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Oral health survey of 6–12-year-old children with disabilities attending special schools in Chennai, India

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Background. The dental literature is replete with reports on the oral health surveys of normal children. Relatively few data exist for the oral conditions of mentally challenged children and adolescents with multiple disabilities in India.

Aim. To assess the oral hygiene practices and treatment needs among 6–12-year-old disabled children attending special schools in Chennai, India, between 2007 and 2008.

Design. A cross-sectional study data were collected using WHO criteria, a questionnaire (for the parents/guardians) regarding demographic data and oral hygiene practices, medical record review, and clinical examination.

Results. Among 402 disabled children, majority of the children brushed their teeth once daily (89.7%) and with assistance from the caregiver (64.4%). The utilisation of the dental services was minimal (extractions 14.4%, oral prophylaxis 1.7%, and restorations 1.7%). There was significant difference between residents and non-residents for the mean dft/DMFT. The periodontal health was comparatively better among the residents of the institutions than the non-residents ($P < 0.001$). Regression analysis revealed that various variables were significantly associated with dft/DMFT and Community Periodontal Index (CPI).

Conclusion. This study gives sufficient evidence to suggest that the oral health status of this disabled population was poor and there was an increased unmet dental treatment needs.

Introduction

Individuals suffering from various disabilities form a considerable population of every community. The psychological reactions associated with a deformity can be emotionally devastating, not only to the disabled but also to the parents, caregivers, and family, which often lead to the attitudes of hopelessness and defiance in the lives of these individuals[1]. There is an estimated 10% of the world's population or approximately 650 million people who experience some form of disability[2]. About 80% of the estimated 200 million children worldwide with disability live in developing countries[3]. India being the most populous country following China has a large population with multiple disabilities. As per the National Sample Survey Organization (NSSO, India) conducted in 2002, 1.8% (18.5 million) of the total population of the country were disabled. Among them, the percentage with multiple disabilities was estimated to be around 10.63%[4].

Dental diseases are one of the most prevalent ailments among the disabled children worldwide and dental care is the greatest unattended health need of the disabled[5]. Mental retardation (MR) affects the general behaviour and impairs the level of social functioning. Health care in this group is often neglected and may be due to ignorance, fear, social stigma, traditions, socioeconomic status, misconception, and negative attitudes; apart from practical difficulties during treatment sessions, insufficient recall systems,

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communication problems, uncooperative attitudes, and underestimation of treatment needs[6]. In addition, a significant barrier to receiving dental care has been an unfavourable attitude towards treating the overwhelming needs of the disabled by dental providers based on financial, attitudinal, and educational factors[7]. Several basic reasons have been accounted for the inadequacy of dental care for the disabled. On the part of the profession, there has been lack of knowledge, understanding, and actual experience in treating these patients, and the importance of dental care for them has been overlooked by health planners and administrators in establishing programs for the non-institutionalised population[8]. There has been inadequate information on the oral health status and dental needs of the disabled population. Parents and guardians of these children have not been made aware of the importance of oral health and may lack knowledge of the healthcare system and financial resources available to them. Home care has been so neglected that most of them require extensive dental treatment[9]. Several studies have reported a higher prevalence of untreated dental disease in disabled children than in normal children, clearly indicating them as a low priority issue[10,11].

Although a number of studies have been carried out to assess the oral health of children in general, there have been relatively few investigations of the oral conditions of mentally challenged children and adolescents with multiple disabilities in India. To obtain a detailed and systematic data, an effort has been made in this study to assess the oral health condition, oral hygiene practices, and treatment needs among 6–12-year-old children attending special schools in Chennai, India.

Materials and methods

This study was conducted among mentally challenged individuals attending special schools in Chennai, India, between August 2007 and December 2008 to assess their oral health conditions and was part of a large epidemiological survey on disabled children in South India. Ethical clearance was obtained from Institutional Review Board of Ragas Dental College, Chennai, India, and permission was solicited and obtained from the special commissioner of disabled and the chairman of all the schools. For the dental examination, prior consent of the parents or guardians was obtained through the schools.

Study sample and sampling procedure

The list of the registered special schools for mentally retarded was collected from the office of state commissioner for the disabled. Of the 22 institutions, eight schools were excluded from the study for the following reasons: one institution was a vocational training centre for adults; authorities of four institutions denied permission to conduct the study and three institutions were no longer functioning. Fourteen institutions accepted the study proposal and granted permission to conduct the study.

The number of individuals available in the 6–12-year age group was collected from each institution. Among the 14 institutions included, three institutions of the Spastic society of Tamil Nadu gave permission of only one day each to conduct the study. At other centres, all the individuals of 6–12-year age group, present on the scheduled days of survey, were examined for the study. A total of 472 mentally challenged individuals including those with multiple disabilities from 14 special schools were included. Eventually, only 402 children were examined due to prolonged periods of the absence or non-cooperation by the subjects.

Pilot study and examiner calibration

A pilot study involving 24 mentally challenged children from National Institute for Empowerment of Persons with Multiple Disabilities (NIEPMD), Muttukadu, was undertaken to determine the feasibility of the study, the amount of time required for reviewing medical records, collection of the questionnaire, examination of each subject, and applicability of WHO Oral Health Surveys: Basic Methods (1997) Pro-forma[12].

Based on the pilot study, the questions on utilisation of dental services and oral hygiene practices were modified for the main study.

As a single examiner carried out the examination, intra-examiner calibration was performed. Twenty-four subjects who regularly attended NIEPMD were examined using the study pro-forma and were re-examined after 3 weeks. The reproducibility was 94% for decayed, missing, filled teeth (DMFT) and 90% for Community Periodontal Index (CPI) scores.

Inclusion and exclusion criteria

All individuals in the age group of 6–12 present on the scheduled days of examination and those diagnosed with an intelligence quotient (IQ) ≤85 were included in our study. The exclusion criteria included those children who were uncooperative due to the severity of their medical conditions and those individuals whose parents did not give consent to the school authorities for participation.

Implementing the study

Examination was conducted in the school premises under bright natural light. The subjects were made to sit on a chair or a wheel chair with comfortable arm rest facing the light in an upright position with sufficient head rest. The concerned class teacher was also present with the subject to help the examiner in communication and behaviour management. Some of the children were accompanied by the parent(s) too. Type-III clinical examination as recommended by American Dental Association (ADA) specification[13] was followed. The examiner was seated in front of the subject in such a way that the examiner had a good control over the subject's movements. A previously trained person recording the data was positioned on the left side of the patient close to the examiner, so that the examiner's instructions and codes were audible and also the examiner was able to see the data being entered. To gain maximum visibility, to avoid soft-tissue injury to the subject from instruments, and to avoid finger injury to the examiner, self-fabricated acrylic finger caps were used as mouth props.

A pre-tested questionnaire (in local language, Tamil) was distributed to the school authorities 4 days prior to the oral examination, which included demographic data, questions to assess utilisation of dental care services and child's oral hygiene practices. Date of birth of the subjects was obtained from the records maintained in the schools. The school medical record of each subject was reviewed with the help of the school authorities. The data on disability status, IQ, systemic diseases, and history of regular drug intake (if present) were collected and recorded.

The findings of the intraoral examination were reported to the school authorities and parents after the survey. After the examination, a short oral health education session was conducted in the local language (Tamil) to all the parents, teachers, and caregivers using appropriate aids. Health education charts as well as oral hygiene materials were distributed to all the 14 schools where the study was successfully completed. Children requiring complex treatment or those unable to cooperate were referred to Ragas Dental College and Hospital for further management.

Statistical analysis

The data recorded were entered into statistical software (SPSS version 16.0; SPSS Inc., Chicago, IL, USA) for the purpose of data analysis. Descriptive statistics including number and percentages for categorical variables and means and standard deviations (SD) for continuous variables were calculated. Chi-square, Mann–Whitney, and Kruskal–Wallis tests were used to calculate inferential statistics. A stepwise multiple linear regression analysis was carried out to assess the linear relationship between dft/DMFT and CPI as dependent variables and various independent variables. We considered P values of <0.05 to be statistically significant.

Results

In this study, the oral health status of a total of 402 mentally challenged individuals was

assessed. Table 1 shows the background characteristics of the study population. The mean age of the study population was 8.97 ± 2.05 years. There were 267 (66.4%) males and 135 (33.6%) females. MR was the most common disability among the children surveyed (32.8%). The other type of disabilities included children having Down's syndrome, MR along with cerebral palsy, autism, visual impairment, speech and hearing impairment, Attention Deficit Hyperactivity Disorder (ADHD), or dyslexia (learning disability). A higher percentage (41.5%) of the children had moderate MR with an IQ level of 36–51. Approximately 70% of the children lived with their family members, whereas 30.3% of the children were residents of the respective institutions. Most of the children neither brushed their teeth with fluoridated toothpaste (36.8%) nor were aware of it (33.3%). Most of the children brushed their teeth once daily (89.7%) and under the supervision of the caregiver (64.4%). More than half of the children (59.7%) did not rinse their mouth after meals. The utilisation of the dental services was minimal; 14.4% had extractions and only 1.7% each had oral prophylaxis and restorations.

Table 1. Background characteristics of the study population (*n* = 402).

Variables	Males (*n* = 267) *n* (%)	Females (*n* = 135) *n* (%)	Total (*n* = 402) *n* (%)
Type of disability			
MR	86 (32.2)	46 (34.1)	132 (32.8)
MR+ cerebral palsy	60 (22.5)	37 (27.4)	97 (24.1)
MR+ autism	41 (15.4)	14 (10.4)	55 (13.7)
Down's syndrome	32 (12.0)	22 (16.3)	54 (13.4)
MR+ visual impairment	6 (2.2)	2 (1.5)	8 (2.0)
MR+ speech and hearing disability	13 (4.9)	7 (5.2)	20 (5.0)
MR+ ADHD	18 (6.7)	4 (3.0)	22 (5.5)
MR+ dyslexia	11 (4.1)	3 (2.2)	14 (3.5)
Intelligence quotient*			
Borderline+ Mild	76 (28.5)	35 (25.9)	111 (27.6)
Moderate	105 (39.3)	62 (45.9)	167 (41.5)
Severe + Profound	86 (32.2)	38 (28.1)	124 (30.8)
Residential status			
Resident	80 (30.0)	42 (31.1)	122 (30.3)
Non-resident	187 (70.0)	93 (68.9)	280 (69.7)
Oral hygiene practices			
Use of fluoridated toothpaste			
Yes	86 (32.2)	34 (25.2)	120 (29.9)
No	98 (36.7)	50 (37.0)	148 (36.8)
I do not know	83 (31.1)	51 (37.8)	134 (33.3)
Frequency of toothbrushing			
Once daily	238 (89.1)	127 (94.1)	365 (89.7)
Twice daily	24 (9.0)	7 (5.2)	31 (7.7)
Irregular	5 (1.9)	1 (0.7)	6 (1.5)
Toothbrushing performed by			
Self-toothbrushing	97 (36.3)	43 (31.9)	140 (34.8)
Supervised toothbrushing	170 (63.7)	92 (68.1)	262 (64.4)
Rinsing after every meal			
Yes	109 (40.8)	53 (39.3)	162 (40.3)
No	158 (59.2)	82 (60.7)	240 (59.7)
Utilisation of dental services			
Oral prophylaxis	6 (2.2)	1 (0.7)	7 (1.7)
Extractions	37 (13.9)	21 (15.6)	58 (14.4)
Restorations	3 (1.1)	4 (3.0)	7 (1.7)

MR, mental retardation; ADHD, attention deficit hyperactivity disorder.
*Borderline: IQ 68–85; mild: IQ 52–67; moderate: IQ 36–51; severe: IQ 20–35; Profound: IQ < 20.

Mean caries prevalence according to gender, residential status, and type of disability is given in Table 2. The overall mean dft and mean DMFT scores were 3.15 and 2.03, respectively, and the decayed component had the highest score. There was a statistically significant difference among the males and the females for the f component ($P = 0.046$). The mean dft was higher and the mean DMFT was lower among the non-residents compared with the residents of the institutions. There was a statistically significant difference between residents and non-residents for the mean dft/DMFT ($P < 0.05$). Based on the type of disability, there was no statistically significant difference for the mean dft/DMFT. Children with MR and cerebral palsy had the highest dft score of 3.95 and children with Down's syndrome had the highest DMFT score of 2.44. The decayed components (dt and DT), however, were higher than the missing and filled components in all the disability groups. The filled component was evident only in the children with MR and those with MR and cerebral palsy.

The CPI scores recorded indicated that 3.7% ($n = 15$) had a healthy periodontium with a score of 0. Approximately 36% ($n = 145$) had a score of 1, which indicates gingivitis with bleeding on probing. A score

Table 2. Mean caries prevalence according to gender, residential status, and type of disability.

	dt Mean ± SD	ft Mean ± SD	dft Mean ± SD	DT Mean ± SD	MT Mean±SD	FT Mean ± SD	DMFT Mean ± SD
Overall	3.05 ± 3.57	0.00 ± 0.07	3.15 ± 3.69	1.99 ± 2.28	0.04 ± 0.31	0.01 ± 0.09	2.03 ± 2.34
Gender							
Male	2.93 ± 3.41	0.00 ± 0.00	3.01 ± 3.49	1.99 ± 2.38	0.06 ± 0.37	0.00 ± 0.06	2.05 ± 2.47
Female	3.28 ± 3.87	0.01 ± 0.12	3.43 ± 4.05	1.98 ± 2.06	0.01 ± 0.09	0.01 ± 0.12	2.00 ± 2.08
P value†	0.452	0.046*	0.416	0.700	0.147	0.224	0.779
Residential status							
Resident	1.99 ± 2.79	0.00 ± 0.00	2.02 ± 2.81	2.47 ± 2.37	0.05 ± 0.38	0.02 ± 0.13	2.53 ± 2.49
Non-resident	3.51 ± 3.78	0.01 ± 0.08	3.64 ± 3.91	1.78 ± 2.21	0.04 ± 0.27	0.00 ± 0.06	1.82 ± 2.24
P value†	0.000*	0.350	0.000*	0.002*	0.844	0.170	0.002*
Type of disability							
MR	2.93 ± 3.37	0.01 ± 0.09	3.06 ± 3.53	2.26 ± 2.37	0.03 ± 0.21	0.01 ± 0.09	2.30 ± 2.41
MR+ cerebral palsy	3.80 ± 3.72	0.01 ± 0.10	3.95 ± 3.77	1.99 ± 2.19	0.00 ± 0.00	0.02 ± 0.14	2.01 ± 2.19
MR+ autism	2.58 ± 3.42	0.00 ± 0.00	2.65 ± 3.70	1.20 ± 1.65	0.07 ± 0.42	0.00 ± 0.00	1.27 ± 1.72
Down's syndrome	3.37 ± 4.39	0.00 ± 0.00	3.41 ± 4.39	2.35 ± 2.64	0.09 ± 0.56	0.00 ± 0.00	2.44 ± 2.91
MR+ visual impairment	2.13 ± 3.76	0.00 ± 0.00	2.13 ± 3.76	1.13 ± 1.46	0.00 ± 0.00	0.00 ± 0.00	1.13 ± 1.46
MR+ speech and hearing disability	2.55 ± 2.98	0.00 ± 0.00	2.55 ± 2.99	2.25 ± 2.36	0.00 ± 0.00	0.00 ± 0.00	2.25 ± 2.36
MR+ ADHD	2.91 ± 2.94	0.00 ± 0.00	3.05 ± 3.24	1.55 ± 1.65	0.05 ± 0.21	0.00 ± 0.00	1.59 ± 1.65
MR+dyslexia	1.00 ± 1.92	0.00 ± 0.00	1.00 ± 1.92	1.93 ± 3.10	0.14 ± 0.54	0.00 ± 0.00	2.07 ± 3.15
P value‡	0.103	0.979	0.074	0.111	0.543	0.829	0.176

*P value ≤ 0.05 statistically significant.
†Mann–Whitney test.
‡Kruskal–Wallis test.

of 2 which implies the presence of plaque retentive factor (calculus) was recorded in 48% ($n = 193$). The periodontal health was comparatively better among the residents of the institutions than the non-residents ($P < 0.001$). There was no statistically significant difference for the different CPI scores according to gender and type of disability (Table 3).

Overall, the need for restorative treatments was the most prevalent treatment need in our study population (69%, $n = 277$ for one surface fillings and 59%, $n = 236$ for two or more surface fillings). There was no statistical difference in the treatment needs based on gender. None of the residents of the institution required space maintainers compared with the non-residents ($P = 0.016$). One surface fillings and pulp care were statistically significant treatment needs among the different disability groups ($P < 0.05$), more prevalent in the MR and cerebral palsy group as shown in Table 4.

The stepwise multiple linear regression analysis revealed that the best predictors for dft index were residential status and type of disability with a variance of 5.7%. The best predictors for DMFT index and CPI were residential status and oral hygiene practice with a variance of 4.3% and 9.6%, respectively. Table 5 shows the various variables significantly associated with dft/DMFT and CPI.

Discussion

This report describes the oral health practices, prevalence of dental caries, periodontal health, and treatment needs in a sample of disabled children in India. In the present study, irrespective of the different types of disability, majority of the subjects used tooth brush and tooth paste for tooth cleaning (92.4%) at least once daily (90%). The high usage of tooth paste and tooth brush can be attributed to the fact that the study was carried out in an urban population. Most of the children, however, neither brushed their teeth with fluoridated toothpaste nor were aware of it.

More than half of the (64.4%) individuals brushed their teeth under the supervision of their caregivers. This finding is in contrast to

Table 3. Distribution of CPI scores according to gender, residential status, and type of disability.

	Healthy *n* (%)	Bleeding *n* (%)	Calculus *n* (%)	Not recorded (9) *n* (%)
Overall	15 (3.7)	145 (36.1)	193 (48)	49 (12.2)
Gender				
Male	10 (3.7)	92 (34.5)	131 (49.1)	34 (12.7)
Female	5 (3.7)	53 (39.3)	62 (45.9)	15 (11.1)
P value	0.695 (NS)			
Residential status				
Resident	1 (0.8)	29 (23.8)	89 (73)	3 (2.5)
Non-resident	14 (5)	116 (41.4)	104 (37.1)	46 (16.4)
P value	<0.001*			
Type of disability				
MR	4 (3)	45 (34.1)	76 (57.6)	7 (5.3)
MR+ cerebral palsy	1 (1)	32 (33)	47 (48.5)	17 (17.5)
MR+ autism	3 (5.5)	23 (41.8)	22 (40)	7 (12.7)
Down's syndrome	3 (5.6)	20 (37)	24 (44.4)	7 (13)
MR+ visual impairment	0 (0)	4 (50)	1 (12.5)	3 (37.5)
MR+ speech and hearing disability	2 (10)	8 (40)	9 (45)	1 (5)
MR+ ADHD	1 (4.5)	9 (40.9)	8 (36.4)	4 (18.2)
MR+dyslexia	1 (7.1)	4 (28.6)	6 (42.9)	3 (21.4)
P value	0.543 (NS)			

*Chi-square test: *P* value ≤ 0.05 statistically significant.
NS, not significant.

Table 4. Distribution of the mean prevalence of disabled children requiring the different forms of treatment according to gender, residential status, and type of disability.

	One surface filling Mean ± SD	2 or more surface filling Mean ± SD	Pulp care and restoration Mean ± SD	Extraction Mean ± SD	Crown for any reason Mean ± SD	Space maintainer Mean ± SD
Overall	2.09 ± 1.97	1.80 ± 2.28	0.42 ± 1.08	0.75 ± 1.89	0.02 ± 0.233	0.06 ± 0.37
Gender						
Male	2.16 ± 2.06	1.79 ± 2.31	0.39 ± 1.06	0.61 ± 1.51	0.04 ± 0.29	0.04 ± 0.32
Female	1.94 ± 1.77	1.81 ± 2.24	0.47 ± 1.11	1.03 ± 2.46	0.00 ± 0.00	0.09 ± 0.47
P value†	0.479	0.852	0.448	0.084	0.110	0.118
Residential status						
Resident	2.19 ± 2.05	1.50 ± 1.90	0.24 ± 0.716	0.59 ± 1.44	0.02 ± 0.20	0.00 ± 0.00
Non-resident	2.04 ± 1.93	1.93 ± 2.42	0.49 ± 1.19	0.83 ± 2.05	0.03 ± 0.25	0.08 ± 0.44
P value†	0.531	0.271	0.073	0.942	0.644	0.016*
Type of disability						
MR	2.18 ± 2.06	2.00 ± 2.35	0.42 ± 1.12	0.65 ± 1.60	0.03 ± 0.25	0.09 ± 0.40
MR+ cerebral palsy	2.42 ± 1.87	1.62 ± 1.87	0.86 ± 1.50	0.85 ± 1.79	0.00 ± 0.00	0.05 ± 0.42
MR+ autism	1.44 ± 1.98	1.71 ± 2.64	0.24 ± 0.69	0.49 ± 1.30	0.05 ± 0.41	0.07 ± 0.54
Down's syndrome	2.41 ± 2.09	1.87 ± 2.51	0.13 ± 0.44	1.24 ± 3.22	0.02 ± 0.14	0.02 ± 0.14
MR+ visual impairment	1.00 ± 1.20	1.63 ± 2.26	0.25 ± 0.71	0.63 ± 1.19	0.00 ± 0.00	0.00 ± 0.00
MR+ speech and hearing disability	1.80 ± 1.36	2.10 ± 2.75	0.30 ± 0.80	0.60 ± 1.05	0.00 ± 0.00	0.00 ± 0.00
MR+ ADHD	2.27 ± 1.70	1.32 ± 1.49	0.00 ± 0.00	0.82 ± 1.92	0.00 ± 0.00	0.05 ± 0.21
MR+dyslexia	0.93 ± 1.77	1.71 ± 2.40	0.00 ± 0.00	0.43 ± 1.16	0.14 ± 0.54	0.00 ± 0.00
P value‡	0.001*	0.877	0.000*	0.711	0.518	0.549

**P* value ≤ 0.05 statistically significant.
†Mann–Whitney test.
‡Kruskal–Wallis test.

a Belgium study where majority of the disabled children did not receive help with tooth brushing from their caregivers. The same study depicted poor oral hygiene in 31.8% of the children, and no significant differences were found in oral cleanliness

Table 5. Stepwise multiple linear regression analysis with deft, DMFT, and CPI as dependent variables.

Model	*R*	R^2	*F* value	*P* value
Deft				
1	0.203	0.041	17.218	0.000
2	0.239	0.057	12.118	0.000
DMFT				
1	0.141	0.020	8.058	0.005
2	0.206	0.043	8.879	0.000
CPI				
1	0.290	0.084	32.195	0.000
2	0.310	0.096	18.593	0.000

deft Model 1: Predictors: (Constant), resident or non-resident of the institution.
deft Model 2: Predictors: (Constant), resident or non-resident of the institution, types of disability.
DMFT Model 1: Predictors: (Constant), resident or non-resident of the institution.
DMFT Model 2: Predictors: (Constant), resident or non-resident of the institution, oral hygiene practice (toothbrushing performed by).
CPI Model 1: Predictors: (Constant), resident or non-resident of the institution.
CPI Model 2: Predictors: (Constant), resident or non-resident of the institution, oral hygiene practice.
R is a measure of correlation between the observed value and the predicted value of the criterion variable.
R^2 is the square of this measure of correlation and indicates the proportion of the variance in the criterion variable.
F is the test value.
P is the significance value for the particular F value.

among types of disability[14]. Furthermore, a study conducted in Croatia reported a poor level of oral hygiene among the disabled children and attributed this to an improper brushing technique and inadequate guidance[15]. In the present study, although more parental attention was present, adequate knowledge of oral hygiene practices was probably lacking.

Children with complex disabilities may experience significant barriers to accessing comprehensive dental care that accommodates their special needs[16]. In the present study, most of the subjects (98.3%) had never undergone oral prophylaxis or dental restorations, a finding which is consistent with previous studies[14,17]. The primary form of dental treatment received in our cohort was extraction. It was reported that a greater number of extractions may be performed in disabled patients owing to the time constraints of anaesthesia and the inherent difficulties in performing restorative procedures in a single session and with an intubated patient[18]. Moreover, the extreme progression of dental caries due to lack of early treatment interventions may have contributed to extractions as the only treatment option.

Over the decades, the impact of deinstitutionalisation and normalisation processes of disabled populations has lead to the increasing encounter of such individuals in dental practices. Individuals with MR who would have been permanently relegated to an institution ten or twenty years ago are now often a part of his/her community and are given the opportunity to lead as normal and productive a life as possible with special training. Such an approach requires the development of a responsive environment and alternative community programs that can substantially improve dental treatment outcomes[19]. Several studies have reported that residential status of individuals with MR has had a variable effect on their oral health status[20,21].

The residential institutions, staffed by professional caregivers, can establish links to health services which can be utilised when care is required. Subjects living in the community are less likely to access dental care on a regular basis. They are much more likely to have no dentist and to seek care only when having trouble. But on the other hand, community-based living provides significant benefits for people with learning disabilities. Integration and acceptance by society is important to allow them to lead fuller lives and participate in activities and roles from which they previously may have been excluded. Health service planners and professionals, however, should seek to ensure that these benefits do not result in detriment to the health of these vulnerable individuals[22].

In this present study, the decayed component constituted the major part of the deft/DMFT index and the lack of conservative approach to the treatment has been confirmed. There was no significant difference found among disability types which is in accordance with previous studies[14,15,23]. In our study, the highest dft score was in the MR and cerebral palsy group and the highest DMFT score in the group of children with Down's syndrome. This result is in contrast to

a study performed in Turkey where the mean dmft was highest for children with Down's syndrome and the mean DMFT was highest for those with MR[24]. The prevalence of caries in our cohort was 63.2% and 57.2% for primary and permanent dentition, respectively. Our results revealed that a high proportion of carious lesions were untreated and when treatment was provided, it is more likely to be in the form of extractions rather than restorative care.

In our study, there were more number of non-residents than residents of the institution, and deft index was more evident in the non-residential children. It was reported that non-residential disabled children have greater control of their own diet and more opportunities to buy and eat cariogenic foods. Hence, their risk of developing caries is potentially increased[22]. This greater personal responsibility to make choices and decisions, along with dependence on caregivers, is likely to lead to care being sought late, if at all and could explain the high levels of untreated decay.

The present study showed that a remarkably low percentage of the subjects (3.7%) had healthy periodontal tissues. Majority of the individuals (48%) had the presence of calculus with 36.1% of individuals having bleeding on probing indicating that the periodontal disease was still in the preventable and reversible stage. Numerous studies have reported the increased tendency of mentally disabled children to have poorer oral hygiene and increased prevalence of periodontal disease than their normal counterparts[25] and other disabled groups[26]. In our study, children with MR, MR and cerebral palsy, MR and autism, and Down's syndrome had relatively more bleeding on probing and calculus than other disabled groups. The prevalence and extremely high progression of periodontal disease in individuals with Down's syndrome under the age of 30 years has been reported. However, it was also reported that a large amount of plaque and calculus alone may not explain the severity of periodontal disease in Down's syndrome individuals[27].

Disabled children are generally incapable of obtaining an adequate oral hygiene level by manual brushing because of their limited motor skills and lack of knowledge of oral hygiene measures and effective tooth brushing technique, which in turn result in poor periodontal conditions. Many contributing factors like abnormal anatomical aspects of teeth, disorders of connective tissue, and alteration in immunological response may also play a role in the prevalence and progression of the periodontal disease process. A large number of participants in this study were in need of specific dental care[26]. The need for restorations which was most prevalent in our cohort is consistent with the study carried out in Israel[19]. Several studies have reported that unmet dental care needs were the most common unmet healthcare need among disabled children[16,28].

Our study has certain limitations which may influence the ability to extrapolate our findings extensively. The sampling based on types of disabilities was not evenly distributed, so some types of less common disabilities may not be fully represented within the disabled population. We further acknowledge that our sample was predominantly from non-residents of the institutions, and therefore, comparison with studies which included either institutionalised or non-institutionalised groups was rather problematic; for this reason, some of our findings may be underestimated. A high caries rate and the low numbers of filled teeth among our sample may indicate barriers in access and utilisation of the existing oral healthcare system. Furthermore, a high cost of dental treatment and a lack of dental insurance for disabled children may worsen the situation. Child welfare organisations and other concerned authorities should take necessary steps in improving the oral health of the surveyed children, considering the results of this study.

Conclusion

The poor oral health status and high prevalence of accumulated treatment needs among the study population may be attributed to number of factors such as type of disability, IQ level, residential status, lack of knowledge about good oral hygiene practices among the concerned people, lack of motivation, low

priority given to dental care in the society, poor ability to cooperate at chair side, lack of facilities for early and regular oral health check-up and prompt treatment, poor socio-economic status of the parents or guardians, and the cost of treatment. This study emphasises the need of improved accessibility to dental services to ensure that optimum oral health is within the reach of these less fortunate individuals. Moreover, this study gives sufficient evidence to suggest that the treatment needs among these individuals were not being met and hence the need to reorganise preventive care measurements in the form of incremental dental care, considering the inherited difficulties in rendering curative treatments. Regular dental visits, especially from dental schools, may be a rational solution to overcome this major oral health crisis by carrying out prompt diagnosis, referrals, systematic follow-up, and comprehensive treatment for disabled children. Furthermore, oral health training and awareness programs for the parents, caregivers, teachers, and healthcare professionals will contribute to the early prevention of oral diseases to a great extent and thus decrease its burden among disabled children.

Why this paper is important to paediatric dentists

- This is the largest age-limited cohort of oral conditions in children with multiple disabilities reported from South India. This survey would provide valuable baseline data on oral health conditions and treatment needs of disabled children.
- Oral health survey of children with multiple disabilities in a developing country using globally accepted criteria is compared with existing data.
- These data give valuable evidence to suggest that the treatment needs among these individuals were not being met and hence the need to reorganise preventive care measurements and improve dental care of disabled children.

Conflict of interest

The authors declare no conflict of interest.

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