Research Article

Journal of Dental and Maxillofacial Surgery

Association of Dietary Practices and Dental Caries among Adolescent in Lahore: A Cross Sectional Survey

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Received: February 08, 2019; Accepted: March 05, 2019; Published: March 10, 2019

Abstract

Objective: This study was designed to determine the prevalence of dental caries (DMFT) in 15 years age children and to determine its association with dietary practices.

Methodology: This study was conducted in the schools of Lahore having summer camp in July 2015. Study participants were 15 years old students attending summer camp by simple random technique. Written permission was taken before their examination and interview. Self-structure questionnaire was used to collect information regarding the dietary practices. DMFT index was used to measure dental caries. Data entered and analyzed using SPSS version 20. Data was assessed by percentage and frequency, descriptive part was used for demographic variables, and for dietary habits. Chi square test of association between dietary practices and dental caries was applied. P-value ≤ 0.05 was taken as significant.

Results: Total participants were sixty (n=60). Out of these 80% of the subjects of the study were males and remaining were females. Total 58.3% respondents were caries free in this study while caries positive were 41.7 %. Average DMFT score examined was 1.2 In Logistic Regression for the Prediction of Caries Status on Basis of Dietary Habits, three variables were usage of toffees, chocolates and sandwiches. These three played most important role in the production of caries status. Final regression model for calculating probability was $Z = -10.665 + 1.479 \text{ Toffees} + 1.183 \text{ Chocolates} + 1.582 \text{ Sandwiches}$.

Conclusion: Findings of this study have shown that some of the dietary habits have significant relation with caries or tooth decay status like chewing gum, candies, soft drinks, sweets, toffees, chocolates and sandwiches have strong negative impact or relationship with teeth decay.

Keywords: Dental caries, DMFT, Dietary Practices

Introduction

Dental caries refers to the localized destruction of susceptible dental hard tissues by acidic by-products from the bacterial fermentation of dietary carbohydrates [1]. The bacteria break down the hard tissues of the teeth (enamel, dentin and cementum) by making acid from food debris or sugar on the tooth surface [2]. It is a multifactorial disease in which main factors are cariogenic bacteria, fermentable

carbohydrates, a susceptible tooth surface and time. Apart from these factors genetic, behavioral, environmental, cultural, social, and technological factors also play role in its development [3-5].

Endogenous bacteria residing in the dental plaque ferment dietary carbohydrates. As a result of fermentation (metabolic process) acid produce. The acids cause the

pH in plaque to drop below critical value, resulting in the demineralization of tooth substances [6]. Mutans streptococci are considered major pathogenic bacteria in the initiation of caries [7]. Lactobacilli are highly acidogenic bacteria, found in deep caries lesions. For development of dental caries diet is a common risk factor [8]. Simple sugars in food are primary energy source for bacteria's and thus a diet high in simple sugar is a strong risk factor. If mineral breakdown is greater than build up from sources such as saliva, caries results. Both the amount of sucrose ingested and the frequency of intake are important factors involved in the etiology of dental caries [9].

Consumption of sugar containing foods is increased in developing countries particularly among urban residents from higher socio-economic background. The strategy that is appropriate for the developing countries in order to reduce dental caries prevalence is to focus on primary prevention [10]. Approaches to the prevention of dental caries involve attempts to reduce the microbiological burden, reduce the availability of refined sugars in diet, increase the resistance of teeth, or some combination of these approaches, regular cleaning of the teeth, and small amounts of fluoride [2]. The aim of this study was to investigate the relationship between the dietary habits and prevalence of dental caries in fifteen years old students in Lahore population.

Methodology

Study populations

This study was conducted in the schools of Lahore having summer camp in July 2015. Study participants were school children, aged 15 years. Students of 9th and 10th classes attending summer camp were selected through simple random. Written permission was taken before their examination and interview. Self-structured Questionnaire was used to assess dietary practice and demographic variables. DMFT index was used to measure prevalence of dental caries. Data entered and analyzed using SPSS version 20. Data was assessed by Percentage and frequency, descriptive part was used for demographic variables, dietary habits and oral hygiene practices. The impact of all variables on status of caries was also analyzed by cross tabulation. To see impact of demographic variable, parents' education was selected as important variable. Chi square test of association was performed to see the relationship between father education and caries status. This regression was performed by using backward elimination method at five steps as Logistic Regression for the Prediction of Caries Status on Basis of Dietary and

oral hygiene Habits. The effect of chew gum on the caries (teeth decay) was assessed by applying test of association. P-value ≤ 0.05 was taken as significant.

Results

Table 1: Demographic characteristic in percentage & frequency.

Demographic characteristics	Frequency	Percentage
Gender		
Male	48	80
Female	12	20
Total	60	100
Father education		
Low	40	66.7
Medium	12	20
High	8	13.3
Total	60	100
Mother education		
Low	39	65
Medium	17	28.3
High	4	6.7
Total	60	100
Financial Status		
Less than 15000	27	45
Between 15001 & 50000	23	38.3
More than 50001	10	16.7
Total	60	100
Do you have own house?		
Yes	46	76.7
No	14	23.3
Total	60	100
No. Of wash rooms		
One washroom	11	18
Two washrooms	27	45
Three n more	22	46.7
Total	60	100
Flowing water		
Yes	60	100
Total	60	100

Caries free respondents were 58.3% while 41.7 % had caries. 61 totals decayed teeth, 04 missing and 07 teeth were found in this study. The average DMFT in this study was 1.12.

Table 2 comes here

Table 2: Individual DMFT score in percentage & frequency.

Individual DMFT Score	Frequency	Percentage
Score zero (DMFT = 00)	34	56.7
Score one (DMFT = 01)	8	13.3
Score two (DMFT= 02)	6	10
Score three (DMFT= 03)	5	8.3
Score four (DMFT= 04)	4	6.7
Score five (DMFT= 05)	0	0
Score six (DMFT= 06)	2	3.3
Score seven (DMFT= 07)	0	0
Score eight (DMFT=08)	1	1.7
Total	60	100

This regression was performed by using backward elimination method at five steps. This method was used to develop the model only on significant variables. First table of logistic regression is omnibus test which is used for significance of logistic model. Results have shown that model coefficients are significant for prediction. Cox and Snell R square and other type of R square are used as pseudo R square. Its value is 0.532 but this can be used normally for explained variation in the dependent variable. Hosmer and Lameshow shows that model is significant for prediction as p-value was greater than 0.05. Classification table showed that this model can be used for prediction because 88.3% correct prediction and classification of caries status will be made on the basis of these three variables. In the next table it is cleared that there are three significant variables finalized at 5th step in logistic regression analysis. These three variables are usage of toffees, chocolates and sandwiches. These three played most important role in the prediction of caries status. Last table has the information about insignificant variables of the model. Final regression model for calculating probability is as following;

$$Z = -10.665 + 1.479 \text{ Toffees} + 1.183 \text{ Chocolates} + 1.582 \text{ Sandwiches}$$

Discussion

Medical and social sciences researchers have identified the importance and impact of demographics on the life style, quality of life, survival patterns and diseases occurrences. So this study has also an objective to see the influence of these demographics on caries status of teenagers or subjects of this study. This study has same age group so we cannot see the effect of age or main demographic variable on caries status. After that parental education and

financial status were also having significant contribution towards disease patterns and their intensities. This study has explored that father and mother education has strong positive impact on caries. As parents have higher level of education there will be higher chances to avoid from caries or other teeth problems and vice versa. It is simple that if parents have higher level of education then they will be better aware from diseases and their management. So their education play significantly protective role for caries status.

Similarly economic background or financial position matters in this study. As higher the financial position lower will be the chances of getting this disease of caries. There are facts that lower financial position has to face low caries problems due to access to free dietary habits. But it is simple argument that if a person has higher financial position then there are chances of using some quality foods and products which might be affecting less to teeth and other problems of teeth like caries. They will also have the facilities to avoid caries or other problems at early stages. These are few researches such as Shah & Sundaram (2004) [11] and Gibson & William (1999) [12] have supported this argument that demographic have strong impact on caries status.

This study finding has shown that some of dietary habits have significant relation with caries or tooth decay status. Like chew gum, candies, soft drinks, sweets, toffee, chocolates and sandwiches have strong negative impact or relationship with teeth decay. These results have shown that if a person has higher tendency of using these products then he/she will be on higher risk of getting caries or has to face tooth decay and its complications. There are many other dietary habits which were not significantly affecting the caries in this study like intake of fast food (burger, pizza or Shwama). Normally these fast foods were not used as frequently as other things in this population. The reasons might be that these things cannot be used two times or three times in a day. So these factors were not significant with prevalence of dental caries in this study. Here are some researches which have drawn same conclusion that these habits played negative role for teeth by Llena & Forner (2008) [13], Rugg-Gunn et al., (1984) [14], Gibson & William (1999) [12], Al-Malik et al., (2001) [15] and Beighton et al., (1996) [16] have shown that dietary habits have strong influence on caries especially sugar consumption related habits. American Academy of Pediatric Dentistry recommended use of xylitol as sugar substitutes due to its preventive role in dental caries on the oral health of infants, children, adolescents, and persons [17].

Table 3: Dietary practices in percentage & frequency.

Dietary factors	Frequency	Percentage
Do you take meal twice a day?		
Yes	32	53.3
No	28	46.7
Do you take meal three times a day?		
Yes	39	65
No	21	35
Do you take bakery item like bun or bread in breakfast?		
Yes	6	10
No	54	90
Do you take sweet after dinner?		
Yes	6	10
No	54	90
Do you take snacks in school?		
Yes	47	78.3
No	13	21.7
Do you know frequent intake of snacks can cause tooth decay (dental caries)?		
Yes	52	86.7
No	8	13.3
Do you have Easy access to soft drink?		
Yes	58	96.7
No	2	3.3
Do you know sticky food?		
Yes	50	83.3
No	10	16.7
Do you take tea?		
Yes	26	43.3
No	34	56.7
Do you take salad?		
Yes	27	45
No	33	55

Conclusion

Findings of this study have shown that some of the dietary habits have significant relation with caries or tooth decay status like chewing gum, candies, soft drinks, sweets, toffees, chocolates and sandwiches have strong negative impact or relationship with teeth decay. These results have shown that if a person has higher tendency of using these products then he/she will be on higher risk of getting caries or has to face tooth decay and its complications.

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Table 4: Dietary factors as risk factors of dental caries.

Sr. No	Risk Factor	Exposure	Cases	Control	Chi-square Value/Fisher Exact Test	P-value
1	Chew Gum	Once a day	2	8	25.469	0
		Twice a day	7	4		
		Three or more	13	2		
		None	3	21		
2	Candies	Once a day	4	11	25.667	0
		twice a day	4	3		
		Three or more	12	0		
		None	5	21		
3	Soft Drink	Once a day	8	7	24.58	0
		Twice a day	5	5		
		Three or more	10	1		
		None	2	22		
4	Chips	Once a day	17	17	2.588	0.472
		Twice a day	3	6		
		Three or more	2	3		
		None	3	9		
5	Biscuits	Once a day	12	15	2.038	0.597
		Twice a day	4	10		
		Three or more	2	4		
		None	7	6		
6	Sweets	Once a day	6	10	39.526	0
		Twice a day	7	4		
		Three or more	12	0		
		None	0	21		
7	Toffees	Once a day	4	7	31.72	0
		Twice a day	9	3		
		Three or more	11	2		
		None	1	23		
8	Chocolates	Once a day	12	8	15.067	0.001
		Twice a day	6	5		
		Three or more	3	0		
		None	4	22		
9	Pita Bread	Once a day	9	9	1.029	0.633
		Twice a day	1	3		
		None	15	23		
10	Sausages	Once a day	2	4	3.716	0.281
		Twice a day	5	2		
		Three or more	0	2		
		None	18	27		
11	Ketchup	Once a day	9	5	5.278	0.146
		Twice a day	2	6		
		Three or more	2	1		
		None	12	23		
12	Cake	Once a day	8	11	2.112	0.606
		Twice a day	2	2		
		Three or more	0	3		
		None	15	19		
13	Pizza	Once a day	7	7	3.716	0.269
		Twice a day	0	1		
		Three or more	0	4		
		None	18	23		
14	Burger	Once a day	13	11	3.05	0.373
		Twice a day	1	2		
		Three or more	0	1		
		None	11	21		
15	Shwarma	Once a day	13	11	2.722	0.32
		Twice a day	2	3		
		None	10	21		
16	Patties	Once a day	14	11	3.911	0.241
		Twice a day	2	5		
		Three or more	0	1		
		None	9	18		
17	Sandwich	Once a day	16	4	24.45	0
		Twice a day	4	2		
		None	5	29		

Table 5: Logistic regression for the prediction of caries status on basis of dietary habits.

Omnibus Tests of Model Coefficients			
Step 5a	Chi-square	Df	Sig.
a) Step	-2.527	1	0.112
b) Block	45.543	3	0
c) Model	45.543	3	0
Model Summary			
Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
5	35.960a	0.532	0.716
Hosmer and Lemeshow Test			
Step	Chi-square	Df	Sig.
5	3.628	7	0.821
Classification Tablea			
Observed	Predicted		Percentage Correct
	Does subject has caries?		
Step 5 Does subject has caries?	Yes	No	
Yes	22	3	88
No	4	31	88.6
Overall Percentage			88.3
a. The cut value is.500			

a. The cut value is.500

Variables in the Equation								
Step 5a	B	S.E.	Wald	Df.	Sig.	Exp (B)	95.0% C.I. for EXP(B)	
							upper	Lower
a) Toffees	1.479	0.539	7.527	1	0.006	4.39	1.526	12.631
b) Chocolates	1.183	0.433	7.47	1	0.006	3.263	1.397	7.62
c) Sandwiches	1.582	0.426	13.76	1	0	4.863	2.108	11.215
d) Constant	-10.665	3.018	12.486	1	0	0		

Variables not in the Equation			
Step 5a	Score	Df	Sig.
a. Chew Gum	1.204	1	0.272
b. Candies	0.266	1	0.606
c. Soft Drink	2.52	1	0.112
d. Sweets	0.804	1	0.37
e. Overall Statistics	3.273	4	0.513

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