ORIGINAL RESEARCH

Power doppler sonography in assessment of knee involvement in patients with juvenile idiopathic arthritis

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ABSTRACT

Background: The disease known as juvenile idiopathic arthritis (JIA) is an idiopathic inflammatory condition that mostly affects joints, targeting extraarticular tissue as well as the synovium. The present study assessed the role of power doppler sonography in knee involvement in patients with juvenile idiopathic arthritis (JIA). **Materials & Methods:**75 patients with juvenile idiopathic arthritis (JIA) of both genders were selected. The knee joints were evaluated with plain radiography, US, and colordoppler. **Results:** Knee score was 3.2, 3.7 and 4.2 in group I, II and III respectively. The mean morning stiffness was 74.6 minutes, 57.4 minutes and 72.3 minutes, JAFAR score was 6.6, 10.7 and 11.9 and plain radiography score was 6.5, 6.0 and 7.2 respectively. The difference was significant (P< 0.05). The mean synovial thickness was 1.2 cm, 0.9 cm and 1.0 cm in group I, II and III. The effusion volume was 2.8 ml, 3.1 ml and 4.9 ml, loculation of effusion was seen in 0, 2 and 5, C of medial condyle thickness was 3.6 mm, 2.9 and 2.7 and C of lateral condyle thickness was 2.5, 2.8 and 2.6 and Cartilage IE was seen in 1, 3 and 5 respectively. The difference was significant (P< 0.05). **Conclusion:** Doppler sonography as a non-invasive, low-cost, and readily available tool for the assessment of articular involvement in knees of JIA patients.

Key words: Doppler sonography, Juvenile idiopathic arthritis, oligoarthritis

INTRODUCTION

The disease known as juvenile idiopathic arthritis (JIA) is an idiopathic inflammatory condition that mostly affects joints, targeting extraarticular tissue as well as the synovium.[1,2] Systemic-onset arthritis, oligoarthritis, polyarthritis rheumatoid factor positive, polyarthritis rheumatoid factor negative, psoriatic arthritis, enthesitis-related arthritis, and undifferentiated arthritis are among the various sub-classifications that make up the JIA diagnosis, which were established by the ILAR in 2001.[3] There is growing evidence that some of these groups are more heterogeneous and might be better described by a new system, which has led to criticism of the current classification scheme.[4]

With US of the knee, it is possible to evaluate articular cartilage alterations, joint effusion, and changes in the synovial membrane—all of which can be used to distinguish between patients who are in clinical remission and those who are actively involved in knee involvement.[5] The vascularization of the knee's periarticular tissue and synovial membrane could be investigated with Color Doppler US. Regardless of the direction or type of vessel, low amounts of tissue flow, or tissue perfusion, can be detected with Power Doppler sonography (PDS). Another tool for visually quantifying tissue flow in relation to disease activity is the Power Doppler.[6] The present study assessedthe role of power doppler sonography in knee involvement in patients with juvenile idiopathic arthritis (JIA).

MATERIALS & METHODS

The present study consisted of 75patients with juvenile idiopathic arthritis (JIA) of both genders. Parental written consent was obtainedfor the participation in the study.

Data such as name, age, gender etc. was recorded. Patients were divided into 3 groups of 25 each. Group I was pauciarticular, group II was polyarticular, and group III was systemic JIA with knee involvement. A thorough clinical examination and laboratory investigations were performed on each participant. US, color doppler, and conventional radiography were

used to assess the knee joints. Both knees were scored clinically as: Pain; 0= absence, 1 = presence. The degree of swelling; 0= absence, 1=mild, 2 =moderate, 3= severe. The degree of limitation of extension: 0 = no limitation, 1 < 5 extension, 2 < 10 extension, 3 < 15 extension, 4> 15 extension based on The Juvenile Arthritis Functional Assessment Report (JAFAR). Data thus obtained were subjected to statistical analysis. P value < 0.05 was considered significant.

RESULTS

Table I Comparison of parameters

Parameters	Group I	Group II	Group III	P value
Knee score	3.2	3.7	4.2	0.05
Morning stiffness (min)	74.6	57.4	72.3	0.01
JAFAR score	6.6	10.7	11.9	0.04
Plain radiography score	6.5	6.0	7.2	0.82

Table I, graph I shows that knee score was 3.2, 3.7 and 4.2 in group I, II and III respectively. The mean morning stiffness was 74.6 minutes, 57.4 minutes and 72.3 minutes, JAFAR score was 6.6, 10.7 and 11.9 and plain radiography score was 6.5, 6.0 and 7.2 respectively. The difference was significant (P< 0.05).

Graph I Comparison of parameters

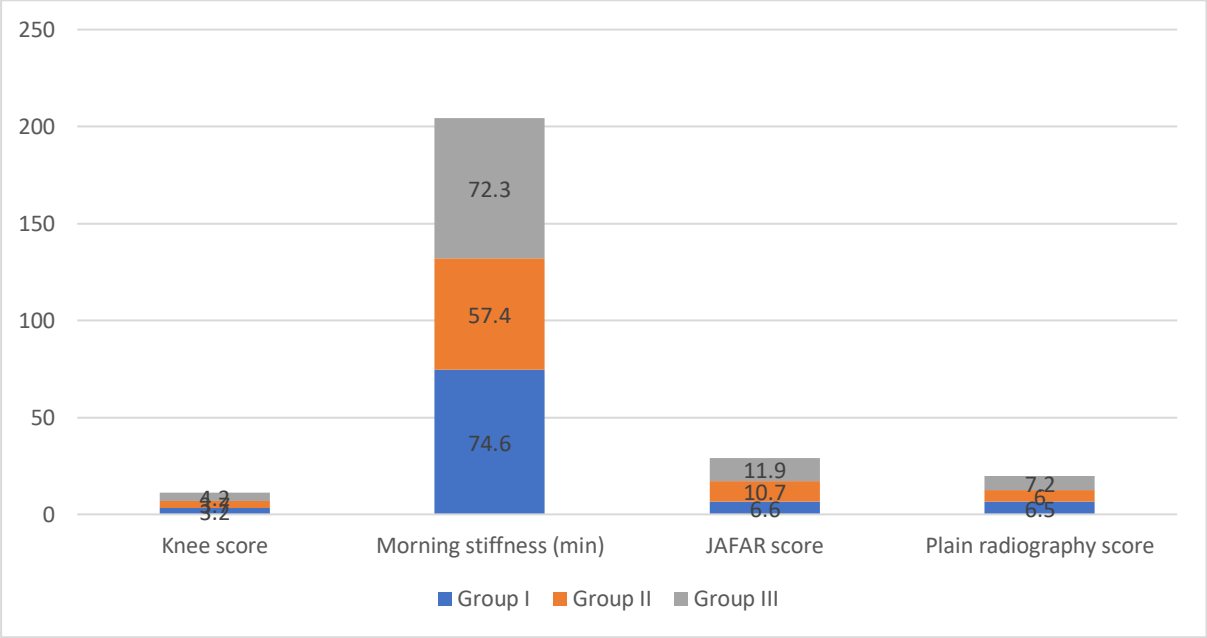

Table II Ultrasound findings

Parameters	Group I	Group II	Group III	P value
Synovial thickness (cm)	1.2	0.9	1.0	0.04
Effusion volume (ml)	2.8	3.1	4.9	0.02
Loculation of effusion (n)	0	2	5	0.01
C of medial condyle thickness(mm)	3.6	2.9	2.7	0.05
C of lateral condyle thickness (mm)	2.5	2.8	2.6	0.04
Cartilage IE	1	3	5	0.12

Table II shows that the mean synovial thickness was 1.2 cm, 0.9 cm and 1.0 cm in group I, II and III. The effusion volumewas 2.8 ml, 3.1 ml and 4.9 ml, loculation of effusion was seen in 0, 2 and 5, C of medial condyle thicknesswas 3.6 mm, 2.9 and 2.7 and C of lateral condyle thickness was 2.5, 2.8 and 2.6 and Cartilage IE was seen in 1, 3 and 5 respectively. The difference was significant (P< 0.05).

DISCUSSION

In Europe, JIA is the most prevalent childhood rheumatic disease, with an average frequency of 70 per 100,000.[7] According to study design, geographic location, and disease classification, the prevalence of JIA varies; reports range from 3.8 to 400 cases per 100,000 people globally. JIA affects women more frequently than men (>2:1), yet the disease classification system has variations in this distribution.[8,9] The age at which distinct subtypes of JIA present also varied greatly from one another. For instance, systemic-onset arthritis has a median age of presentation of two years, whereas enthesitis-related arthritis has a median age of presentation of eleven

years.[11,12]The present study assessed the role of power doppler sonography in knee involvement in patients with juvenile idiopathic arthritis (JIA).

We observed that knee score was 3.2, 3.7 and 4.2 in group I, II and III respectively. The mean morning stiffness was 74.6 minutes, 57.4 minutes and 72.3 minutes, JAFAR score was 6.6, 10.7 and 11.9 and plain radiography score was 6.5, 6.0 and 7.2 respectively. In Shahin et al.'s[13] study, there were 15 healthy youngsters included as a control group and 30 JIA patients with clinical indications of knee involvement. US revealed a highly significant difference ($p<0.0001$) between the knees of JIA affected patients and control knees in terms of synovial thickening and cartilage thickness. In 93% of cases, a knee effusion was seen. In 76.7% of the patients, a Doppler scan revealed synovial vessels. There was a noteworthy association found between the JAFAR score ($P < 0.05$) and the level of vascularity as determined by the PD and knee scores ($p< 0.05$). When the results of the follow-up were compared to the original exam, a significant positive connection ($p<0.05$) was found between the variations in synovial thickness and the knee score.

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The limitation of the study is small sample size.

CONCLUSION

Authors found that doppler sonography is a generally available, affordable, and non-invasive method for evaluating articular involvement in the knees of patients with juvenile onset arthritis.

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