The Korean version of the Childhood Health Assessment Questionnaire (CHAQ) and the Child Health Questionnaire (CHQ)

S.C. Bae[1], N. Ruperto[2], J.H. Lee[1], W.S. Uhm[1], Y.W. Park[1], S.Y. Kim[1], for the Paediatric Rheumatology International Trials Organisation (PRINTO)

[1]The Hospital for Rheumatic Diseases, Hanyang University Medical Center, Seoul, Korea; [2]Laboratorio di Informatica Medica, IRCCS S. Matteo, Pavia, Italy.

Supported in part by the research fund of Hanyang University (HY-2000), by a grant from the European Union (BMH4-983531 CA), and by IRCCS Policlinico S. Matteo (Pavia, Italy).

Please address correspondence and requests for reprints to either: Sang-Cheol Bae, MD, The Hospital for Rheumatic Diseases, Hanyang University Medical Center, Department of Internal Medicine, Division of Rheumatology, Seoul 133-792, Korea
E-mail: scbae@hanyang.ac.kr
or PRINTO, IRCCS Policlinico S. Matteo, Pediatria Generale e Reumatologia, Piazzale Golgi, 2, 27100 Pavia, Italy.
E-mail: nruperto@smatteo.pv.it
WWW: http://www.medit.it/printo/

Clin Exp Rheumatol 2001; 19 (Suppl. 23): S96-S100.

Key words: Korean Childhood Health Assessment Questionnaire (CHAQ), Korean Child Health Questionnaire (CHQ), cross cultural adaptation and psychometric evaluation, health related quality of life, juvenile idiopathic arthritis (JIA), healthy children.

ABSTRACT

We report herein the results of the cross-cultural adaptation and validation into the Korean language of the parent's version of two health related quality of life instruments. The Childhood Health Assessment Questionnaire (CHAQ) is a disease specific health instrument that measures functional ability in daily living activities in children with juvenile idiopathic arthritis (JIA). The Child Health Questionnaire (CHQ) is a generic health instrument designed to capture the physical and psychosocial well-being of children independently from the underlying disease. A total of 221 subjects were enrolled: 87 patients with JIA (18% systemic onset, 37% polyarticular onset, 12% extended oligoarticular subtype, and 33% persistent oligoarticular subtype) and 134 healthy children. The CHAQ clinically discriminated between healthy subjects and the four JIA subtypes of patients, with the JIA patients having a higher degree of disability, pain,and a lower overall well-being when compared to their healthy peers. Also the CHQ clinically discriminated between healthy subjects and JIA patients, with the JIA patients having a lower physical and psychosocial well-being when compared to their healthy peers.

In conclusion the Korean version of the CHAQ-CHQ is a reliable, and valid tool for the functional, physical and psychosocial assessment of children with JIA.

Introduction

The aim of this study was to cross-culturally adapt and validate the Korean parent's version of the Childhood Health Assessment Questionnaire (CHAQ) (1) and the Child Health Questionnaire (CHQ) (2) in a cohort of healthy children and in patients with juvenile idiopathic arthritis (JIA) being followed by the Korean members of the Paediatric Rheumatology International Trials Organisation (PRINTO). This project formed a part of a larger international survey conducted by PRINTO and supported by European Union contract BMH4 983531 CA (3-5), whose scope is to evaluate the health-related quality of life in children with JIA as compared to their healthy peers.

Patients and results

The methodology used is described in detail in the introductory paper of this supplement (6). The complete Korean version of the CHAQ-CHQ, with the corresponding lines of the original American-English questionnaires marked in the left column, is reproduced at the end of this paper.

In brief, after obtaining ethics committees approval of Hanayang University Medical Center and the consent of at least one parent per child, children were recruited into a prospective study performed from April 1999 to March 2000, by the Korean members of PRINTO. Patients included children with JIA of either systemic onset, polyarticular onset, extended oligoarticular or persistent oligoarticular subtype (Durban criteria) (7). The controls consisted of healthy children (6 to 18 years of age) attending local schools and/or healthy sibling(s) of the JIA participants.

Demographic and clinical characteristics of the subjects (Table I)

A total of 221 subjects were enrolled: 87 patients with JIA (18% systemic onset, 37% polyarticular onset, 12% extended oligoarticular subtype, and 33% persistent oligoarticular subtype) and 134 healthy children have been enrolled. The CHAQ-CHQ were completed in 79% of the cases by the mother (mean age 40.9 ± 5.6), and in 21% of the cases by the father (mean age 44.5 ± 5.8).

Clinical discriminant validity

Table II reports the results (mean ± SD) for the 8 CHAQ domains, the disability index (DI) and the 2 VAS scores for pain and parental assessment of global well-being. The CHAQ clinically discriminated between healthy subjects and JIA patients, with the JIA patients having a higher degree of disability, pain, and a lower overall well-being when compared to their healthy peers.

Table III reports the CHQ results (mean ± SD) for the 15 health concepts (see table for abbreviation) and summary scores. The CHQ clinically discriminated between healthy subjects and JIA patients, with the JIA patients having a lower physical and psychosocial well-being when compared to their healthy peers.

Cross cultural adaptation

The CHAQ was fully cross-culturally adapted with 3 forward and 3 backward translations; some questions were modified for the Korean culture according to our previous experience (8). There was a concordance with the original American English version of the CHAQ in at least 2 out of 3 back translations for 47/69 (68%) lines of the translations. The CHQ was fully cross-culturally adapted with 3 forward and 3 backward translations; there was a concordance with the original American English version of the CHQ in at least 2 out of 3 back translations for 61/99 (62%) lines of translations.

Table I. Demographic and clinical characteristics of the Korean sample.

	Systemic onset n = 16	Polyarticular onset n = 32	Extended oligoart. n = 10	Persistent oligoart. n = 29	Healthy controls n =134
Age of the children[1, 2]	15.7 ± 3.1	15.0 ± 4.7	13.8 ± 2.6	15.5 ± 4.6	12.7 ± 3.8
Disease duration[1, 3]	5.6 ± 3.8	5.1 ± 3.7	5.1 ± 2.8	5.6 ± 3.4	
ESR[1, 3]	37.7 ± 18.7	28.7 ± 16.3	31.2 ± 18.5	34.1 ± 17.8	
MD VAS (0-10 cm)[1, 3]	2.3 ± 2.2	3.3 ± 2.9	2.3 ± 1.9	2.1 ± 1.9	
No. swollen joints[1, 3]	1.0 ± 2.3	2.5 ± 4.4	1.0 ± 1.1	1.1 ± 1.7	
No. joints with pain[1, 2]	2.1 ± 3.4	5.8 ± 7.8	2.6 ± 2.6	2.3 ± 3.0	
No. joints with limited range of motion[1, 3]	1.1 ± 3.0	1.8 ± 3.1	2.3 ± 5.6	0.6 ± 1.7	
No. active joints[1, 3]	1.1 ± 2.3	2.8 ± 4.7	1.6 ± 2.0	1.4 ± 2.1	
Female[4]	10 (62%)	19 (59%)	4 (40%)	6 (21%)	90 (67%)
Persistent systemic features[4]	7 (54%)				
Antinuclear antibody[4]	2 (12%)	9 (30%)	1 (10%)	5 (18%)	
Rheumatoid factor[4]	4 (25%)	11 (37%)	0	2 (7%)	
Chronic iritis[4]	1 (6%)	0	1 (10%)	1 (3%)	

[1]Mean ± SD; [2]ANOVA $p < 0.05$; [3]not significant; [4]number and percentage.

Table II. The 8 CHAQ domains (range 0-3), the disability index (DI) (range 0-3), and the 2 VAS scores (range 0-10 cm) for pain and parent assessment of the child's overall well-being. Lower scores indicate better functional ability. Values are expressed as means ± SD.

	Systemic onset n = 16	Polyarticular onset n = 32	Extended oligoart. n = 10	Persistent oligoart. n = 29	Healthy controls n =134
Dressing	0.7 ± 1.1	0.7 ± 1.0	0.6 ± 1.0	0.6 ± 0.8	0.1 ± 0.3
Arising	1.1 ± 0.9	0.8 ± 1.0	0.8 ± 0.9	0.6 ± 0.7	0.0 ± 0.2
Eating	0.3 ± 0.5	0.5 ± 0.8	0.3 ± 0.5	0.2 ± 0.5	0.0 ± 0.3
Walking	0.8 ± 1.0	0.5 ± 0.7	0.4 ± 0.7	0.6 ± 0.9	0.0 ± 0.2
Hygiene	0.8 ± 0.9	0.7 ± 1.0	0.7 ± 0.8	0.6 ± 0.8	0.0 ± 0.2
Reach	0.5 ± 0.9	0.8 ± 0.9	0.5 ± 0.5	0.4 ± 0.6	0.0 ± 0.2
Grip	0.5 ± 0.7	0.5 ± 0.7	0.4 ± 0.5	0.3 ± 0.6	0.0 ± 0.2
Activities	1.5 ± 1.1	1.0 ± 1.1	1.4 ± 1.1	1.0 ± 1.1	0.1 ± 0.3
Disability index	0.8 ± 0.7	0.7 ± 0.7	0.6 ± 0.4	0.5 ± 0.6	0.0 ± 0.2
Parent's evaluation of pain	3.0 ± 2.7	3.2 ± 2.9	2.8 ± 2.2	3.2 ± 3.0	1.1 ± 1.9
Parent's evaluation of overall well-being	3.7 ± 2.9	3.0 ± 3.2	3.5 ± 2.6	2.6 ± 2.3	1.1 ± 1.9

ANOVA $p < 0.001$ for all variable.

Table III. The 15 CHQ health concepts (and their abbreviations) and the 2 summary scores. Higher score indicates better physical or psychosocial well being (range 0-100). Values are expressed as means ± SD.

	Systemic onset n = 16	Polyarticular onset n = 32	Extended oligoart. n = 10	Persistent oligoart. n = 29	Healthy controls n =134
Global health (GGH)[1]	35.0 ± 28.2	38.7 ± 30.8	24.0 ± 12.6	41.0 ± 28.9	72.6 ± 23.4
Physical functioning (PF)	65.3 ± 26.6	70.8 ± 27.3	70.6 ± 20.8	71.6 ± 27.1	96.8 ± 6.7
Role/social limitations - Emotional/Behavioural (REB)[1]	68.1 ± 31.4	78.5 ± 27.2	68.9 ± 33.5	79.3 ± 22.9	93.5 ± 12.1
Role/social limitations - Physical (RP)[1]	69.8 ± 28.0	77.1 ± 29.6	70.0 ± 35.8	74.1 ± 29.1	95.8 ± 12.7
Bodily pain/discomfort (BP)[1]	62.5 ± 26.2	57.8 ± 26.6	68.0 ± 20.4	62.8 ± 25.8	82.9 ± 22.0
Behaviour (BE)[2]	67.1 ± 16.9	73.3 ± 16.3	74.5 ± 12.6	72.1 ± 15.9	78.2 ± 14.9
Global behaviour (GBE)[1]	42.8 ± 21.1	49.7 ± 27.8	46.5 ± 33.3	54.5 ± 27.1	69.5 ± 23.6
Mental health (MH)[2]	64.7 ± 19.0	66.9 ± 26.5	81.1 ± 4.9	73.9 ± 17.6	78.0 ± 15.7
Self esteem (SE)[1]	57.3 ± 25.0	62.9 ± 22.6	53.8 ± 20.3	58.9 ± 23.3	73.5 ± 23.0
General health perceptions (GH)[1]	37.9 ± 18.0	39.5 ± 16.8	39.3 ± 16.0	42.7 ± 17.0	62.3 ± 16.3
Change in health (CH)[3]	68.8 ± 32.3	64.1 ± 31.7	70.0 ± 30.7	62.5 ± 28.5	56.3 ± 22.0
Parental impact – Emotional (PE)[1]	38.0 ± 21.9	44.0 ± 29.0	27.5 ± 24.2	43.4 ± 22.0	56.9 ± 25.6
Parental impact - Time (PT)[1]	59.0 ± 28.0	60.9 ± 31.4	54.4 ± 25.4	62.1 ± 34.7	77.4 ± 24.1
Family activities (FA)[1]	69.8 ± 16.5	76.6 ± 18.1	71.7 ± 22.3	72.0 ± 19.6	87.2 ± 14.4
Family cohesion (FC)[3]	66.9 ± 25.6	60.5 ± 24.9	60.5 ± 27.3	60.3 ± 22.0	66.7 ± 23.9
Physical summary score (PhS)[1]	43.2 ± 10.1	45.1 ± 9.4	44.8 ± 7.2	44.7 ± 10.2	53.5 ± 2.9
Psychosocial summary score (PsS)[2]	41.1 ± 8.6	42.9 ± 10.6	44.3 ± 5.0	44.3 ± 8.6	47.8 ± 9.2

[1]ANOVA $p < 0.001$; [1]ANOVA $p < 0.05$; [3]ANOVA not significant.

Probe technique

For the 69 lines of the translated CHAQ, all the lines of translation were understood by more than 80% of the 20 parents tested (median of 100%; range:90-100%). For the 99 lines of the translated CHQ, all the lines of translation were understood by more than 80% of the parents (median 100%: range: 85-100%). No change in the text of the Korean CHAQ-CHQ was necessary.

Psychometric issues

Descriptive statistics (first Likert assumption). For the CHAQ the total number of missing responses was 0.9% (range 0.1-2.6) with dressing and activity having more missing values; the response pattern were skewed towards normal functional ability. The mean ± SD of the items within a scale were roughly equivalent for all domains. The total number of missing responses on the CHQ was 1.2% (0.5-2.0); the response pattern had most often a normal distribution with the exception of PF, REB, and RP that were skewed towards normal physical and psychosocial well-being. The means ± SD of the items within a scale were roughly equivalent except for BE and GH.

Equal items-scale correlation (second Likert assumption). Pearson items-scale correlations corrected for overlap were roughly equivalent for items within a scale for all of the CHAQ domains except for eating and grip, and for all CHQ health concepts except for BE,MH, GH, and PT.

Items internal consistency (third Likert assumption). Pearson items scale correlations were ≥ 0.4 for 97% of the CHAQ items (except eating) and for 90% of the items of the CHQ (except BE, MH, and GH, and PT).

Items discriminant validity. For the CHAQ, Pearson items correlations with its scale corrected for overlap were greater than at least 1 standard error (SE) of the correlation with other scales for 89% of the items (52% by 2 SE); scaling failure was observed for eating, and grip, where the items were better correlated with other domains. For the CHQ, Pearson items correlations with its scale were greater by at least 1 SE for 98% of the items (81% by 2 SE); scaling failure was observed for BE, and GH.

Floor and ceiling effect. The CHAQ floor effect had a median of 87% (range 78-92%) while for the CHQ the median was 0.5% (range 0-9.6%). The CHAQ ceiling effect had median of 0% (range 0.0-1.1) while the CHQ had a median of 14% (range 1-70%).

Cronbach's alpha internal consistency. Cronbach's alpha was ≥ 0.7 for 7/8 (88%) domains of the CHAQ (median of 0.9; range 0.6-0.9) with the exception being eating (0.6). Cronbach's alpha was ≥ 0.7 for 10/11 (91%) measurable health concepts (*i.e.* health concepts with more than 1 item) of the CHQ (median of 0.9; range 0.7-0.9) with the exception being GH (0.66).

Inter scale correlation. The Pearson correlation of each domain with all other domains of the CHAQ-CHQ was lower than their Cronbach's alpha only for eating, hygiene, and activity for the CHAQ domains. For the CHQ all 11 measurable health concepts have correlation lower than their Cronbach's alpha except for GH.

Test-retest reliability. After a median of 7 days (range 7-13; number of JIA patients re-tested = 10) the intra-class correlation coefficients for the 8 CHAQ domains showed a fair to good reproducibility with median of 1.0 (range 0.5-1.0); also for the 15 CHQ health concepts there was a fair to good reproducibility with a median of 0.9 (range 0.6-1.0).

External validity. The Spearman correlation of the CHAQ with the JIA core set variables (9) showed a median of 0.4 (range 0.2 to 0.5), with the highest correlation being with the physician evaluation of disease activity (r = 0.5). For the CHQ the median correlation was for the PhS -0.3 (range -0.6 to -0.2) and for the PsS was -0.3 (range -0.5 to -0.2). The best correlation was for the PhS with DI of the CHAQ (r = -0.6) and for the PsS with the parent's evaluation of overall well being (r = -0.5).

Final forward version. Line 16 was modified in the CHAQ, and line 76 in the CHQ.

Discussion

The results of the present study show that the Korean versions of the CHAQ-CHQ have excellent psychometric properties.

In this study the Korean CHAQ was fully cross-culturally adapted from the original American English version with 3 forward and 3 backward translations. This disease-specific questionnaire proved its ability to clinically discriminate between the different JIA subtypes and their healthy peers. The 2 most problematic domains were eating, and grip which showed a high number of missing values, problems for internal consistency, discriminant validity and Cronbach's alpha (this last one only for eating). Therefore a question in the eating domain of the final version of Korean CHAQ was modified with committee approval.

In this study the Korean CHQ was fully cross-culturally adapted from the original American English version with 3 forward and 3 backward translations. The generic CHQ questionnaire proved less able to clinically discriminate between the different JIA types and their healthy peers than the CHAQ. Some minor statistical problems were found for BE, and GH for internal consistency, discriminant validity and Cronbach's alpha (this last one only for GH).

In conclusion, the Korean version of the CHAQ-CHQ is a reliable and valid tool for the functional, physical and psychosocial assessment of children with JIA.

Acknowledgements

We are indebted to Dr. J. Landgraf *et al*., developers of the CHQ, to Dr. Luciana Gado-West reviewer of the CHAQ, to Dr. Anna Tortorelli for data entry, and to the committee which prepared and reviewed the forward and backward translations.

References

1. SINGH G, ATHREYA B, FRIES JF, GOLDSMITH DP: Measurement of health status in children with juvenile rheumatoid arthritis. *Arthritis Rheum* 1994; 37: 1761-9.
2. LANDGRAF JM, ABETZ L, WARE JE: *The CHQ User's Manual*. 1st ed., Boston, The Health Institute, New England Medical Center, 1996.
3. RUPERTO N, MARTINI A, for PRINTO: A European network for randomised actively controlled clinical trials in paediatric rheumatic diseases: parenteral methotrexate in medium versus higher doses in juvenile chronic arthritis. "XIVEULAR and VI European Paediatric Rheumatology Congress". *Ann Rheum Dis* 1999; Conference Proceedings,Abstr. 105,pg 25.
4. RUPERTO N, MARTINI A, for PRINTO: Use of unlabelled and off licence drugs in children. A European paediatric rule is needed to protect children. *BMJ* 2000; 320: 1210-1.
5. BRUNNER HI, GIANNINI EH: Evidence-based medicine in pediatric rheumatology. *Clin Exp Rheumatol* 2000; 18: 407-14.
6. RUPERTO N, RAVELLI A, PISTORIO A *et al.*: Cross-cultural adaptation and psychometric evaluation of the Childhood Health Assessment Questionnaire (CHAQ) and the Child Health Questionnaire (CHQ) in 32 countries. Review of the general methodology. *Clin Exp Rheumatol* 2001; 19 (Suppl. 23): S1-S9.
7. PETTY RE, SOUTHWOOD TR, BAUM J *et al*.: Revision of the proposed classification criteria for juvenile idiopathic arthritides:Durban, 1997. *J Rheumatol* 1998; 25: 1991-4.
8. BAE SC, COOK EF, KIM SY: Psychometric evaluation of a Korean Health Assessment Questionnaire for clinical research. *J Rheumatol* 1998; 25: 1975-9.
9. GIANNINI EH, RUPERTO N, RAVELLI A, LOVELLDJ, FELSON DT, MARTINI A: Preliminary definition of improvement in juvenile arthritis. *Arthritis Rheum* 1997; 40: 1202-9.