

Epidemiology of knee osteoarthritis using Kellgren and Lawrence scale in Indian population

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ABSTRACT

Introduction: Osteoarthritis knee is one of the most prevalent conditions of knee in elder age group of population. Its causes pain, disability in geriatric population of society. Longer life expectancy is responsible for increase in osteoarthritis knee. K-L scale is well known scale of radiographic OA knee. This study was done to find prevalence of OA knee in Indian population of older than 40 years using K-L scale.

Method: The study was a community based cross sectional study. The target population was from 5 metropolis, 5 cities near the metropolis, 5 towns and 20 villages from blocks of these towns. i.e. 5 sample groups were covered. Sample size $n = 4680$ which was further divided into 5 sites equally (936 from each site). This was rounded to a sample of 1000 from each site. This evaluation study was conducted using the household as the primary sampling unit for the quantitative survey. The respondents for the study were above 40 years. Quantitative data was collected using structured questionnaire and X-Ray Investigation. OA was graded using the Kellgren and Lawrence scale. Data analysis was performed using SPSS statistical software. Frequencies and percentages were calculated to find the prevalence of OA. Chi-Square test was used to find the association of OA with various factors.

Results: The present study shows a prevalence of 28.7% of OA in the overall sample. This varies slightly in the individual states – Agra (35.5%), Bangalore (26.6%), Kolkata (33.7%), Dehradun (27.2%), and Pune (21.7%). OA prevalence was found to be more in participants who used western toilet (42.1%), in sedentary people (82.9%), in females and in obese.

Conclusion: This study has evidenced that there is a large percentage of sub-threshold population. i.e. K-L grade 1 which is considered as border-line or doubt-full as far as OA diagnosis. Awareness of OA should be initiated at community level, which is needed for prevention of OA at early age.

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1. Introduction

Osteoarthritis (OA) is one of the most common causes of pain and disability in geriatric age group representing a significant burden for the geriatric people and for society.^{1–3} Since incidence and prevalence increases with age, longer life expectancy will result in an increase in OA in the future.^{4,5} Prevalence of clinically symptomatic osteoarthritis knee in Caucasians is around 10% in men and 20% in

women aged 45 years and above,³ whereas radiographic OA, the prevalence increases between 27% and 80%.⁶ Study in US conclude that approximately 35% of women and men aged 60 years and above had radiographic OA of the knee⁷ it is noticed that approximately 85% of all knee and hip replacements being due to OA.⁸ Typical clinical symptoms are pain, particularly after prolonged activity and weight bearing; whereas stiffness is experienced after inactivity. It is also known as degenerative arthritis, which commonly affects the hands, feet, spine, and large weight-bearing joints, such as the hips and knees. Among the most common joint sites affected by OA, the knee is one of the most prevalent.⁹ The knee is a weight-bearing joint, essential for function, and frequently associated with more reported pain in OA.^{9,10} Knee OA diagnosis is based on radiographic changes and clinical examination.¹¹ According to recent recommendations,

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beside the radiographic evaluation, symptoms were also considered the most useful in the identification of OA patients.¹² Pain is thought to be an important marker of OA and is frequently the primary reason for seeking health care. It is correlated with radiographic symptomatic changes, strongly associated with other signs and symptoms and reliably predicts future disability. In Global Burden of diseases in 2000 OA was the 4th leading cause of YLD leading to 3% YLD. The COPCORD¹³ study showed higher prevalence in urban as compared to rural prevalence of OA in China. In observational study done in rural Tibetan region prevalence of knee pain was 25% and significantly associated in 50 years as compared to younger people.¹⁴ Similarly study done by Muraki S et al., on Japanese population symptomatic in radiographically confirmed knee OA cases it was evidenced to have higher prevalence in two mountain regions as compared to rural and urban population.¹⁵ A house to house survey done by Salvi H et al. in South Delhi amongst 260 peri-menopausal women it was found to be higher in lower socioeconomic than higher socioeconomic population.¹⁶ In study done in Chandigarh had similar results but lesser prevalence than this study.¹⁷ Accurate diagnosis and timely intervention is essential to minimize the consequences of knee OA and to slow its progress. Additionally, treatment strategies in OA are frequently focused on pain relief and control. However, there is a high variability in symptoms among individuals with radiographic findings making it difficult to identify patients with OA and to evaluate the progression of the disease among those already identified. Thus a study was conducted to analyze the role of KL scale to find out individuals with radiographic OA.

2. Methods

The study was a community based cross sectional study. The target population was from 5 metropolis, 5 cities near the metropolis, 5 towns and 20 villages from blocks of these towns. i.e. 5 sample groups were covered. The WHO TECHNICAL REPORT SERIES - 919 'The Burden of Musculoskeletal Conditions at the Start of the New Millennium' which contains the BHIGWAN COPCORD Data on prevalence of Rheumatoid Arthritis (RA) & Osteoarthritis (OA) amongst the Indian population was used for sample size calculation. The estimated prevalence was 5.5 according to the study. Thus, we considered this as "p" in the following formula for calculating sample size. $n = [t^2 * p(100-p)] / m^2$, where n = required sample size, t = confidence level at 99% = value 2.58 rounded to 3, p = estimated

prevalence (%) = 5.5, m = margin of error (20% of p) = 1.1. Substituting all these values we get, Sample size $n = 3866 =$ rounded to 3900. Adding 20% no-response rate to this we got Minimum sample size $n = 4680$ which was further divided into 5 sites equally (936 from each site). This was rounded to a sample of 1000 from each site. This evaluation study was conducted using the household as the primary sampling unit for the quantitative survey. The respondents included in the study were above 40 years. One respondent from each household was selected based on the Last Birthday Method. Exclusion Criteria defined in the study were participants who had RA, inflammatory arthritis, bilateral end-stage knee OA, Unable to walk without aids (single cane walkers included), Systemic Lupus Erythematosus, polyarthralgia, any other surgical or medical condition that severely limits subjects functional ability. Quantitative data was collected using structured questionnaire and X-Ray Investigation. Structured questionnaire consisted of following sections – Informed Consent; Demographic Profile – age, sex; Socio-economic profile – education, occupation, income, housing conditions, type of work and life style related information; Physical parameters – height, weight; Family History about Osteoarthritis, Osteoporosis; Respondents history related to Osteoarthritis, Osteoporosis – presence of symptoms, whether diagnosed already & taking treatment, if not diagnosed, since when symptoms present. This was followed by an X-Ray Investigation of the both the knee joints in 2 views – Anterior-posterior view and Lateral view standing. OA was graded using the Kellgren and Lawrence scale for OA (1 = No osteophytes, normal joint space, 2 = Doubtful narrowing, possible osteophytes, 3 = Minimal but definite osteophytes, joint space narrowing, 4 = Definite and moderate osteophytes and joint space narrow, some sub-chondral sclerosis).

3. Data analysis

Data analysis was performed using SPSS statistical software. Frequencies and percentages were calculated to find the prevalence of OA. Chi-Square test was used to find the association of OA with various factors.

4. Results

The study used radiographic diagnosis for confirmation of knee Osteoarthritis. The Kellgren and Lawrence scale (K-L grade) of OA

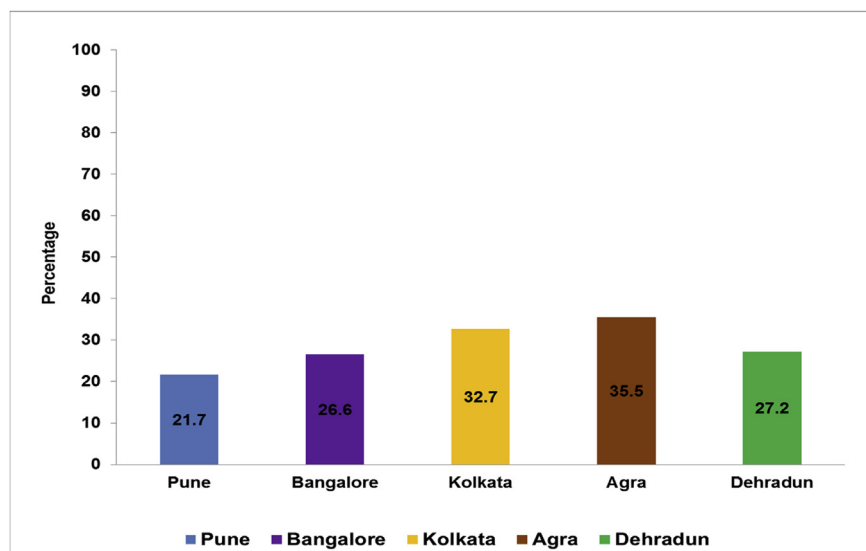


Fig. 1. City –wise prevalence of OA-Knee.

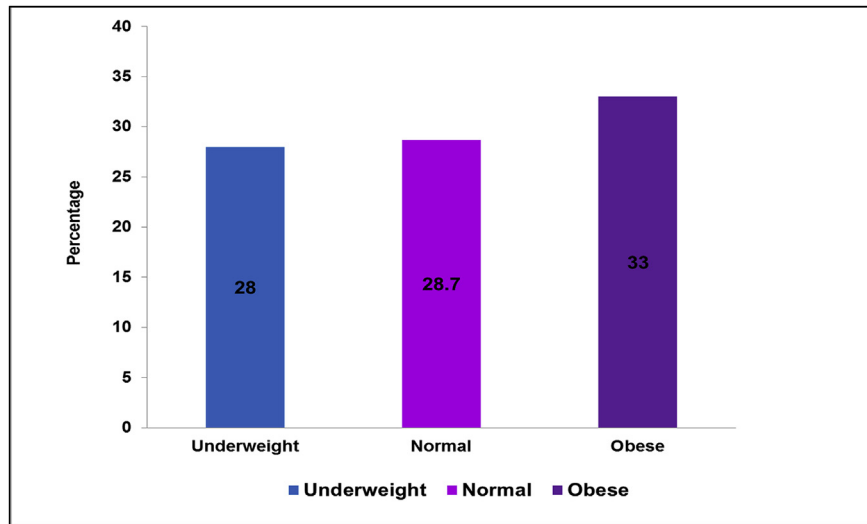


Fig. 2. Prevalence of OA knee according to weight.

grading was used for the same. The present study shows a prevalence of 28.7% of OA in the overall sample. Study was of five cities This varies slightly in the individual Cities – Agra (35.5%), Bangalore (26.6%), Kolkata (33.7%), Dehradun (27.2%), and Pune (21.7%). Fig. 1 shows the city –wise prevalence of OA-Knee.

OA of the knees was found to be more in females (31.6%) than in males (28.1%) which was statistically significant (p value 0.007). Prevalence of OA knee increased with increase in BMI. Knee OA was significantly low in underweight people (28%) as compared to normal weight and obese participants (33%). Fig. 2 shows Prevalence of OA knee according to weight.

Prevalence was lowest among participants who worked as daily wage workers/laborers (22.2%) and was highest in participants who had a sedentary lifestyle followed by participants with a physically demanding lifestyle and active lifestyle. Fig. 3: shows the physical activity level and OA prevalence. This difference was statistically significant (p value 0.001).

OA prevalence was found to be significantly more (p value 0.000) in participants who used western toilet (42.1%) as compared to those who used Indian toilet (29.7%) or both types (38.8%). Fig. 4 shows type of Toilet used and OA prevalence. Prevalence was

higher in participants who do not Exercise (82.9%) compared to participants who do regular exercise (36%).

Although the questionnaire gathered information on type of exercises done, there was not a significant difference in prevalence of OA among different exercise groups. 78.8% participants who had OA according to x-ray diagnosis had pain sometime in the past 5 years. 57.9% of participants with OA had pain sometime in the last 3 months and 35.8% of participants with OA had experienced knee stiffness at least once in the last 3 months.

5. Discussion

There are several studies on the prevalence and determinants of OA but very little work has been done on diagnosis of OA using Kellgren and Lawrence scale. In literature we found 3 pronounced more studies of different countries that used Kellgren and Lawrence scale. National Health and Nutrition examination Survey III (NHANES III) concludes data that approximately 35% of women and men aged 60 years and above had radiographic OA of the knee in US white population.(7). In china Zhang et al. found 43% prevalence of OA(2).Lan T. Ho-Pham, Thai Q. Lai et al. (2014) in Vietnam studied

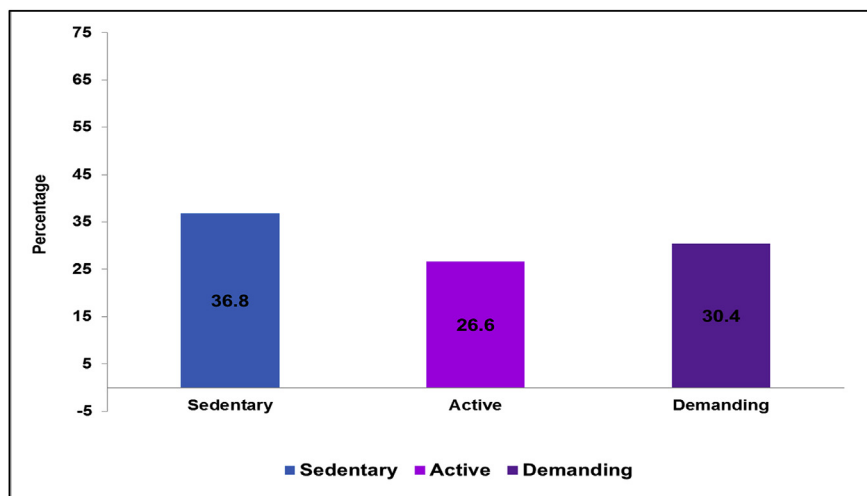


Fig. 3. Physical activity level and OA prevalence.

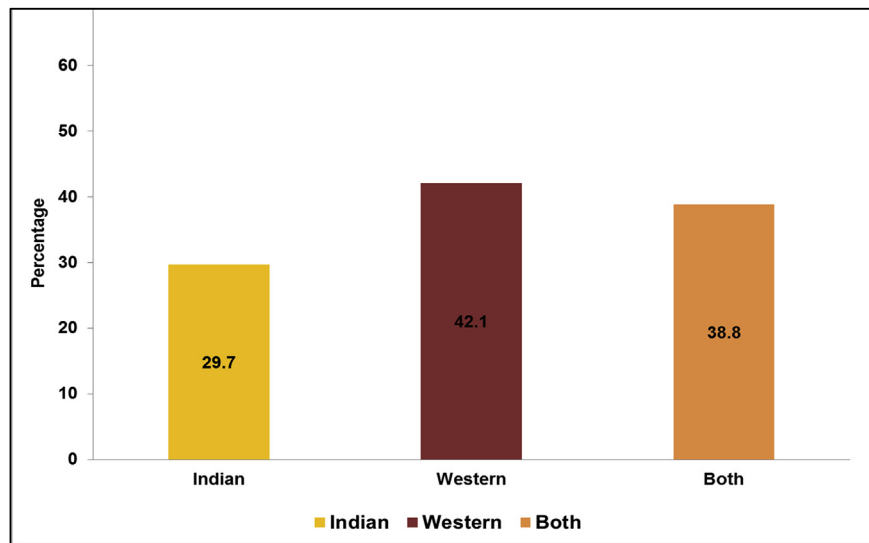


Fig. 4. Type of Toilet used and OA prevalence.

that around one third (34.2%) population having radiographic osteoarthritis¹⁸. All these three studies used K-L Scale for diagnosing OA knee. Our results are comparable to all study except study done in china but in other studies they used different age inclusion criteria except Vietnam study which include population of above 40 years age, this was also our inclusion criteria in population. The present study shows a prevalence of 28.7% of OA. The prevalence of OA varied slightly with individual states.

Pain is the most frequent complaint in OA. Lacey RJ et al. found that 77% of men and 61% of females having osteoarthritis knee in 819 people those self reported knee pain after age of 50 years.¹⁹ Knee pain is an unspecific symptom and its expression may be associated with other conditions than OA. In our study 78.8% participants who had OA had pain sometime in the past 5 years and 35.8% of participants had experienced knee stiffness at least once in the last 3 months.

The present study also showed that prevalence of OA knee increased with increase in BMI and knee OA was significantly high in obese people as other studies showed^{6,15,20–22}. In current study prevalence in obese population was found 33% which was higher than average prevalence because obesity is known risk for OA knee and OA of other joints.^{23–25}

There are most of studies, which prove that OA is seen more frequently in females than in males. The current study also proves the same with a statistically significant p value (0.007) more osteoarthritis in females may be due to more obesity found in females than male²⁶. Most studies show that OA knee is more prevalent in people with sedentary lifestyle than in people who are physically active. In our study the same was statistically proved (p value 0.001). Exercise being an important aspect of lifestyle has a major impact on OA. In our study we found that Prevalence was higher in participants who do not Exercise as compared to participants who exercise. The current study also proves that the prevalence of OA was found to be significantly more in participants who used western toilets as postulated by Lan T Ho-Pham et al.¹⁸

Although the study was done on different widely apart geographical area in India, large sample size, covers both urban and rural population to avoid any factor those affect the results, there are some limitations also. In present patients having osteoarthritis knee with other co morbidities are not included so this study could not assess true prevalence of osteoarthritis. Including those cases

results may be biased. Secondly in this study the diagnostic criterion was K-L scale that is based on x ray. With advancement of other imaging tool like MRI it could be diagnosed much earlier and could affect the prevalence at specific age group. On other scales based on other advanced imaging tools results of study may vary.

6. Conclusion

This study has evidenced that there is a large percentage of sub-threshold population. i.e. K-L grade 1 which is considered as border-line or doubt-full as far as OA diagnosis. Awareness of OA should be initiated at community level, which is needed for prevention of OA at early age. Stress on early diagnosis should be encouraged among the general population. Studies to understand how many people with symptoms of OA seek medical advice are required, to understand the treatment seeking behavior. Longitudinal cohort study can be planned which will in long run will prove impact of physical activity, habits and lifestyles.

Conflicts of interest

There is no conflict of interest between author and coauthors.

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