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COMPARISON OF AGE INFLUENCE IN CHARACTERISTICS OF PRIMARY DENTITION OCCLUSION AND PREVALENCE OF MALOCCLUSION IN 4-6 YEARS OLD PHYSICALLY DISABLED AND NORMAL CHILDREN

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ABSTRACT

The oral health disparities between individuals with disabilities and the general population are widely reported, and malocclusion is no exception. There is a need to explore their oral health status, as the number of people living with disabilities is growing. The study was aimed to determine and compare age influence in changes in occlusal characteristics in disabled and normal children. All the children between the ages of 4-6 years were checked for the occlusal and malocclusion characteristics. A stratified cluster random sampling procedure was performed to collect the representative sample. A total of 500 children were examined. Out of which 400 children were physically disabled and 100 children were normal. A pre structured Questionnaire was used to record the demographic data of the children. Data was statistically analysed using chi-squared test was used; a value of $p<0.05$ was regarded as significant. There was statistically insignificant difference between the different disabled children and the normal children for the prevalence of different occlusal and malocclusion parameters for different age group except for the developmental space in the 4 year old and the overjet and overbite prevalence in the 5 year old children, where the data showed a statistically significant difference. It can be concluded that pattern of characteristics of occlusion and malocclusion did not differ much in disabled and normal children.

KEYWORDS: Age wise, disabled children, malocclusion, occlusion, normal children.

INTRODUCTION

In India, children comprise of 40% of the rapidly growing population, but the provision of health care, especially dental health services, is poor and dental health services at rural schools are almost non-existent, with more than half of children under the age of 5 years are not getting the health care they need.[1] Evaluating extent of occlusion of permanent dentition reflecting that of primary dentition in an individual and what is the likelihood of change in occlusal features with a complete change of dentition is a difficult task.[2]

The risk factors for malocclusion can originate from physical, behavioural or disease mechanism. Those children with premature tooth loss, missing teeth or arch length and tooth discrepancy have a higher risk of malocclusion. The diseases can increase the risk of malocclusion as demonstrated by the incidence of malocclusion in population with disabilities. To improve the oral health of these individuals, it is essential for public oral health-care services to incorporate intervention methods directed at the prevention and treatment of malocclusions.

For this it is necessary to understand the panorama of dental needs of children with disabilities in order to ensure care that can help this proportion of the population overcome their difficulties and improve both their development and quality of life. This study therefore aims to assess the comparison of age influence

in characteristics of Primary Dentition Occlusion and Prevalence of Malocclusion in 4-6 Years Old Physically disabled and normal children. Disabilities included this study are based on the categorization utilized in the earlier study (hearing impairment, speech defects, visual defects and physically dexterity).[3]

MATERIAL AND METHODS

A cross sectional study was conducted on the children between the ages of 4-6 years old for recording the prevalence of occlusion and malocclusion characteristics. A total of 500 children were examined. Out of 500 children, 100 were normal children and 400 were physically disabled children.

The physically disabled children included in this study are; the children with physically dexterity, visual defects, hearing impairment and speech defects. A pre structured Questionnaire was used to record the demographic data of the children. A prior consent was obtained by the school administration and the signed Informed consent was obtained by all the individuals or their parents who willingly participated in the study.

Institutional ethical committee gave the ethical clearance for the study. Data collection technique and methodology were standardized with a series of sessions under supervision of the senior operator (PS). Intra-examiner reliability test was performed by examining a cohort of 25 children at two different time periods of 1 week apart. These were then subjected to Cohen's-Kappa statistical analysis. The kappa accounted for the same was 80%.

For examination, both the normal and physically disabled children were seated in an ordinary chair and examined under natural daylight with a portable light, mouth mirror, straight probe, graded stainless steel wire and dental floss were used for intra and extra-oral examinations.

Criteria for Selection of both normal Children and Disabled children.

The children who have not undergone any orthodontic treatment previously and the children who did not have any kind of dental filling, the oral habits and the systemic disease were selected for the study.

Following parameters were study for the prevalence.

Intra oral
1. Molar relationship: Flush Terminal plane, mesial step and distal step.
2. The canine relationship: Class I, Class II and Class III.
3. Primate spaces, Developmental or Generalized or Physiological spaces.
4. Crowding
5. Anterior cross bite and posterior cross
6. Scissors Bite and open bite

7. Overbite and overjet: 1-2 mm, 2-4 mm, > 4 mm was recorded.
8. Midline Discrepancy.

Extra oral
1. Lateral profile
2. Lip incompetency

The data collected was entered into the spread sheet and was subjected to descriptive statistical analysis. To compare the prevalence of occlusion and malocclusion characteristics among different age groups between in the disabled and the normal children the chi-squared test was used; a value of $p < 0.05$ was regarded as significant.

RESULT

Overall prevalence of different occlusal characteristics of the population being examined is shown in Table 1. The flush terminal molar relationship and class I canine relationship were found to be most prevalent.

The prevalence of different occlusion and malocclusion characteristics of the 4 years age group of the sample is shown in Table 2. There existed statistically insignificant difference for the different parameter between normal and disabled children.

Table 3 depict the comparison of the occlusion and malocclusion characteristics of the normal and physical disabled children of 5 years of age. There existed significant difference between the two groups for the parameter overbite and the overjet. The increased overbite (20.86%) and the overjet (19.42%) were more prevalent in the disabled children.

The occlusion and malocclusion characteristics of 6 years old children are shown in the table 4. Data showed insignificant difference between the two groups for the different examined parameters.

Table 1. Comparison of prevalence of Occlusal Parameters in the Primary Dentition in Children between Age 4-6 Years (n=500).

Occlusal Parameter	Particulars	Normal Children n (%)	Disabled Children				Chi-square test
			Speech Defect n (%)	Hearing Impairment n (%)	Visual Defect n (%)	Physically Dexterity n (%)	
Molar Relationship	Flush Terminal	55 (55.00)	50 (50.00)	47 (47.00)	45 (45.00)	46 (46.00)	P= 0.625 (>0.05),NS
	Mesial Step	30 (30.00)	25 (25.00)	28 (28.00)	25 (25.00)	27 (27.00)	P= 0.923 (>0.05), NS
	Distal Step	05 (5.00)	10 (10.00)	08 (8.00)	09 (9.00)	10 (10.00)	P= 0.693 (>0.05), NS
	Asymmetric	10 (10.00)	15 (15.00)	17 (17.00)	21 (21.00)	17 (17.00)	P= 0.313 (>0.05), NS
Canine Relationship	Class I	65 (65.00)	62 (62.00)	60 (60.00)	63 (63.00)	64 (64.00)	P= 0.959 (>0.05), NS
	Class II	25 (25.00)	24 (24.00)	26 (26.00)	25 (25.00)	26 (26.00)	P= 0.997 (>0.05), NS
	Class III	04 (4.00)	06 (6.00)	07 (7.00)	06 (6.00)	06 (6.00)	P= 0.928 (>0.05), NS
	Asymmetric	06 (6.00)	08 (8.00)	07 (7.00)	06 (6.00)	04 (4.00)	P= 0.824 (>0.05), NS
Developmental Spaces	Maxillary	75 (75.00)	62 (62.00)	58 (58.00)	62 (62.00)	63 (63.00)	P= 0.125 (>0.05), NS
	Mandibular	62 (62.00)	45 (45.00)	42 (42.00)	47 (47.00)	51 (51.00)	P= 0.047 (<0.05), S
Primate Spaces	Maxillary	67 (67.00)	53 (53.00)	57 (57.00)	61 (61.00)	58 (58.00)	P= 0.342 (>0.05), NS
	Mandibular	38 (38.00)	29 (29.00)	32 (32.00)	30 (30.00)	31 (31.00)	P= 0.681 (>0.05), NS
Crowding	Maxillary	20 (20.00)	25 (25.00)	27 (27.00)	28 (28.00)	27 (27.00)	P= 0.704 (>0.05), NS
	Mandibular	32 (32.00)	40 (40.00)	42 (42.00)	44 (44.00)	43 (43.00)	P= 0.425 (>0.05), NS
Midline Discrepancy	Shift in Maxillary	06 (6.00)	08 (8.00)	07 (7.00)	09 (9.00)	08 (8.00)	P= 0.946 (>0.05), NS
	Shift in Mandibular	40 (40.00)	49 (49.00)	47 (47.00)	48 (48.00)	46 (46.00)	P= 0.733 (>0.05), NS
	Shift in both	00 (0.00)	00 (0.00)	00 (0.00)	02 (2.00)	00 (0.00)	P= 0.535 (>0.05), NS
Cross Bite	Anterior Single	00 (0.00)	00 (0.00)	01 (1.00)	00 (0.00)	00 (0.00)	P= 0.689 (>0.05), NS
	Anterior Multiple	00 (0.00)	00 (0.00)	01 (1.00)	02 (2.00)	00 (0.00)	P= 0.840 (>0.05), NS
	Posterior Unilateral	00 (0.00)	01 (1.00)	00 (0.00)	00 (0.00)	00 (0.00)	P= 0.689 (>0.05), NS
	Posterior Bilateral	00 (0.00)	01 (1.00)	00 (0.00)	00 (0.00)	00 (0.00)	P= 0.689 (>0.05), NS
Scissors Bite	-	00 (0.00)	00 (0.00)	01 (1.00)	02 (2.00)	00 (0.00)	P= 0.840 (>0.05), NS

*S= Significant difference, NS= No significant difference.

Table 2: Comparison of occlusal characteristics between normal children and disabled children for age 4 years old (n=500).

Characteristics		Groups		Chi-square test
		Normal Children[#] n (%)	Disabled Children[#] n (%)	
Molar Relationship	Flush Terminal	16 (53.34)	12 (54.54)	P= 0.929 (>0.05), NS
	Mesial Step	12 (40.00)	09 (40.91)	P= 0.950 (>0.05), NS
	Distal Step	01 (3.33)	00 (0.00)	P= 0.874 (>0.05), NS
	Asymmetric	01 (3.33)	01 (4.55)	P= 0.614 (>0.05), NS
Canine relation ship	Class I	19 (63.33)	14 (63.64)	P= 0.975 (>0.05), NS
	Class II	08 (26.67)	05 (22.73)	P= 0.746 (>0.05), NS
	Class III	01 (3.33)	02 (9.09)	P= 0.781 (>0.05), NS
	Asymmetric	02 (6.67)	01 (4.54)	P= 0.781 (>0.05), NS
Developmental spaces	Maxillary	20 (66.67)	13 (59.09)	P= 0.575 (>0.05), NS
	Mandibular	16 (53.33)	10 (45.45)	P= 0.575 (>0.05), NS
Primate spaces	Maxillary	17 (56.67)	10 (45.45)	P= 0.424 (>0.05), NS
	Mandibular	10 (33.33)	07 (31.82)	P= 0.909 (>0.05), NS
Crowding	Maxillary	07 (23.33)	07 (31.82)	P= 0.496 (>0.05), NS
	Mandibular	10 (33.33)	12 (54.55)	P= 0.126 (>0.05), NS
Midline discrepancy	Shift in maxillary	02 (6.67)	03 (13.64)	P= 0.714 (>0.05), NS
	Shift in mandibular	15 (50.00)	11 (50.00)	P= 1.000 (>0.05), NS
Cross bite	Anterior single	00 (0.00)	00 (0.00)	Test not applicable
	Anterior multiple	00 (0.00)	00 (0.00)	Test not applicable
	Posterior unilateral	00 (0.00)	00 (0.00)	Test not applicable
	Posterior bilateral	00 (0.00)	00 (0.00)	Test not applicable
Scissor bite		00 (0.00)	00 (0.00)	Test not applicable
Open bite	Anterior	00 (0.00)	01 (4.54)	P= 0.874 (>0.05), NS

		Normal Children	Disabled Children	
	Posterior unilateral	00 (0.00)	00 (0.00)	Test not applicable
	Posterior Bilateral	00 (0.00)	00 (0.00)	Test not applicable
Over jet	0-2 mm	24 (80.00)	15 (68.18)	P= 0.331 (>0.05), NS
	2-4 mm	03 (10.00)	06 (27.27)	P= 0.209 (>0.05), NS
	>4 mm	03 (10.00)	01 (4.55)	P= 0.840 (>0.05), NS
Over bite	0-2 mm	22 (73.34)	18 (81.82)	P= 0.700 (>0.05), NS
	2-4 mm	04 (13.33)	02 (9.09)	P= 0.975 (>0.05), NS
	>4 mm	04 (13.33)	02 (9.09)	P= 0.975 (>0.05), NS
Lateral profile	Straight	09 (30.00)	07 (31.82)	P= 0.848 (>0.05), NS
	Convex	21 (70.00)	15 (68.18)	P= 0.848 (>0.05), NS
	Concave	00 (0.00)	00 (0.00)	Test not applicable
Lip competency		00 (0.00)	02 (9.09)	P= 0.340 (>0.05), NS

NS= No significant difference.
[#]Total number of normal children 04 years = 30.
Total number of disabled children 04 years = 22.

Table 3: Comparison of characteristics between normal children and disabled children for age 5 Years (n=500).

Characteristics		Groups		Chi-square test
		Normal Children[#] n (%)	Disabled Children[#] n (%)	
Molar Relationship	Flush Terminal	19 (54.29)	77 (55.40)	P= 0.906 (>0.05), NS
	Mesial Step	11 (31.43)	30 (21.58)	P= 0.220 (>0.05), NS
	Distal Step	02 (5.71)	17 (12.23)	P= 0.423 (>0.05), NS
	Asymmetric	03 (8.57)	15 (10.79)	P= 0.938 (>0.05), NS
Canine relation ship	Class I	23 (65.72)	82 (58.99)	P= 0.467 (>0.05), NS
	Class II	08 (22.86)	31 (22.30)	P= 0.944 (>0.05), NS
	Class III	02 (5.71)	14 (10.07)	P= 0.638 (>0.05), NS
	Asymmetric	02 (5.71)	12 (8.64)	P= 0.827 (>0.05), NS
Developmental spaces	Maxillary	29 (82.86)	83 (59.71)	P= 0.011 (<0.05), S
	Mandibular	25 (71.43)	67 (48.20)	P= 0.014 (<0.05), S
Primate spaces	Maxillary	27 (77.14)	76 (54.68)	P= 0.016 (<0.05), S
	Mandibular	15 (42.86)	41 (29.50)	P= 0.130 (>0.05), NS
Crowding	Maxillary	06 (17.14)	28 (20.14)	P= 0.689 (<0.05), S
	Mandibular	12 (34.39)	59 (42.45)	P= 0.380 (>0.05), NS
Midline discrepancy	Shift in maxillary	01 (2.86)	10 (7.19)	P= 0.580 (>0.05), NS
	Shift in mandibular	13 (37.14)	61 (43.88)	P= 0.471 (>0.05), NS
	Shift in both	00 (0.00)	00 (0.00)	Test not applicable
Cross bite	Anterior single	00 (0.00)	01 (0.72)	P= 0.455 (>0.05), NS
	Anterior multiple	00 (0.00)	02 (1.44)	P= 0.862 (>0.05), NS
	Posterior unilateral	00 (0.00)	00 (0.00)	Test not applicable
	Posterior bilateral	00 (0.00)	01 (0.72)	P= 0.455 (>0.05), NS
Scissor bite		00 (0.00)	01 (0.72)	P= 0.455 (>0.05), NS
Open bite	Anterior	00 (0.00)	00 (0.00)	Test not applicable
	Posterior unilateral	00 (0.00)	01 (0.72)	P= 0.455 (>0.05), NS
	Posterior Bilateral	00 (0.00)	00 (0.00)	Test not applicable
Over jet	0-2 mm	31 (88.57)	86 (61.87)	P= 0.003 (<0.01), S
	2-4 mm	04 (11.43)	26 (18.71)	P= 0.308 (>0.05), NS
	>4 mm	00 (0.00)	27 (19.42)	P= 0.005 (<0.01), S
Over bite	0-2 mm	30 (85.71)	93 (66.91)	P= 0.029 (<0.05), S
	2-4 mm	03 (8.57)	17 (12.23)	P= 0.757 (>0.05), NS
	>4 mm	02 (5.72)	29 (20.86)	P= 0.036 (<0.05), S
Lateral profile	Straight	12 (34.29)	32 (23.02)	P= 0.171 (>0.05), NS
	Convex	23 (65.71)	104 (74.82)	P= 0.278 (>0.05), NS
	Concave	00 (0.00)	03 (2.16)	P= 0.879 (>0.05), NS
Lip competency		02 (5.71)	10 (7.19)	P= 0.950 (>0.05), NS

NS= No significant difference
[#]Total number of normal children 05 years = 35, Total number of disabled children 05 years = 139.

Table 4: Comparison of characteristics between normal children and disabled children for age 6 Years.

Characteristics		Groups		Chi-square test
		Normal Children[#] n (%)	Disabled Children[#] n (%)	
Molar Relationship	Flush Terminal	20 (57.14)	99 (41.42)	P= 0.080 (>0.05), NS
	Mesial Step	07 (20.00)	66 (27.62)	P= 0.341 (>0.05), NS
	Distal Step	02 (5.72)	20 (8.37)	P= 0.836 (>0.05), NS
	Asymmetric	06 (17.14)	54 (22.59)	P= 0.467 (>0.05), NS
Canine relation ship	Class I	23 (65.72)	153 (64.02)	P= 0.845 (>0.05), NS
	Class II	09 (25.71)	65 (27.20)	P= 0.854 (>0.05), NS
	Class III	01 (2.86)	09 (3.76)	P= 0.830 (>0.05), NS
	Asymmetric	02 (5.71)	12 (5.02)	P= 0.813 (>0.05), NS
Developmental spaces	Maxillary	26 (74.29)	149 (62.34)	P= 0.170 (>0.05), NS
	Mandibular	21 (60.00)	108 (45.19)	P= 0.101 (>0.05), NS
Primate spaces	Maxillary	23 (65.71)	143 (59.83)	P= 0.506 (>0.05), NS
	Mandibular	13 (37.14)	74 (30.96)	P= 0.463 (>0.05), NS
Crowding	Maxillary	07 (20.00)	72 (30.13)	P= 0.217 (>0.05), NS
	Mandibular	10 (28.57)	98 (41.00)	P= 0.160 (>0.05), NS
Midline discrepancy	Shift in maxillary	03 (8.57)	19 (7.95)	P= 0.836 (>0.05), NS
	Shift in mandibular	12 (34.29)	118 (49.37)	P= 0.095 (>0.05), NS
	Shift in both	00 (0.00)	02 (0.84)	P= 0.603 (>0.05), NS
Cross bite	Anterior single	00 (0.00)	00 (0.00)	Test not applicable
	Anterior multiple	00 (0.00)	01 (0.42)	P= 0.264 (>0.05), NS
	Posterior unilateral	00 (0.00)	01 (0.42)	P= 0.264 (>0.05), NS
	Posterior bilateral	00 (0.00)	00 (0.00)	Test not applicable
Scissor bite		00 (0.00)	02 (0.84)	P= 0.603 (>0.05), NS
Open bite	Anterior	01 (2.86)	02 (0.84)	P= 0.840 (>0.05), NS
	Posterior unilateral	00 (0.00)	00 (0.00)	Test not applicable
	Posterior Bilateral	00 (0.00)	01 (0.42)	P= 0.264 (>0.05), NS
Over jet	0-2 mm	30 (85.72)	172 (71.97)	P= 0.084 (>0.05), NS
	2-4 mm	03 (8.57)	52 (21.76)	P= 0.069 (>0.05), NS
	>4 mm	02 (5.71)	15 (6.27)	P= 0.805 (>0.05), NS
Over bite	0-2 mm	30 (85.71)	179 (74.90)	P= 0.160 (>0.05), NS
	2-4 mm	04 (11.43)	41 (17.15)	P= 0.393 (>0.05), NS
	>4 mm	01 (2.86)	19 (7.95)	P= 0.463 (>0.05), NS
Lateral profile	Straight	11 (31.43)	65 (27.20)	P= 0.601 (>0.05), NS
	Convex	24 (68.57)	168 (70.29)	P= 0.836 (>0.05), NS
	Concave	00 (0.00)	06 (2.51)	P= 0.741 (>0.05), NS
Lip competency		01 (2.86)	18 (7.53)	P= 0.509 (>0.05), NS

NS= No significant difference, Total number of normal children 06 years =35, Total number of disabled children 06 years = 239.

DISCUSSION

The primary objective of our study was to evaluate the prevalence rates of different occlusal characteristics of primary dentition in normal and disabled children so that it would enable us to determine the prevalence of malocclusion in the present sample, as well as differences in these occlusal characteristics in different age groups in 4 to 6 years old school children in Udaipur city.

The present study showed that the majority of the both children in the sample had a flush terminal molar relationship {(Normal children (55%), Speech defect children (50%), Hearing impairment children (47%),Visual defect children (45%)and Physically dexterity children (46%)} followed by mesial step {(30%), (25%), (28%), (25%) and (27%),} asymmetric molar relationships{(10%), (15%), (17%), (21%) and (17%)} and distal step {(5%), (10%), (8%), (9%) and (10%)}respectively.

Similar results have been reported by Nanda et al (1973) in an earlier study from Indian children.[4] Slightly higher prevalence of flush terminal relationship has been reported in Saudi Arabian children (Farsi and Salma, 1996).[5] According to The Pattern of Angle's class I, II, III noted in this study is in agreement with the reports of Brown.[6] that the occlusal pattern do not differ widely between disabled and normal children.[7]

Prevalence of primate spaces found in the current study is higher in the maxilla than the mandible. In normal children prevalence of primate space in

maxilla was 67% and in mandible it was 38%. mandible to be 38% and in Speech defect children (maxilla 53%, mandible 29%), Hearing impairment children (maxilla 57%, mandible 32%), Visual defect children (maxilla 61%, mandible 30%) and Physically dexterity children (maxilla 58%, mandible 31%). Similar results have been reported by Ohno et al (1990) in 5-7 year old in Indian children.[8]

According to the previous study the prevalence of spacing among the handicapped children is expected to be as high as that among normal counterparts.[9]

It may be suggested that low prevalence of crowding found in our study in maxillary then mandibular primary dental arches may lead to less crowding in the permanent dentition.[10]

Increased overjet of more than 2 mm has been considered as abnormal. Higher prevalence rates of increased overjet have been reported by Banker et al (1984)[11] in 3-5 year old Mexican-American children (43.5%), Tschill et al (1997)[12] in 4-6 year old Danish children (16.7%).

We found that overjet between 0 to 2 mm and 2-4 mm was significantly higher in normal children, whereas overjet between > 4 mm was significantly higher in Disabled children than the normal children. Available literature on the age wise comparison of the occlusion and malocclusion prevalence is very limited.

Higher prevalence rates of overbite (mandibular incisors covered by maxillary incisors completely) have been reported by Abu Alhaija and Qudeimat (2003)[13] in 5-6 year old Jordanian children.(27%) It was seen that overbite in the range of 0-2 mm was significantly higher in normal children. Age-wise differences in overbite have not been reported in the literature prevalence of overbite 1 is higher than the overbite 2 in Caucasians and According to the previous study report handicapped children showed reduced overbite values than the normal children.[14]

Straight and convex lateral profiles were more prevalent in the present group normal and disabled children of 4-6 years old. The comparison of the current results with the other studies was not possible owing to the scanty literature on the same.

The majority of the children in the sample had competent lips, very less sample had incompetent lips in normal children(3%), Speech defect children(6%), Hearing impairment children(8%), Visual defect children (9%) and Physically

dexterity children(7%). No studies have been reported in the literature regarding lip competency in children between age 4-6 years.

CONCLUSIONS
Following conclusions can be drawn from our study in   normal and disable children between age 4-6 years.
1. Prevalence of flush terminal molar relationship was found to be high, which is followed by mesial step molar relationship. Prevalence of distal step relationship was found very low.
2. Majority of the children had Class I canine relationship followed by Class II and Class III canine relationships.
3. More of the children showed developmental spaces in the maxillary arch then in the mandibular arch.
4. Primate spaces were found more frequently in the maxillary arch than in the mandibular arch and crowding was seen more frequent in the mandibular arch than in the maxillary arch.
5. Majority of the children studied exhibited overbite and overjet between 0-2 mm.
6. Convex profile was more frequent than straight profile.
7. Very low prevalence rates of occlusal abnormalities including crowding, mid-line discrepancy, cross bite, scissors bite, open bite, increased overbite, increased overjet and lip incompetency were found.

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