

ORIGINAL RESEARCH

DENTAL AND FACIAL CHARACTERISTICS OF PATIENTS WITH JUVENILE IDIOPATHIC ARTHRITIS

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OBJECTIVE: It has been shown that the temporomandibular joint is frequently affected by juvenile idiopathic arthritis, and this degenerative disease, which may occur during facial growth, results in severe mandibular dysfunction. However, there are no studies that correlate oral health (tooth decay and gingival diseases) and temporomandibular joint dysfunction in patients with juvenile idiopathic arthritis. The aim of this study is to evaluate the oral and facial characteristics of the patients with juvenile idiopathic arthritis treated in a large teaching hospital.

METHOD: Thirty-six patients with juvenile idiopathic arthritis (26 female and 10 male) underwent a systematic clinical evaluation of their dental, oral, and facial structures (DMFT index, plaque and gingival bleeding index, dental relationship, facial profile, and Helkimo's index). The control group was composed of 13 healthy children.

RESULTS: The mean age of the patients with juvenile idiopathic arthritis was 10.8 years; convex facial profile was present in 12 juvenile idiopathic arthritis patients, and class II molar relation was present in 12 ($P = .032$). The indexes of plaque and gingival bleeding were significant in juvenile idiopathic arthritis patients with a higher number of superior limbs joints involved ($P = .055$). Anterior open bite (5) and temporomandibular joint noise (8) were present in the juvenile idiopathic arthritis group. Of the group in this sample, 94% ($P = .017$) had temporomandibular joint dysfunction, 80% had decreased mandibular opening ($P = 0.0002$), and mandibular mobility was severely impaired in 33% ($P = .015$).

CONCLUSION: This study confirms that patients with juvenile idiopathic arthritis a) have a high incidence of mandibular dysfunction that can be attributed to the direct effect of the disease in the temporomandibular joint and b) have a higher incidence of gingival disease that can be considered a secondary effect of juvenile idiopathic arthritis on oral health.

KEY WORDS: Juvenile idiopathic arthritis. Dental pain. Teeth. Temporomandibular joint juvenile. Rheumatoid arthritis.

Juvenile idiopathic arthritis (JIA) is a chronic, inflammatory, systemic disease. Beginning before 16 years of age, it affects 1 or more joints of the body. It is characterized predominantly by idiopathic peripheral arthritis with an immunoinflammatory pathogenesis. According to the expression at onset and during the first 6 months of the disease, the most common types of JIA onset are: oligoarticular (4 or fewer involved joints), polyarticular (5 or more involved joints), and systemic (pres-

ence of arthritis and severe systemic involvement). The characteristic joint manifestations are chronic synovitis, arthralgia, and impaired joint mobility. Extra-articular manifestations of dis-

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ease include fever, rheumatoid rash, cardiac disease, chronic uveitis, and others^{1,2}.

The involvement of the masticatory system, mainly involving the temporomandibular joint (TMJ), by this rheumatologic disease is very common. Chronic inflammation in this joint results in degenerative alterations and the presence of signs and symptoms of dysfunction, such as pain, TMJ noises, and limited movement. Alterations in facial growth, such

as micrognathia, retrognathia, facial asymmetry, and anterior open bite, also occur due to condylar involvement³⁻⁷.

The teeth and gingiva can be indirectly affected by JIA due to physical limitations in the superior limbs of these patients, which make performing adequate oral hygiene difficult, contributing to the higher incidence of dental and gingival pathology^{8,9}.

Until recently, there have been no studies that evaluate the various components of masticatory system in children with JIA. The aim of this study is to evaluate the dental, gingival, and facial characteristics, including TMJ dysfunction, of patients with JIA seen at a tertiary teaching hospital.

PATIENTS AND METHOD

Patient selection

Thirty-six patients attending the Pediatric Rheumatology Unit at a large teaching hospital who fulfilled the diagnostic criteria for JIA as proposed by the ILAR (International League of Associations of Rheumatology)¹⁰ were evaluated for their dental and facial characteristics, including temporomandibular joint (TMJ) dysfunction. In order to ensure consistency in the interview methods, the diagnoses were confirmed by a clinical examination performed by a trained and calibrated dentist. A control group consisted of 13 healthy children who were attended to by the Dentistry Department of the same hospital. The study was approved by the Ethics Commission of the hospital.

Clinical evaluation

The diagnostic protocol was applied to all patients equally. It consisted of a standardized interview and systematic evaluation of cervical, cranial, facial, oral, and dental structures. Considered were: a) age and gender; b) age of onset

of JIA; c) duration of JIA; d) type of onset and evolution of JIA; e) Steinbrocker's functional classification¹¹ (classes I to IV, according to the capacity to perform daily activities); f) number of affected joints in superior limbs (swelling and limitation of motion); g) the facial profile (determined by facial analysis and classified into 3 patterns—concave, convex, and straight profile); h) molar relationship determined according to the Angle classification¹² (classes I to III, according to the position of the superior first molar in relation to the inferior first molar); i) tooth decay index¹³ (used to record the decayed, missing, and filled permanent and primary teeth—DMFT index); j) dental plaque index¹⁴ (used to evaluate the level of oral hygiene, which was calculated according to the number of dental surfaces stained by plaque-detection tablets multiplied by 100 and divided by the total number of surfaces); k) gingival bleeding index¹⁵ (used to evaluate gingival inflammation as determined by the number of bleeding surfaces after survey with a periodontal probe, multiplied by 100 and divided by the total number of surfaces); and l) temporomandibular joint dysfunction index (Helkimo¹⁶), which consists of the clinical dysfunction index (CDI) with evaluation of 5 clinical signs of dysfunction (jaw mobility, impaired TMJ function, jaw muscle pain, TMJ pain, and pain on mandibular movement), and the mandibular movement index (MMI) consisting of an evaluation of mandibular movements (maximum interincisal opening, right and left movements, and protrusion), and the presence of TMJ noises on movement.

Statistical analysis

To evaluate the nature of the distribution of the values of the variables or the variability of the measurements, parametric and nonparametric tests were performed. The following tests

were applied: Student *t* test for 2 independent samples, chi-squared partition test for 2XN tables, chi-squared test for 2X2 tables, and Fischer exact test. In all statistical tests, the level of significance was set at 5% ($P \leq .05$).

RESULTS

Twenty-six girls and 10 boys with JIA were evaluated. The median age of the JIA patients was 10.8 years (ranging from 4.7 to 20 years). The control group consisted of 9 girls and 4 boys with the median age of 9.4 years (ranging from 5.4 to 14 years). The median age of JIA onset was 4.6 years (ranging from 1 to 13 years). The median duration of JIA was 7 years (ranging from 1 to 16 years). Twenty-two patients showed systemic onset, 7 had polyarticular onset with rheumatoid factor negative, and 7 had oligoarticular onset, with an extended course in 6. Thirty-five patients showed polyarticular evolution, and only 1 had oligoarticular evolution. The following functional classes were observed according to Steinbrocker's functional classification: CI I in 20 patients, CI II in 9, CI III in 4, and CI IV in 3 patients. Eighteen patients had up to 2 affected joints, and the other 18 had between 3 and 8 joints affected by the JIA (Table 1).

Orofacial pain or jaw restriction

When interviewed, 10 JIA patients (28%) complained of some problem of the orofacial region, including toothache (3), pain on chewing or during mouth opening (6), and difficulty in opening the mouth (1). Only 1 child in the control group reported pain on chewing.

Facial profile, dental relationship (occlusion)

Among the JIA patients, 12 had a convex profile (33%), 2 had a concave

Table 1 - Clinical characteristics of 36 patients with juvenile idiopathic arthritis.

Sex	Male: 10; female: 26
Age range	4 y 7 mo to 20 y (median= 10 y 8 m)
Age at onset of the disease	4 y 6 mo (median)
Disease duration at time of study entry	1 y to 16 y (median = 7 y)
Type of onset	Systemic: 22 Polyarticular with rheumatoid factor negative: 7 Oligoarticular: 7 (extended course in 6)
Type of evolution	Polyarticular course: 35 Oligoarticular course: 1
Steinbrocker's functional class	I: 20 II: 9 III: 4 IV: 3

y = years; mo = months

profile (5%), and 22 had a straight profile (61%). In the control group, 1 had a concave profile (7%), 11 had a straight profile (84%), and 1 had a convex profile (7%). A Class I molar relationship was more prevalent among controls (92%) compared with JIA patients (60%). A Class II molar relationship was observed only in patients with JIA (34%); this difference was statistically significant ($P = .032$). A Class III molar relation was observed in 2 patients with JIA and 1 patient in the control group. In 1 patient with JIA, it was not possible to determine the molar relationship due to the absence of molars and canines (Table 2).

Anterior open bite

Anterior open bite was observed in 5 patients (14%) with JIA, and 4 of

these patients presented with a systemic onset of the disease (Table 2). Three of these patients presented with a convex profile, and 2 presented with a straight profile. Three reported complaints in the orofacial region, with only 1 presenting with TMJ noise (bilaterally crepitus).

Dental and gingival conditions

Patients in the JIA group had higher values of the DMFT index, dental plaque index, and gingival bleeding index than those of the control group, with the worst dental conditions in patients with JIA. Patients with polyarticular JIA and with rheumatoid factor negative onset had a gingival bleeding index of 29% and DMFT index of 6.6. These values were statistically significant ($P = .047$ and

$P = .046$, respectively) compared with the control group. There was a progressive increase in the dental plaque index and gingival bleeding index in the group with JIA in proportion to a higher number of involved superior limb joints in these patients, with a statistically significant difference for the gingival bleeding index ($P = .055$) (Table 3).

Temporomandibular joint dysfunction

Evaluation of the Helkimo's index (CDI) showed dysfunction among 34 patients (94%) with JIA that was more frequent in systemic onset, as compared with the control group ($P = .017$). Eleven patients with JIA (30%) presented with severe clinical dysfunction, while this degree of dysfunction was not observed in patients in the control group. Regarding the mandibular mobility index, severely impaired mandibular mobility was observed in 12 patients (33%) with JIA compared with no patient in the control group ($P = .015$) (Table 4). The mandibular range of movement of patients with JIA was smaller compared with the controls. The maximum interincisal mouth opening of the patients with JIA was 38.7 ± 7.3 mm compared with 47 ± 5.3 mm of the control group ($P = 0.0002$). The mean right

Table 2 - Molar relationship and facial profile in patients with juvenile idiopathic arthritis according to the type of onset, compared with the control group.

Orofacial characteristics	Total (n = 36)		JIA Systemic (n = 22)		JIA Polyarticular (n = 7)		JIA Oligoarticular (n = 7)		Controls (n = 13)	
	n	%	n	%	n	%	n	%	n	%
Class I molar relation	21	60	13	59	4	57	4	57	12	92
Class II molar relation	12	34	8	36	1	14	3	43	0	0*
Class III molar relation	2	5	1	4	1	14	0	0	1	7
Convex profile	12	33	12	54	0	0	0	0	1	7
Concave profile	2	5	0	0	2	28	0	0	1	7
Straight profile	22	61	10	45	5	71	7	100	11	84
Anterior open bite	5	14	4	18	0	0	1	14	0	0

* $P < 0.032$. The statistical significance is related to the comparison of control group and total of patients with juvenile idiopathic arthritis.

Table 3 - Dental and gingival findings in patients with juvenile idiopathic arthritis according to the number of affected joints in superior limbs, compared with the control group.

Mean Index	Juvenile idiopathic arthritis 0 to 2 affected joints in superior limbs (n = 18)	Juvenile idiopathic arthritis 3 to 8 affected joints in superior limbs (n = 18)	Controls (n = 13)
DMFT index	3.82	6.72	3.6
Plaque index (%)	47.5	62.7	42.4
Gingival bleeding index (%)	15.0	27.7*	4.07

**P* = .05. The statistical significance is related to the comparison of control group and group of patients with 3 to 8 affected joints in superior limbs.

Table 4 - Clinical dysfunction index, mandibular mobility index, and temporomandibular joint noise in patients with juvenile idiopathic arthritis according to the type of onset, compared with the control group.

Index	Total (n = 36)		JIA Systemic (n = 22)		JIA Polyarticular (n = 7)		JIA Oligoarticular (n = 7)		Controls (n = 13)	
	n	%	n	%	n	%	n	%	n	%
Dysfunction	34	94	21	95	6	85	7	100	4	30*
Severe	11	30	7	39	2	28	2	28	0	0
Moderate	5	13	3	13	1	14	1	14	1	7
Mild	18	50	11	50	3	43	4	57	3	23
Normal	2	5	1	4	1	14	0	0	9	69
Decreased mobility	29	80	17	77	5	71	7	100	9	69
Severe	12	33	8	36	3	43	1	14	0	0*
Mild	17	47	9	41	2	28	6	85	9	69
Normal	6	16	5	22	1	14	0	0	4	30
TMJ Noise	8	22	5	22	2	28	1	14	0	0

**P* < 0.015. The statistical significance is related to the comparison of the control group and total of patients with juvenile idiopathic arthritis.

and left jaw mobility was also reduced in patients with JIA (8.2 ± 2.9 mm and 7.3 ± 2.9 mm, respectively); in relationship to the control group (9.8 ± 1.7 and 10 ± 1.2 mm, respectively), this difference was statistically significant (*P* = .024 and *P* = .001, respectively). In the patients with JIA, the mean values for protrusion were also smaller (4.5 ± 2.5 mm); these differences were statistically significant compared with the control group (6.2 ± 2.2 mm) (*P* = .044). Only patients with JIA (8) presented with TMJ noise upon movement (22%).

DISCUSSION

Although 94% of the children with JIA presented with clinical signs of temporomandibular dysfunction, they

did not present with spontaneous complaints of pain in the orofacial region. However, upon questioning, 28% indicated having pain in the face or teeth or restricted chewing. Since TMJ pain is not normally included in the primary complaints of patients with JIA, its involvement is usually fairly asymptomatic compared with other joints^{3,6,16} and rarely disables complete mandibular function, thus leading to under-diagnosis, mainly in the initial stages of the disease.^{17,18} JIA is a physically limiting disease that impairs the patient's quality of life.^{3,17} Nevertheless, there are few studies that have evaluated restrictions of mandibular function of these children. Our study shows a higher index of clinical dysfunction and mandibular mobility in patients with JIA and confirms TMJ impairment in these patients. While dental and

TMJ abnormalities due JIA have been studied in the past, this is the first study that evaluates both the signs and symptoms of dental and TMJ problems of JIA patients in the same study. It demonstrates a wider prevalence of the damage to the stomatognathic system provoked directly or indirectly by the JIA.

Patients with JIA can present with a decrease in the mandibular growth, resulting in facial alterations such as convex profile, micrognathia, retrognathia, and anterior open bite.^{4,19,20} Convex profile is a relevant physical aspect in children with JIA,^{4,5,6,21} and 33% of the JIA patients presented this condition. This type of profile is usually associated with advanced TMJ disease, with partial resorption of the condyle and micrognathia, which are common findings of this degenerative joint disease.²²

²³ An anterior open bite was found in 5 patients with JIA (14%). However, 2 of these patients presented with a straight profile. This finding indicates that care must be exercised regarding the association between a convex facial profile with anterior open bite and micrognathia, because the soft tissues can mimic this condition. In addition, TMJ noises were clinically detected in 27% of the patients with JIA, although in 4 of the patients with micrognathia an anterior open bite, TMJ noises were not detected even though they presented with severe TMJ dysfunction. The level of the compromised and limited TMJ movement accounts for the difficulty in detecting articular sounds.

Complaints of dental pain may not result from JIA but can be a consequence of the physical limitations of the patients, mainly when functional impairment of the superior limbs joints is present.^{2,8,9} Children with JIA cannot perform appropriate oral hygiene, and this can result in decay and gingivitis. The plaque index was similar between the 2 groups; however, on analyzing the gingival bleeding index (GBI) of our sample, it was observed

that the GBI increased as the child presented with a higher number of involved joints. When JIA is detected by clinicians, they should counsel and encourage their patients to maintain good oral hygiene. The parents also should be trained to help with oral hygiene. Dietary recommendations, particularly regarding ingestion of sugar, and periodic dental consultations will aid in the management of associated dental conditions. This strategy will help in avoiding the presence of opportunistic infectious diseases, such as caries or gingival diseases, which are potentially due to the continued activity of JIA.²⁰

Our data reinforces the need for standardized investigation of not only TMJ but also the dental, gingival, and facial aspects in patients with JIA. Further standardized studies would help to define the TMJ involvement and establish preventive dental and gingival procedures. More visits to dentist may be necessary for these children. Awareness of the dental and TMJ alterations arising from JIA, as well early evaluation of the stomatognathic system of children with this disease, is necessary

to identify these patients. These studies would lead to the establishment of treatment plans that minimize the potential orofacial morbidity associated with this disease, thereby achieving an improvement in the quality of these children's lives.

CONCLUSION

This study confirms that JIA significantly affects jaw function and indirectly causes dental abnormalities. The increased levels of the tooth decay index, plaque index, and gingival bleeding index among patients with JIA, associated with their TMJ dysfunction, indicates the need for frequent dental and TMJ evaluations for these children.

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RESUMO

SAVIOLI C e col. Características dentárias e faciais de pacientes com artrite idiopática juvenil. **Rev. Hosp. Clín. Fac. Med. S. Paulo** 59(3):93-98, 2004.

OBJETIVO: A articulação temporomandibular é freqüentemente afetada pela artrite idiopática juvenil, e esta doença degenerativa, durante o crescimento facial, resulta em disfunção mandibular grave. No entanto, não há estudos que avaliam conjuntamente alterações na saúde oral (cáries e doenças gengivais) e na articulação temporomandibular decorrentes da ar-

trite idiopática juvenil. O objetivo deste estudo é avaliar a condição dentária e a função mandibular de pacientes com artrite idiopática juvenil tratados em um hospital escola.

MÉTODO: Trinta e seis pacientes com artrite idiopática juvenil (26 meninas e 10 meninos) foram submetidos a uma avaliação clínica sistemática de suas estruturas dentárias, orais e faciais (índice CPO-D, índice de placa e sangramento gengival, relação dentária, perfil facial e índice de Helkimo para articulação temporomandibular). O grupo controle foi composto por 13 crianças saudáveis.

RESULTADOS: A média de idade dos pacientes com diagnóstico de artrite idiopática juvenil foi 10,8 anos; o perfil facial convexo foi encontrado em 12 pacientes com artrite idiopática juvenil e relação molar classe II esteve presente em 12 deles ($p=0,032$). Os índices de placa e sangramento gengival foram significantes em pacientes com artrite idiopática juvenil que apresentavam maior número de articulações dos membros superiores comprometidas ($p=0,055$). Mordida aberta anterior (cinco) e ruídos articulares (oito) foram encontradas no grupo com artrite idiopática juvenil. Este grupo apresen-

tou 94% dos pacientes com disfunção da articulação temporomandibular ($p=0,017$), além de amplitude mandibular diminuída ($p=0,0002$) e mobilidade mandibular gravemente comprometida em 33% ($p=0,015$).

CONCLUSÃO: Este estudo confir-

ma que pacientes com artrite idiopática juvenil: a) têm alto índice de disfunção mandibular, que pode ser atribuído ao efeito direto da doença sobre a articulação temporomandibular e b) maior índice de doença gengival, que pode ser considerado como efeito

indireto da artrite idiopática juvenil na saúde oral.

UNITERMOS: Artrite Idiopática Juvenil. Dor dentária. Dentes. Articulação temporomandibular. Artrite reumatóide juvenil.

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