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ORIGINAL ARTICLE

DENTAL CARIES AND ITS DETERMINANTS AMONG CHILDREN WITH SPECIAL HEALTH CARE NEEDS IN DISTRICT KARACHI, PAKISTAN

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ABSTRACT

OBJECTIVE: To determine the frequency and determinants of dental caries among children with special health care needs in the special needs schools of Karachi, Pakistan

METHODS: This cross-sectional study was conducted among 196 children (aged 6-18 years) attending the public and private sector special-needs schools of Karachi, Pakistan. Children with mental and/or physical disability were included in the study. Prevalence of dental caries determined oral examination using the Decayed Missing Filled Teeth and Decayed Filled Teeth (DMFT/dft) index. Parental education level, oral health knowledge and house-hold level socioeconomic status were measured through a structured questionnaire. Data were analyzed in SPSS version 20.

RESULTS: The overall frequency of dental caries was 58.2% with 70.3% and 55.3% prevalence in the public and private special needs schools. The mean DMFT/dft value was 1.85±2.28. The Down syndrome group had the highest mean (DMFT/dft=2.45±2.65), followed by the group including vision impairment, autistic and cerebral palsy children. (DMFT/dft=2.05±2.51), Intellectual disability (DMFT/dft=1.70±2.01) and the deaf or hard of hearing group (DMFT/dft =1.49±2.27). Caries status was not significantly associated with gender (p=.518), socioeconomic status (p=.067), father education (p=.158) and mother education (p=.758).

CONCLUSION: The frequency of dental caries was high among children with disabilities in the Karachi district of Pakistan. The most important factor in improving the oral health status of these children is the awareness of their families by continuous community oriented medical and dental education programs.

KEY WORDS: Dental Caries (MeSH); Tooth (MeSH); Children with special health care need (Non-MeSH); Disabilities (MeSH); Socioeconomic Status (MeSH); DMF Index (MeSH); Oral Health (MeSH); Oral Hygiene (MeSH); Dental Care for Disabled (MeSH); Dental Care for Chronically Ill (MeSH); Dental Care for Children (MeSH).

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INTRODUCTION

Oral health is fundamental to general health and necessary for personal well-being.[1] The oral-systemic connection has thoroughly been investigated and established.[2] The bi-directional relationship between oral and systemic health is an essential driver of the overall health and as such contributes to the state of physical, mental, emotional and social well-being for an individual. Poor oral health and hygiene affect various aspects of life including the quality of life, self-perception, esthetics, and social interaction, thus having a strong effect on psychological and social projections. Oral risk factors include previous infections, tooth anatomy and composition of dental plaque, restorations, and oral hygiene and non-oral risk factors include others like age, socioeconomic status, medical condition, medications, history of fluoride, eating habits, genetic predisposition, general health, dental visits, and irregular tooth brushing.[3]

Maintenance of good oral hygiene requires sound psychomotor skills such as movement, coordination, manipulation, and manual dexterity.[4] Children with mental and/or physical disabilities often suffer from endocrine abnormalities excessive tooth grinding, deleterious effects of medicines with high sugar content and inadequate development of psychomotor skills.[5] Additionally, the difficulty faced by the parents/guardians in guiding their children in performing oral hygiene procedures contribute to poor oral hygiene and oral health among children with a disability.[6]

The World Health Organization estimates that about 10% of the total population in developed countries and 12% in the low and middle-income countries suffers from a mental or physical disability.[7] Dental caries remains a public health issue in most industrialized nations affecting 60-90% of children going to school,[8] especially affecting children with a disability 88.8%.[9] The low and middle-income countries fare even worse, comprising approximately 80% of the 1 billion people living with disabilities across the globe[8,10] and 97.1% prevalence of dental caries.[11] Five million children in Pakistan live with a mental or physical disability and this number is increasing at a rate of 2.65% annually, which is more than the annual growth rate of Pakistan i.e. 2.03%.[12] The National Survey of Children with Special Health Care

TABLE I: DEMOGRAPHIC PROFILE OF THE STUDY SUBJECTS (N = 196)

Characteristics		Frequency (n=66)	Percentage
Gender	Male	127	64.8
	Female	69	35.8
Religion	Islam	187	95.4
	Christian	9	4.6
Father Education (years of education)	< 5	41	20.9
	>5 – 10	69	35.2
	>10 – 15	67	34.2
	> 15	19	9.7
Mother Education (years of education)	< 5	68	34.7
	>5 – 10	64	32.7
	>10 – 15	58	29.6
	> 15	6	3.1
Poverty Score	Moderate likely	77	39.3
	Less likely	119	60.7

TABLE II: DENTAL CARIES STATUS IN PRIVATE AND PUBLIC SCHOOLS CHILDREN

School	Frequency (Percentage)		Total	P-value
	No	Yes		
Private	71 (44.7%)	88 (55.3%)	159 (100%)	0.069
Public	11 (29.7%)	26 (70.3%)	37 (100%)	
Total	82 (41.8%)	114 (58.2%)	196 (100%)	

TABLE III: PROFILE OF DENTAL CARIES AND DMFT/DFT SCORE AMONG DIFFERENT DISABILITY GROUPS

Type of Disability	Prevalence of Dental Caries [n (%)]	DMFT/dft* score (Mean ± SD)
Deaf or Hard of Hearing (n = 41)	19 (46.3%)	1.49 ± 2.27
Intellectual Disability (n = 84)	52 (61.9%)	1.70 ± 2.01
Down Syndrome (n = 31)	21 (67.7%)	2.45 ± 2.65
Others (n = 40)	22 (55)%	2.05 ± 2.51

*Decayed Missing Filled Teeth and Decayed Filled Teeth

needs (SHCN) in Pakistan reported that there is a severe unmet need for dental care among this disadvantaged group. [13]

Given the sheer number of people living with a disability, both globally and in Pakistan, it is necessary that the oral health problems of children with disabilities are documented and evidence regarding their prevention is produced to inform oral health care policies. This study aims to determine the frequency of dental caries among children with disabilities; attending special needs school in Karachi and its association with various socio-demographic factors.

METHODS

We conducted a cross-sectional study in the public and private sector special needs schools of Karachi, Pakistan. The study participants were selected on the basis of multistage stratified random sampling. The proportion of special need children calculated to be included in our study were 37 from the public and 159 from the private sector. After the final selection of the study participants, the data was collected from September 2017 to November 2017. The sample size was calculated using open-epi with an anticipated population proportion of 48% for dental caries among special need children,[14] and confidence level of 95% and absolute precision set at 7%. The sample size calculated was 196.

Ethical approval for the study was granted by the ethical review board of Khyber Medical University, Peshawar, Pakistan. The parents of the participants were given an orientation to the study via a study information sheet and were assured that the data is meant only for research purpose and confidentiality will be observed regarding all data and records. Informed consent was obtained from the parents/guardians and approval was taken from the school authorities before the subjects were included in the study.

The Inclusion criteria is that children (both male and female) 6-18 years of age[15] suffering from various types of disabilities i.e. intellectual disabilities (ID), deaf or hard of hearing, Down syndrome (DS), autistic, vision impairment and cerebral palsy were included while exclusion criteria is children with disabilities having a mouth opening less than 30 mm were excluded from the study because with limited mouth opening it is difficult to examine the oral cavity.

We recorded dental caries by using the Decayed Missing Filled Teeth and Decayed Filled Teeth (DMFT/dft) index according to the established WHO criteria, which are widely used to identify decayed teeth states that such teeth should be identified with the presence of cavitation. The sum of the three figures (DMF) forms the DMFT/dft value.[8,16] Parental education level, oral health knowledge was measured through a standardized structured questionnaire.[17] A standardized poverty scorecard was used to establish the socio-economic status (SES) of the child's household. Although this scorecard has been developed to assess poverty, it has been used previously for establishing SES in public health research because of its ease of administration and brevity.[18] The SES in our study was based on the probability of lying above the national poverty line, study participants were specified into three categories: high (probability > 66%), medium (probability 34% - 66%) and low

(probability < 34%). The questionnaire was sent to the parents who completed the general information of child i.e. name, age, type of disability, demographic characteristics of the parents i.e. parent's years of education, father income, mother income, the total number of children and any other child with a disability in the family. Other questions in the questionnaire were related to the oral hygiene practices of the child and awareness of dental problems and the effects of fluoride on dentition among the parents.

Dental checkup of the participants was conducted at their respective schools. Illumination was provided using artificial light (torch) and dental checkup was carried out by using disposable dental kit consisting of a mouth mirror, dental probe, tweezers, napkin, and cotton rolls. Participants were examined on the normal chairs of the classroom. Those participants who were physically disabled were examined on their wheelchairs. A single dentist (principal author) carried out all examinations. The parents/guardians were informed about the clinical findings through written information sheets made for the school record. Following the examination, oral health education was given, in addition to referrals to dental clinics, whenever these were deemed necessary.

Data were entered and analyzed through SPSS version 20.[19] Descriptive statistics were recorded in terms of percentages and frequencies for categorical data and means and standard deviation for numerical data. The categorical outcomes were analyzed by Chi-square tests, and the continuous outcomes were analyzed by t-test (private public sector comparison). The DMFT/dft scores were categorized as low (DMFT/dft=: ≤2.6); moderate (DMFT/dft=:2.7-4.4) and high (DMFT/dft=: ≥4.5).[20] Univariable logistic regression analysis was applied on all the explanatory variables to check the association of various predictors with dental caries (DMFT=0 vs. DMFT greater than 0). A p-value of <0.05 was considered significant.

RESULTS

We recruited a total of 196 children from the public (n=37) and private (n=159) schools providing special healthcare needs in district Karachi with mean age of 12.18±3.89 years with 117 (59.7%) were in the age range 6 to 13 years. Among the 196 participants 41 (20.9%) were deaf or hard of hearing, 84 (42.9%) were intellectually disable, 31 (15.8%) were having Down syndrome (DS) and 40 (20.4%) had other disabilities i.e. vision impairment, autism, and cerebral palsy. The majority of the participants belonged to medium SES category in our study. General characteristics of the study participants are provided in Table I. The overall prevalence of dental caries was 58.2% (n = 114) with a higher percentage in the public sector 70.3% (n = 26) vs. 55.3% (n = 88) in private sector (Table II).

Table III shows the dental caries prevalence and the mean DMFT/dft scores along with their standard deviations among the different disability groups. The mean DMFT/dft score (n = 196) was 1.85±2.28.The highest mean DMFT/dft was in DS (2.45±2.65).

About 96.4% of the children were using toothpaste and toothbrush in overall sample (n=196), in the private schools 96.2% and in public sector 97.3% use toothbrush and paste. Majority of the children i.e. 69.9% were brushing once a day, 89.2% in public and 65.4% in the private schools. No significant association was observed between the frequency of tooth brushing and the presence of dental caries (p-value 0.139). More than 85% (n=170) children practiced supervised tooth brushing, of which 103 children were having caries. No significant association (p-value 0.078) was found between dental caries status and supervised tooth brushing.

Seventy-nine percent of parents were aware that the accumulation of deposits on the tooth surface leads to dental caries. More than 90% of the respondents in both groups were aware that the daily removal of deposits through tooth brushing is essential to prevent dental disease. 75.7% of participants in the public sector and 57.2% participants in the private sector never visited the dentist. In the private sector 39.6% participants and in the public sector 21.6% participants visited the dentist only when necessitated by a dental problem. Table IV provides an overview of univariate analysis (Odds ratio) with regards to different characteristics of children.

DISCUSSION

The present study provides an overview

TABLE IV: ODDS RATIOS OF DENTAL CARIES WITH REGARD TO DIFFERENT CHARACTERISTICS OF CHILDREN

Variables		Odds Ratio (95% CI)	*p*-value
Age (years)	6 to 13	REF value = 1.0	-
	>13 to 18	0.84 (0.47-1.50)	0.565*
Gender	Male	REF value = 1.0	-
	Female	0.82 (0.45-1.47)	0.518*
Group	Private	REF value = 1.0	-
	Public	1.90 (0.88-4.12)	0.101*
Disability Group	Deaf or hard of hearing	REF value = 1.0	-
	Intellectual disability	1.88 (0.88-4.00)	0.101*
	Down Syndrome	2.43 (0.92-6.44)	0.073*
	Others	1.41 (0.59-3.39)	0.436*
Poverty Categories	Moderately likely	REF value = 1.0	-
	Less likely	0.57 (0.31-1.03)	0.067*
Parent's Education	Father Education	0.95 (0.90-1.01)	0.158*
	Mother Education	0.99 (0.93-1.04)	0.758*

of the prevalence and determinants of dental caries among children attending private and public special needs schools of Karachi. The prevalence of dental caries in overall sample was 58.2%, which is in line with both global and local literature reporting a high prevalence of caries in children with intellectual disabilities.[21-23] A study conducted in Rawalpindi, Pakistan reported prevalence of 48.2% in children with intellectual disabilities.[14] The small difference in the prevalence can be attributed to the diversity of included disability groups in the present study as compared to the study carried out in Rawalpindi where only the intellectually disable group was studied. The studies conducted in normal school going children in different cities of Pakistan also reported high prevalence, a study conducted in 12 years old school going children of Lahore and Karachi the prevalence is 58%[12], Another study conducted among 6 and 12 years old normal school going children of Karachi city reported 69.6% prevalence of dental caries.[24] A high prevalence 71.7% is reported in a study conducted in Gadap town, Karachi among 6-14 years old school going children.[25] A study conducted in Hyderabad reported 90% prevalence of dental caries among school children.[26] The high prevalence of dental caries among normal school going children as compared to SHCN children could be because the healthy children have different dietary patterns, they consume more junk food and they brush on their own mostly without parental supervision whereas the SHCN children mostly is dependent on the parents for brushing their teeth. Few studies reported better oral health and low dental caries prevalence in healthy children as compared to the SHCN children, this may be attributed to the improper tooth brushing technique, frequency of tooth brushing and use of medications.[6] The severity of the oral problems in the disabled children may be ascribed to lack of awareness about oral hygiene and inability to access the oral health facilities.[9,27]

The DMFT/dft score in the present study among the disability groups was highest in the DS, a finding that is consistent with results reported in similar studies in different regions.[3,9,28] A study in Guangzhou, China conducted among the children with intellectual disabilities reported DMFT/dft score of 1.5±2.0 which was lower than the present study,[29] this difference could be because of the different constitution of the groups. In a study conducted in Riyadh Saudi Arabia the mean DMFT/dmf was highest in the children with intellectual disabilities as compared to blind and deaf children,[22] which is in accordance with our study The mean dmf, and DMF for the autistic children was 2.4 in a study conducted in Ajman, UAE.[30] Lower caries prevalence in autistic children is reported in other regional and international studies[31,32] this is in line with the results of our study. The low DMFT/dft in deaf or hard of hearing group in our study as compared to other groups was because they have better dexterity and coordination and these children are not totally dependent on their parents to maintain their oral hygiene as compared to other groups.[3]

There was no significant difference in the prevalence of dental caries among male and female children in our study, these findings are consistent with previous studies.[9,21,33,34] In the present study, the prevalence of dental caries was not affected by the increase in educational years of the father but decreased with an increase in years of education of the mother. The DMFT/dft score of children was lower where mothers were more educated as compare to less educated mothers, this finding is in accordance with another study,[35] which reported that the effect of educational background on measures of dental caries was observed was found to be particularly strong when the disease prevalence was high.[36] In our study we found that there were no significant differences in the caries experience of children belonging to a higher or lower SES, with children in both groups suffering from a higher burden of caries, this finding is in line with previous literature where both high and low socioeconomic groups have been associated with a higher prevalence of caries.[37,38] In high SES group, the prevalence of caries can be attributed to increased carbohydrate intake in form of junk food, while in low SES, a lack of knowledge, awareness and inability to buy equipment are plausible reasons.

Karachi is a huge city there are many schools which are not registered and their names were not in the list of registered special care need schools so they were not in the options to be selected. Public sector special care need schools were only three whereas there are many private special care need schools in Karachi. The sample size of the study was 196, and the sample taken from the public school was quite low that is 37 because of the proportionate sampling according to the strength of the schools.

The limitation of the study was small sample size. Even though the sample size was low but still this study can be used for comparisons in future studies on SHCN children in Pakistan. Care for children with special health care need is often complex because of their various health conditions and extra care requirements. Special efforts and arrangements for the treatment of this neglected segment of the population in our society are required to improve their oral health. The most important factor in improving the oral health status of these children is the awareness of their families and teachers about the importance and methods of maintaining oral hygiene. Continuous community-oriented medical and dental education programs can achieve this important task.

CONCLUSION

The present study demonstrates a high prevalence of dental caries in children of special health care needs. The determinants like age, gender, type of disability, household income and parent's education has no association with presence of dental caries.

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AUTHORS' CONTRIBUTIONS

Following authors have made substantial contributions to the manuscript as under:

RJ: Conception, acquisition of data, drafting the manuscript, final approval of version to be published.

ZoK & FA: Study design, drafting the manuscript, critical review, final approval of version to be published.

ZeK: Analysis and interpretation of data, drafting the manuscript, final approval of version to be published.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

CONFLICT OF INTEREST

Authors declared no conflict of interest

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