

Influence of Pain Intensity and Difficulty on Health-Related Quality of Life of Patients with Knee Osteoarthritis

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ABSTRACT

Background: Knee osteoarthritis (OA) is one of the most common causes of pain and disability in the western world and it affects up to 80% of people over the age of 65.

Aim: The objective of this study was to examine the influence of self-reported symptoms of knee OA (KOA) on the health-related quality of life (HRQoL) of patients with KOA.

Materials and Methods: Seventy patients diagnosed with KOA were purposively recruited for the study. The Western Ontario and McMaster Universities OA Index was used to assess the pain intensity, functional difficulty and stiffness, whereas HRQoL form Short-Form 12 Health Survey was used to assess the quality of life of patients with KOA. The data collected were analysed using SPSS version 17. Descriptive and inferential statistics were used to summarise the data.

Results: There was a statistically significant negative relationship between age and physical difficulty ($r = -0.301$ $P < 0.001$). There was a statistically significant negative correlation between health quality domain (Hex) and present pain intensity ($r = -0.473$ $P < 0.01$). There was a statistically significant negative relationship between Hex and total difficulty ($r = -0.321$ $P < 0.05$).

Conclusion: It was concluded from the study that in patients with KOA, the higher the pain intensity and/or physical difficulty, the lower the patient's HRQoL.

Key words: Functional difficulty, knee osteoarthritis, pain intensity, quality of life, stiffness

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INTRODUCTION

Health-related quality of life (HRQoL) refers to how patients assessed their present status of functions and contentment in comparison to an ideal situation.¹ To describe the effect of a disease, the treatment of that disease and assault of such disease on an individual, it is essential to examine the symptom of such a disease in relation to their HRQoL by Adegoke *et al.*² This has made HRQoL become an important outcome measures in evaluating the effect of chronic diseases in the general population and as a measure of effect of health service.³⁻⁵ The effect of some chronic diseases do not result in mortality but can be life-threatening and impose a lot of demand on health

care of the sufferer.⁶ Rheumatic diseases and arthritis are the examples of such chronic diseases, though not always cause death but have significant effect on health. Therefore, HRQoL serves as an indicator for the assessment tool for the effect of such diseases in the community.⁷

Inflammatory joint disorder commonly called osteoarthritis (OA) is a joint disorder, characterised with the progressive erosion of articular cartilage, degeneration of joint cartilage and the underlying bone, most common from middle age onward resulting into joint pain and stiffness.⁸ Its effects on activities of daily living and functions have christened OA as a crippling disease that imposed a critical economic implication on the society.⁹ OA which is the most common

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joint disorder is a leading musculoskeletal cause of disability in elderly persons worldwide and a major cause of physical limitations and reduced quality of life.¹⁰ Knee OA (KOA) is not a localised disease of cartilage alone but it is considered as a chronic disease of the whole joint, including articular cartilage, meniscus, ligament and periarticular muscle that may result from multiple pathophysiological mechanisms. It is painful and disabling disease that affects millions of patients.¹¹ While OA is equally present in men and women, it appears to be more common among younger men (<45 years) and in older women (>45 years).¹²⁻¹⁵

Zhang *et al.* reported that symptomatic KOA occurs in 10% of men and 13% in women aged 60 years or older worldwide.¹⁶ With respect to Nigeria, Akinpelu *et al.* also reported the prevalence and pattern of KOA in Igbo-Ora, a rural community in South-western Nigeria, and found that the KOA among the people was 21.4% among females and 17.5% among males concluding that one out of every five adults aged 40 years and above in a Nigerian rural community may have symptomatic KOA.¹⁷

Pain is the major symptom of OA, on which individuals to seek medical attention; this contributes immensely to functional limitations and reduced quality of life.¹⁸ The nature of the pain is often described as dull and ill-defined. Pain is exacerbated by joint use and relieved by rest. The origin of pain is poorly understood. Hyaline cartilage lacks pain nociceptors, but neighbouring structures do possess them.¹⁹ Pain from articular cartilage lesions results from mechanical irritation of loose flaps of cartilage, from synovial and capsular inflammation and from subchondral bone sclerosis that acts on the periarticular nerve endings. The stimuli causing pain are related to, but fundamentally different from, those producing cartilage loss. In advanced cases, however, pain also persists at rest and night because the protective muscle splinting mechanism around the joint has been lost.²⁰

Other forms of KOA symptoms of concern especially in this research are pain, joint stiffness and functional difficulty. The study was designed to examine the effect of the symptoms of KOA on the quality of life of patients with KOA. Research has been conducted on influence of pain on HRQoL among cancer patients by Montazer.²¹ Over the past three decades, evaluation of the quality of life has become increasingly important in health care.²² The term 'quality of life' has been used to describe a variety of different things such as health status, physical functioning, symptoms, psychosocial adjustment, well-being, life satisfaction and happiness²³ although it is vague with little consistency.²⁴

According to the World Health Organisation,²⁵ quality of life 'is defined as an individual's perception in life in the context of the culture and the value system in which they live and in relations to their goals, expectations, standards and concerns'. It is a broad-ranging concept incorporating in a complex way the person's physical health, psychological state, the level of independence and the social environment.²⁶

This definition reflects the view that quality of life refers to a subjective evaluation which is embedded in a cultural, social and environmental context.²⁶ However, the influence of pain intensity, stiffness and physical function on HRQoL among individuals with KOA have not been well-studied in this environment. The study was designed to examine the effect of the symptoms of KOA on the quality of life of patients with KOA.

MATERIALS AND METHODS

Participants

Participants for this study were patients of age equal to or >40 years diagnosed with KOA.

Inclusion criteria

The inclusion criteria were male and female patients of age 40 years and above diagnosed with KOA of a duration of not <6 weeks or more (subacute or chronic).

Exclusion criteria

The exclusion criteria were patients with knee pain other than that due to KOA, patient with knee surgery or patient that sustain recent trauma at the knee joint.

Study design

The study is a correlational study of the effect of symptoms of KOA on HRQoL of individual with KOA.

Sample size determination

The sample size was calculated using the 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).²⁷

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

The sample size was rounded up to 70 to accommodate for non-response.

Sampling technique

Purposive sampling technique was used to recruit patients with KOA for the study.

Instruments

Western Ontario and McMaster Universities Osteoarthritis Index

The Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) was used as outcome measure for the study. WOMAC, developed by Western Ontario and McMaster University in 1982, was designed to assess the pain, stiffness and physical difficulty in patients with hip and/or KOA.²⁸

WOMAC is a proprietary set of standardised questionnaires used by health professionals to evaluate the condition of patients with OA of the knee and hip. It consists of 24 items divided into three subscales; pain (5 items): during walking, using stairs, in bed, sitting or lying and standing. Stiffness (2 items): after first waking and later in the day. Physical function (17 items): stair use, rising from sitting, standing, bending, walking, getting in/out of a car, shopping and putting on/taking off sock.

The questionnaire was used to measure the pain intensity, joint stiffness and physical difficulties of patients with KOA patients. The questionnaire is a score on the 5-point Likert scale.

WOMAC was used to assess joint pain, stiffness and physical dysfunction perceived in the past 48 h.²⁸ The final score will be obtained by the sum of the points of all domains and ranges from 0 to 100 points. The function subscale of the WOMAC is a valid, reliable and responsive measure of functional impairment in the hip and KOA.²⁸ According to a survey conducted by Seror *et al.*²⁹ on individualising the WOMAC function subscale, the construct validity of all individualised scales was highly convergent with the WOMAC function subscale ($\rho \geq 0.75$). Individualised scales involving all 17 items correlated more strongly with the WOMAC function subscale than shorter scales such as WOMAC top 5 or scales derived from the WOMAC short form. However, the additive scale using VAS for rating of importance was less correlated with the WOMAC function subscale than all other scales. Lower correlations ($\rho < 0.5$) were obtained between all scales measuring functional status and pain and global assessment of activity.²⁸ All WOMAC scales were internally consistent with Cronbach's alpha coefficients of 0.83, 0.87 and 0.96 preoperatively. Test-retest reliability was satisfactory with the intraclass correlation coefficients of 0.74, 0.58 and 0.92. As hypothesized, worse post-operative but not pre-operative outcomes were associated with radiographic OA.²⁹

Health-Related Quality of Life form Short-Form 12 Health Survey

The Short-Form 12 Health Survey (SF-12) contains eight domains: physical functioning, physical role, bodily pain, general health perceptions, vitality, social functioning, emotional role and mental health. The first four domains (physical functioning, physical role, bodily pain and general health perceptions) assess physical health, whereas the last four (vitality, social functioning, emotional role and mental health) assess mental health.³⁰ The questionnaires consist of 26 questions which were scored on a 5-point Likert scale which is in a positive direction.

Research procedure

Approval of the Research and Ethical Committee of the Institute of Public Health, Obafemi Awolowo University, Ile-Ife, Nigeria was obtained (HREC NO: IPHOAU/12/518) for the study. The study procedure and rationale were explained to the participants, and their informed consent to participate was obtained. They were also assured that all information provided by them on the questionnaire would be treated

with utmost confidentiality. Participants were subsequently administered the questionnaire.

Assessment of pain intensity, stiffness and difficulty

WOMAC was administered to examine pain intensity, stiffness and difficulty of the patients. Each patient was asked to complete the questionnaire as soon as it was given. Those who cannot read were assisted with the interpretation of the questionnaire to give them understanding.

Assessment of quality of life

The SF-12 HQoL questionnaire was administered as well to each of the respondents in which it was required to be filled. Those who did not understand English were assisted with the interpretation, and the response was marked in the questionnaire containing eight domains: physical functioning, physical role, bodily pain, general health perceptions, vitality, social functioning, emotional role and mental health. The first four domains (physical functioning, physical role, bodily pain and general health perceptions) assess physical health, whereas the last four (vitality, social functioning, emotional role and mental health) assess mental health.

Assessing the intensity of pain: the semantic differential scale was used. It consists of a 10-cm line, whose left extremity indicates 'no pain' and the right extremity indicates 'worst pain possible'. The patient was instructed to check the point that indicates his/her pain intensity, and the higher the score, the greater the intensity of the pain.³¹

Data analysis

The data collected were analysed using SPSS version 17 (Chicago Illinois). Descriptive and inferential statistics of Spearman's rho was used to assess the relationship between HRQoL and each of pain intensity, difficulty and physical function. An alpha level of 0.05 was used.

RESULTS

Physical characteristics of respondents

Table I shows the physical characteristics of the respondents. The mean \pm standard deviation score of the variables are; age,

Table I: Distribution of respondents' characteristics (n=70)

Variables	Range	Mean \pm SD
Age (years)	48.00-87.00	67.46 \pm 10.71
Hex	0.00-100.00	64.51 \pm 30.08
DurPn	4.00-240.00	40.73 \pm 52.74
PPI	2.00-9.00	5.36 \pm 1.68
PhyD	5.00-310.00	171.97 \pm 65.78
MentD	145.00-315.00	232.19 \pm 45.36
PnTotal	1.00-14.00	8.02 \pm 2.88
StiffTotal	0.00-8.00	3.58 \pm 2.12
DiffTotal	6.00-60.00	27.95 \pm 10.63

Hex: Health quality domain, PPI: Present pain intensity, PhyD: Physical domain, MentD: Mental domain, PnTotal: Total pain score, StiffTotal: Total stiffness score, DiffTotal: Total difficulty score, SD: Standard deviation, DurPn: Duration of pain

67.46 ± 10.71 years; health quality 64.51 ± 30.08; duration of pain in months 40.73 ± 52.74; present pain intensity (PPI), 5.36 ± 1.68; physical domain (PhyD) 171.97 ± 65.78; mental domain 232.19 ± 45.36; total pain intensity score 8.02 ± 2.88; total stiffness score 3.58 ± 2.12 and total difficulty score 27.95 ± 10.63.

Gender and occupational distribution of participants

Table II shows the frequency of occurrence and percentage of females and males. Thirty-eight were (92.7) female, whereas three (7.3) were male.

Table II also shows the occupational distribution of the respondents. Their occupation ranges from civil servants, retiree and trading. Twenty-five (61.0%) were traders, eight were civil servants with a percentage of 19.5% and five (12.3%) were retired.

According to Table III, there was a statistically significant relationship between health quality domain (Hex) and PhyD ($r = 0.587 P > 0.01$).

There was an inverse relationship between Hex and PPI ($r = -0.473 P > 0.01$); also, there was an inverse relationship between Hex and total difficulty (DiffTotal) ($r = -0.321 P > 0.05$).

DISCUSSION

The aim of this study was to assess the influence of pain intensity and difficulty of HRQoL in patients with KOA. The

study found that the average age of patients was >60 years. Thus, one of the major factors pre-disposing people to OA is age. Most of the conditions associated with ageing OA result from an age-related loss in the ability of cells and tissues in the body to maintain homeostasis, particularly when put under stress.³² At old age, there is a reduction in chondroblast formation due to reduced cell activity. A potential contributor to the age-related increase in cartilage catabolism may be the finding that chondrocyte anabolic activity goes down with age. Our findings supported the report of Lawrence *et al.*³³ where they asserted that OA prevalence increased with age and affected the hands and knees of women more frequently than men. In this study, there was no relationship between age and mental domain and health domain, but there was a significant correlation between age and PhyD. In line with this, a recent study³⁴ showed that there was not a significant correlation between age and any subscale of QoL in KOA, except the physical subscale score. Studies reported that there was a significant negative correlation between age and physical functioning, indicating deterioration of this domain as patients become older.³⁵ This was in line with our findings. It is a common adage that as one grows older, the health status diminishes due to wearing and tearing of body tissues, bone blood and nerves from repeated usage, and hence, age may affect HRQoL.³⁶

According to this study, larger percentage was females. The marked gender difference is not far-fetched from the increase in body weight (obesity) which is a risk factor for KOA resulting from the formation of excess fat layers in the body. Because adipocytes share a common mesenchymal stem cell precursor with osteoblasts, chondrocytes, tenocytes and myoblasts, a link may exist between lipid and connective tissue metabolism in OA.³⁷ In obesity, the impact causing joint overload is associated with articular cartilage 'wear and tear'.³⁸ This result supported the observation of Felson and Zhang, in which it was revealed that two-thirds of OA patients tend to be women.³⁹ Women are more affected due to the post-menopausal hormonal changes that occur resulting in degeneration of the bones and cartilages at joints.³⁹ The incidence rate of OA increased with age, and level off around age 80 with women have higher rates than men, especially after age 50⁴⁰ and the symptoms manifest worse in women.⁴¹

Table II: Gender and occupational distribution (n=70)

Variables	n (%)
Sex	
Female	65 (92.7)
Male	5 (7.3)
Total	70 (100.0)
Occupation	
Civil servant	13 (18.6)
Retiree	8 (11.4)
Trading	43 (61.4)
Others	6 (8.6)
Total	70 (100)

Table III: Relationship among mental domain, physical domain, present pain intensity, pain total, joint stiffness and difficulty total

	Hex	PhyD	MentD	PPI	PnTotal	StiffTotal	DiffTotal
Hex	1						
PhyD	0.587**	1					
MentD	0.211	0.225	1				
PPI	-0.473**	-0.176	-0.048	1			
PnTotal	-0.102	0.015	-0.015	0.225	1		
StiffTotal	0.217	0.129	-0.144	0.232	0.284	1	
DiffTotal	-0.321**	-0.90	-0.218	0.040	0.322*	0.436	1

**Correlation is significant at the 0.01 level (two-tailed), *Correlation is significant at the 0.05 level (two-tailed). Hex: Health quality domain, PPI: Present pain intensity, PhyD: Physical domain, MentD: Mental domain, PnTotal: Total pain score, StiffTotal: Total stiffness score, DiffTotal: Total difficulty score

More so, the study revealed that as total pain intensity increases, difficulty increases which invariably affected quality-of-life negatively. Reports revealed that KOA is associated with symptoms of pain and functional disability which reduces the quality of life and increases the risk of further morbidity and mortality.⁴² This may be deduced by the fact that dysfunction and inabilities of patients with KOA are majorly as a result of pain and difficulty of individuals with KOA. It prevents people from attending social functions, civil responsibility and religious matters. Hence, it affected the quality of life. However, our findings were at variance with the study of Adegoke *et al.*,² where they concluded that KOA does not have influence in HRQoL of Nigerians. The cause of variance in the findings of the two studies may be adduced by the fact that Adegoke *et al.*'s work employed knee injury and OA outcome score while WOMAC was used for this study.²

The study observed further that larger percentage of the respondents was trader. This was in line with a study by Ojoawo *et al.*⁴³ in a population study at Odoogbe where they found a female and trader predominance with KOA. The reasons for women and traders found with OA were interrelated. Studies have shown that frequent bending which characterised some occupation including trading is a major risk factor for developing KOA.⁴⁴ With respect to the female gender, research on KOA from Framingham submitted that occurrence of KOA women is as high as double than that of men. Most of these women with KOA were at their post-menopause age which is a pointer that hormone especially oestrogen may be implicated as a pivotal in the development of OA.⁴⁵

CONCLUSION

It was concluded that the more the pain intensity, the less the HRQoL of patients with KOA.

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Conflicts of interest

There are no conflicts of interest.

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