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

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Supported by a grant from the European Union (BMH4-983531 CA), by IRCCS Policlinico S. Matteo (Pavia, Italy), and by Telecom Italy.

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Clin Exp Rheumatol 2001; 19 (Suppl. 23): S141-S145.

Key words: European Spanish Childhood Health Assessment Questionnaire (CHAQ), European Spanish 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 of 2 health related quality of life instruments into the European Spanish language. 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 an underlying disease. The Spanish CHQ was fully validated with 3 forward and 3 backward translations, while the Spanish CHAQ, already published, was revalidated. A total of 149 subjects were enrolled: 80 patients with JIA (28% systemic arthritis, 34% polyarthritis, 17% extended oligoarthritis, and 21% persistent oligoarthritis) and 69 healthy children. The CHAQ appropriately distinguished healthy subjects from JIA patients, with those classified in the systemic arthritis, polyarthritis and extended oligoarthritis categories having a higher degree of disability and pain, as well as a lower overall well-being than their healthy peers. The CHQ was also able to discriminate healthy subjects from JIA patients, with those allocated in the systemic arthritis, polyarthritis and extended oligoarthritis categories having a lower physical and psychosocial well-being than their healthy counterparts.

In conclusion, the European Spanish 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 the study was to cross-culturally adapt and validate the European Spanish 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) followed by the Spanish members of the Paediatric Rheumatology International Trials Organisation (PRINTO). This project was included in a larger international survey conducted by PRINTO and supported by the European Union (contract BMH4 983531 CA) (3-5), designed to evaluate the health-related quality of life in children with JIA as compared to their healthy peers.

Patients and results

The methodology employed has been described in detail in the introductory paper of the supplement (6). In brief, it was a prospective study conducted from April 1998 to March 2000 by the Spanish members of PRINTO. Children were recruited after the participating centres had obtained the correspondent Ethics Committee approval and the consent from at least one parent per child.

The patients were children with systemic, polyarticular, extended oligoarticular and persistent oligoarticular JIA,diagnosed according to the revised ILAR classification criteria (7). Children 6 to 18 years of age attending a primary care clinic for regular healthy child-adolescent check-ups and healthy sibling(s) of the JIA participants acted as healthy controls.

The complete Spanish versions of the CHAQ-CHQ are reproduced at the end of the paper. The numbers in the left column represent the corresponding lines of the original American-English questionnaires.

Demographic and clinical characteristics of the subjects (Table I)

A total of 149 subjects were enrolled: 80 patients with JIA (28% systemic arthritis, 34% polyarthritis, 17% extended oligoarthritis, and 21% persistent oligoarthritis) and 69 healthy children. The CHAQ and CHQ were completed in 76% of the cases by the mother (mean age 39.9 ± 5.1),and in 24% of the cases by the father (mean age 43.4 ± 6.2).

Clinical discriminant validity

As expected, both CHAQ and CHQ discriminated healthy subjects from JIA patients. The CHAQ results are represented in Table II, including the scores (mean ± SD) obtained in its 8 domains, the disability index (DI) and the 2 VAS scores for parental assessment of pain and overall well-being. In summary, CHAQ revealed that patients classified in the systemic arthritis, polyarthritis and extended oligoarthritis JIA categories had a higher degree of disability and pain, as well as a lower overall well-being than their healthy peers.

The CHQ results are displayed in Table III, including the scores (mean ± SD) for the 15 health concepts (see Table III for abbreviations) and summary scores. The CHQ showed that patients allocated in the systemic arthritis, polyarthritis and extended oligoarthritis JIA categories had a lower physical and psychosocial well-being than their healthy counterparts.

Cross cultural adaptation

The European Spanish version of the CHAQ was already validated by the time this endeavour was undertaken although it has not been

Table I. Demographic and clinical characteristics of the Spanish cohort.

	Systemic onset n = 22	Polyarticular onset n = 27	Extended oligoart. n = 14	Persistent oligoart. n = 17	Healthy controls n =69
Age of the children[1, 2]	12.0 ± 5.1	9.3 ± 4.5	9.1 ± 4.2	9.9 ± 3.8	12.3 ± 4.7
Disease duration[1, 2]	7.6 ± 4.4	3.9 ± 3.4	3.5 ± 2.7	4.5 ± 3.6	
ESR[1]	41.1 ± 30.1	34.3 ± 22.4	32.1 ± 25.7	24.7 ± 31.0	
MD VAS (0-10 cm)[1, 2]	3.1 ± 3.0	3.1 ± 2.8	2.3 ± 2.5	0.7 ± 1.2	
No. swollen joints[1, 2]	3.8 ± 7.7	6.3 ± 7.9	2.1 ± 2.6	0.3 ± 0.4	
No. joints with pain[1]	3.9 ± 7.1	4.9 ± 6.8	2.6 ± 5.5	0.1 ± 0.3	
No. joints with limited range of motion[1, 2]	20.1 ± 18.1	14.2 ± 17.1	3.1 ± 3.2	0.8 ± 1.0	
No. active joints[1, 2]	4.9 ± 8.1	7.7 ± 8.5	2.4 ± 3.0	0.3 ± 0.4	
Female[3]	9 (41%)	19 (70%)	9 (64%)	13 (76%)	34 (49%)
Persistent systemic features[3]	20 (95%)	0	0	0	
Antinuclear antibody[3]	0	14 (52%)	11 (79%)	13 (76%)	
Rheumatoid factor[3]	2 (8%)	0	0	0	
Chronic iritis[3]	0	2 (8%)	1 (7%)	5 (29%)	

[1]Mean ± SD; [2]ANOVA $p < 0.05$; [3]number and percentage.

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

	Systemic onset n = 22	Polyarticular onset n = 27	Extended oligoart. n = 14	Persistent oligoart. n = 17	Healthy controls n =69
Dressing	1.4 ± 1.1	1.2 ± 1.3	0.4 ± 0.6	0.2 ± 0.4	0.1 ± 0.5
Arising	1.1 ± 1.0	1.0 ± 1.1	0.4 ± 0.6	0.1 ± 0.3	0.0 ± 0.0
Eating	1.0 ± 1.1	0.8 ± 1.1	0.3 ± 0.5	0.0 ± 0.0	0.1 ± 0.5
Walking	1.4 ± 1.3	0.7 ± 1.0	0.4 ± 0.6	0.1 ± 0.5	0.0 ± 0.0
Hygiene	1.5 ± 1.4	0.9 ± 1.0	0.5 ± 0.8	0.1 ± 0.5	0.1 ± 0.3
Reach	1.4 ± 1.2	1.1 ± 1.3	0.5 ± 0.5	0.1 ± 0.3	0.0 ± 0.2
Grip	1.2 ± 1.2	1.0 ± 1.1	0.1 ± 0.4	0.1 ± 0.2	0.1 ± 0.2
Activities	1.5 ± 1.3	1.0 ± 1.2	0.6 ± 0.8	0.1 ± 0.3	0.1 ± 0.4
Disability index	1.3 ± 1.1	1.0 ± 0.9	0.4 ± 0.4	0.1 ± 0.2	0.1 ± 0.2
Parent's evaluation of pain	2.7 ± 2.9	2.7 ± 3.3	2.0 ± 2.6	1.2 ± 2.6	0.1 ± 0.7
Parent's evaluation of overall well-being	3.3 ± 3.7	3.2 ± 3.2	1.2 ± 1.7	0.7 ± 2.4	0.0 ± 0.0

ANOVA $p < 0.001$ for all variables.

Table III. Results of the CHQ in the cohort. Values are expressed as mean ± SD and represent the scores obtained in each of the 15 CHQ health concepts (and their abbreviation) and the 2 summary scores. Higher scores indicate better physical or psychosocial well-being (range 0-100).

	Systemic onset n = 22	Polyarticular onset n = 27	Extended oligoart. n = 14	Persistent oligoart. n = 17	Healthy controls n =69
Global health (GGH)	40.7 ± 30.6	46.1 ± 29.7	55.4 ± 15.2	67.7 ± 26.7	88.8 ± 12.2
Physical functioning (PF)	52.3 ± 40.8	66.8 ± 35.3	83.7 ± 26.7	91.2 ± 16.9	99.5 ± 2.8
Role/social limitations - 71.7 ± 33.0 Emotional/Behavioural (REB)	78.7 ± 29.7	82.5 ± 28.1	92.8 ± 15.7	98.6 ± 8.3	
Role/social limitations - Physical (RP)	57.6 ± 41.1	77.1 ± 29.8	78.6 ± 28.8	89.2 ± 18.6	99.8 ± 2.0
Bodily pain/discomfort (BP)	52.3 ± 33.7	55.9 ± 31.3	63.6 ± 31.0	78.2 ± 27.4	89.6 ± 15.8
Behaviour (BE)	71.4 ± 15.5	69.2 ± 15.6	67.7 ± 13.0	77.6 ± 15.7	76.1 ± 14.1
Global behaviour (GBE)	69.5 ± 19.9	59.8 ± 23.6	70.4 ± 17.0	74.7 ± 18.4	74.4 ± 16.2
Mental health (MH)	67.7 ± 18.5	65.2 ± 17.6	64.6 ± 16.0	76.5 ± 10.0	77.8 ± 12.4
Self esteem (SE)	61.3 ± 22.1	73.1 ± 25.0	74.6 ± 29.5	86.5 ± 17.4	87.6 ± 14.6
General health perceptions (GH)	47.7 ± 22.2	56.6 ± 21.1	61.9 ± 14.0	69.6 ± 18.5	80.5 ± 11.5
Change in health (CH)	60.7 ± 29.1	50.0 ± 38.1	64.3 ± 33.6	72.1 ± 26.3	54.5 ± 13.0
Parental impact - Emotional (PE)	31.4 ± 29.3	45.2 ± 29.8	53.0 ± 27.5	56.4 ± 34.8	74.5 ± 22.8
Parental impact - Time (PT)	76.3 ± 22.8	82.1 ± 27.8	87.2 ± 14.2	95.8 ± 9.0	96.6 ± 10.4
Family activities (FA)	69.3 ± 27.9	71.9 ± 25.1	79.5 ± 16.5	89.6 ± 15.1	91.2 ± 12.3
Family cohesion (FC)	63.4 ± 26.3	69.6 ± 23.7	63.6 ± 22.6	82.1 ± 16.0	74.3 ± 18.9
Physical summary score (PhS)	39.4 ± 13.8	46.2 ± 11.3	48.5 ± 10.1	52.9 ± 5.1	55.7 ± 1.7
Psychosocial summary score (PsS)	45.3 ± 8.5	45.0 ± 9.1	44.5 ± 7.1	50.7 ± 7.4	51.3 ± 6.2

ANOVA $p < 0.05$ except for BE ($p = 0.09$).

published until recently (8). Our objective regarding the CHAQ was therefore to revalidate it.

The European Spanish CHQ was fully cross-culturally adapted with 3 forward and 3 backward translations. The concordance rate with the original American English version of the CHQ was 75% (74/99 lines) in at least 2 out of 3 back translations.

Probe technique

Regarding the 69 lines of the translated CHAQ, all the lines were understood by more than 80% of the 20 parents tested (median = 100%; range: 100-100%). For the 99 lines of the translated CHQ, all the lines were understood by more than 80% of the parents (median = 100%; range: 85-100%). Therefore, the texts of the Spanish CHAQ and CHQ were unmodified after the probe technique.

Psychometric issues

Descriptive statistics (first Likert assumption). CHAQ. The total number of missing responses was 4.7% (range 0.3-10.4), with dressing and activity having more missing values. The response pattern was skewed towards normal functional ability. All response choices for the different CHAQ items were used except for certain items in the eating, hygiene, reach, and grip areas. The mean ± SD of the items within a scale were roughly equivalent for all CHAQ domains.

CHQ. The total number of missing responses was 1.5% (range: 0.0-4.0%), being SE the health concept with the most missing values. The response pattern was most often skewed towards normal physical and psychosocial well-being. All response choices of the CHQ items were used except for certain items in BP, BE, and MH. The mean ± SD of the items within a scale were roughly equivalent for all CHQ health concepts.

Equal items-scale correlation (second Likert assumption). Pearson items-scale correlations corrected for overlap were roughly equivalent for items within a scale for 100% of the CHAQ domains and 90% of the CHQ health concepts, with the exception of BE, MH, GH, and PT.

Items internal consistency (third Likert assumption). Pearson items-scale correlations were ≥ 0.4 for 100% of the items of CHAQ and 90% of the items of CHQ (except BE, MH, and GH).

Items discriminant validity. For the CHAQ, Pearson correlations of the items with their scales corrected for overlap were greater than at least 1 standard error (SE) of the correlation with other scales for 85% of the items (14% by 2 SE); there was no scaling failure. For the CHQ, Pearson correlations of the items with their scales were greater by at least 1 SE for 94% of the items (65% by 2 SE); scaling failure was observed only for BE, MH, and GH.

Floor and ceiling effect. The floor effect had a median of 84% (range 76-88%) for the CHAQ and 0.8% (range 0.0-4.2%) for the CHQ. Likewise, the ceiling effect had a median of 0.6% (range 0.0-2.2) for the CHAQ and 26% (range 0.8-75%) for the CHQ.

Cronbach's alpha internal consistency. Cronbach's alpha was ≥ 0.7 for 8/8 (100%) domains of the CHAQ (overall 0.98; range 0.8-0.97). Similarly, Cronbach's alpha was ≥ 0.7 for 11/11 (100%) measurable health concepts (*i.e.* health concepts with more than 1 item) of the CHQ (overall 0.96; range 0.7-0.96).

Inter scale correlation. In regards to the CHAQ, the Pearson correlation of each domain with all other domains of the questionnaire was lower than the Cronbach's alpha for dressing, arising, and eating. For the CHQ, all 11 measurable health concepts had lower correlations than their Cronbach's alpha.

Test-retest reliability. It was analysed in 11 JIA patients after a median of 10 days (range 7-38 days). Regarding the CHAQ, the intraclass correlation coefficients for its 8 domains showed a fair to good reproducibility, with a median of 0.9 (range 0.5-1.0). In regards to the CHQ, its 15 health concepts also showed a fair to good reproducibility, with a median of 0.6 (range 0.2-0.9); only BE (0.3) and PT (0.2) had poor reproducibility.

External validity. The Spearman correlation of the CHAQ with the JIA core set of outcome variables (9) showed a median of 0.7 (range 0.4 to 0.7). The CHAQ correlated the best with the number of joints with limited range of motion (r = 0.7). For the CHQ, the median correlation for the PhS was -0.6 (range -0.7 to -0.6) whereas for the PsS it was -0.3 (range -0.4 to -0.2). Both the PhS (-0.6) and the PsS (-0.4) correlated the best with the physician's evaluation of disease activity.

Discussion

The results obtained by the present study show that the European Spanish versions of the CHAQ and CHQ have excellent psychometric properties.

This study revalidated the Spanish version of the CHAQ recently published by García-García *et al.* (8). This disease-specific questionnaire proved its ability to discriminate between patients with JIA and healthy controls. The children diagnosed with systemic, polyarticular and extended oligoarticular JIA had a higher degree of disability and pain, as well as a lower overall well-being than their healthy peers. Psychometric evaluation was good for all domains.

In this study the European Spanish 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 than the CHAQ to discriminate among the different JIA categories tested. However, patients with systemic, polyarticular and extended oligoarticular JIA had a lower physical and psychosocial well-being than healthy controls. 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 European Spanish 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, the committee responsible for the preparation and review of the forward and backward translations, and to the International Co-ordinating Centre of PRINTO in Pavia, Italy, for their methodological and statistical support.

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. "XIV EULAR 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. GARCÍA-GARCÍAJJ, GONZÁLEZ-PASCUAL E, POU-FERNÁNDEZ J, SINGH G, JIMÉNEZ R: Development of a Spanish (Castilian) version of the Childhood Health Assessment Questionnaire. Measurement of health status in children with juvenile chronic arthritis. *Clin Exp Rheumatol* 2000; 18: 95-102.
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.