



ASSESSMENT OF ORAL HEALTH STATUS OF CHILDREN AND YOUNG ADOLESCENTS WITH JUVENILE IDIOPATHIC ARTHRITIS

Dental Science

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ABSTRACT

Aims and Objectives: The study aims to assess the prevalence of the type of JIA, general disabilities, and their implications on the oral health of JIA children.

Material and methods: A total of 52 children with JIA were screened and enrolled to participate in this study. All the parameters recorded were subjected to statistical analysis.

Results: Out of 52 children, 32 are females and 20 are males. On systemic examination, oligoarthritis and polyarthritis were commonly seen in the participants. The dmft/DMFT, Plaque, and Gingival Index scores were 3.53 ± 3.03 , 3.6 ± 2.3 , and 2.2 ± 1.9 respectively. The challenges reported by most of the participants were difficulty in brushing and inability to walk.

Conclusion: As there are myriad oral health implications of JIA such as poor oral hygiene and increase caries index, it is important the condition is diagnosed early and Pedodontist is involved as a part of a multi-disciplinary team for the treatment of children with JIA.

KEYWORDS

Juvenile Idiopathic Arthritis, Dental Caries, Polyarthritis, Oligoarthritis

Juvenile idiopathic arthritis (JIA) is a chronic rheumatic disease, with a prevalence of 1.6 to 23 in 100,000 children under the age of 16 yrs.^[1] According to the International League of Associations of Rheumatology (ILAR) it is classified as Systemic Arthritis, Polyarthritis, Oligoarthritis, enthesitis-related arthritis, psoriatic arthritis, and undifferentiated arthritis.^[2]

The cardinal features of JIA include swelling of one or more joints, tenderness and inability to perform daily activities.^[3] When the arthritis involves upper limbs, there is difficulty in performing brushing. This, in turn, leads to increased caries and gingival problems.^[4-8] Other factors include diet, saliva, and Temporomandibular joint Arthritis (TMJ).^[9-12]

The present study aims to assess the oral health status of children and young adolescents with Juvenile Idiopathic Arthritis (JIA) within age groups of 5-17 yrs of age.

MATERIALS AND METHODS:

Ethical clearance for the study was obtained from the Institutional Ethical Committees of both the institutions, where the study was conducted. All participants and their guardians were explained the purpose of the study verbally and written approval was taken on an informed consent form. The informed consent form was drafted in English and Telugu for the participants and guardians to understand. A total of 52 children with Juvenile idiopathic arthritis (JIA) were examined.

A thorough family and medical history of subjects were taken. Clinical evaluation of systemic, facial, oral, and dental structures was done. A thorough general examination of joints was done to identify the extent of disability.

INCLUSION CRITERIA:

Children of age group 5 -17 yrs attending the Department of Rheumatology diagnosed Juvenile Idiopathic Arthritis (JIA) according to the International League of Associations for

Rheumatology (ILAR) were included.

Exclusion Criteria:

Children suffering with other systemic diseases such as diabetes mellitus, heart diseases, organ transplantations, neurological disorders, infectious disorders, and renal disorders were excluded. Children suffering from syndromes showing similar dentofacial abnormalities were excluded.

Oral Examination: Visual examination of the oral cavity was done on the dental chair. Dental caries incidence was recorded using dmft/DMFT index^[13] and plaque and gingival index were used to record oral hygiene and gingival health. All teeth which were already more than half visible in the oral cavity were assessed. Teeth showing cavitation were assigned d/D (Decayed), teeth missing due to caries were assigned m/M (missing), filled, and crowned teeth as f/F (Filled). Plaque Index: Plaque score was calculated using Silness and Loe Plaque Index, 1964.^[14] The scores were given as 0= No plaque, 1= A film adhering to the free gingival margin, 2= Moderate accumulation of soft deposits within the gingival pocket, or the tooth and gingival margin which can be seen with the naked eye, 3= Abundance of soft matter within the gingival pocket or the tooth and gingival margin.

Gingival Index: Gingival inflammation was calculated using the Gingival Index by Loe and Silness, 1963.^[15] The scores were given as 1= Absence of inflammation/normal gingiva, 2= Mild inflammation, edema, no bleeding on probing, 3= Moderate inflammation, redness, bleeding on probing, 4= Severe inflammation, marked redness, spontaneous bleeding on probing.

Statistical Analysis

Data analysis was carried out using the SPSS 21 version. Descriptive statistics were presented in the form of mean, median and Standard deviation. Gender comparisons of clinical parameters were analyzed using Mann Whitney 'U' test. Chi square test was used to know the difference among males and females for difficulty in brushing and

inability to walk. The level of significance was set at $p < 0.05$ for all tests.

RESULTS

A total of 52 children diagnosed with JIA were enrolled in the study. Among them, 32 children were females and 20 were males (Table 1). Overall, 3 types of JIA were reported, Systemic arthritis is reported in 6 (11.5%) children, oligoarthritis involving less than 4 joints is reported in 30 (57.6%) children and polyarthritis involving more than 4 joints is reported in 16 (30.7) children (Table 2).

Table 1: Prevalence of JIA according to gender.

GENDER	Number of Children/ Percentage
Female	32 (61.5)
Male	20 (38.4)

Table 2: Types of JIA reported.

TYPE	Number of Children/ Percentage
Systemic Arthritis	6 (11.5)
Oligoarthritis	30 (57.6)
Polyarthritis	16 (30.7)

General disabilities: Difficulty in brushing and Inability to walk were mainly reported in females compared to males (Table 3) indicating significant disability and early involvement of joints in females.

Table 3: Gender comparison of Parameters

Parameters	YES	NO	Total	χ Value	P Value
Difficulty In Brushing					
Males	11 (21.2)	9 (17.3)	20 (38.5)	4.132	0.042*
Females	26 (50.0)	6 (11.5)	32 (61.5)		
Inability to Walk					
Males	10 (19.2)	10 (19.2)	20 (38.5)	4.424	0.035*
Females	25 (48.1)	7 (13.5)	32 (61.5)		

Chi Square Test: * $P < 0.05$ (significant), ** $p > 0.05$ (Not significant)

Oral Health parameters: The caries, plaque and gingival indices were significantly higher in children who have reported positive for difficulty in brushing (Table 4). This indicates correlation between inability to brush and oral health status of children. Plaque and gingival indices were significantly high in children with inability to walk (Table 5).

Table 4: Oral Health status in relation with Difficulty in brushing

Difficulty in Brushing	Mean $\pm$ SD	Median	Mean Ranks	Mann-Whitney U Value	P value
DMFT/dmft Index					
Yes	4.67 $\pm$ 1.81	4.00	30.34	135.50	0.003*
No	2.53 $\pm$ 1.92	3.00	17.03		
Plaque Index					
Yes	2.18 $\pm$ 0.51	2.00	33.59	15.00	<0.001*
No	1.00 $\pm$ 0.00	1.00	9.00		
Gingival Index					
Yes	2.91 $\pm$ 0.68	3.00	32.72	47.50	<0.001*
No	1.66 $\pm$ 0.48	2.00	11.17		

Mann Whitney U test, * $P < 0.05$ (significant), ** $P > 0.05$ (Not significant)

Table 5: Oral Health status in relation with Inability to walk

Inability to walk	Mean $\pm$ SD	Median	Mean Ranks	Mann-Whitney U Value	P value
DMFT/dmft Index					
Yes	3.65 $\pm$ 2.04	4.00	23.94	208.00	0.07**
No	4.88 $\pm$ 1.93	4.00	31.76		
Plaque Index					
Yes	1.62 $\pm$ 0.64	2.00	22.17	146.00	0.001*
No	2.29 $\pm$ 0.58	2.00	35.41		
Gingival Index					
Yes	2.34 $\pm$ 0.83	2.00	23.00	175.00	0.011*
No	3.00 $\pm$ 0.70	3.00	33.71		

Mann Whitney U test, * $P < 0.05$ (significant), ** $P > 0.05$ (Not significant)

DISCUSSION

Juvenile idiopathic arthritis is reported to mainly impact joints and growth. The signs and symptoms result in a short term to long term disability. The present study had focused on important parameters that require immediate attention. A total of 52 children within age groups of 5-17yrs with JIA were screened and enrolled to participate in this study.

Among them 32 children are females and 20 are males. According to Padmini A et al^[16], The incidence of JIA is predominantly in females with the ration 1:2.2 and its peak occurrence is in toddlers and preschoolers. The immune response in females is predominately more T helper type 2 whereas in males it is T helper type 1 type. The antigen and antibody response and amount of immunoglobulin levels are usually very high in females. The findings in the present study confirm the predominance of JIA in females.

To understand the genetic predisposition in JIA, data related to consanguinity, medical history of parents, and siblings were analyzed. Consanguineous marriages were reported in 14 families (27%), none of the parents and siblings had a history of either JIA or Rheumatoid arthritis. The genetic predisposition factor is not in accordance with Padmini A et al^[16], who have reported children with JIA have a positive family history of Rheumatoid arthritis. There is evidence from a study by Niibo et al,^[17] that siblings of JIA children have a 15 - 30-fold increased prevalence of JIA.



Figure 1A: Metacarpophalangeal joint swelling in 14yrs old child.



Figure 1B: Bilateral Metacarpophalangeal joint swelling in 11yrs old child.

In the present study, Oligoarthritis involving less than 4 joints is reported in 30 children followed by Polyarthritis in 16 children, with the least type reported being Systemic arthritis in 6 children. According to Olson JC et al,^[18] Oligoarthritic JIA is the most common JIA with the involvement of 1-4 joints and antinuclear antibodies were reported in 55% of children. Polyarthritis JIA involves more than 4 joints and usually small joints of hand and feet. The present study reports 57% of children with Oligoarthritis and children with polyarthritis have swelling of small joints as in Figures 1A and 1B. The inability to walk was reported by 35 (67%) children due to the involvement of knee joints as seen in Figures 2, and 3. A total of 37 (71%) children have reported difficulty in brushing which is in accordance with Barr T et al,^[19] who have reported the cause of poor oral hygiene is due to involvement of joints of the upper limb as brushing and flossing require fine motor movements.



Figure 2: Bilateral Knee Joint swelling in 5yrs old child.



Figure 3: Bilateral Knee Joint swelling in 8yrs old child.

The dmft/DMFT, plaque, and gingival index scores were significantly high in JIA children which is in accordance with many studies. Merle

CL et al^[5] conducted a study in 59 JIA patients and reported a DMFT/dmft score of 2.6, 57.6% of patients had a maximum score of 2 periodontal screening index and 52.5% had Temporomandibular Joint dysfunction. Walton AG et al,^[6] reported the involvement of the upper limb is the main reason for inability to brush, hence a spectrum of increased bacterial load due to plaque accumulation and this parameter is proved to be significant in this study. The quality of Saliva is low due to lower concentrations of Calcium, phosphorous, potassium, lysozyme, and Immunoglobulin. The involvement of TMJ due to pathological inflammatory changes results in tenderness of masticatory muscles, restricted mouth opening and impaired mandibular growth and, Class II malocclusion. Leksell E et al,^[7] reported increase in gingival pocket formation due to lower resistance from gingival tissues.

JIA children tend to have small meals frequently due to the involvement of the masticatory system and pain in the Temporomandibular joint. Welbury RR et al,^[8] reported a higher incidence of untreated dental caries and the number of missing teeth due to caries in a study with 141 JIA children. Skeie MS et al,^[9] conducted a meta-analysis of 19 articles that have reported the oral health status of children with JIA. The results of the meta-analysis include an increase in periodontal diseases and temporomandibular joint disease in children with JIA compared to the healthy control group. JIA children had a high number of untreated caries that warns us of the necessity of early intervention. Niibo et al,^[17] reported there is a high prevalence of bacteria such as streptococcus, Haemophilus, Kingella, Porphyromonas, and Rothia in JIA children resulting in bleeding on probing when compared to healthy control group. Further, cyclosporine is commonly prescribed as part of the treatment regimen for JIA can result in gingival hyperplasia.

Bhatt KH et al^[10] reported dietary practices such as sugar-containing medicines, consumption of a diet with more sugars are the main reasons for high dental caries. The medicines are delivered in Elixir formulations which are sugar-based to improve the palatability and acceptance. Electric toothbrushes can help children with upper limb disabilities. Fluoride toothpastes, varnishes, mouthwashes, pit and fissure sealants at an early age can significantly reduce the load of bacteria in the oral cavity.

Furthermore, Beena JP^[11] illustrates long term use of corticosteroids might result in adrenocortical insufficiency and further compromise the immune system. Hence, children are more susceptible to infections, and wound healing is delayed. This kind of scenario is challenging to facilitate dental care especially when an invasive treatment is required. For patients on Steroid therapy, it's important for steroid coverage before planning any elective dental treatment.

CONCLUSION

The present study mainly focuses on the oral health status and the general disabilities of children with JIA. There is a necessity of further radiographic evaluation of TMJ as the signs and symptoms worsen with age and it is important to diagnose the condition at a very earlier stage. There is a necessity for early intervention as JIA has a significant impact on oral health. Early diagnosis is the key step for the treatment of dental implications of JIA. Hence, Pedodontist should be part of a multidisciplinary team of JIA.

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