

# Oral Health Survey of 6-14-Year-Old Children with Disabilities Attending Special Schools Yemen

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**Objectives:** The purpose of this study was to assess the oral health status and treatment needs of children with disabilities attending special schools in Sana'a, Yemen. **Study design:** This cross-sectional study involved 401 children with different disabilities aged between 6 and 14 years. Dental caries was evaluated using DMFT/dmft indices in accordance with WHO criteria. The plaque index (PI) and the gingival index (GI) were used to assess oral hygiene and gingival health, respectively. **Results :** The mean dmft and DMFT scores of the total population were 4.27 and 1.90 respectively, with no significant differences across gender ( $p>0.05$ ). According to the type of disability, the physically disabled had the highest mean dmft of 4.68 (SD 3.30) and subjects with compound disabilities had the highest mean DMFT of 2.85 (SD 1.98). Among the disability groups, the blind had the highest PI and GI scores, and the deaf had the lowest. Majority of the children were on need for specific type of dental treatment. **Conclusion:** This study suggests that children with disabilities have a high prevalence of dental caries and poor oral hygiene.

**Key words:** oral health, treatment needs, disabled children

## INTRODUCTION

According to the literature, individuals with special health care needs, such as those with physical, mental, sensory, behavioural, cognitive, emotional and chronic medical conditions have poorer oral hygiene and periodontal status, more untreated caries and fewer remaining teeth than individuals without disabilities.<sup>1-3</sup> Such Individuals require health care beyond that considered routine, and this care involves specialised knowledge, increased awareness, attention and accommodation.<sup>4</sup>

The patient's age, the severity of the impairment and the living conditions may influence oral health. The performance of individuals with special needs in terms of oral hygiene may be greatly limited due to the presence of motor, sensory and intellectual disabilities<sup>5</sup>, so they are prone to poor oral health. This group of individuals may also not understand and assume responsibility for or cooperate with preventive oral health practices.<sup>6</sup> Moreover, children with severe impairments as well as the institutionalized disabled are dependent on parents, siblings or caregivers for general care, including oral hygiene. Many caregivers do not have the requisite knowledge or

values to recognise the importance of oral hygiene and do not themselves practice appropriate oral hygiene or adhere to a proper diet.<sup>7</sup> They may be more susceptible to dental caries if they reside at home and are given cariogenic snacks and exposed to other unhealthy eating habits.

Brown and Schodel<sup>8</sup> reviewed 32 studies of handicapped children and reported that such children tended to have poorer oral hygiene than children without special needs. In developing countries like Yemen, patients with special needs comprise a unique population, deserving special attention.

In Yemen, no previous studies have assessed the oral health status of children with disabilities. Therefore, the aims of the present study were 1) to assess the prevalence of dental caries, gingival health status, oral hygiene and oral treatment needs of children and adolescents with disabilities attending special needs schools in Sana'a, Yemen and 2) to investigate the association between caries variables and various socio-demographic and clinical (type of disability) variables.

## MATERIALS ND METHOD

Sana'a is the capital of Yemen, and it is the largest city in the country, which has a population of about 2 million people. At the time this study was carried out, there were eight special needs schools in the city, with a population of 750 children. All children with disabilities lived at home (i.e. none were institutionalised). Five of these schools agreed to participate in the study. The target population included all physically, sensory and mentally disabled children aged 6–14 years attending the five special needs schools ( $n = 458$ ). Uncooperative children and those who had severe detrimental systemic disorders were excluded from the study. The final sample consisted of 401 children and adolescents with disabilities.

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According to the type of disability, the participants were divided into five groups as follows: 1, mentally disabled ( $n = 150$ ); 2, physically disabled ( $n = 81$ ); 3, blind ( $n = 50$ ); 4, deaf ( $n = 92$ ); 5, compound disability (more than one disability) ( $n = 28$ ).

Informed consent was obtained from the parents or guardians and the school authorities before the subjects were included in the study. Prior to undergoing a dental examination, demographic information was obtained for each subject: date of birth, age, school, gender and residence. For each subject, information regarding oral hygiene practices, dietary habits and the parent's educational background was provided by the participant's parents.

The subjects were examined at their respective schools using artificial light while seated on an ordinary chair or in their wheelchairs. Dental caries and treatment needs were evaluated using DMFT/dmft and dmfs/DMFS indices in accordance with WHO oral survey methods<sup>9</sup>. Their gingival health status was evaluated using the gingival index (GI) of Loe and Silness<sup>10</sup>, and the plaque index<sup>11</sup> (PI) was employed to ascertain their oral hygiene status. All the examinations were performed by a single pre-calibrated examiner (Al-Maweri, S.).

The clinical findings were communicated to the parents/guardians. Appropriate oral health education was given, in addition to written referrals to dental clinics whenever it was deemed necessary.

This study was approved by the Research and Ethics Committee of Witten/Herdecke University, Germany, as well as by the Research and Ethics Committee of Sana'a University.

SPSS version 19.00 was used for data entry and analysis. Descriptive statistics were obtained, including percentages and frequencies for categorical data and means and standard deviations for numerical data. The categorical outcomes were analysed by Chi-square tests, and the quantitative outcomes were analysed by either a *t*-test or ANOVA, as appropriate. The Bonferroni post-hoc test was performed whenever ANOVA revealed a significant difference between the subgroups.

Stepwise multiple linear regression analyses were executed to analyse the association between the presence of dental caries (DMFT, dmft) and various sociodemographic and clinical variables (age, gender, type of disability, frequency of teeth brushing, frequency of intake of sweets and parents' education background). A *p* value <0.05 was considered significant.

**RESULTS**

Of the 401 participants in the study, 288 (71.8%) were male. The ages ranged from 6–14 years (mean  $10.15 \pm 2.41$ ). The study population was equally distributed among the age subgroups. Of the study subjects, 150 (37.4%) showed mental disability. Around half of the subjects (47.4%) reported cleaning their teeth regularly. Table 1a and b show the general profile and the background characteristics of the study subjects.

The prevalence of caries-free subjects in the study population was 7.0%, with no significant difference across gender ( $p > 0.05$ ). The highest DMFT/DMFS scores were among the 12–14 year age group, and the highest dmft/dmfs were among the 6–8 year age group (Table 2).

Table 3 shows the distribution of dmft/DMFT and dmfs/DMFS according to type of disability. The physically disabled had the highest mean dmft scores of  $4.68 \pm 3.30$ , and the blind had the

Table 1a: General profile and background characteristics of the study subjects

Characteristics	N	(%)
<b>Sex</b>		
Male	288	71.8
Female	113	28.2
<b>Age (years) (mean = 10.15)</b>		
6 - 8 years	128	31.9
9 - 11 years	139	34.7
12 - 14 years	134	33.4
<b>Type of disability</b>		
Mental	150	37.4
Physical	81	20.2
Deaf	92	22.9
Blind	50	12.5
Compound	28	7.0
<b>Frequency of brushing</b>		
Never/irregular	211	52.6
Once per day	141	35.2
Twice or more per a day	49	12.2
<b>Mother Education</b>		
No schooling	154	38.4
Elementary	170	42.4
Secondary	57	14.2
University	20	5.0
<b>Father Education:</b>		
No schooling	63	15.7
Elementary	140	34.9
Secondary	108	26.9
University	90	22.4

(n = 401).

Table 1b: Age and sex distribution of the study population among disability groups.

Disability Group	Age		Gender		Total
	Mean (SD)	Male (N)	Female (N)		
- Mental	10.39 (2.59)	101	49		150
- Physical	9.47 (2.01)	57	24		81
- Deaf	10.18 (2.41)	62	30		92
- Blind	9.84 (2.26)	50	00		50
- Compound	11.32 (2.29)	18	10		28
Total	10.15 (2.41)	288	113		401 (100%)

lowest dmft value of  $3.44 \pm 3.1$ . However, no statistically significant differences between the groups (ANOVA test,  $p > 0.05$ ) were detected. On the other hand, subjects with compound disabilities had the highest mean DMFT followed by the mentally disabled and the differences between the different disability groups were highly significant (ANOVA test,  $p < 0.0001$ ).

**Table 2: The DMFT/DMFS and dmft/dmfs scores by age and gender (means ± SD).**

Variables	DMFT	DMFS	dmft	dmfs
Age groups				
6-8 years	0.51 ± 0.94	0.66 ± 1.49	5.23 ± 3.49	10.91 ± 10.23
9-11 years	1.73 ± 1.71	3.03 ± 4.55	4.10 ± 2.74	9.22 ± 8.80
12-14 years	3.24 ± 2.55	5.93 ± 6.54	2.18 ± 1.90	3.86 ± 3.65
P† value	0.001	0.001	0.001	0.001
Gender				
Male	1.83 ± 2.13	3.04 ± 4.81	4.19 ± 3.22	9.08 ± 9.32
Female	2.08 ± 2.31	4.13 ± 6.15	4.45 ± 2.95	9.06 ± 8.79
total	1.90 ± 2.18	3.34 ± 5.23	4.27 ± 3.14	9.07 ± 9.16
P* value	0.3	0.07	0.52	0.98

†ANOVA test. SD=standard deviation.

\*t-test.

**Table 3: The DMFT/DMFS and dmft/dmfs scores among different disability groups (mean± SD).**

Disability Group	DMFT	DMFS	dmft	dmfs
Mentally handicapped	2.37 ± 2.59	4.75 ±7.05	4.27 ± 3.12	9.71± 10.18
Physically	0.96 ± 1.35	1.36 ±2.48	4.68 ± 3.30	10.10 ± 9.26
Deaf	1.91 ± 2.07	2.91 ±3.78	4.37 ± 3.11	9.40 ± 9.40
Blind	1.44 ± 1.56	2.23 ±2.99	3.44 ± 3.1	5.78 ± 5.64
Compound	2.85 ± 1.98	4.81 ±4.36	4.28 ± 2.91	8.22 ± 7.54
Total	1.90 ± 2.18	3.34 ±5.23	4.27 ± 3.14	9.07 ± 9.16
P† Value	0.001	0.001	0.355	0.112

†ANOVA test. SD= standard deviation

It should be noted that the SDs sometimes exceeds or equals the mean as a result of the outliers which inflate the SD. It happens when part of the sample have small values while others had higher values especially with caries indexes (dmft/DMFT) (Tables 2 and 3).

Stepwise multiple linear regression revealed that age was the best predictor for caries in permanent teeth (DMFT), explaining 30.6% of the variance, and the best predictors for caries in primary teeth (dmft) were age and the frequency of sweets intake. (Table 4).

The need for restorative treatment was high, with 86.8% of the subjects requiring one surface filling and 53.5% requiring two surface fillings. There was no significant difference across gender ( $p>0.05$ , Table 5).

The total PI and GI of the study population was 1.37± 0.60 and 1.39± 0.68, respectively. Among the disability groups, the blind subjects had the highest mean PI and GI scores while the deaf group had the lowest, and differences between the different disability groups were highly significant ( $p<0.001$ ) (Table 6).

**Table 4: Stepwise multiple linear regression with DMFT and dmft as dependant variables.**

Model	R	R <sup>2</sup>	Adjusted R <sup>2</sup>	SE of Estimate	P value
<b>DMFT</b>					
1	0.555 <sup>a</sup>	0.308	0.306	1.816	0.000
<b>dmft</b>					
1	0.343 <sup>b</sup>	0.117	0.114	2.957	0.001
2	0.364 <sup>c</sup>	0.132	0.127	2.937	0.001

a. Predictors: (Constant), Age

b. Predictors: (Constant), Age

c. Predictors: (Constant), Age, intake frequency of sweets

**Table 5: Dental treatment needs among the subjects by gender N (%) (n=401)**

Gender	1 surface filling	2 surface filling	Crown	Pulp	Extraction	Preventive	Veneer
Male	252 (87.5)	150 (52.3)	41(14.2)	27(9.4)	60 (20.8)	59 (20.5)	4 (1.4)
Female	96 (85)	6 (56.6)	14(12.4)	7 (6.2)	22 (19.5)	28 (24.8)	2 (1.8)
Total	384 (86.8)	214 (53.5)	55(13.7)	34 (8.5)	82 (20.4)	87 (21.7)	6 (1.5)

Chi-square test.  $p >0.05$

Table 6: Plaque Index (PI) and Gingival Index (GI) scores according to the type of disability (mean ± SD).

Disability Group	PI	GI
	Mean ± SD	Mean ± SD
Mentally	1.41 ± 0.60	1.42 ± 0.65
Physically	1.26 ± 0.49	1.28 ± 0.60
Deaf	1.19 ± 0.54	1.13 ± 0.60
Blind	1.62 ± 0.54	1.84 ± 0.79
Compound	1.61 ± 0.71	1.63 ± 0.62
total	1.37 ± 0.60	1.39 ± 0.68
P <sup>†</sup> value	0.000	0.000

<sup>†</sup>P= ANOVA test; SD= standard deviation

## DISCUSSION

The current study presented a comprehensive overview of the oral health status and the treatment needs of disabled children attending special needs schools. To the best of our knowledge, this is the first study to explore these issues among disabled children and adolescents in Yemen.

In the present study, the mean dmft and DMFT scores of the total study group were 4.27 and 1.90, respectively. The former is high when compared with healthy children of a similar age in Sana'a<sup>12</sup>. This finding is consistent with many earlier studies, which reported a higher dental caries incidence among disabled populations than among healthy subjects of corresponding age.<sup>13-15</sup> However, there are many studies that reported better dmft and DMFT values among these groups than among the general population.<sup>16,17</sup> It is most likely that the most significant factor in improving the oral health status of children with disabilities is the awareness of their families of the importance of oral hygiene habits.

No significant difference was found in the prevalence of caries between male and female subjects, which is in agreement with many previous studies.<sup>6,13,14,18</sup> The present study also showed a steady increase in DMFT/DMFS values and a decrease in dmft/dmfs scores with age. This phenomenon is expected due to the replacement of the deciduous teeth with the permanent ones. Similar findings have been observed in many previous studies.<sup>18-20</sup>

The present study showed that the mentally disabled children have a high prevalence of caries which is higher than that reported among a population of healthy children of the same age in Sana'a.<sup>12</sup> These findings are also consistent with many previous studies, which reported a high prevalence of caries among mentally disabled children.<sup>6,15,19-21</sup> Some of the reasons given for the increased occurrence of caries in this group are increased thirst, 'comfort eating' of sweets and drinks and long-term consumption of medications in the form of sweetened syrups.<sup>6</sup>

The blind group had the lowest prevalence of dental caries. Similar to our results, Bhavsar and Damle<sup>21</sup> reported in their study of disabled students that the highest rate of dental caries was found in students with mental disabilities, and the lowest rate was found among the blind. Greeley et al.<sup>22</sup> did not find any association between dental decay and blindness in children. On the other hand, our result is contrary to findings by Gupta<sup>13</sup> and Ajami<sup>19</sup> who reported a higher prevalence of caries among a blind group than among a deaf group.

In the multivariate analysis, age was significantly associated with caries, which is consistent with previous reports.<sup>18-20</sup> Moreover, the intake frequency of sweets was significantly associated with caries in deciduous teeth. This is in agreement with many previous reports in which the intake of sweets was reported as a risk factor for caries in the disabled.<sup>23-24</sup> When parents attend the clinic with their children, it is of paramount importance that they are educated about the need to reduce cariogenic snacks and to substitute them, as much as possible, with fruits and vegetables.

A high prevalence of unmet treatment is evident in this study: Majority of the subjects required restorative treatment. Other studies in developed countries have also shown that dental care is the most prevalent unmet health care need for children with special health care needs.<sup>1,3</sup> This finding may be attributed to inadequate funding and resources, insufficient trained dentists to treat patients with disabilities and complex treatment needs requiring special care or general anaesthesia.<sup>25, 26</sup>

In general, the oral hygiene of the disabled children and the young adults examined in the present study was rather poor. All the subjects had gingivitis and showed poor oral hygiene. These findings are worse than those reported for similarly aged children without disabilities in Sana'a.<sup>12</sup> Data from a study of 2–26-year-olds with disabilities in Turkey showed poor oral hygiene, with no significant differences among the various types of disability<sup>20</sup>. Several other studies also reported poor results for periodontal health and oral cleanliness among children with disabilities.<sup>3,15-17</sup> These results may be due to a lack of coordination, understanding or physical ability or to muscular limitations, which cause difficulties in tooth brushing and subsequently inadequate plaque control among disabled children.

In this study, the blind group had the highest mean PI and GI scores. Similar to our findings, Greeley et al.<sup>22</sup> reported that oral hygiene was worse in blind students. The maintenance of oral hygiene remains the most outstanding challenge in the care of blind patients.<sup>27</sup> The degree of periodontal disease among this group is also higher because it is difficult to maintain oral hygiene without visual feedback while brushing (i.e. seeing whether the plaque has been removed or the gums are bleeding). The present study also revealed that deaf children had better oral hygiene than other disabled individuals. This result is in accordance with other earlier reports.<sup>16,18,28</sup>

Poor oral hygiene has been reported as the most important determinant of caries risk in children with disabilities<sup>24</sup>. The prevalence of caries in the study population is already very high, and the levels of poor oral hygiene are very alarming. Moreover, it should be noted that uncooperative children and those with severe disabilities, who were not included in the study, might have even higher prevalence of caries and poorer oral hygiene, and consequently need more oral health care. The very high prevalence of caries and the poor oral hygiene status demand immediate attention to increase efforts for prevention and treatment of oral diseases in these special groups of children.

## CONCLUSION

The present findings demonstrate a high prevalence of caries, extensive unmet needs of dental treatment and poor oral hygiene among children and adolescents with special needs. They also revealed an association between dental diseases and the type and the severity of the disability. We emphasise the importance of a preventive approach and the critical role of the dentist in providing proper dental education to parents of individuals with disabilities.

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