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Original Article

Linguistic Reliability & Validity of Urdu Version of Roland-Morris Disability Questionnaire in Patients with Chronic Non-Specific Low Back Pain

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ABSTRACT

Roland-Morris Disability Questionnaire (RMDQ) is a self-administered tool that produces reliable measurements for drawing implications about disability. Urdu form of the Roland-Morris Disability Questionnaire (U-RMDQ) is considered apprehensive for the population of Pakistan. Furthermore, the Urdu version of this tool is consistent in reliability, validity & content continuity with the English original version. **Objective:** The aims of the current study were to assess the reliability, validity & utility of the Urdu form of the Roland-Morris Disability Questionnaire (RMDQ) in participants with chronic nonspecific low back pain. **Methods**: This study design was qualitative tool validation. The sampling technique employed was non-random convenience sampling with 100 individuals including both females and males within the age of 20 years to 70 years. Out of 100, 25 were healthy & 75 were patients Measurements were taken at baseline followed by another measurement after 24 hours. The study was completed in three stages; content validity was evaluated through the content validity index in the first stage, a pilot study was run to evaluate reliability & validity in the second stage followed by an evaluation of patients presenting with low back pain using Urdu version of (U-RMDQ) in the third stage. Data were collected through the Urdu version of the (U-RMDQ). Afterward, IBM SPSS version 25.0 was used to analyze the data. **Results:** -retest reliability depicted with Intra-class Correlation Coefficient was 0.684 for healthy individuals while 0.998 for participants with non-specific chronic LBP. The outcomes clearly express the tool reliability for the assessment of disability in patients with nonspecific chronic low back pain. An Independent t-test was employed to check the different validity, results showed the significant differences in means of all variables between both groups thereby producing <.05 two-tailed significance of all variables. After factor analysis of samples of 100 patients, Kaiser-Meyer Olkin (KMO) was 0.872 & *p*-value <0.05 showed the significance of the test. Five variables in (U-RMDQ) were responsible for variance in data. **Conclusion:** The study concluded the Urdu version of the Roland-Morris Disability Questionnaire is a valid and reliable instrument to evaluate disability associated with chronic non-specific low back pain.

INTRODUCTION

The low back of the human body is composed of five lumbar vertebrae with the possible inclusion of sacral vertebrae. Fibrocartilaginous discs lie between these vertebrae. These discs absorb shock, prevent rubbing of discs & protect the spinal cord. Spinal nerves enter & leave through the vertebral foramen to provide innervation to the skin & muscles of the lower back. Moreover, the spine is stabilized through ligaments & strong low back muscles [1]. Due to

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increased loads & advancing age, the discs eventually lose their flexibility thereby compromising the ability of the spine to withstand forces. The reduced ability of discs to bear forces is compensated by ligaments & muscles. Consequentially, ligaments grow thicker & bony outgrowths develop on vertebrae making the nerve passage narrower [2]. The low back of the human body is one of the major weights bearing regions & central axis that withstands immense loads throughout the life span., pain in the low back is a predominant illness [3].The low back pain (LBP) is a prevalent body state among individuals all over the world. The low back pain is neither an illness nor a diagnosis rather it is a pain confined between the rib cage & gluteal folds. Pain may also be felt in the thighs, groin & calf region. It does not necessarily radiate to the leg. Low back pain is frequently described as an ache dull and the duration of the pain varies considerably among individuals. The risk factors associated with LBP are obesity, pregnancy, heavy lifting & prolonged sitting. Other risk factors are population-specific & do not strongly correlate with the progress of low back pain [4]. The causative agents for low back pain are osteoporosis, arthritis, disc bulge & muscular or ligamentous strains are other factors that significantly contribute to the onset of low back pain. Classification of the low back pain is built on numerous ways. Depending on the duration of the pain, acute low back pain is defined as the pain persisting for less than 06 weeks and sub-acute low back pain is defined as the pain having in between 6-12 weeks; chronic low back pain is described as the pain persisting for more than 12 weeks [5]. Among all these pain, the chronic low back pain is the most incapacitating pain leading to reduced performance in activities of daily life for a person. Low back pain is also classified based on clinical manifestations; nonspecific low back pain is diffuse in nature & described as the pain that does not differ in response to movement & is limited to the low back with no radiation [6]. On the other hand, pain that is located unilaterally or bilaterally with radiation below the knee and changes in severity in response to body movements is defined as radicular [7]. Physical examination, medical history, and other radiological tests such as MRI, CT and X-rays are employed to diagnose back pain [8]. Most common and effective strategy for low back pain is the exercise. Moreover, back pain may be managed through medications, heat therapy, massage, acupuncture & spinal manipulation. Aquatic therapy, aerobic exercises, Trans-cutaneous electrical nerve stimulation (TENS) & exercise therapy are some other effective methods to cope with the debilitating the low back pain [9,10]. The pervasiveness of disability is more closely linked with chronic LBP. The disability associated by chronic low back pain needs to be appropriately evaluated. For this purpose, various data collection tools are administered to patients like Modified Oswestry Disability Index (MODI), Quebec Pain Disability Scale (QPDS) and (RMDQ). Among these, (RMDQ) is considered a valid and reliable instrument to appropriately evaluate the disease in patients with chronic nonspecific low back pain (LBP). There is sufficient strong evidence of the reliability & validity of the (RMDQ). An English Scholars Roland & Morris (1983) construct the Roland-Morris Disability Questionnaire to measure the activity status of patients with chronic low back pain & they derived contents from the sickness impact profile (SIP). Sickness impact profile (SIP) reflects the overall health status of individuals. Roland and Morris chose 24 items from the (SIP) that strongly correlated with low back pain (LBP) to develop (RMDQ). The questionnaire grants a score of 1 if the answer is "yes" & a score of 0 if the answer is "no". All components hold no significant difference in rank, the overall score is considered the entire of the score of all components with a minimum score of 0 7 and maximum score of 24. The Greater the score, the more severity of the disability is considered [11]. In recent years, (RMDQ) has been translated into various languages e.g, Korean, Italian, Chinese, Spanish, Arabic, Gujrati, Portugal and Urdu. Urdu form of the Roland-Morris Disability Questionnaire (URMDQ) is considered apprehensive to the population of Pakistan. In addition, the Urdu form of the Roland-Morris Disability Questionnaire (URMDQ) is consistent in reliability, validity & content continuity with the English original version.

METHODS

The qualitative study design was adopted for qualitative tool validation. This research was conducted from February to July 2020 in the Out-patient Physiotherapy department of General Hospital, Lahore. The approval of the current research was obtained from research ethical committee of Riphah College of Rehabilitation Sciences (RCRS), informed consent was signed by each participant and get the permission from the hospital administration. Non-random convenience sampling technique was adopted to collect the data, 100 individuals within the age group of 20-70 years were included as a sample. Out of 100 individuals, 25 were healthy whilst 75 were patients with chronic LBP. Patients were included if they have chronic nonspecific LBP of non-mechanical origin with or without radiation. Patients were excluded if they had acute LBP, low back pain of mechanical or neurological origin were pregnant females, had inflammation, infection, or suspected tumor. Patients were informed before their participation. The study was completed in three stages; (RMDQ) was translated into Urdu & content validity was checked through the content validity index (CVI), and a pilot study was run with the Urdu form of the Roland-Morris

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Disability Questionnaire (RMDQ) to evaluate reliability & validity in the second stage followed by the evaluation of patients presenting with non-specific chronic low back pain through (RMDQ) in the third stage. RMDQ was first translated into Urdu by 2 experts. Both experts had fluency in English & Urdu. One expert belonged to the Allied health care profession & the second one was a junior life scientist. Another expert compared the Urdu translation to the initial questionnaire & formulated the first draft of the (RMDQ). Afterward, the committee was established to check the content validity of the tool. 5 expert Physical therapists rated the 24 items of the RMDQ on Content Validity Index (CVI) created by Waltz & Bausell. Each item of the (RMDQ) was rated for its simplicity, relevance, ambiguity & clarity on a Four-point Likert ordinal scale. The numerical value of the content validity ratio was measured by the Lawshe table. Measurements were taken at baseline followed by another measurement after 24 hours. A Cronbach's alpha was calculated to assess the reliability of the (RMDQ). Test and retest reliability was calculated through Intra-class Coefficient Correlation. An-independent t-test was applied to determine the discriminant validity of the questionnaire. For different factor analysis, Kaiser-Meyer Olkin (KMO) & Bartlett's test of sphericity was used to check the sampling adequacy of data and to ensure that the correlation matrix is the identity matrix.

RESULTS

The Table 1 illustrate the Content Validity Index (CVI) of the Urdu form of the (URMDQ). Each item of the questionnaire was rated by 5 Physical therapy experts for its relevance, clarity, simplicity & ambiguity on a 4-point Likert scale to get an average for each item. The averages were calculated for Content Validity Index to assess the content validity (CV) of the tool.

Questions	Relevance	Clarity	Simplicity	Ambiguity	CVI
Q-1	4	4	4	4	1.00
Q-2	4	3	4	4	0.94
Q-3	4	3	3	4	0.88
Q-4	4	4	4	4	1.00
Q-5	4	4	3	3	0.88
Q-6	4	3	3	4	0.88
Q-7	4	3	4	3	0.88
Q-8	4	4	4	3	0.94
Q-9	4	3	3	3	0.81
Q-10	4	4	4	3	0.94
Q-11	4	3	3	3	0.81
Q-12	4	3	3	4	0.88
Q-13	4	3	3	4	0.88
Q-14	4	4	3	4	0.94
Q-15	4	3	4	4	0.94
Q-16	4	3	3	4	0.88
Q-17	4	4	3	3	0.88
Q-18	4	4	3	3	0.88
Q-19	4	4	3	3	0.88
Q-20	4	3	3	4	0.88
Q-21	4	3	4	3	0.88
Q-22	4	4	4	4	1.00
Q-23	4	4	4	4	1.00
Q-24	4	4	3	3	0.88

Table 1: Content Validity Index-(CVI) of Urdu version of Roland-Morris Disability Questionnaire (URMDQ)

Item	Expert-I	Expert-II	Expert-III	Expert-IV	Expert-V	CVR
Q-1	1.0	0.0	1.0	1.0	1.0	0.6
Q-2	1.0	0.0	1.0	1.0	1.0	0.6
Q-3	1.0	0.0	1.0	1.0	1.0	0.6
Q-4	1.0	1.0	1.0	1.0	1.0	1.0
Q-5	1.0	1.0	1.0	1.0	1.0	1.0
Q-6	1.0	1.0	1.0	1.0	1.0	1.0
Q-7	1.0	1.0	0.0	1.0	1.0	0.6
Q-8	1.0	1.0	1.0	1.0	1.0	1.0
Q-9	1.0	1.0	1.0	1.0	1.0	1.0
Q-10	1.0	1.0	0.0	1.0	1.0	0.6
Q-11	1.0	1.0	1.0	1.0	1.0	1.0
Q-12	1.0	1.0	1.0	1.0	0.0	1.0
Q-13	1.0	1.0	1.0	1.0	1.0	1.0
Q-14	1.0	1.0	1.0	1.0	1.0	1.0
Q-15	1.0	1.0	1.0	1.0	1.0	1.0
Q-16	1.0	1.0	1.0	0.0	1.0	1.0
Q-17	1.0	1.0	1.0	0.0	1.0	1.0
Q-18	1.0	1.0	1.0	1.0	1.0	1.0
Q-19	1.0	1.0	1.0	1.0	1.0	1.0
Q-20	0.0	1.0	1.0	1.0	1.0	0.6
Q-21	1.0	1.0	1.0	1.0	1.0	1.0
Q-22	1.0	1.0	1.0	1.0	1.0	1.0
Q-23	1.0	1.0	1.0	1.0	1.0	1.0
Q-24	0.0	1.0	1.0	1.0	1.0	0.6

Table 2 : Content Validity Ratio of Urdu version of Roland-Morris Disability Questionnaire (URMDQ)

Category	Items	Cronbach Alpha	CI (95%) Lower Bound - Upper bound
Healthy	24	0.942	0.684 (0.690-0.940)
Low Back Pain	24	0.794	0.998 (0.997-0.999)
All Participants	24	0.880	0.856 (0.820 – 0.930)

Table 3: Reliability statistics from "Cronbach's alpha" and the test and retest reliability for the Urdu form of the (URMDQ)

Questions	Mean±SD	SE.	Mean±SD	SE.	Mean±SD	SE.	Mean±SD	SE.
Q-1	0.06±0.24	0.06	0.00±0.00	0.00	0.46±0.51	0.08	0.47±0.51	0.08
Q-2	0.76±0.44	0.11	0.63±0.52	0.18	0.81±0.40	0.07	0.74±0.45	0.07
Q-3	0.06±0.24	0.06	0.13±0.35	0.13	0.89±0.31	0.05	0.89±0.31	0.05
Q-4	0.06±0.24	0.06	0.00±0.00	0.00	0.62±0.49	0.08	0.92±1.58	0.26
Q-5	0.06±0.24	0.06	0.00±0.00	0.00	0.62±0.49	0.08	0.66±0.48	0.08
Q-6	0.12±0.33	0.08	0.13±0.35	0.13	0.30±0.46	0.08	0.24±0.43	0.07
Q-7	0.06±0.24	0.06	0.13±0.35	0.13	0.65±0.48	0.08	0.55±0.50	0.08
Q-8	0.06±0.24	0.06	0.13±0.35	0.13	0.70±0.46	0.08	0.66±0.48	0.08
Q-9	0.12±0.33	0.08	0.00±0.00	0.00	0.62±0.49	0.08	0.79±0.41	0.07
Q10	0.24±0.44	0.11	0.00±0.00	0.00	0.81±0.40	0.07	0.89±0.31	0.05

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Questions	Mean±SD	SE.	Mean±SD	SE.	Mean±SD	SE.	Mean±SD	SE.
Q11	0.12±0.33	0.08	0.13±0.35	0.13	0.78±0.42	0.07	0.74±0.45	0.07
Q12	0.06±0.24	0.06	0.00±0.00	0.00	0.65±0.48	0.08	0.71±0.46	0.07
Q13	0.06±0.24	0.06	0.00±0.00	0.00	0.46±0.51	0.08	0.61±0.50	0.08
Q14	0.06±0.24	0.06	0.00±0.00	0.00	0.73±0.45	0.07	0.79±1.61	0.26
Q15	0.06±0.24	0.06	0.00±0.00	0.00	0.46±0.51	0.08	0.18±0.39	0.06
Q16	0.06±0.24	0.06	0.00±0.00	0.00	0.51±0.51	0.08	0.68±0.47	0.08
Q17	0.06±0.24	0.06	0.13±0.35	0.13	0.86±0.35	0.06	0.89±0.31	0.05
Q18	0.00±0.00	0.00	0.00±0.00	0.00	1.08±2.34	0.38	0.53±0.51	0.08
Q19	0.06±0.24	0.06	0.00±0.00	0.00	0.32±0.47	0.08	0.24±0.43	0.07
Q20	0.00±0.00	0.00	0.00±0.00	0.00	0.57±0.50	0.08	0.63±0.49	0.08
Q21	0.06±0.24	0.06	0.00±0.00	0.00	0.76±0.43	0.07	0.89±0.31	0.05
Q22	0.00±0.00	0.00	0.00±0.00	0.00	0.46±0.51	0.08	0.32±0.47	0.08
Q23	0.06±0.24	0.06	0.13±0.35	0.13	0.86±0.35	0.06	0.95±0.23	0.04
Q24	0.00±0.00	0.00	0.00±0.00	0.00	0.59±0.50	0.08	0.32±0.47	0.08

Table 4: Discriminant validity of Urdu version of (URMDQ)

Table 4 shows the discriminant validity of the Urdu form of the (URMDQ). An Independent t-test was applied to determine discriminant validity for healthy participants and patients with low back pain. The Independent t-test indicated a significant difference in the means of all variables for both groups. Therefore, the results expressed satisfactory discriminant validity for both groups.

DISCUSSION

The prevalence of the LBP is on the rise around the globe and affecting millions of people. Low back pain over prolonged period of time may lead to disability therefore, it limits the ability of individuals to perform "activities of daily life" (ADL) efficiently [12]. The various tool is available to measure the disability related to the LBP. Among these, (RMDQ) is considered a valid and reliable questioner for drawing inferences about disability linked with chronic non-specific LBP [13,14]. The study design followed for the current study was "qualitative, tool validation". These types of studies are conducted to depict the cultural differences, reliability & validity of version change of some standard tools. The reliability recorded by the current study is 0.888% which is very close to the other studies as the French version recorded a 0.84 value for Cronbach's alpha while the Colombia version recorded a 0.86 value for Cronbach's alpha [15]. Two studies demonstrated high values for Cronbach's alpha in the Moroccan version, Cronbach's alpha was computed to be .092 & in the Yoruba version 0.932 value of Cronbach's alpha was recorded [16]. Gujrati's version demonstrates a 0.72 value for Cronbach's alpha which is quite low. All studies that have translated the Roland-Morris Disability Questionnaire (RMDQ) into their native language have used these variables & our research is closely associated with these studies. The current study found satisfactory internal consistency with "Cronbach's alpha" of 0.88 which is parallel to the Japanese version with "Cronbach's alpha" of 0.85, the Chinese version with "Cronbach's alpha" of 0.87 & Turkish version with "Cronbach's alpha" of 0.85. On other hand, Argentine version with "Cronbach's alpha" of 0.90, Moroccan version with "Cronbach's alpha" of 0.96 & Korean version with "Cronbach's alpha" of 0.94 had comparatively fewer validations. The current study demonstrated high authentication than the Gujrat version with "Cronbach's alpha" of 0.72, Portugal version with "Cronbach's alpha" of 0.81, Spain version with "Cronbach's alpha" of 0.83 & Iran version with "Cronbach's alpha" of 0.83. Another similarity observed in current research & Yoruba, Chinese, Arabic, Columbia & Gujrati version was that the pilot study was run for validity before reliability & validity was evaluated with the help of a modified version of the (RMDQ). The (RMDQ) is an excellent & useful tool for the valuation of disability associated with LBP [17]. The current study expressed high Intra-class Correlation Coefficient (ICC) than the Iranian version with an Intra-class Coefficient Correlation (ICC) of 0.86, similar values with the Italian version having Intra-class Coefficient Correlation (ICC) of 0.92 & lower values than the Korean & Chinese version with Intra-class Coefficient Correlation (ICC) of 0.98 & 0.95 respectively. A high correlation has been observed in other validation which qualifies the RMDQ as an effective & consistent tool for the valuation of disability associated with LBP. In one study conducted in Korea, Cronbach's alpha was 0.84-0.93 & Intraclass Coefficient Correlation (ICC) after a follow-up of 1 week was 0.88 which is very close to my study [18]. In the current study, 5 items were load factors sharing most of a load of all items similar to the Colombian version with more than one load factor [8]. Houda Maˆaroufi, MD et.al (2007) conducted an observational scheme to evaluate the validity of the Roland-Morris Disability Questionnaire in 76 Moroccan patients suffering from low back pain. Cronbach's alpha & Intraclass Correlation Coefficient (ICC) evaluated reliability whilst Correspondence analysis was used to assess structure validity. The study found a positive correlation between Visual Analogue Scale (VAS) & Roland-Morris Disability Questionnaire (RMDQ) through construct validity but other variables demonstrated no correlation [19]. Ani´Bal Scharovsky PT (2008) conducted research in which 132 patients with lumbar pain were scored from Roland-Morris Disability Questionnaire (RMDQ. Out of 132, 50 patients were given a final questionnaire prior and were retested after 24 hours. He concluded reliability through Intraclass coefficient correlation (ICC) was 0.940 and validity by Pearson correlation coefficient was r: 0.544. The results show that verification was good enough [20]. Kyoung-Eun Kim et.al (2011) developed a Korean type of the Roland-Morris Disability Questionnaire (RMDQ) & confirmed its usage for evaluating disability in Korean patients presenting with LBP. 231 patients were incorporated in the study and were evaluated using Roland-Morris Disability Questionnaire (RMDQ), Oswestry Disability Index [16], and

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Visual Analogue Scale (VAS). Reliability was assessed through internal consistency and correlation between RMDQ with VAS and ODI were the tools used to assess the validity. He concluded that the Korean version of the questionnaire is linked or correlated with ODI and VAS significantly [21]. It is hence evident that the Urdu version of the RMDQ is a reliable and valid tool for the valuation and evaluation of disability linked with chronic low back pain. This questionnaire will give accurate diagnostic outcomes related with the disability of chronic nonspecific low back pain.

CONCLUSION

The study concludes that the Urdu version of the (URMDQ) is an efficient, valid, and reliable Instrument for assessment of disability associated with chronic nonspecific low back pain.

REFERENCES

[1] Floyd RT, Thompson CW. Manual of structural kinesiology: McGraw-Hill New York, NY; 2009.

[2] Burns BD. An evidence-based approach to the evaluation and treatment of low back pain in the emergency department. Emergency medicine practice. 2013;2.

[3] Akizuki S, Mow VC, Müller F, Pita JC, Howell DS, Manicourt DH. Tensile properties of human knee joint cartilage: I. Influence of ionic conditions, weight bearing, and fibrillation on the tensile modulus. Journal of Orthopaedic Research. 1986; 4(4):379-92. doi: 10.1002/jor.1100040401.

[4] Bryndal A, Majchrzycki M, Grochulska A, Glowinski S, Seremak-Mrozikiewicz A. Risk factors associated with low back pain among A group of 1510 pregnant women. Journal of personalized medicine. 2020 Jun; 10(2):51. doi: 10.3390/jpm10020051.

[5] Koes BW, Van Tulder M, Lin C-WC, Macedo LG, McAuley J, Maher C. An updated overview of clinical guidelines for the management of non-specific low back pain in primary care. European Spine Journal. 2010 Dec; 19(12):2075-94. doi: 10.1007/s00586-010-1502-y.

[6] Schäfer A, Hall T, Briffa K. Classification of low back-related leg pain—a proposed patho-mechanism-based approach. Manual therapy. 2009 Apr; 14(2):222-30. doi: 10.1016/j.math.2007.10.003.

[7] Manusov EG. Evaluation and diagnosis of low back pain. Primary Care: Clinics in Office Practice. 2012 Sep; 39(3):471-9. doi: 10.1016/j.pop.2012.06.003.

[8] Stroker R. Legal and ethical issues. A handbook for new parole board members: Part of a resource kit for new parole board members Retrieved from http://www apaintl org/documents/CEPPParole Handbook pdf. 2003.

[9] Hegmann KT, Travis R, Andersson GB, Belcourt RM, Carragee EJ, Donelson R, et al. Non-invasive and minimally invasive management of low back disorders. Journal of occupational and environmental medicine. 2020 Mar; 62(3):e111-e138. doi: 10.1097/JOM.0000000000001812.

[10] Al Torairi MN, Aljowair MFF, Shamsi S, Khan MS. Effect Of Hydrotherapy And Physiotherapy Exercises On Low Back Pain: Horizon Books (A Division of Ignited Minds Edutech P Ltd); 2021.

[11] Roland M, Morris R. A study of the natural history of back pain: Part 1: Development of a reliable and sensitive measure of disability in low-back pain. spine. (Phila Pa 1976). 1983 Mar; 8(2):141-4. doi: 10.1097/00007632-198303000-00004.

[12] Truchon M, Fillion L. Biopsychosocial determinants of chronic disability and low-back pain: a review. Journal of occupational rehabilitation. 2000; 10(2):117-42.

[13] Garg A, Pathak H, Churyukanov MV, Uppin RB, Slobodin TM. Low back pain: critical assessment of various scales. European Spine Journal. 2020 Mar; 29(3):503-518. doi: 10.1007/s00586-019-06279-5.

[14] Sánchez-Zuriaga D, López-Pascual J, Garrido-Jaén D, de Moya MFP, Prat-Pastor J. Reliability and validity of a new objective tool for low back pain functional assessment. Spine. (Phila Pa 1976). 2011 Jul; 36 (16):1279-88. doi: 10.1097/BRS.0b013e3181f471d8.

[15] Payares K, Lugo LH, Restrepo A. Validation of the roland morris questionnaire in colombia to evaluate disability in low back pain. Spine. (Phila Pa 1976). 2015 Jul; 40(14):1108-14. doi: 10.1097/BRS.0000000000000963.

[16] Mbada CE, Idowu OA, Ogunjimi OR, Ayanniyi O, Orimolade EA, Oladiran AB, et al. Cross-cultural adaptation, reliability, and validity of the Yoruba version of the Roland-Morris Disability Questionnaire. Spine. (Phila Pa 1976). 2017 Apr; 42(7):497-503. doi: 10.1097/BRS.0000000000001899.

[17] Takara KS, Alamino Pereira de Viveiro L, Moura PA, Marques Pasqual A, Pompeu JE. Roland-Morris disability questionnaire is bidimensional and has 16 items when applied to community-dwelling older adults with low back pain. Disability and Rehabilitation. 2022 Jul: 1-7. doi: 10.1080/09638288.2022.2096127.

[18] Lee JS, Lee DH, Suh KT, Kim JI, Lim JM, Goh TS. Validation of the Korean version of the Roland–Morris disability questionnaire. European Spine Journal. 2011 Dec; 20(12):2115-9. doi: 10.1007/s00586-011-1788-4.

DOI: https://doi.org/10.54393/pbmj.v5i7.627

[19] Mâaroufi H, Benbouazza K, Faïk A, Bahiri R, Lazrak N, Abouqal R, et al. Translation, adaptation, and validation of the Moroccan version of the Roland Morris Disability Questionnaire. Spine. (Phila Pa 1976). 2007 Jun; 32(13):1461-5. doi: 10.1097/BRS.0b013e318060a63d.

[20] Scharovsky A, Pueyrredón M, Craig D, Rivas ME, Converso G, Pueyrredón JH, et al. Cross-cultural adaptation and validation of the Argentinean version of the Roland-Morris Disability Questionnaire. Spine. (Phila Pa 1976). 2008 May; 33(12):1391-5. doi: 10.1097/BRS.0b013e318173dc8f.

[21] Kim K-E, Lim J-Y. Cross-cultural adaptation and validation of the Korean version of the Roland-Morris Disability Questionnaire for use in low back pain. Journal of back and musculoskeletal rehabilitation. 2011; 24(2):83-8. doi: 10.3233/BMR-2011-0278