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10.2478/AMB-2023-0040

ORIGINAL ARTICLE

LINGUISTIC VALIDATION, ADAPTATION, AND RELIABILITY OF THE LIVERPOOL ELBOW SCORE'S PATIENT-ANSWERED QUESTIONNAIRE IN BULGARIAN

THE BULGARIAN LES-PAQ QUESTIONNAIRE

Ts. Tsenkov, S. Slavchev, N. Dimitrov

University Hospital of Orthopaedics "Prof. B. Boichev", Department of Orthopaedics and Traumatology, Medical University – Sofia, Bulgaria

Abstract. Background: *There is a lack of upper-limb organ specific patient-reported questionnaires that are linguistically validated and culturally adapted for the Bulgarian population. The Liverpool Elbow Score (LES) is a mixed elbow-specific score with excellent psychometric properties of the patient-answered questionnaire (PAQ). There is no Bulgarian version. The aim of this study was to perform a linguistic validation and cultural adaptation of the LES−PAQ in Bulgarian, and to test the validity and reliability of the Bulgarian version.* ***Materials and Methods:*** *The study was conducted in a single institution. Participant selection criteria were defined – included were mentally healthy adult patients with a diagnosis of osteochondritis dissecans of the radiocapitellar joint, elbow arthritis, lateral epicondylitis and elbow contracture. Excluded were patients with coexisting upper limb conditions, illiterate and non-native Bulgarian speakers. The Bulgarian LES−PAQ was created. The process consisted of forward translation, reconciliation and backward translation. An expert committee agreed upon a pre-final Bulgarian version. A final version was decided after cultural adaptation. The psychometric properties and reliability of the Bulgarian LES−PAQ was tested.* ***Results:*** *101 patients were included in this study. We did not observe a ceiling or floor effect. Cronbach's α coefficient was 0.858. Intraclass correlation coefficient was 0.864 (95% CI 0.77 to 0.92; $p < 0.05$). A moderate negative correlation was revealed between the LES-PAQ and the DASH ($r = -0.591$, $p < 0.05$), and a high positive correlation with SF-12 ($r = 0.867$, $p < 0.001$).* ***Conclusion:*** *The Bulgarian LES−PAQ is a reliable and valid instrument for assessing elbow conditions such as osteochondritis dissecans of the radiocapitellar joint, elbow arthritis, lateral epicondylitis and elbow contracture. It may assist Bulgarian healthcare professionals in both research and daily work.*

Key words: *linguistic validation, elbow, patient-reported outcomes, questionnaire*

Corresponding author: *Tsvetan Tsenkov, University Hospital of Orthopaedics "Prof. B. Boichev", Department of Orthopaedics and Traumatology, 56 Nikola Petkov Blvd., Bg – 1614 Sofia, e-mail: tsvetan.tsenkov@icloud.com, ORCID: 0000-0002-1884-4928*

Received: *08 March 2023;* ***Accepted:*** *16 June 2023*

INTRODUCTION

Clinical outcome measures are clinician-reported, patient-reported or mixed. Self-reported questionnaires reflect the patients' perception of their health and are ever more often being used in addition to clinical assessment – they are easy to use and convenient [1, 2]. Elbow pathologies are an important share of patients who present in orthopedic/rheumatologic practices [3]. It is essential to properly diagnose and treat such conditions, as they affect the working-age group and impair quality of life. There is a variety of elbow-specific scores available in the literature [2, 4]. They are used to assess function, evaluate the effectiveness of treatment, and compare different methods [5]. However, patient-reported outcomes require language fluency and to our knowledge, there is only one formally validated Bulgarian version of a scale that assesses the upper limb – the Disability of Arm, Shoulder, and Hand (DASH) questionnaire [6]. Bulgarian elbow-specific scores that are linguistically validated and culturally adapted for the Bulgarian population currently do not exist.

The Liverpool Elbow Score (LES) is a mixed elbow-specific outcome measure that was developed by Sathyamoorty et al. in 2004 [4]. LES consists of two parts: the first one is a 6-item clinical assessment score (CAS, C1-6) with three subscales, evaluating the range of motion, strength, and ulnar nerve involvement; the second part is a 9-item patient questionnaire (PAQ, P1-9) assessing function and the ability to perform activities of daily living (P1-P7), levels of pain (P8), and participation in sports and leisure activities (P9). Items are scored from 0 to a variable maximum of 3 or 4 points. The interpretation consists of a final score combining PAQ and CAS. The score is normalized to 10 for ease of interpretation, via a formula, with a maximum score of 10 points and a minimum of 0 points. The lower the score, the greater the disability [13]. LES was originally intended to assess patients after elbow replacement surgery, but it was also found as a valid outcome measure in assessing soft-tissue elbow conditions (tendinopathy, contractures).

The purpose of this study was to perform a linguistic validation and cultural adaptation of the LES−PAQ in Bulgarian, and to test the validity and reliability of the Bulgarian version in patients with osteochondritis dissecans of the radiocapitellar joint, elbow arthritis, lateral epicondylitis and elbow contracture.

MATERIALS AND METHODS

We obtained permission from the original author for the linguistic validation of LES−PAQ. The study was conducted in a single institution. Verbal informed consent was obtained from all the participants. Institutional Review Board approval was granted before conducting this research.

Participant selection criteria were defined. Included were mentally healthy adult patients (above 18 years of age) with a diagnosis of osteochondritis dissecans of the radiocapitellar joint, elbow arthritis, lateral epicondylitis and elbow contracture. Excluded were patients with coexisting upper limb conditions, illiterate and non-native Bulgarian speakers. A total of 101 participants were selected for the study (Table 1).

Table 1. Demographic data

Age	47.6 ± 17.2 years	
Sex	71 male/30 female	
BMI	25.2 ± 4.7 kg/m^2	
Dominant hand involvement	74/101	
Diagnosis	Osteochondritis dissecans of the radiocapitellar joint	16/101
	Elbow arthritis	19/101
	Lateral epicondylitis	40/101
	Elbow contracture	26/101

The Bulgarian LES−PAQ was created. We followed Beaton's guidelines [8]. The process consisted of forward translation, reconciliation and backward translation. This was done blindly by two independent researchers – one English native (fluent in Bulgarian), and one Bulgarian native (fluent in English). An expert committee that consisted of two orthopedic elbow surgeons and a rheumatologist agreed upon a pre-final Bulgarian version. It was given to the participants for cultural adaptation. Additional comments from the patients regarding understandability and clarity were taken into notice. A final version of the questionnaire was agreed upon.

The Bulgarian LES−PAQ was self-administered by the participants twice within a one week interval for reliability testing. The participants were clinically

stable during the test-retesting. No treatment was given in this period to ensure a minimum change in clinical condition.

The sample distribution was discovered with the Kolmogorov-Smirnov test. A p-value ≤ 0.05 was considered statistically significant. Floor or ceiling effect was also assessed. The threshold was accepted to be 15% of respondents obtaining the minimum or maximum score respectively [9]. Intraclass correlation coefficient (ICC) and Chronbach's alpha were calculated [10]. Satisfactory internal consistency was accepted for values above 0.7 [11]. Construct validity was assessed by comparing the Bulgarian LES-PAQ, SF-12 version 1, and DASH through Pearson's correlation coefficient.

The obtained data were summarized and analyzed through Microsoft Excel 2019 and the Real Statistics Resource Pack for Excel 2019, Release 7.7.1 [12].

RESULTS

Normal distribution was found for the outcome measure scores. No floor or ceiling effects were seen. None of the participants scored the minimum – 0 points. 4/101 of the patients reached the maximum 6 points score, and in the second study, 6/101 of the patients scored maximum values.

ICC was 0.864 (95% CI 0.771 to 0.921; p = 0.000). Cronbach's α was 0.858 (p < 0.05). Item-total correlations were between 0.641 and 0.795.

Test-retest reliability of the Bulgarian LES-PAQ was established. We found highly positive correlations for all questions and the total score (r = 0.862, p = 0.000) (Table 2).

The LES-PAQ showed a highly negative correlation with the Bulgarian DASH (r = -0.591, p < 0.05) and a highly positive correlation with the SF-12 version 1 physical health subscale (r = 0.867, p < 0.001).

DISCUSSION

The most important finding of this study, the Bulgarian LES-PAQ demonstrated good reliability, satisfactory internal consistency, and validity to assess function in Bulgarian-speaking patients with osteochondritis dissecans of the radiocapitellar joint, elbow arthritis, lateral epicondylitis and elbow contracture. No floor or ceiling effects were discovered. Vishwanathan et al. measured the internal consistency of LES to be 0.87 [13]. In the original developmental and validation study of LES, the authors found good internal consistency (Cronbach's α = 0.997) [4]. The internal consistency of the scale was 0.858 (p < 0.05), and the test-retest reliability of the Bulgarian LES-PAQ was 0.862 (p < 0.05).

Sun and Fan observed high correlations with DASH (r = 0.88 preoperatively and 0.87 postoperatively, p < 0.001), while the Bulgarian LES-PAQ showed a highly negative correlation (r = -0.591, p < 0.05).

Sathyamoorthy et al. also measured validity with DASH and SF-12 correlation testing. High correlation was found with DASH (r = -0.76, p = 0.000) and a low correlation with SF-12 physical health subscale (r = -0.39, p = 0.000) [14].

The Bulgarian LES−PAQ can be routinely used in clinical practice by orthopedic surgeons, rheumatologists, physiotherapists and other health professionals as well. Also, the score has the properties to evaluate the patients remotely [14]. This can be done via email

Table 2. Internal consistency and test–retest reliability of the Bulgarian LES-PAQ (n = 101)

PAQ	Mean (SD)	Re-test Mean (SD)	r (p-value) *	Chronbach's alpha if item deleted
Other arm use (Question 1)	2.48 (1.00)	2.48 (0.97)	0.788 (0.000)	0.829
Combing hair (Question 2)	2.67 (0.83)	2.58 (0.86)	0.629 (0.000)	0.841
Washing self (Question 3)	2.67 (0.83)	2.66 (0.94)	0.676 (0.000)	0.838
Feeding (Question 4)	2.88 (0.88)	2.88 (0.80)	0.529 (0.000)	0.846
Dressing (Question 5)	2.73 (0.89)	2.90 (0.89)	0.709 (0.000)	0.846
Household activities (Question 6)	2.83 (0.98)	2.70 (0.89)	0.644 (0.000)	0.848
Lifting (Question 7)	2.96 (0.79)	2.94 (0.87)	0.699 (0.000)	0.839
Pain (Question 8)	2.71 (1.07)	2.90 (0.97)	0.493 (0.000)	0.854
Sport and leisure activities (Question 9)	3.33 (0.79)	3.34 (0.85)	0.561 (0.000)	0.846

* Pearson's correlation coefficient

or telephone call because the questionnaire is short, easy to use, and understandable.

The LES consists of both clinician and patient-answered sections. In addition to clinical findings, using an elbow score with good psychometric properties in the native language could improve the process of assessment. This would help to better understand the patient's condition and measure the effect of treatment.

LES was originally intended to evaluate patients after elbow replacement surgery, but has since been validated in cases of elbow stiffness, tendinopathy and elbow fractures [12, 19]. In our study, we investigated the properties of LES−PAQ in patients with osteochondritis dissecans of the radiocapitellar joint, elbow arthritis, lateral epicondylitis and elbow contracture. The questionnaire may be used in a wide range of elbow conditions with validity and reliability.

A disadvantage of the LES is the need for a somewhat complex formula that normalizes the score from 0 to 10 for ease of interpretation. Additionally, the mentioned scoring system did not include data that provided information about the patient's quality of life [13]. Quality of life may be evaluated using a different questionnaire.

CONCLUSION

The Bulgarian LES−PAQ is a reliable and valid instrument for assessing elbow conditions such as osteochondritis dissecans of the radiocapitellar joint, elbow arthritis, lateral epicondylitis and elbow contracture. It may assist Bulgarian healthcare professionals in both research and daily work.

Acknowledgements: *none*

Disclosure Summary: *The authors have nothing to disclose.*

REFERENCES

1. Powers JH, Patrick DL, Walton MK, et al. Clinician-Reported Outcome Assessments of Treatment Benefit: Report of the ISPOR Clinical Outcome Assessment Emerging Good Practices Task Force. Value Heal. 2017 Jan;20(1):2–14.
2. Longo UG, Franceschi F, Loppini M, et al. Rating systems for evaluation of the elbow. Br Med Bull. 2008;87(1):131–61.
3. Laratta J, Caldwell JM, Lombardi J, et al. Evaluation of common elbow pathologies: a focus on physical examination. Phys Sportsmed. 2017;45(2):184–90.
4. Sathyamoorthy P, Kemp GJ, Rawal A, et al. Development and validation of an elbow score. Rheumatology. 2004;43(11):1434–40.
5. The B, Reininga IHF, El Moumni M, Eygendaal D. Elbow-specific clinical rating systems: Extent of established validity, reliability, and responsiveness. J Shoulder Elb Surg. 2013;22(10):1380–94.
6. Jacobson-Petrov J, Simeonov L. The Cross-cultural Adaptation of the Disabilities of the Arm, Shoulder and Hand (DASH) Patient-Reported Outcome Measure Into Bulgarian. Hand. 2016;11:146–146.
7. Suk M, Hanson BP, Norvell DC, Helfet DL. Musculoskeletal Outcomes Measures and Instruments. 2nd ed. Thieme; 2009.
8. Beaton DE, Bombardier C, Guillemin F, Ferraz MB. Guidelines for the Process of Cross-Cultural Adaptation of Self-Report Measures. Spine (Phila Pa 1976). 2000;25(24):3186–91.
9. Lim CR, Harris K, Dawson J, et al. Floor and ceiling effects in the OHS: an analysis of the NHS PROMs data set. BMJ Open. 2015 Jul 27;5(7):e007765.
10. Koo TK, Li MY. A Guideline of Selecting and Reporting Intraclass Correlation Coefficients for Reliability Research. J Chiropr Med. 2016 Jun;15(2):155–63.
11. Terwee CB, Bot SDM, de Boer MR, et al. Quality criteria were proposed for measurement properties of health status questionnaires. J Clin Epidemiol. 2007 Jan;60(1):34–42.
12. Zaiontz C. Real Statistics Using Excel [Internet]. 2021. Available from: https://www.real-statistics.com/
13. Vishwanathan K, Alizadehkhaiyat O, Kemp GJ, Frostick SP. Minimal clinically important difference of Liverpool Elbow Score in elbow arthroplasty. JSES Open Access. 2017 Oct;1(3):144–8.
14. Şavkın R, Büker N, Şimşek Ş. The Liverpool Elbow Score, patient-answered section: Cultural adaptation, validity and reliability of Turkish version. Musculoskelet Sci Pract. 2020;50:102256.