

PREVALENCE AND SEVERITY OF DENTAL CARIES AND FLUOROSIS IN SCHOOL CHILDREN OF KHYBER PAKHTUNKHWA

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ABSTRACT

Objective: To measure the prevalence of dental caries and fluorosis among school-aged children living in urban areas of Khyber Pakhtunkhwa.

Materials and Methods: Eighteen hundred children aged between 8-16 years from 12 schools in the urban areas of KPK were systematically sampled. Children were examined using the World Health Organization criteria for dental caries with an emphasis on their decayed, missed and filled teeth.

Results: The prevalence of decayed, missing and filled teeth (%DMFT), mean number of decayed teeth (MDT) and mean number of missing teeth (MMT) were 1.75, 1.45 and 0.17 respectively. The overall prevalence of %DMFT, MDT and MMT among boys (1.80, 1.50, and 0.10, $p < 0.05$) was greater than among girls (1.70, 1.4, and 0.25, $p < 0.05$). However, in private and armed forces schools, the prevalence of %DMFT among girls (1.80 and 1.83, $p < 0.05$) was greater than boys (1.70 and 1.80, $p < 0.05$). Fluorosis was seen in 52% of the child population.

Conclusions: The present study indicates that the overall prevalence of dental caries was found to be higher among boys than girls. Fluorosis was also recorded higher. A province wide evidence based cost effective school based interventions are needed for prevention and control of caries and fluorosis in school children.

Key words: Dental caries, Fluorosis, School children

INTRODUCTION

Years of conflict in the northwest region of Pakistan, combined with earthquakes, floods and around 1.6 million registered Afghan refugees has had an increasingly detrimental effect on the economics, general and oral health of the adults and children of Khyber Pakhtunkhwa (KPK). Dental caries is the most predominant dental condition in children¹. Tooth decay and the pain associated with it severely interferes with the daily activities of eating, sleeping, speaking, learning, playing, and going to school and work². Previous studies have investigated the incidence of caries in

children in different parts of the world and almost all have reported a high incidence of caries³⁻⁵.

Schools provide an effective platform for promoting oral health for a number of reasons. First, schools provide ready access to approximately 1 billion children worldwide⁶. Second, it is during the school years that children are developing lifelong beliefs, attitudes and skills. Hence, the oral health message can be reinforced through these formative years. Pakistan, a developing country, is facing many challenges in meeting the oral health needs. The government is a major employer of dentists as well as a major provider of low cost oral health care for the population.

The northwest region of Pakistan is badly affected by the long standing conflict and natural disasters in recent times that have left significant negative psychological effects on the general population. The present study provides some oral health surveillance data from the KPK region of Pakistan, a region that

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has experienced war and natural disasters that have disrupted health services and in turn oral hygiene and oral health practices. There is little published research on the prevalence of dental caries in school-aged children in this region; the present study was designed to fill this gap in the literature by assessing the prevalence of dental caries among school children. Moreover; scientific evidence is needed to persuade health authorities to establish a school based dental service programme promoting good oral hygiene practices among school children in KPK.

METHODS AND MATERIALS

A school based cross-sectional study was conducted. Oral examination of 1800 school-aged children between 8-16 years was conducted to identify the presence of dental carries. A total of 12 schools were systematically selected and participated in this study. It is important to take note that in Pakistan, there are different schooling systems which maintain their own rules and regulations for different aspect of health management. Moreover; in many parts of Pakistan there are separate schools for girls and boys especially in KPK, the site of this study. The selection of schools and participants in the present study are shown in Table 1.

The three groups were further divided into two subgroups; Subgroup "A" which consisted of girls and Subgroup "B" which consisted of boys.

Before commencing with data collection, a pilot study was conducted to test the oral examination procedures planned for the main study. In this pilot study, a total of 40 students were recruited and examined for the presence of dental caries. The parameters including DMFT, MDT, MMT and MNT were assessed among the children selected for the pilot study.

A systematic sampling was used in this study for selection of study sites. Similarly, for the selection of children, systematic sampling was carried out, where randomization was carried out by their school enrolment. The calculated sample size was 1700 children based on estimated population of school going children in urban areas of the province. In each school it was estimated to examine 150 students with complete history taking and clinical examination.

The study team was divided into two groups and each of these groups was further divided into 3 subgroups. Subgroup I comprised of two members and

was assigned to take history and socio-demographics of the children using the standardized validated form. Subgroup II comprised of two members, where one has to examine the oral condition and the other to record the information on missing and decayed teeth. Subgroup III comprised of two members who advised the students about oral hygiene and dental caries including advice on prevention and treatment of dental caries especially to those who required treatment. Before commencing the study, a presentation on good practices in oral hygiene care was delivered to the students in each school.

Oral cavity was examined under good light. The examiner examined soft and hard tissues and focused on caries, missing and filled teeth. Gums were also examined for the presence of plaque and calculus as well as for gingivitis. Tooth pastes, mouth washes and tooth brushes were distributed in those students who had maintained good oral hygiene.

The research project was approved by Sardar Begum Dental College, Gandhara University (Pakistan). Permission to conduct the study in the selected schools was obtained from each school. Participation in this study was voluntary and written or verbal consent was obtained from each participant. The data were analysed using SSPS version 16 and the Mann-Whitney test was used to assess the significance of differences between boys and girls for each measure of oral health.

RESULTS

The overall percentage prevalence of DMFT among the students was 1.75. The mean number of decayed teeth (MDT) was 1.45, mean number of missing teeth (MMT) was 0.17, and the mean number of teeth per child was 25.5. Among boys, the overall percentage prevalence of DMFT, MDT and MMT indifferent schools was 1.80, 1.50 and 0.10 respectively. The percentage prevalence of DMFT, MDT and MMT among girls was 1.70, 1.4 and 0.25 respectively. The differences between boys and girls on all parameters, except MNT, were statistically significant. The prevalence of DMFT, MDT, MMT and MNT are presented in Table 2.

In Armed Forces schools, a total of 800 students were examined, however, 200 students did not meet the criteria and were excluded from the study. Among the 300 boys, the % DMFT, MDT and MMT were

1.80, 1.50 and 0.20. Compared to boys, % DMFT, MDT and MMT were higher among girls (1.83, 1.72 and 0.35), where the differences for MDT and MNT were found to be statistically significant ($p=0.001$). In Government schools a total of 900 students were examined, however, 300 students below 8 years of age were excluded. The % DMFT among boys (1.90) was much greater than girls (1.60) and was statistically significant ($p=0.001$). The MDT among boys was also higher (2.12) compared to girls (1.25) which was

Table-1: Sample participants

Group	Type of school	Number of schools	Number of students participated
I	Armed Forces Funded Schools	4	600
II	Government Funded Schools	4	600
III	Private Funded Schools	4	600

Table-2: Gender wise comparison of dental caries parameters (n=1800, age 6-12 years)

Variables	Boys students	Girls Students	p-value
Total sample	(n=900)	(n=900)	
DMFT	1.80	1.70	0.001
MDT	1.50	1.40	0.001
MMT	0.10	0.25	0.001
MNT	25.5	25	>0.05
Armed Forces Schools (n=600)			
Total Sample	(n=300)	(n=300)	
DMFT	1.80	1.83	>0.05
MDT	1.50	1.72	0.001
MMT	0.20	0.35	>0.05
MNT	27	20	0.001
Government Schools (n=600)			
Total Sample	(n=300)	(n=300)	
DMFT	1.9	1.60	0.001
MDT	2.12	1.25	0.001
MMT	0.10	0.00	>0.05
MNT	24	28	0.001
Private schools (n=600)			
Total Sample	(n=300)	(n=300)	
DMFT	1.70	1.80	0.001
MDT	1.10	1.35	0.001
MMT	0.03	0.40	0.001
MNT	27.90	27	>0.05

MDT = mean decay teeth, MMT = mean missing teeth, MNT = mean number of teeth, DMFT =

statistically significant ($p=0.001$). In private schools, a total of 700 students were examined, however, 100 students below 8 years of age were excluded. The % DMFT was 1.70 among boys compared to 1.80 in girls ($p=0.001$). However, the MDT was higher among girls (1.35) compared to boys (1.10) and was statistically significant ($p=0.001$). On average, boys were found to have more MNT compared to girls. However boys had less MMT compared to girls.

In this study, 44% (n= 84) of the 12-year-old and 57% (n=206) of the 15-year-old were caries free, and the mean DMFT was 0.44 and 0.56 respectively. Fluorosis was seen in 52% of the study population, with 15% of the 12-year-old and 21% of the 15-year-old suffering moderate to severe fluorosis.

Regarding oral hygiene habits, 86% of all children questioned claimed to clean their teeth with a toothbrush, most of them on a regularly basis. Only 3% had never used a device to maintain oral hygiene. Regarding visits to a dentist, 82% had never visited a dentist. Only 4% visited a dentist regularly.

DISCUSSION

During the past decades the common consensus from many reports worldwide was that dental caries had declined significantly and was continuing to decline in populations⁷⁻¹⁰. This is one of the few independent data on dental caries and oral hygiene from the north-west region of Pakistan. Pakistan has always been a low caries country and the level of caries has been declining steadily over the past few decades¹⁰⁻¹¹.

Previous studies have shown the national capital DMFT score to be 1.2 and 2.1 for the 12 and 15 years old respectively¹⁰. Our study population had one-third of that score. There was a high level of fluorosis seen in this population which may be an indicator that the urban areas in KPK province have more than an optimal level of fluoride in their drinking water and may explain why the prevalence of caries is so low.

Exposure to drinking water containing 1 ppm of fluoride in temperate countries has been shown to reduce caries experience by 40-65%¹²⁻¹⁵. In a systematic review of the literature, water fluoridation is reported to reduce the incidence of caries by an average of 2.3 decayed missing and filled primary or permanent teeth (dmft/DMFT) among children aged 5-14 years¹⁶. Water is one of the main dietary components and its quality plays an important role. Ingestion of water

containing 1.0 mg/L or less of fluoride during tooth calcification may contribute to the emergence of dental fluorosis, but it was not categorized as serious¹⁷. At a fluoride level of 0.9 mg/L to 1.2 mg/L, very mild fluorosis occurs¹⁸. In Pakistan, the appropriate fluoride concentration in drinking water was determined to be 0.35 ppm²². However; this may not be true for northern areas of Pakistan²⁰. Fluoride is a common geogenic contaminant of drinking water, and its effects on human beings have been recognized in many parts of the globe²¹. Studies have reported dental and skeletal fluorosis in the northwest province of Pakistan²²⁻²³.

Within this study population, caries was significantly more prevalent in males than in females, which suggest that dental caries may show some gender relationship. Similar findings have been reported in other studies²⁴⁻²⁵. The present study indicates that the DMFT of girls was lower than boys. This higher caries prevalence in males in primary dentition was due to early eruption and longer retention of these teeth in males²⁶.

Evidence has shown that a strong knowledge of oral health is related to better oral care practice²⁷. Similarly, those with a more positive attitude towards oral health are influenced by better knowledge in taking care of their teeth. Studies have shown that effective oral health education can help to cultivate healthy oral health practice²⁸. The change to healthy attitude and practice can be promoted by giving adequate information, motivation and practice to school children. In order to create such health education, the assessment of knowledge, attitude and practice is essential²⁹.

There are 25 districts in Khyber Pakhtunkhwa province and each district has a certain number of union councils, making a total of 986 union councils. Each union council is comprised of many private, public and mosque schools. Since the sample frame in this study did not include all of these schools, it would be unfitting to generalize the results of this study to the whole province.

CONCLUSION AND RECOMMENDATIONS

However, the present study has provided important and useful baseline data for future comparisons of the caries status of children in this province. This study indicates a very high percentage of untreated caries which requires immediate attention. It is also

important to determine the fluoride levels in natural drinking water sources in northwest region of Pakistan. Dental fluorosis is becoming a major problem in northwest Pakistan whose management must be prioritized. Water testing and defluoridation may be implemented to minimize fluoride exposure. Furthermore, the caries prevalence and severity information would assist in the determination of treatment needs and preventive efforts required in this population. It is proposed that a school dental service may be initiated in Khyber Pakhtunkhwa.

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