Validation and reliability study of the Turkish version of the Pediatric Rhinitis Quality of Life Questionnaire

Hasan Yüksel[1], Özge Yılmaz[1], Ayhan Söğüt[1], Erhan Eser[2]

Departments of [1]Pediatric Allergy and Pulmonology, and [2]Public Health, Celal Bayar University Faculty of Medicine, Manisa, Turkey

SUMMARY: Yüksel H, Yılmaz Ö, Söğüt A, Eser E. Validity and reliability study of the Turkish version of the Pediatric Rhinitis Quality of Life Questionnaire. Turk J Pediatr 2009; 51: 361-366.

The aim of this study was to develop a Turkish version of the Turkish Pediatric Rhinitis Quality of Life Questionnaire (PRQLQ) that is conceptually equivalent to the original and to evaluate its validity and reliability.

The study included 102 children with allergic rhinitis (AR) aged 5 to 16 years. Demographic information, family history of allergy, and duration of AR were recorded. All patients completed the T4SS symptom score and PRQLQ. Reliability including internal consistency and item–total score correlations and validity analysis including Known Group method were performed.

Activity limitations, emotional function and symptoms domains had successful Cronbach alpha scores of 0.62, 0.69 and 0.78, respectively. All items were significantly correlated with their own domain. Correlations of all the domain scores with the total score and the other domains were significant. Linear multiple regression reduced models revealed that both domain and total scores showed statistically significant sensitivity to T4SS.

The Turkish PRQLQ is a valid and reliable measure for use in Turkish children with AR.

Key words: allergic rhinoconjunctivitis, health-related quality of life, Pediatric Rhinitis Quality of Life Questionnaire, children.

Health is the "state of complete physical, mental and social well-being" according to the description of the World Health Organization. This description brings in a general concept that is broader than absence of disease. Therefore, not only the biological but also psychosocial state of an individual needs to be considered in the context of health[1]. The concept of health-related quality of life (HRQL) evolved on this basis. HRQL measures are mainly categorized into either generic measures that evaluate different aspects of quality of life in all health conditions but are insensitive to specific effects of a particular disease condition[2,3], or disease-specific HRQL measures that are designed to measure the influence of a specific disease condition and are more sensitive[3,4].

Chronic diseases during childhood impair quality of life to a great extent, and allergic diseases are the most common chronic diseases of childhood[1]. Allergic rhinitis (AR) is the most common allergic disease with a worldwide prevalence of 5-40% and with clinical findings characterized by nasal itching, sneezing, rhinorrhea, nasal congestion, and conjunctival symptoms[5-8]. AR impairs HRQL in patients due to many aspects of disease like nasal itching, sneezing, need to carry tissue paper, etc.; however, there are other aspects of the disease that need to be considered in pediatric patients[9,10]. These include the impact on school life in the form of learning disabilities and school absenteeism and the impact on social life like inability to fully interact with peers in play[9,11]. Moreover, the disease may also affect the family who may become overprotective, constraining the child's life to a greater extent and who may themselves miss work[9,11].

The essence of evaluation of HRQLQ in children with AR is obvious from the above data and an English questionnaire exists[12]. However, a Turkish questionnaire was lacking.

Therefore, the aim of the present study was to develop a Turkish version of the Pediatric Rhinitis Quality of Life Questionnaire (PRQLQ) that can be understood by the patients while keeping conceptual equivalence with the original and to evaluate its validity, internal consistency and reliability.

Material and Methods

Subjects and Study Design

The study included 102 children with AR who presented to Celal Bayar University Medical Faculty, Department of Pediatric Allergy and Pulmonology consecutively. Clinical findings of nasal itching, sneezing, nasal congestion, and rhinorrhea prompted the diagnosis of intermittent AR. Upon recruitment into the study, demographic information regarding age, sex, education and family history of allergic diseases was recorded, together with duration of AR. All patients were asked to complete the T4SS symptom score to evaluate disease severity and the Turkish PRQLQ.

The Pediatric Rhinitis Quality of Life Questionnaire

The PRQLQ was developed by Juniper et al.[12] and published in 1998. It is composed of symptoms, emotional function and activity limitations domains, with a total of 23 questions. Each item has Likert-type scales of seven-point responses that range from 0 to 6. All items are equally weighted and higher scores show worse outcome. Domains and total scores are the mean of the items included. "Symptoms" domain includes items 4, 6, 8, 10, 12, 14, 16, 18, 20, 23, "emotional function" domain includes 5, 7, 9, 11, 13, 15, 17, 21 and "activity limitations" domain includes items 1, 2, 3, 19, and 22.

Adaptation into Turkish

Adaptation of the PRQLQ into Turkish was performed in four steps.

1. Forward translations: Two independent translators who are native speakers of Turkish translated the measure into Turkish.

2. Consensus forward translation: The two translations were revised by the translators and two other pediatricians and one measure was achieved that was agreed upon by all.

3. Back translations: The Turkish PRQLQ was translated back into English by two independent translators. The English back translation was checked by original developers of the questionnaire and a conceptual equivalence with the original questionnaire was achieved by minor rewording.

4. Cognitive debriefing: Ten children with AR were given the questionnaire and were asked about the ease of comprehension and to suggest alternatives if any item was found to be incomprehensible.

Symptom Score

T4SS is used to assess symptom severity in patients with AR. It includes nasal itching, ocular itching, sneezing, and nasal discharge that are scored by the patients themselves from 0 to 3 with increasing severity. Scores for all domains are summed up to obtain the total score.

Statistical Analysis

Reliability and validity analyses were performed using the SPSS 10.0 statistical package.

Reliability analysis included internal consistency and item–total score correlations. Cronbach alpha coefficient was calculated for every sub-scale of the instrument to evaluate internal consistency. Correlations of each item and total score were assessed by Spearman correlation analysis.

Construct validity analysis was performed by the Known Group method. The test was found to have high sensitivity to changes in T4SS as a marker of disease severity. Known Groups Validity was tested by ANOVA and multiple linear regression.

Results

Descriptive Findings

This study included 102 children (71 male, 31 female) aged between 5 and 16 years (mean±SD: 1.2±2.9 years). Family history revealed history of an allergic disease in 46.1% of the children (Table I). Reported duration of disease ranged between 1 to 10 years (mean±SD: 2.5±1.8 years).

Reliability Analysis

The Internal Consistency of the PAQLQ was tested by Cronbach alpha scores and item-total correlations. Activity limitations, emotional

function and symptoms domains had successful Cronbach alpha scores of 0.62, 0.69 and 0.78, respectively (Table II).

Correlation of each item with its respective domain score revealed that all the items were significantly correlated with their own domain.

Table I. Sociodemographic Properties of the Study Population

Property	n	%
Age		
Mean ± SD	11.2 ± 2.9	
Median	11.5	
Min	5	
Max	16	
Gender		
Male	71	69.6
Female	31	30.4
Familial allergy status (history)		
Present	47	46.1
Absent	55	53.9

Table II. Internal Consistency of the PRQLQ (Cronbach alpha values)

Domain (Number of items)		Cronbach alpha
Activity (5)		0.62
When item removed	1	0.53
	2	0.53
	3	0.49
	19	0.56
	22	0.69
Emotional functions (8)		0.69
When item removed	5	0.67
	7	0.66
	9	0.64
	11	0.67
	13	0.71
	15	0.69
	17	0.63
	21	0.68
Symptoms (10)		0.78
When item removed	4	0.75
	6	0.78
	8	0.75
	10	0.74
	12	0.75
	14	0.78
	16	0.75
	18	0.75
	20	0.76
	23	0.76
Overall (for 3 subscales)		0.86

PRQLQ: Pediatric Rhinitis Quality of Life Questionnaire.

Correlation coefficients for item versus domain score correlation ranged between 0.38 and 0.70 for activity, 0.41 and 0.65 for symptoms and 0.29 and 0.70 for emotional function domains (Table III).

When success of the item discriminant validity tests was summarized, it was found that 80%, 90% and 100% of the items included in the activity limitations, symptoms and emotional function domains, respectively, were highly correlated with their own scale (Table IV).

Correlation of all the domain scores with the total score and the other domains was significant. Coefficients for the correlation of the total score with the domains ranged between 0.72 and 0.94. Coefficients for the correlation of the domains with each other ranged between 0.57 and 0.79 (Table V).

Validity Analysis

Validity of the PRQLQ was tested with Known Groups validity. Comparison of the PRQLQ domain and total scores among the three groups of T4SS values as (<6, 7-11, >12) revealed that the scores were significantly higher in the group with higher T4SS (Table VI).

Moreover, linear multiple regression reduced models indicating effects of age, duration of disease and T4SS on the domain and total scores of PRQLQ revealed that both domain and total scores showed statistically significant sensitivity to T4SS (Table VII).

Discussion

Health-related quality of life (HRQL) is a subjective and multidimensional concept that includes a patient's perception of health, disease and its impact on life and functioning[4,13]. Therefore, evaluation of HRQL needs to include a subjective measure of the multiple dimensions of life. It is an important measure of outcome because the impact of any disease differs on a personal basis due to perceptual differences of each individual for symptoms and severity of disease[14]. Generic measures of HRQL can be used in all individuals and lack specificity[3,4]. They are important for their use in comparing the HRQL impact of different diseases as well as to compare the impact of a disease with the healthy population[3,4,9]. However, these measures are insensitive to specific effects of a particular disease condition on the patient[3].

Table III. Item Descriptive Results and Item-Scale Correlations*

Item code	Mean	SD	Total QOL	Activity	Symptom	Emotional
1	3.3	1.7	0.55	0.68	0.49	0.46
2	3.4	1.7	0.51	0.69	0.40	0.39
3	3.4	1.6	0.37	0.70	0.25	0.29
4	3.2	1.7	0.52	0.30	0.58	0.45
5	2.9	2.4	0.59	0.26	0.58	0.59
6	2.2	1.9	0.43	**0.16	0.41	0.48
7	1.2	1.7	0.39	0.29	0.24	0.56
8	1.4	2.0	0.56	0.21	0.64	0.45
9	3.2	1.9	0.62	0.49	0.51	0.66
10	3.0	1.9	0.63	0.54	0.64	0.55
11	2.9	2.2	0.58	0.52	0.51	0.55
12	1.7	2.2	0.49	0.31	0.59	0.35
13	2.4	2.0	0.29	**0.09	0.22	0.29
14	2.7	2.1	0.42	**0.18	0.47	0.39
15	1.9	1.9	0.33	**0.10	0.31	0.36
16	2.9	1.9	0.63	0.34	0.65	0.50
17	3.2	1.7	0.69	0.48	0.59	0.70
18	2.5	1.9	0.69	0.60	0.65	0.62
19	2.9	1.7	0.53	0.59	0.43	0.60
20	1.4	1.9	0.44	0.35	0.52	0.28
21	2.2	2.3	0.46	0.52	0.31	0.52
22	1.7	1.8	0.22	0.38	0.18*	0.18*
23	2.2	1.9	0.56	0.46	0.54	0.47

*Spearman's correlation analysis.
**non-significant (all of the other correlations are significant at a level of $p<0.05$).
QOL: Quality of life.

Table IV. Success (%) Summary for Item Discriminant Validity Tests

	Scale Success				
Scale	-2	-1	1	2	1+2
Activity	0.0%	20.0%	0.0%	80%	80%
Symptoms	0.0%	10.0%	0.0%	90%	90%
Emotional function	0.0%	0.0%	0.0%	100%	100%

2: if item is significantly higher correlated with own scale. 1: if item is higher correlated with own scale.
-2: if item is significantly lower correlated with own scale. -1: if item is lower correlated with own scale.

Table V. Inter-Correlations* Between the Sub-Scales of the PRQLQ

	Activity	Symptoms	Emotional
Activity	1.0		
Symptoms	0.57	1.0	
Emotional function	0.64	0.79	1.0
Overall Score	0.72	0.94	0.92

*Spearman's correlation analysis.
PRQLQ: Pediatric Rhinitis Quality of Life Questionnaire.

Table VI. Sensitivity of the Sub-Scale and Overall PRQLQ Score to the Variability of the T4SS Score

	T4SS Score categories				
PRQLQ sub-scales	<6 (a)	7-11 (b)	12 and over (c)	p*	Post-hoc comparisons**
Activity	2.54±0.92	2.86±1.16	3.57±0.82	<0.001	(a=b) <c
Symptoms	1.69±1.07	2.45±1.04	3.01±0.88	<0.001	a<b<c
Emotional function	2.07±0.87	2.91±1.12	3.69±1.44	<0.001	a<b<c
Overall Score	1.91±0.94	2.58±0.95	3.20±0.79	<0.001	a<b<c

*One way ANOVA. **Tukey's b. PRQLQ: Pediatric Rhinitis Quality of Life Questionnaire.

Table VII. Results of the Linear Multiple Regression Reduced Models Indicating the Effects of Age, Duration of Illness and T4SS on the Three Domain and Total Scores of the PRQLQ

Independent variables	Model 1 (dependent var: PRQLQ Total score)	Model 2 (dependent var: PRQLQ Activity score)	Model 1 (dependent var: PRQLQ Symptoms score)	Model 1 (dependent var: PRQLQ Emotional score)
Age	p>0.10	p=0.096*	p>0.10	p>0.10
Duration of illness	p=0.076*	p> 0.10	p>0.10	p=0.075*
T4SS	p<0.001	p<0.001	p<0.001	p<0.001

*Non-significant but was not excluded from the reduced regression model.
var: Variable. PRQLQ: Pediatric Rhinitis Quality of Life Questionnaire.

Awareness of this has led to the development of disease-specific HRQL measures[3]. The PRQLQ was developed by Juniper et al.[12] for use in children aged 6 to 12 years with intermittent AR, and the validation study published in 1998 revealed that it is a reliable measure of HRQL in these children.

Evaluation of HRQL is a difficult task in children because the child's age, familial interactions and language comprehension need to be considered[4]. Children's perception of disease and its impact and lifestyle is quite different from adults[1]. Moreover, they may have difficulty understanding the questions and the timeframes that are referenced[1]. Therefore, development and evaluation of pediatric HRQL questionnaires require a more thorough understanding of HRQL and the pediatric view and they require extensive refinement. Considering this, the adaptation of the PRQLQ into Turkish was performed in four steps to achieve the comprehension of Turkish children while keeping the items as close to the original as possible. The four steps included two independent translations by bilingual translators, which were revised into one final translation by the translators and two pediatricians. The third step included back translation into English, which was checked by the original developers. The last stage was cognitive debriefing with 10 children with AR. This last step was important to ensure comprehension by Turkish children because use of HRQL questionnaires in populations with a native language that is different from the language of development requires a cross-cultural adaptation and revalidation[15].

Allergic rhinoconjunctivitis in children is expected to decrease quality of life of both parents and children in an interacting way. Considering all these factors, it is not surprising to expect that the presence or absence of symptoms differs from HRQL because every patient has a different way of life and expectations that are affected to a different extent by the same symptom[12]. Recently, it was considered that evaluation of AR requires assessment of not only symptoms but also functional, emotional and psycho-social effects of the disease[2]. It has been reported that quality of life in patients with AR correlated significantly with patients' subjective report of symptom severity; however, this kind of

a correlation was lacking with endoscopic findings[16]. The results of this validation study revealed that there was a significant correlation between T4SS scores and all domains as well as the total PRQLQ scores. When it is considered that both require subjective evaluation of disease, this is an expected finding that reflects the sensitivity of the Turkish version of the PRQLQ to disease severity. This demonstrated that the Turkish PRQLQ can measure what it proposes to measure, in other words, the validity of the PRQLQ[17].

Reliability is used to describe the stability of a measure[17]. Internal consistency and Cronbach reliability analysis of the Turkish PRQLQ were found to be adequate in this study. The only two questions that had high Cronbach alpha values in item analysis were questions 13 and 22. However, we found that their correlation with their own domains was higher than the other two domains so they were not regarded as problematic questions.

Disease-specific questionnaires are more sensitive to changes over time and are used mostly to compare the effect of treatment[4]. However, in this study, change over time with treatment was not measured. This represents the main limitation of the study.

In conclusion, since health is described as a complete state of well-being, disease evaluation needs to include physical, social and psychological aspects of the individual. Physical evaluation is managed in different aspects by every physician in charge. However, assessment of HRQL requires a valid and reliable measure in the native language of the patient. This study has demonstrated that the Turkish PRQLQ is a valid and reliable measure for use in Turkish children with AR.

REFERENCES

1. Eiser C, Morse R. A review of measures of quality of life for children with chronic illness. Arch Dis Child 2001; 84: 205-211.
2. Kremer B. Quality of life scales in allergic rhinitis. Curr Opin Allergy Clin Immunol 2004; 4: 171-176.
3. Juniper EF, Stahl E, Doty RL, Simons FE, Allen DB, Howarth PH. Clinical outcomes and adverse effect monitoring in allergic rhinitis. J Allergy Clin Immunol 2005; 115: S390-413.
4. Matza LS, Swensen AR, Flood EM, Secnik K, Leidy NK. Assessment of health-related quality of life in children: a review of conceptual, methodological, and regulatory issues. Value Health 2004; 7: 79-92.
5. Skoner DP. Allergic rhinitis: definition, epidemiology, pathophysiology, detection, and diagnosis. J Allergy Clin Immunol 2001; 108: S2-8.
6. Potter PC, Van Niekerk CH, Schoeman HS. Effects of triamcinolone on quality of life in patients with persistent allergic rhinitis. Ann Allergy Asthma Immunol 2003; 91: 368-374.
7. Yuksel H, Dinc G, Sakar A, et al. Prevalence and comorbidity of atopic eczema, allergic rhinitis and asthma in a city in western Turkey. J Investig Allergol Clin Immunol 2008; 18: 31-35.
8. Chen ST, Sun HL, Lu KH, Lue KH, Chou MC. Correlation of immunoglobulin E, eosinophil cationic protein, and eosinophil count with the severity of childhood perennial allergic rhinitis. J Microbiol Immunol Infect 2006; 39: 212-218.
9. Meltzer EO. Quality of life in adults and children with allergic rhinitis. J Allergy Clin Immunol 2001; 108: S45-53.
10. Chen ST, Lu KH, Sun HL, Chang WT, Lue KH, Chou MC. Randomized placebo-controlled trial comparing montelukast and cetirizine for treating perennial allergic rhinitis in children aged 2-6 yr. Pediatr Allergy Immunol 2006; 17: 49-54.
11. Potter PC; Paediatric Levocetirizine Study Group. Efficacy and safety of levocetirizine on symptoms and health-related quality of life of children with perennial allergic rhinitis: a double-blind, placebo-controlled randomized clinical trial. Ann Allergy Asthma Immunol 2005; 95: 175-180.
12. Juniper EF, Howland WC, Roberts NB, Thompson AK, King DR. Measuring quality of life in children with rhinoconjunctivitis. J Allergy Clin Immunol 1998; 101: 163-170.
13. Spilker B. Introduction. In: Spilker B (ed). Quality of Life and Pharmacoeconomics in Clinical Trials (2nd ed). Philadelphia: Lippincott-Raven Publishers; 1996: 1-10.
14. Roberts G, Hurley C, Lack G. Development of a quality-of-life assessment for the allergic child or teenager with multisystem allergic disease. J Allergy Clin Immunol 2003; 111: 491-497.
15. Tauler E, Vilagut G, Grau G, et al. The Spanish version of the paediatric asthma quality of life questionnaire (PAQLQ): metric characteristics and equivalence with the original version. Qual Life Res 2001; 10: 81-91.
16. Leynaert B, Soussan D. Monitoring the quality-of-life in allergic disorders. Curr Opin Allergy Clin Immunol 2003; 3: 177-183.
17. Rutishauser C, Sawyer SM, Bowes G. Quality-of-life assessment in children and adolescents with asthma. Eur Respir J 1998; 12: 486-494.