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Research Articles

Readability of Persian Oxford Elbow Score Using Health Literacy Questionnaire

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Objectives

Readability and understanding of the questions by patients are determining factors in choosing a patient-rated outcome measure. This can be done using Flesh Reading Ease Score (FRES) in English. In place of this software in other languages, we aimed to assess the readability of the Persian-Oxford elbow score (OES) using the validated health literacy questionnaire. Over 110 million speakers widely speak this language from more than six Middle Eastern countries.

Methods

We enrolled 60 patients with elbow and 60 with non-elbow conditions as the control group. Patients rated each of the 12 items of the EOS on a 3-point Likert scale as *very little, moderate, and very good* in response to *"How understandable was the question to you?"*. The rating was compared with the health literacy score, which was categorized as *insufficient, not enough, sufficient*, and *excellent* health literacy.

Results

Testing readability of individual items of the OES showed that the median readability of each item was 3 out of 3 (*very good*) for all 12 items. There was no significant difference between an elbow and non-elbow involvement (P=0.17), which was suggestive of *very good* readability of the EOS by the general population, even if the patients have not experienced the symptoms. Moreover, there was no significant difference among different levels of health literacy which is suggestive of *very good* readability of OES even when the health literacy was *insufficient*.

Conclusion

OES readability is very good and high enough to be understandable by different levels of health literacy, education levels, and different age groups. Persian-EOS can be used confidently for initial and follow-up assessments of elbow conditions.

Level of Evidence

Level V

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INTRODUCTION

The Persian language is widely spoken by over 110 million speakers spread over more than six countries in the Middle East. Patient-reported outcome measures (PROM) became popular over the past years because patients might feel differently about improvement than what providers do.[1-7] Qualitative measures are converted to scoring systems in two ways, including clinical assessment by the provider and judgment by the patient. Satisfaction and well-being are the ultimate goals of any therapeutic interventions where the clinical evaluation alone cannot support a treatment unless it is judged by the patient too. PROMs assess the subjective perception of the patients about the involved region (e.g., Oxford Elbow Score-OES, Disabilities of the arm shoulder hand-DASH), specific condition (e.g., Patient Rated Tennis Elbow Evaluation), or general health and quality of life (e.g., Short Form SF-36).

There are currently more than 18 questionnaires for assessing elbow joints in particular or as part of the upper limb.[8] However, not a single questionnaire is comprehensive enough to include all aspects. We know that a region-specific questionnaire (e.g., OES) can more accurately explain the severity and changes after treatment than a more general one (DASH). Oxford elbow score is one of the popular questionnaires among elbow measures because it was validated using a high-quality methodology on a large heterogenous cohort of patients.[9] The first version was validated in English in 2008.[10] It is also validated in multiple languages, including Persian.[6]

Readability and understanding of the questions by patients are other determining factors in choosing PROMs. El-Daly et al. studied the readability of 121 PROMs in orthopedics using the Flesh Reading Ease Score (FRES) –developed to assess the ease of reading and understanding based on sentence length and word syllables. The OES scored 62 out of 100, representing "standard English," meaning that it is comprehensible by people 13-15 years of age (8^{th}-10^{th} grade) and higher. Of note, Disabilities of Arm, Shoulder, and Hand (DASH) and Quick DASH, Mayo Elbow Performance Score (MEPS), and the American Shoulder and Elbow Surgeons Elbow Score (ASES) were scored between 30 and 40 corresponding to "difficult" readability level which are only understandable by adults of 18-22 years and higher.[11] A standard and validated tool specific to that language are required to compare other languages' readability. We used the validated tool developed for assessing health literacy in Persian speaking population to evaluate the readability of the Persian-OES.[6,12] Since there is an upward trend toward using OES in publications from Persian-speaking countries, we need a basis to judge and compare the results of these papers with the ones from non-Persian-speaking countries. In this study, we aimed to assess the readability of Persian-OES.

METHODS

PATIENT POPULATION

We enrolled patients who were referred to our outpatient clinic of a level-1 hospital consecutively and voluntarily to fill out the questionnaires. We enrolled 60 consecutive patients with elbow and 60 consecutive patients with non-elbow conditions. We included patients who were literate enough to read. We excluded illiterate patients and non-Persian-speaking patients.

The control group with non-elbow conditions was also asked to complete the questionnaires to assess if having the condition makes it easier to understand the related items and to eliminate the condition bias.

TOOLS/MEASUREMENTS

A. OXFORD ELBOW SCORE

Oxford Elbow Score (OES) is a self-report questionnaire comprising 12 items assessing elbow function and its status during the past four weeks. It is validated in many languages, including Persian.[6] Each of the 12 items is scored from 0 to 4, with 0 showing greater severity. The OES is divided into three domains, including Elbow function, Elbow pain, and a Social-psychological domain. The score for each domain and the total OES is calculated by the sum of the individual items ranging from 0 to 48 for the total OES and 0 to 16 for each domain. Scores are then converted to a metric of 0 to 100 by using the below calculation:

$$\text{Conversion to metric score} = \frac{100}{Maximum\ possible\ domain\ score} \times Calculated\ domain\ score$$

To assess the ease of understanding of the items, each of the 12 items was followed by a question as "How understandable was the question to you?". We used a 3-point Likert scale, ranking the answer as Very little, Moderate, and Very good. The 3-point scale was chosen because, in a preliminary study with a 5-point scale, Very little and Little, as well as Very good and Excellent, were checked interchangeably by the patients with little distinction.

B. READABILITY TESTS

In English, the Flesch-Kincaid readability test was developed in 1975 and is commonly used to show how difficult a text is to understand by weighing factors such as word length or sentence length. The Gunning fog index was developed in 1952 for English writing and estimates the years of education required to understand a passage. Coleman-Liau index and Automated readability index are other measures that consider the characters instead of syllables in a word to estimate a grade level in the United States to understand a text. In European countries, an international standard called the Common European Framework of Reference for Languages (CEFR) describes language ability on a 6-point scale from A1 for beginners to C2 for masters in the language.

C. HEALTH LITERACY FOR IRANIAN ADULTS (HELIA)

To assess the readability and ease of understanding of the validated Persian OES questionnaire, we used the health literacy score to indicate the level of literacy required to understand the Persian OES. Health literacy is defined as the level of individual capacity to understand and process basic medical and health information and to make basic health decisions.[13] Montazeri et al. developed a questionnaire in 2014 to evaluate health literacy in the Persian language population called Health Literacy for Iranian Adults (HELIA). Consisting of 33 items as follows: 4 items for reading, six items for access, seven items for understanding, four items for appraisal, and 12 items for the decision.[12] Each item is scored from 1 to 5, with larger numbers showing greater health literacy. The raw score is calculated as the sum of the individual items in each domain. To convert the raw score to metric score, the below calculation is used:

$$\frac{Calculated\ score - Minimum\ possible\ score}{Maximum\ possible\ score - Minimum\ possible\ score} \times 100$$

For instance, if the raw score for the reading domain is 8, the converted metric score is calculated as follows: $\frac{8-4}{20-4} \times 100 = 25$

To calculate the total HELIA score, metric score of the five domains are summed and then divided by 5. The total HELIA score is interpreted as follows:

1. A total score of 0 to 50 indicates *insufficient* health literacy
2. A total score of 50.1 to 66 indicates *not enough* health literacy
3. A total score of 66.1 to 84 indicates *sufficient* health literacy
4. A total score of 84.1 to 100 indicates *excellent* health literacy

HELIA score was compared with the 3-point Likert score for individual items to check for how understandable an item was for different levels of health literacy.

STATISTICAL ANALYSIS

SPSS software version 23 was used for statistical analysis. Quantitative data were presented as mean± standard deviation (SD) or median (interquartile range) according to the distribution normality or variable type. Independent sample t-test or Mann-Whitney test were used to compare the quantitative variables between the two groups. ANOVA was used to compare the quantitative variables between more than two groups. The Spearman correlation test was also conducted to assess the correlation between variables. The level of significance was considered less than 0.05.

RESULTS

We enrolled 60 patients with elbow and 60 with non-elbow conditions (Table 1).

There was a statistically significant difference in total health literacy between the elbow and non-elbow involvement (*P=0.04*). Moreover, except for the Reading domain (P=0.04), the other four domains of health literacy did not show any significant difference between an elbow and non-elbow involvement, showing almost comparable health literacy between both groups (Table 2).

Testing the readability of individual items of the OES showed that the median readability of each item was 3 out of 3 (very good) for all 12 items (Table 3).

There was no significant difference between elbow and non-elbow involvement (P=0.17), which is suggestive of very good readability of the EOS by the general population, even if the patients have not experienced the symptoms (Table 3). Moreover, there was no significant difference among different levels of HELIA. This is suggestive of the very good readability of OES, which was independent of health literacy even when health literacy was insufficient (Table 4).

Both health literacy and OES readability were significantly different between the educational levels (P=0.004 and P=0.002, respectively). There was also an inverse correlation between age and health literacy (r=-0.22, P=0.02), while OES readability and age did not have any significant correlation (r=-0.06, P=0.55) (Table 5).

DISCUSSION

In this study, we aimed to assess the readability of Persian-OES by asking about patients' perceptions of each item and comparing these results with health literacy categorization. Our study showed that the Persian-EOS was comprehensible by the patients regardless of their health literacy level. Even patients with insufficient health literacy could understand the items in this measure.

We found a significant correlation between health literacy and education level, which is expected in this context. The same finding about the OES readability is intuitive that the level of school education might be a more reliable way to rate the readability level; however, when looking at the mean OES readability for each education level, there seems to a small difference, and all education levels scored above 2.5 out of 3 for readability of OES.

OES readability for total and individual items was comparable between the elbow and non-elbow patients. Patients may feel nonsense when answering a question about a symptom they have never experienced. Thus, the items about the elbow might be incomprehensible to the patients without this experience. For this reason, we also asked non-elbow patients as a control group to rate the items to check if they were comprehensible enough for the general population.

In a systematic review, OES was used only in 6% of the cases since its creation in 2008. The most frequently used questionnaire in the studies was the Mayo Elbow Performance Score (MEPS), comprising 55% of the cases, followed by DASH in 30% of the cases.[14] Since the validation of the OES, its application has been increasing, as seen in recent literature.[9,15] Perez et al. investigated the readability of 86 PROMS in orthopedics by a range of algorithms.[16] The American Medical Association and National Institute of Health suggested that a patient-reported questionnaire is preferred if it is understandable by grades 6th to 8th and

Table 1. Demographic data of the patients with elbow conditions (60 patients) and non-elbow conditions (60 patients), including shoulder, wrist, and hand conditions.

	Elbow	Non-Elbow	*P value*
Age, mean (SD)	37 (12)	44 (17)	***0.008****
Sex, No. (%)			
Female	30 (50)	31 (52)	*0.86***
Male	30 (50)	29 (48)	
Education, No. (%)			
Primary school	18 (30)	29 (48)	*0.18***
High school	24 (40)	17 (28)	
Graduate school and higher	18 (30)	14 (24)	
Occupation, No. (%)			
Housewife	19 (32)	22 (37)	*0.83***
Employee	12 (20)	11 (18)	
Self-employed	20 (33)	21 (35)	
No job	9 (15)	6 (10)	

*Independent sample t-test
**Chi-square

Table 2. Calculated mean score in percentage for Health Literacy for Iranian Adults (HELIA) domains and Oxford Elbow Score (OES) domains compared between elbow and non-elbow conditions.

	Mean (SD)		*P value**
	Elbow	Non-Elbow	
HELIA Total (%)	76 (19)	71 (17)	*0.04*
Access (%)	73 (22)	67 (21)	*0.08*
Reading (%)	76 (24)	67 (27)	***0.04***
Understanding (%)	85 (19)	82 (18)	*0.13*
Appraisal (%)	70 (26)	66 (25)	*0.32*
Decision (%)	78 (18)	74 (17)	*0.13*
OES Total (%)	57 (23)	.	
Pain (%)	48 (27)	.	
Function (%)	69 (26)	.	
Social (%)	53 (25)	.	

* Mann-Whitney test
HL= health literacy; OES=oxford elbow score

below. Since we did not have a grading level in Persian, we used the health literacy level to assess the readability of the EOS, which is considered our study limitation.

One of our limitations was the sample size enrolled from a single orthopedic clinic. Although we included consecutive patients, health literacy may be biased by the region. Another limitation was that we had to use the health literacy questionnaire in place of the grading level to assess the readability of the questionnaire in the Persian language. Considering several demographic factors influencing the literacy level, a larger sample size may better define the readability of the questionnaire by including enough sample size within subgroups.

CONCLUSION

OES readability is very good and high enough to be understandable by different levels of health literacy, education levels, and different age groups. Persian-EOS can be used confidently for initial and follow-up assessments of elbow conditions and to compare data between papers emerging from other regions worldwide.

DECLARATION OF CONFLICT OF INTEREST

The authors do NOT have any potential conflicts of interest for this manuscript.

Table 3. Readability of Oxford Elbow Score items as scored by the patients compared between elbow and non-elbow conditions. Readability was scored as 1=very little 2=good 3=very well

		Elbow		Non-Elbow		*P value**
		Median	IQR (25-75)	Median	IQR (25-75)	
Q1	Function	3	2.25-3.0	3	2.0-3.0	*0.34*
Q2	Function	3	3.0-3.0	3	2.0-3.0	***0.03***
Q3	Function	3	3.0-3.0	3	2.0-3.0	***0.03***
Q4	Function	3	3.0-3.0	3	2.25-3.0	*0.21*
Q5	Social-psychological	3	3.0-3.0	3	3.0-3.0	*0.58*
Q6	Social-psychological	3	3.0-3.0	3	3.0-3.0	*0.47*
Q7	Pain	3	3.0-3.0	3	3.0-3.0	*0.75*
Q8	Pain	3	3.0-3.0	3	3.0-3.0	*0.15*
Q9	Social-psychological	3	3.0-3.0	3	3.0-3.0	*0.12*
Q10	Social-psychological	3	3.0-3.0	3	3.0-3.0	*0.47*
Q11	Pain	3	3.0-3.0	3	2.25-3.0	*0.37*
Q12	Pain	3	3.0-3.0	3	2.0-3.0	*0.22*
Total OES readability		**3**	**2.8-3.0**	**3**	**2.4-3.0**	***0.17***

* Mann-Whitney test
Q=Question; IQR=Interquartile range 25%-75%

Table 4. Comparing OES readability among different levels of health literacy showing comparable high readability despite different levels of health literacy

	Health literacy based on HELIA				*P value**
	Insufficient	Not enough	Sufficient	Excellent	
Elbow condition					
Number (%)	7 (12)	8 (13)	17 (28)	28 (47)	*0.66*
OES readability, mean (SD)	2.7 (0.43)	2.9 (0.17)	2.8 (0.36)	2.9 (0.36)	
Non-elbow condition					
Number (%)	4 (7)	23 (38)	18 (30)	15 (25)	*0.23*
OES readability, mean (SD)	2.5 (0.5)	2.7 (0.37)	2.9 (0.30)	2.7 (0.52)	
Total					
Number (%)	11 (9)	31 (26)	35 (29)	43 (36)	*0.26*
OES readability, mean (SD)	2.6 (0.45)	2.7 (0.34)	2.8 (0.33)	2.8 (0.42)	

* Analysis of Variance (ANOVA)

Table 5. Association of education level and correlation of age with the mean OES readability and HELIA score

	Education, mean (SD)				Age	
	Primary school	High school	Graduate school	*P value**	r	*P value***
OES readability, mean (SD)	2.6 (0.42)	2.8 (0.29)	2.9 (0.37)	***0.002***	-0.06	*0.55*
Total HELIA, mean (SD)	68 (19)	75 (15)	82 (16)	***0.004***	-0.22	***0.02***

* ANOVA
** Spearman Correlation test
OES: oxford elbow score; HELIA: health literacy for Iranian adults; SD: standard deviation

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INFORMED CONSENT

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