CROSS-CULTURAL ADAPTATION, RELIABILITY AND VALIDITY OF THE YORUBA VERSION OF THE ROLAND MORRIS DISABILITY QUESTIONNAIRE

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ABSTRACT

Study design: A translation, cross-cultural adaptation, and psychometric analysis.

Objective: The aim of this study was to translate, cross-culturally adapt, and validate the Yoruba version of the RMDQ.

Summary of background data: The Roland-Morris Disability Questionnaire (RMDQ) is a valid outcome tool for low back pain (LBP) in clinical and research settings. There seems to be no valid and reliable version of the RMDQ in the Nigerian languages.

Methods: Following the Guillemin criteria, the English version of the RMDQ was forward and back translated. Two Yoruba translated versions of the RMDQ were assessed for clarity, common language usage, and conceptual equivalence. Consequently, a harmonized Yoruba version was produced and was pilot-tested among 20 patients with nonspecific long-term LBP (NSLBP) for cognitive debriefing. The final version of the Yoruba RMDQ was tested for its construct validity and re-retest reliability among 120 and 87 patients with NSLBP, respectively.

Results: Pearson product moment correlation coefficient (r) of 0.82 was obtained for reliability of the Yoruba version of the RMDQ. The test-retest reliability of the Yoruba RMDQ yielded Cronbach alpha 0.932, while the intraclass correlation (ICC) ranged between 0.896 and 0.956. The analysis of the global scores of both the English and Yoruba versions of the RMDQ yielded ICC value of between 0.995 (95% confidence interval 0.996-0.997), with the item-by-item Kappa agreement ranging between 0.824 and 1.000. The external validity of RMDQ using Quadruple Visual Analogue Scale was r = -0.596 (P = 0.001). The Yoruba version of the

RMDQ had no floor/ceiling effects, as no patient achieved either of the maximum or the minimum possible scores.

Conclusion: The Yoruba version of the RMDQ has excellent reliability and validity and may be an appropriate outcome tool for clinical and research purposes among Yoruba-speaking patients with LBP.

INTRODUCTION

Non-specific Low-Back Pain (LBP) refers to back pain of musculoskeletal origin[1], where symptoms vary with physical activities.[2] Globally, about 80% of all people have a lifetime history of LBP.[3, 4] Chronic or long-term non-specific LBP which constitutes approximately 90% of all cases of LBP[5], results in physical and psychological deconditioning[6], and significant economic liability accruing from cost of management and loss of productivity resulting from sick leave.[7,8,9] The multiple biomechanical, physical, physiological and psychosocial impairments caused by LBP culminate into severe functional disability.[10]

Consequent to the foregoing, several outcome instruments such as the Oswestry Disability Questionnaire, Quebec Back Pain Disability Scale and Roland-Morris Disability Questionnaire (RMDQ) have been designed to assess functional disability and treatment outcomes in LBP.[11,12] The RMDQ has been increasingly recommended for use in clinical and research settings based on its psychometric and clinimetric properties.[11-13] The RMDQ, originally derived from the Sickness Impact Profile, is a 24-item, disability outcome measure.[13-14] The RMDQ has high clinical usability with reliability and validity values of 0.84 and 0.93 Cronbach's alpha.[15-18] High summation score on all checked items on the RMDQ denotes high disability.[15]

Cultural sensitivity is a significant barrier to having ubiquitous outcome tools, as cultural groups vary in disease expression and use of outcome measures.[19-20] Hence, the need for cross-cultural adaptations and translations of outcome measures. Since the publication of the original version of the RMDQ in 1983, [13] it has been translated into about 36 languages.[15] In addition, minor adaptations of the RMDQ for United States of America, Canadian and Australian English are available.[15] However, cross-cultural adapted versions of the RMDQ in indigenous Nigerian languages seem not available. For instance, a significant number of

patients in Nigeria are not literate in English.[21] This has significant limitation on the uptake of outcome measures in the Nigeria's context. Yoruba, as part of the Niger-Congo family of languages, is one of the four official languages of Nigeria. The Yoruba language is spoken largely in Southwest Nigeria, and also in countries like Benin, Togo and Brazil.[22-23] The objective of this study was to translate, cross-culturally adapt and validate the Yoruba version of the RMDQ.

METHODS

One hundred and twenty (71 males and 49 females) consenting individuals volunteered for this study, yielding a response rate of 85.7% (i.e. 120/140). Eligible respondents were patients with chronic LBP without known history of cognitive or mental impairment, who were 18 years and older, and were literate in English and Yoruba languages. The respondents were recruited from physiotherapy departments of the Obafemi Awolowo University Teaching Hospitals Complex, Ile-Ife; Ladoke Akintola University of Technology Teaching Hospital, Osogbo; University College Hospital, Ibadan; and University of Ilorin Teaching Hospital, Ilorin, Nigeria. Socio-demographics, weight, height and Body Mass Index (BMI) were also obtained from the respondents. Quadruple Visual Analogue Scale (QVAS) was used to assess pain intensity.

Following the Guillemin criteria,[20] the English version of the RMDQ was translated into Yoruba language. Two native Yoruba speakers (i.e. a physiotherapist who was familiar with the terminologies used in the RMDQ and a Yoruba linguist) with proficiency in English independently forward-translated the English RMDQ into Yoruba language (translation 1 (T1) and 2 (T2)). The translators were requested to aim for the conceptual translation using accepted contemporary words rather than literal equivalence. Thereafter, two bilingual translators who were not part of the forward translation compared T1 and T2; and produced a reconciled and

harmonized Yoruba translation (T3). Difficulty and quality rating for clarity, common language usage, and conceptual equivalence of the T3 was checked by two additional native Yoruba speakers. Difficulty rating was based on a scale of 0 to 100 (where 0 means "not at all difficult" and 100 means "extremely difficult"). Whereas, quality rating was based on a scale of 0 to 100 (where 100 indicate "perfection" and 0 indicate "extremely poor"). The first assessor rated the T3 on difficulty and quality scale as 70 and 80 respectively while the second assessor's rating was 80 and 90 respectively.

Backward translation of T3 into English language (T4) was carried out by a bilingual (English and Yoruba) professional translator. Independent rating of the equivalence of the T4 was carried out by comparing it with the original English version. A panel of experts comprising the two translators, two physiotherapists and two orthopaedic surgeons conducted the iterative procedure of identifying problematic items in T3 and T4 by comparing it with the original English version. Then, a pre-final Yoruba version of the RMDQ was produced (T5).

The T5 was pilot-tested among 20 individuals with chronic LBP. The pilot study was aimed to assess the patients' perception, understanding and interpretation of translated items, and the terminology used. **Thereafter,** the English and Yoruba RMDQ were given sequentially to respondents to complete **in order to test** for the construct validity. Assistance was not given to respondents in answering to both the English and Yoruba RMDQ. The Yoruba version of the RMDQ was re-administered for a retest seven days after the first administration.

Data analysis

Data were analyzed using descriptive statistics of mean, standard deviation and percentages. Inferential statistics of Pearson correlation analysis, Intra-Class Correlation and Kappa co-efficient was used to determine the relationship between English and Yoruba version of the RMDQ. Scattered plot was used to depict the relationship between the English and

Yoruba RMDQ. Data analysis was carried out using SPSS (Statistical Package for Social Sciences) version 16.0. Alpha level was set at 0.05.

RESULTS

From the translation and cross-cultural process, the outcomes of the cognitive debriefing from the pilot study was used to refine T5 in terms of cultural relevance of certain words and as a result the final version (i.e. the Yoruba version of the RMDQ (T6)) was produced. Clustering and ordering of items in the T6 was same as the original English RMDQ. However, in order to give T6 a conceptual equivalence to the original English version, some cultural adaptations were made to it. Specifically, item 16 "I have trouble putting on my sock (or stockings) because of the pain in my back" was modified to accommodate two options. (i) "Mo ní ìsòro láti wo ìbòsè nítorí ìrora èyìn mi" which is a direct translation of the original item into the Yoruba language; and (ii) "ó máa ń sòro fún mi láti wo bàtà olókùn tàbí bàtà tóó fún". This second option, became necessary as wearing of sock among middle-age and older adults, among which LBP is prevalent is not culturally fashionable among the Yoruba people. Hence, a culturally relevant alternative activity to socks wearing was agreed to be shoe lacing or wearing of tight shoes.

In addition to the foregoing, there is some inconsistencies in the use of words that have the same meaning contextually in the Yoruba translation. For example, items 3 and 9 in the Yoruba version of the RMDQ used "lóra" for "slowly" which was contextually different in translation as used in item 23. Although, the contextual equivalence of "lóra" in English is "sluggish" while "slow" is "díè díè" in the Yoruba language, however, "lóra" was suggested as a better word contextually than "díè díè" in T6. Also, "bed" was translated as "béèdì" and "ibùsùn" respectively in items 14 and 24. "Béèdì" in the Yoruba

language is a loan word ("òrò àfetíyá", i.e. a tonal adaptation of English word into the Yoruba language). Item 15 in the Yoruba version of the RMDQ was modified as "ńnkan kìí wù mí je dáadáa nítorí èyìn mi". The word "dáadáa" was translated as "very" in order to make the adverbial phrase of degree, to be reflected in the construct. Also modified in the Yoruba version of the RMDQ was item 22. This is because, there seems to be no corresponding translation for "bad tempered" in the Yoruba language. However, "fury" was considered as a suitable equivalent, and it was translated as "inú fùfù". Lastly, the words "aláìlera" or "olùgbàtójú" respectively were used instead of "aláìsàn" in the instructions section of the questionnaire. All the above mentioned words are Yoruba language synonyms for "patient". However, because of the negative connotation associated with the word "aláìsàn" in the Yoruba culture, "aláìlera" or "olùgbàtójú" which were less equivalent contextually were used in the Yoruba version of the RMDQ. The final version of the Yoruba RMDQ (T6) and the original English RMDQ are presented in Appendix 1.

The mean age, weight, height and BMI **of the respondents that participated in the psychometric testing of the T6** was 52.3 ±7.22 years, 76.3 ±11.1 kg, 1.68 ±0.04 m and 27.2±4.27 Kg/m^2 respectively. General characteristics of the respondents are presented in Table 1. Pearson's correlation coefficient (r) of 0.82 was obtained for reliability of the Yoruba version of the RMDQ. The construct validity of the Yoruba version of the RMDQ was r=0.992 (p=0.001) using the Pearson's correlation. Figure 1 shows the scatter plot diagram of the correlation between Yoruba and English version of the RMDQ. The Global and Item-by-Item Agreement of the English versus Yoruba Versions of the RMDQ are presented in Table 2. The test-retest reliability and internal consistency of the Yoruba RMDQ are presented in Table 3. Figure 2 shows the scatter plot diagram of the correlation between test-retest of the Yoruba

version of the RMDQ (r=0.781; p=0.001). Pearson's coefficient for the external validity of the Yoruba RMDQ using QVAS was r=-0.596 (p=0.001). Using the present pain rating component of the QVAS, the respondents' mean pain rating was 6.19±0.97 with a range of 5 to 8. The Yoruba version of the RMDQ had no floor/ceiling effects as no patient achieved either of the maximum or the minimum possible scores.

DISCUSSION

This study provides reports on the cross-cultural adaptation of the RMDQ into the Yoruba language and also determined the psychometric properties of the new translation. It is reported that the application of an outcome tool developed in a Western culture to another diverse culture, has questionable construct validity even when translated accurately because of the ambiguous nature of language. [20, 24] Whereas, cross-cultural adaptation of outcome assessment tools from the original language to other languages enhance comprehensibility, ease of utilization and acceptance of outcome tools by the accessible population.[25] Based on difficulty and quality rating result, which was in the range of 70 and 90, it is implied that the Yoruba RMDQ have high data completion rate and good quality data. Therefore, the Yoruba RMDQ is believed to be understood as a self-administered outcome tool among patients with LBP.

The Yoruba RMDQ, has high construct validity when correlated with the English RMDQ. An ICC of 0.75 or more is considered in many studies as reliable.[26-28] This current study has an ICC and internal consistency of 0.932. Literature is replete with favourable results on the construct validity of translated versions and modifications to the original RMDQ. For example, the Modern Standard Arabic (MSA) RMDQ has a high construct validity with an ICC of 0.925,[29] the Hong Kong version has a Cronbach's α value of 0.86; while the Chinese

version of the RMDQ has a Cronbach's α value of 0.874 in urban and 0.883 in rural patients with LBP.[30]

The Yoruba RMDQ had an inverse but moderate external validity, when correlated with pain intensity (r=-0.596). Results of studies on the correlation between RMDQ and pain intensity varies widely. The MSA RMDQ recorded a low correlation against pain intensity (r = 0.259),[29] the Hungarian RMDQ has moderate correlation with pain,[31] while some others, including the original RMDQ,[13] the Italian version,[32] and the Chinese versions[30] of the RMDQ recorded high correlations with pain intensity. Pain is a subjective phenomenon which is influenced by factors such as biological, experiential and environmental.[33] The reason for the inverse correlation between pain and disability in this study is speculative. As it may not be unconnected with cultural and religious mind-sets that influence perception and experience of pain. Literature has shown that cultural, economic, nature of work, societal expectations and roles, lifestyle and access to health care [34-36] influence the experiences and consequences of back pain. Taking culture as a case study, while there is greater awareness of back symptoms as musculoskeletal problems and the willingness to seek redress in some climes, other countries and societies view back pain as a natural consequence of physical work or ageing.[35] It is possible that this setting belongs to the latter group. However, future studies is needed to clarify this assumption.

The test-retest reliability of the Yoruba RMDQ, based on the Pearson's (r=0.781) co-efficient, internal consistency (0.932) and ICC (0.932) results was high. Pearson's correlation coefficient is commonly used as a method for reliability for RMDQ.[28,37] Although, Pearson's coefficient reveals the magnitude to which two repeated measures can be fitted by a straight line, however, the drawback of this test statistic is that pairwise repeated measures may vary statistically, but the overall outcome of the analysis may correlate significantly. On the other

hand, ICC assesses the magnitude of correlation, and in addition, it measures the extent of similarity and difference between each paired repeated measures. Typically, Pearson's coefficients for RMDQ are higher than the ICC scores, and may therefore be used more often for that reason, however, ICC is preferable over the Pearson's correlation as method for reliability. Relating the result of Pearson correlation with ICC as a method of reliability in this study, the magnitude or strength of the relationship tests were comparable. Based on the results (i.e. Pearson and ICC), the test-retest reliability of the Yoruba RMDQ is good. It is adduced that the main source of error in the test-test reliability is due to arbitrary discrepancy rather than systematic differences. The test-retest reliability levels obtained in this study were similar to the French,[38] German,[39] Italian,[32] Spanish[40] and Turkish[41] RMDQ versions.

Overall, the translation and cross-cultural adaptation of the RMDQ for the Yoruba speaking patients with chronic LBP has produced a valid and reliable tool for evaluating functional disability. To our knowledge, this is the first study to translate the RMDQ, and also establish its cultural adaptation and psychometric properties for the Yoruba speaking population. Apart from a few items that were culturally adapted (item 16) or modified (items 3, 9, 14, 22, 24), this study did not change the layout of the original translation. Translations have been reported to make the RMDQ more suitable for use in the accessible populations while the modifications seem to provide modest improvement to the original RMDQ.[15] As a result of the excellent psychometric data on translations and modifications to the original RMDQ, Frymoyer et al[42] published a consensus report of several authors proposing the use of the RMDQ in physical examination, assessment of physical disability and outcome evaluation in clinical trials among patients with chronic LBP. Furthermore, Deyo compared the RMDQ to the complete SIP, and RMDQ to be more reliable when compared to the physical aspects of SIP and also more sensitive to change throughout patient follow-up.[43] Stratford and colleagues

compared the RMDQ scoring to other questionnaires like the Oswestry and found RMDQ to be more sensitive to change through time.[44]

From this study, the Yoruba RMDQ had no floor/ceiling effects as no patient achieved either of the maximum or the minimum possible scores. Floor and ceiling effect happens when greater than 15% of the respondents reach the lowest or highest possible score.[45] According to Terwee et al[46] outcome measures with floor or ceiling effects are typically unable to detect extreme scores in their lower or upper ends. Furthermore, such scales are unable to discriminate between patients with lowest and highest possible scores, thus compromising the reliability of the scale. As changes in health status cannot be measured in these group of patients with extreme scores using a scale with floor or ceiling effects, the responsiveness of such instrument is reduced. Similar to the finding of this study, the Hungarian RMDQ[31] and the simplified Chinese version of RMDQ[47] found no floor and ceiling effects among the population studied.

Conclusion

The Yoruba version of the RMDQ has excellent reliability and validity and may be an appropriate outcome tool for clinical and research purposes among Yoruba-speaking patients with LBP. The Yoruba RMDQ has excellent reliability and validity. Its construct and discriminant validity is comparable with the original English and other translated versions. Therefore, the Yoruba RMDQ is an appropriate outcome tool for clinical and research purposes among Yoruba-speaking patients with LBP.

Competing Interests

The authors declare no competing interests.

Authors' contributions

CEM conceived the idea for this study, participated in data collection, conducted analysis and interpretation of data and prepared the final manuscript for publication. GAA participated in the design of methodology and data collection and drafted the manuscript. MOO, RAA, AA, TOA, OAI and OAO developed the study's methodology and drafted the manuscript. All authors read and approved the final manuscript.

Acknowledgement

The authors wish to thank the African Population and Health Research Centre (APHRC), Nairobi, Kenya for providing technical support through the African Doctoral Dissertation Research Fellowship (ADDRF) Post-Doctoral Fellowship. We will also like to thank all the respondents for this study.

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