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Evaluation of the Activity of the Juvenile Idiopathic Arthritis by JADAS Among Moroccan Children

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Abstract | **Original Research Article**

Background: The JADAS (Juvenile Arthritis Disease Activity Score) is a recent tool for evaluation of the activity of juvenile idiopathic arthritis (JIA). The aims of this study are to assess the activity of juvenile idiopathic arthritis among Moroccan children by JADAS, and to identify the variables which are related to the disease and that influence the JADAS. ***Materials and Methods:*** Cross-sectional study including 47 patients with JIA defined by the ILAR 2001 classification. Sociodemographic, clinical and para-clinical parameters related to patient and disease were collected. Assessment activity of JIA was made by a validated score, JADAS 10. This score includes four steps: physician global VAS, VAS welfare parent / patient, number of active joints and erythrocyte sedimentation rate was standardized to a score ranging from 0 to 10, by the formula (VS-20) / 10. JADAS-10 is calculated as the simple linear sum of its four components, which gives a total score of 0-40, with higher scores corresponding to a severe disease activity. A Childhood Health Assessment Questionnaire (CHAQ) in the Moroccan version was completed by the parents. Biological parameters were measured by ESR (Westergren method) and CRP (C-reactive protein level) (nephelometry). Patients received treatment (therapy) such as Corticosteroid, non-steroidal anti-inflammatory (AINS), biotherapy and Methotrexate (MTX). The state of minimal disease activity in JIA(MDA) has been described as the presence of a physician's global rating of disease activity ≤3.4, a parent's global rating of well-being ≤2.5, and a swollen joint count ≤1 in polyarthritis, and as the presence of a physician's global assessment of disease activity ≤2.5 and a swollen joint count = 0 in oligoarthritis. A descriptive and analytical statistical analysis was performed. ***Results:*** 47 patients were included with a predominance of male n = 28 (59.6%), the mean age was 11.5 years ± 3.3. Fourty patients (85.1%) were schooled. The duration of evolution of JIA had a median of 4 years [2-6], with a predominance of persistent oligoarthritis n = 12 (26.7%), the median of VAS overall patient was 20 [10-40] with a VAS well-being of the mother who averaged was 62.0 ± 26.8. The median of CHAQ was 0 [0-1] and the average of DAS28 was 3.1 ± 1.5 with an average of 11.6 ± 5.3 for the JADAS10.It was not found significant association between JADAS10 and articular index and the index of joints with limited or patient global VAS, the CHAQ, CRP and therapy (p> 0.05 for all). ***Conclusion:*** This study suggests that the activity of juvenile idiopathic arthritis in our patient is moderate. The JADAS is a valid index and easy to calculate and evaluate the activity of JIA.

Keywords: Juvenile idiopathic arthritis; JADAS; DAS28.

I- BACKGROUND

Juvenile idiopathic arthritis (JIA) is a heterogeneous group of disorders characterized by prolonged synovial inflammation. It may cause destructive damage to joint structures which can lead to serious impairment of physical function and have a marked impact on the quality of life of children and their families [1-3]. Therefore, the prevention of joint damage and associated long term disability requires prompt recognition and control of inflammatory disease [4].

Indeed, the management of JIA knew these last years a big progress, with the advent of new treatments, aggressive interventions and the development of new therapeutic agents including methotrexate, biological medications, and combination treatment strategies, this

in order to achieve disease remission or, at least, minimal levels of disease activity [5-8].

The British Society for Paediatric and Adolescent Rheumatology (BSPAR) has promulgated the Standards of Care for children and young people with JIA [9] and the American College of Rheumatology (ACR) has issued a set of recommendations for the treatment of JIA [10]. The incorporation of the treat-to-target strategy in clinical practice requires the availability of validated and clinically useful criteria that describe accurately the clinical states of remission or near remission [11]. The measurement of disease activity is based on composite disease activity scores, such as the Disease Activity Score (DAS), and the Clinical Disease Activity Index (CDAI) [12- 13] in adult RA. These tools are aimed to quantify the absolute level of disease activity by providing one summary number on a continuous scale. Recently, the first composite disease activity score for JIA, termed Juvenile Arthritis Disease Activity Score (JADAS) was developed and validate by Consolaro and al in 2009. JADAS consists of four items; the joint count, the physician and the patient's/parent's global assessment and the erythrocyte sedimentation rate (ESR) as an inflammatory marker [14]. The aim of our study was to assess the activity of juvenile idiopathic arthritis among Moroccan children by JADAS and to identify the variables which are related to the disease and that influence the JADAS.

II- PATIENTS AND METHODS

A- Study population

A cross-sectional study was conducted in patients with JIA defined by the ILAR 2001 classification, recruited in hospital or consultation in the El Ayachi University hospital in Morocco. Informed consent was obtained from all parents.

B- METHODS

Data collection and measurements

Sociodemographic, clinical and para-clinical Parameters related to patient and disease were collected.

The following clinical measures of JIA activity were recorded: physician's global assessment of disease activity, measured on a 10-cm visual analog scale (VAS) where 0 = no activity and 10 = maximum activity); parent's global assessment of the child's well-being, measured on a 10 cm VAS (where 0= very good and 10= very poor); parent's rating of the intensity of the child's pain, measured on a 10 cm VAS (where 0 = no pain and 10= maximum pain); swollen joint count, pain/tenderness, and active joint; functional ability assessment through the Moroccan version of the Childhood Health Assessment Questionnaire (C-HAQ)(with 0= best and 3= worst), duration of morning stiffness; ESR (Westergren method) and C-reactive protein level (nephelometry).

Assessment of disease activity by JADAS

The JADAS is a composite disease activity score for JIA, which was devised by a panel of 9 pediatric rheumatologists with 2 to 20 years of clinical experience in the field, who reached consensus on the individual measures to be included in the score [14].

The final version of the JADAS that was agreed upon by the study panel included the following measures: physician global assessment of disease activity, measured on a 10 cm visual analog scale (VAS) where 0= no activity and 10= maximum activity; parent/patient global assessment of well-being, measured on a 10 cm VAS where 0= very well and 10= very poor; count of joints with active disease; and erythrocyte sedimentation rate (ESR) was standardized to a score ranging from 0 to 10, by the formula (ERS-20) / 10.

Three versions of JADAS: The JADAS-27 includes the following joints: cervical spine, elbows, wrists, meta-carpophalangeal joints (from first to third), proximal interphalangeal joints, hips, knees, and ankles. Two additional versions of the JADAS, one including the entire 71 joints (JADAS-71) and one including a 10-joint reduced count (JADAS-10; based on the count of any involved joint, irrespective of its type, up to a maximum of 10 joints), were tested in the validation analyses.

JADAS-10 (reduced counts) is calculated as the simple linear sum of its four components, which gives a total score of 0-40, with higher scores corresponding to a severe disease activity.

Minimal disease activity assessment

The state of minimal disease activity in JIA has been described as the presence of a physician's global rating of disease activity ≤3.4, a parent's global rating of well-being ≤2.5, and a swollen joint count ≤1 in polyarthritis, and as the presence of a physician's global assessment of disease activity ≤2.5 and a swollen joint count = 0 in oligoarthritis [11].

C- Statistical analysis:

Statistical analysis was performed using the SPSS Statistical package 18.0 for Windows (SPSS 18). Descriptive data are expressed as mean ± SD, median or as percentage. The Spearman or pearson correlation were used to determine the strength of the association between the variables. The chi-square Test to compare the Percentages of patients meeting MDA criteria in each group.

A p value < 0.05 was considered to indicate statistical significance.

III-RESULTS

Patient's characteristics

47 patients were included with a predominance of male n = 28 (59, 6%), the mean age was 11.6 years ±

3.3[4 -17ans] and 40 patients (85.1%) were schooled. The duration of evolution of JIA had a median of 4 years [2-6]. 10 patients had a systemic arthritis, 12(26.7%) had persistent oligoarthritis, 2 extented oligoarthritis, 8 polyarthritis and 13 had other types of arthritis (twelve enthesitis and two undetermined arthritis). The median of VAS overall patient was 20 [10-40] with a VAS well-being of the mother whose average was 62.0 ± 26.8. The average of DAS28 was 3.1 ± 1.5. The JADAS10 had a mean of 11.6 ± 5.4, [2, 5- 29, 9].

21 (47, 1%) had MDA with a prédominance in oligoarthritis form (63, 2%). The JADAS 10 means in patients with MDA was 10, 7 ±2, 1.

Sociodemographic characteristics of the study population are described in Table 1.

Table 1: Characteristics of the study population

Characteristic Population(n=47)	
Age(years)	11,6±3,35
Sexe	
F 19 (40, 4%)	
M 28 (59, 6%)	
Disease duration(years) 4[2-6]	
Global VAS 20[10-40]	
CHAQ 0[0-1]	
DAS28 3,15±1,56	
Type of JIA	
Systemic arthritis 10(22, 2%)	
Seropositive polyarthritis 2(4, 4%)	
Seronegative polyarthritis 6(13, 3%)	
Persistent oligoarthritis 12(26, 7%)	
Extented oligoarthritis 2(4, 4%)	
Enthesitis 11(24, 4%)	
Psoriatic arthritis 0	
Undetermined 2(4, 4%)	

1: mean ± SD, 2: number and percentage, 3: median ± quartile, CHAQ: Childhood Health Assessment Questionnaire, DAS: Disease activity score.

Correlations between JADAS 10 and diseases parameters

JADAS 10 was significantly associated with Clinical parameters of disease activity not included in the JADAS score, JADAS correlation with C-HAQ and the parent pain assessment were in the high range p< 0,01, where as correlation with Tender joint count, CRP level and restricted joint count were significative p< 0,05. [Table 2]

Table 2: Correlation between JADAS 10 and the JIA outcome measures not included in the JADAS 10

	JADAS10
Clinic and biologic data r	p
Parent pain assessment 0,43	0,008
C-HAQ score 0,49 0,002	
Tender joint count 0,41 0,011	
Restricted joint count 0,37	0,023
CRP level 0,50	0,010
DAS28 0,43 0,004	
RN 0,37	0,002

CHAQ: Childhood Health Assessment Questionnaire; DAS: Disease activity score; CRP: C-reactive protein level

There was no statistically significant difference in the JADAS 10 between 147 the groups of patients who received or not corticosteroids (p = 0.46), Conventionel synthetic Dmards (cs Dmards): (p = 0.73) and non-steroidal anti-inflammatory (p=0, 15).

Table 3: Correlation between Jad as 10 and clinical and biological parameters of JIA

JADAS10	r	p
RN	0,37	0,02
RM	0,25	0,12

Disease duration /years	0,12	0,46
FR Latex	0,15	0,66
FR waler rose	0,10	0,79
ACPA	0,51	0,93

RN: number of awakenings per night, RM: Duration of morning stiffness per minutes; ACPA: Rates of anti-peptide antibodies citrulinés; Rhumatoid Factors.

Table 4: Comparison of average Jadas10 among patients under treatment

	JADAS 10
	p
Corticosteroid	0,46
AINS	0,15
biotherapy	0,66
MTX	0,73

MTX: Methotrexate; AINS: non-steroidal anti-inflammatory.

Table 5: Prevalence of minimal or high disease activity in patient with JIA

MDA	Oligoarthritis	Polyarthritis
	12 (63,2%)	4 (26,7%)
HDA	7 (36,8%)	11(7,3%)

MDA: Minimal disease activity; HDA: High disease activity

Table 6: Comparison of JADAS 10 between oligoarthritis and polyarthritis and between MDA and HDA

	Oligoarthritis	Polyarthritis	P	MDA	HDA	P
JADAS 10	10,2 ±4	15,1 ±6,3	0,02	10,7 ±2,1	13,2 ±6,5	0,16

Means ± standard deviation

IV- DISCUSSION

Our study shows that the JADAS was easy to calculate, a valid index to evaluate the activity of JIA and was excellent for all categories. The score of the JADAS results from the arithmetic sum of the scores of each individual component, which makes its calculation simple and quick. This score combines information from 2 physician-centered measures (physician global assessment and active joint count), 1 parent/patient-centered measure (parent/patient global assessment), and 1 acute-phase reactant (ESR) into a continuous measure of inflammation. These processes ensure the face and content validity of the instrument [14]. Mcerlane and al study [4] who included 956 patients AJI with a predominance of Persistent oligoarthritis 484 (51%) demonstrated excellent correlation between JADAS across all ILAR categories while in our study where the persistent oligoarthritis was predominant 12(26, 7%) no significantly association was found between JADAS 10 and the different forms of JIA. This difference can be explained probably by the use of a very large sample size in their study.

Our study shows a significant association with JADAS10 and disease parameters not included in her calculation, such as the tender joint counts, parent pain assessment, restricted joint count and the number of awakeness, (Table 2).

Biologically CRP level was significantly correlated with JADAS 10 (Table 2). This makes sense, since when the disease is active, clinical and biological inflammatory indices are large and this could be explained by the fact that the night awakening is also a marker of inflammation and more important it is more active disease and thus the JADAS 10 score is High. Indeed, our results are consistent with those of Consolaro *et al.,* [14], which found strong correlation between JADAS 10 and JIA activity measures not included in the score.

No significant correlation was found between JADAS 10 and duration of morning stiffness. Consolaro and al study included 490 patients in MTX trial with a DAS28 median = 1.23[1, 12- 1, 34] and a median age of 7.8 [4, 2-11, 3], reported the high correlation between JADAS and DAS28. However, there was no significant association between JADAS 10 and DAS28 in our study, with DAS28 mean = 3.1± 1.5. This could be explained by the fact that our patients had mostly moderate disease activity.

In our study JADAS 10 was very significantly correlated with the 178 C-HAQ but no significant correlation was found between JADAS 10 and age of patient, duration of disease progression; Consolaro and al [14] found moderate association with the C-HAQ.

It was found no significal correlation between JADAS10 and immunological parameters such as rate of ACPA (anti-citrullinated peptide antibodies), and rheumatoid factors (Table 3).

In our study, we use the reduced joint counts version because our patients did not have a high articular index. Indeed, the JADAS versions including the reduced joint counts (either 27 or 10) revealed better or, at least, had a similar validity as compared with the version including the 71 (i.e. complete) joint counts, then use of JADAS versions with reduced joint counts is advised due to their greater feasibility [15].

Our study, however, have some limitations such as a sample size, indeed, a larger sample would be more reproducibly. It also has advantages because it is the first study in Morocco which evaluated the activity of JIA with the JADAS and it is a simple tool and easy to calculate in the daily consultation and hospitalization.

In our study we found moderate disease activity in our patients' whichever methods of assessment used the DAS28 or JADAS10, which could have an impact on our results but this can be explained by the fact that our patients have regular medical care and are well taken care of.

Furthermore, the RA composite scores such as DAS28 are not equally as reliable as JADAS in capturing the level of disease activity in children with JIA [14].

V- CONCLUSION

In our study the evaluation of disease activity by JADAS was easy, with a significant correlation with clinical and biological parameters of the disease; this could improve the management of JIA and to pursue the treat to target control; however, a larger sample would be more significant, as it would have allowed the application the cutoff of JADAS (JIA states criteria based on JADAS score that represent suitable therapeutic targets, such as inactive disease, minimal disease activity, or parent-or child-acceptable symptom sates) to organize the activity of the disease categories, allowing an adequate therapeutic decision.

Competing interests: The authors declare that they have no competing interests.

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