

Up to 450 words (table counts for 100 words)

Frequency and site of clinically unsuspected synovitis on whole-body MRI in Juvenile Idiopathic Arthritis

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Background: Magnetic resonance imaging can facilitate the diagnosis of JIA, especially in enthesitis-related arthritis, but is also increasingly used for monitoring disease activity in individual joints. This prospective study aims to measure the frequency of subclinical synovitis on whole-body MRI, in adolescent patients with JIA.

Methods: JIA patients were recruited from a tertiary adolescent and young adult rheumatology clinic, between September 2019 and August 2020. All patients underwent clinical examination by a senior rheumatology registrar before the MR scan. Patients were assigned to a clinically active or inactive group, depending on their active joint count (AJC); active patients had $AJC \geq 1$, while the clinically inactive patients had an $AJC = 0$. All patients then underwent a contrast enhanced whole-body MRI scan. The post-contrast, water-only mDixon images were assessed for synovitis by one radiologist, blinded to clinical information. Only joints that were definitely abnormal were counted as synovitic. Eighty-one joints per patient were examined with both methods. The presence of subclinical synovitis in a patient was defined as synovitis in one or more joints on MRI, which were not active clinically.

Results: Thirty-two patients aged between 15 and 24, with complete clinical and MRI data were included in the analysis. The patient characteristics and the frequency of subclinical synovitis are summarised in the table.

Subclinical synovitis was detected in a similar proportion of JIA patients in both the active and inactive groups (46.7% vs. 41.2%, $P = \dots$) The most frequent region with subclinical synovitis was the hindfoot, detected in 22% (7/32) of JIA patients and in 17.2% (11/64) hind foot joints assessed by MRI. The second most common joint with clinically unsuspected inflammation was the knee, found in 19% (6/32) of JIA patients, and in 9/64 knee joints. Similarly, 16% (5/32) of the adolescent patients had active disease in the hip, ankle or midfoot joints. The frequency of elbow involvement was also considerable, with 11% (7/64) joints with subclinical synovitis in 14% (4.5/32) of JIA patients.

Patient characteristics and frequency of subclinical synovitis

Age, mean (SD)	18.7 (2.5)
Sex, n (%)	
Female	17 (53.1)
Male	15 (46.9)
Type of JIA, n (%)	
Enthesitis-related arthritis	10 (31.3)
Polyarticular, RF positive	3 (9.4)
Polyarticular, RF negative	7 (21.9)
Extended oligoarticular	4 (12.5)
Psoriatic	3 (9.4)
Systemic-onset	3 (9.4)
Oligoarticular	2 (6.25)
Disease duration (years), mean (SD)	10.3 (6.2)
Treatment, n (%)	
csDMARD only	8 (25)
bDMARD only	9 (28.1)
csDMARD and DMARD	9 (28.1)
none	6 (18.8)
CHAQ, mean (SD)	0.6 (0.8)
JADAS10-CRP, mean (SD)	6.7 (6.1)
Clinical disease activity, n (%)	
Active (AJC=0)	17 (53.1)
Inactive (AJC≥1)	15 (46.9)
AJC, mean (SD) (active, n=15)	3.3 (2.1)
Patients with subclinical synovitis, n (%)	
All (n=32)	14 (43.8)
Inactive (n=17)	7 (41.2)
Active (n=15)	7 (46.7)

Joints with subclinical synovitis per patient, mean (SD)	
All (n=32)	4.3 (11.4)
Active (n=15)	5.4 (13)
Inactive (n=17)	3.3 (10)

RF=rheumatoid factor, AJC=active joint count, CHAQ= Childhood Health Assessment Questionnaire, n=number of patients

Conclusion: In conclusion, 43.8% of JIA patients had subclinical synovitis on whole-body MRI scan with no significant difference between the clinically active vs. inactive JIA patients. Large joints were predominantly affected. Further research is required to validate our findings in a larger cohort of JIA patients.

Author Disclosure Information:

V. Choida: None. **C. Ciurtin:** None. **T.J.P. Bray:** None. **D. Sen:** None. **C. Fisher:** None. **M. Leandro:** None. **M.A. Hall-Craggs:** None.

Category (Complete): Paediatric and adolescent rheumatology

Keyword (Complete): JIA ; MRI ; whole-body

Funding and Disclosures (Complete):

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Funding: Yes

If yes, please give name of funder(s) : This study was supported by the British Society of Rheumatology [179978 to VC] and Action Medical Research [GN2697 to MHC]. The author would like to thank both for their help and support.