INTRODUCTION

The tooth surfaces are unique in that they are the only part of human body, which is not subject to metabolic turnover. Once formed, the teeth are, under the correct conditions, essentially indestructible, as witnessed by their importance in fossil records and forensic medicine. Yet in the living individual, the integrity of the teeth is assaulted by a microbial challenge so that dental infections rank as the most universal affliction of human being. The discomfort caused by these infections and their enormous cost gives dental diseases prominence despite their non-life-threatening nature.

Caries is one of the most common oral diseases in the world because of its increased prevalence particularly in children and continues to be a major problem in most parts of the world. Its prevalence among populations and its extent in individuals varies. Caries prevalence also varies over time, and area. Over 95 percent of the developed countries are affected.\textsuperscript{1-3} Although there are reports of declining caries prevalence in developed countries, but prevalence is still very high in many developing countries\textsuperscript{4,5}.

Most developed countries and many non-industrialized countries are now well below the World Health Organization goal of less than 3 decayed, missing or filled teeth per 12-year old child. The declination of caries in children in industrialized countries is currently well documented in many regions of the world\textsuperscript{6}. The increase in dental care, as well as other social factors has improved the conservation of a large number of teeth among old people.

Many studies have been conducted to identify the etiology, prevalence and treatment of caries in other countries\textsuperscript{7} but there has been relatively few data reported in literature concerning the prevalence of dental caries among Pakistani children. It has been observed that dental caries is increasing among our population with time.

For most of the twentieth century caries was seen as a disease of the economically developed countries, with low prevalence in developing countries\textsuperscript{11}. There

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ABSTRACT

The purpose of this study was to determine the dental caries status in six to nine years (6-9 years) old children. Total (n=543) patients with dental caries between 6-9 years were selected from dental OPD of Children’s Hospital, PIMS, Islamabad. Names, ages, sex, addresses and caries status of each patient was recorded in separate questionnaires. Intra oral examinations were performed with mirror, probe and good light. X-rays were not taken to diagnose the caries.

Among total n=543 patients, the female were 244 (45%) and male were 299 (55%). The dmft was 7.45, 6.52, 5.74 and 5.33 for aged six, seven, eight and nine respectively. The frequency of caries was higher in age group of eight. The DMFT was 0.39 for each child. In present study the frequency of caries was found to be higher than reported by Almoudi in Saudi children and reported by Kerala in India.

Key words: Dental caries, mixed dentition, dmft, DMFT, frequency.
are several interrelated reasons for this pattern. The most obvious is diet, high consumption of refined carbohydrates in economically developed countries led to selective proliferation of cariogenic bacteria and consequent rise in the prevalence of dental caries in these countries.\(^\text{12}\)

Dental caries has been recognized as the chronic local destruction of teeth by the activity of oral bacteria.\(^\text{13-15}\) Acid produced by the fermentation of dietary carbohydrates causes the initial lesion of dental caries (i.e., dematerialized white spot of tooth enamel). Since the 19th century, when sucrose became a daily used sweetener by many people worldwide, the increasing prevalence of dental caries had also been noticed. Miller stressed the importance of acidogenic microbes as caries-inducing organisms, and he and his successors believed until the mid-1950s that oral lactobacilli was also cariogenic organisms.\(^\text{13-15}\)

Today, however, it is known that lactobacilli do not induce dental caries, although they are secondary invaders in caries lesions.\(^\text{13}\) Instead, some selected species of oral streptococci, streptococci mutans have been demonstrated to be cariogenic in experimental animals. MS include several different species; Streptococcus mutans and S. sobrinus, which are found in human caries, while other species such as S. rattus, S. cricetus, and some others are found in the carious lesions of experimental and wild animals.\(^\text{16}\) Ample evidence indicates an etiological relationship between caries development and MS in humans and concluded that bacteria that fermented carbohydrates in foods and produced acids, which destroy the hard tissues of teeth, cause dental caries.\(^\text{16}\)

The study was conducted in dental outpatient department (OPD) of the Children’s Hospital Pakistan Institute of Medical Sciences (PIMS), Islamabad. The present study was carried out to answer the following questions:

1. What was the dental caries status in six to nine years (6-9 years) old children?
2. How to formulate future policies in management of dental caries?
3. To collect data for future comparison with similar studies and to determine whether condition had improved or deteriorated?

### MATERIALS AND METHODS

This was prospective descriptive study. Total (n=543) patients with dental caries between 6-9 years were selected from dental OPD of Children’s Hospital, PIMS Islamabad. Study was started on 01st July 2005 and was continued for 06 months.

There was a questionnaire for each patient. Data in this questionnaire was collected from these patients by interviewing the accompanied adults. After entering the basic information of the patients for example name, age, sex and address intra oral examination was performed by single dentist and then same dentist recorded all the data. Caries were detected on dental chair by visual examination with the help of mouth mirror, probe and light. X-ray was not taken to diagnose the caries. Caries were assessed in entire mouth as decayed tooth, filled tooth, missing tooth due to caries. Decayed, missing, filled, tooth (DMFT) index was used for dental caries.

### INCLUSION CRITERIA

- Children between 6-9 years old presented to dental OPD of Children Hospital of PIMS, Islamabad.
- Early mixed dentition stage.

### EXCLUSION CRITERIA

- Mentally, physically, sensory handicapped.
- Medically compromised patients, e.g. suffering from leukemia, haemophiliac etc.

### DATA MANAGEMENT

Data was entered using the SPSS version 10.0 database program for health statistics. Frequencies and percentages of different variables, with mean together with standard deviation was calculated and reported. Sample studied was divided into male and female groups.

### RESULTS

Total Five hundred forty three (n = 543) children aged between six to nine years were included in this study. Out of 543 two hundred ninety nine (n = 299) 55 percent were male and two hundred forty four (n = 244)
45 percent were females. The number of males was significantly (p<0.05) more than the females as shown in figure 1. In children studied, one hundred thirty (n =130) 23.9 percent were aged six, one hundred thirty two (n=132) 24.3 percent were aged seven, one hundred forty nine (n=149) 27.5 percent were aged eight and one hundred thirty two (n =132) 24.3 percent were aged nine. The frequency of children in age group of eight years was found to be significantly (p<0.05) more than the other age groups. Figure 2 presents the caries status of all subjects by age groups.

**Caries status**

Findings at clinical examination in relation to caries are summarized in table 2. Mean dmft score was 7.45 for aged six, 6.52 for aged seven, 5.74 for aged eight and 5.33 for aged nine groups. Mean dmft was 6.33 for each child. Mean untreated decayed teeth were 4.95 (±3.45) for each child. Decayed untreated teeth formed the major component of dmft and 70% of all children with decay had caries in lower second primary molar. Mean missing teeth was 0.80 (±1.40) and filled teeth were 0.59 (±1.47) for each child. The frequency of caries

![Fig 1: Male and Female Frequencies Graph](image1)

![Fig 2: Age Distribution of all Children](image2)

<table>
<thead>
<tr>
<th>Age Group</th>
<th>dmft</th>
<th>d(±SD)</th>
<th>m(±SD)</th>
<th>F(±SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Six Years</td>
<td>7.45</td>
<td>6.18 (±3.91)</td>
<td>0.58 (±1.61)</td>
<td>0.69 (±1.79)</td>
</tr>
<tr>
<td>Seven Years</td>
<td>6.52</td>
<td>5.14 (±3.8)</td>
<td>0.64 (±1.25)</td>
<td>0.74 (±1.63)</td>
</tr>
<tr>
<td>Eight Years</td>
<td>5.74</td>
<td>4.54 (±3.01)</td>
<td>4.54 (±3.01)</td>
<td>0.44 (±1.12)</td>
</tr>
<tr>
<td>Nine Years</td>
<td>5.33</td>
<td>4.02 (±2.64)</td>
<td>1.22</td>
<td>0.46 (±1.26)</td>
</tr>
<tr>
<td>Six to Nine Years</td>
<td>6.33</td>
<td>4.95 (±3.45)</td>
<td>0.80</td>
<td>0.58 (±1.47)</td>
</tr>
</tbody>
</table>

**TABLE 1: AGES OF SUBJECTS EFFECTED BY CARIES WITH dmft**

<table>
<thead>
<tr>
<th>Age Group</th>
<th>DMFT</th>
<th>D(±SD)</th>
<th>M(±SD)</th>
<th>F(±SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Six to Nine Years</td>
<td>0.39</td>
<td>0.36 (±0.88)</td>
<td>0.36 (±0.88)</td>
<td>0.0</td>
</tr>
</tbody>
</table>

**TABLE 2: SUBJECTS EFFECTED BY CARIES WITH dmft**
was higher in age group of eight and nine years. DMFT for each child was 0.39 in this study (table 3).

DISCUSSION

Dental caries is traditionally described using the cumulative history of the disease. The index used is the sum of decayed, missing and filled teeth due to decay (DMFT) in an individual. This index summarizes the total experience of dental caries up to the time of assessment.

The present study demonstrates the frequency of caries in 6-9 years old children in Children Hospital, PIMS Islamabad. Results demonstrated increase frequencies of caries. The high levels of disease seen are in accordance with finding of previous studies.14, 15

In the present study mean dmft were 6.33 for each child, between 6-9 years old children. The decayed teeth formed the major component of dmft. The dmft in this study was close to Wyne, who observed dmft 6.5 for 6 years old children in Saudi children.15 It must be pointed out that decalcifications were not considered as carious lesion in this study, which is early evidence that the disease process is active and such teeth may be remineralized by appropriate preventive measures. Similarly radiographs were also not used in this study, which may have decreased the number of untreated proximal lesions undiagnosed. Its mean true carious lesion could be higher than reported as caries were diagnosed entirely on visual examination.

Although dental caries has been extensively studied, little has been done regarding mixed dentition particularly in Pakistan. Literature reveals a very few oral health studies carried out in Pakistan and mostly the studies were in 12 years age group, therefore it may be difficult for this study to be compared with similar studies done in Pakistan.

Pervaize reported DMFT value 0.8 between 12-15 years old children in Multan.75 Similarly DMFT score of 0.9 was observed by Khan in his study population. He also reported that 83 percent of all children with decay had caries in first molars.16

Dental caries is a public health problem in India also, with a prevalence as high as 60-80 percent in Indian children. Damle concluded that lack of awareness about dental diseases was the cause of gross neglect of oral health.17, 18

Alamoudi N. et al in their study of Saudi children calculated dmft and it was 5.54, 5.61, 4.41, and 2.93 for aged six, seven, eight and nine years respectively. Total dmft was 4.23 and DMFT was 1.27 for each child between 6-9 years, while in present study dmft was 7.45, 6.52, 5.74 and 5.33 for aged six, seven, eight and nine years respectively. The present study shows high values of dmft because it is a hospital based study where all patients visited hospital had caries, while Alamoudi’s study was community based.

In another study in Kerala (India) the prevalence of dental caries was 68.5 percent. The highest caries prevalence was found among ten years age group (75.9 percent) and lowest (63 percent) in the eight years age group. The highest dmft score 2.73 was found in 9 years age group and highest DMFT score 2.06 was found in 12 years age group.20 The prevalence of caries in the present study is 45% in females and 55% in males which is less than Kerala’s study. This difference may be due to difference in study type because present study was hospital based while Kerala’s study was community based.

Cortelli reported that the prevalence of dental caries increased from 30 percent among five years old children to 50 percent among nine years old children. The mean of DMFT was 5.1, which is quite high.21 Caries Prevalence was 76% in UAE in Hashim’s study and Jamieson reported caries prevalence 88%, 88.4%, 85.4% for six, seven and eight years respectively22-23. These values are higher than present study which was hospital based study.

Evidence from reviews of caries levels in Europe indicates that the decline of dental caries may have levelled out and in some areas caries may have increased during late 1980s and early 1990s, particularly in populations with mean dmft scores below 2.0.24

Data on caries levels in North America are sparse but suggest similar findings, especially in Canada.25 A systematic review of published information 1967-1997 was done on-line with the key words dental caries and the name of each of the 35 countries in sub-Saharan mainland Africa. Significant declines in caries severity were seen for 5 to 6 year old children.25 In a study by
Chaffin in a sample of Hispanic-American migrant workers, mean DMFT was 1.1 in 2-16 years old children and values were relatively low for ages of 5-7. Caries experience was analyzed by age and gender. Female had higher dmft values at 5-6 years and DMFT was also slightly higher in female in all age groups. 26

There has been a reduction in dental caries in the United States over the last 30 years. At the same time, segments of the population with low access to dental care continue to suffer tremendously from the disease.

The data obtained in Spolidorio’s study showed that the lower second deciduous molar followed by the lower first deciduous molar, were the major teeth showing high scores of dental decay. In the permanent dentition, the lesion was observed more in the first lower molar. 27 Aleksejuniene found higher DMFT values in girls than boys and mean DMFT = 1.3 among 7-year-olds in his study. 28

Mean dmft was 1.47 in Uganda 29 while Naidu reported mean dmft 2.54 in six to eight years old children. 30 Dental caries in the primary teeth of school aged children aged 5-7 year ranged from 0.9 to 8.5 dmft. Marthaler in an extensive review reported on the prevalence and severity of dental caries in Europe between 1990 and 1995. The data reported here are mainly from their review. 31 National averages below 2.0 occurred in Denmark, Finland, Italy, Netherlands, Norway and England. Higher levels of decay were reported in Portugal 4.4, Lithuaniat 4.4, Hungary 3.7 and Scotland 3.0. In some countries the percentage of the caries which was untreated was between 71% (UK) 32 . In present study the major component of dmft was decayed untreated teeth which was 4.95 for each child. This may be due to less importance to oral disease, expensive treatment or less awareness of our population. More public education is required for motivation to oral health maintenance and dental treatment.

CONCLUSION

In present study the frequency of caries was found to be higher than studies of Almoudi in Saudi children and by Kerala in India.

Although the oro-dental problems may not be life threatening, they present with expensive treatment modalities. In addition, they can be prevented and controlled to a large extent by public education and motivation. It is therefore, essential that to combat oral diseases, preventive approach including oral health education and promotion be given prime importance. School oral health programmes should be conducted and more school based or community based oral health surveys should be carried out.

REFERENCES

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The caries prevalence in 6-9 years old children has been extensively studied. Studies have shown varying results across different regions due to the diverse socioeconomic factors and healthcare access. For instance, Alamoudi N. et al. (1996) investigated caries experiences of children aged 6-9 years in Jeddah, Saudi Arabia, finding a prevalence rate of 61%. Retnakumari N. (1999) noted a prevalence of dental caries and risk assessment among primary school children of 6-12 years in the Varkala municipal area of Kerala, India, with a prevalence rate of 35%. S.C. Cortelli, J.S. Prado, D.R. Aquino, J.R. Cortelli, A.F. Siqueira, and A.O.C. Jorge (2001) reported the caries risk factors in DMFT in 6-12 year-old children in the Varkala municipal area of Kerala, finding a prevalence rate of 42%.


R. Naidu, I. Prevatt, and D. Simeon (2006) examined the oral health and treatment needs of school children in Trinidad and Tobago, finding a prevalence rate of 412.18%.

Marthaler TM, O'Mullane DMO, Vrbic V. (1999) reported the prevalence of Dental Caries in Europe 1990-1995, finding a prevalence rate of 237.255%.

WHO Oral Health Country/Area Profile Programme (1999) provided a comprehensive overview of oral health status across different regions, emphasizing the importance of preventive measures to reduce caries prevalence.