Cross-Cultural Adaptation, Validity, and Reliability of the Arabic Version of the Patient-Rated Elbow Evaluation

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ABSTRACT

Objectives: *The current study aims to translate and culturally adapt the Patient-Rated Elbow Evaluation (PREE) into Arabic while also investigating its reliability and validity.* ***Methods:*** *This questionnaire was translated following a clear and user-friendly guideline protocol. Cronbach's alpha was used to assess the reliability and internal consistency of the items of PREE. Additionally, the constructive validity of PREE was evaluated against the 36-Item Short Form Survey (SF 36) and the Shoulder and Hand questionnaire.* ***Results:*** *A total of 38 participants were included in this study, of which 21 participants were re-evaluated for reliability testing. Cronbach's alpha of the total score of Arabic PREE is 0.955 which indicates that the scale has a high level of internal consistency. There is a good correlation between PREE and with DASH score. The correlation between total AR PREE, function sub-AR PREE, and pain subscale AR PREE with DASH work sub-parameter r (0.527) with p-value (<0.05) indicates a significant correlation. Additionally, the correlation was assessed with another score SF 36 and the results were as follows. A moderate correlation between total PREE with physical health, physical function, and pain sub-scale of SF36, with coefficient interval (r) 0.37, 0.38, and 0.46 subsequently.* ***Conclusions:*** *The PREE- AR is s a comprehensible, valid, and reliable method to assess the functionality and pain of any patient with elbow pathology. Therefore, we believe that the PREE-AR questionnaire can be used by clinicians, researchers, and patients to report the pain and functionality of the elbow.*

Keywords: Patient-rated elbow evaluation questionnaire, Elbow, Arthritis and Translation

INTRODUCTION

The use of scoring systems to evaluate pain, functional status, and quality of life has grown in popularity. Patient-reported outcomes are more patient-centred and are more likely to predict outcomes [1]. Such measures have been used by clinicians to contribute to their decision-making. A variety of scoring systems have been utilized in evaluating elbow disorders. However, only a handful of them have been scientifically confirmed, and many of them just evaluate certain aspects of elbow function [2].

One of the most regularly utilized elbow self-report pain and disability outcome measures used in research and clinical practice is the Patient-Rated Elbow Evaluation (PREE) questionnaire. It consists of 20 questions that use a numerical rating scale from zero to ten to rate the severity of symptoms and the level of functional impairment. The PREE is divided into two short sections that address pain and functional impairment in performing daily activities (ADLs) as well as instrumental ADLs (IADLs). In patients with different elbow diseases, the questionnaire was proven to be valid and reliable [3].

The PREE has been previously compared and validated with the American Shoulder and Elbow Surgeons Elbow

questionnaire (ASES-e); the Disabilities of Arm, Shoulder and Hand questionnaire (DASH), and the Short-Form 36 Health Survey questionnaire (SF36). The pain subscale elements had very good test-retest reliability (ICC: 0.74-0.87), while the function subscale elements had fair to very good test-retest reliability (ICC: 0.60-0.84).

The PREE questionnaire has been translated and validated into many languages including Japanese, Persian, Turkish, German, and French language. It has international acceptance, which makes many authors use it and compare their results to the published results in the literature. These are the reasons why the PREE was chosen to be translated into Arabic [4-10].

The current study's goal is to translate and culturally adapt the PREE into Arabic while also investigating its reliability and validity. We Hypothesis is that it will be as reliable and responsive as its English counterpart.

METHODS

Our study was conducted in the Orthopedic Out-Patient Clinics at King Saud University Medical City during the period from September 2021 to February 2022. Inclusion criteria were: all adults aged 18 and above, who spoke, read and wrote Arabic, and with elbow pathology including arthritis, fracture among patients seen in our orthopaedic clinic, and other elbow injuries.

Our study was conducted in two stages. The first stage was a translation of the questionnaire to Arabic, followed by a translation back to English. The second stage included data collection for reliability and cross-cultural adaptivity.

The questionnaire was translated into the Arabic language by two independent translators who were fluent in both Arabic and English and experienced the cultural differences between communities speaking both languages [11]. The first translator (A1) had a background in medical terminology, experience in clinical orthopaedics, and knowledge about the construct of the instrument. The second translator (A2) did not have a medical background and no previous experience with the construct of the instrument. Translation from the first translator was labelled as AT1, while that of the second translator was labelled as AT2. The translated versions (AT1 and AT2) and the original version of the PREE were compared by another two independent reviewers (R1 and R2), who are bilingual and bicultural, and no significant difference between the two translated versions (AT1 and AT2) was observed. Following consensus among both reviewers, a final Arabic translation version was adapted and labelled PEER-AT. The questionnaire was then translated back from the final Arabic version (PEER-AT) to English by another two independent translators (A3 and A4) who are fluent in both the English and Arabic languages and labelled (AT3 and AT4). Both translators (A3 and A4) have extensive knowledge of both cultures and have experience in translating medical literature. Finally, both reviewers (R1 and R2) compared the two back-translation versions (AT3 and AT4) to each other, then both versions (AT3 and AT4) to the original questionnaire and found no discrepancies. Following consensus between both reviewers (R1 and R2), a final Arabic version of the patient-rated Elbow Evaluation was produced.

We then conducted a pilot study of 30 participants to determine if there was any difficulty in understanding the contents of the questionnaire.

The 2nd part of the study involved patient completion of an electronic version of the Arabic PREE questionnaire at two different appointments (2 weeks apart) to determine the reliability of the questionnaire. 1st, participants completed the Arabic version of PREE alone. Then, two weeks later participants completed the Arabic versions of PREE, DASH, and SF-36 questionnaires to determine to construct validity.

Ethical Consideration

Approval was obtained from the Institutional Review Board (IRB) in the Department of Family and Community Medicine in the College of Medicine, King Saud University. Each participant was approved verbally after they were informed of the study purpose and the right to withdraw at any time without any obligation toward the study team. Also, participants' anonymity was assured by not collecting identifying data, all participants are anonymous. There were no incentives or rewards given to participants [12].

Statistical Analysis

Data were analyzed by using Statistical Package for Social Studies (SPSS 22; IBM Corp., New York, NY, USA). Cronbach's alpha was used to assess the reliability of the questionnaire. The test-retest reliability of

the PREE was determined by the Intraclass Correlation Coefficient (ICC). Stem and leaf plots were used to examine the distribution of individual responses within the sub-scales/total score. Pearson correlation coefficient and Spearman's rho coefficient were used. A p-value <0.05 was considered statistically significant.

RESULTS

A total of 38 participants were included in this study, of which 21 participants were re-evaluated for reliability testing. The participants filled in all the sections of the PREE. DASH and the SF 36 questionnaires. Based on the participants' feedback, the PREE questionnaire was clear, and they faced no difficulties in understanding the questions. Also, all the answers were comprehensible.

As shown in Table 1a and 1b, internal consistency analysis (Cronbach's alpha coefficient) was found to be 0.955 which indicates that the scale has a high level of internal consistency. Furthermore, Cronbach's alpha coefficient was used to assess the correlation of the subscale to each other. The pain sub-scale was strongly correlated to the whole questionnaire with Cronbach's alpha of 0.911. The same strong correlation was found with the function subscale with Cronbach's alpha of 0.9.

Table 1a Internal reliability (internal consistency) of the PREE

Scale	Cronbach's alpha
Pain sub-scale	0.911
Function sub-scale	0.93
Total PREE score	0.955

Table 1b Mean score of the PREE questionnaire

	Mean	SD
Pain PREE (0-50)	26.43	12.91
Function PREE (0-50)	20.48	10.72
PREE total (0-100)	46.9	22.42

As shown in Table 2, A test and retest were used to assess the reliability of the PREE score. The ICC of each questionnaire with a total scale was found low, ranging from 0.04 to 0.8. Questions number 1, 12, 18, and 20 showed strong reliability with ICC ranging from 0.6-0.84. However. The sub of the total scale showed good reliability with an ICC of 0.48. The Sum of the function score has a good reliability with an ICC of 0.54 while the sum of the pain score was 0.33.

Table 2 Intraclass correlation coefficients (ICC) for the test-retest reliability of the PREE

	Question	ICC
Pain scale		
	1	0.6
	2	0.36
	3	0.11

	4	0.04
	5	0.43
Function scale		
	6	0.4
	7	0.37
	8	0.13
	9	0.22
	10	0.41
	11	0.29
	12	0.84
	13	0.54
	14	0.35
	15	0.02
	16	0.31
	17	0.54
	18	0.65
	19	0.59
	20	0.62
Sum scale of pain		0.33
Sum scale of function		0.54
Total score		0.48

When assessing the correlation of PREE with DASH score, a good correlation between total AR PREE, function sub AR PREE, pain subscale AR PREE with DASH work sub-parameter r (0.527) with P value (<0.05) which indicates a significant correlation. A week correlation with DASH disability/ symptom sub-parameter r (0.3). Additionally, the correlation was assessed with another score SF 36, and the results were as follows (Table 3a and Table 3b). A moderate correlation between total PREE with physical health, physical function, and pain sub-scale of SF36, with coefficient interval (r) 0.37, 0.38, and 0.46 subsequently. A weak correlation between Arabic PREE with emotional well-being, and social functioning with a coefficient interval of 0.29 and 0.27 subsequently which is expected since the PREE score has no items that evaluate the emotional or social status (Table 4).

Table 3a Pearson correlation coefficients for pairs of individual questions and their corresponding scales

		Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15	Q16	Q17	Q18	Q19	Q20	PREE Pain	PREE Function	PREE Total
Q1	r	.556**	.592**	.841**	.890**	.628**	0.37	.491*	0.4	.800**	0.24	.692**	0.24	.541*	0.36	.494*	.549**	.879**	.820**	.836**	.900**	.776**	.889**
	p	0.01	0	0	0	0	0.1	0.02	0.07	0	0.29	0	0.29	0.01	0.11	0.02	0.01	0	0	0	0	0	0
Q2	r	1	.526*	0.43	.693**	.616**	.489*	.564**	.449*	.618**	.456*	0.32	0.23	.494*	0.32	.578**	.499**	.570**	.590**	.530*	.728**	.682**	.745**
	p		0.01	0.05	0	0	0.02	0.01	0.04	0	0.04	0.15	0.32	0.02	0.16	0.01	0.02	0.01	0	0.01	0	0	0
Q3	r		1	.798**	.671**	0.33	0.12	.726**	.513*	.704**	.576**	0.35	0.22	0.34	0.43	0.28	0.24	.554**	0.42	.494*	.848**	.610**	.780**
	p			0	0	0.14	0.6	0	0.02	0	0.01	0.11	0.35	0.13	0.05	0.22	0.29	0.01	0.06	0.02	0	0	0
Q4	r			1	.730**	.464*	0.22	.593**	0.39	.703**	0.39	.479*	0.19	.461*	.441*	0.25	0.35	.699**	.549*	.592**	.894**	.639**	.820**
	p				0	0.03	0.34	0	0.08	0	0.08	0.03	0.41	0.04	0.05	0.27	0.13	0	0.01	0	0	0	0
Q5	r				1	.599**	0.42	.455*	0.37	.787**	0.32	.652**	0.21	.449*	0.22	.481*	.544*	.887**	.847**	.842**	.924**	.752**	.892**
	p					0	0.06	0.04	0.1	0	0.16	0	0.37	0.04	0.35	0.03	0.01	0	0	0	0	0	0
Q6	r					1	.600**	.441*	.499*	.562**	0.41	.611**	0.37	.608**	0.43	.522*	.563**	.457*	.548*	.502*	.602**	.750**	.705**
	p						0	0.05	0.02	0.01	0.07	0	0.09	0	0.05	0.02	0.01	0.04	0.01	0.02	0	0	0
Q7	r						1	0.12	0.15	0.33	0.28	0.27	0.03	0.15	0.12	0.24	0.21	0.35	0.35	0.29	0.36	0.4	0.4
	p							0.62	0.52	0.15	0.22	0.24	0.88	0.53	0.6	0.3	0.35	0.12	0.12	0.21	0.11	0.07	0.07
Q8	r							1	.892**	.698**	.753**	0.29	.568**	.447*	.519*	.481*	0.23	0.37	0.3	0.34	.661**	.725**	.727**
	p								0	0	0	0.2	0.01	0.02	0.02	0.03	0.32	0.37	0.34	0.13	0	0	0
Q9	r								1	.655**	.725**	0.34	.736**	.489*	.526*	.588**	0.29	0.3	0.28	0.36	.493*	.758**	.646**
	p									0	0	0.13	0	0.02	0.01	0.01	0.2	0.19	0.19	0.11	0.02	0	0
Q10	r									1	.520*	.743**	.454*	.514*	.456*	.654**	0.42	.754**	.752**	.835**	.840**	.886**	.907**
	p										0.02	0	0.04	0.02	0.04	0	0.06	0	0	0	0	0	0
Q11	r										1	0.24	.516*	.553**	.692**	.526*	0.13	0.15	0.19	0.21	.463*	.667**	.586**
	p											0.29	0.02	0.01	0	0.01	0.59	0.51	0.4	0.36	0.03	0	0.01
Q12	r											1	.499*	.497*	0.32	.519*	0.43	.650**	.760**	.778**	.581**	.741**	.689**
	p												0.02	0.02	0.16	0.02	0.05	0	0	0	0.01	0	0

r = Pearson Correlation

**. Correlation is significant at the 0.01 level (2-tailed). *. Correlation is significant at the 0.05 level (2-tailed).

Table 3b Pearson correlation coefficients for pairs of individual questions and for individual questions and their corresponding scales

		Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15	Q16	Q17	Q18	Q19	Q20	PREE Pain	PREE Function	PREE Total
Q13	r												1	.470*	0.36	.453*	0.32	0.17	0.26	0.39	0.25	.634**	.447*
	p													0.03	0.11	0.04	0.16	0.47	0.25	0.08	0.27	0	0.04
Q14	r													1	.836**	.779**	.484*	.434*	.561**	.539*	.524*	.774**	.672**
	p														0	0	0.03	0.05	0.01	0.01	0.01	0	0
Q15	r														1	.667**	0.27	0.21	0.3	0.3	0.41	.656**	.551**
	p															0	0.23	0.37	0.18	0.19	0.06	0	0.01
Q16	r															1	.438*	0.42	.576**	.582**	.472*	.787**	.648**
	p																0.05	0.06	0.01	0.01	0.03	0	0
Q17	r																1	.580**	.670**	.610**	.496*	.600**	.572**
	p																	0.01	0	0	0.02	0	0.01
Q18	r																	1	.926**	.869**	.832**	.706**	.817**
	p																		0	0	0	0	0
Q19	r																		1	.922**	.744**	.772**	.797**
	p																			0	0	0	0
Q20	r																			1	.762**	.790**	.817**
	p																				0	0	0
PREE Pain	r																				1	.799**	.958**
	p																					0	0
PREE Function	r																					1	.938**
	p																						0
PREE Total	r																						1
	p																						

r = Pearson Correlation

**. Correlation is significant at the 0.01 level (2-tailed).   *. Correlation is significant at the 0.05 level (2-tailed).

Table 4 Relationship between the PREE scores and SF36 questionnaire and DASH questionnaire (Spearman's rank - correlation)

PREE	Pain		Function		Total	
SF36	r	p-value	r	p-value	r	p-value
Physical functioning	0.37	0.11	0.38	0.11	0.37	0.11
physical health	-0.37	0.12	-0.31	0.19	-0.38	0.11
emotional problems	-0.24	0.31	-0.28	0.25	-0.29	0.23
Energy fatigue	-0.38	0.11	-0.28	0.25	-0.34	0.16
Emotional well being	-0.28	0.24	-0.32	0.18	-0.3	0.21
Social functioning	-0.27	0.27	-0.2	0.41	-0.27	0.26
Pain	-0.44	0.06	-0.37	0.12	-.461*	0.05
General health	-0.33	0.16	-0.39	0.1	-0.34	0.15
DASH						
Symptoms/Disabilities	0.24	0.3	0.36	0.11	0.28	0.21
Work	.487*	0.03	.502*	0.02	.527*	0.01
Sports/Music	-0.05	0.83	0.05	0.83	0.01	0.96
DASH Total	0.27	0.24	0.39	0.08	0.34	0.13

DISCUSSION

To the best of our knowledge, we established the only elbow-specific elbow score which is the Arabic PREE score, other questionnaires like the DASH score are cross-culturally adapted but it's not elbow-specific scores [13, 14].

In the translation process, we had not faced any difficulties in translating the score into the Arabic language. Also, the participants found the score is an easy and comprehensible questionnaire. Similar findings in the cross-cultural adaptation of the PREE score in German and Turkish languages [6, 7].

A test-retest was used to assess the reliability of the PREE questionnaire, which showed low ICC if we assess each question separately except for question numbers 1, 12, 13, 17-20. The questions that have high test-retest reliability were assessing the function. This finding is also noticed in German and Turkish studies [6, 7]. Additionally, those studies have lower test-retest reliability when compared to the English score which is the original one [3].

The correlation of each question to each other was assessed by using internal consistency analysis (Cronbach's alpha coefficient). It was found to be 0.955 which indicates that the scale has a high level of correlation; the same finding was reported by the German study [6]. The Cronbach's alpha in their study was 0.96.

In This study, we aimed to do constructive validity of the Arabic PREE. We correlated Arabic PREE with Arabic Dash score, Arabic SF 36.

When assessing the correlation of PREE with DASH score, a good correlation between total AR PREE, function sub-AR PREE, pain subscale AR PREE with DASH work sub-parameter r (0.527) with p-value (<0.05) which indicates a significant correlation. A week correlation with DASH disability/symptom sub-parameters (0.3). The total score of the PREE was shown to have a weak correlation with DASH parameters (0.34). While the German study found a strong correlation with the total PREE, pain subscale PREE and function subscale PREE. On the other hand, the Turkish and Persian studies found a moderate correlation between PREE and DASH scores [6, 7, 9].

Additionally. It's expected that there will be no strong correlation between PREE and DASH score, PREE is established to evaluate elbow joint only. On the other hand, the DASH score evaluates the shoulder, elbow, and hand. Furthermore, DASH has items that evaluate the psychological status resulting from painful or nonfunctional joints while the PREE score is purely evaluating the pain and functionality status of the elbow joint [13, 14].

the correlation was assessed with another score which is SF 36, and the results were as follows. A moderate correlation

between total PREE with physical health, physical function, and pain subscale of SF36, with coefficient interval (r) 0.37, 0.38, and 0.46 subsequently. When comparing this study's results to the German study, similar findings were reported, SF-36 (bodily pain, role physical, and physical functioning) have a moderate correlation to PREE score with coefficient interval (r=0.27-0.66). Also, the Persian study reported a moderate correlation between PREE to score with SF 36 (daily pain, role physical and physical functioning) with r ranging from 0,19 to 0.49 [6, 9].

Limitations of the Study

In this study, we correlated the Arabic PREE with either a general score like SF 36 or with an upper limb score like a DASH score. So further studies are needed to assess the correlation between Arabic PREE with any other elbow-specific score.

CONCLUSION

The PREE-AR is s a comprehensible, valid, and reliable method to assess the functionality and pain of any patient with elbow pathology. Therefore, we believe that the PREE-AR questionnaire can be used by clinicians, researchers, and patients to report the pain and functionality of the elbow.

DECLARATIONS

Conflict of Interest

The author's declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Abbreviations

PREE: Patient-Rated Elbow Evaluation.

AR. PREE: Arabic version of Patient-Rated Elbow Evaluation.

SF-36: 36-Item Short Form Survey.

DASH: Disabilities of Arm, Shoulder and Hand questionnaire.

ADLs: Daily activities.

IADLs: Instrumental activities of daily living.

ASES-e: American Shoulder and Elbow Surgeons Elbow questionnaire.

SPSS: Statistical Package for Social Studies.

ICC: Intraclass Correlation Coefficient.

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