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Relationship between osteoarthritis of the knee and life-stressing events among Nigerians with knee osteoarthritis

Mukadas O Akindele[1], Jacqueline Y Thompson[1], Miriam Mapulanga[2]

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ABSTRACT

Osteoarthritis (OA) of the knee is one of the most frequent musculoskeletal disorders that physicians do attend to in healthcare facilities. Knee OA is associated with psychological and medical challenges like depression, life-stressing events and pain. This study was carried out to determine the relationship between knee OA and life-stressing events among adults Nigerians with knee OA. Participants with knee OA were recruited consecutively from selected hospitals in Kano State, Nigeria. Western Ontario Macmaster Universities Index of Osteoarthritis (WOMAC), the Modified Somatic Perception Questionnaire and Social Readjustment Rating Scale Questionnaire were administered on the participants to access their pain, somatic complaints and lie-stressing events. Test of normality was carried out using Shapiro Wilk test and showed that the data was not normally distributed. The data was further subjected to descriptive statistics of mean, standard deviation, Spearman Rho and linear regression. A total number of 108 OA of the knee individuals consented and participated in the study of which 62.04% (67) were females while 37.96% (41) were males. The mean WOMAC scores for the whole group was 15.8 (SD=10.6) and there were significant differences in WOMAC score, SES and Somatic perception between male and female. There was positive significant relationship between SRS and emotional function (r=0.331) among male participants. Although, there was no significant association between WOMAC and life stressing events among female participants, but there were positive significant relationships between emotional function and pain (r=0.376), emotional function and stiffness (r=0.328), somatic perception and pain (r=0.286), somatic perception and emotional function (r=0.588) as well as SRS and emotional function (r=0.257). This study shows that there was relationship between somatic perception, life-stressing event and OA of the knee among adult Nigerians with knee osteoarthritis. There were also differences in knee OA, SES and somatic perception between male and female participants.

KEY WORDS: ***Osteoarthritis, life stressing, somatic, perception, knee***

Correspondence to
Mukadas O Akindele;
moakindele.pth@buk.edu.ng

INTRODUCTION

Osteoarthritis (OA) is one of the musculoskeletal conditions resulting in disability in man. It is defined as a progressive disease representing the failed repair of the damaged joint that, in the preponderance of cases, has been triggered by abnormal intra-articular[1]. It has been reported that about one-third of all adults have signs of radiological OA[2], while in an epidemiological study, clinically significant OA of the knee, hand, or hip is seen in only 8.9% of the adult population[3]. The prevalence of radiographic knee OA and symptomatic radiograph knee OA among US adults aged 60 years and older was 37.4% and 12.1 % respectively[4]. The probability of developing OA increases with advancing age. Knee OA in men has been reported to the right knee joint (23%) among the age group 60-64 than left knee (16.3%), whereas its distribution is more evenly balanced in women (right knee, 24.2%: left knee, 24.7%)[5].

The economic costs of OA are high, including those related to treatment, for those individuals and families who must adopt their lives and homes to the disease, and those due to lost work productivity[6]. In a literature review by Hiligsmann and Reginster[7], it was reported that the average total annual cost of OA per patient in Europe ranges from €1330 to €10452 and when considering only direct medical costs, the annual cost of OA ranged from €534 to €1788. Also, it was reported annual total cost of OA in US to be $89.1 billion of which $3.4 billion and $13.2 billion was due to job-related OA, thus making job-related OA more costly that asthma and pulmonary diseases and also more than renal and neurological diseases combined[8]. A study in a rural community in Nigeria reported that one out of every five Nigerian adults has symptomatic OA of the knee and majority of them were females[9].

Pain and other symptoms of OA have been reported to negatively affect physical function and psychological quality of life of individuals with knee OA[10]. Pain, generally, has sensory, affective, cognitive and emotional components. Incapacitating, reduced quality of life and loss of functional independence may all result from OA. Osteoarthritic knee pain, which is characterised by reduced quality of life, incapacity and loss of functional independence, may result from the interaction between biological, psychological and social factors, hence the need to view pain as a biopsychosocial experience[11]. Stress is a demand placed upon the adaptive capacities of the mind and body[12]. Van Houdenhove *et al*[13] defined stress as a threat (or perceived threat) to the organism's homeostasis, caused by a physical assault or a psychological burden (a stressor). Aftermath effects of various diseases and illnesses on the body and mind lead to stress. Chronic pain patients do report specific life events, which can influence the pain, and chronic pain has been shown to have a relationship with stress. Besides general life events, attention has also been paid to identify life events that cluster around pain disorders[14]. For example, Egwu *et al*[15] reported significant relationships between some life-stressing events among Nigerians with chronic low back pain and Steven[16] also reported a positive relationship between workplace stress and future back pain. However, studies show that it is not the life events that lead to adverse outcome to the chronic illness persons but the perceived impact of illness[17].

The correlation between the presence of structural OA (clinical signs, radiographic changes) pain and disability varies according to site. At the knee, reduced muscle strength and adverse psychological factors (anxiety, depression) correlate more strongly with pain and disability than the

degree of radiographic change.[18] Depressive symptoms are associated with the presence of one or more chronic diseases as well as disability[19-20]. It is generally agreed that patients' beliefs about their illnesses and coping strategies may aid adaptation to disease. Among those with rheumatic disease, optimal management can only be achieved if clinicians recognize relevant psychosocial factors and utilize psychosocial interventions that influence these factors[21]. Since pain perception, response and report vary from one ethnic/race to another, therefore, perception of life-stressful events and their relationship with OA of the knee may differ from one ethnic/race to another. This study was designed to investigate the relationship between life stressful events and osteoarthritic knee pain among Nigerian adults.

METHODOLOGY

The population for this study was sourced from patients receiving treatment at Murtala Mohammed Specialist Hospital (MMSH), Aminu Kano Teaching Hospital (AKTH), National Orthopaedic Hospital (NOH), and Mohammed Sir Sunusi Specialist Hospital all in Kano State, Nigeria. A total number of 200 questionnaires were distributed by the researcher to consecutively selected patients with diagnosed OA of the knee in the above-mentioned hospitals out of which 108 (54%) were returned. Sixty seven were females while 41 were males. Ethical approval for the study was obtained from Aminu Kano Teaching Hospital, Kano, Kano State, Nigeria.

The following instruments were administered on the subjects:

a. Western Ontario Macmaster Universities Index of Osteoarthritis (WOMAC): This was used to assess the presence of OA in the patients, and contains 24 questions divided into three domains – pain (5 questions), stiffness (2 questions) and physical functions (17 questions). The reliability and validity of WOMAC in assessing patients with OA have been documented[22].
b. The Modified Somatic Perception Questionnaire: This questionnaire identifies somatic complaints that may be associated with psychological responses such as anxiety or depression. Deyo *et al*[23] have ascertained the reliability and validity of this instrument.
c. Social Readjustment Rating Scale Questionnaire: This was used to assess life-stressing events. It contains 43 life-stressing items. Social Readjustment Rating Scale Questionnaire was based on the premise that good and bad events in one's life can increase stress levels and make one more susceptible to illness and mental problems[24]. Reliability of this outcome measure has been determined[25].

Data analysis

The data collected was subjected to descriptive statistics of mean and standard deviation. Differences in pain score between participants of different marital status and SES was determined by using ANOVA and Bonferroni posthoc analysis was used to determine where the differences were. Spearman rho was used to analyse the relationship between pain from osteoarthritis and life stressing events. Also, linear regression analysis was carried out to determine the impact of OA on life stressing events. Level of significance was set at 0.05. Data analysis was carried out using Statistical Package for the Social Sciences version 22 (SPSS Inc., Chicago, IL, USA).

RESULTS

A total number of 108 OA of the knee individuals consented and participated in

the study of which 62.04% (67) were female while 37.96% (41) were males. The mean WOMAC scores for the whole group is 15.8 (SD=10.6) and there are significant differences in WOMAC score, SES and Somatic perception (SP) between male and female as summarized in **table 1**. T-test as shows a significant difference in physical function, social function and somatic perception between male and female participants. However, no significant difference is observed in pain, stiffness, emotional function, SRS and WOMAC scores between male and female.

Table 1: Gender Differences in OA of the Knee and life-Stressing Events

	Male n(41)	Female n(67)	Total	p-value
Pain	4.46±3.00	4.14±2.19	4.27±2.52	0.56
Stiffness	1.70±1.69	1.43±1.30	1.54±1.46	0.35
Physical function	12.45±9.63	8.48±7.60	9.97±8.60	0.02*
Social function	5.32±4.90	2.78±3.16	3.74±4.08	0.00*
Emotional function	4.85±2.88	5.55±3.29	5.29±3.14	0.25
Somatic Perception (SP)	7.63±6.54	12.18±10.99	10.45±9.76	0.00*
SRS	274.22±146.77	275.16±150.93	274.81±148.68	0.98
WOMAC SCORES	18.32±11.93	14.06±9.46	15.67±10.62	0.06

ANOVA shows significant differences in pain (F(3,104)=2.84, p=0.42), physical function (F(3,103)=4.02, p=0.01), social function (F(3,104)=3.97), p=0.01), SRS (F(3,104)=4.63, p=0.01) and WOMAC SCORES (F(3,104)=4.50, p=0.01) between subjects of different marital status (**Table 2**).

However, Bonferroni posthoc analysis shows that there are significant differences in physical function (M=9.96, SD=8.59, p=0.025), social function (M=3.74, SD=4.08) and WOMAC SCORES (M=15.68, SD=10.62) between married and widowed and in SRS between married and single (M=274.81, SD=148.68) and single and widowed (M=274.81, SD=148.68) respectively. No significant differences were observed for stiffness, emotional function and somatic between subjects of different marital status as shown in **Table 2**.

Relationships between life stressing events and OA of the knee as measured by WOMAC are illustrated in the **Table 3**. There is a positive significant relationship between SRS and emotional function (r=0.331) among male participants. Although, there are no significant correlation between WOMAC and life stressing events among female participants, but there are positive significant relationships between emotional function and pain (r=0.376), emotional function and stiffness (r=0.328), somatic perception and pain (r=0.286), somatic perception and emotional function (r=0.588) as well as SRS and emotional function (r=0.257).

Table 2: Differences in OA of the knee and life-stressing events between marital statuses

	n	m±SD	p-value	F
Pain				
Married	71	4.72±2.68		
Single	9	2.56±2.01	0.042	2.840
Widowed	22	3.78±2.07		
Divorced	6	3.33±0.82		
Stiffness				
Married	71	1.61±1.21		
Single	9	2.33±3.28	0.121	1.985
Widowed	22	1.00±1.07		
Divorced	6	1.50±0.84		
Physical function				
Married	71	11.89±9.58		
Single	9	5.00±5.83	0.009*	4.024
Widowed	22	6.00±4.00		
Divorced	6	8.33±1.75		
Social Function				
Married	71	4.63±4.61		
Single	9	1.11±1.97	0.010*	3.968
Widowed	22	2.05±1.83		
Divorced	6	3.33±1.21		
Emotional function				
Married	71	5.32±2.84		
Single	9	7.00±3.94	0.271	1.324
Widowed	22	4.73±3.69		
Divorced	6	4.33±2.88		
Somatic perception				
Married	71	11.06±10.01		
Single	9	10.67±12.39	0.765	0.384
Widowed	22	9.23±8.74		
Divorced	6	7.50±6.78		
SRS				
Married	71	279.51±151.81		
Single	9	117.00±149.88	0.004*	4.631
Widowed	22	323.91±117.04		
Divorced	6	275.83±34.45		
WOMAC SCORES				
Married	71	18.21±11.96		
Single	9	9.33±6.50	0.005*	4.495
Widowed	22	10.77±3.64		
Divorced	6	13.17±3.25		

Table 3: Relationship between osteoarthritis of the knee and life-stressing events (male and female)

		Pain	Stiffness	Physical function	Emotional function	Somatic perception	SRS	WOMAC SCORES	SES	
MALE	Pain	1	0.560**	0.492**	0.376**	0.286*	0.194	0.703**	-0.025	FEMALE
	Stiffness	0.131	1	0.290*	0.328**	0.190	0.154	0.500**	-0.062	
	Physical function	0.563**	0.439**	1	-0.047	-0.205	0.005	0.957**	-0.113	
	Emotional function	0.086	0.017	-0.058	1	0.588**	0.257*	0.094	-0.090	
	Somatic perception	-0.136	0.144	-0.186	0.169	1	0.064	-0.072	0.036	
	SRS	0.453**	-0.065	0.137	0.331*	0.151	1	0.070	0.124	
	WOMAC SCORES	0.743**	0.198	0.970**	0.004	-0.179	0.257	1	-0.105	

Table 4 below shows the relationships between knee OA (WOMAC SCORES) and life stressing events as measured by emotional function, somatic perception and social readjustment rating (SRS) scale. No significant relationship between the whole WOMAC SCORES and life stressing events but there are significant associations between emotional function and somatic perception (r = 0.490) and SRS and emotional function (r = 0.281).

Linear regression analysis was carried out to determine the impact of OA on life stressing events. The model contained social function, emotional function, somatic perception and SRS using WOMAC Scores as dependent variable. The output showed a moderate association between OA of the knee and life-stressing event (R = 0.48) and 23.2% of the variation (R^2 = 0.232) in OA of the knee could be explained by life-stressing events. The results also show that life-stressing events significantly predict OA of the knee, F (5, 102) = 6.160, p < 0.001, R^2 = 0.232.

Table 4: Factors associated with Anemia in study participants

	Pain	Stiffness	Physical function	Emotional function	Somatic perception	SRS	WOMAC SCORES
Pain	1						
Stiffness	0.341**	1					
Physical function	0.531**	0.316**	1				
Emotional function	0.239*	0.186	-0.071	1			
Somatic perception	0.118	0.139	-0.230*	0.490**	1		
SRS	0.304**	0.058	0.062	0.281**	0.083	1	
WOMAC SCORES	0.720**	0.360	0.965**	0.035	-0.139	0.145	1

DISCUSSION

The outcome of this study shows that there are significant differences in physical function, social function and somatic perception between male and female patients. Also, there are significant differences in sub-scales of WOMAC (pain and physical function), social function, SRS and whole WOMAC score between patients of different marital status. Posthoc analysis shows that there are significant differences in physical function, social function and WOMAC scores between married and widowed and in SRS between married and single, and widowed and single. However, no differences are observed in stiffness, emotional function and somatic perception between patients of different marital status after posthoc analysis. There is positive significant relationship between WOMAC SCORES and emotional function, somatic perception and SRS when gender and marital status were not taken into consideration. Also, there is positive significant relationship between SRS and emotional function among male patients and positive significant relationships between emotional function and pain, emotional function and stiffness, somatic perception and pain, somatic perception and emotional function and SRS and emotional function among female patients.

Osteoarthritis of the knee has been a major clinical problem that affects functional capacity and quality of life of both male and female. The outcome of our study shows that male and female are affected differently in physical function, social function and somatic perception, which is in consistent with previous studies. Recently, it was reported that women had poorer perceived function and more impairment on specific functional tasks[26]. Knee Society Score Scale and the WOMAC were used to show that women had a greater reduction in perceived function when compared with men[27,28] and also, women showed worse score during performance functional tests such as 6-minute walk test and time-up and go test[29,30]. Furthermore, in a multicenter OA study, Glass et al reported women had greater knee pain which might eventually lead to reduction in the functional ability of women[31]. Elboim-Gabyzon *et al* also reported female subjects' higher levels of knee pain and lower functional performance among the Israelis[32]. The degree of functional impairment has been reported to be greatest among females with total knee replacement group and they required greater effort to perform each of the functional tasks they were exposed to[33]. Also, there are significant differences in sub-scales of WOMAC (pain and physical function), social function, SRS and whole WOMAC score between patients of different marital status. A section of demographic variables have been shown to influence pain, physical and social functions reporting among individuals with knee OA. This study shows that there are differences in pain, physical and social functions in patients with knee osteoarthritis. This is in line with the study of Roubion[34] where it was reported that married patients had less severe pain and better function than unmarried patients after total knee arthroplasty. Posthoc analysis shows that there are significant differences in physical function, social function and WOMAC scores between married and widowed and in SRS between married and single, and widowed and single. However, no differences are observed in stiffness, emotional function and somatic perception between patients of different marital status after posthoc analysis.

Low quality of life, poor psychological health status, joint stiffness, pain and reduction in functional are all features of most musculoskeletal disorders especially osteoarthritis[35]. This is in line with our study, which shows an association between osteoarthritis of the knee and psychological

and life-stressing events occasioned by OA of the knee irrespective of marital status and gender. Also, our study findings are consistent with previous studies reported in the literature that OA is associated with joint impairment, affectation of mental health and reduced quality of life[36,37]. Health-care managers of OA of the knee should usually focus on traditional biomedical evaluation and management of OA of the knee oblivious of the fact that the disease has psychological aspect too. Chronic pain, like OA of the knee, affects all aspects of the person's functioning vis-à-vis physical, emotional, interpersonal and avocational aspects[38]. Hence, knee OA management should be all encompassing involving both biomedical and psychological approaches for effective treatment outcomes.

Difference was observed in somatic perception between male and female participants in our study. Osteoarthritis of the knee is associated with psychological and life stressing events aside from the physical limitations that have been reported in literature. Depression and other psychological complaint by the knees OA individuals have been shown to be consequences of OA and not predisposing factors[39]. In line with this study, gender differences in depression (somatic disorder) has been reported in a study from 17 countries across 6 continents in individuals with chronic pain and that higher depressive prevalence is seen in female than male[40]. Furthermore, women (especially women with chronic pain) with have been shown to report pain complaint than men among individuals with depression[41].

CONCLUSION

This study shows that OA of the knee is associated with emotional and life-stressing events. Also, there are gender differences in knee OA, emotional status and life-stressing event among individuals with OA of the knee. Osteoarthritis of the knee management should contain both biomedical and psychological components.

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Author affiliations

[1]Department of Physiotherapy, Faculty of Allied Health Sciences, Bayero University, Kano, Kano State, Nigeria

[2]Ministry of Health, Southern Province, Livingstone, Zambia

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