Arch Rheumatol 2015;30(X):i-vi
doi: 10.5606/ArchRheumatol.2015.5130

ORIGINAL ARTICLE

Evaluation of Childhood Health Assessment Questionnaire in Juvenile Idiopathic Arthritis: A Turkish Single Centre Experience

Duygu GÜMÜŞ, Özge BAŞARAN, Nilgün ÇAKAR, Nermin UNCU, Banu ÇELİKEL ACAR

Department of Pediatric Rheumatology, Ankara Child Health and Diseases Hematology Oncology Training and Research Hospital, Ankara, Turkey

Objectives: This study aims to investigate the relationship between the Childhood Health Assessment Questionnaire (CHAQ) and types of juvenile idiopathic arthritis (JIA), the disease activity, laboratory findings, and treatments of patients with JIA.

Patients and methods: Eighty-two children with JIA (37 males, 45 females; mean age 13.96±4.45 years) and 68 healthy children (31 males, 37 females; mean age 10.1±4.24 years) participated in the study. CHAQ, composed of discomfort and disability indexes, was applied to patients and the control group.

Results: CHAQ score was significantly higher in JIA patients than in the control group ($p<0.05$). Patients having active joint involvement had significantly higher visual analog scale and CHAQ scores than those without active joint involvement ($p<0.05$). There were no statistical differences between the disease types and CHAQ scores ($p>0.05$). Visual analog scale pain scores and CHAQ scores were significantly higher in patients in an active disease period than patients in remission ($p<0.05$).

Conclusion: The CHAQ is a reliable method for JIA follow-up. CHAQ clinically discriminates between healthy groups and JIA patients with a high disability index.

Keywords: Childhood Health Assessment Questionnaire; Juvenile Idiopathic Arthritis; quality of life.

Juvenile idiopathic arthritis (JIA) is the most common chronic rheumatic disease of childhood. It is an important cause of short and long-term disability.[1,2] Etiology of the disease is still unknown and it is not a single disease, but a group of related immunoinflammatory and genetically heterogeneous disorders affecting both joints and other structures of the body.[1,3] JIA is defined as arthritis of unknown etiology that begins before the age of 16, has a disease duration of six weeks or longer and with other known conditions excluded.[4] Although persistent arthritis for at least six weeks is sufficient for diagnosis, disease duration of at least six months is required before the onset type can be determined.[1]

Disease outcomes have improved in recent years, but patients with JIA still have joint destructions and deformities. They also develop rare but important complications like chronic uveitis, blindness, end-stage renal failure secondary to amyloidosis, and growth delay.[5] JIA influences many aspects of a child's life, not only physical, but also social, emotional, educational and economic.[1,6] Moreover, there has been an increasing interest and need to find new therapies for improving the quality of life for pediatric patients. As a result, many instruments have been developed to assess the health-related quality of life including functional questionnaires which are commonly used to evaluate children with chronic diseases.[3,7,8]

The Childhood Health Assessment Questionnaire (CHAQ) is one of the most functional and widely used health status instruments in children with JIA.[2] It is a self-report questionnaire and is said to measure both

Received: June 27, 2014 ***Accepted:*** July 01, 2014 ***Published online:*** January 08, 2015

Correspondence: Özge Başaran, M.D. Ankara Çocuk Sağlığı ve Hastalıkları Hematoloji Onkoloji Eğitim ve Araştırma Hastanesi Çocuk Romatoloji Kliniği, 06200 Dışkapı, Altındağ, Ankara, Turkey. Tel: +90 312 - 596 96 22 e-mail: ozgesalor@yahoo.com

disability and discomfort in children with chronic arthritis.[3]

In this study, we investigated the relationship between CHAQ and types of JIA, the disease activity, laboratory findings, and treatments of patients with JIA.

PATIENTS AND METHODS

This cross-sectional study was conducted between October 2008 and June 2010 in Pediatric Rheumatology Department of Ankara Child Health and Diseases, Hematology and Oncology, Training and Research Hospital. Eighty-two patients (37 males, 45 females; mean age 13.96±4.45 years) diagnosed with JIA and 68 children (31 males, 37 females; mean age 10.1±4.24 years) who did not have any systemic connective tissue disease were enrolled. All participants and their families were informed about the study, and consent was obtained from each child's parent. The protocol was approved by the Ethics committee of Ankara Child Health and Diseases, Hematology and Oncology, Training and Research Hospital.

Patients were diagnosed by a pediatric rheumatologist according to the American Rheumatology College criteria,[9,10] and classified as systemic, polyarticular and oligoarticular based on Durban Criteria.[11] All patients' ages, gender, disease type, age at disease onset, average follow-up durations and therapy were noted. Active joint involvement and eye examination results were also considered. Erythrocyte sedimentation rate (ESR), C-reactive protein (CRP), and anti-nuclear antibody values were noted.

The CHAQ is composed of disability and discomfort indexes. Disability index measures functional ability in eight activities of daily living: dressing and grooming, arising, eating, walking, hygiene, reach, grip and activities. Three components were assessed in each area: 1) the degree to which daily functions were difficult to perform; 2) the use of special aids and devices; and 3) activities for which the assistance of another person was required. Each question had a four level scale between 0 (no difficulty), 1 (with some difficulty), 2 (with much difficulty) and 3 (unable to perform). The category "not applicable" was added for items that might not apply due to the age of the child. Discomfort index assessed pain and overall well-being measured by two 0-100 mm visual analog scales (VASs) (pain VAS and well-being VAS).[2,3] Higher scores were associated with more severe disease activity. The ESR and CRP values of all patients were noted. ESRs higher than 20 mm/hour and CRPs higher than 1 mg/dL were accepted as elevated. Active disease period was defined according to the 'American Rheumatology College provisional criteria for defining clinical inactive disease protocol'.[12] Active joint involvement, ESR-CRP levels, active systemic involvement features, existence of active uveitis and morning stiffness were noted.[8,11] Statistical analyses were performed between CHAQ domains and over-all active disease periods and remission periods, and between CHAQ domains and active joint involvement.

Statistical analysis

The SPSS version 17.0 software program (SPSS Inc., Chicago, IL, USA) was used to analyze the data. Results of the descriptive analysis were presented as mean or numbers (n) and percentages (%). All patients' ages, genders, ages at disease onset and control

Table 1. Demographic and clinical characteristics of patients

	Oligoarticular			Polyarticular			Systemic			Control group		
	n	%	Mean±SD	n	%	Mean±SD	n	%	Mean±SD	n	%	Mean±SD
Age of the children (years)			11.2±4.2			13.5±4.1			9.2±4.0			10.1±4.24
Age of the children at diagnose (years)			6.7±4.1			7.3±4.0			5.9±5.1			
Disease duration (years)			4.7±3.9			6.6±3.8			3.7±3.5			
ESR (mm/hour) (years)			40.6±29.3			42.1±30.2			32.1±29.2			
C-reactive protein (mg/dL) (years)			1.9±2.7			2.5±4.5			2.0±3.7			
Antinuclear antibody	14	36.8		7	21.8		3	30				
Uveitis	7	20.5		1	3.4		0	0				
Number of active joints			0.47±0.8			1.29±2.66			0.8±1.4			

SD: Standard deviation; ESR: Erythrocyte sedimentation rate.

Table 2. Eight Childhood Health Assessment Questionnaire domains (range 0-3) and disability index (range 0-3) of patients and control group

	Patient	Control	
	Mean±SD	Mean±SD	*p*
Dressing	0.9±0.7	0.6±1.0	0.027
Arising	0.4±0.7	0.0±0.0	0.000*
Eating	0.3±0.5	0.3±0.5	0.468
Walking	0.4±0.8	0.0±0.0	0.000*
Hygiene	0.7±0.9	0.3±0.7	0.001*
Reach	0.2±0.4	0.0±0.0	0.000*
Grip	0.2±0.6	0.3±0.2	0.001*
Activities	0.8±1.1	0.2±0.5	0.000*
Disability index	0.5±0.6	0.2±0.3	0.000*

SD: Standard deviation; * p value <0.05 (post hoc test); Lower scores indicate better functional ability.

durations, and laboratory result percentages were compared with ANOVA test. Mann-Whitney test was used to analyze whether the disease was active or not. The significance of differences between CHAQ scores of patient and control groups was evaluated with post-hoc analysis. P values <0.05 were considered to be statistically significant.

RESULTS

Both the JIA group and the healthy group had female predominance. The mean age of the JIA patients was significantly higher than that of the healthy group (p=0.01). The following diagnoses were identified among the participants: oligoarticular JIA (n=38, 46.34%), polyarticular JIA (n=34, 41.46%), and systemic JIA (n=10, 12.2%). Table 1 shows the demographic and clinical characteristics of the patients.

All patients or parents and control groups answered the questionnaire. Two VAS scores for the parent evaluations of pain and overall well-being were also calculated. Table 2 demonstrates the scores (mean ± standard deviation) for eight CHAQ domains of disability index of patients and healthy peers, and Table 3 summarizes the results (mean ± standard deviation) of the CHAQ and VAS scores for all JIA types. CHAQ clinically discriminated between the healthy group and JIA patients having a higher degree of disability compared to their healthy peers. According to the disease subtypes, there were no statistical differences for VAS, CHAQ scores and overall well-being (p>0.05).

There was no significant difference between the active disease period and subtypes of JIA patients. The number of systemic JIA patients in a remission period was significantly higher than the other types (p=0.22). Table 4 shows the results (mean ± standard deviation) of the eight CHAQ domains and VAS scores for active disease periods and remission periods. An evaluation of patients for active joint involvement revealed that subjects who had active joint involvement had significantly higher VAS and CHAQ scores compared to those without active joint involvement (p<0.05) (Table 5).

Among 82 patients, 67 were receiving therapy. Fifteen of them were on remission without treatment. The first choice for therapy

Table 3. Childhood Health Assessment Questionnaire domains (range 0-3), disability index (range 0-3), visual analog scale score (range 0-100 mm) and over all disease activity of juvenile idiopathic arthritis types and control group

	Control	Oligoarticular	Polyarticular	Systemic	
	Mean±SD	Mean±SD	Mean±SD	Mean±SD	*p*
Dressing	0.6±1.0	0.8±1.1	0.9±1.1	1.0±1.0	0.151
Arising	0.0±0.0	0.4±0.6	0.4±0.6	0.5±0.9	0.000*
Eating	0.3±0.5	0.2±0.4	0.3±0.5	0.4±0.6	0.811
Walking	0.0±0.0	0.4±0.8	0.4±0.7	0.3±0.7	0.000*
Hygiene	0.3±0.7	0.7±1.0	0.5±0.8	1.0±0.9	0.008*
Reach	0.0±0.0	0.2±0.3	0.3±0.6	0.2±0.3	0.000*
Grip	0.3±0.2	0.2±0.4	0.3±0.7	0.3±0.8	0.006*
Activities	0.2±0.5	0.8±1.1	0.7±0.9	0.8±1.2	0.000*
Disability index	0.2±0.3	0.5±0.6	0.5±0.6	0.5±0.6	0.000*
Visual analog scale (pain) (mm)	00.0±00.0	25.0±30.0	25.0±26.0	20.0±26.0	0.653
Overall wellbeing	00.0±00.0	52.0±23.0	59.0±23.0	58.0±19.0	0.384

SD: Standard deviation; * p value <0.05 (post hoc test). Lower scores indicate better functional ability.

Table 4. Childhood Health Assessment Questionnaire domains (range 0-3), disability index (range 0-3), visual analog scale score (range 0-100) and over all disease activity of juvenile idiopathic arthritis patients on remission and active period

	Remission (n=52)	Active disease (n=30)	
	Mean±SD	Mean±SD	*p*
Dressing	0.7±0.9	1.2±1.2	0.092
Arising	0.3±0.5	0.7±0.8	0.021*
Eating	0.2±0.4	0.4±0.6	0.133
Walking	0.2±0.5	0.7±1.0	0.018*
Hygiene	0.5±0.8	1.0±1.0	0.010*
Reach	0.1±0.2	0.4±0.6	0.005*
Grip	0.2±0.4	0.4±0.8	0.332
Activities	0.5±0.8	1.2±1.3	0.007*
Disability index	0.3±0.4	0.8±0.7	0.007*
VAS (pain)	17.6±22.2	37.7±32.0	0.004*
VAS (overall wellbeing)	53.6±23.6	61.5±21.1	0.137

SD: Standard deviation; * p value <0.05 (post hoc test); VAS: Visual analog scale. Lower scores indicate better functional ability.

Table 5. Eight Childhood Health Assessment Questionnaire domains (range 0-3), disability index (range 0-3), visual analog scale score (range 0-100) and over all disease activity of juvenile idiopathic arthritis patients with or without active joint involvement

	No active joint involvement (n=55)	Active joint involvement (n=27)	
	Mean±SD	Mean±SD	*p*
Dressing	0.7±0.9	1.2±1.3	0.184
Arising	0.2±0.5	0.8±0.7	0.000
Eating	0.2±0.4	0.4±0.6	0.072
Walking	0.1±0.3	1.0±1.0	0.000
Hygiene	0.4±0.7	1.2±1.0	0.000
Reach	0.1±0.2	0.5±0.6	0.000
Grip	0.1±0.4	0.4±0.8	0.029
Activities	0.3±0.7	1.6±1.2	0.000
Disability index	0.3±0.4	0.9±0.7	0.000
VAS (pain)	13.7±20.5	47.6±28.3	0.000
VAS (overall wellbeing)	52.2±23.1	63.9±20.8	0.030

SD: Standard deviation; * p value <0.05 (post hoc test); VAS: Visual analog scale. Lower scores indicate better functional ability.

was non-steroidal anti-inflammatory drugs (NSAID) and then methotrexate. Patients taking NSAIDs had a better score for hygiene, activities and VAS than patients who did not take NSAIDs ($p<0.05$). Also, patients receiving methotrexate therapy had a better score for dressing and VAS compared to patients who did not receive methotrexate ($p<0.05$).

DISCUSSION

Juvenile idiopathic arthritis is one of the most common rheumatic diseases of childhood. Children with JIA may have long-term disability and lower quality of life. Consequently, there has been an increasing need to assess the daily functional status and quality of life in JIA. The CHAQ is a modification of the Stanford Health Assessment Questionnaire. More questions were added to CHAQ, so that there is at least one question for each functional area. The CHAQ is a valid and sensitive tool for the evaluation of functional outcomes in children with chronic arthritis.[3] Goycochea-Robles et al.[13] studied 55 patients with JIA and found that the Spanish version of CHAQ was a reliable and valid tool for the assessment of health status in Spanish children. Özdoğan et al.[14] reported on 85 JIA patients who completed the CHAQ, and showed that the Turkish version of CHAQ was a reliable and valid tool for the functional, physical and psycho-social assessment of children with JIA. This study revealed that the questionnaire has the ability to discriminate between the JIA types and healthy controls, with the systemic and polyarticular types having a higher degree of disability, pain and lower quality of life when compared to the healthy group. Miyamae et al.[3] reported that the disease specific questionnaire had the ability to discriminate between patients with systemic JIA and polyarticular JIA and the control group. Miller et al.[15] also found significantly higher CHAQ scores for patients over the control group. However, they did not find a significant difference between the subtypes of JIA patients. Similar to findings in the literature, in our study, comparison of JIA patients and their healthy peers revealed significantly higher CHAQ results, particularly high disability index, than the control group. In patients with active joint involvement, VAS and CHAQ scores, particularly in daily activities including arising, walking, hygiene, reach and grip were significantly higher than those without active joint involvement. Similarly, Miller et al.[15] reported a higher disability index for patients with active synovitis than the control group.

Erythrocyte sedimentation rate and CRP are two parameters to assess and follow-up disease activity. Their levels may increase in the active disease period. Özdoğan et al.[14] reported higher

ESR levels in systemic and polyarticular type JIA than oligoarticular type JIA. In our study, ESR and CRP values were used to detect the active disease periods and remission periods. We were unable to detect significant difference between active disease period and JIA subtypes. Özdoğan et al.[14] did not evaluate CHAQ scores for the active disease periods and remission periods. The difference is that in our study, we compared the CHAQ scores and disease periods, and showed that patients having an active disease had significantly higher CHAQ and VAS scores than the control group.

Moretti et al.[16] evaluated the CHAQ results of 44 oligoarticular JIA patients before and six months after intra-articular steroid therapy. After six months, CHAQ scores of 23 patients improved, scores of seven patients worsened, and 14 showed no difference. In our study, patients having NSAIDs had better CHAQ evaluations, patients having methotrexate had better VAS scores, and patients having etanercept had better CHAQ and VAS scores than patients who did not receive those therapies. Nevertheless, at this point, it is difficult to say what role these anti-rheumatic drugs played in CHAQ scores of these children.

Finally, we may conclude that CHAQ is a reliable method for providing real results in JIA follow-up, as clearly reported in the literature. The data from our cross-sectional study revealed that patients having an active disease period had worse CHAQ and VAS scores compared to the control group. Moreover, CHAQ clinically discriminated between the healthy group and JIA patients with a high disability index.

Declaration of conflicting interests

The authors declared no conflicts of interest with respect to the authorship and/or publication of this article.

Funding

The authors received no financial support for the research and/or authorship of this article.

REFERENCES

1. Cassidy JT, Petty RE, Laxer RM, Lindsley CB, editors. Textbook of pediatric rheumatology. 6th ed. Philadelphia: Elsevier Saunders; 2010. p. 211-35.
2. Tarakci E, Yeldan I, Kaya Mutlu E, Baydogan SN, Kasapcopur O. The relationship between physical activity level, anxiety, depression, and functional ability in children and adolescents with juvenile idiopathic arthritis. Clin Rheumatol 2011;30:1415-20.
3. Miyamae T, Nemoto A, Imagawa T, Ohshige K, Mori M, Nishimaki S, et al. Cross-cultural adaptation and validation of the Japanese version of the Childhood Health Assessment Questionnaire (CHAQ). Mod Rheumatol 2008;18:336-43.
4. Gheita TA, El-Gazzar II, El Shazly RI, El-Din AM, Abdel-Rasheed E, Bassyouni RH. Elevated serum resistin in juvenile idiopathic arthritis: relation to categories and disease activity. J Clin Immunol 2013;33:297-301.
5. Pouchot J, Ecosse E, Coste J, Guillemin F. Validity of the childhood health assessment questionnaire is independent of age in juvenile idiopathic arthritis. Arthritis Rheum 2004;51:519-26.
6. Lundberg V, Lindh V, Eriksson C, Petersen S, Eurenius E. Health-related quality of life in girls and boys with juvenile idiopathic arthritis: self- and parental reports in a cross-sectional study. Pediatr Rheumatol Online J 2012;10:33.
7. Ruperto N, Ravelli A, Pistorio A, Malattia C, Cavuto S, Gado-West L, 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(4 Suppl 23):S1-9.
8. Filocamo G, Consolaro A, Solari N, Palmisani E, Dalprà S, Suffia C, et al. Recent Advances in Quantitative Assessment of Juvenile Idiopathic Arthritis. Ann Paediatr Rheum 2012;1:84-96.
9. Saraux A, Berthelot JM, Chalès G, Le Henaff C, Thorel JB, Hoang S, et al. Ability of the American College of Rheumatology 1987 criteria to predict rheumatoid arthritis in patients with early arthritis and classification of these patients two years later. Arthritis Rheum 2001;44:2485-91.
10. Wu EY, Van Mater HA, Rabinovich E. Rheumatic diseases of childhood. In: Kleigman RM, Stanton BF, Schor NF, editors. Nelson textbook of pediatrics. 19th ed. Philadelphia: Elsevier Saunders; 2011. p. 829-39.
11. Cleary AG, Sills JA, Davidson JE. Revision of the proposed classification criteria for juvenile idiopathic arthritis: Durban, 1997. J Rheumatol 2000;27:1568.
12. Wallace CA, Giannini EH, Huang B, Itert L, Ruperto N. American College of Rheumatology provisional criteria for defining clinical inactive disease in select categories of juvenile idiopathic arthritis. Arthritis Care Res (Hoboken) 2011;63:929-36.
13. Goycochea-Robles MV, Garduño-Espinosa J, Vilchis-Guizar E, Ortiz-Alvarez O, Burgos-Vargas R. Validation of a Spanish version of the Childhood Health Assessment Questionnaire. J Rheumatol 1997;24:2242-5.

14. Ozdogan H, Ruperto N, Kasapçopur O, Bakkaloglu A, Arisoy N, Ozen S, et al. The Turkish version of the Childhood Health Assessment Questionnaire (CHAQ) and the Child Health Questionnaire (CHQ). Clin Exp Rheumatol 2001;19(4 Suppl 23):S158-62.
15. Miller ML, Kress AM, Berry CA. Decreased physical function in juvenile rheumatoid arthritis. Arthritis Care Res 1999;12:309-13.
16. Moretti C, Viola S, Pistorio A, Magni-Manzoni S, Ruperto N, Martini A, et al. Relative responsiveness of condition specific and generic health status measures in juvenile idiopathic arthritis. Ann Rheum Dis 2005;64:257-61.