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EVALUATION OF FACIAL SOFT TISSUE PARAMETERS IN THE 12-16 YEARS OLD PHYSICALLY DISABLED AND NORMAL CHILDREN OF INDIAN ORIGIN

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ABSTRACT: Objectives: the study aimed to evaluate and compare the extra oral soft tissue facial features of the physically disabled and the normal children of age 12-16 years of Jabalpur city, India. Materials and Methods: a cross sectional study was conducted on a sample of 342 children, out of which 171 were physically disabled and the rest 171 were normal children. All the children were examined for the soft tissue facial features like Profile, Nasolabial angle, FMA, Lip competency, Facial symmetry and Mentolabial sulcus. Each child was examined by the single examiner and the findings were tabulated and subjected to chi square statistically analysis to compare the results between the two groups. Results: increased number of physically disabled children had convex and concave profile (72.51% and 9.95% respectively) in comparison to the normal children (2.53% and 63.74% respectively). Acute nasolabial angle and high FMA were seen in 78.38% and 59.06% of the physically disabled children, only 61.41% and 40.35% of the normal children had acute nasolabial angle and the high FMA. The difference noted for the all the features was highly significant except for the lip competency and the facial asymmetry. Conclusion: increased number of physically disabled children had facial features which were not ideal in comparison to the normal children, indicating the presence of malocclusion in them. It is required to conduct extensive diagnostic camps to examine the underlying malocclusion and educate the children and the parents to opt the orthodontic treatment.

KEYWORDS: Physically disabled, normal children, facial soft tissue, soft tissue features, orthodontics.

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1.INTRODUCTION

Ideal orthodontics in the past was based on the concept proposed by the father of orthodontist, none other than E.H. Angle. The concept of occlusion like "Old Glory" and the facial profile like "Apollo Belvedere" [1]. But there seems to be an absurdity about the whole concept, so as to synch the bimaxillary dental protrusion of the old glory to the straight facial profile of Apollo Belvedere. The orthodontist appreciated the value of soft facial features with more vigour after the proposal of soft tissue paradigm shift by Ackerman, Profit and Sarver [2]. This changed the concept of the treatment strategies involving orthodontics. It was soft tissue facial features that determine the treatment plan than the underlying malocclusion. Most often the facial soft tissue features match the underlying skeletal and dental malocclusion. According world health organization around 15% of the children around the world are disabled [3]. Disability is a term which encompasses vast majority of problems pertaining to the impairments, activity limitations, and participation restrictions. Disability most often can be the cause of malocclusion [4]. It is well established fact that prevalence of malocclusion is greater in disabled children than the normal children [5-11]. As the soft tissue features follow the underlying skeletal or dental malocclusion [12], we can expect the discrepancy in the facial features of physically disabled children owing to the increased prevalence of malocclusion. Moreover, the degree of attractiveness of the facial features can mar or make the social activities or the success of the person [13]. Thus, it is important to know the facial soft tissue discrepancies present in the physically disabled and to evaluate up to what extent they are different from the normal person. the literature review showed that none of the previous studies in the past have explored the soft tissue facial features in physically disabled children. The current study was aimed to assess the extra oral facial soft tissue parameters in the physically disabled and normal children of age 12-16 years of the Jabalpur city, India.

2. MATERIALS AND METHODS

A cross sectional study was done on 342 children of age 12-16 years of Jabalpur city. The ethical clearance for the study was obtained from the institutional ethical committee. The list of schools belonging to normal children and physically disabled children was obtained from the department of social justice, Jabalpur. The list was scrutinized to segregate the exclusively run schools for the physically disabled, there were 3 schools which trained deaf and dumb and the visually impaired children. There were more than 50 schools for the normal children. Lottery system of sampling was utilized to selected the normal children schools. The school authorities were briefed about the purpose of the study and a written informed consent was obtained to conducted the study in the school premises. The nature of the study was explained to all the children/parent and the written informed consent was obtained before examining the students. All the physically disabled children who fell in age group of 12-16 years and who gave consent for the study were examined for the soft tissue facial parameters. There were 171 physically disabled children, matching number of normal

children were selected again utilizing the lottery system of sample selection. Each student was examined for the following soft tissue parameters [14];

Profile view: Facial profile was examined by viewing the patient from side. Three land marks are used to assess the facial profile. Land marks are soft tissue Nasion, Sub nasalae and soft tissue Pogonion. An imaginary line is drawn to meet all three points in order to analyze anteroposterior position of jaws.

Nasolabial angle: it is an angle formed by the tangent drawn to the columella of nose and upper lip. It can be;

- Acute – Angle formed between tangent to the columella of nose and upper lip was less than 90^0.
- Obtuse- Angle formed between tangent to the columella of nose and upper lip was more than 110^0.
- Average – Angle formed between columella of nose and upper lip was in between 90^0-110^0.

Labiomental Sulcus: it is concavity seen below the lower lip. This is an angle formed by intersection of tangent to lower lip and chin, measured at the soft tissue of chin. The angle is gentle curve. It was divided into

- Deep mentolabial sulcus- Angle formed by intersection of tangent of lower lip and chin was less than 120^0.
- Shallow mentolabial sulcus- Angle formed by intersection of tangent of lower lip and chin was more than 120^0.
- Average mentolabial sulcus- Angle formed by intersection of tangent of lower lip and chin was in between 110^0-130^0

Lip competency: it is defined as the ability to approximate the lips without any strain. Upper lip is protruded slightly in relation to lower lip in a balanced face. Two millimetre of incisors showing at rest is considered as normal.

- **Competent lips**: slight contact between the lips when musculatures are relaxed.
- **Incompetent lips**: seen in case of morphologically short lips and lips do not form a lip seal in relaxed state.

Facial symmetry: A piece of dental floss stretched from the region of the glabella to the lower chin, passing through the philtrum to assess the facial symmetry.

Clinical FMA [15]: Inclination of mandibular plane angle to Frankfort Horizontal Plane (FMA). One scale is placed over Frankfort plane, and another scale is placed on the lower border of mandible, position of posterior end of scales is noted.

- High angle-Posterior end meet behind the auricle or within occiput.
- Low angle- The two lines are parallel and meet very far away.
- Average FMA- it meets behind occiput.

A single examiner did the assessment of all the above said parameters. The collected data was tabulated and was subjected to statistical analysis. SPSS version 21 was used to for all the statistical analysis. To compare the findings between the normal children and the physically disabled children Chi square test was used. To check the calibration of the examiner at the beginning of the study, the examiner examined ten subjected for all the parameters and repeated the examination after a week on the same subjects, the data was subjected to kappa statistics which accounted for 90%.

3. RESULTS AND DISCUSSION

The study was done to test the hypothesis that the soft tissue parameters of the physically disabled children will be showing higher discrepancy than their normal counter parts pertaining to the ideal values. Prevalence of dental and skeletal malocclusion is studied extensively by many of the authors but the soft tissue characteristics have received little attention from the orthodontist until now. However, these characteristics might affect child's quality of life and self-confidence.

Table 1 shows the demographic data of the study population. There were 171 normal and 171 physically disabled children belonging to the age group of 12-16 years. There were 245 males and 97 female children in the study. The children belonging to age group of 12 to 16 years were selected, as by this time all the permanent teeth would have erupted and the subjects will be either in the early permanent and late permanent stage. The soft tissue changes will be more evident in this age than the mixed dentition stage.

Table 1. Gender wise distribution of study subjects

Sample	Gender	Number	Total
Physically disabled	Male	123(35.96%)	171 (50%)
	Female	48 (14.04%)	
Normal	Male	122(35.67%)	171 (50%)
	Female	49 (14.33%)	
Total	Male	245(71.63%)	342(100%)
	Female	97 (28.37%)	

The comparison of the soft tissue facial parameters pertaining to the Profile and Nasolabial angle is given in table 2. In comparison to all the three types of profile, convex profile was more prevalent in both the groups, but it was prevalent in 72.51% of the physically disabled and 63.74% of the normal children. The difference noted was statistically highly significant. Concave profile was least prevalent with high prevalence of 9.95% in physically disabled and 2.53% in normal children. Again the difference noted was highly significant.

Table 2. Prevalence and Comparison of Profile and Nasolabial angle in disabled and normal children

Variable		Disabled	Normal	X^2 value	P value
Profile	Concave	17(9.95%)	4(2.53%)	17.92	0.001(HS)
	Convex	124(72.51%)	109(63.74%)		
	Straight	30(17.54%)	58(33.93%)		
Nasolabial angle	Acute	134(78.38%)	105(61.41%)	15.63	0.001(HS)
	Average	29(16.95%)	59 (34.50%)		
	Obtuse	8(4.67%)	7(4.09%)		

The results indicate that the straight profile prevalence in normal children was in accordance to the intraoral occlusion status of these children, as these children frequently had normal occlusion or class I malocclusion. In an earlier study on 6-7-year-old Italian normal children, it was seen that convex profile was more prevalent in the female children [16]. Female children tend to have tendency for convex profile more than their male counterparts [17]. This fact remained to be verified for the male and female physically disabled children, as the study was not intended find the gender wise difference. The facial profile is relatively stable after the age of 6 years and the minimal change which was seen accounted to around 1.2 degrees in males and -0.5 degrees in females [18]. This is significant as orthodontist need to plan the extraction or non-extraction orthodontic treatment in adolescent patients, knowing that facial convexity doesn't change over the time might influence the treatment decision. Convex profile was more prevalent in Italian attractive children with more prominent maxilla [19]. More than 60% normal children belonging to the age group 10 -16 years had convex profile and the concave profile was seen in 5% of the children belonging to Karnataka state, India [20]. The findings were in accordance to the results of current study. The acute nasolabial angle was appreciated in 78.38% (134) of disabled children and 61.41% (105) of normal children. Obtuse nasolabial angle was prevalent by 4.67% (8) in disabled children and by 4.09% in normal children. Average nasolabial angle was appreciated more in normal children. Contrasting results have been reported in the literature, where obtuse nasolabial angle was more prevalent in normal adolescent children [21, 22]. More acute nasolabial angle was prevalent in northern Sudanese adolescent children and the Brazilian black children [23, 24]. This is considered as normal in them owing to their protruded facial appearance. Nevertheless, according to a study, there was no significant change in nasolabial angle from the adolescent age to adulthood [25]. This variation in nasolabial angle is owing to the ethnic and racial variance [26]. Reduced nasolabial angle seems to be an attractive feature in the Italian children [27]. But the reduced nasolabial angle certainly indicated the underlying proclination of the upper incisors.

The comparison of soft tissue facial features pertaining to the labiomental sulcus and FMA is depicted in Table 3.

Table 3. Prevalence and comparison of FMA and Lip Competency in disabled and normal children

Variable		Disabled	Normal	X^2 value	P value
FMA	Average	48(28.1%)	57(33.33%)	15.12	0.002(HS)
	High	101(59.06%)	69(40.35%)		
	Low	22(12.84%)	45(26.32%)		
Facial symmetry	Asymmetrical	11(6.4%)	5(2.9%)	2.36	0.19(NS)
	Symmetrical	160(93.6%)	166(97.1%)		

The findings suggest that in physically disabled children high clinical FMA was more prevalent (59.06%) than the low and average FMA (12.84% and 28.1% respectively). Similar findings were noted for the normal children as well (Average 33.33%; High 40.35%; Low 13.2%). However, high FMA was more prevalent in physically disabled children by 9.3% than the normal children, indicating a vertical growth pattern in these patients. The reason behind this high prevalence can be attributed to the lack of muscle support, which can be one of the trait of physical disability. Low FMA was more prevalent in normal children (26.32%) than the physically disabled (12.84%). The difference found between the groups was statistically highly significant. However, 3.15% of Brazilian children had short face which is in contrast to the findings of the current study [28]. More than 90% of the children in both groups showed facial symmetry. The results were not statistically significant (P=0.19). About 52% of the physically disabled and 57.90% of the normal children had the competent lips. Incompetent lips were prevalent by 48% and 42.10% in physically disabled and the normal children. The difference noted was statically non-significant (p=0.35). Disabled children had more asymmetrical faces (6.4%) then normal children (2.9%) but it was not statistically significant. Similar findings were reported for Romanian (4.7%) preorthodontic patients and in children of Florida city, US [30, 31]. Presence of mild amount of facial asymmetry is considered to be normal [32] and the concept of composite photographs emphasizes the presence of the mild form of facial asymmetry in every individual [33]. But fairly recognizable facial asymmetry might influence the social life of a person. and facial asymmetry is one of the deciding factor in terms of selection of life partner [34].

Comparison of the prevalence of parameters pertaining to lip competency and the facial asymmetry is given in table 4.

Table 4. Prevalence of Lip competency and Mentolabial sulcus in disabled and Normal children

Variable		Disabled	Normal	X^2 value	P value
Lip competency	Competent	89(52%)	99(57.90%)	2.06	0.35(NS)
	Incompetent	82(48%)	72(42.10%)		
Mentolabial sulcus	Deep	102(59.66%)	86(50.3%)	7.76	0.021(S)
	Average	12(7.01%)	28(16.37%)		
	Shallow	57(33.33%)	57(33.33%)		

Percentage of children having lip incompetency was greater in physically disabled children (47.9%) than the normal children (42.10%). Lip competency depends on the length of lips and tonicity of lips and which in turn vary with the age. In children, lip incompetency may be either due to short upper lip or the incomplete growth of soft tissue. Later seems to be the valid reason for the incompetency in the young children [29]. Prevalence of deep mentolabial sulcus (59.66%) was more in physically disabled children than normal children (50.3%). Prevalence of average mentolabial sulcus was more in normal children (16.37%) in comparison to physically disabled children (7.01%). This data was statistically significant. Increased prevalence of deep mentolabial sulcus in the current group of physically disabled children might be indicative of the tendency towards class II skeletal malocclusion. Acute Mentolabial angle was seen in Turkish adolescent children and Sudanese children. which is similar to the results of current study [35, 27]. Mentolabial sulcus, however decreases from 7 to 18 years and the mean values were 125.3 ± 8.4 degrees for males and 136.1 ± 11.6 degrees for the females at the age of 7 years [36]. Acute mentolabial angle was appreciated in younger children owing to the relative less prominent chin and this was particular seen attractive children [27]. Thus, it can be concluded that perception of beauty changes depending upon the geographical region, ethnicity and the race [26]. The soft tissue abnormalities seen in the current population requires the attention of the orthodontist as self-imaging and negative perception of the individual to his or her facial aesthetic influence the social life significantly [37]. Moreover, Orthodontic treatment can bring about significant soft tissue changes pertaining to profile [38], which will be beneficial to maintain the quality of life of these children. Habit can be one of the factors [39] which would have influenced the soft tissue facial changes and the study carries the scope to explore the relationship between habits and the soft tissue characteristics of face in these children.

4. CONCLUSION

Increased prevalence of abnormal soft tissue parameters was seen in case of the physically disabled children than the normal children. This emphasizes the need of orthodontic educational and diagnostic camps to establish the underlying skeletal and dental malocclusion and encourage the needy to take the orthodontic treatment.

CONFLICT OF INTEREST

Authors have no any conflict of interest.

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