



A Cross-sectional Study of the Prevalence of Dental Caries among 12- to 15-year-old Overweight Schoolchildren

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ABSTRACT

Introduction: Overweight and obesity are growing health-related problems worldwide, and it is currently the most prevalent nutritional disorder among children and adolescents. The objective of this study was to assess the association between overweight and dental caries among 12- to 15-year-old schoolchildren in Mangaluru district, Karnataka, India.

Materials and methods: Data were obtained from 2000 school-going children aged 12 to 15 years. The children were categorized as overweight and normal-weight group by assessing the body mass index (BMI). Body mass index was categorized using the classification system given by the International Obesity Task Force (IOTF) and obtained in units of kg/m². The dental caries was assessed by detection and was performed according to decayed, missing, and filled teeth (DMFT) index.

Results: Of the 2000 children examined, the mean BMI recorded was 26.87 ± 2.26 for the overweight children and 20.82 ± 1.48 for the normal-weight children. Even though the DMFT (3.90 ± 2.95) in the overweight children was slightly higher than the control group (3.36 ± 2.73), it was not statistically significant.

Conclusion: Within the confines of the present study, it can be concluded that there is no significant association between overweight and dental caries among the schoolchildren of Mangaluru district in Karnataka. Longitudinal studies are necessary to substantiate the possible relationships between dental caries and overweight in children. Knowledge of these relationships could lead to preventive health measures designed to reduce the prevalence of both obesity and dental caries.

Keywords: Body mass index, Decayed, Dental caries, India, missing and filled teeth, Obesity, Overweight.

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INTRODUCTION

Dental caries is one of the most prevalent chronic diseases of people worldwide. Individuals are susceptible to this disease throughout their lifetime. Dental caries forms through a complex interaction over time between acid-producing bacteria, fermentable carbohydrate and many host factors including teeth and saliva. The disease develops in both the crowns and roots of teeth, and it can arise in early childhood as an aggressive tooth decay that affects the primary teeth of infants and toddlers.¹ Risk for caries includes physical, biological, environmental, behavioral, and lifestyle-related factors, such as high numbers of cariogenic bacteria, inadequate salivary flow, insufficient fluoride exposure, poor oral hygiene, inappropriate methods of feeding infants, and poverty.²

Overweight and obesity in children are a major public health concern all over the world, and their health consequences are now well documented.³⁻⁵ Both obesity and poor oral health are associated with lifestyle choices. Children and adolescents who are overweight often are exposed to unhealthy diet that focuses heavily on sugar as well as sweet foods and drinks. Such a diet promotes both the overweight condition and the development of tooth decay. Overweight children also experience depression and low self-esteem, further promoting and perpetuating negative behaviors. Stress can add to the mix, serving as a risk factor for periodontal disease as well as

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early fat deposition, overeating behaviors, and increased consumption of fat and highly caloric foods. Overweight and obesity are often correlated with low socioeconomic status and inadequate quality of nutrition, with a strong link between these two parameters.^{6,7}

Dental caries and obesity are both multifactorial diseases with a complex etiology, and both are associated with dietary habits. A sugar-rich diet, including beverages, is associated with various health problems, such as obesity, dental caries, and poor diet quality.^{4,8} Relatively few studies on the relationship between overweight/obesity and dental caries have been published, and a systematic review revealed contradictory results.⁴ Several other published studies have also reported conflicting results.⁹⁻¹³ A study by Bailleul-Forestier et al¹⁴ assessed caries experience in an adolescent population being treated for severe obesity and found that there was a significant association between body mass index (BMI) and decayed, missing, and filled teeth (DMFT) in the severely obese group. Furthermore, Hilgers et al¹⁵ and Willershausen et al¹⁶⁻¹⁸ reported an association between increased weight and high caries frequency in children and adolescents, while Macek and Mitola,¹⁹ Pinto et al,²⁰ and Kopycka-Kedzierawski et al²¹ found no significant association between weight and caries. In most of these studies, dental caries recordings were performed by oral examination and diagnosed at caries level. Only one study diagnosed proximal caries including initial caries lesions using bitewing radiographs.¹⁵

A high prevalence of obesity and dental caries in children has been reported during the past decade. The studies exploring the relationship between caries experience and BMI reported conflicting results.^{6,18-20,22-25} The present study was undertaken to explore the relationship between BMI and dental caries prevalence among schoolchildren aged 12 to 15 years in Mangaluru city in South India.

MATERIALS AND METHODS

The study was conducted among the schoolchildren in Mangaluru city, Karnataka, India. Ethical approval for the study was obtained from the Dental College, Yenepoya University, Mangaluru. Schoolchildren between the ages of 12 and 15 years were included in this study. Schools in Mangaluru city were selected randomly by lottery method. The study population consisted of 2,000 schoolchildren. Both normal-weight and overweight children from both sexes were included in the study. Consent was obtained from parents after explaining the study objectives. Children/parents who refused to sign the consent form and children with disabilities and medical problems were excluded from the study.

The data were collected through interview and a self-report questionnaire. Examination was undertaken by a single examiner (SK) to avoid interexaminer variability. Recording was done by a trained person who assisted throughout the study. Chemical sterilization (5% glutaraldehyde, Korsorex) was used to sterilize the instruments.

Body mass index was categorized using internationally recognized classification system given by the International Obesity Task Force (IOTF). Subjects were weighed in light clothing without shoes using an electronic weighing scale, and height was measured using a stadiometer. Weight and height were measured and BMI was calculated according to the following formula: Weight (kg)/height² (m²). The children were categorized as underweight (BMI <20), normal weight (BMI 20–24.9), overweight (BMI 25–30), and obese (BMI >30).

Subjects were examined on an upright chair under natural daylight. The prevalence of dental caries was obtained using the World Health Organization (WHO) standard criteria for dental caries diagnosis, namely the DMFT index, to determine the total number of teeth or surfaces that are decayed, missing, or filled. Carious lesions were detected at the cavitation level with visual and tactile method. Caps, masks, gloves, and gauze were used in accordance with infection control guidelines.

Statistical Analysis

The data were analyzed using the Statistical Program for Social Sciences, version 16. Descriptive statistics methods were used to analyze the distribution of subjects, such as BMI and DMFT. The chi-square test and Z test were also utilized to analyze the relation between BMI and the DMFT in each group.

RESULTS

Out of the 2,000 children examined, 197 children were overweight and 618 were normal weight. Examination of the oral cavity performed on the overweight and normal-weight children is depicted in Table 1. The mean BMI recorded was 26.87 ± 2.26 for the overweight children and 20.82 ± 1.48 for the normal-weight children (Table 2). The mean DMFT index in the study population is depicted in Table 3 and Graph 1. Even though the DMFT (3.90 ± 2.95) in the overweight children was slightly higher than that of the control group (3.36 ± 2.73), it was not statistically significant. There was also no significant difference in male and female children in both groups (Table 4, Graph 1).

Table 1: Distribution of overweight and normal-weight children

Gender	Over weight no. (%)	Normal weight no. (%)
Male	109 (55.3)	302 (48.9)
Female	88 (44.7)	316 (51.1)
Total	197	618

Table 2: Comparison of mean BMI between overweight and normal-weight children

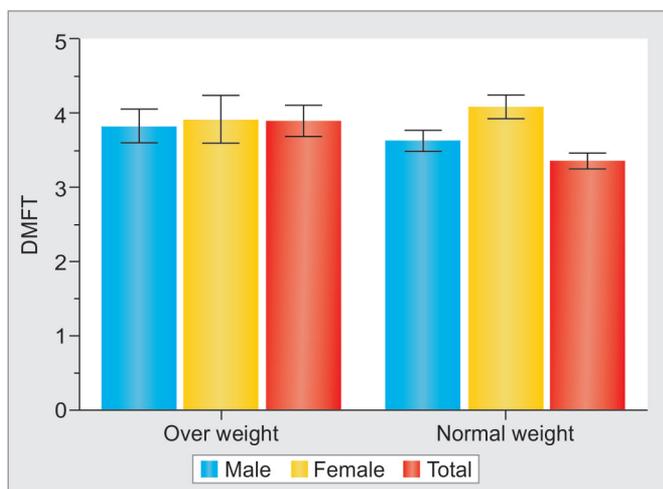
Groups	n	Mean±SD	Mean difference	t	p-value
Overweight	197	26.87±2.26	6.04	43.39	<0.05
Normal weight	618	20.82±1.48			

SD: Standard deviation

Table 4: Gender-wise distribution of the DMFT score (mean and SD) of overweight and normal-weight children

	DMFT		Z	p-value
	Overweight (mean±SD)	Normal weight (Mean±SD)		
Male	3.83±2.38	3.63±2.49	0.620	0.535
Female	3.92±3.04	4.09±2.92	0.566	0.572

SD: Standard deviation



Graph 1: The distribution of DMFT in overweight and normal-weight children of both genders

DISCUSSION

The prevalence of overweight and obesity in children is rapidly increasing in many countries around the world.^{26,27} The WHO has compared this marked change in body weight to a “global epidemic disease.” According to the American Academy of Pediatrics, Committee of Nutrition²⁸ overweight and obesity are now the most common medical conditions of childhood. The potential health problems associated with overweight/obesity in children are numerous.²⁹ The studies exploring the relationship between caries experience and BMI reported conflicting results.^{6,18-20} The present study was undertaken to explore the relationship between BMI and dental caries prevalence among schoolchildren aged 12 to 15 years in Mangaluru city in South India.

The etiology of childhood obesity is multifactorial and includes social and cultural factors. A low socioeconomic level in terms of living area appears to be related to a higher prevalence of obesity.³⁰ Global changes over

Table 3: Decayed, missing, and filled teeth score (mean and SD) of overweight and normal-weight children

Decayed, missing, and filled teeth	n	Mean±SD	Z	p-value
Overweight	197	3.90±2.95	0.032	0.974 NS
Normal weight	618	3.36±2.73		

SD: Standard deviation; NS: Nonsignificant

the past decade have led to serious behavioral changes in populations, such as the increased consumption of soft drinks and fast food, which, together with more sedentary lifestyles,³¹ has contributed to the increasing number of overweight people worldwide.³² The amount of time spent watching TV is positively correlated with obesity,³¹ as it did with the increased consumption of soda.³³ Studies have also shown a relationship between the consumption of sugar-sweetened drinks and childhood obesity.^{34,35} Obese children tend to become obese adults.^{29,36} Studies point to the fact that parental BMI has a positive association with childhood obesity^{29,37} and that familial behavior can predict the risk of obesity.

Body adiposity status is determined by calculating BMI (BMI=weight/height²). The cut-off points for overweight and obesity are BMI of 25 kg/m² and 30 kg/m² respectively. In childhood, BMI changes substantially with age; therefore, the international classification system for childhood obesity (isoBMI) is recommended by the IOTF.³⁸

The current study could not find any significant association between caries and overweight. This is in accordance with an earlier study conducted in children aged 2 to 17 years in the United States.¹⁹ A study by Moreira et al⁶ among obese and normal-weight children in Brazil also failed to show any association with dental caries prevalence. Several other studies are in accordance with our present observation.^{21,39,40} However, in contradiction to the findings, several studies showed an association between the frequency of dental caries and body weight.^{16,17,41} A study in Finland concluded that molar caries and overweight could be used as a predictor of dental caries risk.⁴²

Overweight and obesity have a higher proximal caries prevalence than normal-weight adolescents. Both dental caries and obesity are multifactorial diseases and have common “promoting factors” that increase the likelihood of both diseases and are related to dietary habits and to lower economic status.^{26,30,43} Obesity develops when energy intake exceeds expenditure for a considerable time. Several characteristics in today’s society are contributing to the widespread childhood obesity problem. Changes in the environment that are promoting a sedentary lifestyle and a high consumption of energy-dense foods and drinks have resulted in a larger number of children becoming obese.³⁰

CONCLUSION

Within the limitations of the present study, it can be concluded that there is no significant association between overweight and dental caries among the schoolchildren in Mangaluru city in Karnataka district. Multicenter studies are required to confirm this preliminary observation. Longitudinal studies are needed in order to obtain more knowledge about causative factors and the possible relationships between dental caries and overweight in children. Knowledge of these relationships could lead to preventive health measures designed to reduce the prevalence of both obesity and dental caries.

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