

Evaluation of Oral Health Status, Practices and Treatment Needs of Children Attending Special Schools in the Twin Cities of Telangana State

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Abstract

Objective: To evaluate oral hygiene practices, oral health status and other oral problems in children who are institutionalized in various special schools. **Methods:** 682 children comprising of 5 different categories that is: 1. Mentally challenged, 2. Down syndrome, 3. Autistic disorder, 4. Cerebral palsy, 5. Deaf and Dumb were screened for: oral hygiene practice, Dental caries experience, Oral hygiene status, Malocclusion, Angular cheilitis, Lip incompetency, Term of delivery, Co-operation during examination. **Results:** 89.9% them brushed once daily with compulsory assistance. 78% never visited the dentist. The mean deft/DMFT score was 5.133 with fair oral hygiene (Mean-2.688) and highest prevalence of malocclusion. There was a statistical significance ($p < 0.001$) in the findings among these children. **Conclusion:** Preventive services, regular checkups with education and motivation to the parents would be beneficial to these children.

Key Words: Oral hygiene, Oral health, Special care, Periodontal problems, Cerebral palsy

Introduction

Every child deserves a healthy smile, as a healthy smile contributes to a happy childhood. Good health is an essential human need; and oral health forms a major determinant and an intrinsic part of good health. Children who require special care are more prone to health problems when their oral hygiene is poor. It is estimated that worldwide there are about 500 million people with disabilities [1]. They often face difficulties in oral hygiene maintenance due to their systemic illness and have poor oral health compared to other children due to various social barriers [2].

AAPD defines special health care needs as “any physical, developmental, mental, sensory, behavioral, cognitive, or emotional impairment or limiting condition that requires medical management, health care intervention, and / or use of specialized services or programs. This condition may be developmental or acquired and may cause limitations in performing daily self-maintenance activities or substantial limitations in major life activity. Health care for individuals with special needs require specialized knowledge, increased awareness, attention, adaptation, and accommodative measures beyond what are considered routine” [3].

They have poor oral health compared to those in the general population and their oral health status affects their overall physical health; oral function; physical appearance; and, ultimately the quality of life.

Oral health maintenance in them is a challenge because they exhibit involuntary behaviors which have become a barrier to their dental care [4]. Behaviors that commonly affect the oral health of these children include lip biting, tongue thrusting, finger sucking, and those involved in mastication (i.e. excessive swallowing, food pocketing, bruxism, and drooling of saliva) [4].

The main factor related to dental caries and gingival/periodontal problems in disabled children is the improper oral

hygiene maintenance and inadequacy of the plaque removal from the teeth, which is impaired by learning disabilities, motor in coordination and muscular limitation (in neuromuscular disabled individuals) [5].

In the present study Deaf and Dumb, Autistic disorder, mentally challenged, Down syndrome and Cerebral palsy children have been considered to evaluate oral hygiene practices, oral health status and other oral problems.

Methods

A total of 682 children classified in 5 categories from various special schools in the twin cities of Telangana state were selected for the study. Consent was taken to examine the study group children from the institutional authorities and the parents. Before the start of the study a questionnaire was given to be filled by the parent/guardian of the child regarding the ‘oral hygiene practices’ and ‘term of delivery’. The questionnaire includes:

After taking thorough history about the health status, clinically they were examined for Dental caries, Oral hygiene, Molar relation, Malocclusion and any specific findings in relation to the type of disability. Oral examination was done in the classroom of the respective institution under natural light on the chairs provided by the institution and the findings were recorded in the screening proforma.

The armamentarium used was: Plain mouth mirror, Explorer, WHO Periodontal probe, Tweezer, Cotton and gauze, Soap and Antiseptic solution (Savlon), Cloth or paper towel. All the children were examined by one examiner to avoid inter-examiner variability. The following aspects of oral health were recorded in the screening proforma as discussed below.

Dental caries experience

The caries status was recorded using the decayed, missing and filled teeth (deft/DMFT) index according to WHO (1997) criteria [6].

Oral hygiene status

Oral hygiene was evaluated using simplified oral hygiene index (OHI-S) developed by John CG and Jack RV in 1964. The tooth surfaces examined were labial surfaces of 11 and 31, buccal surfaces of 16 and 26, lingual surfaces of 36 and 46.

Slight modification was done for oral hygiene index for primary dentition where permanent teeth were not erupted (age below 6 yrs). Here labial surfaces of teeth 51 and 71, buccal surfaces of 55 and 65 and lingual surfaces of 75 and 85 were examined [7-9].

Malocclusion, Lip incompetence, Angular cheilitis and Co-operation during examination were evaluated. Criteria for co-operation during examination [10]:

- Opens willingly, allows clinician to lift the lip, allows mirror insertion, all with verbal instruction.

- Opens willingly, allows clinician to lift the lip, but does not allow mirror insertion.
- Opens and allows clinician to lift the lip, but does not allow mirror insertion.
- Opens only.
- Allows clinician to lift the lip only.
- Shows anterior teeth only.
- Refuses passively.
- Refuses aggressively.

Results

The findings were tabulated and statistical analysis was done using the tools mean, standard deviation, frequency, cross tabulation, chi square test, anova, post hoc tukey with IBM SPSS version 19.0 windows version software.

The study has a total population of 682, comprising of three age groups that is 3-6 years, 7-14 year and >14 years (*Table 1*).

Table 1. Age and gender wise distribution of the disability groups.

GENDER	AGE		AUTISM	CP	DEAF and DUMB	DS	MC	TOTAL
Female	3-6 YRS	N	7	10	1	3	0	21
		%	[33.3]	[47.6]	[4.8]	[14.3]	[0.0]	
	7-14YRS	N	13	18	34	5	41	111
		%	[11.7]	[16.2]	[30.6]	[4.5]	[36.9]	
	>14 YRS	N	31	19	22	24	97	193
		%	[16.1]	[9.8]	[11.4]	[12.4]	[50.3]	
	Total	N	51	47	57	32	138	325
		%	[15.7]	[14.5]	[17.5]	[9.8]	[42.5]	
Male	3-6 YRS	N	9	6	1	0	0	16
		%	[56.3]	[37.5]	[6.3]	[0.0]	[0.0]	
	7-14YRS	N	42	21	26	20	24	133
		%	[31.6]	[15.8]	[19.5]	[15.0]	[18.0]	
	>14 YRS	N	27	31	30	27	93	208
		%	[13.0]	[14.9]	[14.4]	[13.0]	[44.7]	
	Total	N	78	58	57	47	117	357
		%	[21.8]	[16.2]	[16.0]	[13.2]	[32.8]	

Discussion

Children form the important group in the society and their health is the major constituent along with education. But children with disabilities are most neglected in all aspects and oral health perspective is one of them.

The recent National Sample Survey Organization (NSSO) report suggests that the number of disabled persons in the country is estimated to be 18.49 million and which forms to

about 1.8% of the total population and the mentally challenged population accounts to 0.44 million individuals [11].

The oral health of the disabled may be neglected because of the disability condition, a systemic disease or limited access to oral health care. Moreover, because of their level of function and their limited ability to undergo an oral examination, the disabled present specific challenges when their oral health is assessed [1].

Characteristically, it has been reported that, 'dental treatment is the greatest unattended health need of the disabled' [12]. Even though "The persons with disabilities act, 1995" spells out the responsibility of the state towards protection of the rights of persons with disabilities; provision of medical care, education, training, employment, and rehabilitation, there is no legislation till date that makes a provision of dental services to the disabled population [1]. Hence, the present study was undertaken.

The study population was categorized into 5 groups.

- Cerebral Palsy (CP)- 105(15.4%)
- Mentally Challenged (MC)- 255(37.3%)
- Down syndrome (DS)- 79(11.6%)
- Deaf and Dumb-114(16.7%)
- Autism-129(18.9%).

Table 2. Oral hygiene practices.

			Autism	CP	DEAF DUMB	and	DS	MC	TOTAL
BRUSHING FREQUENCY	Once daily	N	125	99	89		74	224	611
		%	[20.5]	[16.2]	[14.6]		[12.1]	[36.7]	
	Twice Daily	N	3	6	25		5	30	69
		%	[4.3]**	[8.7]**	[36.2]		[7.2]**	[43.5]	
	Total	N	128	105	114		79	254	680
		%	[18.8]	[15.4]	[16.8]		[11.6]	[37.4]	
METHODS OF ORAL HYGIENE PRACTICES	Tooth brush and paste	N	122	99	91		60	213	585
		%	[20.9]	[16.9]	[15.6]		[10.3]	[36.4]	
	Tooth powder*	N	3	3	23		6	25	60
		%	[5.0]**	[5.0]**	[38.3]		[10.0]**	[41.7]	
	Mouth wash*	N	3	3	0		13	16	35
		%	[8.6]**	[8.6]**	[0.0]**		[37.1]	[45.7]	
	Total	N	128	105	114		79	254	680
		%	[18.8]	[15.4]	[16.8]		[11.6]	[37.4]	
BRUSHING ASSISTANCE	No assistance	N	31	24	80		24	100	259
		%	[12.0]*	[9.3]*	[30.9]		[9.3]*	[38.6]	
	Under supervision	N	67	48	28		34	115	292
		%	[22.9]	[16.4]	[9.6]*		[11.6]	[39.4]	
	Assistance compulsory	N	29	32	6		21	39	127
		%	[22.8]	[25.2]	[4.7]****		[16.5]	[30.7]	
	Total	N	127	104	114		79	254	678
		%	[18.7]	[15.3]	[16.8]		[11.7]	[37.5]	
CO-OPERATION DURING BRUSHING	Uncooperative	N		25	7		19	36	114
		%	[23.7]*	[21.9]*	[6.1]		[16.7]	[31.6]*	
	Manageable	N	74	49	21		41	136	321
		%	[23.1]	[15.3]	[6.5]		[12.8]	[42.4]	

In Oral Hygiene Practices (Table 2), it was observed that 89.9% of the study population brushed only once daily, which was similar to the results obtained from National Oral Health survey (2002-2003) [13] and the study conducted by Purohit BM et al. [14] Whereas 36.2% of Deaf and Dumb children and 43.5% of Mentally challenged children brushed twice daily which was statistically significant ($p < 0.001$) when compared to the other 3 groups.

In the mode of oral hygiene maintenance, 86% of them used tooth brush and paste and this finding was in accordance with the results obtained in the study done by Purohit BM et al. [14], which was 91.1%. Tooth powder was also used by 38.3% of Deaf and Dumb children and 41.7% of mentally challenged children which was statistically significant ($p < 0.001$) from the other 3 groups.

		N	26	29	85	19	82	241
		%	[10.8]*	[12.0]*	[35.3]	[7.9]*	[34.0]	
		N	127	103	113	79	254	676
		%	[18.8]	[15.2]	[16.7]	[11.7]	[37.6]	
		N	67	56	8	25	102	258
		%	[26.0]*	[21.7]*	[3.1]	[9.7]	[39.5]*	
		N	43	33	7	37	103	223
		%	[19.3]*	[14.8]	[3.1]	[16.6]	[46.2]*	
	Swallows mouth wash	N	3	1	0	6	12	24
		%	[12.5]	[4.2]	[0.0]	[25.0]	[50.0]	
	Total	N	115	90	15	68	217	505
		%	[22.8]	[17.8]	[3.0]	[13.5]	[43.0]	

Similar color stars indicate significance between the groups and rest Non-significance

Under supervision brushing was needed for 39.4% of mentally challenged children followed by 22.9% Autism, 16.4% CP, 11.6% Down syndrome and least that is 9.6% for Deaf and Dumb children. Whereas assistance was compulsory for 30.7% Mentally challenged children followed by 25.2% CP, 22.8% Autism, 16.5% Down syndrome and least that is 4.7% for Deaf and Dumb children, where these children have shown statistically significant ($p < 0.001$) difference when compared to the other groups. In a study done by Purohit BM et al. [14] results obtained were not similar to the present study where 53.6% did not require any assistance, 24.2% compulsory assistance and 22.3% supervision, but this study considered whole population comprising of special children and compared them to normal children.

Highest number of uncooperative children during brushing were mentally challenged children (31.6%) followed by Autism (23.7%), Cerebral Palsy (21.9%), Down syndrome (16.7%) and only 6.1% of Deaf and Dumb children.

The main problem during brushing was most of the special children did not open the mouth properly while brushing followed by swallowing of the tooth paste. It was observed that 39.5% of mentally challenged children, 26% of Autism, 21.7% of CP, 9.7% of Down syndrome and only 3.1% of Deaf and Dumb children had this problem. Swallowing the tooth paste was encountered in 46.2% of mentally challenged. Mouth wash was least used by the parents as swallowing of the mouth wash was very fast when compared to tooth paste.

Table 3. Number of dental visits in a year.

Number of dental visits per year		Never	Once in 3 months	Once in 6 months	Once in 12 months	Total
Autism	N	102	7	9	11	129
	%	[79.1]	[5.4]	[7.0]	[8.5]	[8.5]
Cerebral palsy	N	85	9	5	6	105
	%	[81.0]	[8.6]	[4.8]	[5.7]	
Deaf and Dumb	N	86	9	10	9	114
	%	[75.4]	[7.9]	[8.8]	[7.9]	
Down syndrome	N	62	6	5	6	79
	%	[77.3]	[7.1]	[5.1]	[10.6]	
Mentally challenged	N	197	18	13	27	255
	%	[77.3]	[7.1]	[5.1]	[10.6]	
Total	N	532	49	42	59	682
	%	[78.0]*	[7.2]	[6.2]	[8.7]	

78% of the study population never visited the dentist (*Table 3*). This was similar to the result obtained by National Oral Health Survey 2002-2003 [13] and the study conducted by Purohit BM et al. [14]. This was because of lack of awareness

among parents and poor access to dental care for these children. Caries experience was measured using the deft and DMFT index (Table 4).

Table 4. Caries experience of the study population according to the age and disability.

Age	Disability	N	MEAN
3-6 YRS (deft)	Autism	7	3.4286
	Cerebral palsy	9	10.333
	Deaf and Dumb	1	12
	Down syndrome	3	4
	Total	20	7.05
7-14 YRS (DMFT+deft)	Autism	27	4.5556
	Cerebral palsy	25	4.88
	Deaf and Dumb	30	3.7667
	Down syndrome	16	4.125
	Mentally challenged	31	3.1613
	Total	129	4.0465
>14 YRS (DMFT)	Autism	18	4.6111
	Cerebral palsy	30	5.8333
	Deaf and Dumb	28	4.4286
	Down syndrome	18	3.4
	Mentally challenged	99	4.2121
	Total	193	4.3057

The total mean deft/DMFT score of all the disabled children together for all ages combined was 5.133 which was falling in the mean range reported by the studies done by many authors on special children (4.5-12.5) [15,16] and was less compared to the results shown by Ivancic JN et al. [17] (Mean- 6.39), and higher than that reported by Purohit BM et al. [14] (Mean-2.52). The mean deft/DMFT of the present study population is also higher when compared to the mean deft/DMFT score of normal children as reported by Mahesh P et al. [9] (Mean dmft-3.51) and (Mean DMFT-3.94).

When segregated according to the age group, caries experience was high in 3-6 years age group (Mean-7.05) followed by >14 years age group (Mean- 4.305) and 7-14 years age group (Mean-4.04) with no statistical significance ($p>0.05$). The caries experience was high in primary dentition and late permanent dentition than in the late mixed dentition and early permanent dentition period and it was mainly attributed to the newly erupted permanent teeth which was supported by many studies [18,19].

The mean deft and DMFT score was highest in Cerebral palsy children in all the age groups. These results were in accordance with the findings obtained by many studies. High caries activity in cerebral palsy children can be attributed to

carbohydrate rich soft diet necessitated by muscle weakness and impaired self-cleansing ability of the mouth due to uncoordinated muscle movements leading to accumulation of plaque and debris with subsequent rise in caries activity [20].

In Mentally challenged children it could be attributed to low power of concentration leading to negligence of oral hygiene and improper brushing [18].

Children with Autism are often cited as having certain behaviours/life factors which may lead to an increased risk of dental caries. These are poorer masticatory abilities and medications causing xerostomia such as Methamphetamine, medication in the form of sweet syrup solution and poor oral hygiene practices [21].

Oral hygiene status was measured using Oral Hygiene-Simplified index with slight modification for primary dentition. When compared for all age groups together with disabilities, most of them showed fair oral hygiene (Mean-2.688), except for Down syndrome and CP children, where they showed poor oral hygiene (Table 5).

Table 5. Oral hygiene index of the disability groups according to good, fair and poor criteria.

Disability		0-1.2(Good)	1.3 - 3(Fair)	3.1-6(Poor)	Total
Autism	N	24	52	53	129
	%	[18.6]*	[40.3]	[41.1]	
Cerebral palsy	N	11	52	42	105
	%	[10.5]*	[49.5]	[40.0]	
Deaf and Dumb	N	47	50	17	114
	%	[41.2]	[43.9]	[14.9]	
Down syndrome	N	1	40	38	79
	%	[1.3]*	[52.6]	[48.1]*	
Mentally challenged	N	41	122	92	255
	%	[16.1]*	[47.8]	[36.1]	
Total	N	124	316	242	682
	%	[18.2]	[46.3]	[35.5]	

41.2% of Deaf and Dumb children showed good oral hygiene, which was in accordance with the study done by Shaw L et al. [22] where as 48.1% of Down syndrome, Altun C et al. [23] group showed poor oral hygiene which was statistically significant ($p<0.001$) from the Deaf and Dumb group. These findings were in accordance with the results from various studies.

Down syndrome children had poor oral hygiene when compare to other groups followed by cerebral palsy group. The reason is attributed to the highest prevalence of malocclusion along with mental retardation [20].

In cerebral palsy group it is mainly related to the improper oral hygiene maintenance due to uncoordinated and uncontrolled movements (neuromuscular in-coordination) of the jaws, lips and tongue which leads to improper oral clearance and heavy accumulation of plaque and debris.

In mentally challenged children lack of proper concentration and poor motor skills is the cause for improper oral hygiene maintenance and plaque accumulation [24].

In children with Autism it can be attributed to decreased frequency of rinsing/swishing combined with lack of interest in oral hygiene, pouching of food in the mouth for a longer time [23] lack of necessary manual dexterity, which results in inadequate tooth brushing [25-27].

Malocclusion plays an important role in the overall oral health of an individual because it is associated with periodontal diseases, temporomandibular disorders, and may be complicated by an individual's disability.

Table 6. Molar occlusion.

Disability	Autism		Cerebral palsy		Deaf and Dumb		Down syndrome		Mentally challenged		Total	
	N	%	N	%	N	%	N	%	N	%	N	%
Class 1	70	[58.8]	60	[58.3]	95	[84.1]	34	[47.2]	179	[74.6]	438	[67.7]*
Class div1	26	[21.8]*	18	[17.5]*	7	[6.2]	7	[9.7]	51	[21.3]*	109	[16.8]
Class div 2	8	[6.7]*	8	[7.8]*	10	[8.8]	4	[5.6]	4	[1.7]	34	[5.2]
Class III	0	0.00%	1	1.00%	0	[0.0]	24	[33.3]*	5	[2.1]	30	[4.6]
Flush terminal	0	[0.0]	1	[1.0]	0	[0.0]	0	[0.0]	0	[0.0]	1	[0.2]
Mesial step	15	[12.6]	15	[14.6]	0	[0.0]	3	[4.2]	0	[0]	34	[5.3]
Distal step	0	[0.0]	0	[0.0]	1	[0.9]	0	[0.0]	0	[0.0]	1	[0.2]
Total	119		103		113		72		240		647	

*Highest% of study population with class 1 molar occlusion.
 *Highest % of Autism, CP and MC children with class molar occlusion.
 *Highest % of DS children with class III molar occlusion.

Open bite was highest in (12.4%) CP children, Deep bite in 7.6% of Down syndrome children, Both lower and upper anterior crowding was seen most in Down syndrome children (15.2%), Cross bite was the major finding observed in the Down syndrome children. Increased overjet was observed mostly in CP children (9.5%). The reason for increased overjet in CP children was attributed to buccal breathing and tongue thrusting which was related to poor swallowing reflex as stated by Strodel BJ et al. [34].

The high incidence of class III malocclusion among children with Down syndrome is attributed to altered cranial-base relationships, diminished dental arch size, decreased arch length, and reduced maxillary size [20].

In CP children disharmonious relation between intra-oral and peri-oral movements along with uncontrolled and uncoordinated movements of jaws, lips and tongue is

Table 7. Other findings.

OTHER FINDINGS	AUTISM	CP	DEAFandDUMB	DS	MC	TOTAL
	N [%]	N[%]	N[%]	N[%]	N[%]	N
OPEN BITE	1[0.8]	13[12.4]*	5[4.4]	8[8.9]	11[4.3]	37
DEEP BITE	2[1.6]	0[0.0]	5[4.4]	6[7.6]*	0[0.0]	13

Class 11 molar relation (Table 6) was observed in 23.77% of Autism children, 18.1% of Cerebral Palsy children, 38.4% of Mentally challenged children. These findings were in accordance with the studies done by various authors [28-32]. Class III molar relation was mainly observed in 33.3% of Down syndrome children which were similar to the findings obtained by Vittek J et al. [28] Choi NK et al. [33]. These findings showed significant difference among the disability groups.

attributed to the prevalence of malocclusion [20]. Anterior teeth fracture was seen mostly in CP group (41.9%) followed by Autism (31.8%).

These findings were in accordance with the studies done by Miamoto BC et al. [35] Rodrigues dos santos MT et al. [32]. Lip incompetency was the major finding in 30.1% of the disabled children with highest percentage seen in Down syndrome followed by, Autism, CP, MR. Similar finding was observed [35] (Table 7).

Angular cheilitis was observed most frequently in Down syndrome children (19%) followed by CP (14.3%) and Autism (8.5%). Cooperation during the oral assessment was recorded according to the criteria given by Demattie R et al. [10]. It is related to the children's acceptance to oral assessment.

CROWDING						
lower	10[7.8]	11[10.5]	17[14.9]*	9[11.4]	15[5.9]	62
upper	2[1.6]	7[6.7]*	1[0.9]	5[6.3]	11[4.3]	26
both	0[0.0]	3[2.9]	2[1.8]	12[15.2]*	3[1.2]	20
CROSS BITE						
Anterior	2[1.6]	1[1.0]	4[3.5]	10[12.7]*	10[3.9]	27
Posterior	2[1.6]	0[0.0]	1[0.9]	11[13.9]*	5[2.0]	19
Both	0[0.0]	0[0.0]	0[0.0]	3[3.8]*	1[0.4]	4
INCREASED OVERJET	12[9.3]*	10[9.5]*	4[3.5]	3[3.8]	19[7.5]	48
FRACTURE OF UPPER ANTERIOR TEEETH	41[31.8]	44[41.9]*	15[13.2]	15[19.0]	54[21.2]	169
LIP INCOMPETENCE	46[35.7]*	36[34.3]*	15[13.2]	30[38.0]*	78[30.6]	205
ANGULAR CHEILITIS	11[8.5]	15[14.3]*	9[7.9]	15[19.0]*	10[3.9]	60
TERM OF DELIVERY						
Normal term-	116[20.4]	57[10.4]	109[19.2]	65[11.44]	221[38.9]	568
Pre-term-	13[11.4]	48[42.1]*	5[4.4]	14[12.3]	34[29.9]	114
CO-OPERATION DURING EXAMINATION						
0	32	39	95	30	131	327
1	23	24	13	31	56	147
2	24	21	2	8	30	85
3	18	7	1	9	12	47
4	11	11	0	0	0	22
5	6	1	1	0	1	9
6	3	1	2	0	12	18
7	12	1	0	1	13	27

It was observed that 83.3% of Deaf and Dumb children opened their mouth willingly, allowed clinician to lift the lip and allowed mirror insertion all with verbal commands when compared to the other groups and there was statistical significance ($p < 0.001$). Where as many of the autism children came under the criteria 3,4,5,6 and 7.

Term of delivery was also recorded from the parents to associate it with disability. It was observed that most of the mothers of the disabled children had normal term delivery (83.28%) where as 42.1% of mothers whose children have CP and 29.9% of the mothers whose children have autism had preterm delivery and there was statistical significance when compared to the mothers of other groups.

Conclusion

It can thus be concluded that disabled children in the twin cities of Telangana state suffered from extensive dental caries, poor oral hygiene and malocclusion which needs to be treated effectively. Hence, these children require regular dental checkups, preventive programmes and most importantly education and motivation of parents towards importance of dental health.

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