Childhood Obesity and Dental Caries among Paediatric Population in Dhule City.

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Abstract

Aim: the aim of this study was to determine whether dental caries experience was associated with BMI and dietary pattern among children.

Material and methodology: the study was conducted to evaluate the relationship between BMI, dental caries and dietary patterns among a group of 300 school going children in dhule city between the age of 8-12 years. Height and weight were measured and used to calculate BMI. Deciduous and permanent dental caries experience was recorded. Dietary patterns were obtained using diet charts.

Result: according to the statistical data, there is an association between overweight and dental caries in permanent dentition of school children. Out of selected demographic variables such as age, gender, diet, sugar exposure, BMI was significantly associated with dental caries in permanent dentition among school children. The association between increasing BMI, consumption of carbohydrate, oil and fat group and DMFT was statistically significant whereas that of DEFT was not statistically significant.

Keywords: BMI, Dietary Patterns, Dental Caries, DMFT, DEFT

Introduction

Childhood obesity is a serious public health problem, and it is currently defined as an excess amount of body fat in relation to lean body mass [1]. Obesity is not only a problem found in the adult population but has also become an increasing problem in paediatrics [2,3]. Obesity in children increases the risk of subsequent morbidity, increased prevalence of hypertension, type 2 diabetes mellitus, dyslipidaemia, left ventricular hypertrophy, non-alcoholic steatohepatitis, obstructive sleep apnoea, and

orthopaedic and psychosocial problems, accelerates dental development and decreases masticatory performance. Children today lead more sedentary life style and the factors contributing to the increase in childhood obesity includes excessive consumption of soda and juice, consumption of fewer fruits and vegetables dependency on readymade food items, decreased physical activity with great popularity of television and computer games.

Obesity in children is difficult to classify accurately, and no commonly accepted standard has yet emerged. Ideally, it should be measured using the percentage of body fat, measured using dual energy x-ray absorptiometry (dxa) scans. This is usually impractical for epidemiological studies. Hence, the body mass index (BMI) is widely used in such research. BMI in childhood is based on age and sex, and several charts have been derived to define cut-offs. BMI has been shown to correlate well to adiposity in children, along with the waist-to-hip ratio. An increase in energy stored, as fat, can lead to obesity and a number of mechanisms can contribute to an increase in stored energy [4]. If energy intake is in excess of energy expenditure or normal intake with reduced expenditure, it results in the disturbance in the energy balance equation and increases the stored energy resulting in increase in weight or obesity [4].

On the other hand, one of the most common oral diseases is dental caries which has multifactorial aetiology among which diet plays a vital role. The relationship between ingestion of refined carbohydrates, especially sugars and the prevalence of dental caries is well documented in the literature. Childhood obesity and childhood dental caries is `co-incidental in many populations, probably due to common confounding risk factors such as intake frequency, cariogenic diet and poor oral health [13].

As diet is a risk factor common to both obesity and dental caries, this study was set to explore the relationship that exists between body mass index, dental caries and dietary pattern amongst a group of children between 8-12years of age. The data was utilized in educating the parents and their children through health care providers regarding the ill effects of excessive/frequent consumption high caloric and cariogenic foods.

Materials and methodology

The study was conducted to evaluate the relationship between BMI, dental caries and dietary patterns among a group of 300 school going children in dhule city between the age of 8-12 years. The students were selected from five different school in dhule city based on their health status and after obtaining the parental consent. Children suffering from long standing illness, with physical or mental disability, with active dental treatment or without parental consent were excluded from the study. The following armamentarium were used in the study stature meter, size 200 cm, portable electronic weighing scale, sterile mouth mirrors, sterile probes, sterile tweezers, sterile kidney trays, disposable gloves and mouth masks, dettol antiseptic solution, pen, pencil, data recording proforma.

Armamentarium

Data recording sheets

This study was conducted to evaluate the relationship between body mass index, dental caries and dietary pattern among a group of 300 school going children in dhule between 8 to 12 years of age of both the genders by the department of pedodontics and preventive dentistry, ACPM dental college and hospital, Dhule. After obtaining approval of the study design from the institutional review board, the study was conducted for a period of 3 months from july 2018 to september 2018. Permission from school authorities was obtained to conduct the study in schools. Following this, the study design was explained to the teachers and consent forms were sent to parents through the schools. After obtaining parent's consent, children were randomly included in the study. Demographics including age were obtained from school records, anthropometric measurements were recorded using stature meter and electronic weighing machine and children were examined for their dental caries status. Dietary patterns were obtained using diet charts.

Data and statistical analysis

All the data obtained from anthropometric measurements, dental examination and diet records were analysed. The results were tabulated and values were stastistically analysed using 1-way anova test and intergroup comparison was performed using the post hoc tukey test. The data provide a statistically significant difference that can be clinical correlated.

Results

Table 1: demographics

Groups	Parameters	N	Minimum	Maximum	Mean	Std. Deviation
Normal weight	Age	100	8	14	10.98	2.098
	Height (mt)	100	1.20	1.75	1.4727	.11651
	Weight (kgs)	100	30.00	70.00	48.4900	8.55227
	BMI %	100	20.0000	24.8800	22.275400	1.3807357
Overweight	Age	100	8	14	11.63	2.321
	Height (mt)	100	1.26	1.66	1.4640	.11166
	Weight (kgs)	100	49.00	83.00	67.4500	10.40724
	BMI %	100	30.0000	35.5500	31.341000	1.2791249
Obese	Age	100	9	14	12.16	1.587
	Height (mt)	100	1.26	1.69	1.5058	8.17031
	Weight (kgs)	100	44.00	80.00	60.44	.09409
	BMI %	100	25.0000	29.8900	26.608600	1.2297614

Table 1: demonstrates the different groups of the study followed by the parameters that were recorded. It also shows the maximum and the minimum scores obtained for different parameters, calculated mean and the standard deviation that exist.

Groups	N	Mean	Std. Deviation	95% Confidence Interval for Mean		F value	p value
				Lower Bound	Upper Bound		
Normal Weight	100	1.38	1.674	1.05	1.71	9.449	0.001*
Overweight	100	1.92	1.889	1.55	2.29		
Obese	100	2.58	2.257	2.13	3.03		

Table 2: comparison of DMFT

(one way anova test; * indicates significant difference at p<0.05)

Mean DMFT was highest in obese group (2.58) whereas normal group exhibited least DMFT (1.38) followed by overweight group (1.92) and difference in DMFT in between three groups was significant (p=0.001).

Dependent Variable	(I) Groups	(J) Groups	Mean Difference (I-J)	Sig.
DMFT	Normal Weight	Overweight	-.540	0.126
		Obese	-1.200*	0.001*
	Overweight	Normal Weight	.540	0.126
		Obese	-.660*	0.046*
	Obese	Normal Weight	1.200*	0.001*
		Overweight	.660*	0.046*

Table 3: Pair wise Comparison

Post hoc tukey test; * indicates significant difference at p<0.05 Pairwise comparison using post hoc tukey test indicates the difference in the DMFT between the three groups was significant

Table 4: comparison of DEFT

Groups	N	Mean	Std. Deviation	95% Confidence Interval for Mean		F value	p value
				Lower Bound	Upper Bound		
Normal Weight	100	2.05	2.204	1.61	2.49	1.580	0.208
Overweight	100	1.68	1.847	1.31	2.05		
Obese	100	2.21	2.401	1.73	2.69		

One way anova test; ns – non significant

Mean DEFT was highest in obese group (2.21) whereas overweight group exhibited least DEFT (1.68)

Table 5: pair wise comparison

Dependent Variable	(I) Groups	(J) Groups	Mean Difference (I-J)	Sig.
Deft	Normal Weight	Overweight	.370	0.448
		Obese	-.160	0.860
	Overweight	Normal Weight	-.370	0.448
		Obese	-.530	0.195
	Obese	Normal Weight	.160	0.860
		Overweight	.530	0.195

post hoc Tukey test pair wise comparison using post hoc Tukey test indicates the difference in the DEFT between the three groups was not significant.

Table 6- association of caries (DEFT) with different parameters

	Unstandardized coefficients		Standardized coefficients	T	Sig.
	B	Std. Error	Beta		
BMI %	.008	.047	.015	.177	.860
Cereal group	.316	.246	.082	1.283	.200
Meat /poultry	-.474	.366	-.088	-1.294	.197
Dairy products	.103	.386	.016	.268	.789
Vegetables & fruits	-.189	.289	-.038	-.652	.515
Oils &fats	-.506	.439	-.080	-1.154	.249
Snacks	-.158	.260	-.048	-.608	.544

Results show no significant association between DEFT and BMI & different dietary patterns.

Table 7: Association of caries (DMFT) with different parameters

	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
BMI %	.060	.029	0.118	2.046	0.042*
Cereal Group	.611	.219	.172	2.792	0.006*
Meat /Poultry	-.081	.306	-.016	-.266	0.791
Dairy Products	-.612	.339	-.103	-1.804	0.072
Vegetables & Fruits	-.103	.260	-.023	-.396	0.693
Oils &Fats	1.239	.371	.211	3.336	0.001*
Snacks	-.182	.216	-.059	-.842	0.401

DMFT showed significant increase with increase in BMI (β=0.118; p=0.042). Also DMFT showed increase with increase in consumption of cereal group and oil & fats group.

Discussion

Childhood overweight and obesity are global problems that are on the rise due to modernization and change in life style. Despite many alarming findings, health professionals in both medicine and dentistry have been slow to implement clinical protocols to aid in the diagnosis and treatment of childhood overweight/obesity[6,7].

Children's dietary habits are significant contributors to childhood obesity and dietary imbalance causes dental caries which is well established in the literature[8,9,10,11].as both dental caries and obesity share some common risk factors like dietary, biological, genetic, socioeconomic, cultural, environmental and lifestyle issues[12], the current study was done to explore if there is any relationship between body mass index, dental caries and diet in a group of healthy school going children between 8 – 12 years of age in dhule city. Demographics like name, age, gender were recorded. Anthropometric measurements like height and weight were measured and recorded. The most convenient and commonly used tool to screen for overweight/obesity is the BMI (kg/m2), a measure of body weight adjusted for height. In the present study, intra oral examination was based on who oral health assessment for caries detection (2000) using community periodontal index (cpi) probe and mouth mirror.46 caries was recorded following DEFT and DMFT criteria for primary and permanent dentition respectively dietary intake of children was obtained for three days including a weekend through a self-reported diet record 48. After eliminating improperly filled diet recordings, 300 children's data were subjected to statistical analysis using spss software. The mean DMFT was highest in obese group (2.58) whereas normal group exhibited least DMFT (1.38) and difference in DMFT in between three groups was significant (p=0.001). Mean DEFT was highest in obese group (2.21) whereas overweight group exhibited least DEFT (1.38) and difference in DEFT in between three groups was not significant (p=0.208). According to the statistical data , there is an association between overweight and dental caries in permanent dentition of school children. Out of selected demographic variables such as age, gender, diet, sugar exposure, BMI was significantly associated with dental caries in permanent dentition among school children. The association between increasing BMI, consumption of carbohydrate, oil and fat group and DMFT was statistically significant whereas that of DEFT was not statistically significant.

An association between BMI-for-age and dental caries was found in the studies done by hilgers kk et al, willershausen et al, isabelle baileul forestier et al and sharma a and hegde am.[12,13,14,15]. The present study is an attempt to find out if there is any relationship between body mass index and dental caries and the role of diet in contributing to both the problems. It should be remembered that the concept of biological plausibility suggests that neither the hypothesis "obesity increases risk of caries" nor "caries increases the risk of obesity" is particularly logical. Rather, it is more realistic that a common risk factor increases the likelihood of both diseases, which are then observed in association [12].our country is in the midst of a childhood obesity epidemic that threatens nation's 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 this epidemic may be one of our nation's most serious challenges in this century. As members of the pediatric health team, it is critical that pediatric dentists maintain

awareness of this epidemic and participate in the assessment and prevention of childhood obesity [16].

Conclusion

Within the limitations of this study it can be concluded that, according to the statistical data, there is an association between overweight and dental caries in permanent dentition of school children. Out of selected demographic variables such as age, gender, diet, sugar exposure, BMI was significantly associated with dental caries among school children. The association between increasing BMI, consumption of carbohydrate, oil and fat group and DMFT was statistically significant whereas that of DEFT was not statistically significant. Both childhood obesity and caries have common determinants and require a comprehensive, integrated management approach by multidisciplinary medical teams and pediatric dentists should thus be actively involved in limiting this global issue.

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