Asian Pac. J. Health Sci., 2014; 1(4S): 58-62 e-ISSN: 2349-0659, p-ISSN: 2350-0964

Association between dental caries and BMI-for age with sugar consumption among school children

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Received: 30-11-2014 / Revised: 10-12-2014 / Accepted: 31-12-2014

ABSTRACT

Background and Aim: Childhood overweight and obesity are becoming a major public health concern all over the world. Change in lifestyles and economic growth have led to sedentary lifestyle and altered dietary patterns. The prevalence and incidence of dental caries in a population is influenced by a number of risk factor such as sex, age, socioeconomic status, dietary patterns and oral hygiene habits. Dental caries is an infectious microbial disease of multi factorial origin in which diet, host, and microbial flora interacts over a period of time in such a way so as to encourage demineralization of the tooth enamel with resultant caries formation. There are conflicting reports in the literature regarding the association between body mass index (BMI) and dental caries from various parts of the world. The aim of the present study was to determine if there is an association between BMI-for-age and dental caries in children and to find out the role sugar in diet with respect to BMI-for-age and dental caries. **Materials and Methods:** Demographics and anthropometric measurements were obtained for 504 children of 13-17 years age group and BMI-for-age was calculated. Oral examination for dental caries was carried out following WHO criteria. Data obtained were statistically analyzed for association of dental caries with BMI-for age and sugar consumption using Chi-square test. **Results:** 504 children were included in the study. Caries prevalence was more in obese children, though this was not statistically significant. No correlation was found between caries and consumption of sugar. **Conclusion:** Dental caries was found to be the big public health problem among school children of Meerut city, which needs immediate attention. Dental caries scores showed no relationship between BMI-for-age in children. Regular dental checkups and practice of routine oral hygiene procedures will enable them to lead a healthier life.

Keywords: School children, Dental carries, Body mass index, Consumption of sugar

Introduction

Dental caries is the most prevalent dental affliction of childhood. Despite credible scientific advances and the fact that caries is preventable, the disease continues to be a major public health problem.

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Oral diseases especially dental caries among children is still a major problem in most developing countries[1]. There is practically no geographic area in the world whose inhabitant does not exhibit some evidence of dental caries. It affects both the sexes, all races, all socioeconomic status and all age groups[2]. Several characteristics of today's society contribute to the widespread childhood obesity problem. Children today lead more sedentary lifestyle. The factors contributing to the increase in childhood obesity include excessive

consumption of sugar and juice, dependency on readymade food items, decreased physical activity with great popularity of television and computer games, and shortage of space in many schools for outdoor sports. [3]. The relationship between ingestion of refined carbohydrates, especially sugars, and the prevalence of dental caries is well documented in the literature. One of the etiological factors of obesity is diet which also has an equally important role in the caries process. An increase in energy stored, as fat, can lead to obesity and a number of mechanisms can contribute to an increase in stored energy, resulting in increase in weight or obesity[4].

So, the present study was carried out with an aim to determine an association between body mass index (BMI) for age and dental caries in children and role of sugar consumption with respect to BMI for age and dental caries.

Materials and methods

A school -based cross sectional study was conducted to carried out with an aim to determine an association between body mass index (BMI)-for-age and dental caries in children and role of sugar consumption with respect to BMI-for-age and dental caries in school children in Meerut district. A total of 504 school children were examined in the study. The study population consisted of children aged 13 to 17 year. Before starting the study official permission was obtained from all the concerned authorities. This study was conducted in one school. Data was collected from June 2014 to September 2014.

The value of BMI –for -age was obtained percentile curves given by the Centers for Disease Control and Prevention, and children were categorized into four groups based on their BMI percentiles as follows: Underweight group children with BMI-for-age less than 5th percentile , ·Normal group children with BMI-for-age greater than or equal to 5th percentile and less than 85th percentile, ·Over weight group children with BMI-for-age greater than or equal to 85th percentile and less than 95th percentile, ·Obese group children with BMI greater than or equal to 95th percentile.

Examination was carried out by the dentist. An expert social worker was involved in the entry on the survey form. The health status of each tooth was recorded in terms of the presence or absence of disease or a dental restoration. Children were made to sit on the chair and examination was conducted under bright daylight. Sterile mouth mirrors was used. Children were asked for frequency of sugar consumption each day on an average. Food articles included in sugar consumption were Toffee, Chocolate, Ice-cream, Sweets (mithai), Halwa, kheer Jaggery, and sugar etc. Immediate care was given and referral was made as and when required. All the children were referred to Department of Pedodontics and Preventive Dentistry, Subharti Dental college, Meerut. Prevalence of oral health was expressed as percentages. Variables showing statistically significant association with the outcome variables ($p<0.05$) were considered as potential risk factors for oral health hazard.

Results

Of the 504 respondents, 267(52.97%) boys and 237(47.03%) were girls.

Table 1: Association between carries and body mass index in children

BMI	CARRIES		TOTAL
	PRESENT	NOT PRESENT	
UNDER NOURISHED	25	135	**160**
	15.6%	84.4%	**100.0%**
NORMAL	58	251	**309**
	18.8%	81.2%	**100.0%**
OVERWEIGHT, OBESE	7	28	**35**
	20.0%	80.0%	**100.0%**
TOTAL	**90**	**414**	**504**
	17.9%	**82.1%**	**100.0%**

Table 1 is the cross tabulation of BMI category and caries, It shows a total of 31.7% (160/504), underweight, 61.3% (309/504) normal and 6.9% (35/504) children belonged to the overweight and obese category underweight.

Prevalence of dental caries was 17.09% (90/504) overall when x^2 Test was applied for finding association between BMI and caries it came out of be statistically non significant with p value 0.661.The association between BMI and caries was also calculated separately for age 13-17 years of age . In each year of age group, it was found to be statistically non significant except for 17 years. (p.0.002).There was no significant association found between BMI and Caries even when data was analyzed for both the sexes separately.

Table 2: Association between carries and suger consuption in children

SUGER CONSUMPTION	CARRIES		TOTAL
	PRESENT	NOT PRESENT	
NO	11	38	**49**
	22.4%	77.6%	**100.0%**
ONE TIME	68	333	**401**
	17.0%	83.0%	**100.0%**
TWO OR MORE TIME	11	43	**54**
	20.4%	79.6%	**100.0%**
TOTAL	**90**	**414**	**504**
	17.9%	**82.1%**	**100.0%**
p- Value= 0.560 (NS)			

Table shows that 9.7% (49/504) with children had no sugar consumption, 79.6% (401/504) with one time a day and 10.7% (54/504) with two or more time a day consumption of sugar. No association was found in sugar consumption frequency and caries. (p- Value= 0.560) .Segregating the data for both the genders also did not reveal any significant association between sugar consumption and caries.

Discussion

In this study, largest proportion of children affected by caries was among obese and overweight (20.00%) category, followed by normal (18.08%) category and undernourished (15.06%) category. There was no statistically significant difference observed. (p- Value= 0.661).

This result is supported by Sharma A, at al. (2009) in his study. [5].It is supported by a finding of in Indian studies done by Ramachandran A *et al* (2002) [6] and Kumar S, et.al, (2007) [7]. Revealed that there was no statistically significant difference in caries & BMI –for-age. A study conducted by Vasconcelos PL et. al. (2006) suggested that there was no statistically significant difference in caries & BMI –for-age across genders[8]. Dental caries is the most widespread multifactorial infectious disease affecting the oral cavity.

This study demonstrated non significant relationships between nutritional status and oral health among the study subjects. In this study no significant differences between males and female were observed.

A study conducted by Alves LS, *et al*.(2013) revealed that no significant differences between genders were observed in caries experience [9].

Hooley *et al*.(2004), highlighted that there is an inverse relationship between dental caries and BMI from studies done in developing countries[10].

In a study of Carlos Alberto *et al*. (2010) suggested that the prevalence of caries was not associated with the dental caries and nutritional status. Despite the lack of an association between caries prevalence and nutritional status, the greatest severity of caries was found in overweight adolescents and was lowest among obese adolescents[11].

A study done by Sharma A *et al*. (2009) revealed that both obesity and dental caries are linked to diet, making it important for studies of both conditions to assess diet. Snacking between meals, drinks containing high–fructose corn syrup or sucrose, and consumption of high–carbohydrate foods are associated with both an increase in dental caries and an increase in obesity[12].

In a study using data from NHANES 1999- 2002, the relationship between childhood obesity and dental caries was assessed. In this sample of 1,507 children, dental caries was a prevalent disease. Most children had normal BMI; however, about 11 percent were at risk of overweight and 10 percent were actually overweight.The observation is consistent with other studies related to childhood obesity (17-18years). No

statistically significant difference was found in the comparison of BMI category distribution – stratified by age and race- between caries-free children [13].Consumption of sugar , which can be assumed to play a vital role in contributing to the body mass or obesity. In the present study, (49/504) with no, (401/504) one time a day and (54/504) two or more time a day consumption of sugar was observed among the children. No association was found in sugar consumption frequency and caries. p- Value= 0.560 (NS). It has been reported in literature that children who were obese and overweight preferred sweet and fatty foods more frequently compared to children with normal weight. It is evident that the deposition of excess adipose tissue results from a positive energy balance. However, a significant body of research findings suggests that the macronutrient composition of the diet affects the composition of human body[14].

Ludwig *et al*. (2001) in a longitudinal study found that the increasing prevalence of obesity in children is linked to the consumption of sugar sweetened drinks. [15]. A balanced diet helps in the development of a healthy child. It should be noted that a proper diet should include all the essential nutrients in adequate quantities. In the modern society, people eat more sugar and sugar products. Thus, there is less of compensatory reduction of food intake after the consumption of high sugar drinks than when additional foods of equivalent energy content are provided. Both obesity and dental caries are complex issues with multiple etiological factors. Our analysis was limited to Sugar consumption which is only one of the causative factors common to both dental caries and obesity. The prevalence is even higher in school children. The absence of practice of healthy habits often leads to this type of problem. Dental caries is not only a medical problem but many socio-demographic factors are said to be associated with this. Usually the habit of taking care of dental health is obtained from the parents and other senior members of family. The assumption that "overweight/obesity correlates with more caries" cannot be statistically proven in this study though caries scores in both the dentitions increased as BMI‑for‑age increased. The unhealthy practice of children often leads to many medical problems some of which can cause permanent damage. If dental caries develops after the eruption of permanent dentition and proper care is not taken, it may lead to permanent damage and spread of infection throughout the body can also occur. Utmost care must thus be taken so that dental caries should not develop. Early diagnosis with prompt treatment is also necessary. Untreated oral diseases in children frequently lead to serious general health, significant pain, and interference with eating and lost school time. One of the factors to be considered when planning for the required growth in dental care facilities is the prevalence of dental diseases and their treatment need in the population. Poor health and oral diseases in children frequently lead to serious general health, significant pain, and interference with eating and lost school time. One of the factors to be considered when planning for the required growth in dental care facilities is the prevalence of dental diseases and their treatment need in the population. Our world is in the midst of a childhood obesity crisis that threatens its long term health. It is easy to speculate that we are only seeing the tip of the iceberg and that the future economic, health, and social consequences of childhood obesity may be one of the world's most serious challenges in this century. As members of the dental health team, it is critical that dentists maintain awareness of this problem and participate in the assessment and prevention of childhood obesity.

Information from the literature indicates that both childhood obesity and childhood dental caries are complicated disease processes. As a means of decreasing the prevalence of both diseases it would be effective to strengthen and improve the knowledge of the health and educational work force, families, legislators and other key players.To eradicate the present dental health problem suitable community dental health programmes should be conducted to improve the overall well being of the population. High morbidity potential of dental caries has brought it into the main focus of the dental health profession. There is practically no geographic area in the world whose inhabitant does not exhibit some evidence of dental caries. Being the most common affliction of childhood, it makes a child to prone to infection as well as lowers the self-esteem which ultimately impinges on the quality of life of the individual. Untreated oral diseases in children frequently lead to serious general health, significant pain and interference with eating and lost school time. Dental caries was found to be the major public health problems among both the government and private school children of Meerut city, which need immediate attention. Despite the credible scientific advance and the fact that dental caries is preventable, the disease continues to be a major public health problem.

Conclusion

In conclusion, the present study found no association between dental caries and weight status (BMI) among school children in Meerut. These findings indicate that

overweight and obese adolescents should not be regarded as at higher risk of dental caries in this population. The lack of association between BMI and dental decay observed herein could be explained by the fact that the weight excess observed in school children might not be the result of a high consumption of sugar. Despite the lack of an association between caries prevalence and sugar intake, the greatest severity of caries was found in overweight adolescents and was lowest among obese adolescents.

Untreated caries indicates that preventive and restorative treatment needs were high. Dental and dietary habits are likely to increase this prevalence; hence there is a need for continuous monitoring and implementing preventive and restorative programs. Regular dental checkups and practice of routine oral hygiene procedures will enable them to lead a healthier life.

Acknowledgments

Authors are thankful to school children and their faculties and all persons who helped us in this study.

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Source of Support: NIL
Conflict of Interest: None