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Inclination of Sugar Rich Diet and Its Effect on Oral Health among School Children

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Abstract: **In present times sugar consumption is one of the most common factors for the development of Dental caries which significantly increases with the increased consumption of sugar intake.**

Aim: The aim of this study was to analyze the role of sweet preference in dental caries among 12years, 15years and 18years age group children.

Material and methods: The survey was conducted in the two areas of Udaipur city, rural and urban. A total of 252 examinees from rural and urban settlements, were assessed for sweet preference using a free choice method. W.H.O standards and criteria were used for dental caries detection.

Results: Results revealed that the urbanised examinee preferred higher sugar concentration and demonstrated higher DMFT scores than their rural counterparts (p=0.00). These differences between the two populations were statistically significant. Data were analysed for correlation between caries and sweet preference. Urban group children of this study had the habit of snacking in between meals and were found to be greater which is highly significant with the DMFT value (p=0.000)

Conclusion: Dental Caries is an irreversible phenomenon and in a country like India there is an increasing need for dental practitioners to combat high prevalence of dental caries among school children.

Keyword: **Dental caries; Sweet preference; School children; DMFT.**

I. INTRODUCTION

Dental caries is one of the most prevalent diseases in children worldwide. It's a multifactorial disease but one of the main etiological cause is exposure to sugar (especially sucrose) [1]. Sucrose is the most cariogenic form of sugar as it can form a long molecule called "Glucan" This "Glue" (glucan) allows the bacteria to adhere to tooth enamel and keeps the bacterial acid close to the surface of tooth [2].

In present times sugar consumption is one of the most common factors for the development of Dental caries which significantly increases with the increased consumption of sugar intake. Children are the most avid consumers of sugars than adults. Only sugar which is in the form of complex carbohydrates (bread vegetable) is healthy [3], United State's Department of Agriculture's Food Guide Pyramid clearly shows that sugar should only be a very small part of a child's diet [4,5].

Human's love the taste of sugar and the word "sweet" is used to describe not only this basic taste quality but also something that is desirable or pleasurable, people differing in their ability to perceive the basic taste and variation in sweet tooth response may lie in the subtle genetic difference in respective molecules that perceive sweet taste and these genes drive some people but not others towards a caries inducing sweet diet. Preference of sweet may also be affected by a person's learned characteristics preferably it being a more dominant reason. Sweet perception varies even in the same individual overtime, but the time period for such variations is of long duration [6].

This study makes an attempt to compare the taste preference and dental caries prevalence among the adolescents of the two prevailing communities in Udaipur City; a rural and an urban area. This paper reviews the available data on the use of sugar (sucrose) in order to identify trends in consumption of sugar containing foods and drinks that may lead to an increase in caries prevalence. Due to the modern preventive practices sugar caries relationship is changing, in the age of the caries decline, there have been only a few attempts in the literature to quantify this relationship in terms of risk assessment. There is a lot of text available on sugar consumption and dental caries but this study is an attempt to draw attention towards preference of sweet by an individual on his or her oral health.

Background information: Till date no such study has been conducted in this part of the country.

II. MATERIALS AND METHODS

The study population consisted of 252, individuals of three age groups 12 years, 15 years and 18 years old urban and rural school children of Udaipur City, Rajasthan. Udaipur city constitutes of mainly four urban areas and eight rural areas; one school from each zone was selected by a stratified random sampling technique to conduct the survey.

Inclusion Criteria: A total of 300 individuals belonging to the three age groups were sent with the invitation letter. In this study due to missing data and after exclusion criteria final sample consists of 252 children with 127 children in urban and 125 children in rural group. This total is more than the calculated number of sample by the pilot study.

Exclusion criteria: Individuals who were non cooperative, absent on the day of study, and with incomplete questionnaire. Adolescents suffering from severe systemic diseases were not included in the study.

Children, who were selected of these age groups, were sent with a letter which asked their parents to visit school on the respective day for participation in the study.

Prior to the study, ethical clearance was obtained from "Ethical Clearance Committee" of Darshan Dental College, Udaipur. Permission was also obtained from the concerned school authorities for conducting the study. Informed consents were obtained from the Principal and parents of the selected children. The procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional or regional) and with the Helsinki Declaration of 1975, as revised in 2000.

Time: - In order to avoid potential seasonal fluctuations, all the examinations were conducted in the span of 3 - 4 weeks in the month of February 2009. An efficient team of three examiners carried out the field work and the inter examiner variability kappa statistics for diagnosis was determined 91.2% two days prior to the examination.

Test for sweet preference: - Fresh solution of reagent grade sucrose was prepared in following concentration, 0.075 M, 0.15 M, 0.3 M, 0.6 M using distilled water for dilution. Each examinee was presented with a tray carrying four disposable cups. Each examinee received the solution in random order. The cups were signed by a hidden mark to identify the concentration of solutions preferred. Instructions were read to the examinees asking them to drink the solution one after the other, and to select the palatable one.

Rinses in between, each solution were given to avoid overlapping of taste, the answer of the examinee's preference was marked immediately on pre-prepared Performa's. The questionnaire included variables such as frequency of sugar intake and snacks in between meals. All the examinees were first tested for sweet preference, and then the dental examination was performed.

Dental caries assessment: - DMFT index was recorded by following the standard criteria, given by W.H.O in 1997, in mobile Dental Unit for facilitating the procedure.

Statistical analysis- All the data collected was entered into the spreadsheets. The statistical package for social sciences (SPSS) software version 20.0 was used for data processing and data analysis. ANOVA, Chi-square tests were applied.

III. RESULTS

Table 1: From the tabular presentation it can be seen that among the urban population 1/3 sample (28.2%) was found to be 12 years age. Among the rural population 17.5% consisted of 15 years age.

Table 2: Interpretating the frequency of sugar intake per day by the individuals and the analysis reveals that maximum of the urban and rural individuals intake sugar at least once a day. 1/3rd (32.5%) of the urban population and more than 1/3rd (36.9%) of the rural sample's frequency of sugar intake is once a day. A very few individuals frequency was found to be 3 to 4 times a day.

Table 3: Shows a correction between place and snacks taken in between meals. 23.4% of the urban individuals snack intake in between meals is at least 2 times. Rural population snack intake in between meals is found to be less 32.5% of the rural sample's snacks intake in between meals was only one time.

Table 4: Presents the DMFT scores of the overall sample. It is evident that the DMFT is more in the urban areas. 8.7% of the individuals had a minimum of 3 score. 16.3% of the of the rural population had no dental caries

Table 5: It is evident from our free choice method of sweet preference that the urban survey population preferred the O.3 M. concentration of sugar solution the most. 0.15M concentration solution was preferred by 20.2% of the examinees of the rural areas.

Table 6: Establishes the relationship between age and sweet preference. It shows that 15.1% of 12 years of age & 13.5% of 18 years age individuals' preferred 0.15 M concentration of sugar solution and 9.1% of survey sample of 15 years of age chose the 0.3 M concentration of sugar solution.

IV. DISCUSSION

Food choice and eating habits are influenced strongly by taste of foods, palatable and satiety is also involved. Energy rich foods that combine sugar and fat are the most preferable of all. Innate taste preferable for sweetness and fat are thought to be one reason for human desire to consume sweet and high fat foods and for growing consumption of fats and sugar [7] . According to our study 49.60 % of individuals were having affinity towards higher sugar concentrations.

The recognition that sugars have an etiological role in dental caries has been for long time. The 1945-1953 Vipeholm Study investigated the association between sugar consumption and dental caries. It is concluded that consumption of sugary food and drinks both between meals and in meals is associated with a large caries increment [8]. Our survey reported that the DMFT level when compared with the area of residence in the children gave a highly significant results (p:0.00) DMFT scores were observed to be high for both urban and rural population but a comparison between these two clearly states the higher scores were in the urban children . This must be due to dietary changes owed to urbanization which may have a remarkable effect on caries prevalence for these groups in all the countries [9].

The study on Nigerian School Children by Ojofeitimi [10] et al reveals that the highest frequency of sweet consumption was recorded for urban pupils, who also had statistically significantly higher caries prevalence than in rural schools ($p<0.001$) which is quite similar to our study ($p=0.01$) for the two group of children. Urban group children of our study had the habit of snacking in between meals and were found to be greater which is highly significant with the DMFT value ($p=0.000$)

Similar to the Sampaio FC [9] et al study conducted in Brazil there were no differences between boys and girls regarding caries prevalence and the other parameter recorded in our study. Data for both the sexes were therefore combined which is in accordance to our study.

Kendall's tau coefficient was used to correlate sugar preference and caries prevalence in the "rural" group which had a insignificant value [$P = 0.86$), In contrast, the same procedure as to the data obtained from the "urban" group gave no significant results of correlation ($p =0.31$), Combining data from the two separate groups and controlling for the effect of the community, a pooled value of Kendall's tau was calculated as statistically insignificant {$P = 0.57$).

Specification of the sugar caries relationship is complicated by many facets of sugar consumption such as total amount consumed, frequency of ingestion, between meals consumption, different physical form of the sugar containing foods [11]. In this analysis we mainly choose to assess sweet preference and dental caries correlation by a free choice method including frequency of sugar intake and snacks in between meals. But the correlation between caries incidence and sweet preference was found to be weak in our study.

In most of the other studies conducted using varying methods of data collection, the evidence of sweet consumption and dental caries relationship lacks conviction 12-24 the highest explanatory value being 8% 15 and the part played by consumption of sweets has been lower than might be expected.

Tables:

Table 1: Place of origin in relation to age

		AGE (in years)			TOTAL
Place		12	15	18	
Urban	n	71	17	39	127
	%	28.2%	6.7%	15.5%	50.4%
Rural	n	41	44	40	125
	%	16.3%	17.5%	15.9%	49.6%
Total	n	112	61	79	252
	%	44.4%	24.2%	31.3%	100.0%
Chi Square Tests : P = 0.000					

Table 2: Place of origin in relation to sugar intake

Place		FREQUENCY OF SUGAR INTAKE PER DAY				TOTAL
		1	2	3	4	
Urban	n	82	31	12	2	127
	%	32.5%	12.3%	4.8%	0.8%	50.4%
Rural	n	93	27	1	4	125
	%	36.9%	10.7%	0.4%	1.6%	49.6%
Total	n	175	58	13	6	252
	%	69.4%	23.0%	5.2%	2.4%	100.0%
Chi Square Tests : P = 0.012						

Table 3: Place and snacks in between meals

Place		SNACKS IN BETWEEN MEALS.				TOTAL
		1	2	3	4	
Urban	N	40	59	11	17	127
	%	15.9%	23.4%	4.4%	6.7%	50.4%
Rural	N	82	4	1	38	125
	%	32.5%	1.6%	4.0%	15.1%	49.6%
Total	N	122	63	12	55	252
	%	48.4%	25.0%	4.8%	21.8%	100.0%
Chi Square Tests : P = 0.000						

Table 4: Place of origin in relation to DMFT

Place		DMFT										Total
		0	1	2	3	4	5	6	7	8	9	
Urban	N	18	10	19	22	17	13	11	8	8	1	127
	%	7.1%	4.0%	7.5%	8.7%	6.7%	5.2%	4.4%	3.2%	3.2%	0.4%	50.4%
Rural	N	41	28	28	13	10	4	1	0	0	0	125
	%	16.3%	11.1%	11.1%	5.2%	4.0%	1.6%	0.4%	0.0%	0.0%	0.0%	49.6%
Total	N	59	38	47	35	27	17	12	8	8	1	252
	%	23.4%	15.1%	18.7%	13.9%	10.7%	6.7%	4.8%	3.2%	3.2%	0.4%	100.0%
Chi Square Tests : P = 0.000												

V. CONCLUSION

The results of the study indicate that consumption of sweet ,other sugary products and increase of snacks in between meals is one of the most important caries related factor particularly harmful in combination with poor oral hygiene . Dental Caries is an irreversible phenomenon and there is an increasing need for dental practioners to combat high prevalence of dental caries among school children.

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