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Prevalence of Dental Caries among 5–11-Years-Old Children in Ibrahim Hyderi, Coastal Area of Karachi

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ABSTRACT

Objective: Dental caries is the most common oral health disease of school-aged children globally. This study aimed to determine the prevalence of dental caries among 5–11-years-old children in Ibrahim Hyderi, a coastal area of Karachi.

Materials and Methods: This was a descriptive cross-sectional study in which 350 children aged 5–11 years were investigated. Dental examination was performed according to the World Health Organization criteria. Socio-demographic data were collected using a structured questionnaire. The data were analyzed using SPSS version 23.0. Descriptive statistics were employed to compute the mean and standard deviation of quantitative variables. Frequencies (numbers and proportions) were implemented to assess the prevalence of dental caries among groups as $p<0.05$ was considered statistically significant.

Results: A total of 182 (52%) male and 168 (48%) female participants, with 96 (27.4%) aged 5-6 years old, 148 (42.2%) aged 7-9 years old and 106 (30.2%) aged 10-11 years old group participated in the study. The overall prevalence of dental caries among the participants was 91.3%, with the male participants having a higher prevalence (52.1%) than the female counterparts (39.2%). Following the age of the participants, the prevalence of dental caries in primary, permanent, and whole dentition among children was 248 (70.8%), 172 (49.1%), and 310 (88.5%), respectively. Moreover, the odds of decaying permanent teeth were significantly higher in boys ($p = 0.04$), and in children whose fathers are unemployed ($p = 0.02$) compared to their counterparts.

Conclusion: The prevalence of dental caries among the studied children in mixed dentition was high and associated with sociodemographic factors. It is important to provide and implement preventive, therapeutic and informative programs for the control of dental caries at individual and school levels for local health policymakers.

Keywords: Dental Caries, Children, Prevalence, Sociodemographic Factors, Public Health

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INTRODUCTION

Dental caries is a preventable childhood disease, but public health efforts are hindered due to limited information on associated factors in vulnerable populations. It is a chronic, non-communicable disease of the tooth structure, characterized by alternating phases of demineralization and remineralization, which can lead to cavitation of the tooth structure and eventually tooth loss.[1,2] The earlier the problem is diagnosed, the fewer problems it can cause and since children are the most valuable assets for any community, it is imperative to know the dental caries status of children in our region.

According to reports published by the WHO in 2010, dental caries remains a major public health problem in many countries affecting 60-90% of school-age children[3] where more than 60% of children suffer from tooth decay at the age 5 to 11 years due to lack of awareness and improper brushing. Perhaps, the most widely reported at-risk groups are those in the lower socio-economic groups among whom higher caries levels are consistently reported.[4] Although a decline in caries has been observed in most industrialized countries over the past 20 years, mainly a result of various preventive public health measures such as adequate dental exposure to fluoride, especially in toothpaste along with better living conditions and improved oral hygiene practices and promotion, the situation is still far from being completely under control in both the developed and developing world.[5]

Several studies have shown that the prevalence of dental caries may vary with geographic locations owing to the fluoride and mineral content of the water and food being consumed in that region. A study conducted in coastal areas of West Bengal demonstrated that the prevalence of caries in children had been significantly less as compared to those in other parts of India, probably due to the high content of fluoride in the form of fish and fewer carbohydrates in their diet.[6] On the contrary, studies also prove that children coming from the low socioeconomic background, with parents having low education level, are more likely to have caries at a younger age than those in whom those risk factors are not present.[7] Likewise, the fishermen community living in the coastal areas of Karachi have a socially isolated and economically struggling lifestyle where men are out in the sea for several days and their families left behind with meagre resources and minimal access to health facilities.

This raises the need to estimate the prevalence of dental caries in the children of coastal areas of Karachi. The estimation of caries in such children will highlight the treatment need and will be helpful in the reorientation of oral health services towards the more caries susceptible areas of the city. Therefore, the objective of this study was to determine the prevalence of dental caries in children in a local population of the coastal area of Karachi.

MATERIALS AND METHODS

This was a descriptive, cross-sectional study carried out at Liaquat College of Medicine and Dentistry, Karachi after obtaining ethical approval (Ref. No: LCMD/ERC/2020/22) from the Ethics Committee of the institute. The subjects were children aged 5-11-years-old who were referred from a private dental clinic located in Ibrahim Hyderi Coastal Area of Karachi, from July 2020 to December 2020. Informed consent for participation in the study by the children was obtained from their parents/guardians before the commencement of the study.

The inclusion criteria were the child being healthy and being a permanent resident of Ibrahim Hyderi coastal area, aged between 5-11-years old, must be accompanied by a parent/guardian who is willing to provide informed consent for the child's dental examination. The exclusion criteria included children in whom there was significant dental anxiety and who refused to have their teeth examined and children with special needs such as mental or physical handicap, syndromic patients and those with dental anomalies as well as medically compromised.

For the present study, a three-stage stratified clustered random sampling method was implemented. Based on the previous survey which showed an estimate of 62%, with a confidence interval of 95% and using the single population proportion formula, the calculated sample size came out to be 350 for this study.

Sociodemographic characteristics, such as the participant gender (male/female), age (5-, 6-, 7-, 8-, 9-, 10- and 11-year-old), parents' education level (primary, high school, college/university), and parents' professional situation (employee/not employed), were collected using a structured questionnaire.

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A comprehensive intraoral dental examination was performed in the out-patient department using routine examination instruments i.e., dental mirror, probe and tweezers for all selected participants by two professionals and calibrated dentists (kappa = 85%) according to the World Health Organization (WHO) dental caries diagnosis guideline.[8] Then using a dental chart, the numbers of decayed teeth, teeth missing due to caries, and filed teeth for primary teeth (dmft) and permanent teeth (DMFT) were recorded. The dmft/DMFT index was used to describe children's caries experience.

The data collected were analysed using statistical software Statistical Package for Social Sciences® version 23.0 (SPSS, Inc., Chicago, Illinois, USA). For each group, the prevalence of dental caries was computed as the number of affected children divided by group size. Descriptive statistics and frequencies were used for quantitative variables and to assess the prevalence of dental caries among groups, respectively. The Chi-square test was used for bivariate analyses of the dependent variable and independent categorical variables. The socioeconomic characteristics were independent variables, and dental caries (present, not present) in children was the dependent variable. The significance level was set at $p < 0.05$.

RESULTS

Out of 350 children, a total of 182 (52%) male and 168 (48%) female participants, with 96 (27.4%) aged 5-6 years old, 148 (42.2%) aged 7-9 years old and 106 (30.2%) aged 10-11 years old group participated in the study (Table 1).

Table 1: Sociodemographic characteristics of the children and their parents.

Characteristics	Children (n=350)	Percentage (%)	Mean ± SD
Gender			
Male	182	52%	-
Female	168	48%	
Age Group			
5-6 years	96	27.4%	5.3±0.6
7-9 years	148	42.2%	8.5±0.54
10-11 years	106	30.2%	10.1±0.72
Father Education			
Primary	174	49.7%	
High School	42	12%	-
College/University	3	0.85%	
Father Occupation			
Employed	129	36.8%	-
Unemployed	221	63.1%	
Mother Education			
Primary	105	30%	
High School	29	8.2%	-
College/University	4	1.1%	
Mother Occupation			
Housewife	289	82.5%	-
Not Housewife	61	17.4%	

All the children who received and returned the consent forms attended the survey, made a response rate of 100%. The prevalence of dental caries according to gender is presented in Table 2. The overall prevalence of dental caries among the participants was 91.3%, with the male participants had a higher prevalence (52.1%) than the female counterparts (39.2%).

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Table 2: Prevalence of dental caries according to gender

Gender	No. of Children examined	Children without caries N (%)	Children with caries N (%)	dmft Mean±SD	DMFT Mean±SD
Male	182	87 (13.7)	95 (52.1)	1.92±2.09	1.21±1.35
Female	168	102 (60.7)	66 (39.2)	1.63±2.13	0.85±1.23

The prevalence of dental caries in the surveyed children according to sociodemographic variables and dentition type is given in Table 3. Following the age of the participants, the prevalence of dental caries in primary, permanent, and whole dentition among children was 248 (70.8%), 172 (49.1%), and 310 (88.5%), respectively. A significant association was found in the prevalence of dental caries in the age groups of the studied children in both primary ($x^2 = 100.1, p < 0.001$) and permanent teeth ($x^2 = 27.3, p < 0.001$). In addition, the odds of decaying permanent teeth were significantly higher in boys ($p = 0.02$), and in children whose fathers are unemployed ($p = 0.04$) compared to their counterparts. Moreover, the caries prevalence, neither in the primary dentition nor in the permanent dentition, was not significant in terms of the mother's occupation conditions (p = 0.41 and p = 0.93) and mother's education status (p = 0.84 and 0.29).

Table 3: Prevalence of dental caries according to sociodemographic characteristics and dentition type (n=350).

Characteristics	Children (n=350)	Primary teeth		Permanent teeth	
		Caries, n (%)	*p*-value	Caries, n (%)	*p*-value
Gender					
Male	182	142 (78.0)	0.31	96 (52.7)	0.02
Female	168	106 (64)		76 (45.2)	
Age **Group**					
5-6 years	96	87 (90.6)		21 (21.8)	
7-9 years	148	123 (83)	< 0.001	62 (41.8)	< 0.001
10-11 years	106	38 (35.8)		89 (83.9)	
Total	350	248 (70.8)		172 (49.1%)	
Father Education					
Primary	174	141 (81.0)	0.62	34 (19.5)	0.05
High School	42	38 (90.4)		27 (64.2)	
College/University	3	2 (66.6)		1 (33.3)	
Father Occupation					
Employed	129	103 (79.8)	0.15	76 (58.9)	0.04
Unemployed	221	145 (65.6)		96 (43.4)	
Mother Education					
Primary	105	98 (93.3)	0.84	80 (76.1)	0.29
High School	29	18 (62.0)		19 (65.5)	
College/University	4	2 (50)		3 (75)	
Mother Occupation					
Housewife	289	189 (65.3)	0.41	118 (40.8)	0.93
Not Housewife	61	59 (96.7)		54 (88.5)	

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DISCUSSION

Dental caries is a prevalent oral health issue among developing countries and influences 60-90% of school-aged children.[3] Coastal communities are among the most marginalized and hard-to-reach groups and have been largely neglected in health research. The present study documented extensive neglect of the oral health of the coastal area of Karachi. Research being carried out in Pakistan have mostly investigated the tooth caries among children at the two age groups: less than or equal six and 12 or higher years. The present study has provided data on the prevalence and associated factors of dental caries at the mixed dentition stage among 5–11-year-old children. The caries prevalence of primary, permanent, and whole dentition obtained in this study were much higher than the criteria set by the WHO[9] and the values presented in similar age groups of children in developed countries.[13,14] Moreover, the caries prevalence found in this study resulted higher than those reported in several studies carried out in other Asian countries.[14, 15] The possible reasons could be first, the people living in areas of social deprivation are far from the localities who have possible access for dentists. Secondly, the oral health care system in Pakistan especially for such communities of coastal regions are not sufficiently developed, and the cost of dental caries treatment is very expensive.[16] Finally, despite the consumption of fluoride-rich seafood and low intake of sugar and refined diet by the studied participants, cultural norms, and levels of parents' oral health knowledge, attitude, and practices among children of the Asian countries might influence the differences.[17]

While assessing the characteristics and associated factors with dental caries, the results of this study showed that as age increased, caries prevalence of primary teeth among children significantly decreased however, caries prevalence of primary teeth was high as compared to permanent teeth. This may be due to a lack of awareness about health caring and retaining primary teeth as well as the parental attitude that the primary teeth are exchangeable by permanent teeth and are not important.[18] Thus, early exfoliation and extraction or both of the teeth results which caused a reduced number of primary teeth at older ages. This result is per the findings reported in the previous studies.[19,20]

In this study, the prevalence of dental caries among the sexes (male and females) is statistically significant. The prevalence rate found was 52.1% in males, whereas it was 39.2% in females. The possible reason could be the presence of gene-by-sex interactions that are involved in the dental caries experience.[21] On the contrary, girls were found to have higher caries prevalence in a study done by Sofia Papadaki and colleagues.[22] Moreover, the study done by Shaffer and colleagues[23] found no difference in caries prevalence between boys and girls. A recent study on Iranian school children also showed more girls to be affected by dental caries than boys.[7] This wide variation observed among different studies may be attributed to the different age groups and geographic locations studied in the surveys.

This study also showed that the presence of caries in permanent teeth among children was associated with the father's occupation, such that the likelihood of caries experience in children whose fathers were unemployed was higher than their associate peers. Previous studies have shown that the socioeconomic conditions of parents are correlated with the dental caries experiences of children.[24,25] Families with higher income could better provide and have more accessibility to oral health care instruments and treatment needs compared with lower-income families. Targeted strategies are needed to facilitate the use of preventive measures and dental health services especially in families of lower status.

The present study had some limitations which addressing them could be considered in future studies. The detection of dental caries presence in the children was performed without taking radiography. Furthermore, the associated factors of dental caries in children could be better detected and evaluated in a longitudinal study with larger sample size.

CONCLUSION

There was a high prevalence of dental caries among 5-11 years old children of Ibrahim Hyderi coastal area Karachi, with the highest risk among the age group of 7-9 years. Despite the consumption of fluoride-rich seafood and low intake of sugar and refined diet, the children in these areas are at higher risk of dental decay possibly due to lack of education and awareness among families, low socioeconomic conditions and inaccessibility to oral health facilities.

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DISCLAIMER

None to declare.

CONFLICT OF INTEREST

None to declare.

ETHICAL STATEMENT

The study was approved by the Ethical Review Committee of Liaquat College of Medicine and Dentistry before data collection.

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AUTHORS CONTRIBUTION

Conception and design of the study: S. Patoli

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Analysis and interpretation of data: N. Jabeen, S. Hameedi

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Critical review of the manuscript: N. Jabeen, S. Hameedi

Approval of the final version of the manuscript to be published: S. Patoli, N. Jabeen, U. Zareef, S. Hameedi, M.B. Arshad, H. Farid

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