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ORIGINAL ARTICLE

Dental Caries in Relation to Sugar Consumption Among Children, A Study from Public Sector Hospital of Southern Punjab, Pakistan

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ABSTRACT

Objective: The objective of this study was to investigate the prevalence of dental caries among the children presenting in a public dental hospital of South Punjab, Pakistan, as dental caries has been one of the most prevalent diseases among children all around the world. Different factors play a significant role in caries incidence, sugar intake being the most important one. Caries not only leads to dental pain, but also effects a child's body functions, productivity and growth. This study evaluates the factors responsible for caries incidence among children.

Methodology: This cross-sectional study was conducted at the Nishtar Institute of Dentistry, Multan, Pakistan from August, 2022 to December, 2022. Data were collected on a specifically designed questionnaire. A total of 370 participants of age range between 3 to 12 years were chosen for this study. Consent from their parents was taken. The data were analyzed by using SPSS 22 and applying Eta-square test and Pearson's correlation.

Results: Gender had no significant effect on DMFT score with p-value of 0.3. Type and frequency of sugar intake had a significant effect with p-value of 0.00 for both. Age and DMFT were found to have a negative linear relationship.

Conclusion: Increased refined sugar intake was the leading cause of dental caries among children of local population of South Punjab.

Keywords: Dental caries, Caries, Children, Sugar Intake

INTRODUCTION

Dental caries is a major global public health problem and the most widespread non-communicable disease (NCD).[1] Most of the world's population is affected by dental caries, which makes it the most prevalent of all health conditions. Children and adolescents are at risk the most. It is one of the most widespread chronic childhood diseases.[2] Dental caries develops gradually over time, resulting in loss of tooth structure (enamel and dentine) caused by acid production due to bacterial metabolism of dietary sugars.[3] Early stages are usually without symptoms, but the advanced may present with symptoms like pain, infections, abscesses, and sepsis. The severe form of dental caries can impair the quality of life, including difficulty in eating and sleeping. Its advanced stage may result in severe pain, systemic infections and affected growth patterns in children.[4]

Among various risk factors of caries, the most important is sugar consumption. Other factors include different types of bacteria that form plaque, eating and drinking habits, tooth susceptibility, oral hygienic measures, supplementation of fluoride, and salivary flow.[5] There is a direct relationship between sugar intake and dental caries development. Factors that relate to sugar consumption which may affect the caries development process include the amount and type of dietary sugar, the frequency of sugar intake and the dental hygiene measures.[6] World Health Organization (WHO) recommends reduced sugar consumption to decrease the risk of dental caries.[7] Apart from sugar intake, brushing habits of teeth also have an impact on dental health. Children brushing their teeth twice daily are less susceptible to developing caries.[8]

Caries is also connected with socioeconomic status, showing high prevalence rates among poor and underprivileged populations.[9] The incidence of caries is low in developed countries compared to developing countries. Approximately 51% of children from the preschool population complain of caries, which indicates neglected healthcare needs.[10] In the absence of reasonable oral health care measures, increased availability of dietary sugars is related to a marked increase in the prevalence of dental caries. Population-wide strategies to reduce free sugar consumption are a critical public health approach that should be a high and urgent priority.[11]

A slight reduction of sugar intake during childhood can be of great significance in later life. Thus, sugar intake must be kept as low as possible to minimize the risk of caries.[12] Therefore, the aim of our study was to know the choices of children, presenting with caries in a public sector teaching hospital, in regards to sugar type and frequency of sugar intake and correlate these factors with caries prevalence among them.

METHODOLOGY

This study was conducted in outdoor department of Nishtar Institute of Dentistry, Multan, Pakistan from 28-08-22 to 31-12-22, after taking the approval from Ethical Review Committee. A total of 370 children, aged from 3 to 12 years having caries were selected. An informed written consent was taken from the parents of each patient. Children having chronic disorders such as congenital disorders, juvenile diabetes or other metabolic diseases were excluded. Data consisted of age, gender, type of sweet, frequency of sugary meals, and Decayed/Missing/Filled Teeth (DMFT) index was taken by using specifically designed questionnaire. Furthermore, patients were examined by a qualified dentist.

Statistical analysis: The statistical analysis was done using SPSS version 20. Quantitative variables including DMFT score and age were measured as mean ± SD. Qualitative variables including gender, sugar type and frequency of sugar intake were measured by using frequency and percentage. Eta-square test was applied and p-value >0.05 was considered significant.

RESULTS

The study population had 370 children having age of 3-12 years with mean age 7.3±2.3. Majority of participants were 5 years old (20%). The number of male participants was 197(53.2%) and female was 173(46.8%) with the ratio of 1.3:1. The type of sugar taken by children is given in figure 1. The highest intake was of candies with total of 115(31.0%) participants followed by chocolates taken by 113(30.5%) participants. Regarding the frequency of sugar intake, given in table 1, a total of 212(57.3%) participants, had daily intake of sugar followed by 54(14.6%) participants who had sugar intake often. The participants who did not take sugar in any form at all were 29(7.8%).

The DMFT score varied from 0-18 with the mean of 4.7±3.2. The DMFT score 4 had the highest prevalence (16.4%). The association between gender and DMFT was found to be non-significant, with the p-value of 0.3 and Eta-square value of 0.002 given in table 2. Whereas, the association of frequency and sugar type with DMFT was significant, having p-value 0.00, 0.00 and Eta-square value of 0.185 and 0.126 respectively. DMFT score in

relation to age, given in table 3, was analyzed for the association between both. It was found that age and DMFT had negative linear relationship, with Pearson's correlation of -0.369, given in table 4.

Table 1: Frequency of baseline variables

Variable	Frequency	Percentage
Gender		
Male	197	53.4
Female	173	46.8
Sugar type		
Candies	115	31.1
Chocolates	113	30.5
Milk	22	5.9
Sugar	37	10
Other	54	14.6
None	29	7.8
Frequency of sugar intake		
Daily		
Often	212	57.3
Less often	54	14.6
Occasionally	34	9.2
None	41	11.1
	29	7.8

Table 2: Variables in relation to DMFT

Variables		p-value	Eta-squared
Gender	DMFT	0.3	0.002
Frequency		0.00	0.185
Sugar type		0.00	0.126

Table 3: DMFT in relation to age

DMFT	Age (years)										Total
	3	4	5	6	7	8	9	10	11	12	
	Number of children in each age group										
0	0	1	3	1	3	2	1	3	0	7	21
1	0	0	3	3	5	5	1	4	7	9	37
2	0	1	6	6	6	2	3	8	3	3	38
3	0	2	8	8	5	7	3	7	5	8	53
4	0	2	9	7	8	12	6	10	7	0	61
5	0	0	10	4	4	6	9	5	1	1	40
6	0	1	7	6	6	3	3	2	0	0	28
7	0	1	2	2	8	2	0	3	0	2	20
8	1	1	6	4	3	6	1	0	1	0	23
9	0	0	4	1	3	2	0	0	0	0	10
10	0	0	4	2	3	0	1	0	0	0	10
11	0	0	5	2	2	1	0	1	0	0	11
12	0	1	5	2	2	1	0	0	0	0	11
13	0	0	1	0	0	0	0	1	0	0	2
14	0	0	1	2	0	0	0	0	0	0	3
15	0	0	0	0	1	0	0	0	0	0	1
18	0	0	0	1	0	0	0	0	0	0	1
Total	1	10	74	51	59	49	28	44	24	30	370

Table 4: Pearson's correlation

Correlations			
		Age	DMFT
Age	Pearson Correlation	1	-.369**
	Sig. (2-tailed)		.000
	N	370	370
DMFT	Pearson Correlation	-.369**	1
	Sig. (2-tailed)	.000	
	N	370	370

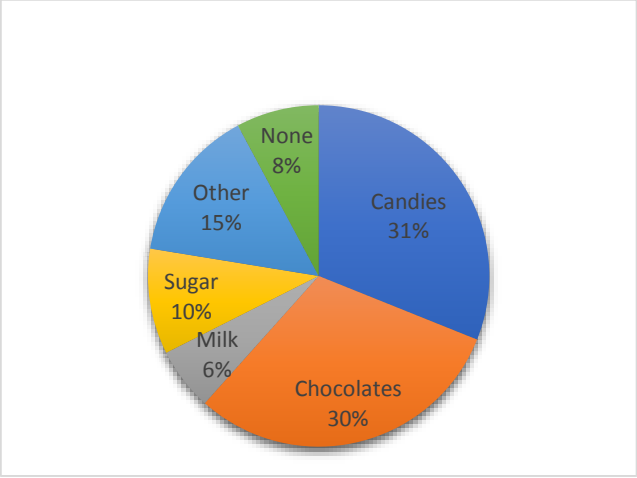

Figure 1: Frequencies of sugar type

DISCUSSION

The variation in the occurrence of dental carries is observed throughout the whole world. Multiple factors like culture, eating habits, lifestyle, and environmental factors are the reason for these variations. Multiple studies showed that the prevalence of caries was quite high in the developing countries like Pakistan which had caries prevalence of 60-80%, [13] and observed more in the school children.

The eating habits play a significant role in the development of caries. The addition of refined sugar (sucrose) in the daily diet has been linked with high caries prevalence. In this study, a direct relationship was found between frequency of sugar intake and the incidence of caries, supported by another study.[14] Whereas, contrary to present study, no significant relation between sugar intake and caries was found in other one.[15] This might be due to the geographic and socio-economic difference between two areas.

In our study, the relationship between the type of sugar consumed and incident of carries was also found, showing candies was the form of sweet taken by the most children. It was also found in the study that the mean DMFT of children taking candies and chocolates were higher as compared to the children taking sweet milk or others. A study conducted in the Bangalore North presented the similar results.[16] In our study it was observed that age had a negative correlation with DMFT, which showed that if the age increased, the incidence of caries decreased, specifically in the children of age 3-12 years. Whereas, a study conducted in La Trinidad, Benguet, Philippines, showed that as age increased the mean DMFT also increased.[15]. This might be due to high prevalence and increased sugar consumption (twice more than WHO recommendation) and widespread oral health neglect, which results in increased level of caries in all age groups.

In our study the mean DMFT value of female was bit higher than male, but the correlation was non-significant, which showed gender had no effect on DMFT. This might be due to the reason that children are not usually self-reliant about their dental health and depend on their care-givers for their oral hygiene maintenance. The similar results were found in the study

conducted in Karachi, Pakistan.[17] Whereas, another study conducted at Hyderabad district showed that males have more caries than females.[18] This might be due to regional differences, and increased sugar intake by the male children of that specific area.

The basic aim of this particular study was to increase awareness about early management, timely screening, and reducing the risk factors of caries and teeth loss. Thus, it may be vital to utilize measures such as fluoride therapy and fissure sealant to prevent caries, particularly in primary teeth in the children as they are more prone to caries. Informative, therapeutic, and preventive programs should be established and applied for reducing the risks of dental caries at all levels, including individual, family, and school.

CONCLUSION

Within the limitations of our study, it may be concluded that dental caries has a direct relation with intake of refined sugars and their increased intake increases the incidence of caries. Children liked to eat thick and sticky sweets more, like candies, which tend to stay on teeth longer and cause more damage to teeth. Caries incidence increased with frequent sugar intake and decreased with the increase in age which means primary teeth are more prone to carious decay than secondary teeth.

Future recommendations: Researchers can opt for Decayed/Missing/Filled Surface (DMFS) index instead of or including DMFT index. Other food options can be considered while surveying like chips etc. Factors like brushing habits and oral hygiene can also be considered.

Conflict of interest: None declared

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