

Correlation between Body Mass Index and Dental Caries Among 12 and 15 Years Old School Going Children in Modinagar, Uttar Pradesh, India

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ABSTRACT

Objective: To evaluate the correlation between body mass index [BMI] and dental caries among 12- and 15-years old school going children in Modinagar city.

Methods: The study population consisted of school children of 12 and 15 years old in the schools' of Modinagar city. Anthropometric (height in meters and weight in kilograms) and caries measurements and decayed missing filled teeth (DMFT) index, were carried out according to the standard criteria

Results: The majority of the study participants were having low normal weight. The frequency of sweet consumption has been significantly increased from low/normal weight to over-weight followed by obese study participants. The concern study demonstrates that the obese study participants had more dental caries. Correlation analysis showed significant positive relation with BMI and DMFT

Conclusion: There was a significant association between over-weight/obesity and dental caries experience among school going children in Modinagar city. Obesity and dental caries have common risk determinants and require a comprehensive multidisciplinary by health professionals

Keywords: Body mass index, dental caries, obesity, over-weight, India

INTRODUCTION

Diet plays an important role in the obesity epidemic ^[1], as dietary habits in children have suffered major changes in last thirty years. Consumption of soft drinks ^[2] is associated with reduced vitamin and mineral intake and an excess of dietary carbohydrates. Prevalence of dental caries is affected by many factors which keep on challenging the health professionals.

Obesity is defined as a condition of abnormal and excessive fat accumulation in adipose tissue to the extent that health may be adversely affected ^[3]. It is a global epidemic and the World Health Organization (WHO) estimates that is the fifth leading cause of mortality worldwide ^[4]. Obesity rates have doubled within the last 20 years in many developing and

developed countries. Moreover, it is a risk factor for many diseases such as type-II diabetes, hypertension, hyperlipidaemia, cerebrovascular diseases and certain types of cancers ^[5,6]. There are many causes leading to obesity but change in the diet and inclination towards westernization/urbanization is one of the major causes which have been reported for the occurrence of obesity. Drastic changes in lifestyles and diet have been reported as the staunch supporter of over-weight followed by obesity. ^[7,8]

It is thought that the increase in children's overweight status has occurred because of an increase in caloric intake and also because of lack of physical activity among children and adolescents ^[9]. The amount of carbohydrates in children's diet

has been increasing over the last 10 years as a consequence of recommendations to decrease dietary fat. Overweight in children has been associated with increased carbohydrate intake and may be related to prolong exposure to carbohydrates^[10,11]. Given the causative relation between refined carbohydrates and dental caries, it is appropriate to hypothesize that overweight might also be a marker for dental caries in children and teenagers^[12]. Strong evidence have been reported in support of association between dental caries and irregular dietary habits i.e intake of carbohydrate rich diet^[13] Henceforth the concern study has been conducted to evaluate correlation between body mass index and dental caries.

SUBJECTS AND METHODS

The study was systematically scheduled to spread over a period of 3 months from first week of May to last week of July 2018 among 12 and 15 years old school going children in Modinagar city, approximately 65 km away from Delhi. A detailed weekly and monthly schedule was prepared well in advance by informing and obtaining consent from the head of the schools. For the study purpose the city was divided into north, south, east, west blocks, out of which stratified random sampling was adopted among the study participants attending the school of two administrative blocks north and east zone, in the city. The study was carried out among 1120 participants studying in North and east-zonal schools

After scheduling the survey ethical clearance was acquired and official permission was secured from the Principals of the schools after duly explaining the purpose and methodology of the study. The daily and weekly schedules were prepared accordingly. The examination was carried out on 4 days in a week. School going students of 12 and 15 years who were willing to participate were included in the study. Students with systemic diseases, prolonged illness, had undergone orthodontic treatment and those who were

not willing to participate were excluded from the study.

Anthropometrical measurements were recorded by using a standardized procedure. Weight in kilogram was assessed using standard physician's scale. Height in meters was measured using Stadiometer. Body adiposity was determined by calculating weight/height². The study participants were cluster classified into the three strata using age-specific body mass index values (iso BMI) given by the international obesity taskforce (15) i.e low normal weight (iso BMI <25), overweight (iso BMI 25- 29.9) and obesity (iso BMI \geq 30).

Data was collected through a pre-structured questionnaire including socio-demographic information, eating habits and frequency of sugar intake in form like cola, chocolate, ice-cream, cookies or biscuits. DMFT index was recorded according to the WHO proforma, clinical assessments were evaluated under the presence of a trained examiner.

To analyse the comparison of difference in mean decayed teeth (DT), missing teeth (MT), filled teeth (FT) and DMFT, ANNOVA is followed by Post hoc Turkey's test. All the statistical analyses were performed using SPSS software version 17.0. A p-value of <0.005 was considered statistically significant.

RESULTS

Total numbers of 1120 study participants were examined according to the planned schedule in different north and eastern zonal schools in Modinagar. Among 12 years old study participants there are 322 (57.5%) and 238 (42.5%) females Among 15 years the study participants there are 311(55.5%) males and there are 249 (44.4%) females of 15 years old [Table—1]. In the concern study *table—2* illustrates the distribution of study participants according low/normal weight, over-weight and obese attending north and east zonal schools. Study participants in *table—3* demonstrates the frequency of sugar intake distribution

according to the variation in body mass index.

TABLES

TABLE 1-GENDER DISTRIBUTION		n(%)	
GENDER	12 YEARS (n=560)	MALES	322 (57.5)
		FEMALES	238 (42.5)
	15 YEARS (n=560)	MALES	311 (55.5)
		FEMALES	249 (44.5)

TABLE 2—DISTRIBUTION OF STUDY PARTICIPANTS ACCORDING TO NORTH AND EAST ZONAL SCHOOLS LOW/NORMAL WEIGHT, OVER WEIGHT, OBESE [BODY MASS INDEX] AMONG 12 and 15 YEARS OLD CHILDREN					
	BMI	LOW/NORMAL WEIGHT n(%)	OVER-WEIGHT n(%)	OBESE n(%)	TOTAL
12 YEARS	EAST ZONE	268 (61)	74(70.3)	11(73)	353
	NORTH ZONE	172 (39)	31(29)	4(26)	207
	EAST ZONE	271 (61.1)	72(69.9)	10(71)	353
15 YEARS	NORTH ZONE	172(39)	31(29)	4(26)	207

Table 3—Distribution of low/normal weight, over weight and obese in relation to sugar consumption among 12 and 15 years old according to the frequency intake

Frequency of sugar consumption	BMI	Low / normal Weight n (%)	Over weight n(%)	Obese N (%)
12 years	Once	206 (46.8)	24 (21.9)	2(13.3)
	TWICE	136 (31)	30 (29.5)	1(6.67)
	THRICE	52 (11.8)	26 (25.8)	5(33.3)
	>THRICE	46 (10.2)	25 (23.8)	7(53.3)
	TOTAL	440 (78)	105 (18)	15(3.7)
15 YEARS	ONCE	208(46)	22(21.7)	2 (13.3)
	TWICE	138(31)	30 (27)	1 (6.6)
	THRICE	52(11.8)	24 (25.8)	4 (33.3)
	>THRICE	46(10.2)	25 (23.8)	7 (53.3)
	TOTAL	445	101	14

There was significant difference in mean DT and DMFT among the three BMI strata ($p < 0.001$). Furthermore, statistical analysis depicts that the obese children had more caries than over-weight and low

normal weight study participants. [table-4]. Study participants in table 5 depict a positive relation between BMI and DMFT. It demonstrates the significant correlation.

Table 4—Caries experience among the study participants in the three BMI (body mass index) strata and DT, MT, FT and DMFT

	BMI	MEAN	SD	p-value	Post-hoc
DT	Low/normal weight[1]	1.58	1.62	<0.001	2>1, 3>1
	Over-weight [2]	2.31	1.80		
	Obesity [3]	3.53	2.41		
MT	Low/normal weight[1]	0.06	0.44	0.808	
	Over-weight[2]	0.05	0.21		
	Obesity[3]	0.00	0.00		
FT	Low/normal weight[1]	0.10	0.45	0.263	
	Over-weight[2]	0.10	0.43		
	Obesity[3]	0.31	1.25		
DMFT	Low/normal weight[1]	1.65	1.62	<0.001	3>2>1
	Over-weight[2]	2.56	1.85		
	Obesity [3]	3.84	2.44		

p ≤ 0.005 was considered significant

DT-Decayed teeth, MT-Missing teeth, FT-Filled teeth, DMFT- Decayed Missing Filled Teeth, BMI- Body Mass Index

BMI	Spearman's rho	DT	MT	FT	DMFT
	Correlation co-efficient	0.254	-0.010	0.013	0.242
	p-value	<0.001	0.826	0.764	<0.001
	n	1120	1120	1120	1120

DISCUSSION

Magnificent mass media have attracted the teenagers globally. Influential media have deteriorated the physical activities among teenagers [1]. Euphoria created by the mass media attracts the youngsters and the physical activities fail to add the charm [1]. Urbanization has showed more inclination towards the prevalence of dental caries. Near-about 80% of adolescents of 15 years of age are affected by dental caries [14,15].

Childhood obesity is a significant issue in the India, with lack of physical activity proving to be a large contributor. Although young children have demonstrated lower percentages of overweight and obesity, their numbers are still concerning, and interventions need to be conducted early stage. Stress should be laid down to ensure that healthy habits among adolescents. Mercilessly obesity is affecting almost 13 million children across the nation [16]

Body adiposity status is determined by calculating body mass index (BMI= weight/height²). In childhood, body mass index changes substantially with age, therefore the international classification system for childhood obesity (BMI) is recommended by the International Obesity Task Force. [17] The prevalence of

overweight and obesity in children is rapidly increasing in many countries around the world [18]. The World Health Organisation (WHO) has compared this marked change in body weight to a “global epidemic disease” [1]

Global changes over the past decade have led to serious behavioural changes in populations, such as the increased consumption of soft drinks and fast food, which, together with more sedentary lifestyles [19], has contributed to the increasing number of overweight people worldwide. The amount of time spent watching TV is positively correlated with obesity [19] and the increased consumption of soda [20]. Studies have also shown a relationship between the consumption of sugar-sweetened drinks and childhood obesity [21]. A study by [22] assessed caries experience in an adolescent population being treated for severe obesity and found that there was a significant association between BMI and DMFT in the severely obese group. Studies have [12] concluded that nowadays the consumption of sweets and other sugary products seem to be a strong factor for the occurrence of caries. Studies [2] have suggested that contemporary changes in beverage intake, particularly the increase in soda pop consumption, have the

potential to increase dental caries rates in children. There are numerous health problems associated with overweight/obesity among children. They include insulin resistance, hypertension, orthopaedic complications, adult obesity and effects on quality of life [24]. The prevalence of dental caries among adolescents need a vigilant attention on eating habits and sedentary lifestyle. Preventive measures should be intervened to restrain the epidemic prevalence among adolescence.

CONCLUSION

Stern initiatives should be taken by the policy makers to laid down the healthy foundations among the adolescents. Influential media should be handled as a vibrant tool to promote healthy habits among adolescents. Counselling should be organized at the remote level to achieve sound health. Media should handle as a catalyst to achieve healthy adolescents however a positive relationship was found between the two diseases. The current study supports the other research that suggest increased rates of adolescent obesity and dental caries among at-risk populations simply co-exist

Implementing prevention and intervention strategies for both diseases during the pre-school years is ideal because the occurrence of obesity or dental caries early in life influences health in adolescence and adulthood. An interprofessional approach between primary healthcare professionals, dental professionals, and health educators would offer a unique opportunity to help prevent and treat these prevalent childhood diseases.

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