ASSESSMENT OF DENTAL CARIES PREVALENCE AMONG BANGLADESHI SCHOOL CHILDREN

Mohammed Kamal Uddin[1*] A B M Farid Uddin[3] Sadia Ahmed[4] Manjur-E-Mahmud[4]

Abstract

Background: Dental caries or tooth decay is one of the most important health problems in human life. In addition, tooth decay is an infectious disease that affects all population Worldwide. The purpose of this study was to determine the Decayed, Missing and Filled Teeth (DMFT) index among a representative sample of 11-16 years old school children in Rangamati district, Bangladesh. **Materials and methods:** This descriptive and cross-sectional study was performed from 1st October to 30th November, 2016 on 146 children 11-16 years old students who were conveniently selected from a high school in Kaptai Upazila, Rangamati District to assess the DMFT index. The DMFT index was determined using the standard method suggested by World Health Organization (WHO) and data were analyzed using SPSS software (Version 18.0) and presented as mean ± Standard Deviation (SD). **Results:** The prevalence of dental caries in permanent dentition was 57.53% and the highest 64.71% in 13 age group in comparison to the other ages (11, 12, 14, 15, and 16) (55.56%, 52.63%, 64.29%, 54.55% and 25.00%) respectively. The mean DMFT for the sample was 1.92 ± 2.36, while the mean DMFT for different age groups (11-16) were 1.67±2.06, 1.68±2.23, 2.45±2.66, 2.29±2.25, 1.09±1.38 and 0.25±0.50 respectively. The prevalence of dental caries was higher in female with DMFT 2.32±2.57 than in males with DMFT 1.60±2.14. **Conclusion:** According to the results of this study, the mean DMFT scores in 11-16 years old students are lower than the global standards suggested by WHO.

Key words

Dental caries; Decayed; Missing and Filled Teeth; Drinking Water; Fluoride.

Introduction

The public health and subsequently the health of the public have a great impact on development, capacities and abilities of the community[1]. In addition, collecting epidemiological data concerning dental health and morbidity is of primary importance, as has been recommended and stressed by the World Health Organization (WHO)[2,3]. In fact, dental caries is a major oral health problem among children in both developed and developing countries and among the most significant dental problems, it is extensively believed that tooth decay is rising quickly, particularly in developing countries and enforces a heavy cost on the public. Nonetheless, during the past decades the common agreement from various reports worldwide was that dental caries had declined considerably and were continuing to decline in populations. The dental community has prided itself on efforts that have reduced dental caries including the use of systemic and topical fluorides, toothpaste, sealants, progresses in diet, oral health education and dental care[4,5]. However, some studies that have been reported recently revealed alarming increases in caries.

Dental health indexes are not only indicators of health status, but also can be features of the socio-economic condition. One of these indexes is Decayed, Missing and Filled Teeth (DMFT) which is used as oral health evaluation criteria in most researches. The DMFT index has been widely utilized in epidemiological surveys of oral health. WHO recommended assessing and comparing the experience of dental caries in various populations. DMFT expresses the mean number of DMFT in a group of individuals[1,6].

1. Assistant Professor of Dentistry
    Chattogram Medical College, Chattogram.

2. Assistant Professor of Prosthodontics
    Chattogram Medical College, Chattogram.

3. Dental Surgeon
    DKRC Smile Design & Orthodontics, Chattogram.

4. Junior Consultant of Oral and Maxillofacial Surgery
    Chattogram Medical College Hospital, Chattogram.

*Correspondence: Dr. Mohammed Kamal Uddin
            E-mail: dkuddin@hotmail.com
            Cell: 01817710716

According to the WHO, about 60-90% of school children worldwide have dental caries. The global target specified in the year of 2000 was to ensure that 50% of children worldwide aged 5-6 years would be caries-free and that the average DMFT in permanent dentition index would be reduced to lower than 3.0 at 12 years of age. By 2011, the global average DMFT index for school children at 12 years of age was equal 1.67 and 78% of countries have a DMFT index less than 3.0[7].

In accord with the United States Surgeon General's report, dental caries problem is declared to be the most frequent chronic childhood disease of children aged 5-17 years and is 5 times more common than asthma and 7 times more common than hay fever. The extent and acuteness of dental caries in primary and permanent teeth continue to be a serious problem and should receive unique attention[8]. In addition, a WHO assessment of global DMFT for 12 years old children reported that in the 188 countries involved in their database, that on a global basis, 200, 335, 280 teeth were decayed, filled or missing among just that age group[9].

Many parameters including oral hygiene habits, nutrition, cultural, social, economical, racial habits of the target populations and low concentration of fluoride in drinking water can have an effect on DMFT index[10].

Measuring dental caries prevalence among Bangladeshi adolescents in Rangamati (One of three Hill Tract districts) area is extremely important to establish a baseline data which is essential for oral health planners to apply intervention programs in schools.

The aim of this paper was to measure the distribution of dental caries among 11–16 years old adolescents of South-East part of Bangladesh.

Materials and methods
This study was carried out from 1st October 2016 to 30th November, 2016 on 146 individuals of both sexes (65 were Girsl and 81 were Boys); their ages ranged from 11 to 16 years. This sample was conveniently selected from a high school in Kaptai Upazilla, Rangamati District (South East of Bangladesh). The sample involved in this study was divided into 6 groups depending on age to be expressive about dental caries status in different age groups in adolescence.

Age of 12 years has been universally accepted as global monitoring age for caries since all permanent teeth except third molars would most likely have erupted by this age. By the age of 15, the dietary habits of the individuals are more or less established and the permanent teeth have been exposed to the oral environment for 3–9 years, thus making the assessment of caries prevalence even more meaningful at this age.

The fieldwork took place in mid-October, 2016 to allow for a higher student attendance. A legal permit and written statement was obtained from the school authority. Adolescents were examined in their respective schools seated in ordinary chair under adequate daylight and facing away from direct sunlight with the help of plain mirrors and standardized dental probes. World Health Organization (WHO) index was used to measure the prevalence of caries activity (2013).

Statistical assessment was carried out manually and using SPSS program version 20 to do descriptive statistics like mean, standard deviation and proportion to describe caries prevalence. Chi-squared test was used to see the association between variables at 95% significant level.

Results

Table I : DMFT prevalence among 11-16 years old students according to gender status (n=146)

Sex	D	M	F	DMF index
Boy	1.42 ± 2.10	0.10 ± 0.44	0.07 ± 0.40	1.60 ± 2.14
Girls	2.25 ± 2.46	0.02 ± 0.13	0.06 ± 0.39	2.32 ± 2.57
Total	1.79 ± 2.30	0.06 ± 0.68	0.08 ± 0.39	1.92 ± 2.36

DMF: Decayed, Missing and Filled; χ^2=8.42, (p<0.05)

Table II : DMFT prevalence among 11-16 years old students according to age (n=146)

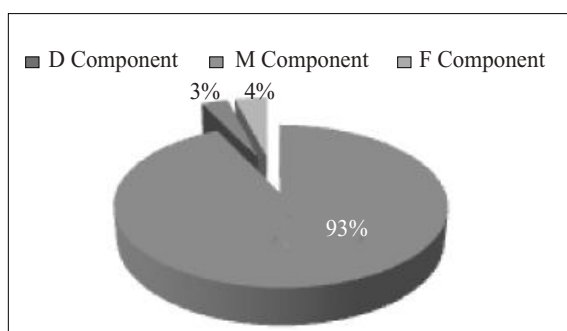| Age	D	M	F	Total
11	1.33 ± 1.87	0.33 ± 0.71	0.00	1.67 ± 2.06
12	1.54 ± 2.20	0.07 ± 0.42	0.07 ± 0.37	1.68 ± 2.23
13	2.31 ± 2.55	0.02 ± 0.14	0.12 ± 0.52	2.45 ± 2.66
14	2.21 ± 2.55	0.07 ± 0.27	0.00	2.29 ± 2.25
15	1.00 ± 1.41	0.00	0.09 ± 0.30	1.09 ± 1.38
16	0.25 ± 0.50	0.00	0.00	0.25 ± 0.50
Total	1.79 ± 2.30	0.06 ± 0.68	0.08 ± 0.39	1.92 ± 2.36

Fig 1: Percent of decayed, missing and filled indexes among total of studied population

Table III : Prevalence and severity of dental caries mean DMFT in different age groups (11–16 years old) (n=146)

Age	Total number	Affected number	Caries prevalence	DMFT (Mean±SD)
11	09	05	55.55%	1.67±2.06
12	57	30	52.63%	1.68±2.23
13	51	33	64.71%	2.45±2.66
14	14	09	64.29%	2.29±2.25
15	11	06	54.55%	1.09±1.38
16	04	01	25.00%	0.25±0.50
Total	146	84	57.53%	1.92±2.36

Table IV : Prevalence and severity of dental caries and mean DMFT in different age groups (11–16 years old) for male and female (n=81, 65)

Age	Sex	Total number	Affected number	Caries prevalence	DMFT (Mean±SD)
11	M	05	03	60.00%	2.2±2.49
	F	04	02	50.00%	1.0±1.41
12	M	34	17	50.00%	1.41±2.05
	F	23	13	56.52%	2.09±2.50
13	M	22	12	54.55%	2.0±2.47
	F	29	21	72.41%	2.79±2.79
14	M	11	06	54.55%	1.64±2.25
	F	03	03	100.00%	4.67±2.31
15	M	07	05	71.43%	1.29±1.38
	F	04	01	25.00%	0.75±1.5
16	M	02	00	00.00%	0.00±0
	F	02	01	50.00%	0.5±0.71
Total	M	81	43	53.09%	1.60 ± 2.14
	F	65	41	63.08%	2.32 ± 2.57

In this study, total 146 11-16 years old students were included as participants, among whom 81 (55.48%) students were boys and 65 (44.52%) were girls involving six different age groups (11-16 years old) in both sexes.

As shown in table I, the mean DMFT value was 1.06 ± 2.14 and 2.32 ± 2.57 in the boys and girls respectively and totally was 1.92 ± 2.36. The results showed that DMFT index in girls is higher than boys and this difference was statistically significant ($p < 0.05$).

According to data presented in figure 1 and table II, decayed teeth were maximum prevalent (93%) and missing teeth was least prevalent (3%). The mean values of decayed (D) teeth in girls was more than boys (56% and 44% respectively), but the mean values of missing (M) teeth and filled (F) teeth in boys ware more than girls (89%:11% vs 64%:36%). The table also shows the maximum and the minimum DMFT prevalence is related to 13 years and 16 years with the DMFT (2.45 ± 2.66 and 0.25 ± 0.50) respectively.

Table III shows the prevalence of dental caries in the permanent dentition which is 57.53%, as well as the prevalence of dental caries in 13 years age which is the highest 64.71% in comparison to the other ages. Furthermore, according to the results of this study, 42.47% of the students were caries free.

Table IV shows the prevalence and severity of dental caries in different age groups (11–16 years old) for males and females. The highest percentage of dental caries prevalence for males was found in age 15 and for female it was found in age 14, while the lowest percentage of caries prevalence for male was found in age 16 and for female it was found in age 15.

Again, the highest DMFT score for male was found in the age group 11 and for female it was in age 14, while the lowest DMFT score for male was in the age group 16 and for female it was in age 16 too.

Discussion

According to results of this study, the mean DMFT values and prevalence of dental caries in girls (2.32 ±2.57 and 63.08% respectively) were higher than boys (1.60 ± 2.14 and 53.09% respectively), and these difference was statistically significant (p<0.05). These finding corresponds with

the study carried out by Okeigbemena who mentioned that the prevalence of dental caries in females was higher than males[11]. Another study conducted by Shingare et al. found that the prevalence of dental caries in females was higher than males[12].

Similarly, Chan et al investigated the oral health status of school children in southern Taiwan in 2009 and found that for the dmft and DMFT index for mixed dentition, girls had higher scores (3.63 ± 3.31) than boys (3.52 ± 3.35)[13]. In addition, they found that the prevalence of dental caries for girls (53.49%) was higher than that for boys (52.02%). Similar findings were also found in the study of Chen where the DMFT index of girls with respect to permanent dentition (2.99 ± 3.40) was significantly higher than that of boys (2.33 ± 2.93, p < 0.05)[14]. In addition, the dental caries rate (36.9%) in permanent teeth for girls was also higher than for boys (34.32%). Yang et al examined the DMFT index for permanent teeth and found that girls had a higher score of 1.87 ± 0.16 than boys (1.31 ± 0.12, p < 0.05) and that the prevalence of dental caries among girls for permanent dentition (60.1%) was also higher than for boys (48.0%, p < 0.05)[15].

In contrast Moses et al found that there was an increase in caries prevalence in boys compared to females[16]. However, the mean DMFT score equal 1.80 ± 1.75 for both sexes had reported by Daneshkazemi and Davari[17].

Furthermore, according to the results of the present study, the DMFT scores in 12 years age group is lower (1.68 ± 2.23) than the global standards suggested by WHO references.

In Asia, the DMFT index for children at the age of 12 years in Singapore in 2011 was the lowest at 0.6, followed by Japan with a score of 1.4. With the exception of Cambodia's score of 3.5 and the Philippines' score of 3.3 in 2011, the DMFT indices for the various Asian countries for children at the age of 12

years are all lower than 3.0. However, the prevalence of dental caries among children aged 5-6 years in Taiwan was 79.32% in 2011. Furthermore, the DMFT index for children aged 12 years in Taiwan was 3.31 in 2000. Although the index had improved to 2.58 in 2006, it remains above the global average, which indicates that there is still a need for further improvements in the dental health of children in Taiwan[18].

As stated earlier the mean DMFT score in the present study area for all ages was 1.92 ± 2.36 with D component of 93%, M component of 3% and F component of 4% (Figure 1) that clearly demonstrate the very low care index and very high treatment need (3% and 93% respectively) and since radiographs were not taken, the severity and extent of the decay is likely to be underestimated for the presence of inter-proximal caries. The mean DMFT score in Saudi Arabic was 7.05 (± 4.58) with D component of 6.02, M component of 0.46 and F component of 0.57[19].

Limitations
This study was conducted with a small sample size over a short period of time. That is why even with all sincere and supportive efforts we couldn't study many more variable. Hence, the exact scenario among the population were least established in some aspects.

Conclusion
Though the sample caries index is low in context to the global target was to achieve by 2000, but higher prevalence of dental caries was found among Bangladeshi adolescents from age 11 to 16 years especially in females. Notably, the most contributory to DMFT was decayed portion that indicate severe negligence to oral hygiene. That also demands very high treatment need of the children. So, to facilitate the situation different preventive measures should be applied to different ages and genders based on the findings that their caries prevalence and severity were different. Strict preventive programs should be implemented and awareness of the adolescents' personal health measures is a must.

Recommendations
Further research and investigation with large samples are required to include all as well as a wide group of population to find out the national scenario.

Author's contribution
MKU- Conception, design, acquisition of data, drafting the article and final approval.
FU- Design, analysis, critical revision and final approval
SA- Interpretation of data, drafting, critical revision and final approval.

Disclosure
All the authors declared no competing interests.

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