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CORRELATION OF DENTAL CARIES STATUS WITH BMI IN SCHOOL CHILDREN OF AGE 3-16 YEARS- AN INSTITUTIONAL STUDY.

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ABSTRACT

Aim: The study investigates the Correlation of dental caries status with BMI in school children of age 3 to 16 years old.

Background: Obesity is a rising global health epidemic. Dental caries have been the predominant disorder in modern society. Obesity and dental caries are major health problems with multifactorial characteristics and similar risk factors, such as diet, lack of physical activity, unhealthy eating pattern, not enough sleep, and high amount of stress etc. Various studies have documented diverse outcomes linked to BMI and dental caries.

Material and methods: A cross-sectional study was implemented on 756 participants. Among the study participants, 475 (62.8%) were boys, and 281 (37.2%) were girls. The DMFT index has been used to assess the prevalence of dental caries. Information of the study participant's height and weight was reported using a standardized measuring scale and weighing machine; after that, the BMI was measured. SPSS version22 was used to analyze the data.

Results: The mean DMFT of the study participants in normal-weight children was 2.3. There was a positive correlation between the dental caries status and BMI, with a significant of value 0.27.

Conclusion: Diet counselling and regular dental check-ups should be prescribed to prevent dental caries from occurring and monitor children's healthy weight. Balanced nutrition needs to be provided to children by school authorities and parents.

KEYWORDS: Body mass index, DMFT, School children.

INTRODUCTION: Dental caries has been the most chronic, terrifying disease affecting individuals in every corner of the world for decades. It is seven times more prevalent than seasonal allergies. It is a complex illness caused by modifiable risk variables such as dietary factors, water fluoride levels, teeth brushing frequency, and non-modifiable risk factors such as socio - economic status and past caries experience. [1] In the prevention of dental caries, the emphasis is now shifting to modifiable factors; especially nutritional.[2] Excessive childhood body weight is a global phenomenon. Obesity has reached epidemic proportions in India, impacting 5% of the population, according to the National Family Health Survey (NFHS). [3] The Body Mass Index (BMI) is calculated by dividing a person's weight in kilograms by their height in metres squared. A high BMI could suggest an increase in body fat. [4] The world is seeing an increase in the number of overweight people as a result of fast food and soft drink consumption, as well as a lack of fitness and exercise. Excess carbohydrate consumption is implicated with obesity. [5] According to the Scientific Advisory Committee on Nutrition, a higher free sugar intake was linked to tooth caries. Consumption of sugar-sweetened beverages is related to increased weight gain and BMI.

Obesity, according to the World Health Organization, is defined as irregular or excessive fat build up that might harm one's health. In teenagers or children, there is no cut-off point for excess fats caused by overweight or obesity.[6] The core notion that regulates weight increase or reduction is energy balance. The body can retain fat if it consumes more energy than is required for physical activity and basal metabolism, and the opposite is true if it consumes less energy than is required for physical activity and basal metabolism. [6] According to a recent study, the prevalence of childhood obesity in Riyadh was 19.5 percent for males and 20.8 percent for females.[7] unfortunately; being overweight or obese between the ages of 14 and 19 years has been linked to an increase in chronic disease mortality. According to several studies, there is a link between BMI and DC. [7, 8] However, there are no additional research in the Guntur District, so the purpose of this study is to examine the relationship between Body Mass Index (BMI) and dental

caries status in children aged 3 to 16 years. Novelty of the study was so far this kind of studies were not done in the Guntur district and it was an institutional based study, with the study participants were taken from the OPD department of Pedodontics. For the present scenario the study was useful because India is caught in a nutrition paradox where stunting and underweight coexist with overweight, and obesity in children. National family health survey -4 reported the prevalence of stunting, wasting and underweight in children below 5 years to be 38%, 21%, and 36% respectively.[3] Increased eating of junk foods may lead to obesity and subsequently high caries incidence among these children.

MATERIALS AND METHODS

The cross-sectional study was conducted on 756 participants who attended the Out-patient Department (OPD) of the Department of Pedodontics and Preventive Dentistry at the SIBAR Institute of Dental Sciences aged 3-16 during the period from March 2019 to December 2019.

Ethical approval and consent of participants: The acquiescence was obtained from the Institutional Ethics Committee, and informed written consent was derived from the participants' parents. The institutional review board approved the study on 20/01/2019, and has given the no 46/IRB/SIBAR/2019.

Sampling method: Convenience sampling was carried out by including children from the out-patient department. **Study size of the population**: a total of 756 participants were taken in to this study, which ever comes to the OPD department of Pedodontics and preventive Dentistry. The sample population's age group is 3-16 years of age. Overall 756 children were recruited into the present study. Of these, 318 children were between 3-8 years and 438 children were between 10-15 years. Among the study participants, 475 (62.8%) were boys and 281 (37.2%) were girls. **Study Questionnaire** Structured questions about specific daily eating circumstances, oral hygiene habits, and routine dental check-ups were created, and they proved to be important for a higher caries risk, were administered for conducting study. Questionnaire content validity was checked by conducting pilot study. According to the World Health Organization, the usual method for documenting the anthropometric measurement of BMI is to use a digital scale of 150 kg and 200 cm of tape to compute the height (WHO). The body weight was measured using a typical beam balancing scale while the individuals wore light clothes and walked barefoot. The height of the body is measured with subjects wearing no shoes and their heads contacting the ruler with their line of sight horizontally aligned. Weight (kg)/height(m^2) is the BMI formula.

According to WHO, the scores are as follows: underweight (18.5), average weight (18.5-24.99), overweight (>25), and obese (>30). The evaluation of dental caries was done according to Dunning type III examination method. By using mouth mirror and probe, in the natural light, the DMFT /deft were recorded, as decayed, missing, filled teeth. **Intra examiner reproducibility** was checked among examiners and Kappa value was 0.85, it shows strong agreement.

Inclusion and Exclusion criteria:

- All healthy children with regular physical activity of both sexes were included.
- Children of age group 3-16 years
- Who are cooperative

Exclusion criteria:

- Children suspected of having some disease with chronic medical conditions (continuous use of sugar-containing medications is a compulsion), who were not physically involved and had enamel/dental abnormalities other than dental caries were excluded.

Procedure for recording dental caries:

Diagnosis of dental caries was developed using a non-invasive technique based on the WHO approach and criteria. The children were positioned in chairs and visually inspected using optimum illumination, a CPI probe, and disposable mouth mirrors. The deft index was recorded for the primary teeth. Dental caries in permanent dentition were measured using the DMFT index.

Statistical methods: Data was collected and tables and graphs were created to represent it. The BMI and dental caries groups were evaluated with chi-square, t-test and linear regression model using the version 22 of SPSS computer software. The significance level was set top<0.05%

RESULTS:

The majority of the children (79.3%) had a BMI falling within the underweight category. Around 1.4% of the children were either overweight or obese. The rest of the children were normal weight (17.9%). The majority of the children (66%) had a fair OHI-S index, 32% had good and remaining 2% had a poor OHI-S (shown in Table1)

Table 2 shows a statistically significant relationship between BMI categories and subjects' OHI-S (Chi-square test, P=0.001).

The mean DMFT of male and female subjects was 2.71 and 1.5 respectively which was statistically significant. There was no significant relationship found between age groups. (fig1)

However, after taking the age and gender into consideration, the relationship between the dental variables and body mass index categories showed that the mean value of DMFT was significantly greater among overweight (8.5)compared with other age groups (P<0.018) (figure 1).

According to a linear regression model, there is a significant relationship between BMI and DMFT (P=0.04). The DMFT score increases 0.624 times for every unit increase in BMI (table 3). Dental caries in children is commonly untreated and represents a public health problem. At least 30% of obesity begins in children and 50-80% obese children become obese adults. The rise in the prevalence of obesity has mirrored in the rise in DMFT.

DISCUSSION

For ages, both obesity and dental Caries are alarmingly multidisciplinary aspects. There is a tremendous need to fix it until it takes its full form. In the Alghamdi study[8], about 32 percent of the study population was either overweight or obese, which is about 1.4 percent in the prevailing study. The mean DMFT of the research participants was 2±0.05, which is very similar to 1.8 of the Jurgensen N study.[9] There is a positive correlation between BMI and dental caries, with a P-value of 0.001. Similarly, it is significant for BMI and age groups, i.e., overweight and obese children in the 3-9 years age group, which is 2.3% in the 10-16 years age group, which is quite similar to Tubert Jeannin S et al., showing that there is an increasingly growing risk to the health of populations in an increasing number of countries. Diet has a significant impact on the individual's caries status, as fiber-containing food decreases the accumulation of plaque, preventing tooth decay. Carbohydrate-rich diets, on the other hand, facilitate the destruction of teeth. A statistically significant positive association between dental caries and BMI was found in this study, which contradicts the study of Ahmed Abdullah Alghamdi and Ahmed Almahdy[8]. According to a systematic review, 48 percent of the studies found no association between dental caries and BMI, 35 percent found a positive correlation, and 19 percent found a negative association. High BMI and DCs are closely linked to lifestyle; for example, low consumption of sugar, frequent brushing, and regular oral dental check-ups can help improve general health. Macek and Mitola[10] demonstrated in 2006 that normal-

weight children had greater dental cavities in both primary and permanent dentition. Similarly, Narksawat et al.[11] discovered that overweight children were less likely than normal-weight children to have dental caries in primary (OR = 0.6) and permanent dentition (OR = 0.5). It was also discovered that underweight and normal-weight pupils were at least 1.94 times and 2.22 times more likely to develop dental caries, respectively, than overweight and obese children aged 12 to 14 years. Similar to the current study, Honne et al.[12] discovered a positive relationship between obesity/overweight status and dental caries. Bailleul-Forestier et al.[13] discovered that highly obese children (n = 16) had a significant caries incidence. In the obese group, there was a significant relationship between BMI and DMFT indices (p = 0.01). In the study by Sede MA et al., the mean DMFT of overweight people is 8.5±0.5, which is 3.03±4.25. [14] We discovered that obese students have a higher chance of developing dental caries than normal-weight participants, which is consistent with the findings of Costacurta M.[15]. The study participant's mean DMFT among normal-weight children was 2.3. There was a link between BMI and the presence of dental caries. In the study done by Kavitha Swaminathan et al, there is no difference in caries experience between normal weight and overweight children.[16] In the present scenario, factors causing high BMI were biological factors, genetic factors, age, dietary factors, physical activity, TV watching, psychological factors, family factors, socio-economic factors, control over these factors were most beneficial in the control of DMFT among children.

Limitations:

1. Under estimation of caries burden, because no radiographs were taken
2. Many of normal weight children will be included in overweight category, if the BMI values were given specific to Indian population.
3. Generalizability usually not possible in the hospital based studies.

CONCLUSION

The investigation concludes that there are more underweight subjects than overweight and obese children. In the current research, the prevalence of caries in obese subjects is high relative to normal-weight subjects, which could be attributable to reduced physical activity in obese subjects compared to normal-weight children. Diet counselling and regular dental check-ups should be prescribed to prevent dental caries from occurring and monitor children's healthy weight. Balanced nutrition needs to be provided to children by school authorities and parents. It is proposed that newer and more comprehensive longitudinal

research be performed in the future to provide useful insights into this relationship. Children should most significantly be provided with adequate education and knowledge of obesity and caries. This reinforcement would shield them from adverse effects. It also encourages them to have a safe and balanced lifestyle. In the present study higher BMI was associated with higher odds of caries. Measures should be taken for the control of obesity and overweight among children to prevent future oral and general health consequences.

Future obesity management programmes and oral health interventions, through determining common risk factors is recommended through this study.

Table 1: Distribution of study subjects by age, gender, categories of Body mass index and OHI-S

Variables		Frequency	Percent
Age group	3-8 years	318	42.1
	10-15 years	438	57.1
Gender	Female	281	37.2
	Male	475	62.8
BMI Index	under weight	599	79.3
	normal weight	135	17.9
	over weight	11	1.4
	Obese	11	1.4
OHI-S Index	Good	242	32.0
	Fair	499	66.0
	Poor	15	2.0

Table 2: Statistical comparison of dental variables and BMI categories by age and gender

			OHI-S			Total	R value	P value
			Good	Fair	Poor			
Age group	3-8 years	N	126	192	0	318	0.165	0.095
		%	39.6%	60.4%	0.0%	100.0%		
	10-15 years	N	115	307	16	438		
		%	26.3%	70.1%	3.6%	100.0%		
Gender	Female	N	85	196	0	281	0.006	0.360
		%	30.2%	69.8%	0.0%	100.0%		
	Male	N	156	303	16	475		
		%	32.8%	63.8%	3.4%	100.0%		
BMI Index	under weight	N	222	377	0	599	0.274	0.001*
		%	37.1%	62.9%	0.0%	100.0%		
	normal weight	N	20	105	10	135		
		%	14.8%	77.8%	7.4%	100.0%		
	over weight	N	0	6	5	11		
		%	0.0%	54.6%	45.4%	100.0%		
	Obese	N	0	11	0	11		
		%	0.0%	100.0%	0.0%	100.0%		

P value=Chi-square test, R value = Pearson's correlation, *statistically significant.

Table 3: Linear regression model with BMI as predictor and DMFT as outcome variable.

	N	Mean	Std. Deviation	95% Confidence Interval for Mean	
				Lower Bound	Upper Bound
under weight	599	2.14	2.760	1.64	2.64
normal weight	135	2.30	2.643	1.25	3.34
over weight	11	8.50	6.364	-48.68	65.68
obese	11	2.50	.707	-3.85	8.85
Total	756	2.26	2.839	1.80	2.72

Coefficients[a]								
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	1.482	.580		2.554	.012	.335	2.629
	BMI	.624	.427	.119	1.462	.046	-.220	1.468

a. Dependent Variable: DMFT

REFERENCES

1. Rao A, Sequeria SP, Peter S. Prevalence of dental caries among school children in moodbindri. *Journal of Indian Society of Pedodontics* and Preventive Dententistry.1999;17(2):45-8.

2. Shivakumar S, Srivastava A, Shivakumar GC. Body mass index and Dental caries; A Systematic Review. *International Journal Clinical Pediatric Dentistry*. 2018;11(3): 228–32.

3.Prahlad Gupta, Nidhi Gupta, and Harkanwal Preet Singh Prevalence of Dental Caries in relation to Body Mass Index, Daily Sugar Intake, and Oral Hygiene Status in 12-Year-Old School Children in Mathura City: A Pilot Study. *International Journal of Pediatrics* 2014;1-6.

4. A. Pinto, S. Kim, R. Wadenya, and H. Rosenberg, "Is there an association between weight and dental caries among pediatric patients in an urban dental school? A correlation study," *Journal of Dental Education*, 2007;71(11):1435–40.

5. D. T. Kopycka-Kedzierawski, P. Auinger, R. J. Billings, and M. Weitzman, "Caries status and overweight in 2- to 18-year-old US children: Findings from national surveys. *Community Dentistry and Oral Epidemiology*. 2008;36 (2);157–67.

6. E. W. Gerdin, M. Angbratt, K. Aronsson, E. Eriksson, and I. Johansson, "Dental caries and body mass index by socio-economic status in Swedish children," *Community Dentistry and Oral Epidemiology*, 2008;36(5); 459–65.

7. M Alqarni SS A Review of Prevalence of Obesity in Saudi Arabia. *Journal of Obesity Eat Disorder* 2016;2:25

8.Ahmed Abdullah Alghamdi and Ahmed Almahdy Association Between Dental Caries and Body Mass Index in Schoolchildren Aged Between 14 and 16 Years in Riyadh, Saudi Arabia*Journal of Clinical Medical Research*. 2017; 9(12): 981–86.

9. N Jürgensen, P E Petersen Oral health behaviour of urban and semi-urban school children in the Lao PDR *Community Dental Health*.2011;28(4):280-5.

10.Mark D Macek, David J Mitola Exploring the association between overweight and dental caries among US children Pediatric DentistryJul-Aug 2006;28(4):375-80.

11. Kulaya Narksawat, Utsana Tonmukayakul, Angsana Boonthum Association between nutritional status and dental caries in permanent dentition among primary schoolchildren aged 12-14 years, Thailand. *The Southeast Asian Journal Tropical Medical and Public Health* 2009 Mar;40(2):338-44.

12. T Honne, K Pentapati, N Kumar, S Acharya Relationship between obesity/overweight status, sugar consumption and dental caries among adolescents in South India. International Journal of Dental Hygiene.2012 Nov;10(4):240-4.

13. Isabelle Bailleul-Forestier, Karine Lopes, Mourad Souames, Sylvie Azoguy-Levy, Marie-Laure Frelut, Marie-Laure Boy-Lefevre Caries experience in a severely obese adolescent population. *International Journal of Paediatric Dentistry*. 2007;17(5):358-63.

14. Sede MA, Ehizele A O.Relationship between obesity and oral diseases. *Nigerian Journal of Clinial Practice*. 2014; 17:683-90.

15. M. Costacurta, L. Di Renzo, L. Sicuro, S. Gratteri, A. De Lorenzo, R. Docimo Dental caries and childhood obesity: Analysis of food intakes, lifestyle. *European Journal of Paediatric Dentistry. 2014*;15(4);343-48.

16. K.Swaminathan, V. Anandan Correlation between BMI & Dental caries among 3-12 year old school children in India: Across sectional study.PMC 2019Aug:11(8): e 5421.

LEGENDS

Table 1: Distribution of study subjects by age, gender, categories of Body mass index and OHI-S

Table 2: Statistical comparison of dental variables and BMI categories by age and gender

Figure 1: Bar chart showing association between age, gender, BMI, and the dependent variable DMFT.

Table 3: Linear regression model with BMI as predictor and DMFT as outcome variable.