INTRODUCTION

Dental caries is the single most common chronic childhood disease. Dental caries is fourteen times more common than chronic bronchitis, five times more common than asthma and seven times more common than hay fever. Considering sugar as causative agent for caries, it is important to take into consideration the amount, consistency and frequency of sugar. Sticky foods are more harmful as they remain on tooth surface for longer time. Carbohydrates taken in an adherent solid form are more cariogenic than those consumed in a soluble state. Approximately 70% of the countries in the world have succeeded in achieving WHO goal of decayed, missing and filled teeth (DMFT) index 3 for 12 year olds. WHO” global data has shown an increase in DMFT of 12 years old Pakistani children from 0.9 to 1.38.
an urban population. There are 11 Government primary schools (5 girls' and 6 boy's schools) and 31 private primary schools. A random sampling was done by the Executive District officer (E.D.O) Schools and Literacy programme Peshawar, 6 Government (4 female and 2 male schools) and 4 private Schools (all Co-education Schools) were chosen for purpose of this survey. After formal permission from the school authority, days were chosen for interviews of students. First a pilot testing was performed at a school to overcome deficiencies in the actual study. In this trial a total number of 30 students were interviewed and examined according to the actual survey. The sampling technique used was multi-stage stratified random sampling. The study included school children from class 1 to class 5th who were willing to participate. Exclusion criteria comprised those children who had congenital anodontia or had systemic diseases.

The data was collected by means of a custom questionnaire. At every school the concerned Headmaster/ Headmistress performed random sampling using random numbers table. A total of 500 students (50 from each school) were surveyed. The students were interviewed using a specially designed questionnaire and then examined for caries. There were 16 questions altogether, 5 related to demographic information like age, sex, parent’s occupation and nationality. Questions were asked pertaining to oral hygiene practices, dietary intake and preventive awareness like time, frequency and regularity in tooth brushing, use of any other oral hygiene aid like dental floss, maswak, mouth wash, tooth powder or fluoride tablets, and benefits of fluoride. Dietary questions included frequency of eating sweets like candy, chocolate and intake of daily tea cups. For clinical examination, gloves, disposable mirrors and probe were used for every student. Natural light was used for examination. Dental caries status was recorded using dft and DMFT score. Each questionnaire was completed in about twenty minutes followed by examination. Examination for dental caries was carried out in a systematic fashion using the FDI tooth-numbering system. A tooth was diagnosed as “Sound” if there was no evidence of treated caries (filling) or untreated caries (decay), evidence of white chalky spots (incipient enamel lesion), staining, calculus or rough spots, a deep pit or fissure (stained or unstained) that catches the probe but has no detectably softened dentin floor, undermined enamel or softened walls, fluorosis or any question-

able lesion which cannot reliably be diagnosed as caries. The status of permanent teeth was scored according to the DMFT index. Confidentiality of the collected data was assured to the students, teachers and principals. At the end of survey in every school, a lecture was delivered, using dental models, to students about oral hygiene, caries, healthy snacking, tooth brushing and dental visits. 10% of children examined were re-examined by another survey member to check inter-examiner reliability and it was found to be excellent (Kappa Value 0.75). Data collected in the field were checked for completeness of responses before feeding into the computer. Data was analyzed using Epi Info 6.0. The level of significance for all tests was set at p<0.1.

RESULTS

In this study, 500 students from class 1 to class 5 of Hayatabad schools were recruited. Amongst these, 205 students (41%) were male and 295 students (59%) were female as shown in Table 1. This table also shows that 27.6% of children were caries free while in 72.4% of the sample caries were noted irrespective of the gender. Mean Value came out to be 0.7240, with variance of 0.2002 and standard deviation of 0.4475.

<table>
<thead>
<tr>
<th>Gender</th>
<th>Caries</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes</td>
<td>%</td>
<td>No</td>
<td>%</td>
<td>Total</td>
</tr>
<tr>
<td></td>
<td>N</td>
<td></td>
<td>N</td>
<td>%</td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>200</td>
<td>40</td>
<td>95</td>
<td>19</td>
<td>295</td>
</tr>
<tr>
<td>Male</td>
<td>162</td>
<td>32.4</td>
<td>43</td>
<td>8.6</td>
<td>205</td>
</tr>
<tr>
<td>Total</td>
<td>362</td>
<td>72.4</td>
<td>138</td>
<td>27.6</td>
<td>500</td>
</tr>
</tbody>
</table>

The age distribution of 362 caries positive children is given in Figure 1. Peak group was of 9 years old followed by 10 years, 7 years and 8 years in descending order of frequency.

![Fig. 1: Age distribution of caries positive children](image-url)
Responses about chocolate intake by the investigated children were evaluated in Figure 2. The use of chocolate is taken as an indicator of sticky or retentive sugar. Moderate and too much intake of chocolate were grouped as high intake of chocolate. Out of 362 children who were found to have caries, 178 children (49.2%) were those who had high intake of chocolate. Among those whose chocolate intake was either nil or little, 90 children (33.7%) were noted to have caries.

Caries were cross tabulated against the sugar level in tea, as shown in Table-2. It was observed that out of 72.4% children with caries, 7.7% were found to have nil intake of sugar in tea, while 13.8% were taking too much sugar.

Table-2 Caries versus level of intake of sugar

<table>
<thead>
<tr>
<th>Sugar in tea</th>
<th>Yes</th>
<th>No</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Little</td>
<td>208</td>
<td>70.0</td>
<td>90</td>
</tr>
<tr>
<td>Nil</td>
<td>28</td>
<td>7.7</td>
<td>11</td>
</tr>
<tr>
<td>Normal</td>
<td>76</td>
<td>21.0</td>
<td>31</td>
</tr>
<tr>
<td>Too much</td>
<td>50</td>
<td>13.8</td>
<td>7</td>
</tr>
<tr>
<td>Total</td>
<td>362</td>
<td>72.4</td>
<td>138</td>
</tr>
</tbody>
</table>

Table-3 depicts tea intake versus caries. Tea intake was measured and considered as representing frequency of sugar intake. It was observed that the percentage of children who had dental caries increased as the tea cups taken daily increased from little, normal and more than normal, i.e. 66.4%, 83.9%, and 78.6% respectively.

Table-4 shows how the chocolate intake and tooth brushing habits jointly affects the dental caries. When ‘Too much’ chocolate intake was coupled with ‘Unsatisfactory’ brushing habits, the caries were noted amongst 37% of the children. In this ‘High’ intake group, when brushing habits were ‘Normal and above
normal’, then caries was noted amongst 11.3% of the children. When chocolate intake was ‘Nil’ and brushing habits were ‘Unsatisfactory’, the caries was noted among 18% of the children. In this ‘Nil’ intake group with ‘Normal and above normal’ brushing habits, caries was noted only among 5.2% of the children.

**Statistical calculations**

Prevalence: Persons with a given health indicator at a given time period / Population during same time period x 100.

Prevalence: 362/1800 X 100 = 20.11  
So Prevalence per 100 = 20.11

dft : Mean dft = 0.7983 Variance = 1.4031 Standard deviation = 1.1845

DMFT : Mean DMFT = 2.163. Variance = 1.976. Standard Deviation = 1.405

**DISCUSSION**

Dental caries continues to be a major problem in dentistry. This study was carried out about prevalence of caries and some of its causative factors. A study by Saravanan concluded that caries prevalence was higher in boys (52.2%) than in girls (47.8%). In this present study 45% males versus 55% females were found to have caries.

Chocolate is included in category of those foods considered as containing retentive sugars. Sticky foods are more harmful than non sticky foods because they are retained on surface of tooth for longer period of time than non-sticky food, so there is more time for interaction between tooth and carbohydrates. Bibby carried out extensive research about food retentive potential and decalcification. Bibby postulated that sugar in liquid state should less often cause caries than sugar eaten in solid state or in combination with adhesive substances. Decker concluded that Carbohydrate containing foods that are rapidly cleared from mouth have less chance to initiate caries than those foods which are slowly cleared. Chocolate is slowly cleared from oral cavity, so it has more chance to cause caries. Similarly in this present study, it was found that when chocolate intake was high, more children were found to be caries positive and when chocolate intake was nil, less children were caries positive.

There is convincing evidence between amount of sugar intake and caries. WHO reported sugar consumption in different countries and found that when sugar intake exceeded 44 kg per person per year, those countries had a higher caries index. Pakistan had 26.6 kg per person intake in 2005, which puts it in low intake countries. In present study when amount and consistency were grouped together to tabulate against caries in this study, the caries level was high. When both were absent, the caries was low. Taking frequency as a factor, Zita et al found a higher correlation between sugar utilization between meals and dental caries. Gustafsson et al proved that more frequent consumption of sugar between meals had greater tendency for caries. Similar results were found in the present study.

Oral hygiene practices were amongst the 120 variables observed during the National Health Survey of Pakistan. The survey showed that 90% of population clean their teeth irrespective of the method used. The people in Pakistan use a variety of devices

<table>
<thead>
<tr>
<th>Chocolate Intake Daily</th>
<th>Tooth Brush Habits</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Above Normal</td>
</tr>
<tr>
<td></td>
<td>n</td>
</tr>
<tr>
<td>Little</td>
<td>1</td>
</tr>
<tr>
<td>Moderate</td>
<td>0</td>
</tr>
<tr>
<td>Nil</td>
<td>1</td>
</tr>
<tr>
<td>Too much</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
<td>5</td>
</tr>
</tbody>
</table>
for maintenance of oral hygiene, like toothpaste and tooth brush, local salt mixtures, tooth powder, barks of different trees (Dandassu) and chewing stick or maswak. According to National Health Survey of Pakistan, more than 50% of community utilize maswak for oral cleanliness, which is also a religious ritual before each prayer. Berenie et al studied the frequency of tooth brushing and its effect on caries. It was noted that children performing daily regular brushing had lower comparable level of DMFT and DMFS. Beal et al concluded that children having good oral hygiene had lower caries increment. Same result was found in this study. In present study when tooth brushing habits were normal or above normal, the caries incidence was low but when brushing habits were unsatisfactory, then the caries index was high. Mack studied that when candy intake is high in diet, but if brushing habits are regularly maintained, so there is no significant increase in caries. This study supported these findings because regardless of nil or high intake of chocolate, but when oral hygiene habits were satisfactory, the caries level was found to be low.

In the present study, the reported prevalence is 20.11 per 100 persons, dft is 0.7983 and DMFT calculated is 2.163. According to WHO survey, Pakistan was classified as low caries prevalent country. While 50% of children aged 12-15 years were caries free but on the negative side, 97% of all carious lesions were found to be untreated. Haleem et al carried out a study on caries prevalence in the urban regions of Pakistan and reported ratio of caries has been static for more than a decade in children. The caries status of two hundred and eighteen 12 year old school children from four schools of Karachi and Lahore was investigated. A mean DMFT of 1.82 for decayed and filled teeth was noted and 42% children were caries free. In similar studies, caries free children were reported to be 60% and 70% respectively. The present study showed 27.6 % children were caries free. Variations in different figures, compared to previous study, may be due to difference in age group, in which study is done, or target population.

CONCLUSIONS

From this it is concluded that

1- Irrespective of the gender 27.6% of children were caries free while in 72.4% of the studied children caries was noted.

2- Peak group affected by caries was 9 year followed by 10 year.

3- When chocolate and sugar intake was high, the caries index was also high.

4- When tooth brushing habits were normal or above normal, the caries index was low. When brushing habits were unsatisfactory, the caries index was high.

Recommendation:

Community-based oral health education at school level is recommended for prevention of caries in children.

REFERENCES


8) Bibby BG. Effect of sugar content of foodstuffs on their caries-producing potentials. JADA 1955; 51: 293-306.


