

ASSOCIATION BETWEEN BODY MASS INDEX AND CARIES EXPERIENCE IN SCHOOL GOING CHILDREN OF SALEM SUBURBS: A CROSS SECTIONAL STUDY



Dental Science

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ABSTRACT

Background: Obesity and dental caries are widely-recognised problems that affect general health. The prevention of both dental caries and obesity have proven very difficult: children and their parents may need professional support to achieve behaviour change. Change in lifestyles and economic growth have led to sedentary lifestyle and altered dietary patterns. The aim of the present study was therefore to use anthropometric data obtained professionally to investigate the association between Body Mass Index and dental caries experience in school going children of Salem suburbs aged 6 to 12 years.

Materials and Methods: A total of two hundred children with in the age group of six to twelve years were evaluated. The parents of those children answered a questionnaire on socio demographic, oral hygiene and dietary information. The children's height was measured in centimeters, the weight in kilograms, and BMI was calculated. A dental examination was done. All data were analyzed using Epi Info and Graph Pad Prism software.

Results: The mean BMI in the studied population was 14.66(+/-1.92 SD); all scores fell within the 13.31 to 16.16 BMI range. There was a positive correlation between caries experience and BMI deviations.

Conclusion: As BMI increases, the caries experience also tends to increase in school going children of Salem suburbs.

KEYWORDS

INTRODUCTION

Body mass index deviations are the result of chronic inconsistency between the intake and expenditure of energy and are modulated by various genetic, behavioral and environmental factors¹. BMI is used to measure if a subject is underweight, overweight or obese. According to the Centers for Disease Control and Prevention in the United States, childhood obesity has both immediate and long term effects on overall health². Caries is a common chronic infectious transmissible disease modulated by several factors, such as diet, host, microbiota and genetic factors³. It remains a major oral health problem in most industrialized countries, affecting 60 to 90 percent of school children⁴. Both caries and obesity are public health challenges especially among young children⁵. These conditions share several broadly predisposing factors such as diet, socio economic status, life style and genetics⁶. Therefore, the purpose of this study was to investigate if there is an association between caries and BMI deviations in a group of Salem school children.

MATERIALS AND METHODS

Study settings and period

A cross sectional study was conducted among children in Salem suburbs. Ethical approval for collection of data was obtained and written informed consent was obtained from parents.

Inclusion criteria

- Children with in the age group of 6 to 12 years
- Malnutrition
- Low socioeconomic status

Exclusion criteria

- Children who were mentally immature
- Children for whom parental consent was rejected
- Children with physical or mental disability

Procedure

Two hundred children with in the age group of six to twelve years were evaluated. Parents or caregivers answered a questionnaire about the child's sociodemographics (age and sex), oral hygiene habits (tooth brushing, use of dental floss daily, brushing teeth before bed time) and dietary habits. Caries was diagnosed using a modified World Health Organization (WHO) protocol recommended for oral health surveys. The examination was performed in primary and permanent teeth and was recorded using the decayed, missing and filled primary and permanent teeth (dmft/DMFT) index. The dmft index was recorded to measure dental caries in primary dentition and DMFT index was used to record dental caries in permanent dentition using a mouth mirror and a no.23 explorer. Recording the anthropometric assessment of BMI was done by using a weighing machine scale and 200cm tape to measure height according to the World Health Organizations (WHO) guidelines. The body weight was recorded by standard beam balance scale with participants wearing light dresses and barefoot machine. The body height was recorded with subjects not wearing any shoes and head touching the ruler with line of sight aligned horizontally. For the calculation of BMI, the following formula was used: Weight (kg) / height (m³). The interpretation of the scores are underweight (<18.5), normal weight (18.5-24.99) and overweight (>25) as per WHO.

Statistical analysis

Data was analyzed using Epi Info 7 software and Graph Pad Prism software. Independent t test was used for gender wise comparison of BMI. One way analysis of variance was used for age wise comparison of BMI. Pearson's coefficient test was used to evaluate the degree of the correlation between BMI and caries.

RESULTS

Participant's ages ranged from six to twelve years, with a mean age of 8.61±1.34 years. The mean BMI was 14.66 ±1.92 (Table-1). Males (54.00%) were more compared to females (46.00%). (Graph-1).

Significant difference was observed compared mean BMI between the males and females ($p < 0.03$) (Table-2). The sociodemographic information, oral hygiene habits and dietary information are presented (Table-3). Age wise comparison of BMI showed significant difference with p value of 0.001 (Table-4). Correlation between the BMI and deft/DMFT showed significance (Table-5).

DISCUSSION

Childhood overweight and underweight is global problems that are on the rise due to modernization and change in lifestyle. BMI and childhood dental caries are coincidental in many populations, probably due to the common confounding risk factors such as intake frequency, cariogenic diet, and poor oral health^{7,8}. The results show an association between caries and BMI deviations for primary dentition. The standard way of recording the anthropometric assessment of BMI is done by using a 150 kg digital scale and 200 cm tape to measure height according to the World Health Organization (WHO) guidelines. The body weight was recorded by using a standard beam balance scale with participants wearing light dresses and barefoot. Body height is recorded with subjects not wearing any shoes and head touching the ruler with line of sight aligned horizontally. The BMI is calculated by the formula: Weight (kg)/height (m^2). The interpretation of the scores are underweight (< 18.5), normal weight (18.5-24.99) and overweight (> 25) as per WHO⁹. The ease of implementation and objectivity makes BMI a popular tool to measure obesity. But, this index is to be considered cautiously, as it can produce false-positive results for the fact that it cannot differentiate between lean bodies mass and fat mass. Obesity and malnutrition represent opposite extremities on the spectrum of adiposity, and both are routinely quantified in terms of weight and height relative to the child's age. Factors that were found to be associated with caries were ethnicity, low parental education achievement, poverty/lower socioeconomic level, higher SES level, not eating breakfast daily, eating fewer than five servings of fruit and vegetables daily, soft drink consumption and low health attitude^{10,11}. Both underweight and dental caries are complex issues with multiple etiological factors¹². Our analysis was limited to dietary pattern alone which is only one of the causative factors common to both dental caries and underweight¹³. The dentists can play an important role in promoting good nutrition with the aim of establishing a healthy lifestyle for the children¹⁴. This can be done by educating their parents and caregivers about importance of integrating healthy snacks and meal patterns in their diet which can help in reduction of dental caries in school children.

CONCLUSION

There was a positive correlation between caries experience and BMI deviations. From my study we can conclude that as the BMI increases, the caries experience also tend to increase in school going children of Salem suburbs. Further studies should be targeted on exploring other contributing factors to obesity like physical activity, genetic makeup of the child, and caloric quantification of dietary intake on a larger scale. 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.

Table-1: Sample Distribution according to schooling, age ranges, type of dentition, caries experience and body mass index.

Category	Age range (Years)	Type of dentition	Sample size (n)	deft/DMFT (MEAN $\pm$ SD)	BMI (MEAN $\pm$ SD)
School children	6-12	Primary, mixed and permanent	200	6.05 $\pm$ 3.52	14.66 $\pm$ 1.92

Graph-1: Sample distribution according to gender

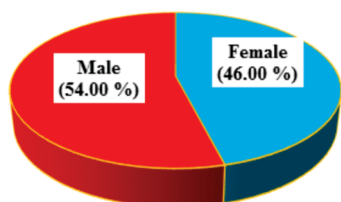


Table-2: Comparison of BMI between the males and females

Gender	Mean	SD	t value	p value
Male	14.92	1.90	2.14	0.03*
Female	14.34	1.92		

(* $p < 0.03$ statistically significant compared between males and females)

Table 3 : Sample Characteristics

Variables	Distribution
Median (range) of the anthropometric data	
BMI (kg/m^2)	14.66 (12.5 – 30.0)
Gender N (%)	
Male	108 (54 %)
Female	92 (46%)
Mother's education level N (%)	
Low	110 (55%)
High	90 (45%)
Father's education level N (%)	
Low	130 (65%)
High	70 (35%)
Tooth brushing per day N (%)	177 (88.5%)
Tooth brushing before sleep N (%)	
Yes	143 (71.5%)
No	57 (28.5%)
Use of fluoridated toothpaste N (%)	
Yes	167 (83.5%)
No	33 (16.5%)
Daily use of dental floss N (%)	
Yes	8 (4%)
No	192 (96%)
Consumption of sweet foods between meals N (%)	
Yes	123 (61.5%)
No	77 (38.5%)

Table-4: Age wise comparison of BMI

Age (Years)	Number (n)	BMI MEAN	SD	p value
6	17	14.15	1.52	0.001**
7	22	13.31	1.08	
8	50	13.91	1.56	
9	58	15.31	2.06	
10	39	15.07	1.81	
11	13	16.16	2.13	
12	1	14.50	1.92	
Total	199	14.66		

(** $p < 0.001$ statistically highly significant)

Table-5: Correlation between BMI and deft, DMFT

Correlations			
		BMI	deft DMFT
BMI	Pearson Correlation	1	0.178* -0.084
	Sig. (2-tailed)		0.036 0.239
	N	200	138 200

*. Correlation is significant at the 0.05 level (2-tailed).

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