Relationship among Self Efficacy, Physical Activity and Beliefs in Patients with Knee Osteoarthritis

Ojoawo Adesola Ojo* and Oduniyi Segun Collins

Department of Medical Rehabilitation, Faculty of Basic Medical Sciences, College of Health Sciences, Obafemi Awolowo University, Ile Ife, Nigeria

*Corresponding Author: Ojoawo Adesola Ojo, Department of Medical Rehabilitation, Faculty of Basic Medical Sciences, College of Health Sciences, Obafemi Awolowo University, Ile Ife, Nigeria.

Abstract

The study evaluated the physical activity level the beliefs, self-efficacy and assessed the relationship among those variables in patients with knee osteoarthritis. A total of 70 knee osteoarthritis patients were purposefully recruited for the study. Each patient completed four different questionnaires: The International Physical Activity Questionnaire (IPAC), General Self-Efficacy Questionnaire (GSE), Pain Self-Efficacy Questionnaire (PSE) and the Knee Osteoarthritis Fear and Belief Questionnaire (KOFBeQ). Socio-demographic information of the respondents was also collected. The subjects' scores in each of the completed copies of the questionnaire were interpreted to their appropriate values based on the scoring formats of the questionnaires. Data were analyzed using descriptive and inferential statistics. Alpha level was set at < 0.05.

The mean general self-efficacy, fear avoidance and beliefs were 27.09 ± 3.16, 28.89 ± 11.07 and the 60.13 ± 14.32 respectively. Results showed a significant inverse relationship between physical activity and pain self-efficacy among respondents (r = -0.282, p = 0.018) and a significant relationship between general self-efficacy and belief among respondents (r = 0.327, p = 0.006).

In conclusion majority of the respondents had a high general self-efficacy. There was a significant but inverse relationship between self-efficacy and each of pain self-efficacy and belief among patients with knee osteoarthritis.

Keywords: Pain Intensity; Fear Avoidance; Attitudes; Self-Esteem

Introduction

Osteoarthritis which is a degenerative joint disease resulting from breakdown of joint cartilage and underlying bone; the resulting pathological changes includes damages to the joint cartilage and destruction of all joint structures [1]. Studies have shown that articular cartilage, subchondral bone, meniscus, tendon, muscle synovium and infrapatellar fat pad were seriously involved in manner of development of knee osteoarthritis in the molecular level [2,3]. Robinson., *et al.* (2015) and Zhang., *et al.* (2021) reported that the secretion of pro-inflammatory cytokines, which facilitates the formation of inflammation of microenvironment leading to the inflammation of synovial membrane and cartilage degradation was as a result of accumulation of macrophages [4,5]. These are the bedrock of osteoarthritis at the molecular level especially in the knee joint.

The joints mostly affected are the hips, knees and those of the hands and spine, its onset is gradual and usually begins after the age of 40 [6]. Treatment for OA focuses on alleviating pain and improving function, and can include a combination of physical therapy, use of

medications, weight control and patient education [6]. The knee joint is the most common weight-bearing joint being involved in OA [7]. The common symptoms of knee OA are pain, stiffness, limited range of motion, joint deformities and muscle wasting and weakness [8]. Patients with knee OA suffer from a progressive disability in walking, going up, and down the stairs due to pain and stiffness [9]. Persistent knee pain, limited morning stiffness, and reduced function are the three symptoms that are recommended for the diagnosis of knee OA by the EULAR [10].

Documentation in other part of the world revealed that patients with knee osteoarthritis' self-efficacy positively influences their physical activities and has led to improvements in walking and climbing of stairs [11]. Again, Sharma., *et al*. [12] reported that high self-efficacy reduces the amount of patient's complaints of poor physical performance. Lack of self-efficacy in patients with chronic pain correlated with other types of somatosensory, affective, and cognitive variables. More so, evidence showed that patients with chronic pain who have high levels of self-efficacy always present a lower intensity of pain and disability associated with their problem [13].

Beliefs and attitudes influence the acceptance, the results and the satisfaction with treatment, it also impacts the capacity of individuals to build an active and satisfactory life, despite the pain [14]. People's beliefs about knee OA have an important impact on their live experience with the disease, influencing activity levels, social and leisure participation, and emotional wellbeing [15]. Beliefs about knee OA aetiology have been explored in a number of qualitative studies, indicating that many people consider OA to be an inevitable part of ageing that is influenced by wear and tear due to joint use and obesity [16]. Beliefs that OA is caused by wear and tear result in worry that weight bearing exercise will exacerbate joint damage [17] and these concerns may cause people to reduce activity levels or avoid activities [18].

Research reported that physical activity is associated with risk for knee OA [19], other studies have shown that physical activity may have no effect [20] or may even protect the knee joint from degenerative changes [21]. These conflicting findings may be a result of individual variation in response to exercise and/or different methodology employed by studies to measure knee structure and physical activity. Physiotherapy management usually includes therapeutic education for patients on exercises they can perform alone at home in order to transition towards physical activities adapted to each patient's condition in order to decrease the functional impact of knee OA.

Patients with knee OA suffer from a progressive disability in walking, going up, and down the stairs due to pain and stiffness [9]. However, the relationship among self-efficacy, belief and physical activity in patients with knee osteoarthritis is not clearly understood. The study is therefore designed to evaluate the relationship among self-efficacy, physical activity and beliefs in patients with knee osteoarthritis.

Aim of the Study

The study is aimed to know if patient's self-esteem, and beliefs concerning knee OA affects day to day activities.

Methods

The subjects for this study were patients with primary knee osteoarthritis receiving treatment at Out-Patient Physiotherapy Clinic of Obafemi Awolowo University Teaching Hospitals Complex Ile-Ife, Nigeria.

Inclusion criteria

Patients with primary knee osteoarthritis for at least 6 months duration.

Exclusion criteria

- Patients not willing to participate in the study.

- Patients with knee osteoarthritis with associated co-morbidities.

- Patients that are not ambulant because of the severity of the OA.

Sample size determination

The sample size anticipated for the study was based on the application of the following formula:

$$N = \frac{4(Z)^2 p(1-p)}{D^2}$$

Where p = pre-study estimate of proportion.

N = Sample size of the single study group

Z = Standard normal deviation (1.96)

D = Total width of expected confidence interval (0.2) [22]

$$N = \frac{4(1.96)^2 \times 0.2(1-0.2)}{0.2^2} = 61.5$$

The sample size was rounded up to 70 to accommodate attrition.

Sampling technique

Purposive sampling technique will be used to recruit the subjects for the study.

Research design

Cross-sectional survey research design will be used in this study.

Site of the study

The study was conducted at the Orthopedics and Physiotherapy unit of the Obafemi Awolowo University Teaching Hospitals Complex (OAUTHC) Ile-Ife, Osun State Nigeria.

Instrument

The instruments to be used for this study include:

- **International physical activity questionnaire (IPAQ)**: This is an instrument that is designed primarily for population surveillance of physical activity among adults [23]. A short-self-administered version of IPAQ which has been reported to have acceptable test-retest reliability and criterion validity was used to assess the physical activity level in this study [23]. The purpose of this questionnaire was to provide common instruments that can be used to obtain internationally comparable data on health-related physical activity. It estimates vigorous physical activity, moderate- intensity physical activity, walking and sitting in terms

of frequency (days/wk) and duration(min/day) within 7 days prior to the administration of the questionnaire. IPAQ assesses physical activity undertaken across a comprehensive set of domains including: (1) leisure time physical activity, (2) domestic and gardening (yard) activities, (3) work- related physical activity, (4) transport- related physical activity, but with no information on frequency and duration of these separate domains. Calculated total hours for vigorous, moderate physical activities and walking will be determined. A Metabolic Equivalent of Task (MET)-hours was derived by multiplying the respective total hours with the MET value of vigorous physical activity (MET = 8.0), moderate physical activity (MET = 4.0) and walking (MET = 3.3) and adding all three. Then the total physical activity score was calculated and related as Low, Moderate or High depending on the total score.

Physical activity levels were classified as low, moderate or high intensity, defined by the IPAQ core group as follows:

1. Low: No activity or some activity reported, but not enough to satisfy the requirements of the other activity categories.

2. Moderate: Any of the following three criteria: (a) 3 or more days of vigorous intensity activity for at least 20 minutes per day, (b) 5 or more days of moderate intensity activity or walking for at least 30 minutes per day, or (c) 5 or more days of any combination of walking, moderate intensity, or vigorous-intensity activities achieving a minimum of 600 MET-minutes per week.

3. High: Either of the following 2 criteria: (a) 3 or more days of vigorous- intensity activity accumulating at least 1500MET-minutes per week or (b) 7 days of any combination of walking or moderate or vigorous intensity activities achieving a minimum of 3000MET-minutes per week.

   These 3 groups will be categorized as, sufficient physical activity and insufficient physical activity. The sufficient physical activity group includes respondents in the moderate or high intensity categories who will meet the WHO physical activity recommendation. According to the WHO global standard, satisfying the recommendations for healthy physical activity was defined as engaging in at least 150 minute-intensity activity per week, 75 minutes of vigorous intensity activity per week, or an equivalent combination of moderate and vigorous intensity activity.

Pain self-efficacy questionnaire (PSEQ)

This is a measure of generalized PSE that assesses the patient's confidence in performing daily activities despite experiencing pain, tolerating pain, and coping with pain. The PSEQ contains 10 items rated on a 7-point Likert scale from 0 ("not at all confident") to 6 ("completely confident"). The sum of all items is the total score, which ranges from 0 ("no PSE") to 45 ("the most PSE") and was used in this study. Sample items include "I can enjoy things, despite the pain" and "I can still accomplish most of my goals in life, despite the pain." Studies of the psychometric properties of the PSEQ have demonstrated its reliability and validity [24].

General self-efficacy scale

The General self-efficacy Scale is a 10-item psychometric scale that is designed to assess optimistic self-beliefs to cope with a variety of difficult demands in life. It was originally designed in Germany by Schwarzer and Jerusalem [25]. It has been used in many studies with hundred-thousand of participants to assess personal agency (the belief that one's actions are responsible for successful outcomes). It is correlated to emotion, optimism, work satisfaction. Negative coefficients were found for depression, stress, health complains, burnout, and anxiety [25].

Knee osteoarthritis fear and belief questionnaire (KOFBeQ)

It is an 11-item questionnaire assessing patients' fears and beliefs concerning knee OA with good content and construct validity. The general purpose of this questionnaire was to facilitate the patient–physician relationship and patient education by recording patient fears

and beliefs in routine practice and clinical research. The specific purposes are to better define patients' unrealistic fears and beliefs to try to modulate barriers to treatment adherence and help plan disease management.

Procedure

Ethical approval was obtained (HREC/2018/022) from the Health Research and Ethics Committee of the Institute of Public Heath (HREC), Obafemi Awolowo University, Ile-Ife, Osun State, Nigeria. Permission was obtained from the Heads of the Department of the Orthopedic and Physiotherapy Units of the Obafemi Awolowo University Teaching Hospitals Complex Ile-Ife to administer the question-naire to the patients. Informed consent was obtained from every patient that volunteered to participate in the study. Every patient that volunteered to participate in the study was given a copy of the questionnaire to fill.

Data analysis

Descriptive statistics of frequency, percentage, mean and standard deviation was used to summarize the data. Chi square test of as-sociation was used to determine the association among the physical activity level, self- efficacy and beliefs of patients with knee osteoar-thritis. The alpha level was set at $p < 0.05$. International Business Machine for Statistical Package of Social Sciences (SPSS version 22) was used to carry out data analysis.

Results

Sociodemographic variables of respondents

Presented in table 1 is the sociodemographic variables of respondents. Seventy (70) knee osteoarthritis respondents participated in this study. Fifty (71.4%) were females and 19 (27.1%) were males. Fifty-five (78.6%) of them were married, 10 (14.3%) widowed and 5 (7.1%) divorced.

Variables	Frequency	Percentage (%)
Sex: Female	50	71.4
Male	19	27.1
Marital Status: Divorced	5	7.1
Married	55	78.6
Widowed	10	14.3
Religion: Christianity	44	62.9
Islam	26	37.1

Table 1: *Sociodemographic variables of respondent N = 70.*

Occupation and educational level of respondents

Shown in figure 1 is the occupation and educational level of respondents. Thirty (42.9%) were retired, 20 (28.6%) were traders, 12 (17.1%) were farmers, 8 (11.4%) were teachers.
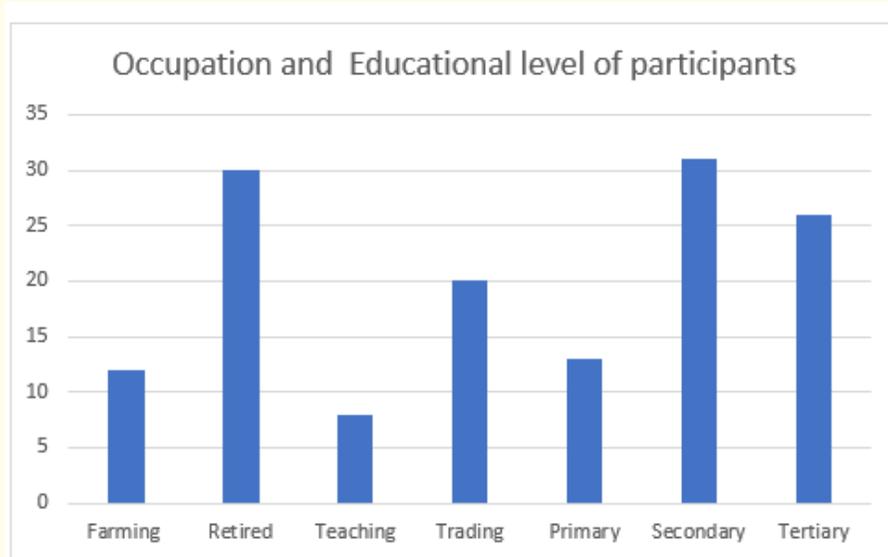
Figure 1: Occupation and educational level of respondents.

Descriptive variable of respondents

Table 2 presents the descriptive variable of the respondents. It was observed that respondents age ranged from 51 years to 86 years with a mean age of 67.89 ± 7.39 years. The general self-efficacy minimum score was 21. 00 and maximum score 34.00 with a mean score of 27.09 ± 3.16. The pain self-efficacy score for the respondents ranged from 11.00 to 47.00 with a mean score of 28.89 ± 11.07.

Variables	Minimum	Maximum	Mean	Std. Deviation
Age (years)	51.00	86.00	67.89	7.39
GSEtotal	21.00	34.00	27.09	3.16
SPNtotal	11.00	47.00	28.89	11.07
FAVBtotal	39.00	91.00	60.13	14.32

Table 2: Descriptive variable of respondents N = 70.
Key: GSEtotal = General Self Efficacy Total, SPNtotal = Pain Self Efficacy Total, FAVBtotal = Fear Avoidance Belief Total.

Relationship among participations' physical activity level and each of self-efficacy and belief of respondents

Shown in table 3 is the result of Pearson's product moment correlation which showed that there was a negative significant relationship between physical activity and pain self-efficacy (r = -0.282, p = 0.018). There was a significant relationship between general self-efficacy and belief (r = 0.327, p = 0.006).

Variables	Age	IPACTotal	GSEtotal	Spntotal	FAVBtotal
Age	1				
IPACTotal	-0.507** 0.000	1			
GSEtotal	-0.042 0.073	-0.052 0.667	1		
Spntotal	-0.479** 0.000	-0.282* 0.018	0.115 0.345	1	
FAVBtotal	-0.189 0.117	0.075 0.538	0.327** 0.006	0.730** 0.000	1

***Table 4:** Relationship between participation in physical activity, self-efficacy and belief among respondents N = 70.*
*Key: ** Correlation is significant at the 0.01 level (2 tailed) * Correlation is significant at the 0.05 level (2 tailed).*
GSEtotal = General Self Efficacy Total, SPNtotal = Pain Self Efficacy Total, FAVBtotal = Fear Avoidance Belief Total.

Discussion

This study assessed the relationship among self-efficacy, physical activity and beliefs in patients with knee osteoarthritis. The main purpose of this study was to assess if patient's self-esteem, and beliefs concerning how knee osteoarthritis affects day to day activities.

From the results, it can be deduced that majority of the respondents were females; this suggests that a higher number of females have knee osteoarthritis than males in this community as observed in the study. The reason for this could be deduced from the hormonal changes that occurs after menopause which predisposes women to loss of density of bone [26]. Also, most women tend to be more obese than men due to child bearing, which has been reported to increase mechanical stress in a weight bearing joint like the knee, resulting to knee osteoarthritis [27]. This was in line with the study of Kinsella., *et al*. [28] who reported that the prevalence of OA increases with age and generally affects women frequently than men with a ratio 1.3:1.

It was observed that there was a negative significant relationship between pain self-efficacy and physical activity, this is because patients with knee osteoarthritis may be less physically active than the general population due to pain. This observation was similar to that of Keefe., *et al*. [29] who studied 40 men and women with knee osteoarthritis, and reported that functional ability and extent of activity participation were enhanced by efforts that improved pain self-efficacy and perception of the condition.

A larger percentage of the respondents had an excellent score in the knee osteoarthritis fears and beliefs, depicting that most of them had a good knowledge about the condition and could cope with it. This exposure could be as a result of the presence of the Obafemi Awolowo University Teaching Hospitals Complex (OAUTHC), the College of Health Sciences, and the Health Center situated in the Obafemi Awolowo University through which the indigenes could have been enlightened about the condition. Also, through a course- Community Physiotherapy offered by final year Medical Rehabilitation Students, Obafemi Awolowo University that engage in various community outreaches making indigenes more informed about the condition and their health at large. Again, larger number of respondents have tertiary education. This is in line with the study of Appelt., *et al*. [30] which reported that those with higher level of education viewed osteoarthritis as a natural part of ageing.

Significant relationship was also reported between general self-efficacy and belief. This is in line with the study of Harrison [11] and who reported that a person's intra-individual beliefs, their outcome expectancies as well as their views on barriers and appropriate and adequate incentives or resources is needed to permit self-efficacy beliefs to translate into desired activities. It was observed as well that there was a significant negative relationship between physical activities and belief an indication that as physical activity level increases, the pain self efficacy reduces, on the other hand the lower the pain self efficacy, the better the physical activities which sound logical. There is no one with high intensity of pain that will have high level of physical activity. Similarly, in a 3-year study carried out by Sharma., *et al.* [12] on men and women with knee OA, it was reported that a high baseline self efficacy decreased the odds of self-reporting poor physical functioning.

It was concluded from this study that there was a significant inverse relationship between physical activity and pain self-efficacy, and a significant relationship between self-efficacy and beliefs. Majority of the respondents had a high general self-efficacy hence there was participation in physical activity.

Bibliography

1. Ahmed AF. "Effect of sensorimotor training on balance in elderly patients with knee osteoarthritis". *Journal of Advanced Research* 2.4 (2011): 305-311.

2. Loeser RF., *et al.* "Osteoarthritis: a disease of the joint as an organ". *Arthritis and Rheumatology* 64.6 (2012): 1697-1707.

3. Fan X., *et al.* "Macro, Micro, and Molecular. Changes of the Osteochondral Interface in Osteoarthritis Development". *Frontiers in Cell and Developmental Biology* 9 (2021): 659654.

4. Robinson WH., *et al.* "Low-grade inflammation as a key mediator of the pathogenesis of osteoarthritis". *Nature Reviews Rheumatology* 12.10 (2016): 580-592.

5. Zhang H., *et al.* "Macrophages regulate the progression of osteoarthritis". *Osteoarthritis and Cartilage* 28.5 (2020): 555-561.

6. Lawrence RC., *et al.* "Estimates of the prevalence of arthritis and other rheumatic conditions in the United States. Part II". *Journal of Arthritis and Rheumatology* 58.1 (2008): 26-35.

7. Toda Y and Tsukimura N. "A six-month follow up of a randomized trial comparing the efficacy of a lateral-wedge insole with subtalar strapping and an in-shoe lateral-wedge insole in patients with varus deformity osteoarthritis of the knee". *Arthritis and Rheumatology* 50.10 (2004): 3129-3136.

8. Ansari S., *et al.* "Effects of aquatic exercise training on pain, symptoms, motor performance, and quality of life of older males with knee osteoarthritis". *Annals of Applied Sport Science* 2.2 (2014): 29-38.

9. Chuang SH., *et al.* "Effect of knee sleeve on static and dynamic balance in patients with knee osteoarthritis". *Kaohsiung Journal of Medical Sciences* 23.8 (2007): 405-411.

10. Zhang Y and Jordan JM. "Epidemiology of osteoarthritis". *Clinics in Geriatric Medicine* 26.3 (2010): 355-369.

11. Harrison AL. "The influence of pathology, pain, balance, and self-efficacy on function in women with osteoarthritis of the knee". *Physical Therapy* 84.9 (2004): 822-831.

12. Sharma L., *et al.* "Physical functioning over three years in knee osteoarthritis: role of psychosocial, local mechanical, and neuromuscular factors". *Arthritis and Rheumatology* 48.12 (2003): 3359-3370.

13. Denison E., *et al*. "Musculoskeletal pain primary health care: subgroups based on pain intensity, disability, self-efficacy, and fear avoidance variables". *The Journal of Pain* 8.1 (2007): 67-74.

14. Pimenta CA and da Cruz Dde A. "(Chronic pain beliefs: validation of the survey of pain attitudes for the Portuguese language)". *Revista da Escola de Enfermagem da USP* 40.3 (2006): 365-373.

15. Pit SW., *et al*. "Health problems and retirement due to ill-health among Australian retirees aged 45-64 years". *Health Policy* 94.2 (2010): 175-181.

16. Turner A., *et al*. "Beliefs about the causes of osteoarthritis among primary care patients". *Arthritis Care and Research* 57.2 (2007): 267-271.

17. Hendry M., *et al*. "Why should we exercise when our knees hurt? A qualitative study of primary care patients with osteoarthritis of the knee". *Family Practice* 23.5 (2006): 558-567.

18. MacKay C., *et al*. "A qualitative study of the consequences of knee symptoms: 'It's like you're an athlete and you go to a couch potato'". *BMJ Open* 4.10 (2014): e006006.

19. Szoeke C., *et al*. "The relationship between prospectively assessed body weight and physical activity and prevalence of radiological knee osteoarthritis in postmenopausal women". *Journal of Rheumatology* 33.9 (2006): 1835-1840.

20. Felson D., *et al*. "Effect of recreational physical activities on the development of knee osteoarthritis in older adults of different weights: The Framingham Study". *Arthritis and Rheumatology* 57.1 (2007): 6-12.

21. Rogers LQ., *et al*. "The association between joint stress from physical activity and self-reported osteoarthritis: an analysis of the Cooper Clinic data". *Osteoarthritis and Cartilage* 10.8 (2002): 617-622.

22. Eng J. "Sample size estimation; how many individuals should be studied?" *Radiology* 227.2 (2003): 309-331.

23. Craig CL., *et al*. "International Physical Activity Questionnaire:12-country reliability and validity". *Medicine and Science in Sports and Exercise* 35.8 (2003): 1381-1395.

24. Nicholas MK. "Self-efficacy and chronic pain. Annual conference of the British Psychological society". St. Andrews (1989).

25. Schwarzer R and Jerusalem M. "Generalized Self-Efficacy scale. In J. Weinman, S. Wright and M Johnston, Measures in health psychology: A user's portfolio". Causal and control beliefs. Windsor, UK: NFER-NELSON (1995): 35-37.

26. Sam S. "Obesity and Polycystic Ovary Syndrome". *Obesity Management* 3.2 (2007): 69-73.

27. Guelinckx I., *et al*. "Maternal obesity: pregnancy complications, gestational weight gain and nutrition". *Obesity Reviews* 9.2 (2008): 140-150.

28. Kinsella K and He W. "An aging World: U.S". Census Bureau: Washington. DC (2009).

29. Keefe FJ., *et al*. "Self-efficacy for arthritis pain: Relationship to perception of thermal laboratory pain stimuli". *Arthritis and Rheumatism: Official Journal of the American college of Rheumatology* 10.3 (1997): 177-184.

30. Apelt CJ., *et al*. "Arthritis-specific health beliefs related to aging among older male patients with knee and/or hip osteoarthritis". *The Journals of Gerontology Series A. Biological Sciences and Medical Sciences* 62.2 (2007): 184-190.

Volume 13 Issue 4 April 2022