The Belgian-Flemish version of the Childhood Health Assessment Questionnaire (CHAQ) and the Child Health Questionnaire (CHQ)

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ABSTRACT

We report herein the results of the cross-cul tural adaptation and validation into the Belgian-Flemish language of the parent's version of two health related quality of life instruments. The Childhood Health Assess ment 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 de signed to capture the physical and psycho social well-being of children independently from the underlying disease. The Belgian-Flemish CHAQ was fully validated with 3 forward and 3 backward translations, while the Belgian-Flemish CHO was equal to the Dutch version and revalidated in this study. The French version of both CHAQ and CHQ was exactly the same as the one used in France. A total of 199 subjects were en rolled: 53 patients with JIA (11% systemic onset, 40% polyarticular onset, 13% exten ded oligoarticular subtype, and 36% per sistent oligoarticular subtype) and 146 healthy children. The CHAQ clinically dis criminated between healthy subjects and JIA patients, with the polyarticular onset, and extended oligoarticular subtypes hav ing 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 polyarticular onset and extended oligoarticular subtypes hav ing a lower physical and psychosocial wellbeing when compared to their healthy peers. In conclusion the Belgian-Flemish 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 Belgian-Flemish parentís 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 Belgian 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. Since no Belgian - French speaking centres are member of PRINTO at the moment no cross cultural validation has been done for this part of Belgium. It can be accepted that the French version of CHAQ-CHQ (2, 6) is used for these patients.

Patients and results

The methodology used is described in detail in the introductory paper of this supplement (7). The complete Belgian-Flemish 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 the respective participating institutions and the consent of at least one parent per child, children were recruited into a prospective study performed from April 1998 to March 2000, by the Belgian members of PRINTO. Patients included children with JIA of either systemic onset, polyarticular onset, extended oligoarticular or persistent oligoarticular subtype (Durban criteria) (8). 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 199 subjects were enrolled: 53 patients with JIA (11% systemic onset, 40% polyarticular onset, 13% extended oligoarticular subtype, and 36% persistent oligoarticular subtype) and 146 healthy children. The CHAQ-CHQ were completed in 85% of the cases by the mother (mean age 39.3 \pm 5.4), and in 15% of the cases by the father (mean age 40.8 \pm 5.2).

Clinical discriminant validity

Table II reports the results (mean \pm SD) for the 8 CHAQ domains, the disability index (DI) and the 2 VAS scores for parental assessment of pain and overall well-being. The CHAQ clinically discriminated between healthy subjects and JIA patients, with the polyarticular onset, and extended oligoarticular subtypes 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 \pm 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 polyarticular onset and extended oligoarticular subtypes having a lower physical and psychosocial well-being

Table I. Demographic and clinical characteristics of the Belgian-Flemish sample.

	Systemic onset $n = 6$	Polyarticular onset $n = 21$	Extended oligoart. n = 7	Persistent oligoart. n = 19	Healthy controls $n = 146$
Age of the children ^{1,2}	9.2 ± 5.0	11.4 ± 4.1	10.2 ± 5.0	9.2 ± 4.5	12.1 ± 3.2
Disease duration ¹	3.4 ± 3.3	3.5 ± 3.7	5.4 ± 4.0	2.4 ± 1.9	
ESR ^{1, 2}	13.4 ± 8.5	41.5 ± 36.3	32.7 ± 12.9	16.8 ± 16.7	
MD VAS (0-10 cm) ^{1,2}	1.2 ± 1.8	3.0 ± 2.4	4.0 ± 2.3	1.7 ± 1.7	
No. swollen joints ^{1,2}	2.0 ± 4.9	3.9 ± 4.2	3.9 ± 2.1	0.9 ± 1.4	
No. joints with pain ^{1, 2}	2.5 ± 4.2	5.1 ± 7.1	4.6 ± 2.6	1.1 ± 1.4	
No. joints with limited range of motion ^{1, 2}	0.7 ± 1.6	7.3 ± 10.6	2.7 ± 1.9	0.6 ± 0.8	
No. active joints ^{1, 2}	2.3 ± 5.7	5.0 ± 5.4	4.9 ± 2.6	0.9 ± 1.4	
Female ³	3 (50%)	16 (76%)	6 (86%)	11 (58%)	127 (87%)
Persistent systemic features ³	2 (40%)	0	0	0	
Antinuclear antibody ³	1 (17%)	8 (38%)	5 (71%)	6 (32%)	
Rheumatoid factor ³	0	2 (10%)	0	0	
Chronic iritis ³	0	2 (10%)	3 (43%)	0	
¹ Mean \pm SD; ² ANOVA p < 0.05; ³ number and	l 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 \pm SD.

	Systemic onset $n = 6$	Polyarticular onset $n = 21$	Extended oligoart. n = 7	Persistent oligoart. n = 19	Healthy controls $n = 146$
Dressing	0.4 ± 0.9	0.8 ± 1.0	0.9 ± 0.9	0.6 ± 1.1	0.2 ± 0.5
Arising	0.0 ± 0.0	0.9 ± 1.1	1.3 ± 1.3	0.3 ± 0.8	0.0 ± 0.2
Eating	0.5 ± 0.8	0.4 ± 0.6	0.3 ± 0.8	0.3 ± 0.6	0.0 ± 0.1
Walking	0.0 ± 0.0	0.6 ± 0.9	1.1 ± 1.1	0.2 ± 0.5	0.0 ± 0.2
Hygiene	0.0 ± 0.0	0.7 ± 1.0	0.9 ± 1.2	0.3 ± 0.7	0.0 ± 0.2
Reach	0.0 ± 0.0	0.9 ± 1.0	1.1 ± 0.9	0.3 ± 0.7	0.1 ± 0.3
Grip	0.0 ± 0.0	0.5 ± 0.7	0.1 ± 0.4	0.2 ± 0.4	0.0 ± 0.1
Activities	0.0 ± 0.0	1.0 ± 1.2	1.3 ± 1.4	0.5 ± 0.7	0.1 ± 0.3
Disability index	0.2 ± 0.3	0.7 ± 0.8	0.9 ± 0.7	0.3 ± 0.5	0.1 ± 0.1
Parent's evaluation of pain	0.7 ± 1.8	3.0 ± 3.2	3.7 ± 3.1	1.4 ± 1.8	0.0 ± 0.3
Parent's evaluation of overall well-being	0.0 ± 0.0	2.5 ± 3.3	3.6 ± 3.3	0.9 ± 1.4	0.0 ± 0.2

ANOVA p < 0.01 for all variables.

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 \pm SD.

	Systemic onset $n = 6$	Polyarticular onset $n = 21$	Extended oligoart. n = 7	Persistent oligoart. n = 19	Healthy controls $n = 146$
Global health (GGH) ¹	78.0 ± 31.9	63.0 ± 28.1	48.6 ± 31.8	72.6 ± 27.0	91.8 ± 12.2
Physical functioning (PF) ¹	85.6 ± 29.3	76.8 ± 25.3	55.6 ± 31.6	87.7 ± 23.1	96.3 ± 17.0
Role/social limitations - (REB) ¹ Emotional/Behavioural	77.8 ± 43.7	92.8 ± 13.0	81.0 ± 32.5	89.6 ± 24.7	96.9 ± 14.4
Role/social limitations - Physical (RP) ¹	76.7 ± 43.5	85.3 ± 19.4	69.0 ± 39.0	87.8 ± 24.8	96.7 ± 15.1
Bodily pain/discomfort (BP)1	70.0 ± 41.5	60.0 ± 24.5	40.0 ± 34.2	72.4 ± 27.0	90.2 ± 13.4
Behaviour (BE)	93.2 ± 7.6	79.7 ± 14.5	68.1 ± 16.7	78.8 ± 15.5	81.3 ± 15.9
Global behaviour (GBE) ¹	80.0 ± 28.9	74.7 ± 18.4	65.7 ± 15.1	75.6 ± 23.2	84.2 ± 17.5
Mental health (MH)	82.0 ± 9.1	81.5 ± 14.1	71.4 ± 19.5	70.9 ± 15.2	78.9 ± 13.6
Self esteem (SE)	89.6 ± 12.5	77.2 ± 16.9	73.2 ± 15.7	79.3 ± 18.0	82.5 ± 15.9
General health perceptions (GH) ¹	64.2 ± 14.2	57.6 ± 26.2	46.2 ± 19.9	66.8 ± 19.3	81.1 ± 15.2
Change in health (CH) ¹	35.0 ± 22.4	65.6 ± 35.2	39.3 ± 37.8	53.3 ± 28.1	57.6 ± 19.4
Parental impact - Emotional (PE) ¹	61.1 ± 44.6	84.4 ± 17.4	60.7 ± 21.4	76.7 ± 24.2	87.2 ± 18.7
Parental impact - Time (PT)	86.7 ± 29.8	85.2 ± 18.6	77.8 ± 17.0	79.5 ± 23.9	92.3 ± 18.6
Family activities (FA) ¹	94.2 ± 10.9	90.4 ± 9.8	70.8 ± 15.4	83.6 ± 21.2	91.6 ± 12.7
Family cohesion (FC)	87.5 ± 6.1	82.0 ± 19.0	64.3 ± 27.5	72.0 ± 25.5	81.8 ± 19.4
Physical summary score (PhS) ¹	53.2 ± 2.0	47.8 ± 9.0	41.2 ± 12.9	50.7 ± 9.7	54.3 ± 6.1
Psychosocial summary score (PsS)	56.1 ± 5.1	52.3 ± 8.4	47.6 ± 9.1	47.6 ± 7.8	52.8 ± 7.5

¹ANOVA p < 0.05.

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when compared to their healthy peers. *Cross cultural adaptation*

The Belgian-Flemish CHAQ was fully crossculturally 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 34/69 (49%) lines of the translations. The Belgian-Flemish CHQ was derived from the Dutch (2, 9), there was no need for changes in the wording for the Belgium-Flemish CHQ with respect to the original Dutch CHQ.

Probe technique

For the 69 lines of the translated CHAQ, all the lines of translation were understood by more than 80% of the 16 parents tested (median = 100%; range:100-100%). 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: 100-100%). No change in the text of the Belgian-Flemish CHAQ-CHQ was necessary after the probe technique.

Psychometric issues

Descriptive statistics (first Likert assumption). For the CHAQ the total number of missing responses was 7.1% (range 5.5-9.7%); the response pattern were skewed towards normal functional ability. All response choices of the CHAQ items have been used only for arising, walking, and activity. The mean \pm SD of the items within a scale were roughly equivalent except for dressing. The total number of missing responses on the CHQ was 7.7% (range: 5.8-12.7%) with PT being the health concept with missing values more than 10%; the response pattern was most often skewed towards normal physical and psychosocial well-being. All response choices of the CHO items have been used except for BE, MH, SE, and FA. The means \pm SD of the items within a scale were roughly equivalent except for GH.

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

Items internal consistency (third Likert as sumption). Pearson items scale correlations were 0.4 for 90% of the CHAQ items (except eating),and for 88% of the CHQ items (except BE, MH, and GH).

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 82% of the items (46% by 2 SE); scaling failure was observed for eating, and hygiene where the items were better correlated with other domains. For CHQ, Pearson items correlations with its scale were greater by at least 1 SE for 96% of the items (82% by 2 SE); scaling failure was observed for MH.

Floor and ceiling effect. The CHAQ floor effect had a median of 95% (range 78-97%)

while for the CHQ the median was 0.0% (range 0-3.1%). The CHAQ ceiling effect had median of 0.0% (range 0.0-1.4) while the CHQ had a median of 38% (range 8.5-90.8%). *Cronbach's alpha internal consistency*. Cronbach's alpha was 0.7 for 7/8 (88%) domains of the CHAQ (overall 0.97; range 0.28-0.99) with the exception being eating (0.28). Cronbach's alpha was 0.7 for 9/11 (82%) measurable health concepts (*i.e.* health concepts with more than 1 item) of the CHQ (overall 0.93; range 0.61-0.96) with the exception being MH (0.61), and GH (0.67).

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

Test-retest reliability. After a median of 56 days (range 28-105 days; number of JIA patients re-tested = 14) the intra-class correlation coefficients for the 8 CHAQ domains showed a poor to fair reproducibility with a median of 0.37 (range 0.04-0.8) with a poor reproducibility for arising, eating, hygiene, and reach. Also the 15 CHQ health concepts showed a fair to good reproducibility with a median of 0.7 (range -0.1 to 0.9) with a poor reproducibility for REB, PE, PT.

External validity. The Spearman correlation of the CHAQ with the JIA core set variables (10) showed a median of 0.6 (range 0.5 to 0.7), with the highest correlation being with the physician evaluation of disease activity (r = 0.7). For the CHQ the median correlation was for the PhS -0.5 (range -0.7 to -0.3) and for the PsS was -0.2 (range -0.4 to -0.1). The best correlation was with the physician's evaluation of disease activity for both the PhS (-0.7) and for the PsS (-0.4).

Discussion

The resultsofthe presentstudy show that the Belgian-Flemish versions of CHAQ-CHQ have excellent psychometric properties. In this study the Belgian-Flemish 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 JIA subtypes and healthy controls, with the polyarticular onset, and extended oligoarticular subtypes having a higher degree of disability, pain, and a lower overall wellbeing when compared to their healthy peers. Minor statistical problems were found for eating and hygiene which showed different means \pm SD, an unequal item scale correlation, and problems for internal consistency, discriminant validity, and Cronbach's alpha. The Belgian-Flemish CHQ was equal to the Dutch-language CHQ (2, 9). The generic CHQ questionnaire proved less able to clinically discriminate between the different JIA types than the CHAQ with the JIA patients with polyarticular onset or extended oligoarticular subtypes having a lower physical and psychosocial well-being when compared to their healthy peers. Some minor statistical problems were found for the equal item scale correlation, the item internal consistency, and discriminant validity for BE, MH, and GH.

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

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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.
- 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. "XIV EULAR and VI European Paediatric Rheumatology Congress". Ann Rheum Dis 1999; Abstr. 105, pg 25.
- 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.
- BRUNNER HI, GIANNINI EH: Evidence-based medicine in pediatric rheumatology. *Clin Exp Rheumatol* 2000; 18: 407-14.
- POUCHOT J, RUPERTO N, BARBIER C et al.: The French version of the Childhood Health Assessment Questionnaire (CHAQ) and the Child Health Questionnaire (CHQ). *Clin Exp Rheumatol* 2001; 4 (Suppl. 23): S61-S65.
- 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; 4 (Suppl. 23): S1-S9.
- 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.
- 9. WULFFRAAT N, VAN DER NET JJ, RUPERTO N, et al.: The Dutch version of the Childhood Health Assessment Questionnaire (CHAQ) and the Child Health Questionnaire (CHQ). *Clin Exp Rheumatol* 2001; 4 (Suppl. 23): S111-S115.
- 10. GIANNINI EH, RUPERTO N, RAVELLI A, LOVELLDJ, FELSON DT, MARTINIA: Preliminary definition of improvement in juvenile arthritis. *Arthritis Rheum* 1997; 40: 1202-9.