

Prevalence and Functional Disability Associated with Knee Osteoarthritis in Rural Bihar: A Cross-Sectional StudyUtkarsh¹, Shanu Gupta², Rajeev Kumar Rajak³¹Senior Resident, Department of Orthopaedics, Government Medical College & Hospital, Bettiah, West Champaran, Bihar, India²Senior Resident, Department of Orthopaedics, Government Medical College & Hospital, Bettiah, West Champaran, Bihar, India³Professor and HOD, Government Medical College & Hospital, Bettiah, west Champaran, Bihar, India

Received: 25-12-2025 / Revised: 23-01-2026 / Accepted: 26-02-2026

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Conflict of interest: Nil

Abstract:**Background:** Knee osteoarthritis is a prevalent degenerative joint disorder that leads to pain, stiffness, reduced mobility, and functional disability, particularly among elderly and rural populations who are involved in physically demanding activities.**Objective:** To evaluate the prevalence, clinical characteristics, functional impact, and risk factors associated with knee osteoarthritis in adults aged 40 and above in rural West Champaran, Bihar.**Method:** In a hospital-based and community-oriented cross-sectional observational study lasting 8 months, 80 participants from the Orthopaedic OPD and nearby rural areas were involved. Participants were chosen based on the eligibility criteria. Information about the socio-demographic profile, BMI, occupation, clinical features, and medical history was gathered through a semi-structured questionnaire. Knee osteoarthritis was identified based on ACR criteria, and functional disability along with pain severity was evaluated using WOMAC and VAS scores.**Outcome:** Most participants were aged 60–69 years (35%), with females making up 57.5%. Being overweight or obese was common, impacting 45% and 30% of participants, respectively. All participants experienced knee pain; this was followed by crepitus in 77.5% of cases, difficulty in walking in 75%, and morning stiffness in 72.5%. The average total WOMAC score was 54.8 ± 10.6 , while the mean VAS score was 6.9 ± 1.8 . There was a significant association between BMI, occupation, and the severity of osteoarthritis.**Conclusion:** In rural adults, especially those with obesity and those engaged in heavy labor, knee osteoarthritis is a significant source of pain and disability. To lessen the burden of disease, early screening, maintaining a healthy weight, physiotherapy, and lifestyle changes are crucial.**Keywords:** Knee Osteoarthritis, Rural Population, Functional Disability, WOMAC, VAS, Body Mass Index, Obesity, Occupational Risk Factors, Knee Pain.**DOI:** 10.25258/ijpqa.17.3.43

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Introduction

Osteoarthritis (OA) is a long-term degenerative joint condition marked by the wearing away of cartilage and the development of osteophytes (irregular bone growths), especially impacting weight-bearing joints such as the knees. OA knee, a prevalent type of arthritis, is mainly linked to the deterioration of the joints.

This chronic ailment, stemming from multiple factors, leads to structural and biochemical alterations in the synovial membrane and capsule of the joints involved [1]. Primary OA is frequently related to age and has no known cause, whereas secondary OA can be caused by underlying diseases or conditions. The pathological

advancement of OA includes the softening, ulceration, and breakdown of articular cartilage, along with inflammation of the synovial membrane. Typical clinical symptoms include pain and, after prolonged activity and weight-bearing, sometimes swelling; stiffness occurs after inactivity. Also referred to as degenerative arthritis, it typically impacts the major weight-bearing joints, including the hips, knees, hands, feet, and spine [2].

The epidemiologic transition has altered the disease pattern worldwide, affecting both developed and developing regions. While the burden of infectious diseases has been reduced through medical and public health innovations and improvements in

socioeconomic status, this has concurrently resulted in a rise in noncommunicable diseases. In a country such as India, which is grappling with a dual burden of communicable and noncommunicable diseases that leads to higher rates of illness and death, this is particularly relevant. Musculoskeletal diseases are the non-communicable conditions that affect individuals throughout their lives and across all global regions [3].

Musculoskeletal conditions encompass 150 diseases or syndromes that are typically progressive and painful [4]. The most debilitating among these are pain in the neck and back, rheumatoid arthritis, fractures, and osteoarthritis. Osteoarthritis is a condition characterized by inflammation of the bone and joint cartilage, where all components of the joint experience pathological alterations, frequently simultaneously [5]. It is the most prevalent form of arthritis found in older adults. OA is associated with significant morbidity and a decrease in quality of life, as assessed by Disability Adjusted Life Years and Years lived with Disability. According to the 2010 global burden of disease study, OA was identified as the eleventh leading cause of years lived with disability worldwide [6]. In women, it ranks as the fourth most common predictor of health issues globally, while in men, it ranks eighth [7].

Numerous studies in India have indicated that osteoarthritis is the second most prevalent rheumatologic issue [8] and the joint disease with the highest occurrence, exhibiting a prevalence of 22% to 39% [9]. OA can be generally divided into primary and secondary types. Primary osteoarthritis, which is usually caused by the aging process and has no known cause, differs from secondary OA, which is linked to injuries from squatting and kneeling work. The knees, hips, lower spine, and fingers are the joints most often affected, but it can also involve the hands and feet.

Osteoarthritis is influenced by advancing age, female gender, and obesity, lack of physical activity, minimal exercise, and poor eating habits. The patient typically reports grating sounds with joint movement, joint tenderness and swelling, and a limited range of motion. In addition to these physical symptoms, it causes mental suffering because of the disruption of daily routine activities. Joint pain symptoms are often overlooked for years, particularly by women, as they tend to associate them with the physical demands of housework. People generally seek health care only when it interferes with physical activity, and pain relief is often the sole symptom that drives them to consult health care service providers.

OA management comprises both pharmacological and nonpharmacological strategies. Nonpharmacological measures encompass

education, health awareness, weight reduction, brace usage, and physiotherapy. In contrast, pharmacological measures solely enhance quality of life by alleviating pain. Drugs that are commonly used include painkillers, NSAIDs, opioids, and intra-articular corticosteroids. In cases where pharmacological measures fail to alleviate the symptoms, surgery is required.

The health-seeking behavior of individuals or communities is shaped by various factors, including their living environment, the customs and traditions upheld in their community, and their financial circumstances. To bridge the gaps between the community's felt needs and health care delivery in both urban and rural populations, it is crucial to understand individual-level health care-seeking patterns. The majority of osteoarthritis studies are conducted in hospitals, resulting in a scarcity of community-level data, particularly from rural regions. This research aims to explore the epidemiological factors contributing to OA and to evaluate the health-seeking behavior of older adults, as this influences their medical management.

Even though the risk factors and prevalence of OA are well-known, there is a lack of evidence regarding the effects of co-morbidities, lifestyle factors, and socio-demographic variables on the burden of OA. To create customized management strategies, it is crucial to examine the present burden of OA and its correlation with a range of factors across diverse socio-cultural contexts. This study aims to investigate the prevalence of knee OA and its risk factors in the Indian population, particularly among adults aged 40 and above in rural settings. Additionally, it seeks to assess the functional impact of OA on patients' daily lives to address this research gap.

Materials and Methods

Study Design: This research was structured as a cross-sectional observational study, both hospital-based and community-oriented, to evaluate how common knee osteoarthritis is and the extent of its functional impact on the rural population of West Champaran district, Bihar.

The objective of the study was to assess the burden of knee osteoarthritis (OA) and its relationship with demographic and clinical factors like age, gender, body mass index (BMI), occupation, pain severity, and functional disability through standardized assessment tools such as the Western Ontario and McMaster Universities Arthritis Index (WOMAC) and the Visual Analog Scale (VAS).

Study Area: The research took place at the Department of Orthopaedics, Government Medical College and Hospital, Bettiah, West Champaran, Bihar, India.

Study Duration: The duration of the study was 8 months.

Study Participants: A total of 80 study participants fulfilling the eligibility criteria were included in the study.

Inclusion Criteria

- Adults, aged 40 years and older.
- Participants from rural parts of West Champaran district.
- Patients approaching Orthopaedic OPD with complains of Knee Pain, stiffness or trouble in walking.
- Knee osteoarthritis diagnosed by clinical examination and according to American College of Rheumatology (ACR) standards.
- Participants willing to give written informed consent to participate in the study.

Exclusion Criteria

- Patients having history of recent trauma or fracture of knee.
- Those have inflammatory joint illnesses such as gout or rheumatoid arthritis.
- Patients with congenital abnormalities of the knee joint.
- Participants with severe neurological disease impairing mobility
- Patients have a past history of knee replacement.
- People who do not want to participate in the study.

Sample Size: The study was conducted on a sample of 80 patients recruited from Orthopaedic OPD and neighbouring rural regions.

Procedure: Data were obtained via a validated semi-structured questionnaire on socio-demographic information, lifestyle practices, medical history and anthropometric measures for BMI calculation. Knee osteoarthritis was diagnosed according to the American College of Rheumatology (ACR) criteria and participants underwent clinical examination by an orthopaedic expert. Functional assessment was based on WOMAC and Visual Analogue Scale (VAS) values for pain, stiffness and physical impairment.

Statistical Analysis: The data gathered were imported into Microsoft Excel and analysed by using IBM Statistical Package for Social Sciences (SPSS) version 27.0. The data were summarised using descriptive statistics such as mean, standard deviation, frequency and percentage. Chi-square test was used for analysis of the association between categorical variables. Continuous variables were evaluated with suitable statistical tests. Logistic regression analysis was used to determine important predictors and risk variables linked with knee osteoarthritis and functional impairment. Throughout the research, a p-value < 0.05 was deemed statistically significant.”

Result

The distribution of study participants according to age group is shown in Table 1. The most proportion of the participants was from the age range of 60–69 years with 28 (35%) people out of the total of 80 participants. 14 (17.5%) participants each of age 40–49 years and age ≥ 70 years were included in the research population. The results show that knee osteoarthritis was more common in older persons, particularly in the 60–69 years age group.

Table 1: Distribution of Study Participants According to Age Group

Age Group (Years)	Frequency (n=80)	Percentage (%)
40–49	14	17.5
50–59	24	30
60–69	28	35
≥ 70	14	17.5
Total	80	100

The distribution of study participants by gender, BMI category and employment is presented in Table 2. Of the 80 participants, 46 (57.5%) were girls and 34 (42.5%) were men. A total of 36 (45%) patients were overweight, 24 (30%) were obese and 20 (25%) had normal BMI. Occupation distribution

showed that farmers were the highest category with 28(35%) followed by manual labourers 22(27.5%), homemakers 20(25%) and others 10(12.5%). These results show a greater burden of knee osteoarthritis in the overweight and those in physically demanding employment.

Table 2: Distribution of Study Participants According to Gender, BMI, and Occupation

Variables	Frequency (n=80)	Percentage (%)
Gender		
Male	34	42.5
Female	46	57.5
BMI Category		
Normal (18.5–24.9 kg/m ²)	20	25
Overweight (25–29.9 kg/m ²)	36	45
Obese (≥ 30 kg/m ²)	24	30
Occupation		
Farmer	28	35
Manual Laborer	22	27.5
Homemaker	20	25
Others	10	12.5
Total	80	100

Table 3 shows the frequency of clinical characteristics of knee osteoarthritis among the research subjects. Knee discomfort was experienced in all individuals 80 (100%) Walking difficulty was observed by 60 (75%) subjects and crepitus was seen in 62 (77.5%) instances. Morning stiffness of less than 30 minutes was present in 58

(72.5%) individuals, bony discomfort in 54 (67.5%) and bony enlargement in 39 (48.8%) persons. These data suggest that discomfort, crepitus and difficulties in walking were the most prevalent clinical features in individuals with knee osteoarthritis.

Table 3: Prevalence of Clinical Features of Knee Osteoarthritis among Study Participants

Clinical Features	Frequency (n=80)	Percentage (%)
Knee Pain	80	100
Morning Stiffness (<30 min)	58	72.5
Crepitus	62	77.5
Bony Tenderness	54	67.5
Bony Enlargement	39	48.8
Difficulty in Walking	60	75

Table 4 presents the distribution of WOMAC and VAS scores among study participants. The mean WOMAC pain score was 11.4 \pm 3.2 and the mean WOMAC stiffness score was 4.8 \pm 1.5. The mean score of WOMAC physical function was 38.6 \pm 8.4

and total WOMAC score was 54.8 \pm 10.6. The mean VAS pain score of the participants was 6.9 \pm 1.8 suggesting moderate to severe severity of pain and functional impairment among knee osteoarthritis patients.

Table 4: Distribution of WOMAC and VAS Scores among Study Participants

Assessment Parameters	Mean \pm SD
WOMAC Pain Score	11.4 \pm 3.2
WOMAC Stiffness Score	4.8 \pm 1.5
WOMAC Physical Function Score	38.6 \pm 8.4
Total WOMAC Score	54.8 \pm 10.6
VAS Pain Score	6.9 \pm 1.8

The connection of BMI category and employment with severity of osteoarthritis of the knee is shown in Table 5.

The connection between severity of osteoarthritis and Body Mass Index category was statistically significant ($p = 0.021$). Obese patients also had a higher prevalence of severe osteoarthritis 12 (50%) compared with overweight and normal BMI

groups. There was a statistically significant connection between occupation and severity of osteoarthritis ($p = 0.034$).

Homemakers and other jobs had lower rates of severe osteoarthritis than farmers and manual labourers. Conclusion: Obesity and physically demanding jobs are a major risk factor related with higher severity of knee osteoarthritis.

Table 5: Association of BMI and Occupation with Severity of Knee Osteoarthritis

Variables	Mild OA n (%)	Moderate OA n (%)	Severe OA n (%)	p-value
BMI Category				0.021
Normal	10 (50.0)	8 (40.0)	2 (10.0)	
Overweight	8 (22.2)	18 (50.0)	10 (27.8)	
Obese	2 (8.3)	10 (41.7)	12 (50.0)	
Occupation				0.034
Farmer	4 (14.3)	14 (50.0)	10 (35.7)	
Manual Laborer	3 (13.6)	10 (45.5)	9 (40.9)	
Homemaker	9 (45.0)	8 (40.0)	3 (15.0)	
Others	4 (40.0)	4 (40.0)	2 (20.0)	

Discussion

The present cross-sectional study was undertaken to determine the prevalence and functional effect of knee osteoarthritis in the rural population of West Champaran, Bihar. The results of the study showed that knee osteoarthritis was more prevalent in old age, female sex, overweight and obese subjects and those who had physically demanding jobs such as farming and manual labour. The study also revealed significant pain and functional impairment among afflicted patients based on WOMAC and VAS rating methods.”

The bulk of the research participants were aged between 60 and 69 years (35%) and 50 and 59 years (30%). Results indicate that older age is a significant risk factor for knee osteoarthritis. Similar findings were reported by Felson et al. in senior populations over 50 years of age, demonstrating a higher prevalence of knee osteoarthritis due to age-related deterioration of articular cartilage and cumulative mechanical load on joints [10]. Pal et al. similarly documented a greater frequency of osteoarthritis among the elderly in India, especially in rural populations with extended physical activity and delayed healthcare-seeking behaviour [11].

However, a few studies did not find any statistically significant connection between age and severity of osteoarthritis after adjusting for other metabolic and occupational risk variables. Females were 57.5% of the study population demonstrating an increased burden of knee osteoarthritis among females as compared to males (42.5%). Similar data were observed by Salve et al who showed higher prevalence of knee osteoarthritis among perimenopausal and postmenopausal women [12].

Among females, vulnerability may be enhanced by hormonal fluctuations, oestrogen shortage, obesity, dietary deficits and decreased muscular strength. Lou et al. similarly found that postmenopausal women had higher cartilage deterioration and more severe symptoms of osteoarthritis than premenopausal women [13]. On the other hand, some research in occupational populations have

shown similar incidence in males and females with similar patterns of physical workload.

The present investigation revealed statistically significant connection between Body Mass Index and severity of osteoarthritis ($p = 0.021$). Severe osteoarthritis was seen in 50% of obese persons and in lower proportions among those with normal BMI. Zheng and Chen observed similar results and showed that the risk of knee osteoarthritis rose by roughly 35% with each 5 kg/m² rise in BMI [14]. Obesity leads to increased mechanical strain on the knee joint which accelerates cartilage deterioration and exacerbates symptoms. Khan et al. have reported a substantial relationship between obesity and knee osteoarthritis in adult populations [15]. Moreover, inflammatory mediators associated with obesity may exacerbate joint deterioration and discomfort.

In the current study, occupation was significantly associated with severity of osteoarthritis ($p = 0.034$). Farmers and manual workers were more likely to have severe osteoarthritis than homemakers and individuals with less physically demanding jobs. Similar findings were reported by Cooper et al. who found higher risk of osteoarthritis among those with repeated squatting, kneeling, heavy lifting and extended standing [16].

In Bihar, rural communities are involved in agricultural activities with repetitive stress on weight bearing joints, which may be a contributing factor for greater disease burden. Habitual floor activities and prolonged squatting were also strongly associated with an elevated incidence of knee osteoarthritis in Asian populations (Tangtrakulwanich et al.) [17].

The commonest clinical presentation in the present study was knee pain and was found in all the subjects (100%). Walking difficulty was reported by 75% of the subjects. Crepitus was found in 77.5% of instances. Morning stiffness of <30 minutes was experienced by 72.5% of subjects. These results are congruent with the clinical criteria for osteoarthritis set by the American College of Rheumatology, where pain, stiffness, crepitus and functional restriction are thought to be the

characteristic clinical symptoms. Similar symptom patterns were found in community-based studies of rural Indian communities, where pain and restricted mobility were considered the main reasons for impairment in elderly people.

The present study indicated significant pain intensity and functional impairment by functional evaluation utilising WOMAC and VAS ratings. Mean WOMAC total score was 54.8 ± 10.6 and mean VAS score was 6.9 ± 1.8 denoting moderate-to-severe symptom load.

Creamer et al. found a mean WOMAC score of around 55% in individuals with symptomatic knee osteoarthritis, which is quite similar to the results of the present investigation [18]. In our study, higher WOMAC physical function ratings suggest that patients have difficulties doing normal daily activities such as walking, ascending stairs and sitting and standing. Poor access to healthcare facilities, physiotherapy services and early intervention in rural populations may result in deteriorating disability and decreased quality of life. The findings of the present study highlight that knee osteoarthritis is a serious public health problem in the rural Bihar. Age, female gender, obesity, and physically demanding jobs were major variables linked with illness severity and functional impairment. Lack of knowledge, delayed diagnosis and ongoing work pressure even in the presence of symptoms may accelerate the course of the disease in rural populations. Early screening programmes, lifestyle modification, weight management, physiotherapy and occupational counselling may assist minimise disease load and improve functional results in afflicted persons.

Conclusion

The present study showed the knee osteoarthritis as a major health problem among the rural population of West Champaran, Bihar, especially in the elderly, females, overweight and obese individuals and those involved in physically demanding occupations such as farming and manual work. The most prevalent clinical symptoms were knee pain, crepitus, morning stiffness and trouble in walking and the WOMAC and VAS ratings were moderate to severely painful and disabled. The severity of osteoarthritis was significantly associated with BMI and occupation indicating that excess body weight and the repeated occupational stress play a crucial role in the course of the disease. The need of the hour for reducing impairment and improving quality of life among afflicted persons is early diagnosis, weight reduction, lifestyle adjustment, physiotherapy, occupational counselling and community-based awareness programmes.

References

1. Loeser RF, Goldring SR, Scanzello CR, Goldring MB. Osteoarthritis: a disease of the joint as an organ. *Arthritis and rheumatism*. 2012 Mar 5;64(6):1697.
2. Akinpelu AO, Alonge TO, Adekanla BA, Odole AC. Prevalence and pattern of symptomatic knee osteoarthritis in Nigeria: A community-based study. *Internet Journal of Allied Health Sciences and Practice*. 2009;7(3):10.
3. Bala K, Bavoria S, Sahni B, Bhagat P, Langeh S, Sobti S. Prevalence, risk factors, and health seeking behavior for knee osteoarthritis among adult population in rural Jammu—A Community based Cross Sectional Study. *Journal of family medicine and primary care*. 2020 Oct 30;9(10):5282-7.
4. Briggs AM, Woolf AD, Dreinhöfer K, Homb N, Hoy DG, Kopansky-Giles D, Åkesson K, March L. Reducing the global burden of musculoskeletal conditions. *Bulletin of the World Health Organization*. 2018 Apr 12;96(5):366.
5. Longo DL, Fauci AS, Kasper DL, Hauser SL, Jameson JL, Loscalzo J. *Harrison's principles of internal medicine 18E Vol 2 EB*. McGraw Hill Professional; 2012 Nov 8.
6. Vos T, Flaxman AD, Naghavi M, Lozano R, Michaud C, Ezzati M, Shibuya K, Salomon JA, Abdalla S, Aboyans V, Abraham J. Years lived with disability (YLDs) for 1160 sequelae of 289 diseases and injuries 1990–2010: a systematic analysis for the Global Burden of Disease Study 2010. *The lancet*. 2012 Dec 15;380(9859):2163-96.
7. Murray CJ, Lopez AD, World Health Organization. *The global burden of disease: a comprehensive assessment of mortality and disability from diseases, injuries, and risk factors in 1990 and projected to 2020: summary*. World Health Organization; 1996.
8. Silman AJ, Hochberg MC. *Epidemiology of the rheumatic diseases*. Oxford University Press; 1993 Nov 25.
9. Mathers DS, Pflieger B. The global burden of rheumatoid arthritis in the year 2000. *Criticon*. 2006;1(2).
10. Felson DT, Naimark A, Anderson J, Kazis L, Castelli W, Meenan RF. The prevalence of knee osteoarthritis in the elderly. *Arthritis Rheum*. 1987;30(8):914-8.
11. Pal CP, Singh P, Chaturvedi S, Pruthi KK, Vij A. Epidemiology of knee osteoarthritis in India and related factors. *Indian J Orthop*. 2016;50(5):518-22.
12. Salve H, Gupta V, Palanivel C, Yadav K, Singh B. Prevalence of knee osteoarthritis amongst perimenopausal women in an urban resettlement colony in South Delhi. *Indian journal of public health*. 2010 Jul 1;54(3):155-7.
13. Lou C, Xiang G, Weng Q, Chen Z, Chen D, Wang Q, Zhang D, Zhou B, He D, Chen H.

- Menopause is associated with articular cartilage degeneration: a clinical study of knee joint in 860 women. *Menopause*. 2016 Nov 1;23(11):1239-46.
14. Zheng H, Chen C. Body mass index and risk of knee osteoarthritis: systematic review and meta-analysis of prospective studies. *BMJ open*. 2015 Dec 1;5(12):e007568.
 15. Khan B, Khan OY, Zehra S, Azhar A, Fatima S. Association between obesity and risk of knee osteoarthritis. *Pak J Pharm Sci*. 2020 Jan 1;33(1):295-8.
 16. Cooper C, McAlindon T, Coggon D, Egger P, Dieppe P. Occupational activity and osteoarthritis of the knee. *Annals of the rheumatic diseases*. 1994 Feb 1;53(2):90-3.
 17. Tangtrakulwanich B, Chongsuvivatwong V, Geater AF. Habitual floor activities increase risk of knee osteoarthritis. *Clinical Orthopaedics and Related Research (1976-2007)*. 2007 Jan 1;454:147-54.
 18. Creamer P, Lethbridge-Cejku M, Hochberg MC. Factors associated with functional impairment in symptomatic knee osteoarthritis. *Rheumatology*. 2000 May 1;39(5):490-6.