

Comparison of Health-Related Quality of Life and Other Patient-Reported JAMAR Outcomes Across Common Juvenile Idiopathic Arthritis Subtypes: A Cross-Sectional Study

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Research Article

Keywords: Juvenile Idiopathic Arthritis, Health-related Quality of Life, JAMAR, Subtype, Physical function, Patient-reported outcomes, Pain, Well-being

Posted Date: September 4th, 2026

DOI: <https://doi.org/10.21203/rs.3.rs-10799998/v1>

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Additional Declarations: No competing interests reported.

Abstract

Objective

Juvenile idiopathic arthritis (JIA) can substantially impair health-related quality of life (HRQoL). Comprehensive comparisons of HRQoL and other related patient-reported outcomes (PROs) across JIA subtypes remain limited. This study compared HRQoL and other PROs among the most common JIA subtypes using the Juvenile Arthritis Multidimensional Assessment Report (JAMAR).

Methods

In this cross-sectional study, children with JIA attending two tertiary pediatric rheumatology referral centers in Tehran, Iran, were enrolled. HRQoL was the primary outcome, while physical function, pain, disease activity, and overall well-being were secondary outcomes, all assessed using the validated Persian JAMAR. Differences among JIA subtypes were evaluated using Kruskal–Wallis and post hoc Mann–Whitney U tests. A multivariable general linear model assessed whether the association between JIA subtype and HRQoL was independent of age and sex.

Results

A total of 101 patients were included (mean age 8.25 ± 3.81 years; 56.4% oligoarticular, 24.8% polyarticular, and 18.8% systemic JIA). HRQoL differed significantly among JIA subtypes ($P = 0.004$), with systemic JIA showing the greatest overall impairment. Patients with polyarticular JIA reported poorer physical function ($P = 0.005$), greater pain ($P = 0.036$), and worse overall well-being ($P = 0.002$). After adjustment for age and sex, JIA subtype remained independently associated with HRQoL.

Conclusion

Systemic JIA was associated with the greatest impairment in HRQoL, whereas polyarticular JIA had the poorest physical function, pain, and overall well-being. HRQoL differences among JIA subtypes may be influenced by factors beyond physical disability and pain alone, supporting the need for individualized multidisciplinary management.

Introduction

Juvenile idiopathic arthritis (JIA), the leading chronic rheumatic disease in the pediatric population, presents with several distinct types of inflammatory peripheral arthritis that arise before 16 years of age and persist for at least six weeks in the absence of an identifiable cause (1). To facilitate a better understanding of disease pathogenesis, guide treatment decisions, determine follow-up strategies, and predict prognosis, several classification systems have been developed for juvenile idiopathic arthritis.

Among these, the International League of Associations for Rheumatology (ILAR) classification categorizes JIA into seven subtypes based on clinical and laboratory characteristics: systemic arthritis, polyarthritis (rheumatoid factor-positive or rheumatoid factor-negative), oligoarthritis, enthesitis-related arthritis (ERA), psoriatic arthritis, and undifferentiated arthritis (1).

The burden of JIA extends well beyond joint inflammation (2). JIA significantly affects patients' mental health, physical functioning, and social participation, including school attendance, not only because of pain, joint swelling, stiffness, and functional impairment but also due to fatigue, growth abnormalities, osteoporosis, uveitis, and psychological distress associated with the disease and its treatment (2). These comorbidities collectively reduce the health-related quality of life (HRQoL) of both children with JIA and their caregivers (3, 4).

HRQoL is defined as an individual's perception of their position in life within the context of their culture and value systems and in relation to their goals, expectations, standards, and concerns, encompassing physical, emotional, and social well-being (5). Because no definitive cure for JIA has yet been established and achieving sustained remission remains challenging, current management strategies primarily focus on improving HRQoL by controlling inflammation, preserving joint function, and reducing pain and disease activity (6, 7). Consequently, periodic assessment of HRQoL has become an important outcome measure for evaluating treatment effectiveness and providing patients and their families with information regarding disease prognosis (6, 8). Moreover, patient-reported outcomes (PROs) capture patients' perspectives on disease burden and treatment response. By assessing domains such as pain, physical function, overall well-being, and disease activity, they complement physician-reported measures and provide a more comprehensive evaluation of disease impact (9).

The Juvenile Arthritis Multidimensional Assessment Report (JAMAR) is a validated disease-specific multidimensional questionnaire that provides a comprehensive assessment of the disease status by capturing multiple patient- and parent-reported outcome domains, including HRQoL, physical function, pain, disease activity, and overall well-being, together with information on symptoms, treatment, medication side effects, therapeutic adherence, and school functioning (10).

Although previous studies have evaluated individual patient-reported outcomes in children with JIA, comprehensive comparisons of HRQoL across JIA subtypes remain limited, particularly in Middle Eastern populations (11). Furthermore, few studies have simultaneously described differences in patient-reported outcomes among JIA subtypes using a single validated disease-specific instrument (12). Identifying subtype-specific differences may improve risk stratification, support individualized management, and help clinicians identify patients who may benefit from more intensive multidisciplinary care (1). Therefore, this study was conducted to primarily compare HRQoL among common JIA subtypes. As secondary analyses, we compared patient-reported physical function, pain, disease activity, and overall well-being using the Persian version of the JAMAR questionnaire.

Patients and Methods

Study design and participants

This prospective cross-sectional study was conducted at two tertiary pediatric rheumatology referral centers affiliated with Tehran University of Medical Sciences (Imam Khomeini Hospital and Children's Medical Center) in Tehran, Iran, between January and June 2020. Patients aged 6 months to 16 years with a confirmed diagnosis of JIA by a board-certified pediatric rheumatologist according to the ILAR classification criteria were consecutively enrolled during routine outpatient visits. The primary outcome was the HRQoL total score. Secondary outcomes included patient-reported physical function, pain, disease activity, overall well-being, and HRQoL subscales. Written informed consent was obtained from at least one parent or legal guardian before participation. The study protocol was approved by the institutional ethics committee of Tehran University of Medical Sciences (IR.TUMS.MEDICINE.REC.1398.722).

Patients were excluded if any of the following criteria were present: (1) neither the child nor a parent or legal guardian was able to complete the questionnaire because of developmental limitations or communication barriers; (2) a diagnosis of JIA established less than 6 months before enrollment, to avoid capturing acute-phase responses or diagnostic uncertainty; (3) initiation of or major dose modification in disease-modifying antirheumatic drugs (DMARDs) or biologic agents within the preceding 3 months; (4) treatment with oral systemic corticosteroids at a daily dose exceeding 0.2 mg/kg or intra-articular corticosteroid injection within the preceding 4 weeks, as these interventions could transiently attenuate patient-reported symptoms; (5) a coexisting diagnosis of fibromyalgia or chronic pain syndrome, which could independently confound pain and quality-of-life assessments; or (6) active uveitis requiring topical or systemic immunosuppressive treatment, given its potential to independently impair overall well-being and health-related quality of life.

Sample Size

A formal sample size calculation could not be performed because JIA is a relatively uncommon disease and no previous study has reported subtype-specific means and standard deviations (SD) for HRQoL total scores using the JAMAR. Both the American and Farsi JAMAR validation studies, which demonstrated that the HRQoL total score discriminates between JIA subtypes, reported these scores only as medians with interquartile ranges (IQR) (13, 14). Therefore, our sample size was guided by the feasibility and subtype distribution reported in the Farsi JAMAR validation study, which successfully enrolled 102 patients from the same target population. Based on its subtype distribution (67.6% oligoarticular, 16.7% RF-negative polyarticular, and 14.7% systemic), our target enrollment of approximately 100 patients was expected to provide sufficient numbers for the three most prevalent subtypes (oligoarticular, polyarticular, and systemic).

Data collection

Demographic information, including age, sex, and age at diagnosis, was obtained through interviews. JIA subtype was determined by a pediatric rheumatologist according to the ILAR classification criteria. HRQoL and other PROs (i.e., patient-reported physical function, pain, disease activity, and overall well-being) were assessed using the Persian validated version of JAMAR, which has demonstrated good internal consistency (Cronbach's $\alpha = 0.71-0.91$), acceptable test-retest reliability (ICC = 0.53–0.87), and discriminative validity between JIA patients and healthy controls. (14). Whenever children were unable to complete the questionnaire independently, parents completed the validated proxy version, consistent with previous studies demonstrating good agreement between child- and parent-reported responses (10).

The five quantitative patient-reported JAMAR domains that were analyzed were:

- **HRQoL**, was measured using a 10-item questionnaire divided into two subscales: Physical Health and Psychosocial Health. Each item is scored from 0 to 3, yielding a total score ranging from 0 to 30, with each subscale ranging from 0 to 15. Higher scores indicate poorer quality of life.
- **Physical function**, was assessed using a 15-item questionnaire evaluating the child's ability to perform daily activities. Each item is scored from 0 (no difficulty) to 3 (unable to do), yielding a total score ranging from 0 to 45, with higher scores indicating greater functional disability.
- **Patient-reported pain, overall well-being, and disease activity**, were assessed using separate 21-numbered circle visual analogue scales (VASs) ranging from 0 to 10, with higher scores indicating more severe pain, poorer well-being, and greater disease activity.

Statistical analysis

Statistical analyses were performed using IBM SPSS Statistics for Windows, Version 26.0 (IBM Corp., Armonk, NY, USA). Continuous variables were summarized as mean $\pm$ standard deviation (SD) or median (IQR), as appropriate, whereas categorical variables were presented as frequencies and percentages. The Kolmogorov–Smirnov test was used to assess the normality of data distribution.

Comparisons among JIA subtypes were performed using one-way analysis of variance (ANOVA) for normally distributed continuous variables and the Kruskal–Wallis test for non-normally distributed variables. When the Kruskal–Wallis test was statistically significant, pairwise comparisons were performed using the Mann–Whitney U test with Bonferroni correction. Comparisons between two groups (e.g., sex) were performed using the independent-samples *t*-test for normally distributed variables and the Mann–Whitney U test for non-normally distributed variables. Categorical variables were compared using the chi-square test or Fisher's exact test, as appropriate.

Correlations between continuous variables (i.e., age and disease duration) and PROs were evaluated using Spearman's rank correlation coefficient, while between categorical variables (i.e., sex) were assessed using the Mann–Whitney U test.

To determine whether the association between JIA subtype and HRQoL was independent of potential demographic confounders, a multivariable general linear model was constructed with HRQoL score as the dependent variable and JIA subtype as the fixed factor. Age and sex were included as covariates based on their potential to confound the association between JIA subtype and patient-reported outcomes. Disease duration was initially evaluated as a candidate covariate but was not retained in the final model because it did not contribute independently after adjustment for age. Regression coefficients (B), 95% confidence intervals (CIs), and partial eta squared (η^2) were reported. All statistical tests were two-sided, and P values < 0.05 were considered statistically significant.

Results

A total of 116 consecutive patients with JIA attended the participating pediatric rheumatology clinics during the study period. Of these, 11 patients were excluded according to the predefined eligibility criteria (Fig. 1). The remaining 105 patients successfully completed the Persian version of the JAMAR questionnaire. However, due to the small number of patients with psoriatic JIA ($n = 3$) and enthesitis-related JIA ($n = 1$), these subtypes were excluded from the subgroup analyses.

Among the 101 included participants, 64 (63%) were female. The mean age at study evaluation was 8.25 ± 3.81 years, and the mean age at disease onset was 4.98 ± 2.71 years. Regarding JIA subtypes, 57 (56.4%) patients had oligoarticular JIA, 25 (24.8%) had polyarticular, and 19 (18.8%) had systemic JIA.

HRQoL total scores (mean 3.94 ± 2.73) differed significantly among JIA subtypes ($P = 0.004$). Post hoc Mann–Whitney U tests with Bonferroni correction demonstrated significantly higher HRQoL scores (indicating poorer quality of life) in patients with systemic JIA compared with those with oligoarticular JIA ($P = 0.002$) (Table 1). No significant differences were observed between oligoarticular JIA and polyarticular ($P = 0.066$) or between polyarticular and systemic JIA ($P = 0.092$).

Table 1
Demographic characteristics and patient-reported outcomes according to juvenile idiopathic arthritis subtype

Female, n (%)	Overall (n = 101)	Oligoarthritis (n = 57)	Polyarthritis (n = 25)	Systemic (n = 19)	P value
	64 (63%)	35 (61%)	18 (72%)	11 (58%)	0.565
Age at visit (years), mean $\pm$ SD	8.25 $\pm$ 3.81	7.76 $\pm$ 3.73	9.04 $\pm$ 4.27	8.67 $\pm$ 3.34	0.329
Age at onset (years), mean $\pm$ SD	4.98 $\pm$ 2.71	4.76 $\pm$ 2.53	5.40 $\pm$ 2.93	5.07 $\pm$ 2.99	0.630
Duration of disease (years), mean $\pm$ SD	3.27 $\pm$ 2.84	2.99 $\pm$ 2.74	3.64 $\pm$ 3.18	3.59 $\pm$ 2.70	0.557
HRQoL Total score, median (IQR)	4 (2–6)	3 (1–5)	4 (3–6)	5 (4–8)	0.004
HRQoL, Physical Health score, median (IQR)	2 (1–3)	2 (1–3)	2 (2–3)	3 (2–4)	0.002
HRQoL, Psychosocial Health score, median (IQR)	1 (0–3)	1 (0–2.5)	2 (1–3)	2 (1–4)	0.030
Pain VAS, median (IQR)	1 (0.5–2)	0.5 (0–2)	1.5 (1–2.5)	1 (0.5–2)	0.036
Physical function score, median (IQR)	2 (1–3)	2 (1–3)	3 (2–5)	1 (1–3)	0.005
Disease activity VAS, median (IQR)	1 (0.5–2)	1 (0.5–1.5)	1 (1–2)	1 (0.5–2)	0.226
Overall well-being VAS, median (IQR)	1 (1–2)	1 (0.5–2)	2 (1.5–2.5)	1 (1–2)	0.002
Continuous variables are presented as mean $\pm$ standard deviation (SD) for normally distributed data or median (interquartile range [IQR]) for non-normally distributed data. Categorical variables are presented as number (%). <i>P</i> values were calculated using one-way ANOVA for normally distributed continuous variables, the Kruskal–Wallis test for non-normally distributed continuous variables, and the chi-square test or Fisher's exact test for categorical variables, as appropriate. HRQoL = health-related quality of life; VAS = visual analogue scale; SD = standard deviation; IQR = interquartile range.					

Similarly, the HRQoL Physical Health subscale differed significantly among JIA subtypes ($P = 0.009$), with patients with systemic and polyarticular JIA reporting significantly higher scores than those with oligoarticular JIA ($P = 0.016$, $P = 0.012$). No significant differences were observed between polyarticular

and systemic JIA ($P = 0.663$). The HRQoL Psychosocial Health subscale also differed significantly among subtypes ($P = 0.003$), primarily due to higher scores in patients with systemic JIA compared with those with oligoarticular and polyarticular JIA ($P = 0.001$, $P = 0.006$).

Spearman's correlation analysis demonstrated that HRQoL scores increased significantly with increasing age and disease duration (both $P < 0.001$). No significant association was found between HRQoL scores and sex (Table 2).

Table-2: Correlations between demographic and clinical characteristics and patient-reported outcomes

Patient-reported outcome	Age, ρ (P)	Disease duration, ρ (P)	Sex (Male vs Female), r (P)
HRQoL	$\rho = 0.626$, $p < 0.001$	$\rho = 0.516$, $p < 0.001$	$r = 0.02$, $p = 0.829$
Pain VAS	$\rho = 0.350$, $p < 0.001$	$\rho = 0.191$, $p = 0.056$	$r = 0.30$, $p = 0.002$
Physical function	$\rho = 0.537$, $p < 0.001$	$\rho = 0.399$, $p < 0.001$	$r = 0.03$, $p = 0.739$
Diseases activity VAS	$\rho = 0.084$, $p = 0.401$	$\rho = 0.140$, $p = 0.163$	$r = 0.30$, $p = 0.002$
Overall well-being VAS	$\rho = 0.177$, $p = 0.077$	$\rho = 0.153$, $p = 0.127$	$r = 0.15$, $p = 0.120$

Values for age and disease duration are Spearman's rank correlation coefficients (ρ). Values for sex are Mann–Whitney U test effect sizes ($r = Z/\sqrt{N}$). Positive effect sizes indicate higher scores among males. P values are two-sided. HRQoL = health-related quality of life; VAS = visual analogue scale.

To determine whether the association between JIA subtype and HRQoL was independent of demographic characteristics, a multivariable general linear model was constructed with age, sex, and JIA subtype as independent variables (Table 3). After adjustment, both age and JIA subtype remained independently associated with HRQoL. Each one-year increase in age was associated with a 0.41-point increase in HRQoL score ($B = 0.409$, 95% CI 0.298–0.521; $P < 0.001$). Compared with patients with systemic JIA, those with oligoarticular ($B = -2.012$, 95% CI -3.123 to -0.901 ; $P = 0.001$) and polyarticular JIA ($B = -1.530$, 95% CI -2.808 to -0.253 ; $P = 0.019$) had significantly lower HRQoL scores. Sex was not independently associated with HRQoL ($P = 0.805$).

Table 3

Multivariable general linear model evaluating factors independently associated with HRQoL score

Variable	B (95% CI)	P value
Age (years)	0.409 (0.298 to 0.521)	< 0.001
Male sex	0.108 (– 0.761 to 0.978)	0.805
JIA subtype		
Oligoarticular vs. Systemic	–2.012 (– 3.123 to – 0.901)	0.001
Polyarthritis vs. Systemic	–1.530 (– 2.808 to – 0.253)	0.019
Overall effect of JIA subtype	$F = 6.47$; partial $\eta^2 = 0.119$	0.002
Multiple general linear regression analysis with HRQoL score as the dependent variable. Age and sex were covariates as they are established demographic characteristics that may influence patient-reported outcomes and could differ among JIA subtypes. Disease duration was initially evaluated but was excluded from the final model as it was highly related to age at the time of visit and did not contribute independently to the model ($P = 0.936$). Systemic JIA served as the reference category. Model $R^2 = 0.432$; adjusted $R^2 = 0.408$. HRQoL = health-related quality of life; CI = confidence interval.		

Pain VAS scores (mean 1.28 ± 1.11) differed significantly among JIA subtypes ($P = 0.036$) (Table 1). Post hoc Mann–Whitney U tests with Bonferroni correction showed significantly higher pain scores in patients with polyarticular than in those with oligoarticular JIA ($P = 0.014$), whereas no significant differences were observed between oligoarticular and systemic JIA ($P = 0.153$) or between polyarticular and systemic JIA ($P = 0.488$).

Spearman's correlation analysis demonstrated that pain VAS scores increased significantly with increasing age ($P < 0.001$), whereas no significant association was observed with disease duration. Female patients reported significantly higher pain VAS scores than male patients ($P = 0.002$) (Table 2).

Physical function score (mean 2.39 ± 1.94) differed significantly among JIA subtypes ($P = 0.005$) (Table 1). Post hoc Mann–Whitney U tests with Bonferroni correction demonstrated significant differences between oligoarticular and polyarticular JIA ($P = 0.003$) and between polyarticular and systemic JIA ($P = 0.007$), whereas no significant difference was observed between oligoarticular and systemic JIA ($P = 0.741$).

Spearman's correlation analysis showed that physical function scores increased significantly with increasing age and disease duration (both $P < 0.001$). No significant association was found between physical function scores and sex (Table 2).

Disease activity VAS scores (mean 1.16 ± 0.77) did not differ significantly among JIA subtypes (Table 1). However, disease activity scores were significantly higher in female patients ($P = 0.002$), whereas no significant correlations were observed with age or disease duration (Table 2).

Overall well-being VAS scores (mean 1.40 ± 0.95) differed significantly among JIA subtypes ($P = 0.002$) (Table 1). Post hoc Mann–Whitney U tests with Bonferroni correction demonstrated significantly higher well-being scores in patients with polyarticular than in those with oligoarticular JIA ($P < 0.001$). No significant differences were seen between oligoarticular and systemic JIA ($P = 0.411$) or between polyarticular and systemic JIA ($P = 0.021$). Spearman's correlation analysis revealed no significant associations between overall well-being scores and age, disease duration, or sex (Table 2).

Discussion

In this cross-sectional study, we found that HRQoL differed significantly among JIA subtypes, with patients with systemic JIA experiencing the greatest overall impairment. In contrast, patients with polyarticular JIA reported the poorest physical function, highest pain intensity, and worst overall well-being. The HRQoL subscale analysis further showed that systemic JIA was associated with impairments in both physical and psychosocial health, whereas polyarticular JIA exhibited poorer physical health than oligoarticular JIA. Importantly, JIA subtype remained independently associated with HRQoL after adjustment for age and sex. Interestingly, despite poorer physical function and greater pain in polyarticular JIA, HRQoL was most impaired in systemic JIA. This finding suggests that differences in HRQoL among JIA subtypes may not be explained solely by physical disability and pain, and that psychosocial and other disease-related factors may also contribute substantially.

The significantly worse HRQoL observed among patients with oligoarticular JIA than systemic JIA patients in our study are consistent with findings from several multinational JAMAR validation studies (12–21). Although these studies did not statistically compare HRQoL across JIA subtypes, the reported median (IQR) HRQoL scores were generally lower in patients with oligoarticular JIA than in those with systemic or polyarticular JIA, suggesting a similar pattern across diverse populations. Comparable findings have also been reported using other HRQoL instruments (11, 22–24). In a large cohort of 3,324 children with JIA, health outcomes differed across JIA categories, with patients with persistent oligoarticular JIA generally reporting better quality of life and functional status as assessed by the Child Health Questionnaire (CHQ) in both physical and psychosocial domains (22). Similar results were reported in a cohort of 581 adults with JIA, in which persistent oligoarticular JIA was associated with better HRQoL than other JIA subtypes as assessed by the EuroQol-5D (EQ-5D) (11). Furthermore, in a study of 398 patients with JIA using the Pediatric Rheumatology Quality of Life Scale (PRQL), ERA and undifferentiated JIA showed the greatest impairments in quality of life compared with other JIA categories (24). However, these subtypes were not included in our analysis because of their low frequency in our cohort, limiting direct comparisons with these findings. Our study further extends previous observations by demonstrating that the association between JIA subtype and HRQoL remained significant after adjustment for age and sex, indicating that subtype independently contributes to differences in HRQoL.

In addition, we found that older age was independently associated with poorer HRQoL, consistent with the findings in a cohort of 2,552 adults with JIA (25). This association may reflect the cumulative burden

of chronic disease that increases with age. (26). Moreover, adolescence is a critical developmental period during which concerns regarding independence, social participation, body image, and psychological well-being may further influence the impact of JIA on HRQoL (27). In contrast to our findings indicating no association between sex and HRQoL, Barth et al. reported poorer HRQoL among females(25). This discrepancy may reflect differences in study populations, as our cohort comprised children with relatively homogeneous disease duration and healthcare access, whereas the adult cohort likely captured the cumulative effects of long-term disease burden, psychosocial factors, and sex-related differences that become more pronounced over time.

The higher pain scores observed among patients with polyarticular JIA compared with oligoarticular JIA are consistent with previous studies showing that greater joint involvement and disease burden are associated with increased pain in JIA. In the PRINTO multinational quality of life cohort, poorer pain outcomes were reported in patients with more extensive joint involvement, while Rashid et al. identified higher active joint counts as a predictor of persistent high-pain trajectories over time. (22, 28). A similar pattern can also be observed in several multinational JAMAR validation studies, although these studies reported only descriptive median (IQR) pain scores across JIA subtypes without formal statistical comparisons (13–20, 29–33). Likewise, Taxter et al. reported higher pain scores among patients with polyarticular, ERA, and undifferentiated JIA than among those with oligoarticular JIA. (24). Furthermore, previous studies have shown that older age and female sex are independently associated with greater pain in patients with JIA, consistent with our adjusted analyses (24, 28, 34–36).

Our study demonstrated that patients with polyarticular JIA had the poorest physical function scores among the evaluated subtypes. Similarly, Taxter et al. reported that children with ERA and polyarticular JIA had the highest prevalence of impaired physical function assessed by the Childhood Health Assessment Questionnaire (CHAQ) (24). However, while Pouchot et al. found poorer CHAQ scores in systemic and polyarticular JIA compared with oligoarticular JIA (23), the PRINTO multinational cohort study found comparable CHAQ scores among patients with systemic JIA, polyarticular JIA, and extended oligoarticular JIA (22). Furthermore, using Health Assessment Questionnaire (HAQ) and the physical component of the 36-Item Short Form Health Survey (SF-36) indicated greater physical disability in polyarticular JIA compared with persistent oligoarticular JIA (11), highlighting that greater disease-related damage is associated with increased functional disability in JIA patients (37). Although these studies consistently demonstrate better physical function among oligoarticular JIA patients, differences between systemic and polyarticular JIA have been less consistent. Differences in study populations, sample sizes, disease characteristics, and assessment instruments may explain these discrepancies. In addition, although systemic JIA carries a higher risk of systemic complications, polyarticular JIA may lead to greater functional impairment because the involvement of multiple joints can result in persistent limitations in mobility and activities of daily living (38).

Furthermore, overall well-being in our study was found to be significantly poorer in polyarticular disease compared to oligoarticular JIA, while disease activity remained insignificant across subtypes. This was in accordance with the PRINTO multinational quality of life cohort study demonstrating higher well-being

scores in polyarticular JIA patients and lowest in oligoarticular JIA patients based on the parent's assessment of child's global well-being (22). This can also be seen in Jamar Validation studies (13–20). The absence of significant differences in patient-reported disease activity among JIA subtypes may be explained by the dynamic nature of disease activity and the influence of treatment response. Although systemic and polyarticular JIA are generally considered more severe phenotypes, effective disease-modifying therapies may reduce differences in current disease activity between subtypes (39).

Based on our findings, although patients with polyarticular JIA reported the poorest physical function, highest pain intensity, and worst overall well-being, systemic JIA subtype was the one associated with the greatest impairment in overall HRQoL. This discrepancy suggests that HRQoL in JIA is influenced by factors beyond pain and physical disability alone. Previous studies have demonstrated that, in addition to pain severity and functional limitations, other factors including pain frequency, number of active joints, body mass index, age, extra-articular manifestations such as fatigue, and psychological factors significantly contribute to impaired HRQoL and well-being among patients with JIA (26, 27, 35, 38, 40–44). Systemic JIA represents one of the most severe JIA subtypes due to the coexistence of systemic inflammation and arthritis, with a higher risk of progressive joint damage, growth impairment, and potentially life-threatening complications, which may explain its greater impact on HRQoL compared with other subtypes (45). Furthermore, the finding that the psychosocial health subscale was significantly more impaired in systemic JIA than in polyarticular JIA, despite the absence of a significant difference in physical health, further supports the concept that HRQoL is determined not only by physical disability but also by the broader psychological and systemic burden of the disease.

Although our study is among the few to comprehensively compare HRQoL and multiple patient-reported outcomes across JIA subtypes using a single validated disease-specific instrument, and its adjusted analyses accounting for age and sex further strengthen the robustness of the findings, several limitations should be considered when interpreting the results. Although the overall cohort size was adequate, the relatively small number of patients with systemic JIA, together with the exclusion of other less common JIA subtypes, limited comparisons across all ILAR subtypes. In addition, the limited ethnic diversity of the study population may restrict the generalizability of the findings. Patient-reported outcomes were also susceptible to recall and reporting bias. Furthermore, several factors that may influence HRQoL and other patient-reported outcomes, including treatment regimen, objective disease severity, socioeconomic characteristics, psychological factors, and parent-proxy reporting in younger children, were not evaluated or adjusted for in the analyses.

In conclusion, HRQoL and several patient-reported outcomes differ across JIA subtypes. Patients with systemic JIA experienced the greatest overall impairment in HRQoL, whereas those with polyarticular JIA reported the poorest physical function, highest pain levels, and inferior overall well-being. These findings suggest that differences in HRQoL among JIA subtypes may not be explained solely by physical disability and pain, and that psychosocial and other disease-related factors may also contribute substantially to patients' perceived health status. Therefore, larger longitudinal studies involving more diverse populations are needed to further elucidate the determinants of HRQoL and disease burden

across JIA subtypes. Such evidence may facilitate the identification of patients who would benefit from more individualized, multidisciplinary care strategies.

Declarations

Ethics approval and consent to participate

The study was conducted in accordance with the ethical principles of the Declaration of Helsinki and was approved by the Ethics Committee of Tehran University of Medical Sciences, Tehran, Iran (Approval No. IR.TUMS.MEDICINE.REC.1398.722). Written informed consent was obtained from the parents or legal guardians of all participants before enrollment. All data were handled confidentially and analyzed anonymously to protect participants' privacy. The rights, safety, and well-being of all participants were safeguarded throughout the study.

Consent for publication

Not applicable

Competing interests

Not applicable.

Funding

Not applicable.

Author Contribution

ES: Investigation, data curation, formal analysis, visualization, writing – original draft. EK: Conceptualization, Investigation, data curation, methodology, writing – original draft, project administration. SRR: Conceptualization, methodology, supervision, writing – review & editing. VZ: Conceptualization, supervision, writing – review & editing. BS: Conceptualization, methodology, supervision, writing – review & editing.

Acknowledgement

The authors gratefully acknowledge all the patients and their parents or legal guardians who generously gave their time and participated in this study. Their willingness to contribute to research despite the challenges of living with juvenile idiopathic arthritis made this work possible. The authors also thank the nursing staff and administrative personnel at the rheumatology referral clinics of Imam Khomeini

Hospital and the Children's Medical Center, Tehran University of Medical Sciences, for their invaluable assistance with patient recruitment. We are also grateful to the Pediatric Rheumatology Society of Iran for providing the infrastructure and support that made this study possible.

The authors used ChatGPT (OpenAI, GPT-5.5) solely to assist with language editing, including grammar, clarity, and readability of the manuscript. The authors reviewed and verified all edits and take full responsibility for the content of the manuscript.

Data Availability

The datasets used and/or analyzed during the present study are available from the corresponding author upon request.

References

1. Martini A, Lovell DJ, Albani S, Brunner HI, Hyrich KL, Thompson SD, et al. Juvenile idiopathic arthritis. *Nat Reviews Disease Primers*. 2022;8(1):5.
2. Rebane K, Ristolainen L, Relas H, Orenius T, Kautiainen H, Luosujärvi R, et al. Disability and health-related quality of life are associated with restricted social participation in young adults with juvenile idiopathic arthritis. *Scand J Rheumatol*. 2019;48(2):105–13.
3. Grazziotin LR, Currie G, Twilt M, MJ IJ, Kip MMA, Koffijberg H, et al. Factors associated with care- and health-related quality of life of caregivers of children with juvenile idiopathic arthritis. *Pediatr Rheumatol Online J*. 2022;20(1):51.
4. Richmond B, Sharpe L, Boyse J, Menzies RE, Dudeney J, Colagiuri R, et al. The impact of juvenile idiopathic arthritis on psychosocial outcomes: a systematic review and meta-analysis. *J Pediatr Psychol*. 2025;50(11):1033–49.
5. Karimi M, Brazier J, Health. Health-Related Quality of Life, and Quality of Life: What is the Difference? *Pharmacoeconomics*. 2016;34(7):645-9.
6. Onel KB, Horton DB, Lovell DJ, Shenoi S, Cuello CA, Angeles-Han ST, et al. 2021 American College of Rheumatology Guideline for the Treatment of Juvenile Idiopathic Arthritis: Therapeutic Approaches for Oligoarthritis, Temporomandibular Joint Arthritis, and Systemic Juvenile Idiopathic Arthritis. *Arthritis Rheumatol*. 2022;74(4):553–69.
7. Prince FH, Otten MH, van Suijlekom-Smit LW. Diagnosis and management of juvenile idiopathic arthritis. *BMJ*. 2010;341:c6434.
8. Pan D, Ye X, Zheng W, Zhang C. Assessment of quality of life in children with juvenile idiopathic arthritis. *Minerva Pediatr (Torino)*. 2022;74(3):393–4.
9. Grazziotin LR, Currie G, Kip MMA, MJ IJ, Twilt M, Lee R, et al. Health State Utility Values in Juvenile Idiopathic Arthritis: What is the Evidence? *Pharmacoeconomics*. 2020;38(9):913–26.

10. Filocamo G, Consolaro A, Schiappapietra B, Dalprà S, Lattanzi B, Magni-Manzoni S, et al. A new approach to clinical care of juvenile idiopathic arthritis: the Juvenile Arthritis Multidimensional Assessment Report. *J Rheumatol*. 2011;38(5):938–53.
11. Oliveira Ramos F, Rodrigues A, Magalhaes Martins F, Melo AT, Aguiar F, Brites L et al. Health-related quality of life and disability in adults with juvenile idiopathic arthritis: comparison with adult-onset rheumatic diseases. *RMD Open*. 2021;7(3).
12. Bovis F, Consolaro A, Pistorio A, Garrone M, Scala S, Patrone E, et al. Cross-cultural adaptation and psychometric evaluation of the Juvenile Arthritis Multidimensional Assessment Report (JAMAR) in 54 languages across 52 countries: review of the general methodology. *Rheumatol Int*. 2018;38(1):5–17.
13. Lovell DJ, Brunner HI, Ringold S, Weiss PF, Martin N, Consolaro A, et al. The American English version of the Juvenile Arthritis Multidimensional Assessment Report (JAMAR). *Rheumatol Int*. 2018;38(Suppl 1):35–42.
14. Shafaie N, Ziaee V, Aghighi Y, Raees Karami SR, Moradinejad MH, Consolaro A, et al. The Farsi version of the Juvenile Arthritis Multidimensional Assessment Report (JAMAR). *Rheumatol Int*. 2018;38(Suppl 1):171–8.
15. Consolaro A, Bovis F, Pistorio A, Cimaz R, De Benedetti F, Miniaci A, et al. The Italian version of the Juvenile Arthritis Multidimensional Assessment Report (JAMAR). *Rheumatol Int*. 2018;38(1):251–8.
16. Holzinger D, Foell D, Horneff G, Foeldvari I, Tzaribachev N, Tzaribachev C, et al. The German version of the Juvenile Arthritis Multidimensional Assessment Report (JAMAR). *Rheumatol Int*. 2018;38(1):211–8.
17. Al-Mayouf SM, AIE'ed A, Muzaffer M, Consolaro A, Bovis F, Ruperto N, et al. The Arabic version of the Juvenile Arthritis Multidimensional Assessment Report (JAMAR). *Rheumatol Int*. 2018;38(1):43–9.
18. Quartier P, Hofer M, Wouters C, Truong TTT, Duong NP, Agbo-Kpati KP, et al. The French version of the Juvenile Arthritis Multidimensional Assessment Report (JAMAR). *Rheumatol Int*. 2018;38(Suppl 1):195–201.
19. Ekelund M, Berntson L, Consolaro A, Bovis F, Ruperto N. The Swedish version of the Juvenile Arthritis Multidimensional Assessment Report (JAMAR). *Rheumatol Int*. 2018;38(Suppl 1):371–7.
20. Lahdenne P, Aalto K, Rebane K, Vahasalo P, Putto-Laurila AK, Malin M, et al. The Finnish version of the Juvenile Arthritis Multidimensional Assessment Report (JAMAR). *Rheumatol Int*. 2018;38(Suppl 1):179–86.
21. Ioseliani M, Pagava K, Consolaro A, Bovis F, Ruperto N. The Georgian version of the Juvenile Arthritis Multidimensional Assessment Report (JAMAR). *Rheumatol Int*. 2018;38(Suppl 1):203–9.
22. Oliveira S, Ravelli A, Pistorio A, Castell E, Malattia C, Prieur AM, et al. Proxy-reported health-related quality of life of patients with juvenile idiopathic arthritis: the Pediatric Rheumatology International Trials Organization multinational quality of life cohort study. *Arthritis Rheum*. 2007;57(1):35–43.
23. Pouchot J, Larbre J-P, Lemelle I, Sommelet D, Grouteau E, David L, et al. Validation of the French version of the Childhood Health Assessment Questionnaire (CHAQ) in juvenile idiopathic arthritis.

- Joint Bone Spine. 2002;69(5):468–81.
24. Taxter AJ, Wileyto EP, Behrens EM, Weiss PF. Patient-reported Outcomes across Categories of Juvenile Idiopathic Arthritis. *J Rheumatol*. 2015;42(10):1914–21.
 25. Barth S, Haas JP, Schlichtiger J, Molz J, Bisdorff B, Michels H, et al. Long-Term Health-Related Quality of Life in German Patients with Juvenile Idiopathic Arthritis in Comparison to German General Population. *PLoS ONE*. 2016;11(4):e0153267.
 26. Tollisen A, Selvaag AM, Aasland A, Lerdal A, Flatø B. Longitudinal Health Status from Early Disease to Adulthood and Associated Prognostic Factors in Juvenile Idiopathic Arthritis. *J Rheumatol*. 2019;46(10):1335–44.
 27. Stevanovic D, Susic G. Health-related quality of life and emotional problems in juvenile idiopathic arthritis. *Qual Life Res*. 2013;22(3):607–12.
 28. Rashid A, Cordingley L, Carrasco R, Foster HE, Baildam EM, Chieng A, et al. Patterns of pain over time among children with juvenile idiopathic arthritis. *Arch Dis Child*. 2018;103(5):437–43.
 29. Wulffraat N, Kamphuis S, Swart JF, Vastert S, Van Dijkhuizen P, van Pelt P, et al. The Dutch version of the Juvenile Arthritis Multidimensional Assessment Report (JAMAR). *Rheumatol Int*. 2018;38(1):139–46.
 30. Demirkaya E, Ozen S, Sozeri B, Ayaz NA, Kasapcopur O, Unsal E, et al. The Turkish version of the Juvenile Arthritis Multidimensional Assessment Report (JAMAR). *Rheumatol Int*. 2018;38(Suppl 1):395–402.
 31. Susic G, Vojinovic J, Vijatov-Djuric G, Stevanovic D, Lazarevic D, Djurovic N, et al. The Serbian version of the Juvenile Arthritis Multidimensional Assessment Report (JAMAR). *Rheumatol Int*. 2018;38(Suppl 1):347–54.
 32. Dehoorne J, Joos R, Wouters C, Swart JF, Consolaro A, Bovis F, et al. The Flemish version of the Juvenile Arthritis Multidimensional Assessment Report (JAMAR). *Rheumatol Int*. 2018;38(Suppl 1):187–94.
 33. Flato B, Rygg M, Nordal EB, Røisland M, Ødegård HB, Hoftun GB, et al. The Norwegian version of the Juvenile Arthritis Multidimensional Assessment Report (JAMAR). *Rheumatol Int*. 2018;38(Suppl 1):291–8.
 34. Mensink MO, de Roock S, Drylewicz J, Jenniskens K, Wulffraat N, Swart JF, et al. Defining pain trajectories in juvenile arthritis and associated patient characteristics. *Arthritis Res Therapy*. 2026;28(1):138.
 35. Brandelli YN, Chambers CT, Mackinnon SP, Parker JA, Huber AM, Stinson JN, et al. A systematic review of the psychosocial factors associated with pain in children with juvenile idiopathic arthritis. *Pediatr Rheumatol Online J*. 2023;21(1):57.
 36. Randell RL, Reeve BB, Weitzman ER, von Scheven E, Zigler CK, Li Z, et al. Pain Interference in Juvenile Idiopathic Arthritis. *J Rheumatol*. 2024;51(11):1119–24.
 37. Susic GZ, Stojanovic RM, Pejnovic NN, Damjanov NS, Soldatovic II, Jablanovic DB, et al. Analysis of disease activity, functional disability and articular damage in patients with juvenile idiopathic

- arthritis: a prospective outcome study. *Clin Exp Rheumatol*. 2011;29(2):337–44.
38. Tharwat S, Nassar MK, Salem KM, Nassar MK. Extraarticular manifestations of juvenile idiopathic arthritis and their impact on health-related quality of life. *Clin Rheumatol*. 2024;43(7):2295–305.
39. Miller ML, Ruprecht J, Wang D, Zhou Y, Lales G, McKenna S, et al. Physician assessment of disease activity in JIA subtypes. Analysis of data extracted from electronic medical records. *Pediatr Rheumatol Online J*. 2011;9(1):9.
40. Fair DC, Rodriguez M, Knight AM, Rubinstein TB. Depression And Anxiety In Patients With Juvenile Idiopathic Arthritis: Current Insights And Impact On Quality Of Life, A Systematic Review. *Open Access Rheumatol*. 2019;11:237–52.
41. Młyńczyk J, Abramowicz P, Bernacka-Kusznierko I, Konstantynowicz J. The quality of life assessment in children with juvenile idiopathic arthritis- comparison of PROMIS(®) generic and disease-specific cut-off points: a pilot study. *Rheumatol Int*. 2025;45(3):61.
42. Tezer D, Başay BK, Başay Ö, Yener GO, Yüksel S. [Formula: see text] Cognitive performance, psychiatric comorbidities, and quality of life in pediatric patients with juvenile idiopathic arthritis: a comparative analysis with healthy controls. *Child Neuropsychol*. 2025;31(5):692–710.
43. Tuomi AK, Rebane K, Arnstad ED, Berntson L, Fasth A, Glerup M, et al. Body mass index is associated with health-related quality of life and disease characteristics in young adults with juvenile idiopathic arthritis. *Pediatr Rheumatol Online J*. 2024;22(1):25.
44. Yan Y, Rychlik KL, Rosenman MB, Miller ML. Use of PROMIS® to screen for depression in children with arthritis. *Pediatr Rheumatol Online J*. 2020;18(1):92.
45. Ambler WG, Nanda K, Onel KB, Shenoi S. Refractory systemic onset juvenile idiopathic arthritis: current challenges and future perspectives. *Ann Med*. 2022;54(1):1839–50.

Figures

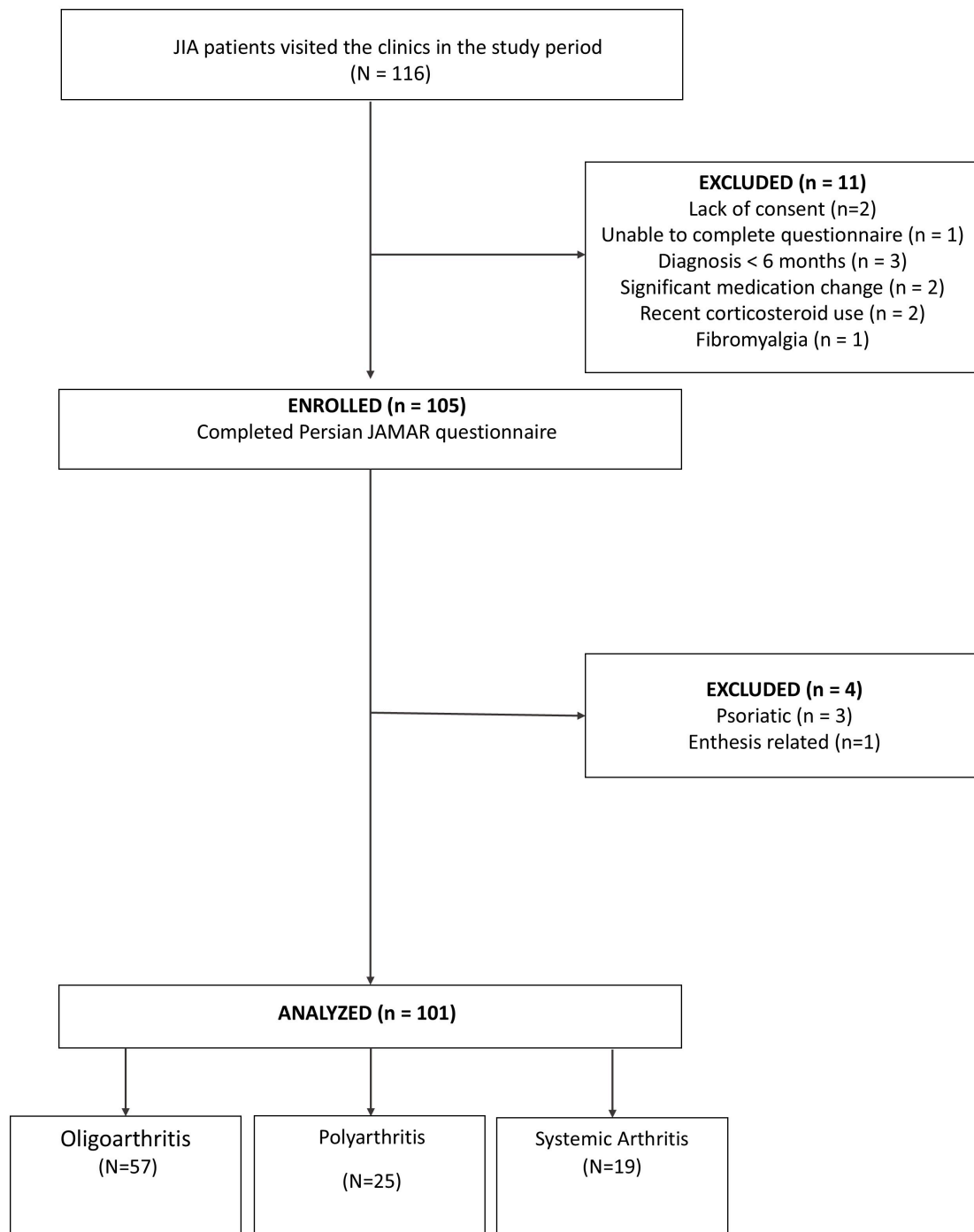


Figure 1

Diagram of the study enrollment and patient subtypes.