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Association between Caries Prevalence and Caries Related Factors in 5-13 Years Old Children in Western Gujarat- A Cross-Sectional Study

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Abstract

Background and Aim: The prevalence of dental caries was of great interest for long and is a principal subject of many epidemiological researches being carried out worldwide. Aim of this doctoral research dissertation is to examine the prevalence of dental caries and its correlation with the caries related factors like salivary pH, dietary habits, brushing techniques in children of 5-13 year of age. **Material and Methods:** A cross-sectional study was carried out in Western Gujarat on a sample size of approximately 1000 school going children aged 5-13 years attending Department of Dentistry Gujarat Adani Institute of Medical Science, Bhuj, Kutch. The demographic details and oral health status of the children was recorded in a self-designed questionnaire according to their respective age groups. An investigator administered proforma was used for data collection consisting of two parts. First part was used to record the demographic details of the patient and second part recorded the data related to oral hygiene habits, snacking habits and regular or irregular oral health checkups. The caries and oral hygiene status was calculated using DMFT/dmft index and OHI Index. **Results:** According to age there were 545 subjects in 5-8 years age group in which 240 were male and 305 were female. 345 subjects were present in 9-10 years age group in which 154 were male and 191 were female and 110 subjects were present in 11-13 years age group in which 35 were male and 75 were female respectively. The prevalence of caries was significantly found to be more in the children who never cleaned their teeth followed by those children who brushed their teeth either once or twice. The prevalence of DMFT score was significantly more among children who visited the dentist only when problem arose in comparison to those who visited once in 6 months. **Conclusion:** The present study has revealed a direct relationship between oral hygiene habits, snacking habits and caries prevalence in children. Therefore, dental professionals need to focus more on primary prevention of dental caries through public awareness on oral health promotion and education.

Keywords: Caries, DMFT, Kutch, Oral health promotion

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Introduction

Dental caries is an important dental public health problem and is also the most prevalent oral disease among children and adults in the world. The prevalence of dental caries was of great interest for long and is a principal subject of many epidemiological researches being carried out worldwide. This significant but a preventable public health problem

interferes with normal food intake, speech, self-esteem, and routine activities affecting overall health status of the children. Dental caries is a multifactorial infectious microbial disease of the teeth that results in localized dissolution and destruction of the calcified tissues often resulting in cavitation.¹

The Surgeon General's report in 2000 labeled Dental caries as a "SILENT EPIDEMIC" that is affecting individuals of all

ages, cultures, ethnicities, and socioeconomic backgrounds.² It was determined that dental caries was the most common chronic disease of childhood, with a rate five times greater than that seen for the next most prevalent disease of childhood.³

It has been recognized as a pandemic disease and its prevalence among school going children is 60-90%.⁴ In Asia the prevalence in 3 years old ranges from 36-85% while in India a prevalence rate of 44% has been reported for caries in 8-48 months old children.⁵ Caries is multifactorial disease involving internal defense factors such as saliva, tooth surface morphology and mineralization, general health, nutritional, hormonal status, and a number of external factors such as diet, microbial flora colonizing the teeth, oral hygiene, and fluoride availability.⁶ During mixed dentition period oral hygiene is poor because of care free age, emotional stresses of the child, frequent intake of refined sugars, soft and sticky foods, shedding of deciduous and eruption of permanent teeth.⁷ Caries is controlled to a large extent by a natural protective mechanism inherent within the saliva which collaborates to prevent dental caries by mechanical washing, antimicrobial function, remineralization and regulating oral pH by its buffering capacity. Microorganisms in the oral cavity rapidly metabolize dietary sugars to acid, creating a low pH environment locally.⁸⁻¹⁰

The oral health of children 12-year-old is the object of several epidemiological studies conducted around the world.¹¹ According to the World Health Organization (WHO, 2013),¹² the importance given to this age group is because it is the age that children leave primary school. Thus, in many countries, it is the last age at which data can be easily obtained through a reliable sample of the school system. Moreover, it is possible that at this age, all the permanent teeth except third molars have already erupted. Thus, the age of 12 was determined as the age of global monitoring of caries for international comparisons and monitoring of disease trends. There is a high prevalence of dental caries worldwide involving the people of all regions and society,¹³ voluminous literatures exists about dental caries levels in Indian population.¹⁴ The high prevalence of dental caries may be attributed to local differences in eating habits,

oral cleaning habits, fluoride content of water, tooth paste etc. In the past, innumerable studies and surveys have been conducted to determine the prevalence of the disease and the variables associated with its prevalence across the globe. Still a number of towns and districts lack data on the prevalence of oral health problems which is very essential to formulate an action plan to combat them. Therefore, the overall goal of this doctoral research dissertation is to examine the prevalence of dental caries and its correlation with the caries related factors like salivary pH, dietary habits, brushing techniques in children of 5-13 year of age.

Materials and Methods

A cross-sectional study was carried out in Western Gujarat on a sample size of approximately 1000 school going children aged 5-13 years attending Department of Dentistry Gujarat Adani Institute of Medical Science, Bhuj, Kutch. The demographic details and oral health status of the children was recorded in a self-designed questionnaire according to their respective age groups.

The subjects were examined on an upright chair in adequate natural light. Both the examiner and assistant were calibrated before the start of study. An investigator administered proforma was used for data collection consisting of two parts. First part was used to record the demographic details of the patient and second part recorded the data related to oral hygiene habits, snacking habits and regular or irregular oral health checkups. The caries and oral hygiene status was calculated using DMFT/dmft index and OHI Index. The subjects were examined using plain mouth mirror and probe. All the data was entered in the proforma and results were calibrated using statistical analysis.

Statistical analysis:

The recorded data was compiled and entered in a spreadsheet computer program (Microsoft Excel 2007) and then exported to data editor page of SPSS version 15 (SPSS Inc., Chicago, Illinois, USA). Descriptive statistics included computation of percentages, means and standard deviations. For all tests, confidence level and level of significance were set at 95% and 5% respectively.

Results

The study population consisted of 1000 subjects out of which 429(42.9%) were male and 571(57.1%) were female. According to age there were 545 subjects in 5-8 years age group in which 240 were male and 305 were female. 345 subjects were present in 9-10 years age group in which 154 were male and 191 were female and 110 subjects were present in 11-13 years age group in which 35 were male and 75 were female respectively. (TABLE 1)

Based on the frequency of brushing among 1000 subjects, 35 children (100%) never cleaned their teeth and had DMFT score ≥ 1 . The children who cleaned their teeth once and had a DMFT score ≥ 1 were found to be 410 followed by 445 children who brushed their teeth twice a day and had a DMFT score ≥ 1 . The prevalence of caries was significantly found to be more in the children who never cleaned their teeth followed

by those children who brushed their teeth either once or twice. (TABLE 2)

The distribution of study population was 1000 (100%) out of which children having DMFT score ≥ 1 was 240 who never taken sweets followed by once and twice having DMFT score ≥ 1 were 455 and 217 respectively. The prevalence of caries was significantly more among children who were consuming sweets and candy twice daily as compared to children who were not consuming sweets and candy in their diet. (TABLE 3)

Out of the 1000 subjects studied, the children who visited the dentist once in 6 months and had a DMFT score ≥ 1 were 315(88.5%) and the children who visited the dentist when problem arose were 785 The prevalence of DMFT score was significantly more among children who visited the dentist only when problem arose in comparison to those who visited once in 6 months.

Table 1: Distribution of study population according to age and gender

Gender	Age Groups			Total n (%)
	5-8 years n (%)	9-10 years n (%)	11-13 years n (%)	
Male	240 (44)	154 (44.6)	35 (31.8)	429 (42.9)
Female	305 (56)	191 (55.3)	75 (68.1)	571 (57.1)
Total	545 (100)	345 (100)	110 ()	1000 (100)

Table 2: Prevalence of caries in permanent dentition based on frequency of brushing

Frequency of Brushing	DMFT score = 0 n (%)	DMFT score ≥ 1 n (%)	Total n (%)
None	0	35 (100)	35 (3.5)
Once	49 (44.5)	410 (46)	459 (45.9)
Twice	61 (55.4)	445 (54)	506 (50.6)
Total	110 (100)	890 (100)	1000(100)

Table 3: Distribution of dmft score based on consumption of sweets & candy

	DMFT score = 0 n (%)	DMFT score ≥ 1 n (%)	Total n (%)
None	32 (36.3)	240 (20)	272 (27.2)
Once	45 (51.1)	455 (49.8)	500 (50)
Twice	11 (12.5)	217 (23.7)	228 (22.8)
Total	88 (100)	912 (100)	1000(100)

Discussion

Dental caries is a multi-factorial disease that starts with microbiological shifts within the complex bio film (dental plaque). Caries is affected by the consumption of dietary sugars, salivary flow; exposure to fluoride and preventive behaviours.¹⁵ The impact of dental caries includes destruction of the dental

structure and oral pain which may affect speech, eating, sleeping, and swallowing of food. The altered appearance it causes can also lead to low self-esteem and undermine social acceptance.

Many studies have been conducted to identify the prevalence of caries in different parts of India.¹³⁻¹⁴ However, there has been relatively very few data reported in literature concerning the prevalence of dental caries among Kutch

district children, particularly in mixed dentition period, so the present study was conducted in school children of 5–13 years. In the present study the prevalence of dental caries was significantly higher in females when compared to males. Similar findings were seen by Rai B,¹⁶ Mishra FM¹⁷ and Mosha HJ¹⁸ who in their studies also reported increased caries prevalence for females. The results of the present study were not in agreement with the study done by Sudha P, Bhasin S and Anegundi RT¹⁹ as they reported increased prevalence of dental caries for males. This wide variation observed among different studies may be attributed to the different age groups and geographic locations studied in the surveys.

The overall prevalence of dental caries among the school going children aged between 5–13 years was found to be 61.2% which is in concordance with the study by Karunakaran R et al;¹³ which was conducted among children aged between 5–10 years in which the prevalence of dental caries was 65.9%. Dhar V and Bhatnagar M²⁰ in their study among children aged between 6–10 years reported the prevalence of dental caries to be 63.2% and Parasuraman G et al;²¹ in their study in school children 5–18 years of age found the prevalence of dental caries to be 30.9% which is far below the prevalence in the present study and this discrepancy can be attributed to different age groups. In this study, prevalence of dental caries among the children of age group of 11–12 years was 91.4% that was higher than the prevalence of dental caries among children of 5-8 years of age group. This shows that as the age advances the prevalence of dental caries escalates. Higher DMFT was found in the age group of 10-13 years than age group of 5-8 years and this could be explained on the basis of increased exposure of the teeth to poor oral hygiene conditions and other caries related factors.

In this study oral hygiene practices like frequency of brushing the teeth among the study participants was noted and it was found that more number of participants brushed their teeth once a day while in compare to participants brushed their teeth about twice or more than twice a day. Prabhakar J, John J and ShrisakthiD²² from their study reported that a total of 2708 (60.3%) study subjects brushed their teeth once daily and 1785 (39.7%) subjects

who brushed their teeth twice daily. It was found that those who brushed their teeth about twice or more than twice a day had lower prevalence of dental caries than those who brushed their teeth once a day and this difference was highly significant ($p=0.000$) and was in concordance with Shailee F, Girish MS, Kapil RS and Nidhi P.²³

The strongest correlation between sugar consumption and caries development was seen when international data are compared. A study by Sreebny²⁴ data on sugar supplied in various countries and data on caries prevalence obtained from the WHO for 6-year-old children in 23 nations and 12-year-old in 47 nations, showed that the availability of <50 g sugar per persons per day in a country was always associated with dmft or DMFT scores of <3.

According to a study conducted²⁵ visiting the dentist benefits a child's dental health and it is recommended to visit the dentist twice a year to protect oral health. The result from present study shows prevalence of decayed teeth was high among subjects who never visited a dentist subjects in comparison to those who visited the dentist only when a problem arose was or among subjects who visited the dentist once in every 6 months. Significantly higher prevalence of caries was seen in children who had never visited a dentist. As this study is cross-sectional, it measures cause and effect at the same point in time, introducing the problem of temporal ambiguity, and inability in establishing a causal relationship. Risk factors for dental caries, and oral hygiene behaviors should be assessed along with the prevalence of dental caries.

Conclusion

The present study has revealed a direct relationship between oral hygiene habits, snacking habits and caries prevalence in children. Therefore, dental professionals need to focus more on primary prevention of dental caries through public awareness on oral health promotion and education.

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