

DETERMINING THE ASSOCIATION BETWEEN BODY MASS INDEX (BMI) AND DENTAL CARIES AMONG 12 & 15 YEARS SCHOOL CHILDREN OF CENTRAL INDIA”: A CROSS SECTIONAL STUDY.

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ABSTRACT

OBJECTIVE: The Aim of the study was to evaluate the association between body mass index and dental caries among 12 and 15 years school children

Keywords: Cross sectional study, Dental caries, BMI, School children

MATERIALS AND METHODS:

A cross sectional study was carried out with sample size of 700 school children. 350 children of 12 years age and 350 children of 15 year age were examined for caries and BMI. Caries were evaluated using the WHO recommended Decayed, Missing and Filled Tooth/Surface (DMFT, DMFS). Method BMI for age was calculated using a value obtained from body weight and height (kg/m^2). The data was analyzed by Statistical Package for Social Sciences (SPSS) version 22.0.

RESULTS:

To obtain the result we compared BMI, DMFT and DMFS scores separately among 12 years and 15 years. After that we compared the BMI with DMFT scores and BMI with DMFS scores. We found that BMI and DMFS scores of the children are linearly correlated with moderate correlation 0.392 and BMI and DMFT scores of the children are linearly correlated with moderate correlation 0.34.

CONCLUSION:

Statistical analysis showed BMI had a positive correlation with DMFT. These children would have lack of knowledge about general and oral health. Awareness about general and oral health among parents and children can help to some extent to improve their health status.

INTRODUCTION/PURPOSE OF THE STUDY

Dental caries is an infectious microbiologic disease of the teeth that results in localized dissolution and destruction of calcified tissue. [1]. The early manifestation of caries process is a small patch of demineralized enamel of the tooth surface. [2]. The destruction spreads into the sensitive part of the tooth beneath the enamel. The weakened enamel then collapse to form the cavity and tooth gets progressively destroyed. [3]

Dental caries is caused by the action of acids on enamel surface. Factors, mostly involved in dental caries are age, sex, race, familial and

genetic pattern of caries, emotional disturbances, bacterial factors, role of carbohydrates, geographic variation, fluoride, total water hardness, social factors, etc. Nowadays dental caries are more common in school children due to increased consumption of junk food, beverages and poor oral hygiene practices.^[4] In recent trend there is increased number of dental caries in most of the developing countries. The reason could be due to the increased consumption of sugars and reduced exposure to fluorides.^[5] In 2018 according to global oral health data bank prevalence rate varies from 49% - 83% across different countries ^[6]

Dental caries is considered to be the most prevalent infectious disease which affects mankind.^[7] Dental caries among school children is the most common oral disease.^[8]

. Obesity has become epidemic in recent years, it is a global public health problem despite improvements . In disease prevention programs ^[9]. Obesity and dental caries are increasing epidemics, especially among children and adolescents.^[10]

Obesity and Overweight are defined as having an excessive body fat related to lean mass, with conditions involving psychological, biochemical, metabolic, anatomic and social alterations ^[11]. Obese children have higher incidence of dental caries than those having normal weight ^[12]. Increase in BMI is usually caused by an increased in body fat. As children grow, the amount of body fat changes and hence BMI changes. Obesity and dental caries share common modifiable influences such as diet and lifestyle and are common childhood disease that affects overall growth and development of children.

^[13] Researchers in due course have evidently gathered the data to analyze the relation between BMI and dental caries. ^[14]

Apparently, there are less studies available in central India and hence this study is designed to analyze the association between dental caries and BMI among school children of age 12 and 15 years in Nagpur region of Maharashtra, India. Age 12 years and 15 years had been chosen as it is the global age as given by WHO.

MATERIALS AND METHODS:

Ethical considerations: The study was endorsed by the ethical committee of VSPM Dental College and Research Centre. Permissions were taken from regional schools to conduct the study

Study design and sample size calculation:

A cross sectional study was designed to assess the relation between the variables. The study sample comprised school children of age 12 and 15 years. At the age of 12 years all permanent teeth except third molar are likely to be erupted, at the age of 15 years permanent teeth have been exposed to oral environment for 3-9 years. The assessment of caries prevalence in Adolescents may therefore be relevant^[15]

Prevalence of dental caries in 12 year children was found to be 49% and prevalence of dental caries in 15 years children was found to be 60% ^[16]. As per formula, $4pq/d^2$, The sample size was calculated where p = Prevalence, q = 1- p , d = Precision (5) Putting these values, For 12 year children the sample size was calculated to 339 and for 15 year children it was calculated to be 345 which was

rounded off to 350. Hence, the total sample size considered was 700.

INCLUSION CRITERIA:

All children who gave informed consent.
Children who were free from systemic diseases.
School children of age 12 and 15 years

EXCLUSION CRITERIA:

Children who had not given informed consent
Children having systemic diseases.

MATERIALS:

Data collection form, mouth mirror, dental probe, weighing machine, measuring tape

PROCEDURE:

On the day of examination 350 children of 12 year age and 350 children of 15 year age group from 3-4 schools from Nagpur were screened to obtain a sample size of 700. Students of class 6th, 7th, 8th, 9th were examined. Randomly samples were selected. On recording format basic demographic information was obtained,

Caries status was examined using WHO recommended decayed, missing, filled tooth (DMFT) and decayed, missing, filled surfaces. Distribution of DMFT scores in 12 years children we found that, 8.29% of children having DMFT score 0, while 88.57% children having DMFT score ranging from 1-3 and 3.14% children having DMFT score >3. In 15 years children we found that 4% children having DMFT score 0, while 89.71% children having DMFT score ranging from 1-3, and 6.29% children having DMFT score >3.

(DMFS) index. BMI was calculated using the value obtained from the weight and height of each child.
[17]

STATISTICAL ANALYSIS:

Data obtained was entered in excel sheets. Statistical analysis was done by using SPSS 22.0 software.

RESULT:-

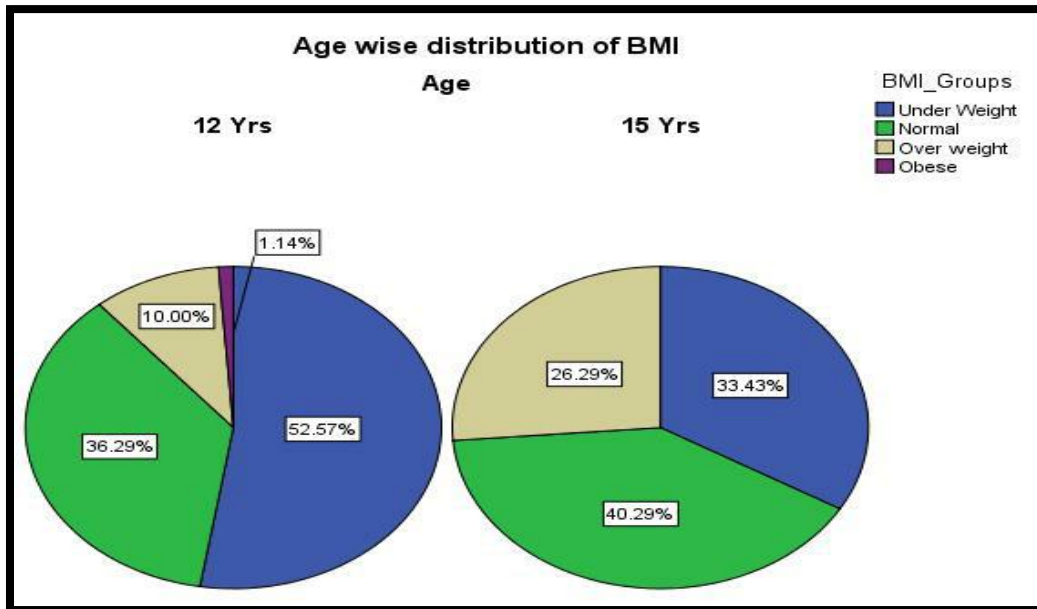
Overall 700 school children were examined in the study from 4 schools located in Nagpur 350 of them belonged to 12 years of age out of these 49.4% are males and 50.6% are females. 350 of them belonged to 15 years of age out of which 45.4% are males and 54.6% are females.^[18]

It was found that in school children aged 12 years 52.57% were underweight, while 36.29% of children were of normal weight, 10% of children were overweight and less 1.14% were obese. In 15 years age group of school children, 33.43% were underweight, while 40.28% of children were normal, and 26.29% children were overweight.

Hence, as age increases number of underweight children decreases and children with normal BMI increases. When we calculate the age wise. Similarly, in the age wise distribution of DMFS scores we found that, in age group of 12 years 8.29% children having DMFS score 0, while 84% children having DMFS score ranging from 1-3 and 7.71% children having DMFS score >3. In the age group of 15 years 4% children having DMFS score 0, while 85.71% children having DMFS score ranging from 1-3 and 10.29% children having

DMFS score >3. After correlating the BMI with DMFS scores, we found that overall, BMI and DMFS scores of the children are linearly correlated with moderate correlation 0.392.

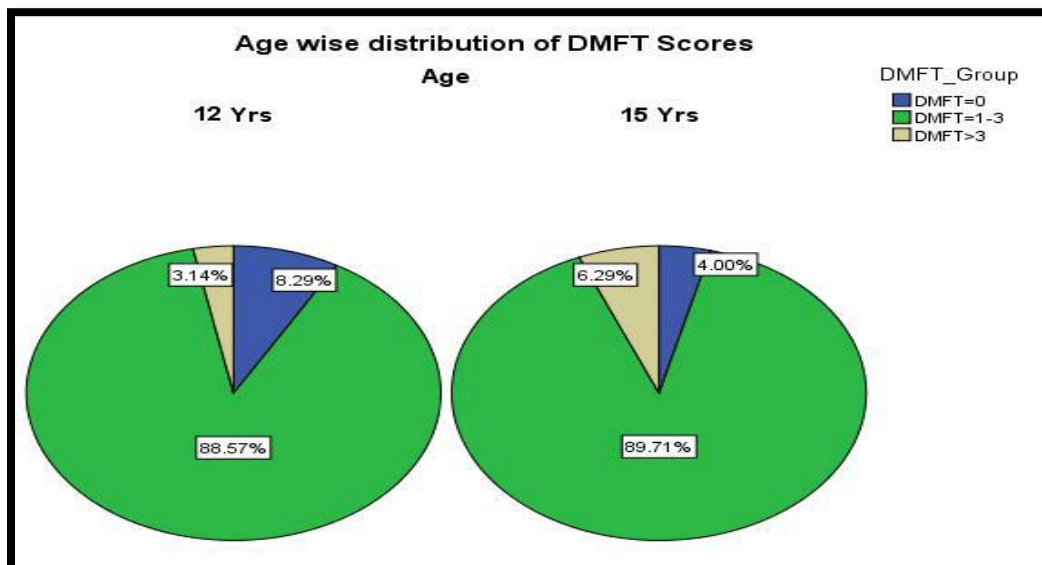
After correlating the BMI with DMFT scores, we found that overall BMI and DMFT scores of the children are linearly correlated with Positive correlation of 0.34.



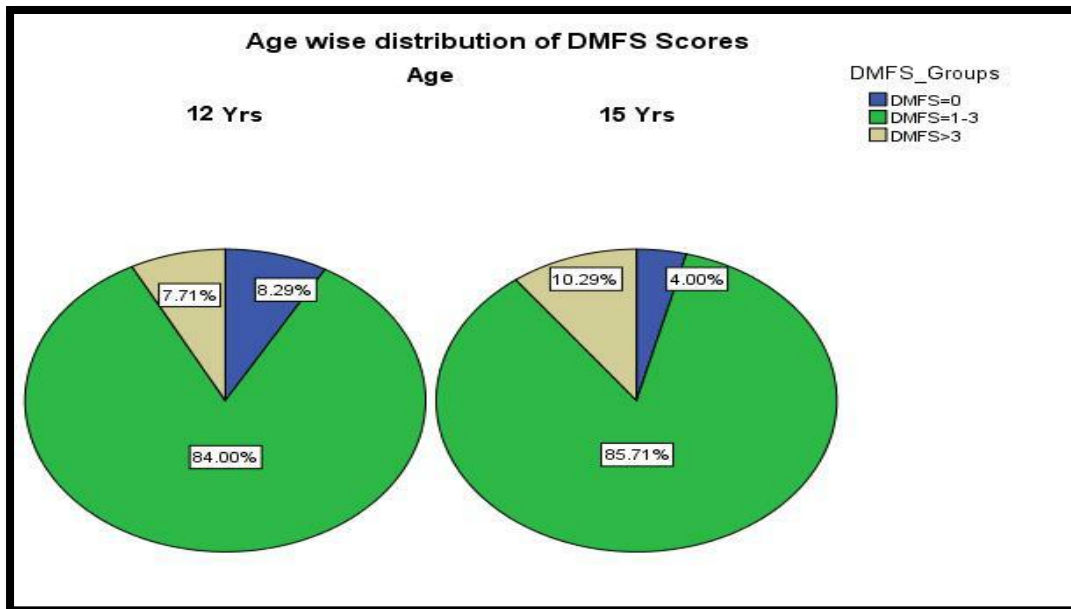
A) Underweight: <18; Normal: 18-25; Overweight: 25-30; Obese: >30

As age increase, no. of underweight children decrease and children with normal BMI increases.

B) Age wise distribution of DMFT Scores



C) Age wise distribution of DMFS Scores



Symmetric Measures

Age Group			Value	Asymp. Std. Error ^a	Approx. T ^b	Approx. Sig.
12.00	Interval by Interval	Pearson's R	.282	.068	5.487	.000 ^c
	Ordinal by Ordinal	Spearman Correlation	.097	.060	1.814	.071 ^c
	N of Valid Cases		350			
15.00	Interval by Interval	Pearson's R	.470	.049	9.939	.000 ^c
	Ordinal by Ordinal	Spearman Correlation	.408	.054	8.336	.000 ^c
	N of Valid Cases		350			
Total	Interval by Interval	Pearson's R	.392	.040	11.269	.000 ^c
	Ordinal by Ordinal	Spearman Correlation	.259	.041	7.072	.000 ^c
	N of Valid Cases		700			

Symmetric Measures

Age Group			Value	Asymp. Std. Error ^a	Approx. T ^b	Approx. Sig.
12.00	Interval by Interval	Pearson's R	.221	.067	4.229	.000 ^c
	Ordinal by Ordinal	Spearman Correlation	.072	.061	1.347	.179 ^c
	N of Valid Cases		350			
15.00	Interval by Interval	Pearson's R	.423	.051	8.709	.000 ^c
	Ordinal by Ordinal	Spearman Correlation	.430	.053	8.874	.000 ^c
	N of Valid Cases		350			
Total	Interval by Interval	Pearson's R	.340	.040	9.564	.000 ^c
	Ordinal by Ordinal	Spearman Correlation	.249	.041	6.795	.000 ^c
	N of Valid Cases		700			

Linear correlation between BMI and DMFS score at the age of 12(0.28) is less than at the age of 15 (0.47). Overall, BMI and the DMFS scores of the children are linearly correlated with Positive correlation 0.392

E) Correlation between BMI and DMFT Scores:

Linear correlation between BMI and DMFS score at the age of 12(0.221) is less than at the age of 15 (0.423). Overall, BMI and the DMFS scores of the children are linearly correlated with positive correlation 0.34

D) Age wise correlation between BMI and DMFS:

DISCUSSION: -

There are so many articles available demonstrating the relationship between dental caries and BMI among schoolchildren. This is the first study to be performed among school children residing in , central India Maharashtra. Purpose of this study is to facilitate the health promotion and program planning of two of the most prevalent diseases among the school going children in Nagpur, Maharashtra. It is observed in this study that the overall prevalence of obesity among school children in Nagpur is low. In this study it is seen that the prevalence of caries in overweight children was greater in comparison to normal weight.

Prevalence rate of dental caries in this study was seen to be positive than the studies conducted in developed nations in the world, such as Sweden, Italy, Mexico and China. In contrast to reports from other states with similar socioeconomic status this survey did Not find any significant difference between 12year old children from rural and urban areas in terms of caries prevalence, caries experience (DMFT, dmft) and BMI.^[19]

In this study, the results appear to show a moderate association between overweight and Obesity and the prevalence of dental caries. Dental caries detection was carried out visually and no x-rays were taken^[20] This study shows positive correlation, therefore, reporting that the schoolchildren with high untreated caries exhibited high BMI values^[21] A negative correlation was reported by studies with similar designs conducted in developed countries, such as United States and Scotland; and in developing nations, such as

Philippines, Taiwan, Thailand, Brazil, Mexico. There is sufficient evidence that obesity and caries are more likely to be caused by common potential risk factors like lifestyle, between meal snacking and frequency of sugared foods. There is also a possibility that the high prevalence of dental caries is not because of food habits but most probably due to poor oral hygiene, lack of oral health . This explains the positive correlation between BMI and dental caries among schoolchildren in Nagpur, Maharashtra.

CONCLUSION:-

This research was conducted to evaluate the association between dental caries and BMI among school children. Positive correlation existed between BMI and between dental caries which explained that BMI as a reason for increased dental caries. It is also proved that statistically significant association exists between dental caries and BMI for the selected age in this study sample. It is important that Dental I professionals should be exposed to the epidemiology of BMI of children, as many of these children will need oral care modifications. BMI estimation should be included in the standard case history of any pediatric patient, as it can help in diagnosis of health problems of the growing child. Exploring the study of the dentist from this gives excellent knowledge for future clinical practice and research.

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