Caries prevalence of school going boys and girls according to sweet taking frequency among different age groups in and around Guwahati city

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ABSTRACT

Dental caries is the most common oral disease in human. Many epidemiological studies have been carried out worldwide to assess the prevalence of dental caries. In India also, several studies have been carried to find out the prevalence of dental caries. To know the cause of disparity of prevalence of dental caries epidemiological study of all the regions is very important. The objective of this study was to determine the caries prevalence of school going boys and girls in and around Guwahati city, Assam, India. About 7233 school going boys and girls from 25 schools, aged 3-17 years participated in the study. Data were also recorded for frequency of taking sweets along with the prevalence of caries to see the association of caries with sweet taking frequency among different age groups. Data were collected using basic oral health survey (WHO) modified form. Results showed that 43.40% boys and girls were affected by caries. Boys (45.85%) showed higher prevalence than girls (40.92%) with a mean value of 5.60 ± 0.03 and 5.28 ± 0.03 respectively, and the difference was statistically significant. Caries is very negligible (1.82% in males and 1.75% in females) among those who occasionally take sweets or never take. Contrary to that, more than 94% sweet takers of both the sexes, those who take sweets more than 5 times a day are affected by caries.



Key words: Dental caries, Epidemiology, Prevalence, School going boys and girls, Sweet taking frequency

INTRODUCTION

Dental caries is a disease of modern civilization. It is a bio-social disease rooted in technology and economy of a society. As living standard improves, severity of the disease increases. An estimated 90% of school children worldwide and most adults have experienced caries.^[1] Studies reveal that more than 51 million school hours are lost annually due to suffering in oral diseases.^[2]

Diet plays a very important role in the initiation of caries. High frequency of sugar consumption for a prolonged period in the presence of cariogenic bacteria may lead to a serious deficiency of host protective factor and result in rapid progression of caries. There is conclusive evidence of a high correlation between the frequency and the amount of sugar intake.^[3-5]

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Guwahati, the most important city in the entire North-East Region of India, serve as the hub of all commercial activities. Children are exposed to highly refined carbohydrate, which has a major role in the initiation of dental caries, necessitating the need for study of caries prevalence and its associating factors. To know the inequality of oral health, a survey of every region is important, so the present study is undertaken to know the prevalence of dental caries in this region.

Objectives

The present study aims at examining:

- Prevalence of dental caries in school going boys and girls of 3-17 years age group.
- 2. Prevalence of dental caries among different age groups.
- 3. The relationship of caries with a frequency of taking sweet.

MATERIALS AND METHODS

This cross-sectional study was conducted among school going boys and girls in Guwahati city and its nearby areas in between the ages of 3 and 17 years. The field work was conducted during July 2006 and March 2010. Twenty-five schools participated in the study. Approval from the concerned authorities was obtained prior to the survey. All boys and girls present on the day of examination were included in the study and no children refused to participate. A total of 7233 boys and girls were examined out of which 3636 were boys and 3597 girls.

The author visited the schools, one at a time, during the study period of 5 years. Intra-oral examination was done properly to find out the boys and girls affected by caries as well as to see the extension of dental caries among them. Dental caries were assessed by using mouth mirror and explorer, which involve inspection of all visible surfaces. In this study, WHO^[6] criteria for caries diagnosis were followed.

Samples were divided into three groups according to the sweet taking frequency. The first group comprised of those who never take sweets or take occasionally. Second group covers those who take sweets 2-5 times a day and third group include those, who take more than 5 times a day. Sugars may be in any form such as sweetened milk, soft drink, cake, pastry, ice-cream, and chocolate.

Data-analysis

A modified WHO Health Survey Assessment form^[6] was used for collection of data. The data so collected were analyzed using SPSS 9.4 (IBM SPSS Statistics). Chi-square analysis is done to analyze sex difference in caries affected boys and girls, between different age groups, caries prevalence of boys and girls and sweet taking frequency. Mean is found among the age group to find out the trend of caries among boys and girls in different age group. Logistic regression analysis was performed to see the association of caries and its risk factors.

RESULTS

The sample consisted of 7233 boys and girls, of which 3636 were boys and 3597 girls. The distribution of sample population according to sex and age groups is shown in Table 1.

The epidemiological picture of dental caries in the present study depicts [Table 2] that the boys have higher (45.84%) prevalence of dental caries than the girls (40.92%).

The mean number of caries affected boys is found to be higher than the girls. The sex difference in caries prevalence rate is found to be statistically significant as is revealed from the Chi-square test ($\chi^2 = 17.84$, df = 1, P < 0.001). Statistically significant sex difference is also observed in respect of mean number (t = 7.62, P < 0.001). Caries prevalence is found to increase gradually from 3 to 5 years age group to 15-17 years age in both the sexes [Table 3].

The mean number of caries affected boys and the girls are also found to increase from 3 to 5 years to 15-17 years in both the sexes except with a slight deviation in the 9-11 years age group. The highest mean values in the boys and the girls are observed in 15-17 years. Chi-square test shows statistically significant difference between different age groups ($\chi^2 = 32.273$, df = 4, P < 0.001) in respect of caries prevalence [Table 4 and Figure 1].

Table 1: Distribution of sample by sex and age groups

| Age groups | Se | x | Total | | |
|------------|--------------|--------------|--------------|--|--|
| (years) | Boys | Girls | | | |
| 3-5 | 738 (50.93) | 711 (49.07) | 1449 (20.03) | | |
| 6-8 | 686 (50.93) | 661 (49.07) | 1347 (18.62) | | |
| 9-11 | 725 (49.42) | 742 (50.58) | 1467 (20.28) | | |
| 12-14 | 723 (50.24) | 716 (49.76) | 1439 (19.90) | | |
| 15-17 | 764 (49.90) | 767 (50.10) | 1531 (21.17) | | |
| Total | 3636 (50.27) | 3597 (49.73) | 7233 (100) | | |

Table 2: Sex-wise distribution of caries affected boys and girls with mean number

| Sex | Total n | Noncarious n (%) | Carious n (%) | Mean | SE | SD | | | | | |
|----------|--|---------------------|---------------|------|------|------|--|--|--|--|--|
| Boys | 3636 | 1969 (54.15) | 1667 (45.85) | 5.6 | 0.03 | 1.41 | | | | | |
| Girls | 3597 | 2125 (59.07) | 1472 (40.92) | 5.28 | 0.03 | 1.56 | | | | | |
| Total | 7233 | 4094 (56.60) | 3139 (43.40) | 5.45 | 0.02 | 1.49 | | | | | |
| SE: Star | SE: Standard error. SD: Standard deviation | | | | | | | | | | |

| Table 5. Ale group-wise distribution of carles affected boys and gins with mean nur | Table | ole | 3: | Aae | arour | o-wise | distribution | of | ⁱ caries | affected | bovs | and | airls | with | mean | num | be | ŗ |
|---|-------|-----|----|-----|-------|--------|--------------|----|---------------------|----------|------|-----|-------|------|------|-----|----|---|
|---|-------|-----|----|-----|-------|--------|--------------|----|---------------------|----------|------|-----|-------|------|------|-----|----|---|

| Age groups | Total | | Boys | | | Total | | Girls | | | Grand total |
|------------|-------|--------------|--------------|------|------|-------|--------------|--------------|------|------|--------------|
| (years) | n | Noncarious | Carious | Mean | SE | n | Noncarious | Carious | Mean | SE | |
| 3-5 | 738 | 445 (60.30) | 293 (39.70) | 4.88 | 0.08 | 711 | 449 (63.15) | 262 (36.85) | 4.59 | 0.07 | 1449 (20.03) |
| 6-8 | 686 | 390 (56.85) | 296 (43.15) | 5.76 | 0.08 | 661 | 403 (60.97) | 258 (39.03) | 5.44 | 0.10 | 1347 (18.62) |
| 9-11 | 725 | 387 (53.38) | 338 (46.62) | 5.58 | 0.08 | 742 | 439 (59.16) | 303 (40.84) | 5.20 | 0.08 | 1467 (20.28) |
| 12-14 | 723 | 370 (51.18) | 353 (48.82) | 5.83 | 0.07 | 716 | 404 (56.42) | 312 (43.58) | 5.46 | 0.09 | 1439 (19.89) |
| 15-17 | 764 | 377 (49.35) | 387 (50.65) | 5.85 | 0.07 | 767 | 430 (56.06) | 337 (43.94) | 5.58 | 0.09 | 1531 (21.16) |
| Total | 3636 | 1969 (54.15) | 1667 (45.85) | | | 3597 | 2125 (59.08) | 1472 (40.92) | | | 7233 |

SE: Standard error

Table 4: Age - sex distribution of caries with mean

| Age groups (years) | χ ² | df | Р |
|--------------------|-----------------------|----|--------|
| 3-5×6-8 | 2.330 | 1 | 0.127 |
| 3-5×9-11 | 8.762 | 1 | 0.003 |
| 3-5×12-14 | 18.517 | 1 | 0.000* |
| 3-5×15-17 | 24.543 | 1 | 0.000* |
| 6-8×9-11 | 1.893 | 1 | 0.169 |
| 6-8×12-14 | 7.308 | 1 | 0.007 |
| 6-8×15-17 | 11.017 | 1 | 0.001* |
| 9-11×12-14 | 1.861 | 1 | 0.172 |
| 9-11×15-17 | 3.903 | 1 | 0.048 |
| 12-14×15-17 | 0.345 | 1 | 0.557 |

*Statistically significant (P < 0.001)

Caries prevalence according to sweet taking frequency

More than one-quarter (26.85%) of the population take sweets more than 5 times a day, 38.19% take sweets 2-5 times a day and 34.96% never take sweets or few of them take it occasionally [Figure 2].

More than one-quarter of the boys (28.82%) and 24.85% of the girls are found to take sweets regularly or more than 5 times a day [Table 5 and Figure 3].

The difference in caries prevalence among different categories of sweet takers is found to be statistically significant in both the sexes (in boys χ^2 = 1955.818, df = 2, P < 0.001 and in girls χ^2 = 1929.232, df = 2 P < 0.001) [Table 6].

Logistic regression analysis was performed to identify association of sex and age group with the prevalence of dental caries. Table 7 shows prevalence of caries according to age and sex along with the associated odds ratio (Model I and Model II) with significance.

Significant association is revealed among the age groups with caries prevalence. The risk of experiencing caries shows linear rise with increasing age. In respect to sex, boys are 1.20 times more affected than girls by dental caries. In respect to sweet takers, those belonging to the groups, who take sweet more than 5 times a day, are 120.82 times greater at risk than the occasional takers.



Figure 1: Grossly decayed teeth of a 6-year-old boy

On the other hand, it is much less with 17.03 times, who take sweets 2-5 times a day. It gives a clear indication that consumption of sweet is one of the very important causal factors of dental caries.

DISCUSSION

Oral health being a part of general health affects the total well-being of an individual. A total of 43.39% school going boys and girls are found to experience dental caries of which, boys are found to exhibit significantly higher caries prevalence (45.84%) than the girls (40.92%). Gangwar et al. studied the bio-social relation of dental caries of boys and girls in the age range of 5-14 years in rural areas of Lucknow and found male children experienced higher caries prevalence (57.89%) as compared to females (45.20%), which was statistically significant.^[7]

Higher prevalence of caries among the boy^[8-11] was also observed by few researchers whereas some found it more among girls.^[12-14] Although the higher prevalence of caries among the boys is difficult to explain, the boys usually have more access to sweets inside and outside their home. At home, in Indian society sweets are offered to the boys first both by the parents and other guests as well. Even when they are out of the home, unlike boys, girls usually does not go to shops alone. The higher consumption



Figure 2: Distribution of the sample according to sweet taking frequency



Figure 3: Carious broken primary teeth

Table 5: Distribution of sweet taking frequency according to age and sex

| Sweet taking | | Age (years) | | | | | | | | | | | | | |
|-----------------------|----------------|----------------|----------------|----------------|----------------|-----------------|----------------|----------------|----------------|----------------|----------------|-----------------|-----------------|--|--|
| frequency/day | | | Bo | oys | | | Girls | | | | | | total | | |
| | 3-5 | 6-8 | 9-11 | 12-14 | 15-17 | Total | 3-5 | 6-8 | 9-11 | 12-14 | 15-17 | Total | - | | |
| Never/ | 256 | 245 | 233 | 235 | 186 | 1155 | 299 | 269 | 273 | 247 | 286 | 1374 | 2529 | | |
| occasional n (%) | (34.69) | (35.71) | (32.14) | (32.50) | (24.35) | (31.77) | (42.05) | (40.70) | (36.79) | (34.50) | (37.29) | (38.20) | (35.00) | | |
| 2-5 times n (%) | 325 (44.04) | 231 (33.67) | 284 (39.17) | 267 (36.93) | 326 (42.67) | 1433 (39.41) | 245 (34.46) | 253 (38.28) | 275 (37.06) | 280 (39.11) | 276 (35.98) | 1329 (36.95) | 2762 (38.20) | | |
| >5 times <i>n</i> (%) | 157 (21.27) | 210 (30.61) | 208 (28.69) | 221 (30.57) | 252 (32.98) | 1048 (28.82) | 167 (23.49) | 139 (21.03) | 194 (26.15) | 189 (26.40) | 205 (26.73) | 894 (24.85) | 1942 (26.80) | | |
| Total | 738 | 686 | 725 | 723 | 764 | 3636 | 711 | 661 | 742 | 716 | 767 | 3597 | 7233 | | |

Table 6: Sex-wise distribution of caries affected boys and girls according to sweets taking frequency

| Sex | Sweet taking | Total | Teeth | | | | | | | | | | | |
|----------|------------------|-------|------------------|---------------|------|------|------|--|--|--|--|--|--|--|
| | frequency/day | | Noncarious n (%) | Carious n (%) | Mean | SE | SD | | | | | | | |
| Boys | Never/occasional | 1155 | 1134 (98.18) | 21 (1.82) | 4.76 | 0.21 | 0.94 | | | | | | | |
| | 2-5 times | 1433 | 791 (55.20) | 642 (44.80) | 4.67 | 0.05 | 1.27 | | | | | | | |
| | >5 times | 1048 | 44 (4.20) | 1004 (95.80) | 6.22 | 0.04 | 1.16 | | | | | | | |
| | Total | 3636 | 1969 (54.15) | 1667 (45.85) | 5.60 | 0.03 | 1.42 | | | | | | | |
| Girls | Never/occasional | 1374 | 1350 (98.25) | 24 (1.75) | 6.13 | 0.30 | 1.45 | | | | | | | |
| | 2-5 times | 1329 | 722 (54.33) | 607 (45.67) | 4.31 | 0.06 | 1.40 | | | | | | | |
| | >5 times | 894 | 53 (5.93) | 841 (94.07) | 5.95 | 0.04 | 1.26 | | | | | | | |
| | Total | 3597 | 2125 (59.08) | 1472 (40.92) | 5.28 | 0.04 | 1.55 | | | | | | | |
| Grand to | ital | 7233 | 4094 (56.60) | 3139 (43.40) | 5.45 | 0.03 | 1.49 | | | | | | | |

SE: Standard error, SD: Standard deviation

Table 7: Results of binary logistic regression analysis on risk factors of caries

| Variable | Value | Frequency | Caries | Percentage | В | SE | df | Significant | R | Model I | | Model II | |
|-----------|------------|-----------|------------|------------|-------|-------|----|-------------|-------|---------|--------------|----------|--------------|
| | | | prevalance | | | | | | | OR | 95% CI | OR | 95% CI |
| Age | 3-5 | 1449 | 555 | 38.30 | | | 4 | 0.000 | 0.092 | | | | |
| (years) | 6-8 | 1347 | 554 | 41.13 | 0.381 | 0.155 | 1 | 0.014 | 0.020 | 1.46 | 1.08-1.98 | 1.46 | 1.08-1.98 |
| | 9-11 | 1467 | 641 | 43.69 | 0.814 | 0.151 | 1 | 0.000 | 0.052 | 2.26 | 1.68-3.03 | 2.26 | 1.68-3.04 |
| | 12-14 | 1439 | 665 | 46.21 | 1.208 | 0.155 | 1 | 0.000 | 0.077 | 3.35 | 2.47-4.53 | 3.32 | 2.45-4.5 |
| | 15-17 | 1531 | 724 | 47.29 | 1.270 | 0.153 | 1 | 0.000 | 0.082 | 3.56 | 2.64-4.81 | 3.56 | 2.63-4.81 |
| Sex | Girls | 3597 | 1472 | 40.92 | _ | _ | _ | _ | _ | _ | _ | — | _ |
| | Boys | 3636 | 1667 | 45.84 | 0.181 | 0.094 | 1 | 0.053 | 0.013 | 1.20 | 1-1.44 | — | _ |
| Sweet | Occasional | 2529 | 45 | 1.78 | | | 2 | 0.000 | 0.212 | | | | |
| Taking | 2-5 times | 2762 | 1249 | 45.22 | 2.835 | 0.182 | 1 | 0.000 | 0.155 | 17.03 | 11.93-24.3 | 16.96 | 11.9-24.17 |
| Frequency | >5 times | 1942 | 1845 | 95.01 | 4.794 | 0.225 | 1 | 0.000 | 0.212 | 120.82 | 77.71-187.86 | 119.76 | 77.12-185.99 |

SE: Standard error, CI: Confidence interval, OR: Odds ratio

of sugar by boys might have resulted higher caries prevalence among them.^[9]

The present study shows an increasing trend of caries prevalence with an increase in age for both the sexes. The permanent teeth are found to be affected more than the deciduous teeth in both the sexes. Lack of dental health education and easy availability of sweet and soft drinks may lead to a linear increase of caries prevalence among different age groups. Contrary to the present finding the level of caries was found to be higher for the primary than the permanent dentition for children of several developing countries like China by Wang.^[15] Thailand by Petersen *et al.*,^[16] in Madagascar by Petersen and Razanamihaja.^[17] etc.

In the present study, it has been observed that those who consume sweets more than 5 times a day experience caries more than those who consume sweets less. Lingstrom et al., [18] reported sweet eating frequency of 3 or more times per day is found to elevate significantly caries activity. Holbrook et al., [19] reported higher caries among those who consume 5.1 times a day than those who take 2.1 times a day, when the intake of sugars were averaged. Rugg-Gunn et al.,[3,20] concluded that there is evidence of a high correlation between the frequency and the amount of sugar intake in relation to caries. In the present study though caries has been found to be significantly high among those who took sweet more than 5 times a day, other associated factors like habit of taking fibrous food, consumption of soft drinks, oral hygiene maintenance method and frequency must have played a major role for the occurrence of dental caries.

CONCLUSIONS

The epidemiological picture of dental caries in the present study depicts that the boys have higher (45.84%) prevalence of dental caries than the girls (40.92%). Caries prevalence is found to increase gradually from 3 to 5 years age group to 15-17 years age in both the sexes. Age factor is found to be significantly associated with caries prevalence. Those who consume sweets more than 5 times a day are more susceptible to dental caries than the occasional takers. Though sweet has a strong impact in causation of dental caries there are many associated factors that have to be considered like form of food, fluoride, fluid intake, oral hygiene methods, frequency of cleaning teeth, awareness to oral health etc. Taking into account of these facts stress should be given on initiating dental health awareness and healthy diet pattern among the children as it is very much essential for reduction of dental caries, thereby reducing the suffering experienced by them.

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Conflicts of interest

There are no conflicts of interest.

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