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Validation of the Russian version of the Quality of Life-Rheumatoid Arthritis Scale (QOL-RA Scale)

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ABSTRACT

Purpose: To translate the English version of the Quality of Life-Rheumatoid Arthritis Scale (QOL-RA Scale) into Russian, test the reliability and validity of the Russian version and compare the scaling assumptions, reliability, and validity of the English, Spanish and Russian versions.

Materials/Methods: The development of a Russian version of the Quality of Life-Rheumatoid Arthritis Scale (QOL-RA Scale) involved translating the English version of the instrument into Russian, linguistic adaptation, 50 face-to-face interviews with outpatients with definite rheumatoid arthritis (RA) and testing the reliability and validity.

Results: The QOL-RA Scale, an 8-item scale, took about 3 minutes to administer. Psychometric analysis revealed that the psychometric attributes of English, Spanish and Russian questionnaires are satisfactory.

Conclusions: The Russian version of the QOL-RA scale is a reliable and valid measure of RA-specific QOL.

Key words: health-related quality of life, rheumatoid arthritis, QOL-RA scale, psychometrics

INTRODUCTION

In the last 10-15 years, there has been a growing interest in the assessment of quality of life (QOL), particularly in chronic disabling conditions [1]. Health-related quality of life (HRQOL) takes into account not only how a person functions physically, mentally and socially, but also incorporates the individual's perceived well-being in their physical, mental and social aspects of daily life [2]. The Quality of Life-Rheumatoid Arthritis Scale (QOL-RA Scale) was designed by Johnson et al. as a rheumatoid arthritis (RA)-specific HRQOL instrument [3]. This questionnaire consists of 8 items: physical ability, pain, interaction with family and friends, support from family and friends, mood, tension, arthritis, and health. It takes about 3 minutes to administer. Each item is scored from 1 to 10, where 1 is an indicator of 'very poor QOL' and 10 is an indicator 'excellent QOL'. Although developed in an original specific language, the majority of HRQOL measures are used in international settings. The psychometric attributes and constructs analysis of both the English and Spanish questionnaires showed comparable results [3,4].

The aim of this study was to translate the English version of the QOL-RA Scale into Russian, test the reliability and validity of the Russian version and compare the scaling assumptions, reliability, and validity of the English, Spanish and Russian versions.

MATERIALS AND METHODS

The first stage of validation of the QOL-RA Scale included its linguistic adaptation. Two Russian translators fluent in English made two independent-forward translations, which were then reconciled to produce a consensual Russian version. The latter was translated back into English by two English native translators who were fluent in Russian, and reconciled. No significant differences were found between the back translation and the original QOL-RA Scale. Results of interviewing showed, that all questions were clear to patients.

The subjects were continuous outpatients living in Orenburg (Russian Federation) with a diagnosis of definite RA made by a rheumatologist. Recruitment was done at the

Chair of General Medical Practice in Orenburg State Medical Academy. The patient's written consent was obtained before the face-to-face interview utilising the QOL-RA Scale. All subjects (n=50) satisfying the American College of Rheumatology criteria for RA were included. The mean age was 51.94±10.38 years (range from 22 to 73 years), the mean disease duration was 9.55±9.67 years, and 90% were women. All patients had polyarthritis. Most subjects were seronegative on the rheumatoid factor (64%), with II degree of disease activity (64%), with II radiological stage of RA (64%) and III functional class (50%).

Scaling assumptions of the QOL-RA Scale were examined with descriptive statistics. Difference tests between two means and between two proportions were used to identify significant frequency, mean, and variance differences in sample characteristics, QOL-RA Scale scores, and item scores. Cronbach's alpha technique, correlation, and factor analysis were used in our study.

The reliability of the 8 items in the QOL-RA Scale was calculated using the internal consistency method by computing Cronbach′s alpha coefficient. Cronbach′s alpha ≥ 0.70 was considered acceptable.

Test-retest reliability of the Russian version of the QOL-RA Scale was evaluated in a subgroup of 25 patients without treatment in 3 days after the first examination. We considered the absence of statistically significant differences between repeated measures as appropriate in terms of the same patient's health status.

Construct validity was estimated by Principal factor analysis to assess the structure of the questionnaire.

Criterion-related validity was determined by examining the relationships of the QOL-RA Scale items with external criteria such as the 36-Item Short-Form Health Survey (SF-36) subscales, the radiological stage of RA and clinical parameters. The Spearman correlation coefficients were taken into account in this analysis.

The similarity of the psychometric results across the Caucasian/English, Hispanic/Spanish (according to Danao et al., 2001) and Russian groups will serve to illustrate the capability of the QOL-RA Scale for adaptation to other languages.

RESULTS

Difference tests were carried out between samples of 107 homebound Caucasian/English, 80 homebound Hispanic/Spanish females and 50 Russian patients with RA *(Tab.1)*. The Caucasian/English and Russian groups were shown to be significantly older, to be significantly more likely to be married, divorced, or widowed than single or separated, and more likely to be working or retired, compared with the Hispanic/Spanish group ($p<0.05$). However, the Caucasian/English group had a higher education in comparison with the other groups ($p<0.001$). It is necessary to note, that the Russian group had more severe RA than the Caucasian/English and Hispanic/Spanish groups ($p<0.001$).

An examination of scale characteristics in the Caucasian/English, Hispanic/Spanish and Russian groups revealed distribution of the QOL-RA Scale with a mean and standard deviation of 5.54±1.93 in the Caucasian/English group, 5.28±1.73 in the Hispanic/Spanish group, and 4.78±1.22 in the Russian group *(Tab. 2)*. The distribution of the scale items in all groups were roughly symmetrical, except for interaction

Table 1. **Demographic, socio-economic and disease characteristics of the Caucasian/English, Hispanic/Spanish and Russian groups.**

Sample characteristics	Caucasian/English (n=107) [3]	Hispanic/Spanish(n=80) [3]	Russian (n=50)
Mean age, years	51.96±14.50[1]	45.43±13.92	51.94±10.38[3]
Age range, years	22-81	20-78	22-73
Marital status % single or separated	25.23	46.25[13]	12.00
Education % > 12 years	56.07[12]	13.75	26.00
Occupation % full-time or retired	29.91[1]	1.25	56.00[23]
Functional class			
% class I	9.34	7.50	4.00
% class II	48.60	46.25	42.00
% class III	36.45	42.50	50.00
% class IV	5.61	3.75	4.00
Severity			
% remission	Not applicable	Not applicable	2.00
% mild	25.23[12]	12.50	4.00
% moderate	50.47[2]	57.50[3]	30.00
% severe	24.30	30.00	64.00[23]

[1] Difference tests between the Caucasian/English and Hispanic/Spanish groups significant at $p<0.05$

[2] Difference tests between the Caucasian/English and Russian groups significant at $p<0.01$

[3] Difference tests between the Hispanic/Spanish and Russian groups significant at $p<0.05$

Table 2. **Quality of Life-Rheumatoid Arthritis Scale (QOL-RA Scale): means, standard deviations (SD), and percent floor and ceiling scores in the Caucasian/English and Hispanic/Spanish groups.**

Scale items	Caucasian/English (n=107) [3]			Hispanic/Spanish (n=80) [3]			Russian (n=50)		
	Mean±SD	% floor	% ceiling	Mean±SD	% floor	% ceiling	Mean±SD	% floor	% ceiling
Physical ability	5.76±1.98***	2.8	2.8	5.29±1.88**	5.0	1.3	4.38±1.41	4.0	0.0
Pain	5.46±2.31***	5.6	2.8	4.76±2.39**	15.0	2.5	3.60±1.60	10.0	0.0
Interaction	7.21±2.32	1.9	18.7	6.94±2.21	0.0	17.5	7.22±2.38	2.0	16.0
Support	6.95±2.43	1.9	20.6	6.49±2.31	1.3	15.0	6.20±2.23	6.0	8.0
Mood	6.22±2.19*	5.6	5.6	6.08±2.14	1.3	7.5	5.42±2.00	6.0	2.0
Tension	5.74±2.22***	2.8	4.7	5.65±2.03***	5.0	3.8	4.28±1.92	10.0	0.0
Arthritis	5.28±2.28***	7.5	1.9	4.99±2.04***	10.0	1.3	3.40±1.63	14.0	0.0
Health	5.60±2.17***	3.7	2.8	5.84±2.26***	3.8	11.3*	3.84±1.53	8.0	0.0
QOL-RA Scale	5.54±1.93*	0.9	0.9	5.28±1.73	2.5	1.3	4.78±1.22	0.0	0.0

* Test differences between the Caucasian/English or Hispanic/Spanish groups and the Russian group significant at $p<0.05$
** Test differences between the Caucasian/English or Hispanic/Spanish groups and the Russian group significant at $p<0.005$
*** Test differences between the Caucasian/English or Hispanic/Spanish groups and the Russian group significant at $p<0.001$

with family and friends and support from family and friends, which were skewed to the right. The items with the top 3 means in all groups were interaction with family and friends, support from family and friends, and mood, whereas the items with the lowest means were arthritis and pain. But the performance of difference tests showed a significant difference between 5 items in the Caucasian/English, Hispanic/Spanish and Russian groups, and between the total QOL-RA Scale score and the mood in the Caucasian/English and Russian groups, respectively ($p<0.05$).

As shown in *Tab. 2*, the QOL-RA Scale had negligible floor and ceiling effects in all ethnic/language groups. In the Caucasian/English group, floor and ceiling effects were well below 10 percent, except for interaction with family and friends (ceiling) and support from family and friends (ceiling). Similarly, no higher than 10 percent floor and ceiling effects were found in the Hispanic/Spanish group, with the exception of pain (floor), interaction with family and friends (ceiling), support from family and friends (ceiling), and health (ceiling). The exception in the Russian group was made by arthritis (floor) and interaction with family and friends (ceiling). In the Russian group, the scores of interaction with family and friends, support from family and friends, and mood ranged from 1 to 10. The scale values ranged from 1 to 8 for physical ability, health and tension; from 1 to 7 for arthritis and pain, and from 1.25 to 7.25 for total Scale. Missing data were 0%.

The correlation analysis revealed a negligible relationship between tension and gender in the Russian group ($r = -0.29$, $p<0.05$). The comparison of male responses with those of the female showed a significant difference (6.40±1.34 and 4.11±1.86; respectively, $p<0.05$). With one exception, other items and the total QOL-RA Scale had no statistically significant differences between males and females.

Analysis of the item-item correlations showed that in the Caucasian/English group 26 of the 28 item correlations were within the 0.31-0.70 range [3]. The correlations of arthritis with physical ability (0.72) and health (0.75) were higher than the upper limit of the range. In the Hispanic/Spanish group, all correlations except 2 were within the 0.31-0.66 range. The exceptions were the correlations between health and tension (0.23) and between arthritis and support from family and friends (0.28). In the Russian group, the statistically significant item-item correlations were found between 20 of the 28 items *(Tab. 3)*. The correlation of arthritis with pain (0.80) was higher than other correlations. The item-to-total correlations ranged from 0.52 to 0.77 in the Caucasian/English group and from 0.55 to 0.75 in the Hispanic/Spanish group. Statistically significant correlations were revealed between the total QOL-RA scale and the other 8 items in the Russian group ($r=0.54$-0.75, $p<0.0001$). The highest correlation was obtained between the total Scale and mood, and the lowest correlation was revealed between the total scale and support.

Cronbach's alpha coefficients of the QOL-RA Scale in the Caucasian/English, Hispanic/Spanish and Russian groups were 0.90, 0.87 and 0.81, respectively. The alpha coefficients, if the item was deleted, ranged from 0.89 to 0.91 in the Caucasian/English group, from 0.84 to 0.86 in the Hispanic/Spanish group and from 0.77 to 0.83 in the Russian group. The item-to-total correlations, corrected for overlap, ranged from 0.52 to 0.77 in the Caucasian/English group, from 0.55 to 0.75 in the Hispanic/Spanish group and from 0.29 to 0.68 in the Russian group.

Assessment of the Russian instrument reliability with test-retest analysis did not reveal differences between the first and repeat examinations of the 25 patients whose health status had not changed after 3 days (mean scores of total QOL-RA Scale were 4.77±1.33 and 4.77±1.39, respectively; $p=0,57$).

Factor analysis was done to analyze the factor structure and factor loadings of the QOL-RA Scale. The methods of principal components and varimax rotation analysis were used. The results are shown in *Tab. 4*.

In all the ethnic/language groups, 2 factors were extracted. Factor I was labeled the physico-psychological factor, and factor II was labeled the socio-psychological factor. Instead of

Table 3. **Quality of Life-Rheumatoid Arthritis Scale (QOL-RA Scale): inter-item correlations in the Russian group.**

Scale items	Russian group (n = 50): r coefficients							
	Physical ability	Pain	Interaction	Support	Mood	Tension	Arthritis	Health
Physical ability								
Pain	0.45**							
Interaction	0.26	0.04						
Support	0.11	0.13	0.34*					
Mood	0.40**	0.36*	0.53***	0.28*				
Tension	0.46***	0.41**	0.50***	0.36*	0.63***			
Arthritis	0.34*	0.80***	0.20	0.22	0.44**	0.45**		
Health	0.50***	0.54***	0.08	0.05	0.29*	0.43**	0.44**	
QOL-RA Scale	0.60***	0.64***	0.57***	0.54***	0.75***	0.69***	0.55***	

* - p<0.05; ** - p<0.005; *** - p<0.001.

Table 4. **Quality of Life-Rheumatoid Arthritis Scale (QOL-RA Scale): factor structure, loadings, and percent of variance explained in the Caucasian/English, Hispanic/Spanish and Russian groups.**

Caucasian/English (n=107) [3]			Hispanic/Spanish (n=80) [3]			Russian (n=50)		
Scale items	Factor I	Factor II	Scale items	Factor I	Factor II	Scale items	Factor I	Factor II
Arthritis	0.86		Arthritis	0.90		Pain	0.89	
Physical ability	0.85		Pain	0.75		Arthritis	0.83	
Pain	0.83		Health	0.71		Health	0.78	
Health	0.78		Physical ability	0.67	0.50	Interaction		0.87
Tension	0.67		Mood	0.55	0.52	Mood		0.80
Mood	0.58	0.58	Tension		0.70	Tension		0.74
Interaction		0.86	Interaction		0.84	Physical ability		
Support		0.85	Support		0.78	Support		
% variance explained	60.66	12.64	% variance explained	52.44	12.96	% variance explained	33.66	30.89

Table 5. **Spearman correlations between QOL-RA items and SF-36 scales (Russian versions).**

SF-36 / QOL-RA	PF	RP	BP	GH	VT	SF	RE	MH	PCS	MCS
Physical ability	0.34*	0.08	0.17	0.49***	0.44**	0.37**	0.14	0.21	0.25	0.33*
Support	0.21	0.16	0.01	-0.10	0.18	-0.06	0.21	0.28*	-0.12	0.19
Pain	0.36**	0.39**	0.54***	0.38**	0.52***	0.38**	0.17	0.19	0.41**	0.33*
Tension	0.42**	0.23	0.27	0.43**	0.60***	0.39**	0.45**	0.65***	0.17	0.62***
Health	0.27	0.15	0.16	0.38**	0.38**	0.32*	-0.04	0.13	0.31*	0.16
Arthritis	0.35*	0.15	0.54***	0.32*	0.44**	0.27	0.22	0.27	0.31*	0.31*
Interaction	0.26	0.01	0.09	0.23	0.27	0.13	0.31*	0.32*	0.08	0.30*
Mood	0.32*	0.20	0.27	0.43*	0.53*	0.43*	0.51*	0.60*	0.16	0.63***

PF - Physical functioning, RP - Role-physical, BP-Bodily Pain, GH-General Health, VT-Vitality, SF-Social Functioning, RE-Role-Emotional, MH-Mental Health; * - p<0.05, ** - p<0.01, *** - p<0.001.

constituting a separate factor, the psychological function items of tension and mood loaded substantially on both the physical and social function factors. In contrast to the Caucasian/English and Hispanic/Spanish groups, in the Russian group, both factors had only three items and explained approximately equal percents of variance in the scale scores (33.66% and 30.89%, respectively).

Criterion-related validity of the Russian version of instrument was determined by the evaluation of the Spearman correlation between QOL-RA Scale items and the 36-Item Short-Form Health Survey (SF-36) subscales *(Tab. 5)*. The scores of items and scales measuring the same property (tension and mental health, mood and mental health, tension and vitality, pain and bodily pain for the QOL-RA scale and

SF-36, respectively) correlated higher among themselves (Spearman r = 0.65-0.54), than scores of items and scales measuring different properties.

The correlation of the scale items with the criterion measures in Caucasian/English and Hispanic/Spanish groups had the highest coefficients between the QOL-RA Scale item and its corresponding criterion AIMS2 measures; for example, QOL-RA physical ability with AIMS2 physical activity subscales, QOL-RA pain with AIMS2 pain, and so on (r = -0.30 to -0.60).

Statistically significant negative correlations with external criteria were revealed between QOL-RA items of the Russian version and such clinical parameters as duration of morning stiffness and functional class. For example, the subjects with long-lasting morning stiffness estimated the pain and arthritis on the QOL-RA scale as worse (Spearman r = -0.36 to -0.43, $p<0.01$). The patients with a higher functional class had the lowest scores of pain, arthritis, tension and total QOL-RA scale (Spearman r = -0.34 to -0.40, $p<0.05$).

DISCUSSION

Because the results on scale characteristics, floor and ceiling effects, inter-item correlations, internal consistency, criterion-related concurrent validity, and construct validity were equivalent across the Caucasian/English and Hispanic/Spanish groups, Danao et al. (2001) have concluded that the English and Spanish versions of the QOL-RA Scale have satisfactory psychometric properties. Our research has shown similar properties of the Russian version of the QOL-RA scale.

The Russian version of this questionnaire was developed in accordance with the recommended methodological guidelines. Translation and adaptation were performed as consecutive forward and back translations. Because face-to-face interviews were used, we did not have any missing data. During interviewing, all questions were clear to patients. The scores of physical ability, pain, tension, arthritis and health in the Russian group were worse than in the Caucasian/English and Hispanic/Spanish groups and had no maximum values. It is possible to connect a prevalence of patients with a greater severity of RA in the Russian group ($p<0.05$). Nevertheless, all versions demonstrated less than 10% floor and ceiling effects. While many of the Scale responses in the Russian group were similar among the genders, an interesting difference was also noted. Females showed a greater tension compared to males.

In the three ethnic/language groups, Cronbach's alpha coefficients were 0.81-0.90. Analysis of the item-item correlations showed that some items were higher associated with their scale than others. The moderate and high correlations between the 8 items and the total Scale indicated a significant contribution of each item to the total score. The findings showed that the QOL-RA Scale did not vary significantly across the test-retest conditions. Extraction of 2 factors, namely physico-psychological and socio-psychological, explained the identical percentage of variance in the Russian group (33.66% and 30.89%, respectively), whereas the physico-psychological factor prevailed in the Caucasian/English and Hispanic/Spanish groups. Significant correlations of the QOL-RA Scale with external criteria confirmed the validity of all language versions.

Thus, validation of the Russian version of the QOL-RA scale showed the questionnaire to be a reliable and valid instrument for QOL assessment in RA patients. The scale is simple, short, and easy for use in clinical practice, including ambulatory practice. Respondent burden is reduced to a minimum, thus encouraging higher participation and completion rates.

The Russian version of the QOL-RA scale and its items need further study of responsiveness.

It would have been interesting to study the ability of the Russian version of the QOL-RA Scale to measure the specific quality of life in patients with early RA.

CONCLUSIONS

The Russian version of the QOL-RA scale is a reliable and valid measure of RA-specific QOL. It can be a useful tool to assess QOL in clinical trials and clinical practice in the Russian Federation. Obviously, it appears to be a good instrument for monitoring health status as well as for the assessment of treatment outcomes in RA patients.

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