

Interobserver reliability of articular examination in juvenile idiopathic arthritis

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SUMMARY: Şenocak Ö, Ünsal E, Akalın E, Ergör G. Interobserver reliability of articular examination in juvenile idiopathic arthritis. Turk J Pediatr 2003; 45: 29-32.

Diagnosis, treatment and follow-up of children with juvenile idiopathic arthritis are based upon the articular examination. The objective of the current study was to assess the interobserver agreement in grading the joint with arthritis and limited range of motion, and to detect the sources of disagreement. Twenty children with juvenile idiopathic arthritis were included. Assessment parameters were a) Physician Global Assessment, b) number of joints with active arthritis, and c) number of joints with limited range of motion. A total number of 1,320 joints were examined by both observers, blinded to each other. Each observer marked the involved joints as active arthritis, as limited range of motion, or as both. Interobserver agreement was determined by using Kappa statistics and Wilcoxon signed rank test. The statistical analysis was performed by SPSS 10.0. There was no statistical difference in the comparison of Physician Global Assessment of the two observers. There was substantial agreement in both arthritis and limited range of motion scores. Chance corrected agreement for the interobserver reliability was also performed for frequently involved joint such as neck, wrist, hip and knee. A substantial agreement was found. The close agreement between the observers could be attributed to standardization of examination techniques and to using objective variables.

Key words: juvenile idiopathic arthritis, articular examination, interobserver agreement.

Juvenile idiopathic arthritis (JIA) is the most commonly diagnosed rheumatic disease in children and is often an important cause of disability¹. The aims of treatment are to relieve pain, reduce general and local inflammation, prevent disability, maintain locomotor function and sustain satisfactory growth and development. A multidisciplinary approach is important to achieve the goals of therapy². The pediatric rheumatologist and the physiatrist, being members of the multidisciplinary team, need to be in close cooperation with each other in the assessment of joint involvement.

Giannini et al.³ recommend a core set of outcome variables for JIA patients to standardize the follow-up of patients. These are Physician Global Assessment of disease activity, parent/patient global assessment of disease activity, functional disability index, number of joints with active arthritis, number of joints with

limited range of motion (ROM) and erythrocyte sedimentation rate. Physician Global Assessment, number of joints with active arthritis and number of joints with limited range of motion are physician-dependent parameters. The agreement of the pediatric rheumatologist and the physiatrist on these parameters is very important to determine the sort of therapy given to each involved joint.

Our study was designed to assess the interobserver agreement for the joints with arthritis and limited range of motion, Physician global assessment and to detect the sources of disagreement.

Material and Methods

Twenty children with JIA were included in the study. The disease subgroups were polyarthritis (PA), oligoarthritis (OA), systemic arthritis

(Sys) and enthesitis related arthritis (ERA), as defined in the second meeting of the International League Against Rheumatism (ILAR) in Durban, South Africa, 1997⁴. Physician Global Assessment, number of joints with active arthritis and number of joints with limited range of motion were used for assessment parameters. Physician Global Assessment was done by using a 10 cm visual analog scale, "0" being the worst and "10" being the best score, regarding the patient's disease status. Active arthritis was defined by the American College of Rheumatology (ACR) criteria⁵: presence of swelling (not due to currently inactive synovitis or to bony enlargement) or, if no swelling is present, limitation of motion accompanied by heat, pain or tenderness. We made a screening examination of all joints to identify the ones with restricted movement. Then, assessment of limited range of motion in affected joints was performed according to international standard orthopedic measurements⁶. The starting point for all measurements was the anatomical position and the arc of motion was determined with a goniometer. The joint was then evaluated to have limited range of motion or not. Each patient was examined by observers, a pediatric rheumatologist and a physiatrist, separately during the same visit. Observer one, the pediatric rheumatologist, and experience in pediatrics for 10 years, and in pediatric rheumatology for five years. He also worked in one of the pediatric rheumatology centers in the United Kingdom as a clinical fellow for one year. Observer two, the physiatrist, had 10 years' experience. The two observers had been working together as members of the rheumatology team for five years. At the beginning of the study, the observers made an agreement on a standardized joint examination, and they utilized an average of 30 minutes for each patient. The neck; temporomandibular joints (TMJ); shoulders; elbows; wrists; metacarpophalangeal (MCP), proximal interphalangeal (PIP) and distal interphalangeal (DIP) joints; lumbar spine; hips; knees; tibiotalar, subtalar, metatarsophalangeal (MTP) joints; and interphalangeal joints of feet were assessed separately. Each observer marked the involved joint as active arthritis, limited range of motion, or both. The observers were blinded to each other. A total of 1,320 joints were examined to assess limited range of motion. The number of joints for the assessment of active

arthritis was 1,200, because certain joints such as the neck, hip, subtalar joint and lumbar spine could not be assessed. All the assessed joints were scored for kappa analysis as follows:

1. Both observers agreed in involvement.
2. 1st observer defined as involved, 2nd as not involved.
3. 1st observer defined as not involved, 2nd as involved.
4. Both observers defined as not involved.

The results were summarized in 2 by 2 tables for the assessment of all joints. Interobserver agreement for the assessment of arthritis and limited range of motion was determined using kappa statistics⁷. Agreement was considered good if both observers agreed on the presence or absence of a finding, and poor if they disagreed. We also used chance corrected agreement statistics to measure global agreement, because some agreement could be expected by chance. In addition, we also made a chance corrected agreement of some specific joints such as neck, wrist, knee and hip, because they are among the most commonly involved joints. The value of a corrected agreement statistic can vary from 1 (total disagreement) to 0 (chance expected agreement). Values of kappa between 0.41 and 0.60 were interpreted as moderate agreement, between 0.61 and 0.80 as substantial, and over 0.80 as almost perfect.

For the analysis of Physician Global Assessment, Wilcoxon signed rank test was used. The statistical analysis was performed by SPSS 10.0.

Results

Demographic features of patients are outlined in Table I. The mean age at onset was 6.35 years, and the mean follow-up was 12.9 months. Twenty patients (100%) were on non-steroid anti-inflammatory drugs (NSAID's), 13 patients (65%) were on concomitant disease modifying antirheumatic drugs (DMARDs), and two patients were taking low-dose steroids.

Table I. Features of Patients with Juvenile Idiopathic Arthritis

Sex (M/F)	Age at onset in years (mean, median)	Disease subtype PA/OA/SYS/ERA*	Follow-up in months (mean, median)
9/11	6.35,5.50	8/7/3/2	12.9, 12.0

* Polyarthritis, oligoarthritis, systemic arthritis and enthesitis related arthritis, respectively.

The Physician Global Assessment (10 cm VAS scale) of the two observers was 4.3 (mean score) for the first observer (pediatric rheumatologist) and 3.7 (mean score) for the second observer (physiatrist). There was no statistical difference ($p=0.241$).

Interobserver agreement for the overall assessment of joints with arthritis and limited range of motion was determined using kappa statistics, as shown in Table II. A total of 1,320 joints were examined by both observers, blinded to each other. Kappa analysis was done for arthritis scores and limited range of motion, separately. There was substantial agreement in both arthritis and limited range of motion scores (between 0.61 and 0.80).

Table II. Overall Agreement Among Two Observers in Determining Active Arthritis and Limited Range of Motion

	Arthritis n=1200	Limited range of motion n=1320
Good agreement		
• Involved	46 (4%)	83 (6%)
• Not involved	1105 (92%)	1149 (87%)
Poor agreement	49 (4%)	88 (7%)
Corrected agreement*	0.63	0.62

* Chance corrected agreement estimated by kappa statistics for two observers. Values from 0.41 to 0.60 reflect moderate agreement, values from 0.61 to 0.80 reflect substantial agreement, and values over 0.80 reflect perfect agreement.

Chance corrected agreement for the two observers was also performed for some specific joints the neck, wrists, hips and knees and the results are outlined in Table III. There was substantial agreement in assessment of arthritis and limited range of motion for the knee and the wrist joints. There was also substantial agreement in evaluating the neck and the hip for limited range of motion alone.

Table III. Chance Corrected Agreement by Kappa Statistics for Two Observers in the Assessment of the Neck, Knee, Hip and Wrist Joints

	Arthritis	Limited range of motion
Knee joint	0.69	0.67
Hip joint	not evaluated	0.71
Wrist joint	0.62	0.61
Neck	not evaluated	0.65

Discussion

Articular examination is important to identify the problems and to establish the treatment goals and plans for children with JIA. Identification of objective and standardized variables and agreement of members of the rheumatology team in articular examination will contribute to obtaining better results.

There are quite a few published data concerning interobserver assessment in children with chronic arthritis. Guzman et al.⁸ evaluated 10 patients with JIA. Four rheumatologists graded tenderness, swelling and limitation of motion in the joints, as recommended by the Pediatric Rheumatology Collaborative Study Group. There was moderate agreement in the assessment of joint swelling and limited range of motion. One of the important reasons for this low agreement was the differences in examiners' techniques. In this study, we found substantial agreement in the joints with active arthritis and limited range of motion. This better results as compared to Guzman's study could be attributed to the standardization of the joint examination prior to the study. Another important factor was to use ACR criteria for active arthritis and goniometric measurements for limited range of motion in assessment of joint involvement. Large number of articular response variables used in clinical trials may cause statistical error and ambiguous results, as mentioned in the study by Ruperto and Giannini⁹. Giannini et al.³ then proposed a standard core set of outcome variables, which were used in our study. These criteria might also have contributed to our agreement. We assessed the interobserver agreement for some specific joints which were frequently involved such as neck, wrist, hip and knee. There was substantial agreement for these joints. In the study done by Marks et al.¹⁰, interobserver variation in the examination of knee joints was evaluated. Close agreement was found for objective measurements such as range of motion and knee circumference. These findings also indicate the importance of using objective criteria in our study such as ACR criteria for active arthritis, goniometric measurements of the joints for limited range of motion and Giannini's core outcome variables.

Long-term follow-up of children with JIA by the same members of the team could cause a bias. We tried to prevent this by establishing

standardized methods prior to the study and evaluated the patients blinded to each other. In conclusion, standardization of examination techniques and use of objective variables among members of the pediatric rheumatology team. Would enhance the co-operation and the success of treatment on the affected joints.

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