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A STUDY OF FUNCTIONAL AND RADIOLOGICAL OUTCOME IN JIA: IN A TERTIARY CARE TEACHING MEDICAL COLLEGE HOSPITAL.

Rheumatology

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ABSTRACT

Introduction: Juvenile idiopathic arthritis (JIA) is a chronic debilitating disease1.The outcome of the disease has much changed since the introduction of newer therapies.

Aim: To find out the clinical profile, functional outcome and the radiological score in a cohort of JIA patients.

Materials and Methods: This study included 30 children with JIA attending Institute of Rheumatology (IOR), Madras Medical College, who fulfilled the classification criteria for JIA as per ILAR and with significant wrist involvement.2The study period was January 2012 to December 2013. History, clinical examination, musculoskeletal examination, laboratory investigations, outcome indices (including CHAQ) and radiological indices (Poznanski's score) were done for all patients. The study was done after Institutional Ethical committee approval and informed consent from patients and parents.

Results: The mean age of the patients in Oligoarticular was 5.17±2.34, in polyarticular 8.01±3.04 and in systemic JIA was 6.3±2.301. In this cohort, 14 had Oligoarticular type, 10 had polyarticular type and 6 had systemic JIA type. Boys were 14 in number and 16 were girls. The worse Pozanski score was seen in 14.28% of Oligoarticular type, 30% in polyarticular type and 33.33% in systemic JIA type. CHAQ improved during the study period in majority of domains of Oligoarticular type (p value of 0.6) and in polyarticular type(p value was 0.03). In systemic JIA type, the p value for CHAQ was 0.133. There was also improvement in the acute phase reactants and functional outcome.

Conclusion: The outcome of JIA is dependent on early diagnosis, appropriate therapy and duration of therapy. Oligoarticular type has the best overall prognosis and good functional outcome. Children with systemic JIA have the most severe disease and had poor functional outcome. Nearly 33.3% of systemic JIA had worse Pozanski score. This study shows that CHAQ reflects the severity of disease and the prognosis of JIA depends on the type of JIA functional outcome of the patients correlates with acute phase reactants in polyarticular and systemic onset J I A Radiological score can be an useful tool for assessing the prognosis of the patients but larger cohort and longer duration would add more to our knowledge in this aspect.

KEYWORDS

CHAQ: childhood health assessment questionnaire. JIA: juvenile idiopathic arthritis. ILAR: international league against rheumatism.

INTRODUCTION

JIA is a heterogeneous group of chronic disorders brought under one umbrella by the common denominator of age and joint involvements. The morbidity is quite significant.1 These patients suffer not only physically but their social life, education and general participation is also affected.[3] 4

There are wide array of treatment options available now including newer modalities of treatment like biologicals.5 The aim of treating JIA patients is amelioration of symptoms and to reduce inflammation, thereby to prevent irreversible damage and also to improve health related quality of life.

Compared to objective parameters JADAS,JADI-A,-E , not many studies are available on the patient or parent reported outcomes , functional outcome of JIA patients from developing nations including India. Hence this study was taken up to assess the clinical profile, functional outcome6 and radiological damage in our cohort of JIA patients.

METHODS AND MATERIALS

1. STUDY DESIGN: This is a descriptive study in the Institute of Rheumatology in Madras Medical College. The study was done over a period of 1 year from January 2012 to January 2013. The study was approved by Madras Medical College Institutional Ethical Committee.
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Inclusion criteria: Patients with age less than 16 and fulfilling the ILAR classification criteria ILAR Criteria[2]

4 Exclusion criteria: severe illness and duration of illness more than 5 years, undifferentiated arthritis and who were diagnosed as connective tissue diseases.

3. METHODS:

A total of 31 children were recruited. The female were 16 and males 14. Out of this cohort, 1 child was lost for follow up.

Based on the type of JIA, treatment was started after thorough clinical examination and laboratory investigations including complete blood count, liver function tests, renal function tests and immunological tests. Disease activity measures were calculated and x-rays were taken. CHAQ7 was calculated. Radiological scoring was done using Poznanski's score[8].

After initial evaluation, patients were reviewed regularly. At the end of 1 year, the patients were examined for the outcomes.

The CHAQ is parent or self administered. It measures functional difficulty over past 1 week. The limitation due to the disease alone is documented. It is composed 30 items of 8 categories. These include dressing & grooming, arising, eating, walking, hygiene, reach, grip and activities. For each category, the care givers are asked to record the amount of difficulty their child might have. Child's function will fluctuate, from day to day and week to week. The aim is to measure what is the child's usual best ability and difficulty. Each category will score from 0 to 3 based on the difficulty. Without ANY difficulty: 0, With SOME difficulty: 1, With MUCH difficulty: 2 and UNABLE to do: [3]

The score is calculated by adding scores for each category and dividing by the number of categories answered.[6]

Radiological evaluation was done with wrist x-ray AP view and scores documented. Poznanski's score depends on measurement of radio metacarpal (RM) length, which is the distance from the base of the third metacarpal bone to the midpoint of the distal growth plate of the radius, and of the maximal length of the second metacarpal bone (M2)[9]. a nomogram is available from which test values can be interpreted.The RM/M2 score which represents the carpal length and constitutes Poznanski's score reflects the amount of radiological damage to the wrist. Based on the available Z score, the degree of damage can be calculated which will give the effect of affection at the wrist.

Poznanski score used[10]. is dependent on the distal radius growth plate. It measures the carpal damage. Since wrist is affected in many types of JIA and studies have shown it to correlate with functional and physical disability.

4. STATISTICAL ANALYSIS: analysis was done with SPSS software version 17.0.

5. RESULTS:

Arthritis (swelling or effusion or the presence of two or more of the following signs: limitation of range of motion, tenderness or pain on motion) in more than 1 joint.

Duration: ≥ 6 weeks. ,Onset type is defined by articular involvement in the first 6 months after onset., Oligoarticular: <5 inflammed jointsand Polyarticular: ≥ 5 inflamed joints.

And systemic JIA, psoriatic arthritis and ERA: as per the classification criteria.in this study,

The mean age of the patients was 5.17±2.34 in Oligoarticular type, 8.01±3.04 in polyarticular type and 6.3±2.301 in Systemic JIA type. There were 14 patients in Oligoarticular type (46.7%), 10 in the polyarticular type (33.3%) and 6 in the systemic type (20%). Males were 14 (46.7 %) and female patients were 16 (53.3%).

TABLE 1 Demography

	Oligoarticular =14	Polyarticular=10	Systemic JIA=6
Age of the children (mean)	5.17±2.34	8.01±3.04	6.3±2.301
Disease duration(months) (mean)	8.57	9.8	12.33
Anaemia(<11g/dL) (mean)	5(35.71 %)	6(60%)	6(100%)
Thrombocytosis	1	5(50%)	6(100%)
Antinuclear antibody	2(14.28%)	4(40%)	0
RF positivity	0	4	0
Uveitis	2	0	0

The The mean duration of disease in Oligoarticular, polyarticular, systemic JIA types were 10.57, 13.81and 2.33 respectively.Anaemia was present in 35.71% of Oligoarticular, in 60% of polyarticular and in 100% of systemic JIA types. Anti-nuclear antibody positivity was present in 2 children in Oligoarticular type, in 4 children in polyarticular and in none in systemic JIA type. Thrombocytosis was present in all children with systemic JIA but only in 5 children in polyarticular and 1 child in Oligoarticular type.

RF positivity was present in 4 patients in polyarticular type and none in Oligoarticular type or systemic JIA type. Two children with Oligoarticular type had Uveitis but none in the other types.

Table 2 :: Disease characteristics

	Oligoarticular	Polyarticular	Systemic JIA
Fever	0	2	6
Rashes	0	1	3
Joint tenderness	14	10	6
Joint swelling	10	7	4
Hepato-splenomegaly	2	3	5
Lymphadenopathy	0	2	4

All the systemic JIA patients presented with fever and majority had Hepato-splenomegaly. Only 2 children in the polyarticular type had fever while none in the Oligoarticular type had.

Table 3: Joint affection

	Oligoarticular = 14	Polyarticular =10	Systemic JIA =6
Cervical	0	4	1
Shoulder	0	1	0
Elbow	1	1	0
Wrist	5	10	6
MCP	2	8	6
PIP	1	5	2
DIP	1	0	2
Hip	0	4	3
Knee	11	9	2
Ankle	8	7	4

In the Oligoarticular type the commonest joints involved were knee and ankle. In the systemic JIA, the commonest joints were wrist and metacarpophalangeal joints. In the polyarticular type, knee and wrist were the commonest involved. Wrist involvement was present in all types which was used for pozanskis score assessment .

Table 4: Treatment categories

	NSAIDSs	Intra-articular steroids	Dmards (MTX)	Systemic steroids	Biologicals
Oligoarticular	14	6	10	0	0
Polyarticular	10	3	10	0	4 (Etanercept)
Systemic JIA	6	1	6	3	2 (Tocilizumab)

In the Oligoarticular group, all patients received NSAIDs, 4 patients had intra-articular steroids (IAS) and 10 patients received methotrexate in addition to NSAIDs. In the polyarticular group, 10 patients received NSAIDs, and methotrexate. Four of these children were on injection Etanercept subcutaneous given in dose of 0.8mg/kg every week. In addition, 4 of them also received IAS. Of the 6 systemic JIA patients, 6 received antipyretics, NSAIDs, methotrexate,3 received systemic steroids and 2 were on injection Tocilizumab in the dose of 8mg/kg every 2weeks.

6. OUTCOME MEASURES:

6.1. ACUTE PHASE REACTANTS

MEAN±SD	ESR I (INITIAL)	ESR II (END OF STUDY)	CRP I	CRP II
Oligoarticular(=14)	20.93±9.16	11..43±3.52	1.71±3.66	0.43±1.603
Polyarticular(=10)	33.4.±5.89	13.8±4.75	32.4±28.17	1.8±2.89
Systemic JIA(= 6)	65.33±25.033	19±6.033	39±33.02	4±4.89

The mean ESR and CRP in the Oligoarticular group was20.93±9.16 and1.71±3.66 respectively. The ESR was 11.43±3.52 and CRP 0.43±1.603 was at the end of the study. The mean ESR and CRP in the systemic JIA group was65.33±25.033 and39±33.02 initially and 19±6.033 and 4±4.89 at end of study. The mean ESR and CRP in the polyarticular type were 33.4±5.89 and 32.4±28.17 initially and 11.43±3.52 and0.43±1.603 at the end of study.

6.2

MEAN CHAQ	INITIAL EVALUATION	END OF STUDY
OLIGOARTICULAR	0.34±0.16	0.24 ±0.11
POLYARTICULAR	0.75±0.22	0.32±0.09
SYSTEMIC JIA	0.9±0.22	0.47±0.25

Oligoarticular type The mean CHAQ was 0.34±0.16; while mean the disability index was 0.4±0.6 initially. At the end of the study, the mean CHAQ was 0.24 ±0.11 while the disability index was 0.3±0.7.

Polyarticular type , The mean CHAQ at the onset was 0.75±0.22. At the end of the study the mean CHAQ was 0.32±0.09

Systemic JIA type The mean CHAQ in the systemic JIA was 0.9±0.22. The mean CHAQ at the end of study was 0.47±0.25

Using Spearman's correlation coefficient, the R value for Oligoarticular type was 0.77837 and the p value was 0.00104. The R value for systemic JIA was 0.867 and the p value was 0.02512. The R value in polyarticular type is 0.28848 and the p value was 0.41889. There was significant change (p value < .05) in the systemic and Oligoarticular types while the p value in the polyarticular type was not significant

6.3 Poznanski's score:

	More than -2 SD (BETTER OUTCOME)	Less than -2SD (WORSE OUTCOME)
Oligoarticular	4 (80%)	1 (20%)
Polyarticular	7(70%)	3(30%)
Systemic JIA	4(66.66%)	2(33.33%)
TOTAL =30	15 (50%)	6 (20%)

DISCUSSION:

Not many studies are available from developing countries like India. Even in western literature there is lack of uniformity in measuring the patient reported outcome in JIA.

Therefore our study aimed to fill this gap in knowledge. In our cohort, Oligoarticular type constitutes 46.6 % and is the most frequent type. This is similar to what was reported in western literature and worldwide. (11, 12) by Ravelli A, et al, However in a study by Reem Abdwani et al, polyarticular type was the most common. 12 In our study, polyarticular type constituted 33.33%, which is comparable to other studies11 Systemic JIA constituted 20% in our study, which was the least common type.[13]

In several studies the prevalence of systemic JIA has been reported as 5% to 15% P.J. (Manners et al, A. V. Ramanan and A. A. Grom,..Systemic JIA constituted 8.93% and 55.36% had polyarticular type in a study by Viswanatha Kumar et al,from a tertiary care hospital in South India[13]

The mean duration of the disease was highest for the systemic JIA type. Systemic features like fever (100%), rashes (50%), lymphadenopathy and hepato-splenomegaly (83%) were common in systemic JIA type. Fever was present in 20% of polyarticular type and rashes in 10% of polyarticular type. The joints most affected in Oligoarticular type was knee and ankle. In the systemic JIA type , the common joints affected are the MCP, wrist and ankle. The patients with hip involvement portend poorer prognosis and the response to conventional DMARDs was poor.

Anaemia was much more common in Systemic JIA (100%) than polyarticular type (60%). These children also had thrombocytosis which reflects the systemic inflammatory nature of the disease described by M. Rooney et al. Anaemia is not common in Oligoarticular type. This is due to the disease per se in systemic onset and that anaemia is very common in this age group due to nutritional causes. Overall the anaemia was present in 56.66% showing the wide prevalence of anaemia .

Uveitis was present in Oligoarticular type only which was similar to literature and a study from India.cc A.T. Vitale,et al associated uveitis: complicatedwith for severe course and visual outcome, Rheumatoid factor(RF) positivity was present in 4 children (40%) in polyarticular type. There is wide variability in RF positivity across ethnic groups as reported in literature. Generally the positivity is 15-20%.(P.J. Mannerset al described the variability

The overall ANA positivity was 20% combining all patients. In the study done by Viswanatha kumar H M, et al, the ANA positivity was 5.3% combining all types of JIA. In our cohort, 14.2% of the Oligoarticular type and 40% in polyarticular type had ANA positivity. In a study by Clara Malagon et al, ANA positive was around 17.5% which correlated with our finding.

In the Oligoarticular group, all patients responded to conventional disease modifying drugs and none were started on biologicals. In the polyarticular group 4 patients were on injection Etanercept (dose 0.8mg/kg every week) because they did not respond to conventional disease modifying drugs. aa. In the systemic JIA group, 2 patients were on injection Tocilizumab (dose of 12mg/kg/dose – in weight less than 30lb and 8mg/kg/dose in weight more than 30lb) given every month. Three children in the systemic JIA group were on systemic steroids in addition to conventional disease modifying drugs.

There was statistically significant reduction of ESR in the Oligoarticular type (p value 0.02552). In the polyarticular type and the systemic JIA type the ESR was not significantly reduced (p value 0.504 and 0.354 respectively). This is similar to several studies including the study by Viswanatha et al. Patients in the systemic JIA group had the maximum mean ESR and CRP.ss. The mean ESR and CRP in all the subtypes showed improvement with treatment

CHAQ

There was significant change in CHAQ in the Oligoarticular and systemic JIA.

In a systemic review by Heather A. van Mater CHAQ was the most extensively used outcome measure in JIA. There was good reproducibility high correlation between inter administrations. .

Using Spearman's correlation coefficient, the R value for Oligoarticular type was 0.77837 and the p value was 0.00104. The R value for systemic JIA was 0.867 and the p value was 0.02512. The R value in polyarticular type is 0.28848 and the p value was 0.41889. There was significant change (p value < .05) in the systemic and Oligoarticular types while the p value in the polyarticular type was not significant.similar results were observed in Arthritis Res Ther. 2018 May 3;20(1):91. Predicting unfavorable long-term outcome in juvenile idiopathic arthritis: results from the Nordic cohort sRheum Dis Clin North AmRheum Dis Clin North Am. 2016 May; 42(2): 333–346.Aimee Hersh

This is similar to several studies where the CHAQ scores reflected less damage in the Oligoarticular type.(SPIEGEL LR, S C H N E I D E R R , LANG BA , e t al.: Early predictors of poor functional outcome in systemic-onset juvenile rheumatoid arthritis. (A multicenter cohort study. Arthritis Rheum 2000; 43: 2402-9.) (VAN DER N E T J, K U I S W, P R A K K E N A B, e t a l .: C o rre l ates of disablement in systemic onset juvenile chronic arthritis. A cross sectional study (Ravelli et al) wherein the damage in the systemic and polyarticular types was more severe and correlates with our study.

Poznanski score discussion : In the Oligoarticular type, poor Pozanski score was found in 1 (20%) and 4 (80%) had good score reflecting less carpal damage. In a study by Ravelli et al the damage in the systemic and polyarticular types was more severe and correlates with our study. (32). In the polyarticular type, 7(70%) of patients had good Poznanski score and 3(30 %) had worse Pozanski score. In the systemic JIA group, 2(33.33%) children of patients had worse Poznanski score and 4 (66.66%) had worse Poznanski score. (6, 7, 9, 32, 36).This was similar to the finding in the study by S.Magni-Manzoni et al and in a study by S. Viola et al. (3,38)

Conclusion The outcome of JIA is dependent on early diagnosis, appropriate therapy and duration of therapy. Oligoarticular type has the best overall prognosis and good functional outcome. Children with systemic JIA have the most severe disease and had poor functional outcome. Nearly 33.3% of systemic JIA had worse Pozanski score. This study shows that CHAQ reflects the severity of disease and the prognosis of JIA depends on the type of JIA functional outcome of the patients correlates with acute phase reactants in polyarticular and systemic onset J I A Radiological score can be an useful tool for assessing the prognosis of the patients but larger cohort and longer duration would add more to our knowledge in this aspect.

The limitations of our study was the short duration of study period, and Enthesitis related arthritis and Psoriatic Arthritis not being represented in this study..

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