



## THE EFFECT OF DIETARY HABITS AND ORAL HYGIENE ON CARIES AMONG CHILDREN AGED 2-12 YEARS VISITING PESHAWAR DENTAL HOSPITAL, PESHAWAR, PAKISTAN.

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### Abstract

**Background:** There are a few researches in Pakistan, particularly among children population, about dental health issues. The Decayed, Missing and Filled Teeth (DMFT) scale was used in this research as a measure of dental health. Additionally, among Pakistani children with high DMFT indexes, this score was utilized to determine the relationship between eating behaviors, dietary practices, and oral hygiene status.

**Objective:** The purpose of the current study was to examine nutritional practices relating to oral hygiene in connection to the DMFT score among children (2–12 years old) attending Peshawar dental hospital, Peshawar, Pakistan.

**Methods:** A total of 376 patients, ages 2 to 12 years, participated in this cross-sectional research, including 134 boys and 242 girls. With each participant, a face-to-face interview was scheduled in order to gather data employing a survey. Parents of age 2-4 years children completed questionnaire and from age 5 years and above children questions were asked directly. The participants responded to a survey that asked them about their food, dental health-related activities, dentist appointment regularity, gender, and sex. The greatest predictors of aging, sex, plaque, snacking, brushing and the consumption of supplementary oral hygiene agents on the DMFT score were determined using multiple linear regression modeling (MLRM), Chi-square test.

**Results:** Nearly two third (70%) of the individuals had routine breakfast, lunch, and supper, as per the data analysis of diet. Among the 290 patients, who made up 77.12%, snacking was prevalent. Although not at a greater incidence, the majority of respondents (45.74%) routinely cleaned their teeth twice daily with fluoridated toothpaste, and almost half (43.35%) utilized other dental care products

in addition to brushing. The sample's overall mean for the DMFT scale was determined to be 6. The number of patients (43.35%) had considerable plaque buildup that was visible with the naked eyes.

**Conclusion:** To achieve optimal plaque control, dental health awareness for children should focus on the frequency of major meals, the reduction of snacking, and the inclusion of advice for good oral health-related activities.

**Keywords:** Dental behavior, Caries, DMFT index, Dietary habits.

## Introduction

The disease known as dental caries (DC) affects practically each adult's teeth over their lifetime, with an estimate of 5 to 10 teeth for each person. Apparently, DC is a powerful indication of living standards and a worldwide determinant of oral hygiene [1-3]. This disease will induce cavities of the teeth by demineralizing and destroying the teeth. DC can, in extreme situations, make it challenging to consume and also contribute to poor breath. Additionally, an infection can extend to the tooth's soft tissues, which may result in irritation and potentially result in loss of teeth [4-6].

The total of the proportion of decaying (D), missing (M), and filled (F) teeth is used to measure DC (DMFT index). The Decayed, Missing and Filled Teeth (DMFT) index is a worldwide indicator that recent investigations use to evaluate the state of the society's dental and oral hygiene as well as its general health. Additionally, this outstanding score is employed in public research for the assessment and oversight of relevant oral health activities [7-9].

The oral cavity is among the vital parts of the body which thus affects people's health since it works closely with other organs. Eating, talking, personal appearances, and interpersonal connections are just a few of the daily activities that are impacted by oral health. DC may be caused by a variety of behaviors, including inadequate teeth brushing habits, a higher diet of fermentable carbohydrates, and a lack of oral health knowledge. Similarly, various socioeconomic factors and eating patterns can contribute to an increased incidence of DC [10-12].

The incidence of DC differs from nation to nation, however emerging nations tend to have higher incidence rates. This is mostly attributable to social factors, eating practices, and illiteracy, in contrast to demographic situations. Few research on dental health, particularly among children populations, have been conducted in Pakistan to far [13]. Consequently, the purpose of the current study was to examine nutritional practices relating to oral hygiene in connection to the DMFT score among children (2–12 years old) attending Peshawar dental hospital, Peshawar, Pakistan.

## Material and Methods

A total of 376 patients, ages 2 to 12, participated in this cross-sectional research, including 134 boys and 242 girls. They were chosen at random from OPD of Peshawar Dental Hospital in Peshawar during August, 2022 to November, 2022. Each patient who attended the OPD throughout the research period gave written informed consent. With each participant, a face-to-face interview was scheduled in order to gather data employing a survey. The participants responded to a survey that asked them about their food, dental health-related activities, dentist appointment regularity and gender. The frequency and composition of breakfast, lunch, supper, and snacking patterns were evaluated. Throughout a one-year period, eating patterns for breakfast, lunch, dinner and any snacks were surveyed in three distinct categories based on how frequently they were consumed: very usually, occasionally, very rarely, or maybe never. Based on the responses to the questions, oral hygiene-related behaviors were assessed, including teeth brushing practices in addition to the usage of dental floss, toothpicks, mouthwash, and chewing gum.

Two skilled dentists conducted intra - oral exams after the survey had been completed in accordance with the standard protocol followed in the oral diagnostic center. An intra - oral inspection was carried out following the anamnesis and extra-oral evaluation. Following that, the teeth were washed, rinsed, and viewed under department's lighting using regular dental mirror without the need for a magnifying glass. Caries-related extractions, teeth with fillings, and teeth with specific lesions in the dentine were

all considered to be DMFT. The total of the teeth that were damaged, lost, and treated was used to construct the DMFT index.

The SPSS 29.0 for Windows 11 programme was used to do the statistical evaluation of the data. Where appropriate, qualitative comparisons were performed using the Chi-square test. The greatest predictors of aging, gender, plaque, snacking, brushing and the consumption of supplementary oral hygiene agents on the DMFT score were determined using multiple linear regression modeling(MLRM). For each independent variable, the regression coefficient and 95% confidence intervals (CI) were determined. The threshold for reliability was set at p value less than 0.05.

## Results

Nearly two third (70%) of the individuals had routine breakfast, lunch, and supper, as per the data analysis of diet. There wasn't a discernible gender variation in the frequency of main meals (p value greater than 0.05). Among the 290 patients, who made up 77.12%, snacking was prevalent. Snacking intensity didn't differ across genders and varied from 1 to 8 times per week with a mean value of 2.09 (sd1.48) (p: 0.332). Although not at a greater incidence, the majority of respondents (45.74%) routinely cleaned their teeth twice daily with fluoridated toothpaste, and almost half (43.35%) utilized other dental care products in addition to brushing. Alternative hygiene products like toothpicks (13.56%), chewing gum (5.05%), mouthwash (9.84%), and dental floss (23.67%) were not widely used in the sample as a whole. Boys and girls have different oral hygiene standards. Men were more likely to wash their teeth irregularly and using fluoridated toothpaste (p 0.001). In contrast to brushing, girls are more likely than boys to apply additional oral health tools. The overwhelming of both boys and girls (80.31%, P=0.219) attended the dentists seldom and with a complaints (Table 1,2).

The sample's overall mean for the DMFT scale was determined to be 6. The DMFT values obtained of men and women did not differ significantly (P=0.583). The number of patients (43.35%) had considerable plaque buildup that was visible with the naked eyes in the gingival edge, gingival pocket, or tooth. Boys showed a greater amount of plaque buildup than girls (P=0.002). Table 1 and 2 provides information about the sample as a whole as well as information by gender.

Tea was consumed at greater rates than fruit juice and milk. Patients ate sandwiches, toast, and pastries more often than they did cheese, eggs, olives, butter, jam, and other morning staples. The consumption of fast food was less than that of fish, vegetables, poultry, and beef during lunch and supper. Of the drinks eaten at lunch and supper, it was discovered that water received the best ratings. Fruit juice and Soft drink intake was not very prevalent (Table 3).

Eating habits, Plaque level, and brushing frequency all affected the DMFT scale. With increasing plaque formation, the frequency of eating and inconsistent brushing, the DMFT levels rose. Regularly brushing twice, a day led to a noticeably lower DMFT score as contrasted with other brushing schedules (Table 4). Participants who did not consume food had decreased plaque buildup, and there was a substantial difference in the lack of plaque accretion between patients who didn't snack. Patients who regularly ate snacks did not wash their teeth considerably differently from those who did not (Table 5). Both age and gender were discovered to be among the most important variables in relation to the DMFT score, as determined by the MLRM method (Table 6).

**Table 1:** Participant demographics, diet quality, intention to revisit, dental health-related activities, DMFT measures, and plaques levels.

Variables	Patients Numbers (n)	Percentage (%)
<b>Gender</b>		
Boys	134	35.63
Girls	242	64.37
<b>Plaque</b>		
No plaque	36	9.57
Only with probe	123	32.71
Visible medium plaque	163	43.35
High plaque	54	14.37

<b>Brushing</b>		
Rarely	6	1.59
Sometimes	38	10.10
Regularly once	141	37.5
Regularly twice	172	45.74
Regularly more than twice	19	5.07
<b>Other Aids</b>		
Yes	163	43.35
No	213	56.65
Dental floss	89	23.67
Tooth pick	51	13.56
Mouth rinse	37	9.84
Chewing gum	19	5.05
<b>DMFT</b>	6 (0 – 18) <sup>a</sup> [a: median (minimum to maximum)]	
<b>Visit frequency</b>		
Irregular-Only in the presence of complaint	302	80.31
6-months	48	12.77
1 year	26	6.92
Regular Breakfast	262	69.68
Regular Lunch	273	72.60
Regular Dinner	281	74.73
Snacking	290	77.12

**Table 2.** Relationships between sex and diet quality, visiting rate, dental health-related activities, DMFT score, and plaque quantity

Variables	Male (n=134) N%	Female (n=242) N%	P <sup>a</sup>	P <sup>b</sup>
Brushing				
Rarely or Sometimes	32 (23.8)	35 (14.46)	0.005	<0.001
Regularly once	45 (33.67)	70 (28.92)		0.169
Regularly twice	52 (38.8)	121 (50.0)		0.015
Regularly more than twice	5 (3.73)	16 (6.62)		0.162
Visit frequency				
In the presence of complaint	107 (79.85)	201 (83.05)	0.219	
6 months	19 (14.17)	24 (9.91)		
1 year	8 (5.98)	17 (7.04)		
Regular Breakfast	97 (72.38)	168 (69.42)	0.556	
Regular Lunch	101 (75.37)	191 (78.92)	0.187	
Regular Dinner	113 (84.32)	181 (74.79)	0.361	
Snacking	106 (79.10)	192 (79.33)	0.332	
Plaque				
No plaque	7 (5.23)	17 (7.02)	0.029	0.445
Only with probe	41 (30.59)	88 (36.36)		0.322
Visible medium plaque	59 (44.03)	111 (45.86)		0.781
High plaque	27 (20.15)	26 (10.76)		0.002
DMFT	5.7±3.31	5.6±3.14	0.583	
Other Aids				
Yes	43 (32.08)	125 (51.66)	0.018	
No	91 (67.92)	117 (48.34)		
Dental floss	27 (20.14)	48 (19.83)		0.019
Tooth pick	16 (11.94)	29 (11.98)		0.542
Mouth rinse	4 (2.98)	26 (10.74)		<0.001
Chewing gum	6 (4.47)	9 (3.71)		0.676

**Table 3:** The pattern of intake and the nutritional and beverage components of brunch, lunchtime, and supper

	Nutrients and drinks	Nearly Always N%	Occasionally N%	Infrequently or never N%
Brunch	<i>Fruitjuice</i>	58 (15.42)	206 (54.78)	112 (29.78)
	<i>Egg/bread</i>	113 (30.05)	185 (49.2)	78 (20.74)
	<i>Cereals</i>	73 (19.41)	178 (47.34)	125 (33.24)
	<i>Tea</i>	185 (49.20)	126 (33.51)	65 (17.28)
	<i>Milk</i>	55 (14.62)	188 (50.00)	135 (35.90)
	<i>Other(pastry, sandwiches.)</i>	159 (42.28)	152 (40.42)	65 (17.28)
Lunch	<i>Desert</i>	29 (7.71)	190 (50.53)	157 (41.75)
	<i>Fish/meat</i>	89 (23.67)	219 (58.24)	68 (18.08)
	<i>Vegetables</i>	114 (30.31)	243 (64.62)	19 (5.05)
Dinner	<i>Fast food</i>	15 (3.93)	172 (45.74)	219 (58.24)
	<i>Desert</i>	29 (7.71)	259 (68.88)	117 (31.11)
	<i>Vegetables/Fruits</i>	274 (72.87)	81 (21.54)	19 (5.05)
	<i>Fish/meat</i>	109 (28.98)	226 (60.10)	41 (10.90)
Drinks	<i>Tea/ Coffee</i>	67 (17.81)	119 (31.64)	190 (50.53)
	<i>Soft Drinks</i>	31 (8.24)	176 (46.80)	169 (44.94)
	<i>Fruit juice</i>	23 (6.11)	215 (57.18)	138 (36.7)
	<i>Water</i>	287 (76.32)	62 (16.48)	27 (7.18)

**Table 4:** Plaque, eating patterns, brushing patterns, usage of additional dental products, and sex all have an impact on the DMFT score

Variables	DMFT	P	
<b>Brushing</b>			
<i>Rarely</i>	10.8±4.91	<0.001	a: The distinction among the group with no plaques was statistically meaningful (p<0.01).
<i>Sometimes</i>	7.3±3.89		b: Statistics showed that the distinction among the only sample with a probe was different (p<0.01).
<i>Regularlyonce</i>	5.8±2.64 <sup>e</sup>		c: Statistics demonstrated that the distinction among the apparent medium plaque sample was substantial (p<0.001).
<i>Regularlytwice</i>	5.1±3.12 <sup>d,e,f</sup>		
<i>Regularlymorethantwice</i>	5.2±3.39 <sup>e</sup>		d: Statistics revealed that the disparity between the seldom group was substantial (p<0.005).
<b>Otheraids</b>			e: Statistics indicated that the distinction between the occasionally groups was considerable (p<0.05).
<i>Yes</i>	5.1±3.09	<0.001	f: There was a statistically significant discrepancy among the group that participated frequently (p<0.05).
<i>No</i>	6.3±3.29		
<b>Snack/Sweet</b>			
<i>Yes</i>	5.8±3.19	0.021	
<i>No</i>	5.1±3.48		
<b>Plaque</b>			
<i>Noplaque</i>	2.2±1.39	<0.001	
<i>Onlywithprobe</i>	4.7±2.34 <sup>a</sup>		
<i>Visiblemediumplaque</i>	6.1±2.64 <sup>a,b</sup>		
<i>Highplaque</i>	9.1±4.11 <sup>a,b,c</sup>		
<b>Gender</b>			
<i>Female</i>	5.6±3.14	0.589	
<i>Male</i>	5.7±3.31		

**Table 5.** The quantity of brushing behavior and plaque among participants who engage in snacking (yes/no)

Variables	Yes(n=253) N%	No(n=123) N%	pa	pb
<b>Brushing</b>				
<i>Rarely</i>	2 (0.79)	7 (5.69)	0.097	
<i>Sometimes</i>	52 (20.57)	19 (15.44)		
<i>Regularlyonce</i>	73 (28.85)	39 (31.73)		
<i>Regularlytwice</i>	113 (44.66)	49 (39.83)		
<i>Regularlymorethantwice</i>	13 (5.13)	9 (7.31)		
<b>Plaque</b>				
<i>Noplaque</i>	6 (2.37)	17 (13.84)	<0.001	<0.001
<i>Onlywithprobe</i>	88 (34.79)	38 (30.89)		0.213
<i>Visiblemediumplaque</i>	125 (49.41)	49 (39.83)		0.272
<i>Highplaque</i>	34 (13.43)	19 (15.44)		0.696

**Table 6:** factors identified by MLRM as having an impact on the DMFT score.

IndependentVariables	b1 (Unstandardized coefficients)	Standard deviationFault	b2 (Standardized coefficients)	P	95 Percent Confidence Interval forb	
					InferiorBound	Superior Bound
<b>Constant</b>	0.679	0.262	-	0.012	0.137	1.251
<b>Gender</b>	-0.119	0.057	-0.08	0.036	-0.229	-0.004
<b>Age</b>	0.017	0.005	0.119	0.013	0.002	0.021
<b>Snack/sweet(yes)</b>	0.089	0.063	0.068	0.194	-0.035	0.234
<b>High plaque</b>	1.318	0.147	0.704	<0.002	1.016	1.631
<b>Medium plaque</b>	0.914	0.118	0.686	<0.003	0.654	1.159
<b>Only with probe</b>	0.667	0.116	0.471	<0.002	0.431	0.914
<b>Rarely brushing</b>	0.265	0.359	0.029	0.443	-0.423	0.988
<b>Sometimes brushing</b>	0.019	0.139	0.004	0.926	-0.276	0.312
<b>Regularly once</b>	0.059	0.125	0.039	0.613	-0.182	0.332
<b>Regularly twice</b>	-0.017	0.115	-0.029	0.874	-0.256	0.246
<b>Other aids</b>	0.006	0.076	0.003	0.921	-0.132	0.153

## Discussion

For dental practitioners to establish a person's diet-related caries risk behaviors, they must first get a record of their eating habits, diet, consumption of carbohydrates, and frequency of brushing [14]. Gender and age affect dietary practices, activities linked to oral hygiene, and the DMFT scale. There are many researches assessing these behaviors among children from various demographics, yet there are few reports describing these behaviors among children. Consequently, the present study analyzed the dietary habits, dental health-related behaviors, DMFT scores, and any potential correlations among them.

About one-third of the participants had inconsistent breakfast, lunch, and supper, and there weren't gender differences in the frequency of primary meal options per survey, which also asked about eating patterns. The incidence of snacking was discovered to be quite high as well, with no discernible gender difference. Findings highlight how crucial it is to preserve the frequency of primary meals. Bruno *et al.*, (2005), revealed a link between skipping meals and a higher risk of developing cavities. It might be claimed that skipping meals could promote the intake of light meals and sugary snacks throughout the day and raise the prevalence of tooth decay. Therefore, maintaining snacking frequency at a modest level certainly requires a suitable and good diet [15-17]. In the latest research, we did not examine specifics like the quantity of daily calcium, sugar, phosphate, etc. intake; instead, we just categorized the items under general categories. It may be possible to do more study to look at the precise ingredients and serving sizes of food and beverages in order to evaluate their nutritional value and their exposure to calcium, sugar, phosphate, and fluoride.

The prevention of dental caries depends heavily on the decrease of plaque buildup. In the current investigation, plaque buildup was discovered to be the element that significantly affected the DMFT score. For the eradication of tooth plaque, twice-daily brushing and regular flossing are advised since they are simple, efficient, and affordable dental soul practices [18]. The usage of dental floss was lesser than tooth brushing, and a sizable number of the patients would not have brushed their teeth with fluoride toothpaste on a regular basis. Most research indicated that twice-daily teeth brushing had a greater incidence of usage than dental floss [19-21]. Our findings concur with these findings. The results of the current research suggested that in addition to the recommended twice-daily brushing with fluoride toothpaste, dental floss consumption should be promoted.

Gender differences in dental hygiene-related habits may exist. According to reports, girls floss and brush more frequently than boys do [22]. According to the current study, female was more likely to brush their teeth twice per day, which is consistent with other studies. Since inconsistent brushing and the consumption of other oral hygiene products varied between genders, the preventative focus should be different for each gender. The vast majority of people only went to the dentist when they had a problem; appointments for routine preventative checkups were extremely rare. Both boys and girls had comparable tendencies for how frequently they visited the dentist. Patients should be exhilarated to attend the dentist often for checkups as well as for compliance.

The mean and median of the DMFT index, which ranged from 0 to 18, was 6, meaning that on average, respondents had 6 teeth that were missing, filled, or removed. According to the World Health Organization (WHO), children's optimal oral health status in respect of the DMFT score is 4 at age 6 and 7 at age 12 [23]. The current report's mean DMFT value is close to the recommended values for children. The DMFT index was influenced by plaque buildup, ageing, eating habits, and brushing and flossing practices. Plaque presence was linked to a boost in the DMFT scale, demonstrating the significance of effective plaque reduction in preventing tooth decay.

Individuals with a tendency of snacking displayed greater DMFT indices than patients without such a tendency. While some research were unable to duplicate these findings or only discovered modest links between having been exposed to sugared foods and tooth decay, others have shown substantial connections [24-26]. The reality that dental health-related behaviors of participants with snacking habits did not change noticeably from those of patients without such a habit may be one explanation for the increased DMFT levels for these individuals. These patients must be educated about the relationship among snacking and the elimination of plaque and dental health-related behaviors with regard to caries, and they should be urged to cut back on their snacking frequency and improve their dental health-related activities. Oral health was discovered to be the primary variable associated with the score, and some earlier research revealed that DMFT scores did not change substantially even a larger consumption of sugar and an increasing prevalence of snacks [27,28].

## Conclusion

According to the report's findings, nearly one-third of the participants did not follow a regular routine for their major meals, and snacking was widespread. Additionally, around fifty percent of the patients did not adequately practice oral hygiene habits, and the most of them had obvious tooth plaque. Snacking patterns among participants did not significantly influence oral health-related activities. Snacking, plaque buildup, incorrect daily meals patterns, plaque quantity, and dental health-related activities were discovered to be associated to the DMFT score. Therefore, to achieve optimal plaque control, dental health awareness for children should focus on the frequency of major meals, the reduction of snacking, and the inclusion of advice for good oral health-related activities.

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