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ORIGINAL ARTICLE

Acceptable quality of life and low disease activity achievable among transition phase patients with rheumatic disease

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Abstract

Objectives Across diagnosis groups, transition of adolescents and young adults from children's hospitals to adult care associates with decreased treatment adherence and suboptimal treatment results. Our aim was to compare the health-related quality of life (HRQoL) and disease activity of juvenile idiopathic arthritis (JIA) patients after the transfer of care to the adult clinic and adult patients in the same outpatient clinic.

Methods All consecutive JIA patients aged 16 to 20 years who visited the transition clinic between September 2016 and August 2017 and all consecutive adult onset arthritis patients between December 2016 and August 2017 in the rheumatology outpatient clinic of Helsinki University Hospital were evaluated. HRQoL was measured by a generic instrument, 15D.

Results A total of 291 patients, 130 JIA, and 161 adults were identified with respective median disease durations of 6.5 and 4.0 years. Adults had lower HRQoL measured by 15D (median 0.90 vs. 0.96, $P < 0.001$) and higher Disease Activity Score 28 (DAS28) than JIA patients (median 2.4 vs. 1.6, $P < 0.001$). Adults smoked more frequently than JIA patients (22% vs. 7%, $P < 0.001$). In multiple regression, female gender, smoking, disease activity, and obesity were associated with poorer HRQoL. Smoking adults had more active disease (DAS28 median 3.1 vs. 2.1, $P = 0.031$) and lower HRQoL (15D median 0.86 vs. 0.93, $P < 0.001$) than non-smoking adults.

Conclusions Transition phase JIA patients had acceptable HRQoL and lower disease activity than patients with adult onset rheumatic diseases with similar disease duration. Smoking was associated with more active disease and lower HRQoL.

Keywords Disease-modifying antirheumatic drugs · Juvenile idiophatic arthritis · Rheumatoid arthritis · Smoking · Transition of care

Introduction

Juvenile idiopathic arthritis (JIA) is a group of arthritides that emerge before the age of 16 [1]. The incidence of JIA in the Nordic countries is 15–19.5/100,000 [2]. The course of disease varies from self-limiting monoarthritis to chronic and destructive forms of polyarthritis [3] which have influences that carry over into adulthood [4]. Up to 50% of JIA patients were not in remission 8 years after diagnosis in a Nordic population-based study [5], and a majority of patients were not in remission when followed up as young adults [6]. Radiological joint damage may be as common as in adult onset rheumatoid arthritis [7].

The health-related quality of life (HRQoL) of adult patients with various rheumatic diseases is significantly lower than that of the general population [8]. Similar findings are true for JIA patients in adulthood [9–11]. Among adolescents, JIA has a greater effect on physical than mental HRQoL measures during the transition of care [12]. However, less is known about HRQoL and disease activity of young JIA patients compared with other patients attending an adult rheumatology clinic.

Although the prognosis of JIA has improved in the past decades [13], transition from pediatric care to an adult clinic is a challenging time period for maintaining a good patient-doctor relationship as well as continuity of treatments and satisfactory disease control. Transition of care programs have been developed to meet the special needs of adolescent patients [14–17], and recommendations for the transition of care for young people with JIA have recently been updated [18]. The transition phase (12–24 years) is a critical period to avoid joint damage in adulthood.

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The transition process spans several years and begins with preparation of the patient and family for the transfer of care from pediatricians to adult specialists. Actual transfer of care with close collaboration of specialists involved in patient care finally leads to follow-up at the adult clinic [14]. During the third and final phase of transition in the adult clinic, patients still require special attention from service providers due to the patients' young age, gradually increasing autonomy and great differences in maturation between individuals.

The aim of this study was to compare the HRQoL and disease activity of young JIA patients whose care has been transferred to an adult rheumatology clinic and adult patients with similar disease duration. We hypothesized that due to the known challenges during transition of care, young JIA patients would have lower HRQoL and worse disease activity outcomes compared to adult onset rheumatic disease patients with similar disease duration.

Material and methods

Patient cohorts

Practically all JIA patients who require follow-up after treatment by specialists in pediatric rheumatology in Southern Finland are referred to the Helsinki University Hospital (HUH) Rheumatology outpatient transition clinic (background population 1.6 million). The transfer of rheumatology patients from pediatric to adult care occurs based on individual assessment at the age of 16–18 years. The transition process of rheumatology patients in the HUH area has been described previously [19]. Since public health care in Finland is based on universal health coverage, insurance type is irrelevant.

Using the electronic patient registry of our hospital, we identified two patient cohorts which included all consecutive JIA patients aged 16 to 20 years (ICD-10 codes M08.0–M08.9 and M09.0*L40.5) who visited the HUH Rheumatology outpatient transition clinic between September 2016 and August 2017 and all consecutive adult onset arthritis patients aged 18 to 65 years (ICD-10 codes M05–M06, M13, M45–M46, and M07.3*L40.5) between December 2016 and August 2017 in the respective outpatient clinic. Ankylosing spondylitis (AS) (ICD-10 code M45) and axial spondyloarthritis (ICD-10 codes M46.1–M46.9) were combined into the spondyloarthritis (SpA) group. All study participants had a pre-established diagnosis and treatment regimen, and patients with other potentially disabling diseases were excluded.

Clinical data

We conducted a meticulous review of the electronic patient records and collected data on previous and ongoing medications, smoking status, and body mass index (BMI). Disease outcome was evaluated using the Health Assessment Questionnaire Disability Index (HAQ-DI) [20] and Disease Activity Scores 28 (DAS28) [21, 22]. The DAS-C-reactive protein (DAS-CRP) is a modification of the DAS28. The original DAS28 includes the erythrocyte sedimentation rate (ESR) value, while the DAS-CRP uses the serum CRP concentration instead. In the following, DAS28 refers to DAS28-CRP which was the primary outcome measure for patients with peripheral disease. Bath AS Disease Activity Index (BASDAI) [23] was used in patients with enthesitis-related arthritis (ERA) (ICD-10 code M08.1) and SpA.

The HAQ-DI assesses the patient's ability to perform 20 activities of daily living on a four-point Likert scale (from "without any difficulty" to "not able to do"; respective scores ranging from 0 to 3). These activities are divided into eight categories; the category score is the highest score of any activity within the category. The total HAQ-DI score is the mean of the category scores. Pain was measured on a 10-cm visual analog scale (VAS) [24].

HRQoL was measured using the 15D (http://www.15d-instrument.net/15d/), a generic instrument which can be used as a profile and a single score measurement [25]. The 15D questionnaire consists of 15 dimensions: mobility, vision, hearing, breathing, sleeping, eating, speech, excretion, usual activities, mental function, discomfort and symptoms, depression, distress, vitality, and sexual activity. For each dimension, the patient chooses one of the five levels that best describes her/his state of health at the moment. The optimal total score equals 1.0, and the minimum important difference in 15D scores is 0.015.

Ethics

Retrospective data were used, and patients were not contacted for this study. Thus, ethics approval was not required for this study at our institution.

Statistical methods

Data are presented as means (± standard deviation, SD) for continuous variables, or in case of skewed distribution, median (with range). Percentages are reported for categorical variables. *t* tests were used to compare normally distributed continuous variables. When distribution was skewed, the Mann-Whitney *U* test and Spearman correlation were used. Multiple regression was conducted to examine the differences in HRQoL in the two patient cohorts while accounting for sex, smoking status, and remission as categorical variables and BMI and disease duration as continuous variables. A P value < 0.05 was considered statistically significant. Data analyses were performed using IBM SPSS Statistics 22 (IBM, Somers, NY).

Results

A total of 291 patients were identified. The two groups were similar with regard to gender distribution and disease duration, but JIA patients were leaner and less frequently smokers (Table 1). Smoking was fairly frequent in the different adult diagnosis groups: 23% of seronegative or seropositive arthritis patients, 25% of PsA patients, and 22% of SpA patients were smokers. The distribution of diagnoses is shown in Fig. 1. Patients with adult onset arthritides were more often seropositive than were JIA patients. Psoriatic arthritis (PsA) was the least common diagnosis in both groups.

Disease activity

According to the DAS28 remission criteria [21], 86% of JIA patients and 53% of adult patients were in remission (DAS28 < 2.6). Disease activity was low (DAS28 2.6–3.2) in 10% of JIA and 22% of adult patients, and high (DAS28 > 3.2) in 4% of JIA and 25% of adult patients, respectively. Other disease activity parameters are shown in Table 1. Disease activity was similar between females and males in both patient groups. All JIA patients reported lower levels of pain on the VAS than did adults. Median pain VAS was higher among JIA females than among JIA males (13.5, range 0–76 vs. 8.5, range 0–50; $P = 0.029$). BASDAI was similar between ERA and SpA patients. Non-ERA JIA patients had lower disease activity measured by DAS28 and better functional status measured by HAQ-DI than non-SpA adults. Adult smokers had higher pain VAS, increased disease activity measured by DAS28 or BASDAI, and poorer functional status measured by HAQ-DI than non-smoking adults (Table 2). We found no significant differences in disease activity measures among smoking and non-smoking JIA patients, but only nine JIA patients (7%) were smokers.

Table 1 Clinical characteristics and disease activity parameters of juvenile idiopathic arthritis (JIA) patients and adult onset arthritides

	JIA, $n = 130$	Adults, $n = 161$
Females (n (%))	92 (71)	114 (71)
Age (years)	18 (16–20)	39 (18–65)*
Duration of the disease (years)	7 (1–18)	4 (0–38)
BMI (kg/m^2)	22.2 ± 3.8	26.8 ± 5.8*
CRP (mg/dl)	1 (1–40)	1 (1–55)
Pain VAS (mm)	12 (0–76)	25 (0–99)*
DAS28[a]	1.6 (1.4–5.3)	2.4 (1.4–5.6)*
HAQ-DI[a]	0 (0–1.5)	0.25 (0–2.5)*
BASDAI[b]	1.0 (0–5.7)	1.7 (0–8.9)
15D	0.96 (0.77–1.0)	0.90 (0.53–1.0)*
Smoking (n (%))	9 (7)	36 (22)*

BMI body mass index, *CRP* C-reactive protein, *VAS* visual analogic scale, *DAS28* Disease Activity Score 28, *HAQ-DI* Health Assessment Questionnaire Disability Index, *BASDAI* Bath Ankylosing Spondylitis Disease Activity Index

*$P < 0.01$ for difference between groups

[a] DAS28 and HAQ-DI available for JIA excluding enthesitis-related arthritis (ERA), $n = 107$; adults excluding spondyloarthritides (SpA), $n = 124$

[b] BASDAI available for ERA, $n = 23$; SpA adults, $n = 40$

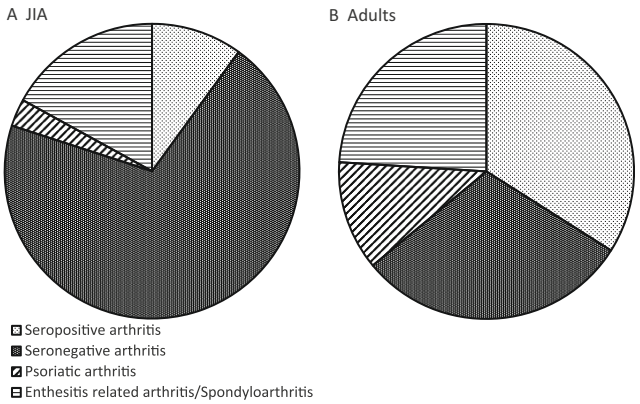

Fig. 1 Distribution of diagnoses of **A** juvenile idiopathic arthritis (JIA) and **B** adult onset arthritis patients. Seropositive arthritis 10% and 34%; seronegative arthritis 70% and 30%; psoriatic arthritis 3% and 12%; enthesitis-related arthritis/spondyloarthritis 17% and 24%; JIA and adult patients, respectively

Quality of life

JIA patients had significantly higher median 15D scores than adults (Table 1). Of the 15 dimensions covered by 15D, JIA patients scored significantly higher than adults in 12 dimensions: mobility, vision, hearing, breathing, sleeping, excretion, usual activities, mental function, discomfort and symptoms, depression, vitality, and sexual activity (Fig. 2). JIA females scored slightly lower on the 15D (0.93 ± 0.05 vs. 0.96 ± 0.06, $P = 0.021$, respectively) than did JIA males. Adult smokers had significantly lower 15D score than non-smoking adults (Table 2). These differences were evident in nine dimensions: mobility, eating, usual activities, mental function, discomfort and symptoms, depression, distress, vitality, and sexual activity (Fig. 3). Adult smokers' 15D scores were also inferior to smoking JIA patients' scores. Smoking JIA patients had lower 15D scores on breathing (0.87 ± 0.20 vs. 0.97 ± 0.08, $P = 0.014$, respectively) and sexual function (0.97 ± 0.10 vs. 1.0 ± 0.03, $P = 0.017$, respectively) than non-smoking JIA patients. Overweight (BMI > 25) adults had lower HRQoL than normal weight adults (15D score 0.86 ± 0.11 vs. 0.89 ± 0.09, $P = 0.028$, respectively). HRQoL was similar in overweight and normal weight JIA patients. In multiple regression, female gender, smoking, active disease, and increasing BMI were significantly associated with lower HRQoL (Table 3).

Table 2 Clinical characteristics and disease activity parameters of non-smoking and smoking juvenile idiopathic arthritis (JIA) and adult onset arthritis patients

	Non-smokers JIA, $n = 119$	Adults, $n = 126$	Smokers JIA, $n = 9$	Adults, $n = 35$
Age (years)	18 (16–20)	39 (18–65)	19 (16–20)	41 (18–65)
BMI (kg/m^2)	21.2 (16.4–40,6)	25.2 (17.9–43.1)##	23.7 (17.5–28.6)	27.2 (16.4–41.1)#
CRP (mg/dl)	1 (1–40)	1 (1–55)	1 (1–25)	3 (1–38)
Pain VAS (mm)	11 (0–76)	21.5 (0–90)##	26 (4–66)	41 (0–99)**
DAS28	1.6 (1.4–5.3)	2.1 (1.4–5.6)##	1.9 (1.4–4.2)	3.1 (1.4–5.5)*
HAQ-DI	0 (0–1.5)	0.13 (0–2.5)##	0 (0–6.0)	0.5 (0–2.1)**#
BASDAI	1.0 (0–5.7)	1.6 (0–6.2)	1.7 (1.3–2.9)	4.3 (0.9–8.9)*
15D	0.96 (0.80–1.0)	0.93 (0.57–1.0)##	0.92 (0.77–1.0)	0.86 (0.53–1.0)**#

Median (range)

BMI body mass index, *CRP* C-reactive protein, *VAS* visual analogic scale, *DAS28* disease activity score 28, *HAQ-DI* health assessment questionnaire disability index, *BASDAI* bath ankylosing spondylitis disease activity index

*$P < 0.05$ from non-smokers; **$P < 0.01$ from non-smokers; #$P < 0.05$ from JIA; ##$P < 0.01$ from JIA

Medications

Synthetic disease modifying anti-rheumatic drugs (sDMARDs) were used by 80% of JIA and 74% of adult patients, but sDMARD combination therapy was more common in adults (30% vs. 12%, $P < 0.001$). Biological DMARDs (bDMARDs) were commonly used in both groups (JIA 40% and adults 35%), whereas 10% of patients in either group used no DMARDs. Cortisone was infrequently used by JIA (5%) and adult patients (10%). We found no significant difference in HRQoL between patients using only sDMARDs or sDMARD and bDMARD combination therapy (data not shown). HRQoL was also similar between patients with or without methotrexate (data not shown).

Discussion

In the present study of consecutive rheumatology outpatient clinic patients with pre-established diagnoses and treatment regimens, transition phase JIA patients had acceptable HRQoL and their disease activity and degree of disability were lower than in patients with adult onset rheumatic diseases with similar disease duration. In multiple regression including the whole study population, female gender, smoking,

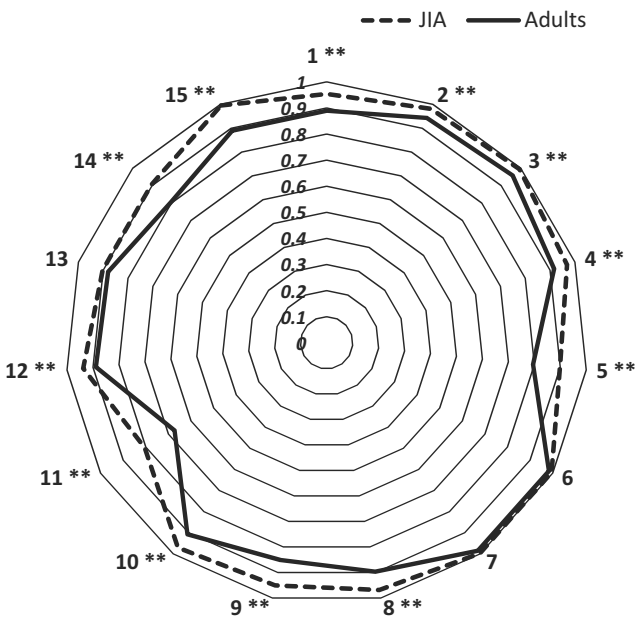

Fig. 2 Health-related quality of life measured by 15D for juvenile idiopathic arthritis (JIA) and adult patients ($n = 130$ and 161, respectively). 1 mobility, 2 vision, 3 hearing, 4 breathing, 5 sleeping, 6 eating, 7 speech, 8 excretion, 9 usual activities, 10 mental function, 11 discomfort and symptoms, 12 depression, 13 distress, 14 vitality, 15 sexual activity. *$P < 0.05$; **$P < 0.01$ between groups

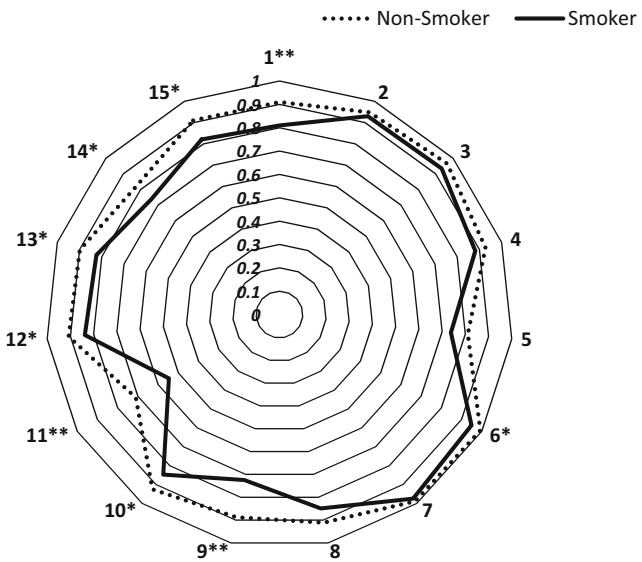

Fig. 3 Health-related quality of life measured by 15D for non-smoking and smoking adult onset arthritis patients ($n = 126$ and 35, respectively). 1 mobility, 2 vision, 3 hearing, 4 breathing, 5 sleeping, 6 eating, 7 speech, 8 excretion, 9 usual activities, 10 mental function, 11 discomfort and symptoms, 12 depression, 13 distress, 14 vitality, 15 sexual activity. *$P < 0.05$; **$P < 0.01$ between groups

Table 3 Associations of individual variables and quality of life and results in a regression analysis

	Binominal test[a] (covers r^b and P value)		In multiple regression model		
Variable	r^b	P value	β (SE)	95% CI	P value
Age cohort, JIA vs. adults (adults as baseline)	0.330	< 0.001	0.071	− 0.010–0.036	0.278
Gender (female as baseline)	0.150	0.010	0.135	0.005–0.052	0.016
Smoking status (smoking as baseline)	0.285	< 0.001	0.245	0.032–0.088	< 0.001
Disease activity (active disease as baseline)	0.481	< 0.001	0.367	0.049–0.096	< 0.001
BMI, continuous	− 0.200	0.001	− 0.151	− 0.005–0.000	0.016
Disease duration, continuous	− 0.010	0.240	− 0.016	− 0.002–0.001	0.773

JIA juvenile idiopathic arthritis, *BMI* body mass index

[a] Mann-Whitney U test for categorical variables and Spearman correlation for continuous variables

[b] For Mann-Whitney U tests, r was estimated using the formula $r = z$ / square root of N

disease activity, and increasing BMI were associated with lower HRQoL.

In previous reports, JIA patients undergoing transition of care [12], JIA patients in adulthood [9], and patients with adult onset rheumatic diseases [8, 26] have had lower HRQoL than the general population. To the best of our knowledge, this is the first study to compare the HRQoL of young JIA patients and patients with adult onset rheumatic diseases of similar disease duration. Although JIA and adult onset rheumatic diseases are partly different diseases [27], they share several common features and can cause joint damage if treated inappropriately [7]. To achieve optimal treatment results, both JIA and adult onset arthritides are treated with similar medications, i.e., sDMARDs and bDMARDs [28, 29].

Although our study is limited by the retrospective data collection, it also has several strengths. Our data presents two comprehensive patient cohorts. The cohort of adult arthritides was limited to working-age population to reduce age bias. Furthermore, disease duration was similar between JIA patients and adults. Patients with other potentially disabling diseases were excluded. We were, however, unable to assess the impact of previous changes in medications on HRQoL or the rates of possible complications, such as uveitis. Any changes in vision were still captured by the 15D instrument, thus compensating for this lack of data. We were also able to explore the associations of smoking and obesity, two well-known risk factors for decreased HRQoL, in our patient cohorts.

Smoking was associated with poorer disease outcomes in adults. Smoking habits differed significantly between JIA and adult patients. According to the latest data [30], smoking is more common among adults (12% of women and 13% of men aged 20–84 years) than among adolescents (7% in age group 14–18 years) in Finland. In this study population, smoking was as common among JIA patients as in the respective population in Finland, but smoking of adult patients exceeded the population level. The proportion of smokers was similar in different adult arthritis groups. It is possible that the reason for the greater proportion of adult smokers in the present study relates to smoking as an environmental risk factor for the development of RA [31, 32]. Smoking is also a factor provoking disease activity [33, 34] of arthritides. This may cause a concentration effect of patients with more active and longer standing diseases in the outpatient clinics. The proportion of smokers in the present study is comparable to the earlier cohorts of Swedish inflammatory arthritis patients [33, 34] and the proportion of JIA smokers in the transition phase was similar to our earlier transition cohort from 2015 [19]. Smoking has also been recognized as a cause for lower HRQoL in general [35].

Obesity is associated with poorer disease outcomes in rheumatoid arthritis [36]. Adult patients were more often overweight than JIA patients in the present study. The proportion of overweight (BMI > 25) patients was similar to the general population in Finland [37]. Overweight/obese patients had lower HRQoL than normal weight patients, but disease activity was similar in body weight groups.

Despite similar disease duration among JIA and adult patients in this study, JIA patients had better disease outcomes than patients with adult arthritides. The proportion of bDMARDs was similar in both groups, whereas adults were more often treated with a combination of sDMARDs. Combination therapies with sDMARDs are commonly used for treating adult rheumatoid arthritides in Finland [38]. We found no differences in HRQoL between different medication groups.

It is possible that smoking and overweight in the adult population explain most of their inferior disease outcomes compared to the JIA patients in this study. This highlights the importance of encouraging especially young patients to avoid smoking and to maintain a normal bodyweight in order to sustain good treatment results throughout the lifecourse. Engaging with and motivating young patients in the management of their condition is vital for treatment success. Similarly,

a more holistic care and treatment approach including smoking cessation programs and interventions for obesity could benefit all RA patients attending follow-up in adult clinics.

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Compliance with ethical standards

Retrospective data were used, and patients were not contacted for this study. Thus, ethics approval was not required for this study at our institution.

Disclosures None.

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