



## Original article

### Dietary habits of school going children in West Bengal – A cross sectional study

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#### ABSTRACT

**Objective:** Dietary habits play a lion role for maintenance of good oral health and development of dental caries. This study was done to survey dietary habits of school going children of 6-16 year old residing in West Bengal. **Materials and Methods:** A total of 1000 children of 6-16 years age group, in standard one to senior secondary classes were examined over a 2 months period (camp frequency 1-2 times/wk) using World Health Organization criteria (1997) to record the prevalence of dental caries along with their history of dietary habits. The treatment needs were also calculated according to that given criteria. **Results:** Test of proportion showed that higher proportion of students taken chocolate, candy, biscuits, puffed rice was statistically significant ( $p < 0.0001$ ) which are the high risk factor for caries. Distribution of cheese, which is low risk factor for caries, was statistically significant ( $p < 0.0001$ ). Distribution of cold drinks which is the high risk factor for caries was statistically significant ( $p < 0.0001$ ). **Conclusion:** In this study children take their snacks like plain milk, chocolate, candy etc. much more than cheese, tea and milk etc. as it is statistically significant. They also take their snacks more while watching T.V than just before sleeping. This habit is deleterious to oral structures including teeth. Child oral health is always a matter of concern for a developing country so further research is required to explore actual cause.

**KEYWORDS:** Dietary habits, school going children

#### INTRODUCTION

Healthy habits, such as dietary habits, exercising, avoiding harmful substances etc that benefits our physical, mental, and emotional health. These habits improve our overall well-being and make us feel good. Healthy dietary habits help prevent certain health conditions and diseases, such as heart disease, stroke, high blood pressure, blood sugar, gastro-intestinal diseases, dental caries etc. Dental caries is a major health problem with high prevalence, globally involving the people of all regions and society. The prevalence of these diseases is continuously increasing with change in dietary habit of peoples and increased consumption of sugar and its related products. This disease not only causes damage to the tooth, but is also responsible for several morbid conditions of the oral cavity and other systems of the body. [1]

Among oral diseases, the dental caries is an important dental public problem in India and is predominantly a disease of childhood. Pain due to dental caries can affect normal food intake and daily curriculum and sports activities in the children. [2] Various environmental factors affect dental caries prevalence, among them diet, especially sucrose rich diet takes a lion role. [3] Diet plays an important role in the nutritional status and henceforth the development of an individual. When diet and oral health is considered, Moynihan states that, "Good diet is essential for the development and maintenance of healthy teeth, but healthy teeth are important in enabling the consumption of a varied and health diet throughout life cycle," thus emphasizing the two-way relationship between diet and oral health. Dental caries is a multifactorial disease with diet being one of the contributing factors is well documented by numerous studies.

Children and adolescents form the backbone of future generation and many serious diseases in adulthood have their roots in adolescence, for example, dietary habits and tobacco usage. Unhealthy lifestyle factors like skipping meals and food choice leading to a poorer nutrient intake are common among this vulnerable adolescent group. Children and adolescents are giving preferences for sweetened foods, and soft drinks that are rich in carbohydrate and thus are at risk for caries development. With the known culture difference, where an Indian diet is different from a western diet and with not many studies addressing this issue there arises the need to explore this concept of diet, and in recent decades with the western culture influences in the urban sector especially in relation to diet, there goes the need to study the Indian urban scenario. [4]

The factor of diet in relation to caries has been studied most exhaustively like sucrose, cocoa, chocolate, candy, biscuits, juices, cakes, different preparation of milk etc. and their time of consumption. [5] The prevalence rates and experience of dental caries are tending to increase in developing countries with a decline in caries in most industrialized countries. The distribution and severity of dental caries vary in different parts of the world and within the same region or country. Dental caries experience in children is relatively high in the Americas (DMFT = 3.0) and in the European Region (DMFT = 2.6) whereas the index is lower in most African countries (DMFT = 1.7). In most developing countries, the levels of dental caries were low until recent years but prevalence rates of dental caries and dental caries experience are now tending to increase. [7]

The scenario in India is no different from other developing countries. Available literature about the prevalence of dental caries in India shows a varied picture, i.e., caries being very high in some areas and low in other areas. Oral health surveys help to detect the population's oral health status providing baseline information. [1] According to National Oral Health Survey, 2002-2003, caries prevalence in India was 51.9% (mean DMFT=2), 53.8% (mean DMFT=1.8) and 63.1% (mean DMFT=2.4) at ages 5, 12 and 15 years. In India where the birth rate is still high and there is less spacing between two birth, mothers often are not capable of giving proper care to all the children which leads to unhealthy oral hygiene practice ultimately incidence of dental caries. [8] More than 40% of Indian children are found to be afflicted with dental caries. A large number of those children are residing in the West Bengal. In 1939 Sarkar examined 18,445 school children up to 16 years of age in West Bengal. He reported that 13.3% children had defective teeth. Furthermore in 1931 he examined 2,000 children and found 14.4% had defective teeth. [9]

Thus, this study was undertaken in the West Bengal with the objective to identify dietary habits (type of diet like different snacking with different timing) in school going children.

## MATERIALS AND METHODS

The source of data was primary. The data were collected using the following instruments: the state of West Bengal has been divided into 5 zones: East, West, Central, North and South. About 1000 children with equal gender

distribution from schools in the age group of 6 to 16 years studying in standard one to senior secondary classes were examined over a 2 months period (camp frequency 1-2 times/wk). The project was cleared by the IEC.

WHO Oral Health Assessment Form (1997) was used to assess the dentition status and treatment needs. Subjects were seated comfortably on an ordinary chair. Examination was done under natural daylight using plain mouth mirror and CPITN "C" probe. The dentition status was assessed using dentition status and treatment needs. The first instrument, a semi closed ended questionnaire which was distributed among the volunteer students one day before examination and asked to fill with the help of their parents. This form addressed data on dietary habits (i.e. frequency, time, type of food, snacking habits etc.).

For statistical analysis data were entered into a Microsoft excel spreadsheet and then analyzed by SPSS 20.0.1 and GraphPad Prism version 5. Unpaired proportions were compared by Chi-square test or Fischer's exact test, as appropriate. Z-test (Standard Normal Deviate) was used to test the significant difference between two proportions.

## RESULTS

957(25.6%) students were age group of 4-6 years, 952 (25.4%) students were age group of 7-9 years, 962(25.7%) students were age group of 10-12 years and 871(23.3%) students were age group of 13-15 years in this study. 1837 (49.1%) students were female and 1905 (50.9%) students were male in this study.

### Distribution of types of Snacking among study subjects:

3314(88.6%) students consumed chocolate, 1595(42.6%) students consumed candy, 2847(76.1%) students consumed biscuits, 2248(60.1%) students consumed puffed rice, 604(16.2%) students consumed cheese, 2953 (78.9%) students consumed soft drinks, 2579 (68.9%) students consumed fruits, 2831(75.7%) students consumed bread, 2614(69.9%) students consumed cake and 1203(32.1%) students consumed juices. Test of proportion showed that higher proportion of students consumed chocolate and this was statistically significant ( $p < 0.0001$ ). Proportion of students consumed candy was statistically significant ( $p < 0.0001$ ). Proportion of students consumed biscuits was statistically significant ( $p < 0.0001$ ). Distribution of students consumed puffed rice was statistically significant ( $p < 0.0001$ ). Distribution of students consumed cheese was statistically significant ( $p < 0.0001$ ). Distribution of students consumed soft drinks was statistically significant ( $p < 0.0001$ ).

### Distribution of time of snacking among study subjects:

1014(27.1%) students consumed snacks before going to bed, 2536 (67.8%) students consumed snacks while watching TV, 864 (23.1%) students consumed snacks while studying and 167 (4.5%) students consumed snacks just before sleeping. (Table-1)

**Table: 1**Distribution of time of snacking among study subjects

Time of snacking	Group	Number	Percentage	Z-value	p-value
Before going to bed	no	2728	72.9%	39.6254	<0.0001*
	yes	1014	27.1%		
While watching TV	no	1206	32.2%	30.7478	<0.0001*
	yes	2536	67.8%		
While studying	no	2878	76.9%	46.561	<0.0001*
	yes	864	23.1%		
Just before sleeping	no	3575	95.5%	78.7885	<0.0001*
	yes	167	4.5%		

**Distribution of taking on milk or tea among study subjects:**

1570(42.0%) students consumed plain milk, 739 (19.7%) students consumed chocolate milk, 1445(38.6%) students consumed milk with sugar, 907(24.2%) students consumed tea with milk, and 437 (11.7%) students consumed black tea and 613 (16.4%) students consumed tea with sugar.

**Association between types of snacking and age among study subjects:**

Association between intake of chocolate and age was statistically significant (p=0.0031). Relationship between intake of candy and age was statistically significant (p<0.0001). Relationship between intake of biscuits and age was statistically significant (p<0.0001). Association between intake of puffed rice and age was statistically significant (p<0.0001). Association between intake of cheese and age was statistically significant (p=0.0015). **(Table-2)**

**Table-2: Association between types of snacking and age among study subjects**

Snacking	Age in Years	4-6	7-9	10-12	13-15	Chi-square value	p-value
		Number %	Number %	Number %	Number %		
Soft drinks	No	358	190	122	119	223.6439	<0.0001*
	Row %	45.4	24.1	15.5	15.1		
	Col %	37.4	20.0	12.7	13.7		
	Yes	599	762	840	752		
	Row %	20.3	25.8	28.4	25.5		
	Col %	62.6	80.0	87.3	86.3		
Fruits	No	556	263	142	202	476.3460	<0.0001*
	Row %	47.8	22.6	12.2	17.4		
	Col %	58.1	27.6	14.8	23.2		
	Yes	401	689	820	669		
	Row %	15.5	26.7	31.8	25.9		
	Col %	41.9	72.4	85.2	76.8		
Bread	No	428	171	131	181	302.9410	<0.0001*
	Row %	47.0	18.8	14.4	19.9		
	Col %	44.7	18.0	13.6	20.8		
	Yes	529	781	831	690		
	Row %	18.7	27.6	29.4	24.4		
	Col %	55.3	82.0	86.4	79.2		
Cake	No	593	217	177	141	628.1690	<0.0001*
	Row %	52.6	19.2	15.7	12.5		
	Col %	62.0	22.8	18.4	16.2		
	Yes	364	735	785	730		
	Row %	13.9	28.1	30.0	27.9		
	Col %	38.0	77.2	81.6	83.8		
Juices	No	775	665	625	474	153.0894	<0.0001*
	Row %	30.5	26.2	24.6	18.7		
	Col %	81.0	69.9	65.0	54.4		
	Yes	182	287	337	397		
	Row %	15.1	23.9	28.0	33.0		
	Col %	19.0	30.1	35.0	45.6		

**Association between types of snacking and age among study subjects:**

Association between intake of soft drinks and age was statistically significant ( $p < 0.0001$ ). Relationship between intake of fruits and age was statistically significant

( $p < 0.0001$ ). Association between intake of bread and age was statistically significant ( $p < 0.0001$ ). Association between intake of cake and age was statistically significant ( $p < 0.0001$ ). Relationship between intake of juices and age was statistically significant ( $p < 0.0001$ ). (**Table-3**)

**Table: 3 Association between milk/tea and age among study subjects**

Milk/tea	Age in Years	4-6	7-9	10-12	13-15	Chi-square value	p-value
		Number %	Number %	Number %	Number %		
Plain milk	No	372	594	620	586	198.5593	<0.0001*
	Row %	17.1	27.3	28.5	27.0		
	Col %	38.9	62.4	64.4	67.3		
	Yes	585	358	342	285		
	Row %	37.3	22.8	21.8	18.2		
	Col %	61.1	37.6	35.6	32.7		
Chocolate milk	No	913	767	744	579	248.1179	<0.0001*
	Row %	30.4	25.5	24.8	19.3		
	Col %	95.4	80.6	77.3	66.5		
	Yes	44	185	218	292		
	Row %	6.0	25.0	29.5	39.5		
	Col %	4.6	19.4	22.7	33.5		
Milk with sugar	No	601	632	556	508	19.5258	0.0002*
	Row %	26.2	27.5	24.2	22.1		
	Col %	62.8	66.4	57.8	58.3		
	Yes	356	320	406	363		
	Row %	24.6	22.1	28.1	25.1		
	Col %	37.2	33.6	42.2	41.7		
Tea with milk	No	883	738	698	516	278.4024	<0.0001*
	Row %	31.1	26.0	24.6	18.2		
	Col %	92.3	77.5	72.6	59.2		
	Yes	74	214	264	355		
	Row %	8.2	23.6	29.1	39.1		
	Col %	7.7	22.5	27.4	40.8		
Black tea	No	937	815	838	715	126.2603	<0.0001*
	Row %	28.4	24.7	25.4	21.6		
	Col %	97.9	85.6	87.1	82.1		
	Yes	20	137	124	156		
	Row %	4.6	31.4	28.4	35.7		
	Col %	2.1	14.4	12.9	17.9		
Tea with sugar	No	897	763	797	672	106.8114	<0.0001*
	Row %	28.7	24.4	25.5	21.5		
	Col %	93.7	80.1	82.8	77.2		
	Yes	60	189	165	199		
	Row %	9.8	30.8	26.9	32.5		
	Col %	6.3	19.9	17.2	22.8		

**Association between time of snacking and age among study subjects:**

Association between snacks intake before going to bed and age was statistically significant ( $p < 0.0001$ ). Relationship between snacks intake while watching TV and age was statistically significant ( $p < 0.0001$ ). Association between snacks intake while studying and age was statistically significant ( $p < 0.0001$ ). Association between snacks intake while sleeping and age was statistically significant ( $p < 0.0001$ ).

**Association between milk/tea and age among study subjects:**

Association between intake plain milk and age was statistically significant ( $p < 0.0001$ ). Relationship between intake chocolate milk and age was statistically significant ( $p < 0.0001$ ). Association between intake milk with sugar and age was statistically significant ( $p = 0.0002$ ). Association between tea with milk and age was statistically significant ( $p < 0.0001$ ). Association between intake black tea and age was statistically significant ( $p < 0.0001$ ). Association between intake tea with sugar and age was statistically significant ( $p < 0.0001$ ). (**Table-4**)

**Table: 4 Association between types of snacking and sex among study subjects**

Snacking	Gender	Female	Male	Chi-square value	p-value
		Number %	Number %		
Chocolate	No	225	203	2.3401	0.1260
	Row %	52.6	47.4		
	Col %	12.2	10.7		
	Yes	1612	1702		
	Row %	48.6	51.4		
	Col %	87.8	89.3		
Candy	No	1163	984	51.9552	<0.0001*
	Row %	54.2	45.8		
	Col %	63.3	51.7		
	Yes	674	921		
	Row %	42.3	57.7		
	Col %	36.7	48.3		
Biscuits	No	726	169	482.7765	<0.0001*
	Row %	81.1	18.9		
	Col %	39.5	8.9		
	Yes	1111	1736		
	Row %	39.0	61.0		
	Col %	60.5	91.1		
Puffed rice	No	682	812	11.7901	0.0005*
	Row %	45.6	54.4		
	Col %	37.1	42.6		
	Yes	1155	1093		
	Row %	51.4	48.6		
	Col %	62.9	57.4		
Cheese	No	1526	1609	1.2490	0.2637
	Row %	48.7	51.3		
	Col %	83.2	84.5		
	Yes	309	295		
	Row %	51.2	48.8		
	Col %	16.8	15.5		

**Association between types of snacking and sex among study subjects:**

Association between intake of chocolate and sex was not statistically significant (p=0.1260). Relationship between intake of candy and sex was statistically significant (p<0.0001). Relationship between intake of biscuits and sex was statistically significant (p<0.0001). Association between intake of puffed rice and sex was statistically significant (p=0.0005). Association between intake of cheese and sex was not statistically significant (p=0.2637).

**Association between types of snacking and sex among study subjects:**

Association between intake of soft drinks and sex was not statistically significant (p=0.1345). Relationship between intake of fruits and sex was statistically significant (p<0.0001). Association between intake of bread and sex was statistically significant (p=0.0024). Association between intake of cake and sex was statistically significant (p<0.0001). Relationship between intake of juices and sex was not statistically significant (p=0.4179). (Table-5)

**Association between time of snacking and sex among study subjects :**

Association between snacks intake before going to bed and sex was statistically significant (p=0.0084). Relationship between snacks intake while watching TV and sex was statistically significant (p=0.0051). Association between snacks intake while studying and sex was not statistically significant (p=0.1179). Association between snacks intake just before sleeping and sex was not statistically significant (p=0.5282).

**Association between time of snacking and sex among study subjects :**

Association between intake plain milk and sex was not statistically significant (p=0.70393). Relationship between intake chocolate milk and sex was not statistically significant (p=0.13461). Association between intake milk with sugar and sex was statistically significant (p<0.0001). Association between intake tea with milk and sex was statistically significant (p=0.0035). Association between intake black tea and sex was not statistically significant (p=0.5061). Association between intake tea with sugar and sex was not statistically significant (p=0.0782).

**Table:5 Association between time of snacking and sex among study subjects**

Time of snacking	Gender	Female	Male	Chi-square value	p-value
		Number %	Number %		
Before going to bed	No	1375	1353	6.9322	0.0084*
	Row %	50.4	49.6		
	Col %	74.9	71.0		
	Yes	462	552		
	Row %	45.6	54.4		
	Col %	25.1	29.0		
While watching tv	No	632	574	7.8165	0.0051*
	Row %	52.4	47.6		
	Col %	34.4	30.1		
	Yes	1205	1331		
	Row %	47.5	52.5		
	Col %	65.6	69.9		
While studying	No	1433	1445	2.4448	0.1179
	Row %	49.8	50.2		
	Col %	78.0	75.9		
	Yes	404	460		
	Row %	46.8	53.2		
	Col %	22.0	24.1		
Just before sleeping	No	1759	1816	0.3978	0.5282
	Row %	49.2	50.8		
	Col %	95.8	95.3		
	Yes	78	89		
	Row %	46.7	53.3		
	Col %	4.2	4.7		

**DISCUSSION**

There are various biological factors and social factors that affect caries process in oral cavity. In the recent decades, the most frequent risk factor of dental caries is dietary habits. Bagramian and Russell had reported no significant relationship between the consumption of sucrose containing between-meal snacks and caries experience. [10] But in this decade with snacking in between meals predominantly containing unhealthy junk food with high carbohydrate content, studies have found a positive correlation between snacking in between meals and caries occurrence. For example, Marshall et al. in his study on the role of meal, snack and daily total food and beverage exposures on caries experience in young children found that higher exposure to sugar at snacks increased caries risk. [11]

In our study relationship between intake of candy, biscuits, puffed rice and sex was statistically significant ( $p < 0.0001$ ) but association between intake of cheese and sex was not statistically significant ( $p = 0.2637$ ) and also association between intake of chocolate and sex was not statistically significant ( $p = 0.1260$ ). Children consuming cheese showed less occurrence of caries. Cheese mainly contains fats and proteins. Fats may possibly decrease caries activity by altering surface properties of the enamel, by having a direct toxic effect on oral microbes, through interference with sugar solubilization, or simply by the replacement of dietary carbohydrates. Proteins may function to reduce caries posteruptively direct effect on plaque metabolism, replacement of dietary carbohydrate, or by increasing saliva secretion, which enhances oral cleaning time. [12]

In this present study has made an observation that children who were in the habit of snacking in between meals had higher DMFT values. This finding would serve as an important input to oral health education content on advising or educating the children about avoiding in-between unhealthy snacking behaviour. Most children tend to eat unhealthy snacks in-between meals that are usually high in carbohydrate. American Dental Association has recommended that children and adults must limit eating and drinking between meals and when they must snack, give preference to nutritious foods identified by the US Department of Agriculture Dietary Guidelines. [13]

**CONCLUSION**

According to our study children in west Bengal consume plain milk, chocolate, candy etc. much more frequently than cheese, tea and milk etc. which are more cariogenic diet and it was also noticed that frequency of intake of cariogenic diet increased during watching T.V. than just before sleeping. The incidence of caries and its associated pain with loss of work, can be reduced by the personal alteration of dietary habits, hence it is a self controlling factor. When food habits are considered, parents should advise the children on the ill effects of frequent consumption of different snacks on their dental health. Teachers in school also can contribute in educating the children on this. Health education on healthy eating habits can bring about behaviour changes among these school going children that they would take forward into their adult life.

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