):291-7.
27. Leigh F Callahan JS, Bernadette C Siaton. Limited educational attainment and radiographic and symptomatic knee osteoarthritis: a cross-sectional analysis using data from the Johnston County (North Carolina) Osteoarthritis Project. *Arthritis Research & Therapy*. 2010;12(2).
28. Coggon D CP, Kellingray S, Barrett D, McLaren M, Cooper C. Occupational physical activities and osteoarthritis of the knee. *Arthritis Rheum*. 2000;43(7):1443-9.

Table:1 Prevalence of associated factors among Urban and Rural females

Associated Factors	Urban	Rural	% of population
Squatting	44 (80%)	54 (98.2%)	89.1%
Kneeling > 30 min	45 (81.8%)	53 (96.4%)	89.1%
Housewives	41 (74.5%)	51 (92.7%)	83.6%
Menopause	51 (87.3%)	50 (89.1%)	91.8%
Less Education	7 (12.7%)	45 (81.8%)	47.3%
High BMI	45 (81.7%)	44 (80%)	80.9%
Heavy Lifting	22 (40%)	44 (80%)	60%
Climbing > 10 stairs	32 (58.2%)	30 (54.5%)	56.4%
Prolonged Standing > 2hrs	34 (61.8%)	23 (41.8%)	51.8%
Family History	27 (9.1%)	20 (36.4%)	42.7%
History of Knee Injury	13 (23.6%)	12 (21.8%)	21.8%
Smoking/ Hookah	3 (5.5%)	12 (21.8%)	13.6%
High Heels > 1.5 inches	11 (20%)	6 (10.9%)	15.5%
Hypertension	22 (40%)	19 (34.5%)	37.3%
Comorbidities			
Diabetes	5 (9.1%)	3 (5.5%)	7.3%
Both	10 (18.2%)	9 (16.4%)	17.3%

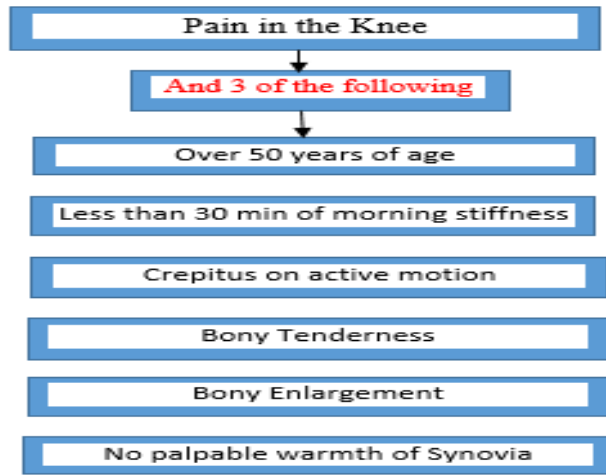


Fig1: ACR Diagnostic Criteria for Symptomatic Knee Osteoarthritis (23)

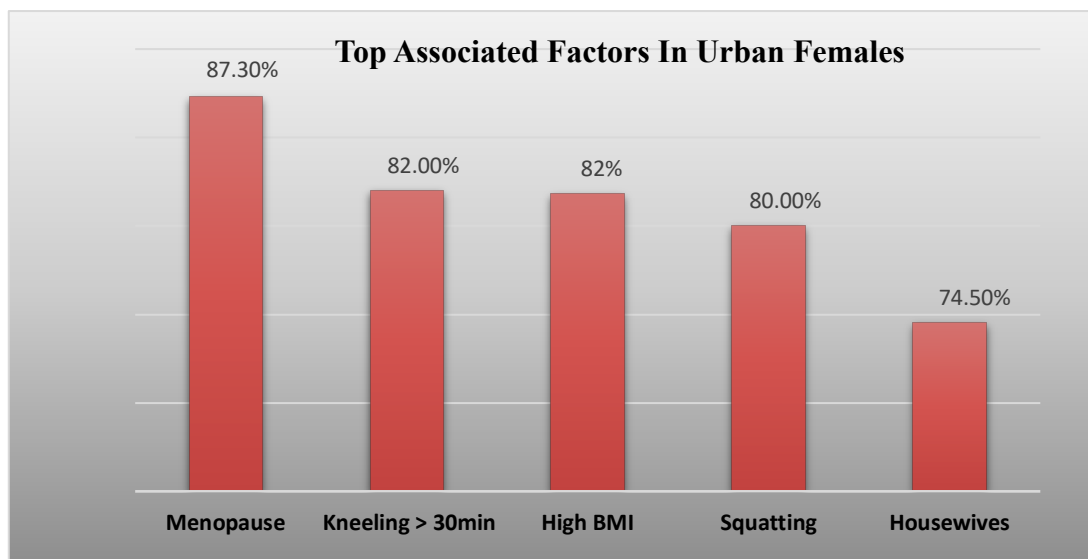


Fig 2: Top Associated Factors in Urban Females

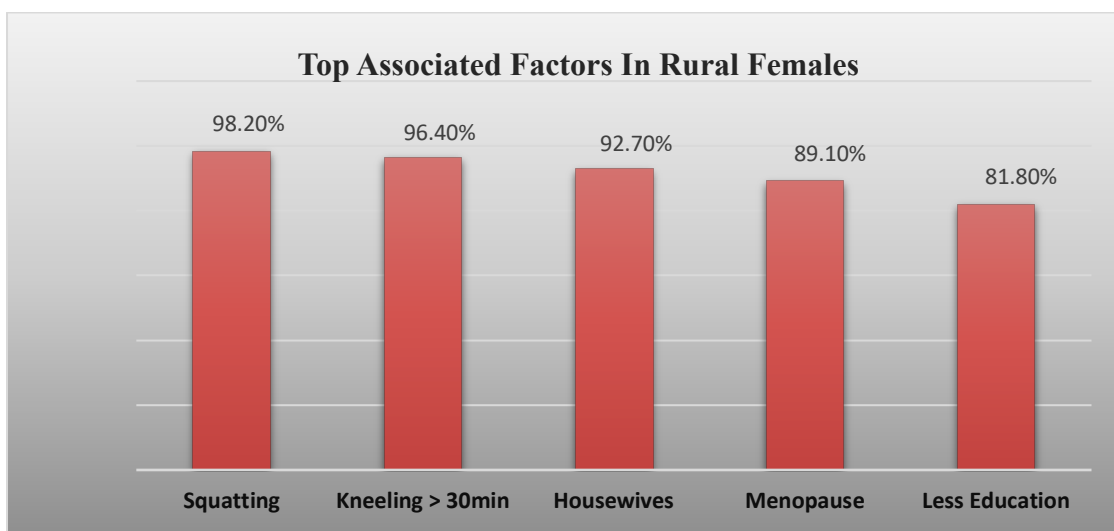


Fig 3: Top Associated Factors in Rural Females