

Clinical Profile of Polyarticular Juvenile Idiopathic Arthritis on Short-Term and Medium-Term Follow-up in a Tertiary Care Centre

Anil Kumar Tennelli¹, Dastagirsab Mamadapur¹, Anagha S. R², Anand P. Rao³, Alkarani T. Patil⁴, Basavaraja GV⁵

¹Assistant Professor, Department of Paediatrics, Indira Gandhi Institute of Child Health, Bengaluru, Karnataka, India. ²Department of Paediatrics, Indira Gandhi Institute of Child Health, Bengaluru, Karnataka, India. ³Consultant Paediatric Rheumatologist, Manipal Hospital and Indira Gandhi Institute of Child Health, Bengaluru, Karnataka, India. ⁴Professor & Head of Department, Indira Gandhi Institute of Child Health, Bengaluru, Karnataka, India. ⁵Professor, Department of Paediatrics, Indira Gandhi Institute of Child Health, Bengaluru, Karnataka, India

Abstract

Background: Polyarticular juvenile idiopathic arthritis (polyJIA) is a chronic inflammatory arthritis involving five or more joints and may result in persistent disease, joint deformity, and functional impairment. Data regarding its clinical profile and follow-up outcomes among Indian children remain limited. The objective is to evaluate the clinical and laboratory profile of children with polyarticular JIA and assess short-term and medium-term outcomes in terms of joint involvement, treatment response, and disease activity. **Material and Methods:** This hospital-based retrospective and prospective observational study included 184 children with polyarticular JIA attending the Indira Gandhi Institute of Child Health, Bengaluru, from August 2022 to February 2024. Demographic characteristics, clinical manifestations, joint involvement, laboratory parameters, RF and ANA status, and treatment were documented. Patients were assessed at approximately six months and one year for clinical symptoms, joint involvement, laboratory parameters, treatment response, and disease outcome. **Results:** Of 184 children, 145 (78.8%) were females and 39 (21.2%) were males, with a male-to-female ratio of 1:3.72. The mean age at disease onset was 7.2 ± 4.3 years. Joint pain (97.8%), joint swelling (59.2%), and morning stiffness (56.5%) were common manifestations. The knee was most frequently involved (72.8%), followed by the wrist (66.8%) and ankle (64.7%). Anaemia was present in 65.2%, while ESR was elevated in 77.1%. RF and ANA positivity were observed in 25.0% and 13.6%, respectively, among the overall cohort. The median total number of involved joints decreased from 13 at baseline to 6 at six months and 2 at one year. Inactive disease increased from 3.8% at six months to 23.9% at one year. RF-positive patients had a significantly later age at onset (8.3 vs 6.7 years; $p=0.03$) and a greater proportion with active disease during follow-up (87.0% vs 60.2%; $p=0.03$). **Conclusion:** Polyarticular JIA predominantly affected females and commonly involved the knee, wrist, and ankle joints. Progressive improvement in clinical manifestations, joint involvement, and inflammatory activity was observed during follow-up. However, persistent active disease, particularly among RF-positive patients, highlights the importance of early treatment and continued disease monitoring.

Keywords: Polyarticular juvenile idiopathic arthritis; JIA; rheumatoid factor; antinuclear antibody; methotrexate; biologics; disease activity; remission.

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INTRODUCTION

Juvenile idiopathic arthritis (JIA) is a heterogeneous group of chronic inflammatory arthritides beginning before 16 years of age and represents the most common chronic rheumatic disease of childhood. Polyarticular JIA (polyJIA), characterized by involvement of five or more joints during the initial six months of disease, is an important phenotype because of its greater disease burden and potential for persistent arthritis and joint damage.^[1]

Despite advances in treatment, achieving sustained inactive disease remains an important therapeutic goal in polyarticular-course JIA. Early recognition of prognostic factors and appropriate escalation of therapy may improve long-term disease control.^[2] Contemporary real-world evidence indicates that treatment strategies for polyJIA increasingly involve early use of disease-modifying antirheumatic drugs (DMARDs) and biologic agents in children with persistent or severe disease.^[3] Indian experience with biologic DMARDs has also demonstrated

their role in achieving disease control in children with JIA who have an inadequate response to conventional therapy.^[4]

The expanding availability of biologic and targeted synthetic DMARDs has substantially changed the therapeutic landscape of non-systemic JIA.^[5] Nevertheless, disease activity may persist in a proportion of children, requiring treatment escalation and continued monitoring.^[6] Longitudinal studies have further

Address for correspondence: Dr. Dastagirsab Mamadapur, Assistant Professor, Department of Paediatrics, Indira Gandhi Institute of Child Health, Bengaluru, Karnataka, India
E-mail: mamadapurdastagir1995@gmail.com

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demonstrated variability in disease course and outcomes over time, emphasizing the importance of systematic follow-up.^[7] Improved understanding of the pathophysiology and therapeutic targets in JIA has facilitated more individualized treatment approaches aimed at controlling inflammation and preventing irreversible joint damage.^[8]

Data describing the clinical spectrum and medium-term outcomes of polyarticular JIA in Indian children remain relatively limited. The present study was therefore undertaken to describe the clinical and laboratory profile of children with polyarticular JIA and assess their short-term and medium-term outcomes during follow-up at a tertiary care centre.

Aim and Objectives

Primary objective: To study the clinical and laboratory profile of patients diagnosed with polyarticular juvenile idiopathic arthritis.

Secondary objective: To study the outcomes of these patients during follow-up in terms of joint deformity and response to medications.

MATERIALS AND METHODS

Study Design and Setting: This was a hospital-based retrospective and prospective observational study conducted in the Department of Pediatrics/Rheumatology at the Indira Gandhi Institute of Child Health (IGICH), Bengaluru, a tertiary care centre. Children with polyarticular JIA attending the Rheumatology outpatient department or admitted to the hospital constituted the study population.

Study Period: The study was conducted over approximately 18 months, from August 2022 to February 2024.

Study Population and Sample Size: A total of 184 children diagnosed with polyarticular JIA according to ILAR criteria were included during the study period. The calculated minimum sample size was 79, based on an anticipated prevalence of polyarticular JIA of 28.5%, a 95% confidence level, and an absolute precision of 10%. However, all eligible patients available during the study period were included, resulting in a final sample of 184 children.

The sample size was estimated using:

$$n = \frac{Z^2 pq}{d^2}$$

where $p = 0.285$, $q = 1 - p$, $Z = 1.96$ at 95% confidence level, and $d = 0.10$ absolute precision.

Inclusion Criteria

Children aged <16 years diagnosed with polyarticular JIA according to ILAR criteria during the preceding two years and fulfilling the study enrolment requirements were included.

Exclusion Criteria

Children with other categories of JIA, including systemic-onset JIA, enthesitis-related arthritis, oligoarticular JIA, and psoriatic arthritis, were excluded. Secondary causes of arthritis, including systemic lupus erythematosus, juvenile dermatomyositis, mixed connective tissue disease, vasculitic syndromes, infectious arthritis, neoplastic disorders, and rheumatic arthritis, were also excluded.

Data Collection and Clinical Assessment: Relevant

demographic and clinical information was recorded using a predefined structured proforma. A detailed history was obtained with particular emphasis on joint pain, joint swelling, fever, rash, early morning stiffness, gelling, easy fatigability, and other extra-articular manifestations.

A detailed musculoskeletal examination was performed. Each large joint was assessed individually for arthritis, whereas minor joints such as the carpal and tarsal joints and axial joints such as the cervical and lumbar spine were collectively counted as individual joint groups, as specified in the study protocol.

Anthropometric measurements were recorded to assess nutritional status. Systemic examination included assessment for hepatosplenomegaly, serositis, ocular involvement, and cardiac involvement. All children diagnosed with JIA underwent screening for uveitis.

Laboratory Evaluation: Baseline laboratory investigations included haemoglobin, total leukocyte count, platelet count, erythrocyte sedimentation rate (ESR), C-reactive protein (CRP), and liver function tests. Rheumatoid factor (RF) and antinuclear antibody (ANA) by immunofluorescence were also documented. Patients were categorized according to RF and ANA status, and clinical characteristics and outcomes were compared where relevant.

Treatment Assessment: Treatment received at presentation and during follow-up was documented. Therapeutic modalities included non-steroidal anti-inflammatory drugs (NSAIDs), methotrexate, intra-articular corticosteroids, leflunomide, sulfasalazine, and biologic agents, as applicable. Treatment compliance and changes in medication during follow-up were also recorded.

In the study cohort, NSAIDs and methotrexate were the predominant initial treatments, being prescribed to 98.4% and 80.4% of patients, respectively.

Follow-up and Outcome Assessment: Patients were evaluated at approximately 6 months and 1 year to assess short-term and medium-term outcomes. Clinical symptoms, number and distribution of involved joints, laboratory inflammatory markers, treatment received, treatment compliance, development of joint deformities, and response to therapy were assessed at follow-up. The primary follow-up outcomes included improvement in disease manifestations and achievement of inactive disease.

Of the original 184 children, 172 were assessed at the first follow-up and 138 at the second follow-up, with treatment compliance documented at both assessments.

Statistical Analysis: Data were entered into Microsoft Excel and analyzed using IBM SPSS Statistics version 25. Categorical variables were expressed as frequencies and percentages. Normally distributed continuous variables were summarized as mean $\pm$ standard deviation, whereas skewed continuous variables were expressed as median with interquartile range (IQR).

Comparisons of continuous variables were performed using appropriate parametric or non-parametric tests according to data distribution, while categorical variables were compared using the Chi-square test or Fisher's exact test, as applicable. Comparisons between relevant paired observations were performed using paired statistical tests. Associations between RF status and clinical or follow-up outcomes were assessed where appropriate. A p -value <0.05 was considered statistically significant.

RESULTS

A total of 184 children with polyarticular juvenile idiopathic arthritis (JIA) were included. There was a marked female predominance, with 145 (78.8%) females and 39 (21.2%)

males, giving a male-to-female ratio of approximately 1:3.72. The mean age at presentation was 8.8 ± 4.3 years, while the mean age at disease onset was 7.2 ± 4.3 years. The median delay between disease onset and presentation was 1.0 year (IQR 0.3–2.0).

Table 1: Demographic, clinical and laboratory profile of the study population

Parameter	Findings (n=184)
Male, n (%)	39 (21.2)
Female, n (%)	145 (78.8)
Male:Female ratio	1:3.72
Age at presentation, mean $\pm$ SD (years)	8.8 ± 4.3
Age at onset, mean $\pm$ SD (years)	7.2 ± 4.3
Delay in presentation, median (IQR), years	1.0 (0.3–2.0)
Joint pain, n (%)	180 (97.8)
Joint swelling, n (%)	105 (59.2)
Early morning stiffness, n (%)	104 (56.5)
Fever, n (%)	71 (38.6)
Gelling, n (%)	19 (10.3)
Rash, n (%)	15 (8.2)
Fatigue, n (%)	19 (10.3)
Haemoglobin, mean $\pm$ SD (g/dL)	10.7 ± 1.4
ESR, mean $\pm$ SD (mm)	43.2 ± 27.4
CRP, mean $\pm$ SD (mg/L)	23.5 ± 18.1
Anaemia, n (%)	120 (65.2)
Thrombocytosis, n (%)	60 (32.6)
Elevated ESR, n (%)	142 (77.1)
Elevated CRP, n (%)	43 (23.3)
RF positive, n (%)	46 (25.0)
ANA positive, n (%)	25 (13.6)

Joint pain was the predominant presenting manifestation (97.8%), followed by joint swelling (59.2%) and early morning stiffness (56.5%). Anaemia was present in 65.2%

and ESR was elevated in 77.1%, indicating a substantial inflammatory burden at presentation. RF testing was positive in 46 patients and ANA testing in 25 patients.

Table 2: Pattern of joint involvement at presentation

Joint involved	n (%)
Knee	134 (72.8)
Wrist	123 (66.8)
Ankle	119 (64.7)
Subtalar	109 (59.2)
Intertarsal	93 (55.5)
Elbow	91 (49.5)
Metacarpophalangeal	91 (49.5)
Interphalangeal – upper limb	85 (46.2)
Metatarsophalangeal	73 (39.7)
Interphalangeal – lower limb	56 (30.4)
Shoulder	53 (28.8)
Hip	51 (27.7)
Cervical	40 (21.7)
Temporomandibular	33 (17.9)
Sacroiliac	13 (7.1)
Spine	8 (4.3)
Small joints involved, median (IQR)	6 (2–14)
Large joints involved, median (IQR)	7 (5–10)
Total active joints, median (IQR)	13.5 (8–23)

The knee was the most frequently affected joint (72.8%), followed by the wrist (66.8%), ankle (64.7%) and subtalar joint (59.2%). The median total number of actively involved

joints was 13.5 (IQR 8–23), reflecting substantial polyarticular involvement at presentation.

Table 3: Clinical, joint and laboratory changes during follow-up

Parameter	Baseline (n=184)	6 months (n=172)	12 months (n=138)
Joint pain, n (%)	180 (97.8)	142 (82.6)	85 (61.6)
Joint swelling, n (%)	105 (59.2)	54 (31.4)	33 (23.9)
Morning stiffness, n (%)	104 (56.5)	69 (40.1)	25 (18.1)

Fever, n (%)	71 (38.6)	11 (6.4)	3 (2.2)
No complaints, n (%)	—	37 (21.5)	51 (37.0)
Small joints involved, median (IQR)	6 (2–14)	1 (0–8)	0 (0–3)
Large joints involved, median (IQR)	7 (5–10)	3 (1–8)	2 (2–4)
Total joints involved, median (IQR)	13 (8–23)	6 (1–15)	2 (2–6)
Haemoglobin, median (IQR), g/dL	10.9 (9.8–11.5)	11.0 (10.0–12.0)	11.4 (11.4–12.1)
ESR, median (IQR)	34.5 (25.0–58.8)	30.0 (18.0–46.0)	25.0 (25.0–40.0)
CRP, median (IQR), mg/L	7.9 (3.1–30.1)	8.0 (2.9–15.2)	2.3 (2.3–3.5)

There was progressive clinical improvement during follow-up. Joint pain decreased from 97.8% at baseline to 61.6% at 12 months, while joint swelling decreased from 59.2% to 23.9%. Morning stiffness also declined markedly. The

median total number of involved joints decreased from 13 at baseline to 6 at 6 months and 2 at 12 months. ESR and CRP showed an overall downward trend, consistent with improvement in inflammatory activity.

Table 4: Treatment, follow-up outcomes and comparison according to RF status

Parameter	Finding
NSAID at first visit, n (%)	181 (98.4)
Methotrexate at first visit, n (%)	148 (80.4)
Intra-articular steroid at first visit, n (%)	8 (4.3)
Biologic at first visit, n (%)	2 (1.1)
Compliance at 6 months	161/172 (93.6%)
Compliance at 12 months	130/138 (94.2%)
Inactive disease at 6 months	7 (3.8%)
Inactive disease at 12 months	44 (23.9%)
Clinical remission on medication at 12 months	23 (12.5%)
Clinical remission off medication at 12 months	21 (11.4%)
Joint deformity, n (%)	37 (20.1)
Uveitis, n (%)	3 (1.6)
RF-negative vs RF-positive	p-value
Age at onset: 6.7 ± 4.2 vs 8.3 ± 4.3 years	0.030
Delay in presentation: 1.7 ± 1.9 vs 1.2 ± 1.3 years	0.080
Total joints involved: 15 (7–25) vs 12.5 (8–22)	0.760
ESR: 41.3 ± 26.6 vs 48.4 ± 30.4	0.140
Joint deformity: 20.4% vs 22.2%	0.540
Active disease: 60.2% vs 87.0%	0.030
Biologic use: 7.5% vs 18.8%	0.080

NSAIDs (98.4%) and methotrexate (80.4%) were the principal therapies at presentation. Treatment compliance remained above 93% among children available at both follow-ups. Inactive disease increased from 3.8% at 6 months to 23.9% at 12 months; at one year, 23 patients were in clinical remission on medication and 21 were in remission off medication.

RF-positive patients had a significantly later age at disease onset than RF-negative patients (8.3 ± 4.3 vs 6.7 ± 4.2 years; $p=0.03$). Active disease was also more frequent in the RF-positive group (87.0% vs 60.2%; $p=0.03$), whereas differences in joint deformity, ESR and biologic use did not reach statistical significance.

Overall, the findings demonstrated a progressive reduction in clinical symptoms, active joint involvement and inflammatory markers over 12 months, accompanied by an increase in the proportion achieving inactive disease. RF-positive polyarticular JIA was associated with later disease onset and persistence of active disease during follow-up.

DISCUSSION

Polyarticular juvenile idiopathic arthritis (polyJIA) is associated with persistent inflammation, functional impairment, and risk of irreversible joint damage. In the present study of 184 children, a marked female predominance was observed, with a male-to-female ratio of

1:3.72. The mean age at disease onset was 7.2 years, and joint pain, joint swelling, and morning stiffness were the predominant manifestations. These findings are consistent with the recognized clinical spectrum of polyarticular JIA, in which musculoskeletal manifestations predominate and extra-articular complications such as uveitis require continued surveillance.^[9]

The knee was the most frequently affected joint (72.8%), followed by the wrist, ankle, and subtalar joints. The median number of actively involved joints was high at presentation, reflecting the substantial inflammatory burden characteristic of polyarticular disease. Methotrexate remains an important conventional disease-modifying therapy in JIA and continues to form the basis of treatment for many children with polyarticular involvement.^[10]

Treatment of polyarticular-course JIA has evolved substantially with increasing availability of conventional and biologic DMARDs. Schanberg et al. highlighted advances in therapeutic development for polyarticular-course JIA and the importance of optimizing treatment strategies in this heterogeneous population.^[11] Similarly, Nijhuis et al. emphasized that early suppression of inflammation using conventional and targeted therapies is important for preventing persistent disease and long-term joint damage.^[12]

In the present study, NSAIDs and methotrexate were the predominant therapies at initial presentation. Biologic therapy was used in a smaller proportion but increased during follow-up,

particularly among children with persistent disease. Achievement of remission is an important therapeutic goal because disease flare may occur even after clinical remission and treatment withdrawal, emphasizing the need for continued monitoring.^[13]

The clinical profile observed in our study is also comparable with Indian experience. Sethupandi et al. reported a female predominance and considerable musculoskeletal and inflammatory manifestations among children with newly diagnosed JIA at a tertiary care centre in Karnataka.^[14] Such findings underscore the importance of locally generated data, as disease phenotype and patterns of referral may differ across populations and healthcare settings.

Over follow-up, a progressive improvement in disease activity was observed. The median total number of involved joints decreased from 13 at baseline to 6 at six months and 2 at one year. Joint pain, swelling, and morning stiffness also declined, accompanied by reductions in ESR and CRP. These findings are consistent with the contemporary treatment paradigm of achieving early disease control and preventing structural and functional consequences of chronic inflammation.^[15] Current ACR recommendations similarly emphasize appropriate use and monitoring of pharmacological therapy together with supportive and non-pharmacological management in children with JIA.^[16]

Inactive disease was achieved in 3.8% of patients at six months and increased to 23.9% at one year. RF-positive patients had a significantly later age at onset than RF-negative patients (8.3 vs 6.7 years; $p=0.03$) and had a higher proportion of active disease during follow-up (87.0% vs 60.2%; $p=0.03$). These observations suggest a more persistent disease course among RF-positive patients. Indian clinical studies have likewise demonstrated heterogeneity in JIA presentation and laboratory profiles, supporting the importance of subtype-specific assessment and long-term follow-up.^[17]

The present study was limited by its single-centre design and combined retrospective-prospective nature. In addition, RF and ANA testing was not available in all children, and there was attrition during follow-up, with 172 children evaluated at six months and 138 at one year. Nevertheless, the relatively large cohort provides useful information regarding the clinical profile, treatment pattern, and short- to medium-term outcomes of polyarticular JIA in an Indian tertiary-care setting.

CONCLUSION

Polyarticular JIA in this cohort showed a marked female predominance, with joint pain, swelling, and morning stiffness as the major presenting manifestations and the knee being the most frequently involved joint. Most children received NSAIDs and methotrexate, while biologic therapy was increasingly used in persistent disease. Clinical symptoms, joint involvement, and inflammatory markers improved progressively during follow-up, with inactive disease increasing from 3.8% at six months to 23.9% at one year. RF-positive patients had a later age of onset and greater persistence of active disease. Early diagnosis, regular

assessment of disease activity, appropriate escalation of therapy, and continued follow-up are important for improving outcomes and minimizing long-term joint damage.

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Conflicts of interest

There are no conflicts of interest.

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