



## ORIGINAL ARTICLE

## Differences in Clinical Variables and Physical Activity Levels of Patients with Knee Osteoarthritis in Ibadan, Nigeria

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### Abstract

**Objectives:** Osteoarthritis (OA) is a major cause of disability worldwide and it often results in pain, decreased physical functioning and physical activity level. This study was aimed to investigate the Pain Intensity (PI), Physical Function (PF) and Physical Activity Level (PAL) of patients with knee OA and the difference in their PI and PF across the different physical activity levels (PALs).

**Methods:** A purposive sample of 110 individuals diagnosed with knee OA participated in this survey. The International Physical Activity Questionnaire (IPAQ), Visual Analogue Scale (VAS) and Ibadan Knee/Hip Osteoarthritis Outcome Measure (IKHOAM) were used to measure the PAL, PI and PF of the participants respectively. Data was analyzed using ANOVA at  $\alpha$  set at 0.05.

**Results:** Participants (59 males, 51 females) were aged  $55.59 \pm 10.51$  years. Participants mean PI, PF and duration of onset of knee pain score were  $3.86 \pm 2.03$ ,  $76.1 \pm 16.91$  and  $6.42 \pm 7.57$  months respectively. Majority (80.9%) had low PAL. There was no significant difference in PF ( $F = 0.058$ ,  $p = 0.05$ ) across the three PALs (low -  $73.46 \pm 17.58$ , moderate -  $83.97 \pm 5.76$  and vigorous -  $83.97 \pm 5.76$ ). There was also no significant difference in PI ( $F = 0.058$ ,  $p = 0.05$ ) across the three PALs (low -  $4.08 \pm 2.04$ , moderate -  $3.05 \pm 1.34$  and vigorous -  $2.92 \pm 1.77$ ).

**Conclusions:** Participants who were more active reported lower PI and higher PF. No significant difference was found between PI and PF on the basis of their PALs, however those who reported low physical activity had higher PI and lower PF. Hence, it is necessary for physiotherapists to assess PALs of individuals with knee OA and provide suitable specific instructions on this to alleviate pain and improve PI.

### Keywords

Physical activity, Pain intensity, Physical function, Knee osteoarthritis

### Introduction

Osteoarthritis (OA) is the number one chronic disease and the most common form of arthritis [1,2]. The disease onset of knee OA is gradual and usually begins after the age of 40 [3]. Osteoarthritis relates with age, and is associated with modifiable and non-modifiable risk factors, such as lack of exercise, among others [4]. As of 2004, OA globally causes moderate to severe disability in 43.4 million people [5]. In the United States, about 27 million people are affected [6] and there were approximately 964,000 hospitalizations for osteoarthritis in 2011 [7]. Globally, studies have shown that knee OA is the most prevalent form of OA with approximately 250 million people (3.6% of the population) affected [8]. According to data produced by the Dutch Institute for Public Health, the prevalence of knee OA in those aged 55 and above was 15.6% in men and 30.5% in women [9]. Prevalence rates for knee OA, based on population studies in the USA, are comparable to those in Europe [10]. These studies reported that severe radiographic changes affect 1% of people aged between 25 and 34 years and this figure increases to nearly 50% in those 75 years and above [10].

In Nigeria, many hospital-based studies have shown that OA is more prevalent than among Caucasians especially below 50 years of age [11-14]. Though the common joints affected by OA include knee, hip, spine, and joints of the hands [15]. The knee has been found to be the most commonly affected joint among Nigerians, accounting for 65%-78% of cases [11,13,14]. The prevalence estimate of symptomatic knee OA in

Nigerian rural community dwellers aged  $\geq 40$  years is 19.6% [16]. Eighty-one patients out of 116 patients were diagnosed with osteoarthritic knees at the University College Hospital (UCH), Ibadan in six years [11]. Adebajo's study in 1991 at the University College Hospital revealed a 5:1 female to male ratio of OA. A female preponderance (ratio 3.5-5:1) was also reported in other studies [16,17].

Pain, a leading cause of chronic disability is the most common symptom in knee OA. Knee pain in knee OA results to progressive physical inactivity, thereby causing muscular atrophy which invariably leads to decreased functional ability and physical function [1,18,19]. Pain severity is variable ranging from barely perceptible to immobilizing [20].

Physical activity (PA) is recommended for osteoarthritis (OA) management in order to reduce pain and improve function [21,22]. A consistent positive relationship between physical activity level and functional performance of adults with knee OA has been reported [1]. Patients with high self-reported physical activity and higher walking speed on a timed 20-meter walk test had better performance than patients who were inactive, more so a small increase in activity was related to better walking function [1]. Other studies have shown that active patients who engage in vigorous forms of exercise did not increase the risk of developing knee OA instead regular exercise is paramount in preserving joint integrity and maintaining good function [1,23,24]. Dunlop and colleagues [25] reported that a consistent graded relationship exists between physical activity level and better performance in adults with knee OA. A study in Centre for Disease Control and Prevention (CDC) revealed that the recommended levels of physical activity for older adults (150 minutes of moderate exercise per week) does not increase the risk of knee OA among middle-aged and older adults [21]. Also, the study showed that high levels of physical activity (at least 300 minutes per week) may increase risk of knee OA in this population, which is consistent with another study [26]. New findings suggest that both sedentary lifestyle and rigorous exercise are linked with early degenerative changes in knee cartilage that might lead to OA [27].

Levels of physical activity vary across populations. The relationship among clinical symptoms, physical activity and physical performance among individuals with knee OA in developed populations has been previously documented [28]. The physical activity level of an average Nigerian appears low; more than 80% of urban professional Nigerian adults do not meet the WHO recommendations of physical activity [29]. It is uncertain whether pain intensity and physical function of individuals with knee OA in Ibadan, Nigeria will differ across the physical activity levels of vigorous, moderate and low. This study was therefore designed to investigate the relationship among physical activity level, pain severity and physical function in patients with

knee OA in all public hospitals in Ibadan, Nigeria. We hypothesised that there would be significant differences in pain intensity and physical function across the three physical activity levels of low, moderate and high.

## Methods

Ethical approval for this study was sought and obtained from the University of Ibadan/University College Hospital Health Research Ethics Committee. Participants were individuals diagnosed with knee OA in all public hospitals in Ibadan, Nigeria and literate in English or Yoruba language (the major indigenous language spoken in South-west Nigeria where this study was conducted). They were patients with chronic clinical features of only knee OA using the American College of Rheumatology (ACR) Clinical Classification Criteria for OA of the knee, without prior knee surgery, acute knee trauma, any other form of arthritis or intra-articular corticosteroid injection to the knee(s) 3 weeks prior recruitment for the study. They were purposively selected into this cross-sectional survey.

## Measures

### Pain

Pain was assessed using the Visual Analogue Scale (VAS) [30]. It represents the intensity dimension by a 10 cm plain line with anchor points of "no pain" and "worst I ever felt. Each patient was asked to draw a line at the point that best described his or her pain level. VAS is the most widely used scale in assessment of pain in the clinical setting and has been reported to be sensitive and reliable [30]. The Yoruba version of the questionnaire which has been reported to have a moderate correlation with the English version [31] was administered to individuals who were not literate in English language.

### Physical function

The original English version of IKHOAM [32] and its Yoruba translation [33] were used to assess participants' physical function. The IKHOAM is a three part, 23-item patient/interviewer administered questionnaire that is used for measuring physical functioning in patients with Hip/Knee osteoarthritis. Part 1 measures disability in activity of daily living and Part 2 assesses participation restrictions due to knee/hip osteoarthritis. Part 3 comprises five physical performance tests that are rated by the clinician. The English version has evidence of validity ( $r = 0.38$ ), responsiveness and internal consistency ( $\alpha = 0.80-0.99$ ) [32], minimal clinical important difference (12.89) [34]. The Yoruba version has evidence of validity and internal consistency [33]. For ease of administration, parts 1 and 2 of this questionnaire were administered in this study.

### Physical activity

The short version of IPAQ with 7 items (IPAQ-SF)

was used to assess physical activity undertaken across a comprehensive set of domains including: leisure-time physical activity, domestic and gardening (yard) activities, work-related physical activity, transport-related physical activity. The IPAQ-SF asks about three specific types of activity undertaken in the four domains introduced above. The specific types of activities that were assessed included walking, moderate intensity activities and vigorous-intensity activities. It obtains details about the specific types of activities undertaken within each of the four domains. IPAQ is a generic scale and has a reliability of 0.80 and criterion validity of 0.30 [35]. The IPAQ short form has evidence of reliability, validity and wide utility [36,37].

### Data analysis

Descriptive statistics of frequency counts, percentages were used to summarize participants' sex, marital status, occupation, knee(s) affected and physical activity level and their respective mean scores; standard deviation were used to summarize participant's ages, on-

**Table 1:** Socio-demographic characteristics of the participants.

Variables	Category	Frequency	Percentage
Age groups (years)	41-45	20	18.2
	46-50	27	24.5
	51-55	17	15.5
	56-60	12	10.9
	61-65	12	10.9
	66-70	11	10.0
	71-75	6	5.5
	76-80	5	4.5
Marital status	Single	2	1.8
	Married	92	83.6
	Divorced	2	1.8
	Widow/er	14	12.7
Occupation	Professional	14	12.7
	Civil servant	38	34.5
	Retiree	23	20.9
	Self-employed	28	25.5
	Unemployed	4	3.6
	Others	3	2.7
Total		110	

set of knee pain and scores on IKHOAM, VAS and IPAQ. Analysis of variance (ANOVA) was used to compare the differences in pain intensity and physical function across vigorous, moderate and low physical activity levels with  $\alpha$  set at 0.05.

### Results and Discussions

One hundred and ten patients with knee OA aged  $55.59 \pm 10.51$  years participated in this study, 59 (53.6%) were males and 51 (46.4%) were females. Ninety-two (83.6%) participants were married and 38 (34.5%) were civil servants (Table 1). A large proportion of the participants were within the age group of 40-60 years (Table 1). Participants' mean PI score was  $3.86 \pm 2.03$ . Majority of participants (63) had mild pain (Table 2). The mean duration of onset of knee pain was  $6.42 \pm 7.57$  months (Table 2). Participants mean PI score was  $76.1 \pm 16.91$ . Sixty-eight (61.8%) participants had affectation of the right knee (Table 2). Majority of the participants (81%) had low physical activity level.

The mean pain intensity scores participants with low, moderate and vigorous physical activity were  $4.08 \pm 2.04$ ,  $3.05 \pm 1.34$  and  $2.92 \pm 1.77$  respectively (Table 3). There was no significant difference in the participants' pain intensity scores across the three physical activity levels ( $F = 0.264$ ,  $p = 0.077$ ) as shown

**Table 3:** Comparison of mean, pain intensity and physical function across the three levels of physical activity using ANOVA.

	M	SD	F	p
Pain intensity (overall):	3.863	2.0263		
Vigorous	2.9158	1.77491		
Moderate	3.0500	1.34350		
Low	4.0831	2.04040		
			0.264	0.769
Physical function (overall):	76.10	16.91		
Vigorous	87.66	5.95		
Moderate	83.97	5.76		
Low	73.46	17.58		
			2.420	0.058

Key: M: Mean; SD: Standard deviation; F: Joint significance of all the variables in the model.

**Table 2:** Clinical characteristics of participants.

Variables	Category	Frequency	Percentage
Pain intensity (VAS)	Mild Pain (0-3)	63	57.3
	Moderate Pain (4-6)	35	31.8
	Severe Pain (7-10)	12	10.9
Knee affected	Left	36	32.7
	Right	68	61.8
	Left and Right	6	5.5
Onset of pain, months prior to data collection	M	SD	
	6.4	7.6	

Key: M: Mean; SD: Standard deviation.

in Table 3. However, participants with low physical activity level had higher pain intensity score compared to those with the moderate and low physical activity levels. The mean physical function for participants with low, moderate and vigorous physical activity levels were  $73.46 \pm 17.58$ ,  $83.97 \pm 5.76$  and  $87.66 \pm 5.96$  respectively (Table 3). There was no significant difference in the participants' physical function scores across the three physical activity levels ( $F = 2.420$ ,  $p = 0.058$ ). However, participants with low physical activity level had reduced scores on physical function when compared to those with moderate and low physical activity levels.

The American College of Rheumatology defined OA as a disease that most often affects middle-aged to elderly people [38]. The Journal of Aging Research also defined osteoarthritis (OA) as a major health burden of our time with age being the most prominent risk factor for its development and progression [39]. The fact that all the participants in this study were within the middle aged and elderly supports these definitions of osteoarthritis as a disease of the middle-aged and elderly. There were more male participants with knee OA in this study. This finding is not in consonance with the findings from previous studies [40-42] where a female preponderance of participants was reported. According to a study by Andersen, et al. [43], occupations with heavy physical workload present a strong risk for knee OA in both men and women, and the risks increase with cumulative years in occupation and noticeably among male farmers. According to John Hopkins arthritis center, being only 10 pounds overweight increases the force on the knee by 30-60 pounds with each step and overweight women have nearly 4 times the risk of knee OA; for overweight men the risk is 5 times greater. This study was not aimed at investigating the influence of different occupations and body weight on the incidence or prevalence of knee OA hence the findings of Susan, et al. and the report from John Hopkins arthritis center may not be plausible reasons for the preponderance of male participants. From this study, the right knee was mostly affected, probably due to prevalent right-extremity dominance among the participants. Though, there is no known published study on this.

The questionnaires on PAL (IPAQ), PI (VAS) and PF (IKHOAM) provided an insight into PAL, PI and PF among the older adults. On a general note, the participants mean PI score was low and mean PF score was high even though their PAL was predominantly low. Inverse relationship of pain and physical function among individuals with knee OA has been previously reported [44]. However, this is not consistent with the result of a previous study in which physical function correlates positively with physical activity [45]. This therefore reveals that despite the finding that the participants were found to be highly physically functional due to reduced pain, their PAL did not meet up with the recommended WHO guideline of physical activity for older adults. One would

therefore assume that the participants' low PAL would not be attributed to knee OA since Nigerians' low PAL has been reported [46-48]. A study showed that despite the importance of physical activity for health and function of weight-bearing joints, historically physical activity was believed to increase the risk of knee OA because the disease was labelled as "wear and tear arthritis" [49]. In this study of 110 participants, 80.9% had low physical activity level. It was found out that more of the older adults had low PAL following increased PI and decreased PF. Pain intensity across the three PALs were not the same which indicates that participants with low PAL had more pain intensity compared to those with moderate and vigorous PAL. According to Center for Disease Control and Prevention [3], studies have shown that participation in moderate-intensity, low-impact physical activity improves pain, function, mood, and quality of life without worsening symptoms of knee OA, but people with arthritis may encounter difficulty in being physically active because of symptoms of pain and joint stiffness, lack of confidence in knowing how much and what to do, and unclear expectations of when they will see benefits. Other risk factors for decline in physical function include proprioceptive inaccuracy, and muscle weakness [50]. Both aerobic and muscle strengthening activities are proven to work well, and both are recommended for people with arthritis [3], hence the role of a physiotherapist in the management of OA cannot be over-emphasized.

## Conclusion

In conclusion, middle-aged and older adults with knee OA in Nigeria have low physical activity level. Participants who were more active reported lower pain intensity and higher physical functioning. Therefore, increase in PAL appears to reduce PI and improve PF among individuals with knee OA.

## Limitations

The possibility of participants' inability to recall events 7 days prior to data collection while responding to the questions on the International Physical Activity Questionnaire might have affected the internal accuracy of the study. Participants' previous physiotherapy or medical management which could have impacted on their PI and PF was not controlled for. More so, the cause-effect relationship of PI/PF and PAL is beyond the scope of this study.

## Recommendations

Measures to educate and encourage older adults on more PA should be integrated into the management of knee OA so as to reduce pain intensity and improve physical function. Further studies on age and gender variations in the clinical variables and PAL is needful.

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## Conflicts of Interest

None.

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