Original Article

Psychometric Properties of Translated Knee Outcome Survey–Activities of Daily Living Scale from English to Yoruba Language among Patients with Knee Pathologies

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ABSTRACT

Introduction: The study translated the Knee Outcome Survey–Activities of Daily Living Scale (KOS-ADLS) from English to Yoruba language and established the reliability and validity of Yoruba version with the original English version.

Methods: Seventy-four patients with knee pathologies in selected hospitals, South West Nigeria, participated in the study. The original version of KOS-ADLS was translated to Yoruba by two Linguists from Obafemi Awolowo University, Ile-Ife, whose mother tongue is Yoruba. The Yoruba version was retranslated by another specialist in English Language, but the mother tongue is Yoruba from the English Department of the same university. The original KOS-ADLS questionnaire was administered to each participant, and 3 days later, the translated KOS-ADLS questionnaire was readministered. After 2 weeks, a copy of the Yoruba translated version was readministered to each participant. The data collected were analysed using descriptive and inferential statistics. Alpha level was set at 0.05.

Results: There were 67.6% of females participants, and 70.2% were fluent in both Yoruba and English languages. The concurrent validity of translated KOS-ADLS shows a significant relationship between original and translated versions of symptoms ($r = 0.828$, $P < 0.001$) and functional limitation ($r = 0.973$, $P < 0.001$). There was a significant relationship between each of the score of symptoms ($r = 0.969$, $P < 0.001$) and functional limitation ($r = 0.983$, $P < 0.001$) of translated KOS-ADLS and score of Yoruba retranslated KOS-ADLS. Intra-class correlation of the test–retest was 0.813 and the Cronbach's alpha was 0.897.

Conclusion: It can be concluded that there was a strong relationship between the Yoruba and original versions of KOS-ADLS in all domains and test–retest reliability was very strong.

Key words: Functional limitations, knee osteoarthritis, Knee Outcome Survey–Activities of Daily Living Scale, symptoms, Yoruba language

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INTRODUCTION

One of the health challenges facing the world population currently is chronic diseases of the musculoskeletal system among which osteoarthritis (OA) is prominent.[1] Studies have shown that OA is affecting about 60%–70% of the population older than 60 years in Nigeria[2-4] and the commonly involved joint is the knee joint accounting for 65%–78% of cases presenting in Nigerian hospitals.[4,5] According to Akinpelu *et al*.,[2] one out of every five adults older than 40 years in a rural setting in South West Nigeria, Igbo-Ora, in Oyo State has symptomatic knee OA, with a female to male ratio of 1:2.1. Ojoawo *et al*. established knee osteoarthritis (KOA) prevalence of about 40% in the population of another Yoruba-speaking urban community,[6] indicating that there is a high prevalence of KOA among Yoruba community.

There are many outcome measures for clinicians and researchers to use with a client presenting with knee

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dysfunctions; these include the Arthritis Impact Measurement Scale,[7] Oxford Knee Score,[8] and Western Ontario and McMaster Universities Osteoarthritis Index. Another of the outcome measures is the Knee Outcome Survey–Activities of Daily Living Scale (KOS-ADLS) which combines questions on symptoms and functional limitations.[9] The KOS-ADLS is a subject self-report instrument that includes a subscale of ADLS. The ADLS queries patients about how their knee symptoms affect their ability to perform general daily activities as well as how the knee condition affects their ability to perform specific functional tasks. The ADLS is a self-administered questionnaire designed to determine the symptoms and functional limitations in usual daily activities experienced within the last few days.[9] The KOS-ADLS questionnaire has excellent reliability and good responsiveness to treatment for patients with disorders of the knee in the United States of America in English Language.[9] The KOS-ADLS has been widely used in patients with knee disorders especially for OA, arthrosis, patellofemoral pain, menisci injury and acute ligamentous injury.[12,13] Marx *et al*., in New York, United States of America, investigated the reliability, validity and responsiveness of four knee outcome scales, including the KOS-ADLS among patients who have various athletic knee injuries. As a result, the KOS-ADLS was considered reliable with intra-class correlation coefficient (ICC) of 0.93.[13] With this, KOS-ADLS was reported to be valid, and responsive for use in clinical research, with good utility.[13]

The KOS-ADLS was developed originally in the English language but subsequently has been translated, validated and in some cases cross-culturally adapted into other languages such as Greek,[14] Portuguese,[15] Turkish,[16] German[11] and French.[17] Yoruba is the major language in South West Nigeria and is spoken by approximately 30 million Nigerians.[18] The Yoruba-speaking inhabitants are one of the largest ethnolinguistic groups in sub-Saharan Africa, constituting about 21% of the total population of modern-day Nigeria.[19] Previous studies have reported high prevalence of KOA among Yoruba ethnic groups in Nigeria.[4-6] For good clinical application within this region, there is a need to ascertain the reliability and validity of the Yoruba version of KOS-ADLS. Adamu reported that there were 65–75 million individuals without formal education in Nigeria.[20] Due to the poor literacy rate among the Yoruba ethnic group, the Yoruba translation of a widely used outcome measure such as the KOS-ADLS will be of immense benefit among patients with knee pathologies in this region of Nigeria.[21] It is, therefore, necessary to provide Nigerian language (Yoruba) versions of the index. The aim of this study was to translate KOS-ADLS from its original English language version to the Yoruba language and examine its psychometric properties in terms of its reliability and validity in order to overcome language barrier with the use of KOS-ADLS in clinical settings with respect to the management of knee pathologies.

METHODS

Participants

A total of 74 patients with knee pathologies such as knee OA and sports injuries such as ligamentous injury and meniscus injury including those with post-operative pain at knee joint presented in the study. These patients diagnosed and managed at the Orthopaedic Clinic of Obafemi Awolowo University Teaching Hospitals Complex (OAUTHC), Ile-Ife, Nigeria, were recruited into the study. These patients were referred for treatment at the Physiotherapy Outpatient Clinic of the same hospital.

Patient recruitment

All the patients who presented with knee pain receiving treatment at the Orthopaedic Outpatient Clinic of the OAUTHC, Ile-Ife, were recruited for the study. The following symptoms were the criteria for inclusion into the study: intrinsic joint changes, decreased joint flexibility, pain and joint effusion, crepitus, deformities of joint components and loss of function.[22] Non-Yoruba-speaking participants and patients with severe knee effusion and previous knee arthroplasty were excluded from the study.

Sampling technique and sampling size

Purposive sampling technique was used to recruit patients with various knee conditions who understood both English and Yoruba Languages for the study. Understanding both languages was a priority because the original version in English was administered, then the Yoruba version and the Yoruba retranslated version. The sample size was 74 participants, determined using the formula for calculating sample size to estimate a proportion at a given precision level.[23]

$$N = \frac{(Za + Zb)^2 \times p(1 - p)}{d^2}$$

N = sample size of a single study group, Z critical = 1.960 at 95% confidence interval – 95% confidence interval was chosen in order to give strong power to the study at an alpha level of 0.05, P = a pre-study estimate of proportion to be measured which may be assumed to be 0.80 and d = total width of expected confidence interval which is 0.20.

The equation yielded 61. Twenty per cent attrition was added thinking that some questionnaires may not be analysable or some questionnaires may not be returned. Therefore, 74 patients were recruited for the study.

Research design

It was a descriptive cross-sectional study.

Instruments

KOS-ADLS questionnaire was used in this study.

The KOS-ADLS is a 25-item scale, with the items divided into four sections. The sections are as follows: A – What degree does each of the following symptoms affect your level of activity? B – How does your knee affect your ability to? C – To what degree does each of the following symptoms affect your level of sports activity? D – How does your knee affect your ability to? Patients are to check one answer on each line of the subscale.

Section A has eight questions concerning symptoms: pain, grating, stiffness, swelling, giving way, buckling, weakness and limping. The responses are scored in a Likert-type format and graded on a scale from 0 to 5, with 5 being no symptom and 0 being the highest limitation caused by the symptom. Thus, the lower the score on this subscale, the worse the symptoms experienced from the knee pathology. Questions regarding functional limitations were also eight which include: walking, ascending and descending stairs, standing, kneeling, squatting, sitting and rising from a chair.[9] The responses were graded on a 0–5 scale, where 5 indicates no limitation and 0 indicates a high level of functional limitation. The lower the score on the functional subscale, the greater the limitation experienced. The scores on the symptoms and functional subscales are added to obtain the total score.[9] In addition to KOS-ADLS questionnaire, enquiry on the sociodemographic data of each patient was added.

Interpretation of Knee Outcome Survey–Activities of Daily Living Scale

What we did was basically a forward–backward translation of KOS-ADLS. The English version of the KOS-ADLS was translated to Yoruba Language from two linguists who were of Yoruba ethnicity from the Linguistic Department of the Obafemi Awolowo University, Ile-Ife. The translated version was used as the Yoruba version. The Yoruba version was taken back to the English Language Department of the same university for back-translation into English to ensure accuracy. This version was used as the retranslated version. The two versions were semantically and culturally appropriated. The Yoruba version was given to five patients to answer before the proper administration. The Yoruba retranslated was given to another five patients to answer. All areas of ambiguity were properly addressed for clarity. This provided feedback from a few patients before the actually collected data.

Procedure

Ethical approval was obtained (HREC NO: IPHOAU/12/303) from the Ethics and Research Committee of Institute of Public Health, Obafemi Awolowo University, Ile-Ife. Each patient was approached individually, the aim and objectives of the study were explained to each of them and the consent to participate was obtained. The procedure of answering the questionnaire was explained to each patient, and clarification was provided to any question not understood by the patient. Each participant was administered the English version of KOS-ADLS, and 3 days later, the translated KOS-ADLS questionnaire was administered. After 2 weeks, the Yoruba retranslated copy was readministered to each participant. This was to assess the test-retest reliability and validity of the translated copy. The score of the Yoruba version will be compared with the gold standard for validity. Participants answered the questions without gender bias.

Data analysis

The data collected were analysed using SPSS version 16 (Chicago Illinois). Data collected were analysed using descriptive statistics and inferential statistics. Spearman's rho correlation was used to examine the relationship between scores of original KOS-ADLS and translated scores for concurrent validity, and test–retest reliability was calculated between the translated and Yoruba retranslated scores using intra-class correlation and Cronbach's alpha. Level of significant was set at $P < 0.05$.

RESULTS

Sociodemographic data of respondents

Table I shows the sociodemographic data of respondents; 32.4% of the respondents were males, 79.8% of the respondents were married, 43.2% had tertiary education and 35.9% were civil servants.

Table II shows the mean of age, duration of onset of KOA and history of KOA in the family. The minimum age was 34 years and the maximum was 84 years, whereas the mean duration of KOA was 3.39 ± 1.49 years.

Table I: Sociodemographic data of respondents *n*=74

Variables	Frequency (%)
Sex	
Male	24 (32.4)
Female	50 (67.6)
Marital status	
Married	59 (79.8)
Widow	11 (14.9)
Single	2 (2.7)
Divorced	2 (2.7)
Educational level	
No education	10 (13.5)
Primary	12 (16.2)
Secondary	20 (27.0)
Tertiary	32 (43.2)
Yoruba and English language speaking	
Yoruba speaking only	22 (29.7)
English and Yoruba	52 (70.2)
Occupation	
Civil servant	26 (35.9)
Retired	13 (17.7)
Business	18 (23.3)
Artisan	17 (23.1)

Table II: Mean age, duration and family history of knee osteoarthritis

Variables	Minimum	Maximum	Mean±SD
Age (years)	34.00	83.00	58.34±10.16
Duration of KOA (years)	1.00	7.00	3.39±1.49
History of KOA in the family, frequency (%)			
Yes		51 (68.9)	
No		23 (31.1)	

KOA: Knee osteoarthritis

Table III shows the relationship between the original KOS-ADLS and the translated score of KOS-ADL. There was a significant relationship between total scores of the KOS-ADLS of the original and translated (r = 0.828, P < 0.001), and there was a significant relationship between total scores of the functional limitation (TFLS) of the original and translated (r = 0.973, P < 0.001).

Table IV shows the relationship between the first score of translated KOS-ADLS and 2-week score of Yoruba retranslated KOS-ADLS score. There was a positive significant relationship (r = 0.990, P < 0.001) between the first score of total scores of symptoms on the original questionnaire of translated KOS-ADLS and Yoruba retranslated score, and there was a positive significant relationship (r = 0. 953, P < 0.001) between the first score of TFLS translated KOS-ADLS and Yoruba retranslated score.

Table V shows the test–retest reliability with Cronbach's alpha of the translated version scores of the retest score after 2 weeks of the first administration. The intra-class correlation of the test–retest was 0.813 and the Cronbach's alpha was 0.897.

Table III: Summary of Spearman's rho showing relationship between scores from original questionnaire and scores from translated Knee Outcome Survey-Activities of Daily Living Scale

Variables	TADLS	TFLS	TADLS2
TADLS	1		
TFLS	0.580**	1	
TADLS2	0.831**	0.702**	1

**Significant at P < 0.001. TADLS: Total scores of symptoms on the original questionnaire, TFLS: Total scores of functional limitations on the original questionnaire, TADLS2: Total scores of symptoms on the translated questionnaire

Table IV: Summary of Spearman's rho to show relationship between the first score of translated Knee Outcome Survey-Activities of Daily Living Scale and 2-week score of translated Knee Outcome Survey-Activities of Daily Living Scale score

Variables	TADLS2	TFLS2	TADLS3	TFLS3
TADLS2	1			
TFLS2	0.415**	1		
TADLS3	0.990**	0.494**	1	
TFLS3	0.415**	0.953**	0.724**	1

**Correlation is significant at the 0.01 level (two-tailed). TADLS2: Total scores of symptoms on the translated questionnaire, TFLS2: Total scores of functional limitations on the translated questionnaire, TADLS3: Total scores of symptoms on the translated questionnaire administered at 2 weeks, TFLS3: Total scores of functional limitations on the translated questionnaire administered at 2 weeks

Table V: Test-retest reliability score of the translated Yoruba Version

KOS-ADLS	Test	Retest	ICC	CA
TADLS	12.27±5.19	12.38±5.20	0.813	0.897
TFLS	22.09±6.50	22.23±6.66	0.973	0.986

TADLS=Total scores of symptoms on the Translated Questionnaire, ICC: Intra-class correlation, CA: Cronbach's alpha, KOS-ADLS: Knee Outcome Survey-Activities of Daily Living Scale, TFLS = Total scores of function on translated questionnaire

DISCUSSION

This study translated KOS-ADLS from English to Yoruba language and determined the psychometric properties of the translated copy. This is with the aim of overcoming the language barrier in clinical settings with respect to the management of knee pathologies.

There were 24 males and 50 females who participated in the study. This may be inferred that the number of females was almost double that of male. A similar observation was recorded by Felson *et al*., and Srikanth *et al*., where they found that OA of the knee affects a greater percentage of women than men due to hormonal factors.[24,25] More so research on KOA from Framingham submitted that the occurrence of KOA in women is as high as double that of men.[24]

Our study observed that the minimum age for the participants and the mean age were 34 years and 58.34 ± 10.16 years, respectively. This was in agreement with the study of Losina *et al*.,[26] where they found that the incidence of diagnosed symptomatic knee OA in the US was highest among adults aged 55–64 years, and they concluded that the diagnosis of knee OA occurs relatively early in life.

The original KOS-ADLS is a valid and reliable instrument; the objectives of the study were to translate the original KOS-ADLS to Yoruba language and to provide psychometric properties for the usage among Yoruba-speaking community.

Our study observed a strong correlation between test–retest variables when the total score of symptoms and functional limitations of translated copy was compared with Yoruba retranslated copy considered 2 weeks after the first administration of the translated questionnaire. Irrgang *et al*.[9] reported an ICC of 0.97 for the total score in their original study. This was similar to that found with the German version of the KOS-ADLS (ICC range, 0.94–0.97).[11] Our ICC was 0. 819 for total score of symptoms and 0.937 for total score of functional limitation, indicating a high test–retest reliability for the Yoruba version. Irrgang *et al*.[9] reported that the internal consistency of the KOS-ADLS was very good, with a Cronbach's alpha of 0.92, when compared with the Lysholm Knee Scale (Cronbach's alpha, 0.60). The Cronbach's alpha calculated in our study was 0.896 and 0.897 for the symptoms and functional disability, respectively, which was similar to that reported by Bizzini and Gorelick.[11] This indicated that the Yoruba version of the KOS-ADLS has high internal consistency reliability for all items of the questionnaire.

Our study employed the English version of KOS-ADLS to validate the translated Yoruba version since there is no

gold standard to test for measuring validity, especially of the instrument.[27] The result of the validity of the translated KOS-ADLS with the original copy showed a very high relationship in all domains. This inferred that all domains of the Yoruba version of KOS-ADLS are valid for the assessment of patients with knee OA. Furthermore, the test–retest reliability of KOOS at the 2nd week showed a very high reliability in all domains. The validity of KOS-ADLS has been established by Evcik *et al*.[16] using Visual Analogue Scale, get-up-and-go test and ascending/descending stair tests. This amounted to the fact that KOS-ADLS is a valid tool for assessing pain intensity and dynamic balance of patients with knee OA.

One major limitation of this study was that the interpretation could not be done into all the dialects within Yoruba language. However, a common and accepted dialect which was used to write the Bible in Yoruba Language was adopted for the interpretation. This dialect was accepted throughout the Yoruba race irrespective of the dialect.

CONCLUSION

The Yoruba version of the KOS-ADLS was found to meet the criteria of reliability and validity in measuring symptoms and functional limitations in patients with knee OA.

Clinical importance and recommendation

It is recommended that the Yoruba version of KOS-ADLS can be used as an outcome measure in assessing the symptoms and disability of patients with knee pathologies among the Yoruba-speaking nations. The Yoruba version will provide a standard value of KOS-ADLS for those who do not understand English language.

Limitation

The factor structure of the scale was not captured in the study.

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Conflicts of interest

There are no conflicts of interest.

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