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Health Related Quality of Life, Disease Activity, Severity and Coping in Juvenile Rheumatoid Arthritis

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The aim of the present study was to assess the health related quality of life in children and adolescences suffering from Juvenile Rheumatoid Arthritis. It also aimed at studying its relationship with disease activity, subtypes and important clinical parameters and accumulated damage and the usefulness of this tool to indicate the improvement or worsening of the patient's clinical condition in daily practice and physical capacity. This study is a case control study that comprised 52 children and adolescent suffering from Juvenile Rheumatoid Arthritis (JRA) in the age range 5-18 years classified as polyarticular (46.2%), systemic onset (26.9%) and pauciarticular (26.9%) attending the rheumatology and rehabilitation outpatient clinic at Cairo University Hospitals and 61 healthy children as a control. All patients underwent clinical rheumatologic and laboratory assessments. A questionnaire including demographic and anthropometric variables (age, sex, weight and height….), clinical variables (onset, age at onset, subtype, course, duration, morning stiffness….) and laboratory variables (ESR, ANA, RF, CRP and HB) was fulfilled. The outcome measure and health assessment were evaluated by two tools: The Childhood Health Assessment Questionnaire (CHAQ) which is a disease specific instrument that measures functional ability in daily living activities in children with juvenile rheumatoid arthritis and The Child Health Questionnaire (CHQ-PF 50) which is a generic health instrument designed to capture the physical and psychosocial well being of children independently from the underlying disease. The disability index (DI), Physical and Psychosocial scores (PhS and PsS) were then drawn out and correlated to the variables reflecting disease activity. There was a significant difference for almost all measures of disease activity being significantly higher in the systemic onset compared to the other two subtypes ($p<0.005$). The CHAQ significantly discriminated between healthy subjects and JRA patients [DI= 0.1±0.2 vs 1.1±0.8, respectively ($p<0.01$)]. It also discriminated between the three subtypes of JRA where the DI was significantly higher in the systemic onset type (1.4±0.7), followed by the polyarticular (1.2±0.7) then the pauciarticular subtype (0.7±0.6and $p<0.05$). The CHQ discriminated clinically healthy subjects from JRA patients, with the patients having significantly lower physical and psychosocial well- being scores when compared to their healthy peers (PhS = 46.8±18.8 vs 78.0±14.2), (PsS = 57.3±17.2 vs 68.9±15.6), respectively and ($p = 0.000$). The CHQ proved to be less able to discriminate clinically between the different JRA subtypes. The CHAQ and the CHQ proved to be reliable and valid tools for the functional, physical and psychological assessment of children with JRA and this was confirmed by the strong correlation between the DI, PhS and PsS and the variables reflecting disease activity.

Key words: Health related quality of life, Juvenile Rheumatoid Arthritis, CHAQ, HAQ, children, adolescence, chronic arthritis

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INTRODUCTION

Juvenile idiopathic arthritis (JRA) (formerly called Rheumatoid Arthritis) is the commonest rheumatic disease in children. It is a chronic systemic inflammatory disease of undetermined etiology involving primarily the synovial membranes and articular surfaces of multiple joints. It is often progressive and results in pain, stiffness and swelling of joints and in late stages deformity and ankylosis develop (Weiss and Ilowite, 2005; King, 2005).

Although rarely a life-threatening disease, JRA can, if poorly controlled, lead to functional, physical and psychosocial disabilities (Reiff, 2004). Consequently, it may profoundly affect growth, development and quality of life in children (Zebracki *et al*., 2004). Children suffering from JRA experience difficulty in performing every day activities in the same way as peers. This may heavily interfere with the development of independence and self esteem, especially in adolescence, and leads to problems in family and peer relationship, school achievement and vocational expectations (Ruperto *et al*., 2001; Pratsidou-Gertsi, 2002)

Previous studies carried out on Arab children focused only on the patient's functional disability caused by JRA (El Miedany *et al*., 2003; Madi *et al*., 2004). However more emphasis is now being placed on incorporating estimates of physical, social and mental functioning (HRQoL) into health assessment besides the measurement of disease activity. This may help to understand the burden of chronic illness and its treatment on children and their families (Tucker, 2000; Moretti *et al*., 2005). In an original article, Feldman *et al*. (2000), made use of a tool developed to measure quality of life and health related quality of life, comparing their scores with the physical and functional capacity measures. Should these indicators be able to detect the important clinical changes, effects of treatment or coupled the disease activity scores even in a small series of patients cross culturally, are not yet known.

The aim of the present study was to assess the health related quality of life (HRQoL) in children and adolescences suffering from juvenile rheumatoid arthritis. It also aimed at studying its relationship with disease activity, subtypes important clinical parameters and accumulated damage and the usefulness of this tool to indicate the improvement or worsening of the patient's clinical condition in daily practice and physical capacity.

MATERIALS AND METHODS

This study is a case control study that comprised 52 children and adolescents (21 males and 31 females) suffering from JRA and attending the Rheumatology and Rehabilitation clinic of Kaser El-Aini and AbuElrich hospitals during the period from December 2004 to August 2005. The patients were defined by the American College of Rheumatology Revised Criteria for diagnosis of JRA (Brewer *et al*., 1977). Their ages ranged from 5 to 18 years and were 21 males and 31 females. Sixty one healthy normal children were recruited from children attending the same hospital for minor illnesses and considered as a control group. The protocol was approved by the ethics committee in the National Research Center and consent was obtained from each child's parents.

All patients underwent clinical rheumatologic and laboratory assessments that were studied using specially designed forms to evaluate the current status.

Standard forms of questionnaire for data collection were designed which was completed by primary caretaker and children aged 12 years and older.

The questionnaire was designed to collect data about age, sex, weight and height. Clinical variables included: disease onset (the onset was considered acute if symptoms andsigns developed during the initial six weeks), age at onset, subtype, disease course (progressive or unremitting course was characterized by active disease for more than two years.), duration of disease (the years from disease onset till the study time), morning stiffness (the number of minutes from awakening to optimal status for that day).

The disease activity was assessed and classified into four categories:

- Active (with increase in the number of joints with active synovitis despite the treatment).
- Stable (the number of joints with synovitis remained stable during the treatment).
- Inactive (no evidence of synovitis and no medication for a period shorter than two years).
- In remission (no evidence of synovitis and no medication for a period longer than two years) (Arguedas, 2001).

Laboratory variables include Erythrocyte Sedimentation Rate (ESR), Antinuclear Antibody (ANA), Rheumatoid Factor (RF), C Reactive Protein (CRP) and Hemoglobin level (HB). Treatments: (parenteral gold salts and oral corticosteroids), comorbid disease.

Articular variables were based on a joint count in which swelling, limited motion and deformity was recorded for each of 50 standard joints in every patient and any abnormality was scored as an involved joint. The standard joints include: 8 distal interphalangeal joints in the hand, 10 proximal interphalangeal joints in the hand, 10 metacarpophalangeal joints in the hand, 2 shoulders,

2 knees, 2 hips, 2 ankles, 2 wrists, 2 elbows and 10 metatarsophalangeal joints in the feet. Tender joints were estimated using the Richi articular index (RI) and Grip strength: A blood pressure cuff was inflated to 30 mm Hg and the patient was asked to squeeze it as hard as he or she could. The test was repeated three times for each hand and the score recorded was the mean of these six measures. Disease activity was assessed using modified Disease Activity Score(DAS) that including the RI, swollen joint count, ESR and general health assessment on a Visual Analog Scale (VAS) (Prevoo *et al*., 1995).

Health assessment was evaluated using two tools, the Childhood Health Assessment Questionnaire (CHAQ) and the Child Health Questionnaire Parent Form (CHQ-PF 50). Two doctors translated the questionnaires to Arabic and another doctor retranslated the accepted formula to English. Then, wording changes were done to get the final Arabic version to assure high validity of the two questionnaires. The questionnaires were tested on a pilot sample of 10 patients. Each subject fulfilled the questionnaires twice with one week apart to detect their reliability which was found to be 0.8.

The Childhood Health Assessment Questionnaire (CHAQ): It is a disease specific health instrument that measures functional ability in daily living activities in children with JRA. It consists of two components: disability and discomfort. Disability is assessed depending on 8 domains using 30 questions covering major aspects of daily living over a one week period. The 8 domains include: dressing and grooming, arising, eating, walking, hygiene, reach, grip and activities. Each of the items within a domain has 4 possible categories of answers: without any difficulty (score 0), with some difficulty (score 1), with much difficulty (score 2), unable to do (score 3). Each domain contains at least one item that is developmentally appropriate for children according to their age. The term not applicable was added if a child cannot be expected to perform a certain maneuver because of young age. The score for each domain was determined according to the item with the highest score. However the use of any aids or devices or help from another person was assigned a minimum score of 2 for that domain. The Disability Index (DI) is the mean of the scores of the eight domains of the CHAQ and can range from 0 (no disability) to 3 (maximum disability). While discomfort assessment was depending on 2 Visual Analogue Scales (VAS):

- The parent's global assessment of the child's overall well being (parent global) on a 10 cm VAS (0= very good; 10= very poor).
- The parent's assessment of the child's pain (parent pain) on a 10 cm VAS (0= no pain; 10= very severe pain) (Brasil *et al*., 2003; Brunner *et al*., 2005).

The Child Health Questionnaire Parent Form (CHQ-PF 50): It is a generic health instrument designed to assess the health related quality of life of children. It consisted of 50 items/questions scored in 15 health concepts to assess the physical and psychosocial functioning of children during the last 4 weeks. These health concepts includes: global health (GGH), physical functioning (PF), social role emotional/behavioral limitations (REB), social role/ physical limitations (RP), bodily pain discomfort (BP), behavior (BE), global behavior (GBE), mental health (MH), self esteem (SE), general health perception (GH), change in health (CH), emotional impact on the parent (PE), impact on the parent's personal time (PT), limitations in family activities (FA) and family cohesion (FC). The CHQ yields two summary scores, the physical score (PhS) and psychosocial score (PsS). Only 10 out of the 15 health concepts are currently used to calculate the physical and psychosocial scores (PF, RP, BP and GH for PhS and REB, BE, MH, SE, PE and PT for PsS). Each concept has a 0-100 score; the higher the score, the better the health condition (Landgraf *et al*., 1999; Moretti *et al*., 2005). The correlation between the disability index, physical and psychosocial scores and the disease clinical variables was done.

Statistical analysis: Data entry and analysis were done using SPSS version 13. Chi-square test of significance was used in order to compare proportions between two categorical variables. For comparing between two means, t-test of significance was done and one way analysis of variance was used when comparing between more than two means. When data were not normally distributed, non-parametric Mann-Whitney test was used for comparing between two means and Kruskal-Wallis test when comparing between more than two means. Pearson correlation was done to assess the significant association between 2 continuous variables

RESULTS

Out of the 52 JRA patients 46.2% had polyarticular subtype, 26.9% had systemic subtype and 26.9% had pauciarticular subtype. The CHAQ- CHQ was completed in 69.2% of the cases by the mothers, in 19.2% by the fathers and in 11.5% by the adolescent child himself.

The demographic and clinical characteristics among patients with the three types of JRA and controls are presented in Table 1. Patients with systemic onset JRA had significantly higher % of acute onset, mean level of (ESR), number of active joints, number of joints with limited range of motion, (RI), functional capacity (FC) and morning stiffness (MS) ($p<0.01$) than the other two types. Patients with the polyarticular JRA had significantly

Table 1: Demographic and clinical characteristics of the studied groups

Variables	Polyarticular n = 24	Systemic onset n = 14	Pauciarticular n = 14	Healthy controls n = 61	ANOVA test
Age[1]	12.0±30.2	9.0±3.9	10.7±2.8	10.2±2.9	0.048
Disease duration[1](months)	50.5±30.8	22.4±14.1	52.4±23.9		0.002
ESR[1]	27.5±14.9	75.9±27.7	23.0±19.0		0.000
Hemoglobin[1]	11.0±1.2	9.8±1.0	10.9±0.8		0.018
Number of joints with *LROM[1]	2.5±1.7	5.5±3.6	0.7±0.7		0.000
Number of active joints[1]	3.0±2.3	4.7±3.4	1.1±1.2		0.001
Richi articular index [1]	4.5±3.3	14.2±8.7	2.2±2.0		0.000
Functional capacity[1]	1.5±0.6	1.9±0.6	1.0±0.2		0.001
Morning stiffness[1]	24.6±18.8	43.2±16.1	7.5±11.8		0.000
Disease activity score[1]	4.2±1.3	7.2±2.4	2.6±1.1		0.08
Female[2]	18 (75.0%)	6 (42.9%)	7 (50.0)	40(65.6)	0.104
Stunting[2]	6(25.0%)	7 (50.0%)	4 (28.6%)		0.265
Deformity[2]	16 (66.7%)	9 (64.3%)	3(21.4%)		0.017
Antinuclear antibody[2]	6 (25.0%)	0 (0%)	0 (0%)		0.019
Rheumatoid factor[2]	6 (25.0%)	0 (0%)	0 (0%)		0.025
C reactive protein[2]	6 (42.9%)	4 (66.7%)	6 (60.0%)		0.542
**Disease onset[2]					
Acute Inciduous Gradual	12 (50.0)	13(92.9)	6(42.9)		0.046
	4 (16.7)	1 (7.1)	2 (14.3)		
	8 (33.3)	0 (0.0)	6 (42.9)		

[1]Mean±SD, [2] number and percentage within each group. LROM = Limited Range of Motion, **acute onset = 31(59.6%), Insidious onset = 7 (13.5%) and gradual onset = 14 (26.9%)

Table 2: Distribution of clinical and laboratory findings according to gender

	Males		Females		Total		
Variables	n	%	n	%	n	%	p-value of Mann-Whitney test
Stature							
Normal	8.0	38.1	27.0	87.1	35	67.3	0.000
Stunted	13.0	61.9	4.0	12.9	17	32.7	
Deformities							
Present	10.0	47.6	18.0	58.1	28	53.8	0.458
Absent	11.0	52.4	13.0	41.9	24	46.2	
Functional capacity (FC)							
I	11.0	52.4	19.0	61.3	30	57.7	0.040
II	6.0	28.6	12.0	38.7	18	34.6	
III	4.0	19.0	0.0	0.0	4	7.7	
Antinuclear antibody (ANA)							
+ve	0.0	0.0	6.0	20.0	6	11.5	0.029
-ve	22.0	100.0	24.0	80.0	46	88.5	
Rheumatoid factor (RF)							
+ve	0.0	0.0	6.0	21.4	6	12.0	0.024
-ve	22.0	100.0	22.0	78.6	44	88.0	
C reactive protein (CRP)							
+ve	4.0	28.6	12.0	75.0	16	53.3	0.011
-ve	10.0	71.4	42.0	5.0	14	46.7	
Richi index (RI) #	6.2±7.2		6.7±7				0.506
Morning stiffness (MS) #	19.2±22.1		28.9±19.4				0.030
Disease activity score (DAS) #	4.2±2.4		4.8±2.3				0.250

#Mean±SD

Table 3: The 8 CHAQ domains, the Disability Index (DI) and the 2 VAS scores for pain and parent assessment of the child's overall well-being

	Patient					
Variables	Polyarticular n = 24	Systemic oncet n = 14	Pauciarticular n = 14	Kruskal Wallis	Total JRA n = 52	Healthy* controls n = 61
Dressing	1.1±0.7	1.2±0.9	0.5±0.5	0.016	1.0±0.8	0.2±0.4
Arising	0.9±0.7	1.0±0.9	0.5±0.9	0.245	0.8±0.8	0.0±0.0
Eating	1.4±0.9	1.8±0.8	0.7±0.9	0.012	1.3±0.9	0.1±0.3
Walking	1.0±0.9	1.2±1.1	0.9±0.9	0.802	1.0±0.9	0.0±0.0
Hygiene	1.2±1.0	1.5±0.7	1.0±0.6	0.234	1.2±0.8	0.1±0.2
Reach	1.4±0.9	1.6±0.8	1.1±1.0	0.287	1.4±0.9	0.0±0.1
Grip	1.2±1.0	1.6±1.0	0.6±1.0	0.043	1.1±1.0	0.0±0.1
Activities	1.2± 1.1	1.3± 0.8	0.7± 0.8	0.256	1.1±0.9	0.1±0.5
DI	1.2±0.7	1.4±0.7	0.7±0.6	0.045	1.1±0.8	0.1±0.2
VAS pain	4.7± 2.7	6.4± 2.8	3.9± 3.3	0.061	5.0±3.0	0.1±0.4
VAS of well being	5.4± 1.9	6.4± 2.2	3.5± 3.3	0.005	5.1±2.6	0.0±0.3

Range of CHAQ domains (0-3), range of DI (0-3) ; range of VAS = Visual Analogue Scale scores (0-10), lower scores indicate better functional ability, *Significant difference between JRA cases (52) and controls for all variables, (p-value for t-test <0.01)

higher age, percentages of deformity, +ve (ANA) and (RF) than the other two types ($p<0.05$).

Table 2 presents the distribution of clinical and laboratory findings according to gender. Stunting and gradeIII functional capacity were significantly higher among males than females ($p<0.001$ and $p<0.05$, respectively).While morning stiffness and + ve laboratory findings (ANA, RFand CRP) were significantly higher among females than males ($p<0.05$).

Table 3 shows the relation between the mean score for the 8 CHAQ domains, the Disability Index, (DI) and the parent assessment of pain and overall well being. The CHAQ clearly discriminated between healthy subjects and JRA patients. It also discriminated between the three subtypes of JRA. The mean scores in each of the 8 domains in addition to the 2 VAS and the DI were higher in the systemic subtype compared to the other two subtypes although not statistically significant in all the domains.

A significant statistical relation was found between the activity of the disease and the degree of disability.

When the disease was active, the percentage of those having moderate to severe degree of disability (DI>1.5) was significantly higher than those having stable or inactive disease ($p<0.05$) (Table 4).

Table 5 shows the CHQ mean scores for the 15 health concepts and the two summary scores of quality of life: the physical score (PhS) and psychosocial score (PsS). The CHQ differentiated between healthy subjects and JRA patients. The physical and psychosocial well-being scores were significantly lower among patients with JRA when compared to their healthy peers ($p<0.005$). No clinical differentiation between the different JRA subtypes was found.

Table 6 presents the correlation between the Disability Index, Physical and Psychosocial scores and other clinical variables.

Table 7 shows the effect of disease activity on the Disability Index (DI) of the patient as well as on the physical (PhS) and psychosocial (PsS) scores. It was found that when the disease is active the DI increases, the PhS and PsS scores decrease significantly compared to the inactive disease ($p<0.05$).

Table 4: Relation between severity of the disease (DI), disease activity, pattern of disease and gender

	Total	DI>1.5		DI<1.5		
Variables	n	n	%	n	%	p-value
Activity						
Active	21	12	57.1	9	42.9	
Stable	24	10	41.7	14	58.3	0.030
Inactive	7	0		7	100.0	
Pattern						
Polyarticular	24	10	41.7	14	58.3	
Systemic	14	9	64.3	5	35.7	0.072
Pauciarticular	14	3	21.4	11	78.6	
Sex						
Males	21	11	52.4	10	47.6	0.226
Females	31	11	35.5	20	64.5	

DI: 1 (mild degree of disability), 2 (moderate degree of disability), 3 (severe degree of disability) (Oen *et al.*, 200317)

DISCUSSION

The impact of chronic arthritis on health and it's related quality of life was studied by means of two

Table 5: The 15 CHQ health concepts and the 2 summary scores

	Patients						
Variable	Polyarticular (n = 24)	Systemic onset (n = 14)	Pauciarticular (n = 14)	Kruskall Wallis	Total JRA (n = 52)	Healthy controls n = 61	*Man-Whitney
Global health (GGH)	27.0±16.3	49.6±20.0	44.6±32.7	0.057	29.8±24.2	69.2±19.0	0.000
Physical functioning (PF)	50.4±22.4	30.4±27.9	57.2±29.0	0.016	46.8±27.4	89.1±13.3	0.000
Role/social limitations-Emotional/behavioral (REB)	56.5±27.2	52.2±36.1	80.1±25.8	0.010	61.8±30.8	78.6±22.6	0.000
Role/social limitations-physical (RP)	60.3±22.5	48.9±38.2	71.1±25.7	0.171	60.4±28.5	83.9±21.3	0.000
Bodily pain/ discomfort (BP)	45.3±19.0	32.1±12.7	54.4±25.2	0.024	44.2±20.9	74.8±22.4	0.000
Behavior (BE)	69.3±17.8	75.0±20.5	64.2±18.5	0.193	69.5±18.8	75.8±13.2	0.032
Global behavior (GBE)	47.9±27.5	41.0±30.3	44.6±31.2	0.880	45.1±28.8	74.2±18.0	0.000
Mental health (MH)	65.8±16.2	59.7±18.4	72.6±18.6	0.136	65.9±17.7	76.2±14.9	0.000
Self esteem (SE)	51.4±19.7	43.5±14.7	57.3±20.3	0.070	50.8±19.0	79.5±13.3	0.000
General health perception (GH)	42.0±12.5	35.3±15.4	44.6±10.2	0.282	40.9±13.0	64.4±15.8	0.000
Change in health (CH)	67.7±31.6	44.6±42.9	71.4±29.1	0.159	62.5±35.5	62.7±19.9	0.067
Parent impact - Emotional (PE)	38.5±26.5	43.4±28.3	33.3±27.1	0.640	38.4±26.9	70.3±12.5	0.01
Parent impact - Time (PT)	67.0±32.3	50.0±27.7	59.5±41.4	0.210	60.4±34.0	71.8±30.8	0.052
Family activities (FA)	71.5±24.2	47.3±20.7	66.0±23.7	0.005	63.5±24.9	77.0±25.6	0.000
Family cohesion (FC)	67.7± 23.8	71.4± 25.6	58.9± 23.2	0.409	66.3±24.1	77.1± 18.7	0.025
Physical summary score (PhS)	48.8±12.4	34.8±20.4	55.1±21.5	0.011	46.8±18.8	78.0±14.2	0.000
Psychosocial summary score (PsS)	58.1±14.9	54.1±15.2	59.3±22.9	0.146	57.3±17.2	68.9±15.6	0.000
Total score	53.5±13.0	44.4±15.6	57.2±21.6	0.080	52.0±16.8	72.9±14.1	0.000

Higher scores indicate better physical or psychosocial well being (range 0-100), *Significant difference between JRA cases (52) and controls for all variables ($p<0.05$ of Man Whitney t-test) except for CH ($p = 0.067$) and PT ($p = 0.052$)

Table 6: Correlation between Disability Index (DI), physical, psychosocial and total HRQoL scores and other variables

Variables	DI (R)	PhS (R)	PsS (R)	Total score (R)
Age	-0.127	0.258	0.108	0.200
Sex	-0.216	0.192	0.213	0.217
Duration	-0.063	0.193	0.034	0.126
Pattern	-0.205	0.083	0.012	0.053
Number of active joints	0.385**	-0.253	-0.073	-0.179
Number of joints with LROM	0.483**	-0.264	0.003	-0.146
Richi index	0.421**	-0.324*	-0.069	-0.217
Functional capacity	0.328*	-0.215	0.081	-0.079
ESR	0.287*	-0.434**	-0.103	-0.296*
Morning stiffness	0.373**	-0.438**	-0.232	-0.364**
Disease activity score	0.377**	-0.415**	-0.164	-0.317*
Disability index		-0.725**	-0.587**	-0.707**
Physical summary score	-0.725**		0.736**	0.938**
Psychosocial summary score	-0.587**	0.736**		0.925**
Total HRQoL score	-0.707**	0.938**	0.925**	
VAS pain	0.666**	-0.749**	-0.732**	-0.795**
VAS general health	0.643**	-0.736**	-0.704**	-0.773**

R = Correlation coefficient, *p<0.05, ** p<0.01

Table 7: Effect of disease activity on DI, PhS and PsS

Variables	Active n = 22	Stable n = 22	Inactive n = 8	Kruskal Wallis
DI	1.3±0.7	1.2±0.6	0.0±0.0	0.000
PhS	34.9±17.6	48.6±15.1	79.1±7.6	0.002
PsS	48.5±23.0	57.3±17.2	74.1±6.4	0.000
Total score	41.7±18.1	53.0±15.7	76.6±4.7	0.000

self- reported tools: the parent's version of the Childhood Health Assessment Questionnaire (CHAQ) and the Childhood Health Questionnaire PF® 50 (CHQ). They reflect the patient's or his parent's values and perceptions towards his health status (Brasil *et al*., 2003).

There was a significant difference for all measures of disease activity between the different subtypes. Systemic onset JRA was significantly higher than the other two types as regards ESR, number of active joints, number of joints with limited range of motion, Richi index, functional capacity and morning stiffness and insignificantly higher as regards disease activity score. The polyarticular subtype was significantly higher than the other two types as regards age of onset, presence of deformity, +ve antinuclear antibody and rheumatoid factor. The data concerning disease activity in the present study were more or less similar to those reported by many other investigators (Machado *et al*., 2001; Pouchot *et al*., 2002; Brasil *et al*., 2003). However, the percentage of joints variables was higher among patients with systemic onset disease while in other studies it was higher among patients with polyarticular onset disease. This could be attributed to fact that the majority of the patients in the present study were in the stable form of the disease (46.2%), while in the other studies the majority were in the active phase of the disease (55-60%). Also the smaller number of patients in the present study could be a contributing factor.

Antinuclear antibody (ANA) tests are frequently used to screen children for chronic inflammatory diseases as JRA, it is estimated that ANA are present in approximately 30% of patients with rheumatoid arthritis (King, 2005). However the diagnostic utility of this test is limited because of the large number of healthy children who have low-titer positive tests. In the present study 11.5% of the cases showed +ve ANA and were exclusively of the polyarticular type, similar result (11%), was reported in another study (Brasil *et al*., 2003). Much higher values of 19.7 and 52.3% were reported by Machado *et al*. (2001) and Pouchot *et al*. (2002). A very low percentage of 1.4% was reported by Wakhlu *et al*. (2003). For such big diversity of +ve ANA among patients with JRA, McGhee *et al*. (2004) stated that ANA tests are of no diagnostic utility in either making or excluding the diagnosis of JRA .

Regarding the effect of gender on the outcome of the disease it was found that male sex was significantly associated with stunting and grade III functional capacity. On the other hand, female sex was significantly associated with +ve laboratory findings (ANA, RF and CRP) and higher morning stiffness. Similarly, Oen *et al*. (2003) found that male sex correlated with the worse disability in systemic onset JRA while Flato *et al*. (2003) reported that female sex was a predictor of physical disability.

In the current study it was found that the Child Health Assessment Questionnaire clearly discriminated between healthy subjects and the three subtypes of JRA patients in accordance to several previous studies (Machado *et al*. 2001; Pouchot *et al*. 2002). JRA patients have a higher degree of disability and pain and a lower overall well- being when compared to their healthy peers, ($p<0.01$). In addition, the CHAQ discriminated between the three JRA subtypes where the DI score was significantly higher in the systemic onset type (1.4±0.7) followed by the polyarticular (1.2±1.1) then the pauciarticular subtypes (0.7±0.6). Although the scores in each of the eight CHAQ domains and the two VAS were higher in systemic group compared to the other two subtypes yet in some domains the difference was not significant, this could be attributed to the smaller number of cases in the present study compared to the previous ones as well as to the shorter disease duration. A high percent of JRA patients (42.3%) had moderate to severe degree of disability (DI>1.5) compared to only 6% in the study of Oen *et al*. (2002). The high percentage of moderate to severe disability in this study can be attributed to the lack of compliance of patients leading to poor control of the disease. In the present study the values of VAS for pain and VAS of overall well being were much higher than those reported in previous studies (Machado *et al*., 2001; El-Miedany *et al*., 2003;

Brasil *et al*., 2003). The fact that the majority of the parents was illiterate and from a low socioeconomic standard may contribute to such higher scores as they may show some exaggeration in the evaluation of their children's conditions. However, Schanberg *et al*. (2003) reported severe type of pain in 31% of patient.

The present study confirms the findings of earlier studies that the Child Health Questionnaire differentiates clinically between healthy and JRA patients. Patients had significantly lower physical and psychosocial summary scores when compared to healthy controls (46.8±18.8 vs 78.0±14.2 and 57.3±17.2 vs 68.9±15.6, respectively). As a generic questionnaire it was less able to clinically differentiate the different JRA subtypes, (Landgraf *et al*., 1999; Selvaag *et al*., 2003; Aggarwal *et al*., 2004). These findings are in accordance with Muller-Godeffroy *et al*. (2005) who found that affected children and adolescents with JRA and reactive arthritis usually reported lower health related quality of life compared to normative data in several areas. The present study revealed that the PhsS and PsS decrease significantly in the active compared to the inactive disease.

In the present study, a +ve significant correlation was found between DI and, (Number of active joints, Number of joints with LROM, RI, FC, ESR, MS, DAS and VAS for pain and VAS of overall well-being) while a significant –ve correlation between DI and (PhS, PsS and Total scores). There was also a significant –ve correlation between PhS and (RI, ESR, MS, DAS, DI and VAS for pain and overall well-being) and between PsS and (DI, VAS for pain and overall well-being). Several studies have demonstrated significant correlations between the overall CHAQ score (DI), the CHQ scores (PhsS and PsS) and the variables reflecting disease severity indicating excellent convergent validity of the tool (Kvien, 2002; Pouchot *et al*., 2002; Madi *et al*., 2004).

CONCLUSIONS

The pediatric version of the Childhood Health Assessment Questionnaire proved to be an excellent tool for the assessment of chronic arthritis in pediatric patients. The validity of the CHAQ was confirmed by the strong correlation between the DI and the variables reflecting disease activity parameters. The CHAQ and the CHQ proved to be reliable and valid tools for the functional, physical and psychological assessment of children with JRA according to the parent's perception in routine consultations and have excellent psychometric properties and this was confirmed by the strong correlation between the DI and PhS and PsS. The CHAQ and the CHQ could be used as sensitive tools for assessing clinical improvement during active treatment in JRA patients.

Further studies are recommended on a larger number of patients and accordingly decision about how to help and prepare these children and their families to cope optimally with the disease and its sequence can be done.

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