Research Article

Orthodontic Treatment Needs of Children Living in Orphanage According to the Dental Aesthetic Index (DAI)

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Abstract: The study was conducted to determine the prevalence of orthodontic treatment needs among orphan children as the prevalence malocclusion is common among this population due to high occurrence of malnourishment. The sample consisted of 158 orphans with the age group ranging from 11 to 13 years form different orphanage Institutes using simple random sampling technique. Dental Aesthetic Index (DAI) was used to record orthodontic treatment needs. The Statistical software namely SPSS version 15.0 was used for the analysis different parameters at p value <0.05. Overall DAI was found to be very high i.e. 23.92±5.568 and was more seen in girls. 79.7% orphans had crowding and 42.2% subjects were having diastema between incisors. Maxillary and mandibular anterior teeth irregularity was observed among 67.2% and 78.4% orphans respectively and 41.1% had a normal anterior posterior molar. The severity of malocclusion and orthodontic needs were more among this group of population due to different factors. Hence careful planning based on feasibility is essential for the creation of appropriate solutions.

Keywords: Dental Aesthetic Index; Malocclusion; Orphans.

INTRODUCTION

The major proportion of the Indian population lives in rural areas of country of which more than 40% constitute children [1]. The strength of a nation lies in a healthy, protected, educated and well developed child population as these will grow up to be productive citizens of the country and are hence the future of a nation [2]. Nutrition plays a major role in maintaining health of children while malnutrition appears to generate vulnerability [3].

Malnutrition is a multifactorial disease that can have an early onset during intrauterine life or childhood or can occur during an individual's lifetime as a result of poor nutrition and/or repeated episodes of infectious or chronic diseases [4]. Malnutrition due to hunger and inadequate nutritious food intake makes children anemic, weak and prone to diseases and according to many scholars, most affected among them include a deprived and isolated section of the society called the orphans [3].

Health problems of children living in orphanage can be complex and clearly related to the living conditions in the institution. Children in orphanage are often abandoned by their families as infants, toddlers, or even at school age. The depression and withdrawal that sometimes results leads to immune suppression and puts children at risk for many infectious, communicable diseases and malnutrition, leading to risk of poor health and immunity [5].

The association between malnutrition and impaired growth and the development of facial bones has been reported by a number of researchers and has been linked to a reduction in the length of the skull base and jaw height [6]. There have also been reports of variations in maxillomandibular width, lower facial height and dental and skeletal ages [7] as a result of malnutrition.

Moreover, malocclusion appears to be the second commonest of the dental diseases in children and young adults, next to dental caries [8]. The prevalence of malocclusion varies from country to country and among different age and sex groups. The prevalence of malocclusion in India varies from 20 % - 43 % but little attention has been paid to orphan children in India [9].

Large number of studies have been conducted to evaluate the oral health and treatment needs of mentally challenged, handicapped, institutionalized [10], psychiatric patients and among lower socioeconomic status groups [9,11], but the assessment of the same in orphan population is lacking in the literature. Hence this study was undertaken to estimate the prevalence of orthodontic treatment needs as

assessed with the Dental Aesthetic Index among this special group of children.

MATERIALS AND METHODS

The epidemiological study was performed to assess the prevalence of orthodontic treatment needs among 11 – 13 year age group orphan children using Dental Aesthetic Index. Four orphanage Institutes were surveyed from Jammu.

Inclusion and exclusion criteria

Orphan children between the mentioned age group and free of any serious illness were included. Children who were uncooperative were excluded and a sample size of 158 subjects was finalized. A pilot study was conducted among a group of 10 children in order to ensure the degree of repeatability (Cronbach alpha = 0.80).

Examination

A proforma was designed using WHO Oral Health Assessment Form (1997). Full mouth clinical examination was carried using mouth mirror and explorer under natural day light. William's probe was used to determine the overjet and overbite. For ease of examination all the parameters of Dental Aesthetic Index were included. The 10 DAI components are: missing visible mandibular and maxillary incisor, canine and premolar teeth (number of teeth); crowding in the incisal segment (number of crowded segments 0, 1 or 2); spacing in the incisal segment (number of spaced segments 0, 1 or 2); maxillary diastema (mm); largest maxillary anterior irregularity (mm); largest mandibular anterior irregularity (mm); anterior maxillary overjet (mm); anterior mandibular overjet (mm); vertical anterior open bite (mm); and antero-posterior molar relation (0 = normal, 1 = half cusp, 2 = full cusp).

The scores of DAI parameters were subjected to a DAI regression equation and the points obtained from the regression equation were tabulated to a score for assessing the severity of malocclusion [12].

Statistical analysis

A master chart was developed in Microsoft Excel (2007) for the purpose of analysis. The Statistical software namely SPSS version 15.0 was used for the analysis between gender and different age groups using independent student t-test and ANOVA test respectively. The level of significance used was 5% level.

RESULTS

A total of 158 orphan children were included in the study, of which 61 were boys and 97 were girls. The age ranged from 10 to 13 years which was again divided into four groups for convenience. A total of 40 children were examined among 10 years age group; 44 among 11 years age group; 38 among 12 years age group and 36 among 13 years age group.

The present study observed that 15.2% of the subjects had missing anterior teeth. Crowding was more commonly found (79.7%) in orphans while spacing in 65.8% orphans. Diastema was also observed among 42.2% subjects. Maxillary and mandibular anterior teeth irregularity was observed among 67.2% and 78.4% orphans respectively. Anterior maxillary overjet was seen in 65.8% orphans as opposed to the mandibular overjet seen in 23.4% orphans. Out of the entire sample, 74.1% had no anterior open bite and 41.1% orphans had a normal anterior posterior molar relation as mentioned in Fig-1.

According to the dental aesthetic index cut-offs, normal or minor malocclusion with no or slight treatment need (DAI 13–25) was found in 67.1% of the sample, definite malocclusion with treatment elective (DAI 26–30) in 17.1%, severe malocclusion with treatment highly desirable (DAI 31–35) in 12.7% and very severe (handicapping) malocclusion with treatment mandatory (DAI ≥ 36) in 3.1%. (Fig-2)

Gender wise, the distribution of dental aesthetic index was more among girls (p = 0.111) (Table 1). According to age, the highest DAI score was registered among 11 years age group and lowest with 12 years age group (Table 2).

Table-1: DAI scores according to gender using student t-test

Gender	No	Mean	Std. Deviation	p-value
Boys	61	23.03	5.269	0.111**
Girls	97	24.48	5.703	

Table-2: DAI scores according to different age groups using ANOVA test

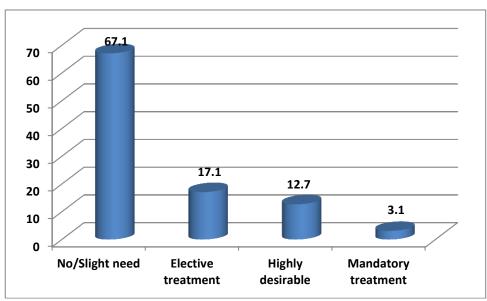| Age groups	No	Mean	Std. Deviation	F-value	p-value
10 years	40	23.62	5.056	1.768	0.156**
11 years	44	25.70	4.292		
12 years	38	22.84	5.871		
13 years	36	24.32	6.493		
Total	158	23.92	5.568		

Fig-1: Orthodontic treatment needs of study population using Dental Aesthetic Index
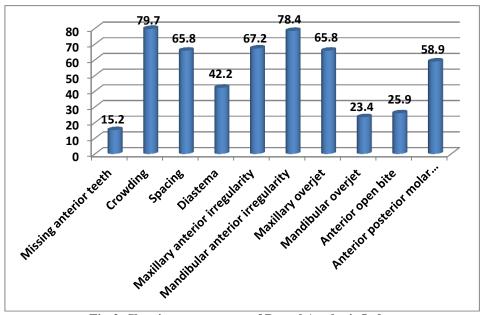

Fig-2: Showing components of Dental Aesthetic Index

DISCUSSION

The DAI is an orthodontic index used on socially defined aesthetic norms. This DAI is a regression equation that links mathematically the public's perceptions of dental aesthetics with the objective physical measurements of the occlusal traits associated with malocclusion. It is simple, reliable, valid, relatively fast and accounts for both function and aesthetics. Hence DAI can be useful as well as a reliable and equitable indicator for malocclusion [13]. It has been adopted by the WHO, making it a universally accepted index and it has decision points differentiating treatment priority [14].

The frequency of orthodontic treatment needs decreased with the increase in the severity of malocclusion and these results were similar in other studies [15,16]. DAI scores ≤ 25 was seen among most of the children (67.1%) and the results were comparable to studies National Oral Health survey and fluoride mapping-India [17] and Nelson et al [18], whereas authors of other studies had shown lesser results [19, 20]. The reason for this difference in DAI scores could be due to inherited difference in tooth size and arch size.

The results for the DAI scores 26 – 30, are in correlation with the studies by Onyeaso CO (2003) [21], and Garcia et al [22]. For DAI scores 31–35 and DAI ≥ 36, the results were 12.7% & 3.1% respectively which were comparable higher to Shivkumar et al in 2009 [23]. But the study by Ast et al by using Angle's

criteria's showed severe type of malocclusion [24]. This difference could be due to the variation in the criteria's for recording the prevalence of malocclusion by using different type of malocclusion indices. Over all DAI was more among orphans than the general school children which may be due to many factors as diet, malnutrition, adverse oral habits etc [22].

Missing anterior teeth was found among 15.2% of the study population and the results were higher than study done by Rao et al [25]. Crowding was the most common finding in this study i.e.79.7%. It worsens the permanent teeth eruption and it continues to increase as the age progresses [19]. Incisal segment spacing is the condition in which the amount of the space available between the right and left canine exceeds than in the normal alignment. Both spacing and midline diastema was higher in the present study than the results of Shivkumar et al [23]. This difference might be attributed due to involvement in parafunctional habits such as mouth breathing, thumb sucking, brauxism and obviously such habits are more common among orphan children as they are lack of parental care and dental health education [26].
The present study showed maxillary and mandibular anterior irregularity as 67.2% and 78.4% respectively and the findings were similar with Otuyemi et al study [20]. Most of the study participants had maxillary overjet than mandibular and the results were comparable to other studies [14]. The antero-posterior molar relation is mostly based upon the relationship of permanent upper and lower first molars. The right and left side were assessed with the teeth in occlusion and only and the largest deviation from normal relation. More than half of the study subjects had half cusp and full cusp deviation and the results were higher than Sureshbabu et al [27].

The present data showed higher mean DAI score among girls than boys. It may be attributed to the differences in the adverse habits such as mouth breathing, nail biting, tongue thrusting and thumb sucking etc. However the findings of present study were in contrast with results of previous data [28].

CONCLUSION
DAI was more among orphans than the general school children which may be due to many factors such as diet, malnutrition, adverse oral habits. The prevalence and severity of malocclusion was more among girls compared to boys. Around 33% of orphans required different kinds of orthodontic treatment needs. So, this special group of children should be educated about the problems related malocclusion and health sector should made orthodontic treatments accessible to them.

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