

International Classification of Functioning as a Framework for Understanding Activity Limitation and Participation Restriction in Elderly Adults with Knee Osteoarthritis in Rural and Urban Community: A Cross-sectional Observational Study

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ABSTRACT

Introduction: Knee OA is the most common joint degeneration disorder which can lead to inactivity with ageing, secondary to pain and reduced function thus ultimately impairing the Quality of Life (QoL). International Classification of Functioning Disability and Health is a universal language that can be used across all professions for an easy communication.

Aim: To assess the activity limitations and participation restriction in elderly adults with knee Osteoarthritis (OA) using ICF functional profile

Materials and Methods: The present cross-sectional observational study was conducted in affiliation to KLE Institute of Physiotherapy at the rural and urban community of Belagavi, Karnataka, India, April 2020 to March 2021. A total of 386 adults from both rural and urban community above the age of 60 years with knee pain were included for the study. A door to door survey for activity limitations and participation restrictions was done using ICF and the data was

later statistically analysed using Statistical Package for Social Sciences (SPSS) 20.

Results: A 52.85% (n=193) of the urban population used western toilets and showed greater amount of difficulty in activities of daily living. The study included 69.95% (n=386) of the population who were females and 71.24% were under the age group of 60-70 years. The comparison of rural and urban communities showed that both communities faced the similar limitations and restrictions in functional activities whereas the type of toilet used had a major impact over the urban population where 37.31% (n=193) of the individuals in urban community showed the need of external support during toileting activities.

Conclusion: The ICF functional profile was helpful in understanding the framework for activity limitation and participation restriction in elderly adults with knee OA. It can also be used as a clinical tool to evaluate activities of daily living and also provides a detailed frame work of understanding the interaction of personal environmental and medical factors.

Keywords: Disability and health, Joints disease, Symptomatic osteoarthritis

INTRODUCTION

The OA is a chronic and systemic disease of the joints that can be categorised as primary or secondary OA depending on the causes. It's characterised by a gradual loss of articular cartilage, as well as alterations in the subchondral bone, muscles, synovium, and tendons and ligaments. As a result, the subchondral plate becomes less capable of storing energy [1]. OA is more than just erosion of bony surfaces; it is an irregular shaping in joint structures caused due to the release of several other inflammatory arbitrators within the unsound joint. Age, gender, earlier joint injuries, obesity, genetic factors, and mechanical factors including malalignment and abnormal joint structure have been among the most common risk factors for OA [2,3]. According to the World Health Organisation (WHO), symptomatic OA affects 9.6% of males and 18.0% of females over the age group of 60 years globally [4]. About 80% of people with OA may have mobility restrictions, and 25% may not be able to perform their major daily activities [5]. The prevalence for knee OA in India was found to be 28.7%, also in comparison to the towns (17.1%) and small cities (17.2%) the prevalence rates were greater in villages (31.1%) and big cities (33.1%) [6]. Knee OA is more significant than other types of OA not only because of its higher prevalence rate, but also because it manifests at a younger age, especially in obese women. Knee OA becomes more

common as people get older, and it gets worse as they live longer and gain more weight [7]. It is extremely enough to necessitate joint replacement accounts for just a small percentage of all knee pain and disability experienced by the elderly. To have an effect on community levels of pain and disability, primary care providers must concentrate on this larger population [8].

OA is the leading cause of physical limitations in older people [9]. As people get older, OA may cause them to become less active due to pain and decreased function, lowering their QoL. OA reduces the capabilities of individuals to carry out their basic daily functions due to the underlying inflammatory changes [10]. People with knee OA can benefit from adopting a physically active lifestyle in addition to exercising. Physical Activity (PA) is a subset of exercise, and both terms apply to energy consumption above normal levels [11]. In patients with knee or hip OA, the way they adapt to their disease, particularly in a way to escape exercise, could be the reason for potential activity constraints. By the Psychological model of Avoidance, mediates the correlation of neglecting exercise and constraints of activities. In order to reduce discomfort, patients generally try to avoid regular PA. This seems to be an adaptive coping mechanism in the near run, as OA pain is often activity related. Avoidance of PA, on the other hand, could result in reduced

muscle power over time, that can lead to hindrance in activity [6].

The International Classification of Functioning, Disability, and Health (ICF), a classification that has been established by the WHO to include a universal communication. ICF is a globally developed and adopted tool that included many professions, organisations, and user groups from all over the world. The ICF core set establishes an objective foundation for determining the ICF categories that applicable to the condition and recovery of typical patients [12]. It can also be tailored to the specific requirements that need to be assessed. Hence, to understand the framework of activity limitation and participation restriction this study aimed to implement the use of ICF functional profile to assess the limitations and restrictions of PA faced by elderly adults with knee OA in rural and urban population of Belagavi. The aim of this study was to assess how knee OA affects the daily activities of older adults, focusing on their activity limitations and participation in community life. As a primary objective we want to create a functional profile using the ICF to better understand these challenges by examining both rural and urban communities in Belagavi, we hope to evaluate on the differences in how these limitations manifest based on where individuals live. As a secondary objective we look forward to what extent the type of toilet used is affecting the individuals Activities of Daily Living (ADL's).

MATERIALS AND METHODS

The present cross-sectional observational study was conducted in rural and urban communities of Belagavi in affiliation to KLE Institute of Physiotherapy Karnataka, India, for a duration of one year (1st April 2020 to 31st march 2021). Ethical clearance was obtained from the Institution Ethical Committee with reference no EC/SI.NO:722-07/08/2020 prior to the commencement of the study.

Sample size calculation: The sample size (n) is calculated according to the cochran's formula: $n = (Z^2 * pq / e^2)$ where $z = 1.96$ (expected confidence level), $p = 50\%$ projected proportion of population (for maximum sample size p is usually 50%) [13], $q = 50\%$ (1-p), $e = 5\%$ (preferred level of precision) $n = (1.96)^2 * (50) * (50) / 5^2 = 385$. Sample size was taken as 386 for the present study and cluster sampling technique was used.

Inclusion criteria: Elderly adults both male and female with age 60 years and above. Clinically, symptomatic for knee OA. At least one of the following symptoms: Morning stiffness lasting ≤ 30 minutes; Pain in the knee on most days of the past month; Crepitus (grating sensation) on active joint motion, Bony tenderness [14].

Exclusion criteria: Individuals suffering from other pathological conditions of knee joint, ongoing pain medications, recent knee surgeries and congenital deformities.

Study Procedure

ICF functional profile was developed for evaluation of activity limitations and participation restriction among the elderly adults with knee OA using ICF codes as a guide. ICF codes falling under body function (b) and activities and participation (d) are scored on a scale of 0-4 where 0 is no impairment and 4 being complete impairment. ICF codes under environmental factors (e 2255 seasonal variations and e 1158 absence and presence of grab bars in the bathroom) is scored on qualifiers where score 0 is no barrier/ facilitator, score 1, 2 and 3 are mild, moderate and severe facilitator respectively

and scores -1, -2 and -3 serve as mild moderate and severe barrier respectively [15]. The final core set chosen for evaluation of activity limitations and participations restrictions are as follows:

S. No.	Code	Discription
1	s75011	Knee Joint
2	b7100	Mobility of a joint
3	b280	Sensation of pain
4	b28016	Pain in single joint
5	d230	Carrying out daily routine
6	d450	Walking
7	d455	Moving around
8	d460	Moving around in different location
9	d640	Doing house work
10	d4103	Sitting
11	d4104	Standing
12	d4153	Maintaining a sitting position
13	d4154	Maintaining a standing position
14	d4501	Walking for long distance
15	d4551	Stair climbing
16	d530	Toileting
17	e2255	Seasonal variations
18	e1158	Absence or presence of grab bars in the bathroom

STATISTICAL ANALYSIS

The master chart was prepared in Microsoft excel sheet, tabulated and subjected to analysis. Analysis for the study was prepared by the means of SPSS 20.0 so as to confirm the results gained. The mean, standard deviation, or numbers and percentages were used to describe the data. Mann-Whitney U test was used to compare between the rural and urban community and also to compare the rural and urban community independently with the type of toilet used. The comparison of environmental factors between the rural and urban community was done using Chi-square test. The level of significance was set at 5% and the probability values of less than 5% were considered statistically significant.

RESULTS

The study enrolled a total of 386 adults with knee OA, out of which 193 belonged to rural population and 193 belonged to urban population. Out of total participants 30.05% were males and 69.95% were females and 71.24% of the total sample fall under the age group of 60-70 years.

Mann-Whitney U test was used to compare between the rural and urban community and also to compare the rural and urban community independently with the type of toilet used [Table/Fig-1].

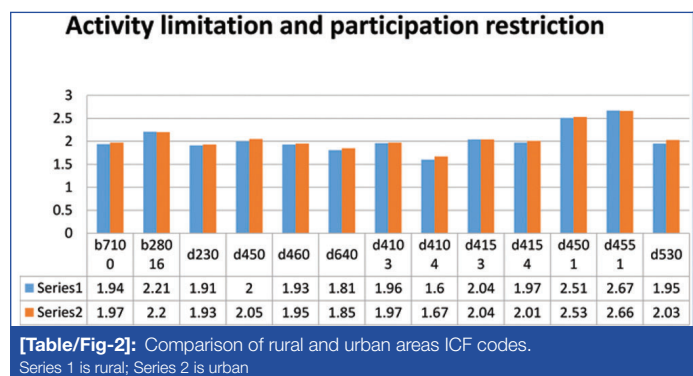
Codes from various domains of ICF were compared between the rural and urban communities [Table/Fig-2]. The results did not show any strong correlation between the two communities. This states that individuals residing in both rural as well as urban community the individuals faced the similar limitations and restrictions in functional

Items	Rural			Urban			U-value	Z-value	p-value
	Mean	SD	Mean rank	Mean	SD	Mean rank			
s75011 Knee joint- extent	2.05	0.58	194.39	2.04	0.56	192.61	18453.50	-0.1890	0.8500
s75011 Knee joint- nature	4.81	2.69	189.62	4.97	2.62	197.38	17876.50	-0.7580	0.4490
s75011 Knee joint- location	2.60	0.61	197.34	2.53	0.66	189.66	17883.50	-0.8010	0.4230
b7100 Mobility of joint	1.94	0.93	192.06	1.97	0.89	194.94	18347.50	-0.2660	0.7900
b280 Sensation of pain	2.15	0.55	191.31	2.17	0.56	195.69	18201.50	-0.5160	0.6060
b28016 Pain in single joint	2.21	0.49	193.67	2.20	0.46	193.33	18591.50	-0.0460	0.9630

d230 Carrying out daily routine	1.91	0.75	192.36	1.93	0.74	194.64	18404.00	-0.2160	0.8290
d450 Walking	2.00	0.76	189.92	2.05	0.77	197.08	17934.50	-0.6720	0.5010
d455 Moving around	2.02	0.74	190.21	2.07	0.76	196.79	17989.50	-0.6210	0.5350
d460 Moving around in different location	1.93	0.88	191.59	1.95	0.89	195.41	18255.50	-0.3610	0.7180
d640 Doing house work	1.81	0.75	190.49	1.85	0.74	196.51	18044.50	-0.5690	0.5690
d4103 Sitting	1.96	0.55	193.10	1.97	0.57	193.90	18548.00	-0.0850	0.9320
d4104 Standing	1.60	0.92	189.00	1.67	0.96	198.00	17756.00	-0.8420	0.4000
d4153 Maintaining a sitting position	2.04	0.84	192.96	2.04	0.87	194.04	18519.50	-0.1030	0.9180
d4154 Maintaining a standing position	1.97	0.95	191.16	2.01	0.96	195.84	18173.00	-0.4350	0.6640
d4501 Walking for long distance	2.51	0.69	191.60	2.53	0.68	195.40	18258.00	-0.3740	0.7090
d4551 Stair climbing	2.67	0.91	194.22	2.66	0.88	192.78	18486.00	-0.1400	0.8890
d530 Toileting	1.95	0.94	188.74	2.03	0.94	198.26	17705.00	-0.8910	0.3730

[Table/Fig-1]: Comparison of rural and urban areas with each item by Mann-Whitney U test.

activities. In the further assessment code s75011 knee joint was not assessed as it requires diagnostic tool which was not a part of the study as it was a community based study. Code b28016 is a sub code of b280 and code d4551 is a sub code of d455 hence they were merged during statistical analysis.

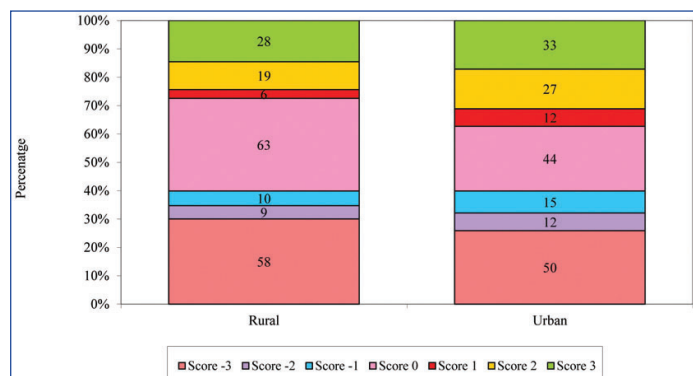


Overall 70.73% of the participants used Indian toilets and only 29.27% used western toilets who mostly belonged to the urban community [Table/Fig-3].

Type of toilet used	Rural	%	Urban	%	Total	%	χ^2	p-value
Indian	182	94.30	91	47.15	273	70.73	103.6170	0.0001*
Western	11	5.70	102	52.85	113	29.27		
Total	193	100.00	193	100.00	386	100.00		

[Table/Fig-3]: Comparison of rural and urban areas by type of toilet used.

The comparison of environmental factors between the rural and urban community was done using Chi-square test [Table/Fig-4]. A 27.46% of the people in rural community had a monkey rope tied for the assistance during the toileting activities and 37.31% of the individuals in urban community either had grab bars or a monkey rope to aid for toileting activities. Only 27.72% of the overall



[Table/Fig-4]: Comparison of rural and urban areas by presence and absence of grab bars.

respondents did not show a need for using external support during toileting activities.

DISCUSSION

The current research work was done to understand the frame work of International classification of functioning disability and health towards the activity limitations and participation restrictions faced by individuals with knee OA residing in various rural and urban areas. The present study included a total of 18 codes from four different domain of ICF. Among the 18 codes that were selected prior to the commencement of the study, three codes belonged to the domain body function, one belonged to the body structure domain, 12 belonged to the domain of activity limitation and participation restriction which were the main focused codes for the present study and two belonged to the environmental factors. The functional limitations and restriction of individuals with knee OA was observed using these 18 codes of ICF among a total of 386 community dwelling elderly individuals out of which 193 belonged to the rural areas and 193 belonged to the urban areas. The two environmental codes that were part of the study were evaluated separately as the scoring of the qualifiers in ICF for environmental domain varies from the other domains.

The age distribution of the present study showed that 71.24% of the total sample belonged to the age group of 60-70 years where 138/193 individuals belonged to the rural community and 137/193 individuals belonged to urban community. The development of OA increases with aging process and approximately about 30-50% of individuals above the age of 65 years tend to suffer from OA [16,17].

The gender distribution in the current study determined that 69.9% (270/386) were women and 30.1% (116/386) were men among both the rural and urban community. This enlightens to us that the women are more prevalent towards developing OA when compared to men. Likewise previously proven literature is available which state that women are more affected with OA when compared to men [18-20]. As per Bhaskar A et al., most significant factor associated to knee OA in women is attainment of menopause [21]. Changes which are observed in old age in both the genders may be due to reporting differences or can also be because of difference in radiological findings or may be because of difference between the severities of the pain among both the genders [22].

A comparison of codes b28016 (Pain in joint), b7100 (Mobility of single joint) from the body function domain; d230 (carrying out daily routine), d4103 (sitting), d4104 (standing), d4153 (maintaining a sitting position), d4154 (Maintaining a standing position), d450 (walking), d4501 (walking long distances), d4551 (climbing), d460 (moving around in different locations), d530 (Toileting), d640 (Doing housework) from the domain activity limitation and participation restriction; e1158 (products and technology for personal use in daily living, other specified) and e2255 (seasonal variations) from the domain of environmental factors between the rural and urban

community were done and the results did not show a significant correlation between the two.

In the present study the result analysis showed that individuals residing in the urban areas faced greater difficulty in ADL's such as toileting when compared to the individuals residing in the rural areas who majorly used Indian toilets. Research state that knee OA was more prevalent in individuals using western toilets and in people who don't or exercise less [23]. The author also stated that the prevalence rates were grater among individuals with a sedentary lifestyle, individuals using western toilets, in females and the obese [23]. Ho-Pham LT et al., study further supports this stating squatting may infact help reduce knee OA and pain during squatting is a good sign [24]. The comparison conducted between the type of toilet used and the urban community showed a strong significance with the codes b7100 (Mobility of joint), b28016 (Pain in single joint), d230 (carrying out daily routine), d450 (walking), d460 (Moving around in different location), d640 (doing house work), d4103 (sitting), d4153 (Maintaining a sitting position), d4154 (maintaining a standing position), d4501 (walking for long distances), d4551 (stair climbing), and d530 (toileting), which states that the individuals residing in the urban area experienced higher amount of pain and had restricted knee joint mobility. The present study showed a smaller amount of limitations among the rural residents in toileting activities which might be due to better joint mobility compared to the urban population having sedentary lifestyle and diet. Contrary to the current study, previous research indicates that the frequency is higher in rural communities than in urban ones [25].

Talking about the environmental codes that were evaluated e2255 seasonal variations it was noted that 82 and 78 individuals residing in rural and urban community respectively did not face any seasonal variations in their symptoms. Rest of the individuals either complained of morning stiffness or exaggerated symptoms in winter and rainy season. There is always an interaction between individual's health condition with their personal factors or the environment. This interaction results in the occurrence of limitations in PA [12]. However, the use of e1158 products and technology for personal use in daily life provide a great support and help to the elderly with their QoL. This code was undertaken to evaluate the presence of grab bars in the toilet or any kind of external aids the individuals used for assistance during toileting activity. The present study showed that 27.46% of the people in rural community had a monkey rope tied for the assistance during the toileting activities and 37.31% of the individuals in urban community either had grab bars or a monkey rope to aid for toileting activities.

There were no significant differences noticed in the comparison between the rural and urban community for their activity limitation and participation restriction. Whereas when rural and urban community were individually compared with the type of toilet they used showed a significant difference between the two communities. It was reported that urban community people had a greater limitations and restrictions when compared to the rural community. According to the previous studies it is a known fact that obesity is one of the common problem faced by the urban population due to their sedentary lifestyle and unhealthy dietary intakes as compared to the rural population [26], due to this high percentage of obesity in urban population people are more prone towards developing knee OA as body weight is considered as the most important risk factor for knee OA [27].

Limitation(s)

The code from ICF that belonged to domain of body structure s75011 could not be assessed as it requires a diagnostic tool to assess the severity of knee OA and one among the two qualifiers used in evaluating the activity limitation and participation restrictions which is capacity was not assessed as it was a door to door community survey. It was a onetime evaluation but capacity needs

to be assessed over a period of time. These were the limitations encountered in the current study.

CONCLUSION(S)

The present study concluded that limitations and restrictions in functional activity were faced by individuals residing in both rural and urban community. However, when the type of toilet used was considered individually in rural and urban community it showed that individuals residing in the urban community faced greater limitations and restrictions particularly in activities like toileting maintain a position stair climbing when compared to the individuals residing in rural community even though 94.3% of people used Indian toilets in the rural area. Regular physical exercise could reduce the risk of developing knee OA. Additionally, the study adds to the literature that knee OA is highly prevalent in females than males and the most commonly affected age group is 60-70 years. The ICF functional profile was helpful in understanding the framework for activity limitation and participation restriction in elderly adults with knee OA. It can also be used for clinical practice by facilitating personalised care plans, interdisciplinary collaboration, and structured outcome measurement. In policy-making, it can help identify disparities in healthcare access, address socioeconomic factors, and promote culturally sensitive programs. By acknowledging the impact of socioeconomic conditions, healthcare access barriers, and cultural practices on health outcomes, policymakers can develop targeted interventions to improve equity and effectiveness in healthcare delivery. This approach can enhance health equity, improve healthcare quality, and promote better outcomes for diverse populations.

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5