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TO ASSESS RELATIONSHIP BETWEEN OBESITY AND DENTAL CARIES, AND LIFESTYLE FACTORS AMONG 12-15 YEARS SCHOOL GOING CHILDREN IN LUCKNOW CITY: A CROSS-SECTIONAL SURVEY

Dr. Neha*[1], Dr. L. Vamsi K. Reddy[2], Dr Sonali Saha[3], Dr. Abhishek Verma[4], Dr. Ravi Shankar[5]

[1]Resident-Department of Public Health Dentistry, Sardar Patel Post Graduate Institute of Dental & Medical Sciences, Lucknow, India.
[2]Prof & Head- Department of Public Health Dentistry, Sardar Patel Post Graduate Institute of Dental & Medical Sciences, Lucknow, India.
[3]Reader – Department of Pedodontics, Sardar Patel Post Graduate Institute of Dental & Medical Sciences, Lucknow, India.
[4]Senior Lecturer- Department of Public Health Dentistry, Sardar Patel Post Graduate Institute of Dental & Medical Sciences, Lucknow, India.
[5]Resident– Department of Pediatrics, Command Hospital (Central Command), Lucknow, India.

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***Corresponding Author**
Dr. Neha
Resident-Department of Public Health Dentistry, Sardar Patel Post Graduate Institute of Dental & Medical Sciences, Lucknow, India.

ABSTRACT

Introduction: Obesity is a global epidemic, and the World Health Organization (WHO) estimates that it is the fifth leading cause of mortality worldwide.A number of epidemiological studies had studied this association but the result were partially inconclusive. **Objective:** To evaluate the possible relationship between obesity, dental caries and lifestyle factors among 12-15 yrs school going children in Lucknow city. **Materials & Method:** The subjects constituted a representative sample of 12 to 15 years aged school going children from government and private schools, 2 each, with a total population of 300 divided equally in each private and government schools from Lucknow city participating in the study. The participants completed a self-administered questionnaire on dietary habits, oral health behaviour, exercise, height and weight. Overweight was defined as body mass index (BMI) > 25 kg/m^2 using the World Health Organization criteria. Caries Status was assessed by WHO dentition status 2013. **Results:** Overweight and obese children had higher dental caries 29.7% and 71.4% respectively as compared to underweight and normal children 22.9% and 14.2%

respectively and this difference was found to be statistically significant ($p < 0.001$). Overweight and obese children had soft drinks more often, received less dental care before, often ate outdoor and these factors were found to be statistically significant ($p < 0.001$). Overall dental caries among children was found to be 22%. **Conclusion:** Prevalence of dental caries was higher among overweight and obese children as compared to underweight and normal children suggesting obesity to be a potential risk factor for dental caries.

KEYWORDS: Adolescents, Dental Caries, Lifestyle, Obesity.

INTRODUCTION

Living a healthy lifestyle and maintaining a healthy weight requires a combination of reliable access to healthy food and physical activity options, knowledge of nutrition, and appropriate amounts of physical activity. A coordinated effort by the entire community is needed and should include child nutrition professionals, school board members, families, students, school administrators, teachers, worksites, local businesses and agencies, healthcare workers and others in the community.[1]

Obesity is a global epidemic, and the World Health Organization (WHO) estimates that it is the fifth leading cause of mortality worldwide. Obesity rates have doubled within the last 20 years in many developing and developed countries.[2] Moreover, it is a risk factor for many diseases such as type 2 diabetes, hypertension, hyperlipidemia, cerebrovascular diseases and certain types of cancers. The rapid cultural and social changes that have occurred in the Gulf region since the discovery of oil and the subsequent economic boom of the 70s and 80s have been associated with an alarming increase in obesity. There are many causes of obesity, but change in the region's diet quantity and quality is one of the major causes.[3]

Excessive weight in children is a cause of major concern. Obesity is a chronic disease, a global epidemic both in developed and developing countries.[4] Obesity and overweight are defined as being an excess of body fat related to lean mass, with multifactor conditions, involving psychological, biochemical, metabolic, anatomic and social alterations.[2] The definitions of overweight (BMI $\geq$ 25 kg/m^2), obesity (BMI $\geq$ 30kg/m^2) and morbid obesity (BMI$\geq$40 kg/m^2) are based on health risks for adult Caucasian populations. Children at risk for being overweight during preschool years carry a greater risk of being overweight by age twelve years.[5]

Besides being the significant risk factor for various diseases, obesity had also been suggested to be a risk factor for dental caries.[6] A number of epidemiological studies have studied this association but the results were partially inconclusive. Hence, the present study was undertaken with an aim to evaluate the relationship between obesity and dental caries, and lifestyle factors among 12-15 years school going children in Lucknow city.

MATERIALS AND METHOD

A cross-sectional study was designed to evaluate the relationship between obesity, dental caries and lifestyle factors among 12-15 yrs old school going children in Lucknow city from April to September 2017 for a period of 6 months. Before the start of study ethical clearance was obtained from the institutional ethical committee and informed consent was taken from all the participants of the study.

The school children population aged 12-15 years was determined for the study. The subjects were taken from two government and private schools each. Subjects included children those who were present on the day of examination and those who gave the consent. Those children who were not present on the day of examination were excluded from the study.

A simple random sampling was used. The survey was in the form of a closed-ended questionnaire which comprised 14 questions relating to possible sources of lifestyle. Survey form also included demographic information, socio-economic status (Kuppuswamy's socio-economic status scale 2013), WHO dentition status 2013 Oral Health Survey [7] and BMI was calculated according to WHO. All descriptive as well as inferential statistical analysis using Chi-square was carried out using SPSS version 17.0 for windows and the value of $P < 0.05$ was considered statistically significant.

RESULTS

Fig 1. Represents proportion of participants according to age group, which was 20%, 32.7%, 31% and 16.3% in 12yrs, 13yrs, 14yrs and 15yrs respectively.

Among 300 children, 164 (54.7%) were males and 136 (45.3%) were females. Equal numbers of children were in private and government schools. 24.7% children lived in rural areas and 75.3% lived in urban area.

Fig 2. Represents the distribution of BMI among children which found 36.3% were underweight, 40.0% were normal, 21.3% were overweight and 2.3% were obese.

Fig 3. Represents prevalence of dental caries among children, which was 22%.

Fig 4. Out of all the questions in the survey questionnaire which evaluated lifestyle factors and had a correlation with obesity and overweight and was found to be significant in obese and overweight children, included those who often had soft drinks, received less dental care before, often ate outdoor and ate late night.

Fig 5. Represents prevalence of dental caries according to BMI with highest prevalence of caries in obese (71.4%) followed by overweight (29.7%), underweight (22.9%) and normal (14.2%) respectively.

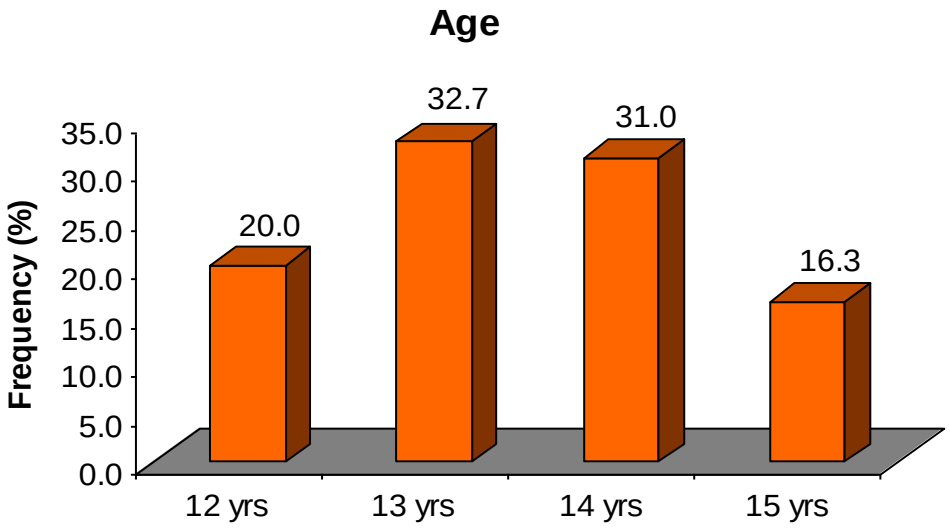

Figure 1: Participants according to age group.

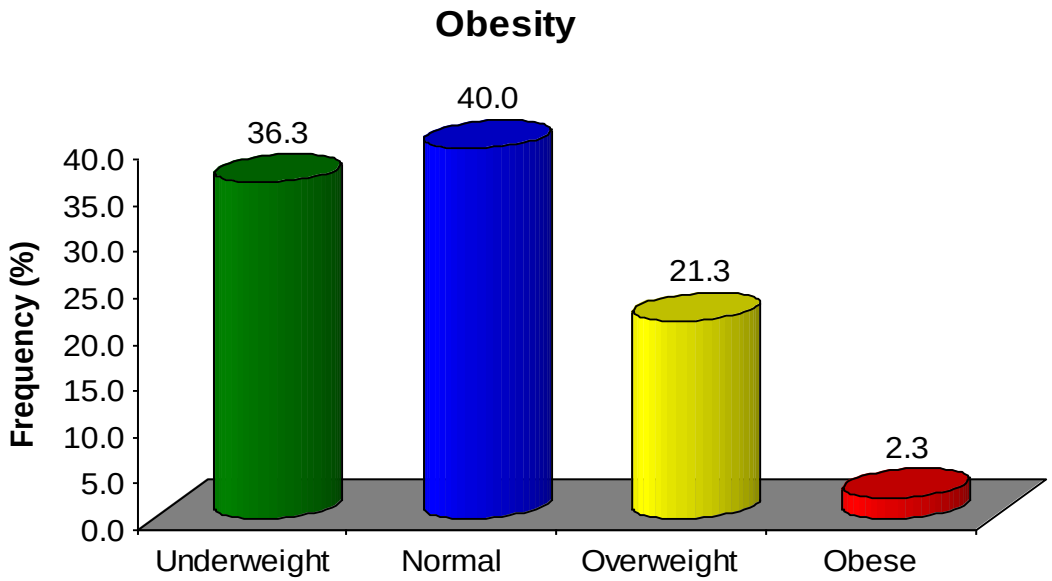

Figure 2: Distribution of BMI among children.

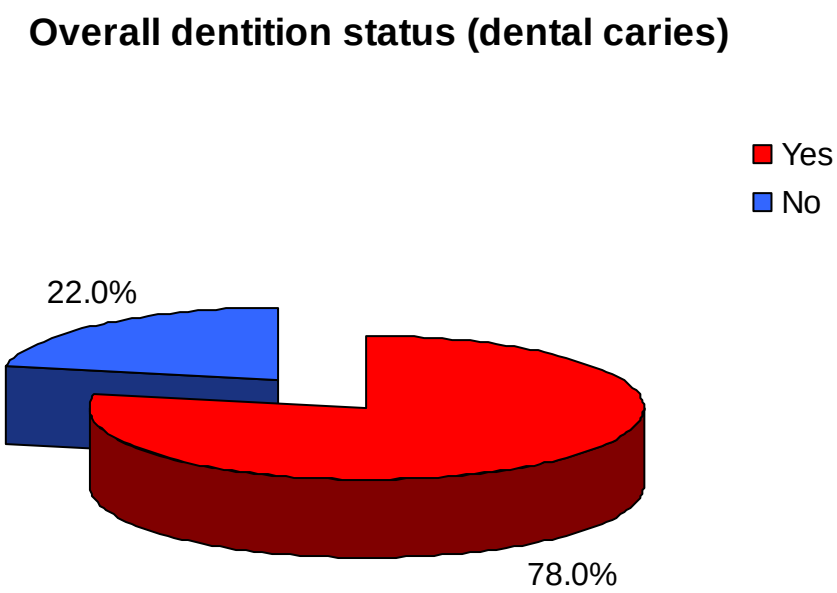

Figure 3: Prevalence of dental caries.

Life style	Obesity (BMI)				χ^2 value	p value
	Underweight (n=109) (%)	Normal (n=120) (%)	Overweight (n=64) (%)	Obese (n=7) (%)		
Q1. Breakfast everyday?						
Yes, alone	39 (35.8)	47 (39.2)	21 (32.8)	4 (57.1)		
Yes, with family	59 (54.1)	56 (46.7)	27 (42.2)	3 (42.9)	14.29	0.112
Seldom	8 (7.3)	17 (14.2)	13 (20.3)	0 (0.0)		
No	3 (2.8)	0 (0.0)	3 (4.7)	0 (0.0)		
Q2. Regular exercise?						
Yes, everyday	12 (11.0)	28 (23.3)	15 (23.4)	1 (14.3)	9.23	0.161
Yes, sometimes	43 (39.4)	43 (35.8)	23 (35.9)	1 (14.3)		
No	54 (49.5)	49 (40.8)	26 (40.6)	5 (71.4)		
Q3. Use electronic media for longer than 3 hrs?						
Everyday	12 (11.0)	27 (22.5)	15 (23.4)	1 (14.3)	16.09	0.065
3 or 4 days per week	38 (34.9)	32 (26.7)	22 (34.4)	3 (42.9)		
1 or 2 days per week	37 (33.9)	45 (37.5)	25 (39.1)	2 (28.6)		
1 day per week or less	22 (20.2)	16 (13.3)	2 (3.1)	1 (14.3)		
Q4. How often eat snacks?						
Everyday	42 (38.5)	38 (31.7)	17 (26.6)	0 (0.0)	6.26	0.100
Less than 4 days per week	67 (61.5)	82 (68.3)	47 (73.4)	7 (100.0)		
5. Eat snacks before dinner?						
Yes, everyday	9 (8.3)	20 (16.7)	4 (6.3)	0 (0.0)	8.52	0.202
Yes, sometimes	54 (49.5)	46 (38.3)	30 (46.9)	4 (57.1)		
No	46 (42.2)	54 (45.0)	30 (46.9)	3 (42.9)		
Q6. Eat snacks before going to bed?						
Yes	10 (9.2)	6 (5.0)	3 (4.7)	1 (14.3)	2.69	0.441
No	99 (90.8)	114 (95.0)	61 (95.3)	6 (85.7)		

Q7. Drink soft drinks before going to bed? Yes No	 17 (15.6) 92 (84.4)	 13 (10.8) 107 (89.2)	 4 (6.3) 60 (93.8)	 2 (28.6) 5 (71.4)	5.31	0.150
Q8. How often drink soft drinks? Everyday Fewer than 4 days per week	 2 (1.8) 107 (98.2)	 2 (1.7) 118 (98.3)	 6 (9.4) 58 (90.6)	 0 (0.0) 7 (100.0)	9.29	0.026
Q9. Time of dinner? Before 7 PM 7 PM-9 PM After 9 PM	 0 (0.0) 80 (73.4) 29 (26.6)	 4 (3.3) 60 (50.0) 56 (46.7)	 5 (7.8) 26 (40.6) 33 (51.6)	 0 (0.0) 2 (28.6) 5 (71.4)	28.54	<0.001
Q10. Eat yellow-green vegetables everyday? Yes No	 103 (94.5) 6 (5.5)	 117 (97.5) 3 (2.5)	 64 (100.0) 0 (0.0)	 7 (100.0) 0 (0.0)	4.65	0.199
Q11. Eat 3 meals at regular times of the day? Yes No	 87 (79.8) 22 (20.2)	 100 (83.3) 20 (16.7)	 43 (67.2) 21 (32.8)	 6 (85.7) 1 (14.3)	6.88	0.076
Q12. How often family eat outdoors? Once a week Twice a week Seldom	 22 (20.2) 5 (4.6) 82 (75.2)	 36 (30.0) 10 (8.3) 74 (61.7)	 16 (25.0) 18 (28.1) 30 (46.9)	 3 (42.9) 4 (57.1) 0 (0.0)	43.95	<0.001
Q13. Received dental care before? Yes No	 18 (16.5) 91 (83.5)	 42 (35.0) 78 (65.0)	 43 (67.2) 21 (32.8)	 1 (14.3) 6 (85.7)	47.03	<0.001
Q14. Developed any illness requiring hospitalization? Yes No	 9 (8.3) 100 (91.7)	 7 (5.8) 113 (94.2)	 7 (10.9) 57 (89.1)	 2 (28.6) 5 (71.4)	5.30	0.151

Figure 4: Correlation between obesity and life style of enrolled children (n=300).

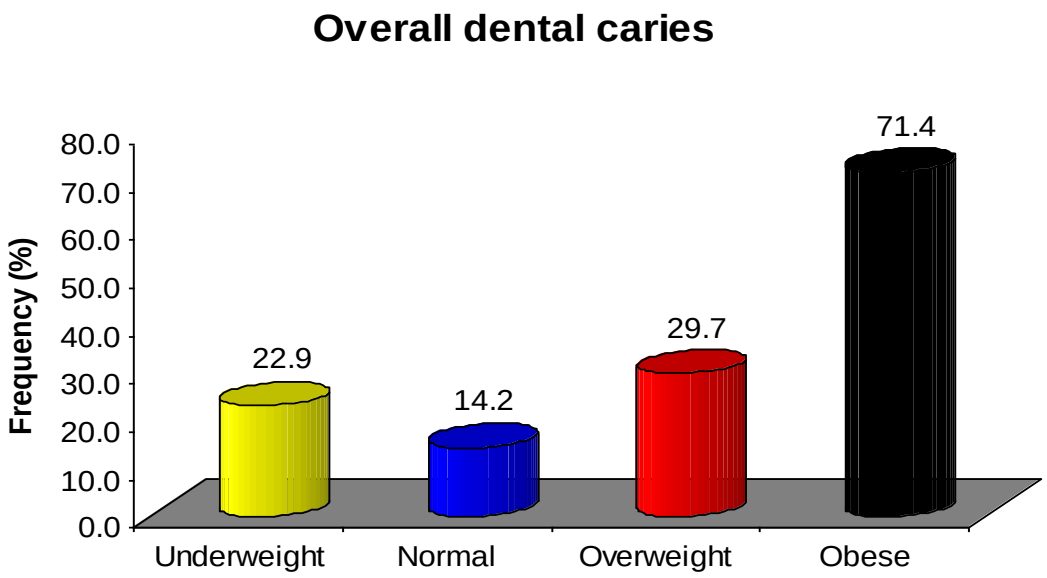

Figure 5: Prevalence of dental caries according to BMI.

DISCUSSION

Although, there are several methods to assess obesity, BMI is commonest of all. However, BMI is a determinant of overweight but does not truly reflect the body fat as it takes height into consideration which confounds the assessment of total body fat.[8] Complications of the obesity epidemic include high cholesterol, high blood pressure, type II diabetes mellitus, coronary plaque formation, and serious psychosocial implications as found in the study by Hiroya Osawa *et al*[9] (2015). The overweight condition in childhood and adolescence increases the risk for adult obesity and its consequent health risks during adulthood. In the present study we have also measured the association between obesity and the risk of dental caries.

In the present study, prevalence of dental caries in 12-15 years school going children was 22%. This result was in agreement with the study conducted by Basha Sakeenabi *et al*[10] (2012) which showed the prevalence of dental caries in 6 to 13 years school going children to be 28.9%.

This study shows that overweight and obesity was associated with the prevalence of dental caries in age group 12-15yrs old school going children and was significantly higher in obese (71.4%) and overweight (29.7%) children. This result was in agreement with the study conducted by Alm *et al*[11] (2011) who found a statistically significant association between obesity and dental caries in the 15yrs children i.e. 67%. Another similar study conducted by Bailleul- Forestier *et al*[12] (2007) showed a significant association between dental caries and obesity i.e. 90% in 12-18yrs school going children.

We found the girls to be normal or underweight as compared to boys. Boys were more overweight and obese. Similar observation was noted by Gonzalez *et al*[13] (2009) where more girls than boys were classified as having normal weight.

This study result also shows that overweight and obesity was significantly associated with children living in urban area than children living in rural area. It is partly supported and partly contradicted by a study done by Opara *et al*[14] (2010) that found that most of the urban children had higher prevalence of underweight and obesity. The difference of result between these studies maybe due to difference in culture, genetics as well as geographical condition.

Present study shows that prevalence of overweight and obesity was significant in children studying in private schools as compared to those studying in government schools. Tripathi Swati *et al*[2] (2010) also showed similar results with higher prevalence of overweight and obese adolescents in private school than in government school.

This study also shows that prevalence of overweight and obesity was significantly associated with children of higher socioeconomic status. It can be explained by more consumption of soft drinks and low-intensity physical activities. Tripathi Swati *et al*[2] (2010) showed similar results. The larger prevalence of obesity in high socioeconomic level children could be explained by them adopting low-intensity physical activities together with consuming high-energy value food.

The results of the present study showed that prevalence of overweight and obesity was significantly associated in children with unhealthy lifestyle like more consumption of soft drink. These children often ate outdoors with their family and obese children rarely received dental care before. Taeko Kanemoto *et al*[15] (2016) showed similar results, the children those who were obese or overweight often eat outdoors with family. Study suggested that fast food and eating out can affect the BMI. The higher the frequency of eating out and fast food intake, the higher the children's BMI. Fast food and eating out can contribute to higher BMI because the restaurant will serve food that is high in calorie content compared to food cooked by self. Prevalence of dental caries in children who had visited dental clinics for prevention of dental caries or periodic dental checkups was especially low. This result was in agreement with the study conducted by Nihtila Annamari *et al*[5] (2016) whose result showed that overweight children drank more soft drinks and energy drinks compared with those who were not overweight and those having seven or more eating or drinking occasions daily were statistically significantly associated with overweight. Associations were found between unhealthy lifestyle and overweight.

Present study showed that more number of overweight and obese children doesn't do regular exercise but this was found to be statistically insignificant. This finding is in contrast with a study conducted by Nihtila Annamari *et al*[5] (2016) who showed that prevalence of overweight and obesity in children who do not do regular exercise was found to be significant.

Change in lifestyle and improvement in socioeconomic status have extensively added to the growing health concern in developing nations. Particularly, lifestyle and food stuffs have an impact on obesity. Therefore, the pattern of eating among overweight children may be a prevalent risk factor for dental caries. Inadequate education about oral health and reduced physical preparation to elementary school children can also be associated with prevalence of obesity and dental caries.[16]

One of the limitation of this study is that the role of genetics, oral health behaviours or other factors (e.g. nutrition, smoking, alcohol consumption, stress levels etc.) which have been shown to affect the prevalence of obesity and dental caries, are not considered in this study. However, study's strength includes evaluation of lifestyle factors, sugary beverage drinking, use of electronic media and physical activities.

RECOMMENDATION

In line with earlier studies, obesity and dental caries share common lifestyle factors among adolescents, regardless of nationality and different health-care systems. Thus, it seems that dental health is a global health concern. There is a need for collaboration between dental and general health-care providers to manage both obesity and dental caries in adolescents by using a holistic approach.

CONCLUSION

The study findings indicated that the prevalence of dental caries was higher in overweight and obese subjects than in their thinner counterparts. Changes in behaviour resulting in the development of obesity may be associated with reduced awareness and practice of behaviours associated with maintaining long-term dental health. Obesity may, however, have an independent effect leading to the manifestations of signs of dental caries.

Although the relationship between obesity and dental caries needs further investigation, the role of oral health care professionals should be more active in endorsing weight management as they see young adults regularly. They should counsel obese persons regarding the possible complications to diminish morbidity for these individuals. The importance of obesity is limited not only to general diseases but also with regard to carious lesions. Hence, educating school children about healthy lifestyle is very important.

PUBLIC HEALTH SIGNIFICANCE

Awareness of the detrimental lifestyle factors including inadequate oral health habits and dental caries among overweight children is important for all healthcare providers, including oral health care professionals.

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Conflicts of interest

There are no conflicts of Interest.

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