Prevalence and Correlation of Dental Caries with its Specific Risk Factors in 5–15-year-old School-going Children in Urban Population of Ghaziabad

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ABSTRACT

Dental caries is a rapidly emerging oral health problem amid the children with differing prevalence rate in different states of India. The data available from Ghaziabad city regarding dental caries are scarce; therefore, the study was conducted in 5–15-year school-going children in urban population of Ghaziabad.

Purpose: The objectives of this study were to determine the prevalence of dental caries in school-going children of 5–15-year age groups in urban population of Ghaziabad and to assess and intercorrelate its relationship with the form, frequency and total sugar exposure, socioeconomic status (SES) of family, and fluoride in drinking water.

Materials and methods: The study was conducted in 3,000 school-going children aged 5–15 years (divided into three age groups of 5–6, 7–12, and 13–15 years) studying in the government and private schools in the urban area of Ghaziabad city. A specifically designed pro forma was used for recording the personal data; sociodemographic profile; World Health Organization oral health assessment form for dental caries; 24-hour dietary recall to record the form, frequency, and total number of sugar exposure; and SES of the family (Kuppuswamy scale) of children. The concentration of fluoride in collected samples of drinking water was measured by the visual spectrophotometric method test. The results were tabulated and statistically analyzed.

Results: The overall caries prevalence in 5–15-year age group was found to be 54.6%. There was a statistical significant difference found when the age-group comparison ($p = 0.001$), gender-wise comparison ($p = 0.001$), SES comparison ($p = 0.002$), the physical form of sugar intake ($p = 0.038$), frequency of sugar consumption at/between meals ($p = 0.001$), and total number of sugar exposure during last 24 hours ($p = 0.001$) were evaluated with caries prevalence. The mean water fluoride level in the surveyed area was found to be 0.48 ppm and was found to be nonsignificantly ($p = 0.248$) associated with caries prevalence.

Conclusion: The risk factors, such as age, gender, physical form of sugar, frequency of sugar consumption at and between meal and total number of sugar exposure during the last 24 hours, and SES of parents, were found to be associated with the prevalence of dental caries in school-going children of 5–15-year age group.

Keywords: Age, Caries prevalence, Drinking water fluoride, Socioeconomic status, Sugar exposure.

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INTRODUCTION

Despite significant achievements in the armamentarium for fighting oral and dental diseases, such as dental caries, it still remains widespread in countless parts of the world, without regard for geopolitical boundaries.[1] Regardless of its decline in all age groups on a global basis over the past few years, it is still prevalent in developing countries and is a serious public health problem affecting children. In India, dental caries has been constantly increasing both in prevalence and severity over the last five decades affecting about 80% of children.[1]

Dental caries has a multifactorial etiology with a complex interplay of multiple risk factors, such as age, gender, socioeconomic status (SES), water fluoride level, dietary factors such as the physical forms of carbohydrate, snacking habits, and frequency of sugar consumption.[2–4] Untreated dental caries not only causes pain and discomfort but also, in addition, places a financial burden on the society.[5] Although effective methods are known for prevention and management of the disease, the unmet need for treatment, especially in children, does not seem to be diminishing.[6] The goal of understanding numerous risk factors contributing to dental caries may possibly lead to insights into the preventive or intervention stratagems for alleviating disparities in disease burden and improving dental health. Moreover, to implement various

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types of community-based oral health programs and preventive measures, it is necessary to know its prevalence.[5] Hence, it is very important for the dental health care professionals to investigate the prevalence of dental caries to implement various health and preventive programs. In order to accurately predict the risk for the disease, an analysis applying a combination of risk factors must be appropriate than any single risk factor studies.

Various epidemiological studies identifying the risk factors have been reported from different parts of country;[3,7,8] however, there

has been a paucity of literature regarding dental caries prevalence in Ghaziabad district. Therefore, the present epidemiological study was designed with an aim to study the prevalence of dental caries in school-going children of 5–15 years of age group in urban population of Ghaziabad and to assess and intercorrelate its relationship with the form, frequency, and total sugar exposure; SES of parents; and fluoride in drinking water as specific risk factors.

MATERIALS AND METHODS

The study was conducted on 3,000 school-going children aged 5–15 years (divided into three age groups of 5–6, 7–12, and 13–15 years) studying in the government and private schools in the urban area of Ghaziabad city. The study was analyzed and approved by the ethical committee of the institution (IRB no. 012). The schools of the Ghaziabad were divided in the North East, North West, South East, and South West zones based on geographic location. Seven schools were randomly selected from each zone with equal number of boys and girls who participated in the study after satisfying the inclusion and exclusion criteria. Children who had been the continuous residents and native of the area and whose socioeconomic records were available in the school were included in the study, while the children with the presence of any systemic disease, acute infection of oral cavity, and children on any medication were excluded from the study. A survey was systematically planned to spread over a period of 1 year and a detailed weekly and monthly schedule was well prepared in advance by informing and obtaining the consent from the authorities of respective schools. A specifically prepared and pretested pro forma designed for collecting all the required and relevant general information and clinical findings was used for recording the data. The pro forma included questions regarding personal data; sociodemographic profile; oral health assessment form for recording of dental caries;[9] 24-hour dietary recall to record the form, frequency, and total number of sugar exposure; and SES of the family. The SES of the children obtained from the school records was recorded according to the modified Kuppuswamy's socioeconomic scale, and the scale was updated using Consumer Price Index 2016.[10] The scale contains three questions, about the education of head, occupation of head, and family income per month in rupees. A definite score was given for each of the three criteria which were added, and according to the total score, the socioeconomic class was classified as upper (26–29), upper middle (16–25), lower middle (11–15), upper lower (5–10), and lower (<5). The clinical examination of every child was carried out under the natural day light by making the child sit on ordinary chair with back rest and the examiner sitting in front of the chair. Four samples of normal drinking tap water supplied by the municipal authority (Ghaziabad Nagar Nigam) were collected from the nearby source from each zone for the estimation of level of fluoride in drinking water by the visual spectrophotometric method. The final data obtained were compiled systematically, transferred from a precoded pro forma to a computer, and a master table was prepared. The data were analyzed using SPSS version 21, and p value less than 0.05 was considered to be statistically significant. Multivariate logistic regression analysis test was used to compare the correlation between various risk factors studied in the survey.

RESULTS

The overall caries prevalence in 5–15-year age group was found to be 54.6%. There was a statistical significant difference found when the age-group comparison ($p = 0.001$), gender-wise comparison ($p = 0.001$), and SES comparison ($p = 0.002$) were done (Table 1) with the caries prevalence. A statistical significant difference was also seen when the physical form of sugar intake ($p = 0.038$), frequency of sugar consumption at/between meals ($p = 0.001$), and total number of sugar exposure during last 24 hours ($p = 0.001$) were evaluated with caries prevalence (Table 2). The mean water fluoride level in the surveyed area was found to be 0.481 ppm and was found to be nonsignificantly ($p = 0.248$) associated with caries prevalence (Table 3). Multivariate regression analysis identified age, gender, physical form of sugar intake, frequency of sugar consumption at/between meals, total number of sugar exposure during last 24 hours, and SES as the risk factors when compared with caries prevalence (Table 4).

DISCUSSION

The major objective of dental caries epidemiology is to analyze its distribution, to explore its determining factors, and to evaluate the impact of certain actions on its occurrence in the society.[5,6] There are a plenty of credible studies on the prevalence of dental caries from the different regions of India, such as the study by Tewari et al.[7] in Rohtak, (Haryana), Sharma et al.[8] in Northeastern region, Mehta et al.[11] in the major cities of Uttar Pradesh (UP),

Table 1: Caries prevalence among the school children according to age, gender and socioeconomic status of parents

| | | Caries prevalence | | |
		Present, n (%)	Absent, n (%)	p value
Age group (in years)	5–6	367 (40)	550 (60)	0.001*
	7–12	833 (69.8)	360 (30.2)	
	13–15	438 (49.2)	452 (50.8)	
	Total	1,638 (54.6)	1,362 (45.4)	
Gender	Male	765 (51)	735 (49)	0.001*
	Female	873 (58.2)	627 (41.8)	
Socioeconomic status	Upper	240 (40.8)	348 (59.2)	0.002*
	Upper middle	258 (44.8)	318 (55.2)	
	Lower middle	401 (54.7)	332 (45.3)	
	Upper lower	295 (55.8)	234 (44.2)	
	Lower	332 (57.8)	242 (42.1)	

Chi-square test applied; *significant difference

Table 2: Caries prevalence among the school children according to form, frequency and total number of sugar exposure in last 24 hours

Sugar exposure			Caries prevalence			
			Present, n (%)	Absent, n (%)	p value (between groups)	p value (between groups)
Form of sugar intake	Solid form	Zero	139 (20.0)	555 (80)	0.001*	0.038*
		Once	498 (42.7)	668 (57.3)		
		Twice or more	1,001 (87.8)	139 (12.2)		
	Liquid form	Zero	563 (37.4)	941 (62.7)	0.003*	
		Once	984 (60)	382 (40)		
		Twice or more	91 (70)	39 (30)		
Frequency of sugar consumption	At meals	Zero	783 (56.8)	595 (43.2)	0.008*	0.001*
		Once	607 (51.1)	581 (48.9)		
		Twice or more	248 (57.1)	186 (42.9)		
	In between meals	Zero	160 (14.8)	921 (85.2)	0.0001*	
		Once	412 (57.7)	302 (42.3)		
		Twice or more	1,066 (88.4)	139 (11.6)		
Total number of sugar exposure		Zero	60 (15.2)	336 (84.8)	0.001*	
		Once	156 (19.6)	641 (80.4)		
		Twice	831 (76.9)	250 (23.1)		
		Thrice or more	591 (81.4)	135 (18.6)		

Chi-square test applied; *significant difference

Table 3: Caries prevalence in relation to mean fluoride content in drinking water in different zones of Ghaziabad

Zones	Mean fluoride content (mg/L)	Caries prevalence (n)	%	p value
North West	0.225	435	58.0	0.248[#]
North East	0.325	365	48.7	
South East	0.50	421	56.1	
South West	0.875	417	55.6	
Total	0.481	1,638	54.6	

Chi-square test applied; [#]nonsignificant difference

Goel et al.[12] in Putter (Karnataka), Moses et al.[13] in Chidambaram (Tamil Nadu), Shingare et al.[14] in Uran, Raigad District (Maharashtra), Ingle et al.[15] in Bharatpur (Rajasthan), and Patloth et al.[16] in 2017 from Mahabubnagar District (Telangana). These research studies highlight that the dental caries is still a major health issue in India.

In the recent times, a trend of declining caries experience in developed countries and increasing caries prevalence in developing countries has been reported. In India as well, a similar trend to that of other developing countries has been observed, and this may continue in the future due to growing globalization.[1] According to U.S. National Library of Medicine, urban population can be defined as "the inhabitants of a city or town, including metropolitan areas and suburban areas," which forms a major population of an area or district.[17] Due to urbanization, there is more availability of processed food items as well as sugars in the forms of chocolates, candies, sweet beverages, and so on, which might lead to an increased exposure of sugars in the children.[2] Although a plethora of studies on dental caries among different age groups from different regions of India are available,[3,7,8] the data on the prevalence of dental caries in school-going children of the urban population of Ghaziabad city are still scarce. Therefore, this study was planned to assess and intercorrelate the relationship between prevalence of dental caries with the form, frequency, and total sugar exposure; SES of parents;

and fluoride in drinking water in school-going children aged 5–15 years of urban population of Ghaziabad. Moreover, according to World Health Organization (WHO), these age groups (5–15 years) are considered as the global monitoring ages for international comparisons and monitoring and have been observed to be most vulnerable age for developing dental caries.[9,18]

The overall prevalence of dental caries was found to be 54.6% among the total number of children examined in Ghaziabad in this study. Similar to this study, Bhatia et al.[19] also reported a prevalence rate of 51.46% from the same district in the children of age group 3–15 years. Contrary to the results in this study, various researchers have reported a variable range of caries prevalence across India. Higher caries prevalence was documented by Sharma et al.[8] (90%) in the Northeastern region of India, Patloth et al.[16] (75%) and Arangannal et al.[20] (68%) in Chennai, respectively, Shingare et al.[14] (80.92%) in Maharashtra, Dash et al.[21] (64.3%) in Cuttack, and Saravanan et al.[22] (71.7%) in Chidambaram. However, many studies conducted in India also have reported lower caries prevalence. Poorani et al.[23] reported caries prevalence of 40% in Chennai, Ahuja[24] 43.3% in Lucknow, Dhar et al.[25] 46.75% in Udaipur, Gupta et al.[26] 47.38% in Jaipur, Prakash et al.[27] 39.19% in Delhi, and Venugopal et al.[28] 35.6% in Mumbai, respectively.

In this study, caries prevalence in the age group of 7–12 years was statistically significantly higher (69.8%) when compared with the children aged 5–6 years (40%) and 13–15 years (49.2%). In the children aged 5 years, the prevalence rate was higher than the UP state average (18.6%) and lower than the country average (83.5%). Similarly, in the children aged 7–12 years, the prevalence rate was higher than the UP state average (58.5%) and lower than the country average (74.6%). However, in the children aged 13–15 years, the prevalence rate was lower than the UP state average (84.1%) and country average (75.8%).[29] Comparable results were reported in the studies done by Bhatia et al.,[19] Shingare et al.,[14] Arangannal et al.,[20] Goyal et al.,[30] Dhar et al.,[25] and Venugopal et al.[28] Higher caries prevalence in the 7–12-year age group when compared with

Table 4: Mutivariate logistic regression analysis between the independent variables: socio-demographic factors and the outcomes: caries experience (DMFT > 0) with OR and 95% CI

Risk factors	Logit coefficient	SE	Wald	Adjusted OR	95% CI Lower	Upper	p value
Age	0.562	0.159	12.521	1.755	1.285	2.396	0.001*
Gender	19.870	8.133	0.001	0.453	0.242	1.032	0.002*
Form of sugar intake	1.832	0.183	19.234	1.53	0.952	1.945	0.001*
Frequency of sugar consumption	2.893	0.638	18.729	1.29	0.740	1.658	0.001*
Total sugar consumption	2.334	0.202	133.601	1.321	0.6948	1.5333	0.001*
Socioeconomic status	−0.053	0.330	0.026	0.432	0.497	1.812	0.008*
Fluoride in drinking water	2.129	0.592	14.324	1.925	1.280	2.746	0.067#

SE, standard error; CI, confidence interval; OR, odds ratio; *significant difference, #nonsignificant difference

5–6- and 13–15-year children could be explained on the basis of increased exposure of the teeth to poor oral hygiene conditions in comparison to lesser age group, whereas in the higher age group the prevalence was found less due to the presence of newly erupted permanent teeth. Kundu et al.[18] and Ahuja[24] reported a higher caries prevalence rate in children aged 5 years, which might be due to the lack of self-motivation about their dental health in younger children and dependence on their parents for the maintenance of oral hygiene as suggested by Ahuja.[24]

On gender-wise comparison in this study, caries prevalence was found to be more in females (58.2%) when compared with males (51%), and the results were statistically significant. These results are in agreement with the studies carried out by Ahuja,[24] Arangannal et al.,[20] and Shingare et al.[14] The presence of higher caries prevalence in females than males could be because of the early eruption of teeth in females, hence longer exposure of their teeth to the cariogenic environment, easy access of food supplies to females, differences in dietary behaviors, frequent snacking habits, and fluctuating hormonal levels during puberty.[16] However, various researchers, such as Dhar et al.,[25] Patloth et al.,[16] Dash et al.,[21] Jain,[31] Moses et al.,[13] reported a higher caries prevalence rate in males. The reasons stated for greater caries prevalence in males might be due to the marked preference for sons compared with daughters in India regardless of the SES leading to longer feeding of sons and thereby causing more dental decay.[16]

The SES is broadly recognized as one of the significant factors affecting the health condition of an individual or a family. It has been reported that the SES and attitude or demographic factors of parents have a strong influence on the child's oral health.[3] Kuppuswamy scale is commonly used as a measure of SES in the urban population which consists of three questions, that is, occupation of the head, family income, and parental education. In this study, modified Kuppuswamy scale with readjustment of the per capita income to suit the present levels was used for classifying the children into different SES.[10] Various authors reported that SES of children had inverse correlation with the prevalence of dental caries among school-going children.[3,16] Patloth et al.[16] stated that the higher SES groups enjoyed the sharpest decline in caries experience, and the Decayed, Missing and Filled teeth in permanent dentition (DMF) values of children in higher SES strata were lower in children of lower SES strata. In this study, high prevalence of dental caries was found in the children of lower SES (57.8%) followed by upper lower (55.8%), lower middle (54.7%), upper middle (44.8%), and upper (40.8%), and the results were statistically significant (*p* = 0.002). Similar results were reported by various researchers, such as Thyath et al.,[3] Katageri et al.,[32] Saravanan et al.,[22] Ingle et al.,[15] Gupta et al.,[26] Datta and Datta,[33] Bhatia et al.,[19] and Moses et al.[13] This could be because of

the reason that the individuals from lower SES experience financial, social, and material detriments that compromise their ability to care for themselves and afford professional health care services. In addition, it has also been reported that the individuals from low SES have more fatalistic beliefs about their health and have a lower perceived need for oral care, leading to less self-care and lower utilization of preventive health services.[34] The possible influences of SES on dental health may also be a consequence of differences in dietary habits and the role of sugar in diet.[35,36] In contrast to the aforementioned authors, Popoola et al. stated that the children with higher caries prevalence belonged to the high and middle socioeconomic classes in Nigeria.[37] The author clarified that this inverse trend was because of the study design, which was carried out in a tertiary dental hospital and larger percentage of attendees were from social class that could afford the cost of dental care.[37]

Dental caries is a biofilm-mediated, sugar-induced, multifactorial, dynamic disease that leads to the cyclic remineralization and demineralization of dental hard tissues.[38] The term "sugars" ascribes to all mono- and disaccharides, whereas the term "free sugars" refers to all mono- and disaccharides incorporated into foods by manufacturers, cooks, or consumers, plus sugars naturally present in honey, fruit juices, and syrups.[2,39] The currently available evidence shows that sugars are undoubtedly the most important dietary factor and is the most often studied factor in the development of dental caries. The form or physical nature (solid or liquid) of the fermentable carbohydrate directly influences the duration of exposure and retention of the food on the teeth.[39] Prolonged oral retention of cariogenic components of food on tooth surface may lead to the production of acid and subsequent demineralization of teeth.[2,39] The duration of the demineralization–remineralization cycle may also be influenced by the frequency and amount of fermentable carbohydrate consumed.[39] The prevalence of dental caries in industrialized countries has decreased in the last three decades; however, in developing countries where systemic modes of fluoride administration are not readily available and populaces have more opportunity to consume free sugars and fermentable carbohydrates, the prevalence of dental caries is increasing.[2,39] Abaas[40] in their study established that hard candies were more risky than soft drink and ice cream and the frequency of sugar intake increases dental caries prevalence. Various breakthrough studies such as Vipeholm study in which Gustafsson et al.[41] reported that when the sugar was consumed between meals when compared with during meal time, the caries risk increases and as the sugar-rich foods were withdrawn from the diet, the increased caries activity rapidly disappeared. The authors also quantified that with the increase in the clearance time of the sugar, caries activity increases.[41] As there is a credible evidence collectively from epidemiological,

animal, experimental, and human intervention studies that there is correlation between the amount and frequency of free sugar intake and dental caries; therefore, in this study, the association between the physical form of sugar, frequency of sugar exposure at or between meals, and total number of sugar exposure with the prevalence of dental caries was attained.[42]

Various authors in the past, such as Lakhanpal et al.[43] and Gupta et al.,[44] have employed the 24-hour diet recall chart in their research studies to document the sugar exposure. The present study also adopted the 24-hour diet recall chart to record the form of sugar intake (solid form or liquid form), frequency of sugar consumption (at meal and between meals), and total sugar exposure during the last 24 hours (no sugar consumption, once, twice, or more than twice). In this study, correlation was found between the prevalence of dental caries with the physical form of sugar exposure (solid or liquid) consumed during the last 24 hours. Children who had taken sugar in solid form had more caries when compared with the children who had consumed sugar in liquid form, and the results were statistically significant ($p = 0.038$). This could be because liquid sugars, such as those found in beverages and milk drinks, pass through the oral cavity fairly quickly with limited contact time or adherence to tooth surfaces when compared with solid sugars as suggested by Moynihan et al.[39] It has also been reported that the long-lasting sources of solid sugars, such as hard candies, breath mints, and lollipops, have extended exposure time in the oral cavity because the sugars are gradually released during consumption resulting in the subsequent demineralization of tooth surfaces.[2] In this study, association was also found between the caries prevalence and frequency of sugar exposure at meal and in between meal during the last 24 hours. The children who had more exposure of sugar between the meal had more caries when compared with the children who had consumed the sugar at meal and the results were statistically significant ($p = 0.001$). The results were in agreement with the research done by Gustafsson et al. (Vipeholm study).[41] This could be due to the fact that at mealtime consumption of sugars, the salivary flow rate is more due to the stimulation by other meal components leading to the rapid neutralization of plaque acids thereby resulting in the decreased caries prevalence.[41] In this study, total number of sugar consumed during the last 24 hours was found to be directly related to dental caries. The caries prevalence in children with no sugar exposure was found to be 15.2%, 19.6% in children with one-time sugar exposure, 76.9% in children with two-time sugar exposure, and 81.4% when the sugar exposure was more than twice. These results suggest that there is direct correlation of total sugar intake with the prevalence of dental caries. Similar findings were also reported by Abaas,[40] Lakhanpal et al.,[43] Sahoo et al.,[45] and Sreebny;[46] however, Yabao et al.[47] stated that there was no significant relation between sugar intake and dental caries. The association of dental caries with excessive sugar intake has also been affirmed by an expert panel of the WHO.[48–50] The panel reported an increased risk of caries associated with frequent and total intake of free, simple sugars. Various research studies imply the frequency of eating sugars to be of considerable etiological importance for caries than the total consumption of sugars.[48] Against the general perception that frequency of sugar intake is more important than the amount of sugars eaten, two longitudinal studies reported that the amount of sugar intake to be more important than the frequency.[51,52] However, there is undoubtedly a strong correlation between these two variables with an increase in one factor leading to an increase in the other.

Systematic analysis of the scientific documentation related to fluoride has concluded that community water fluoridation is efficient in decreasing dental caries prevalence.[29,53] According to Cochrane review, water fluoridation results in reductions in decayed, missing and filled teeth in deciduous dentition (dmft) of 1.81 and Decayed, Missing and Filled teeth in permanent dentition (DMFT) of 1.16, that is, 35% reduction in dmft and 26% in DMFT.[54] There was also an increase in the percentage of caries-free children of 15% in deciduous dentition and 14% in permanent dentition. U.S. Public Health Service now recommends an optimal fluoride concentration of 0.7 mg/L for the community water systems that add fluoride in the drinking water.[54] There are fewer studies in the literature describing the association of prevalence of dental caries and water fluoridation; therefore, this study involved fluoride levels in drinking water as one of the risk factors. Desai et al.[55] reported lower prevalence of caries in the optimal fluoride areas (17.2%) in Nalgonda district and described that the prevalence of dental caries decreased with increasing concentration of fluoride in the drinking water up to 5 ppm. Kotecha et al.[56] stated that there was lesser degree of dental caries in the areas showing more fluoride content in drinking water in district of Gujarat. Various researchers, such as Acharya and Anuradha[57] in Davangere (India), Yiamouyiannis[58] in the United States, and Schluter et al.[59] in New Zealand, documented that the decay rates of deciduous teeth were significantly lower in fluoridated than in nonfluoridated areas. Various public health reports show inverse correlation of prevalence of dental caries with the level of fluoride in drinking water.[56,57] In this study, the mean fluoride level in drinking water in the areas surveyed was found to be 0.48 ppm, which is lower than the optimal fluoride concentration in drinking water as recommended by WHO. Similar levels of fluoride content in drinking water were reported from the other cities of UP. The fluoride in drinking water was reported to be 0.28–0.58 ppm by Rai and Singh[50] in Lucknow; additionally, Bhalla et al.[53] documented the mean fluoride content of 0.64 ppm in normal drinking water in Mathura. Less than 1 ppm fluoride content in drinking water was also reported from various states of India, such as UP (44.6%), Jammu and Kashmir (48.5%), Himachal Pradesh (93.6%), Haryana (80.7%), Delhi (99.6%), Madhya Pradesh (90%), Assam (98.8%), Orissa (85.9%), Maharashtra (54.6%), Karnataka (31%), Andhra Pradesh (72.3%), Tamil Nadu (57.2%), and Kerala (68.8%).[29] Fluoridation of public drinking water systems had been demonstrated to be effective in decreasing trend of dental caries;[54] however, in this study, no correlation was found between the caries prevalence and fluoride levels in drinking water ($p = 0.974$). This could be due to the limited number of water samples collected from the areas surveyed that might not have given the actual status of the fluoride levels in drinking water source. Also, there is no such provision of fluoridation of community water in the areas surveyed in Ghaziabad like those present in the western countries.

This study identified the risk factors, such as age, gender, physical form of sugar, frequency of sugar at and between meals and total number of sugar exposure during the last 24 hours, and SES of parents with the prevalence of dental caries in school-going children of the 5–15 year age group. Taking consideration of all these specific risk factors, this study revealed that dental caries is a major health problem among school children and there is an urgent need for the dissemination of appropriate and accurate information about oral health care for school-going children. Since urbanization is rapid in India, enactment of community-based preventive oral health programs on healthy diet, practices of adequate oral hygiene, and promotion of dental awareness should be encouraged in

schools through integration into school curriculum and services to combat the increasing problem of dental caries among school children. The local health authorities and policymakers responsible must develop and implement appropriate school-based oral health promotion and care programs.

Conclusion

The overall caries prevalence in the 5–15-year-old school children in Ghaziabad city was found to be 54.6%. Among the three age groups, the prevalence of dental caries was found to be more in 7–12-year age group children when compared with 5–6 and 13–15-year age group children and was found more among females in comparison to males. Caries prevalence was found to be more among the children who consumed sugar in solid form when compared with liquid form during the last 24 hours. Caries prevalence was more in children whose sugar consumption was present between the meals when compared with sugar consumption at meals during the last 24 hours. The prevalence of caries was present more in children who had consumed sugar three times or more when compared with the children with zero sugar consumption during the last 24 hours. Among the various SES, the prevalence of dental caries was found higher in children from lower class SES followed by upper lower, lower middle class, upper middle, and upper class, respectively. Mean fluoride content in drinking water of areas surveyed in Ghaziabad was found to be 0.48 ppm, and the caries prevalence was not significantly related to mean fluoride content of drinking water of surveyed areas.

The risk factors, such as age, gender, physical form of sugar, frequency of sugar consumption at and between meal and total number of sugar exposure during the last 24 hours, and SES of family, were found to be associated with the prevalence of dental caries in school-going children of 5–15-year age group.

Clinical Significance

Knowledge of the prevalence and associated risk factors is necessary to develop targeted interventions to prevent subsequent decay and also to lessen the number of children requiring emergency treatment. Special emphasis on childhood dental care should be given by the school authorities by organizing oral health campaigns to increase the awareness about the disease among children to engage them in preventive oral practices.

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