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PREVALENCE OF DENTAL CARIES AMONG ADOLESCENT STUDENTS.

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ABSTRACT

INTRODUCTION: Dental caries is an irreversible microbial disease of calcified tissues of teeth. Despite numerous scientific progressions, it continues to be the focal public health problem, particularly in developing countries. In 2016 it was leading disease affecting 2.4 billion people globally. The disease is of concerned severe in adolescents, but no such studies have been conducted in Pakistan, which involves the entire period of adolescence. **METHODS:** It was a school-based cross-sectional study conducted from 19th September 2019 to 19th February 2020. The sample size consists of 350 school students aged between 12-18 years from Private and government schools of Shaheed Benazirabad. An intraoral examination was performed by the researcher himself under strict protocol. DMFT scale was used to assess and measure dental caries. Data was analyzed through SPSS v25. Statistical association with age, gender and type of school was confirmed by chi-square test, independent sample t-test and bivariate analysis. **RESULTS:** Overall prevalence of dental caries was 72% with mean DMFT 3.28±3.05. Prevalence was high 89.2%in 18 years old students, 76.7% in boys and 77% in government schools. Statistical analysis showed a significant association with age, gender and type of school. **CONCLUSION:** Dental caries is a significant threat to the health of adolescents. Robust preventive strategies incorporating health education, school health services and legislation should be adopted to overcome the problem.

KEYWORDS: Dental caries, Adolescents, Students, Shaheed Benazir Abad, Nawabshah

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INTRODUCTION

Dental caries is an irreversible microbial disease of calcified tissues of teeth, characterized by demineralization of inorganic portion and destruction of the organic substance of the tooth, which often leads to cavitation[1].Dental caries forms through a multifaceted interplay over time between acid-producing bacteria, fermentable carbohydrate, and various host-related factors, including saliva and teeth[2].If left untreated, it can lead to infection and severe pain, which influence children's performance and school attendance, as well as the quality of life[3].Despite numerous scientific progressions and the fact that caries is preventable, it continues to be the focal public health problem, particularly in the developing countries, dietary patterns and changing lifestyles are considerably increasing the incidence of caries[4]. According to Global Burden of Disease study which investigated the prevalence, and years lived with disability for 328 diseases and injuries for 195 countries reported that dental caries in permanent teeth was leading disease throughout the world with most significant prevalence affecting 2.44 billion (CI 95%, 2.29-2.59 billion) people globally and responsible for 1708 thousand (CI 95%, 760-3325 thousand) years lost due to disability

(YLDS) [5]. Adolescence is the period in human life when the relationships between biological, behavioural, socioeconomic, and psychological conditions have a powerful effect on caries etiology[2]. Studies conducted on adolescents throughout the world show marked variation in the prevalence of caries ranging from 44% in Chinese 12-14 years adolescents with mean DMFT 1.14 to 85.2% with mean DMFT 3.58 in Cambodian 12-18 years old adolescents[3,6]. Data regarding dental caries is scarce in Pakistan, expressly in adolescent, and most of the studies are conducted in commercial cities. Results from two recently conducted studies showed 66.7% and 70% prevalence, but these studies were conducted in Karachi and limited to 12-15 years old adolescents[7,8].In short, dental caries is primarily investigated in 12-15 years old adolescents and data regarding middle and late adolescence period, which is of paramount concern for oral health is still limited.

To our knowledge, no studies on caries experience have been conducted in Pakistan, which includes the entire crucial period of adolescence. The objectives of the current study were to determine the frequency of dental caries in adolescent students and its statistical association with age, gender and type of school.

MATERIAL AND METHODS

Study Design, Duration and Settings.

This cross-sectional study was carried out on students of different private and government schools of Shaheed Benazirabad district from 19th September 2019 to 19th February 2020.

Sampling Technique, Sample Size and Selection. The sample size was calculated through Cochran's formula by keeping prevalence at 70% based on past studies, for a confidence interval of 95%, margin of error 5% and z value at 1.96. The total sample was calculated to be 322. To account for losses and discrepancies, sample size was increased to 350. Study subjects were selected through convenience sampling technique. Consenting students of either gender aged between 12-18 years who had permanent dentition were included in the study whereas, non-consenting students, students who had mixed dentition and patients of cleft lip and cleft palate, were excluded from the study.

Ethical Considerations: The study was conducted after approval from the Ethical Review Board PUMHS Nawabshah. Informed consent was taken from students, and the principal of concerned college/school and they were explained about the purpose and procedures of the study. Instruments used on one participant were either discarded or sterilized before their use on other participants.

Data Collection Procedure: After approval, a pilot study was conducted to verify questioner and methods, ten questioners were tested, and they were excluded from study. Students presenting to the study setting and meeting the eligibility criteria were asked to rinse their mouth with water, and then tooth surface was dried with cotton rolls. An intraoral examination was performed by researcher himself on students seated on an ordinary stool under the artificial light with the help of mouth mirror, cotton rolls and a blunt ball ended probe with a diameter of 0.5 mm. The presence of decay (chalky white, brown spot and cavity on the tooth surface), missed and filled tooth due to dental caries was identified as the case of dental caries. Dental caries was assessed and measured with the help of the Decayed, Missing and Filled Teeth (DMFT) index, and severity was measured using the only decayed component. All third molars were excluded from the study.

Statistical Analysis

Data was entered and analyzed by the Statistical Package for Social Sciences (SPSS) version 25.0 and expressed as number (No), percentage (%), mean and standard deviation (X ± SD). Chi-square test was used to investigate the association of dental caries with gender and school type. Independent sample t-test was used to estimate the mean difference of DMFT in gender and school type. Correlation between age and DMFT was confirmed through bivariate analysis using Pearson correlation coefficient. A confidence level of 95% was used for the study. P-value $\leq$ 0.05 was considered as statistically significant.

RESULTS

A total number of 350 students were examined in the current study. Among the participants, 275 (79%) were boys, and 75 (21%) were girls. The mean age of participants was 15 years. The overall prevalence of dental caries was 72%. Among various subjects, 9.5% had very mild caries, 31.3% had mild caries, 29%had moderate caries, and 30.2% had severe caries. The mean DFMT was found to be 3.28 with a standard deviation of ±3.05 (Table 1).Prevalence of dental increased as the age of student increased from 50% with a mean DMFT 2.00 in 12 years old adolescents to 89.2% with a mean DMFT 4.78 in 18 years old adolescents. Bivariate analysis showed positive correlation between DMFT score and age (r= 0.257, p-value < 0.01) (Table 3). Prevalence of dental caries was significantly

higher in boys 76.7% whereas, the prevalence in girls was 54.7 ($\chi 2$= 14.226, p-value <0.01). Mean DMFT was also significantly higher in boys 3.60 as compared to 2.11 in girls (t= 3.836, p-value <0.01) (Table 4).Students from government schools experienced significantly higher caries 77% ($\chi 2$= 5.787, p value < 0.05) with mean DMFT 3.59 (t= 2.184, P value < 0.05) as compare to students from private school 65.3% with mean DMFT 2.87 (Table 5)

DISCUSSION

Adolescence is a period of growth and development, with significant internal and external changes in the intellectual, emotional area and the sexual maturation; therefore, it is a period of significant

Table 1: Prevalence of dental caries

Dental caries		Frequency	Percentage (%)	Mean DMFT	Standard Deviation SD
No		98	28%	0	0
Yes	Overall	252	72%	3.28	3.05
	Very mild	24	9.5%	1	0
	Mild	79	31.3%	2.50	0.677
	Moderate	73	29%	4.38	0.517
	Severe	76	30.2%	8	1.592

Table 2: Proportion of individual component of DMFT

Decayed Teeth	Missing Teeth	Filled Teeth
97.91%	1.30%	0.78%

Table 3: Association between dental caries and age

Age	N	Dental Caries				Mean DMFT	P Value
		Yes		No			
		Frequency	%	Frequency	%		
12 years	22	11	50 %	11	50 %	2.00	<0.01* r=0.257
13 years	49	27	55.1 %	22	44.9 %	2.18	
13 years	49	27	55.1 %	22	44.9 %	2.18	
14 years	62	41	66.1 %	21	33.9 %	2.66	
15 years	76	58	76.3 %	18	23.7 %	3.57	
16 years	68	54	79.4 %	14	20.6 %	3.60	
17 years	36	28	77.8 %	8	22.2 %	3.89	
18 years	37	33	89.2 %	4	10.8 %	4.78	
Total	350	252	72 %	98	28 %	3.28	

*Pearson correlation coefficient

Table 4: Association between dental caries and gender

Gender	N	Dental Caries				P Value	Mean DMFT	P Value
		Yes		No				
		Frequency	%	Frequency	%			
Boys	275	211	76.7 %	64	23.3 %	<0.01 *	3.60	<0.01 **
Girls	75	41	54.7 %	34	45.3 %		2.11	
Total	350	252	72 %	98	28 %		3.28	

*Chi square test ($\chi 2$= 14.226), ** Independent sample t test (t= 3.836)

Table 5: Association between dental caries and type of school

School	N	Dental Caries				P Value	Mean DMFT	P Value
		Yes		No				
		Frequency	%	Frequency	%			
Government	200	154	77 %	46	23 %	< 0.05 *	3.59	< 0.05 **
Private	150	98	65.3 %	52	34.7 %		2.87	
Total	350	252	72 %	98	28 %		3.28	

*Chi square test ($\chi 2$= 5.787), ** Independent sample t test (t= 2.184)

changes[9]. The emotionally unstable behavior of adolescents with mood swings that vary from positive to negative attitudes may predispose them to neglect self-care activities, which consequently leads to an increase in the prevalence of dental caries[10].

The results of the current study indicate 72% prevalence of dental caries in adolescent aged between 12-18 years and out of that 9.5% had very mild caries, 31.3% had mild, 29% had moderate, and 30.2% had severe caries (Table: 4.1). The findings of the current study can be compared with the study conducted in Karachi by Leghari et all., where prevalence was 70% in adolescents aged between 12-15 years[8].On the contrary, Shaikh et all., reported 100% prevalence in Larkana city, this is because the study was conducted on patients visiting dental OPD and dental caries is leading cause for seeking treatment[11].An 18% is rise is observed in dental caries in the last three decades since the national pathfinder survey conducted in 1988[12]. Comparing the results with international studies conducted on adolescents, the prevalence in the current study is higher than observed in India, China, Nepal and Spain where the frequency of caries was 39.6% in 12 years old and 51.7% in 15 years old[13,3,14,15].Changes in dietary habits, dental health services availability and utilization, ignorance regarding oral and dental health, socio-demographic and cultural factors, study design, sample size and distribution are some of the possible factors that can explain the increased trend of dental caries in the current study settings.

The decline in DMFT is evident from the reports of the first decade of the 21st century. The distribution DMFT score in 12 years old varies in different regions of the World Health Organization (WHO), ranging from 1.1 in North America to 2.4 in Latin America[16]. However, the DMFT obtained from the current study is slightly higher than all six regions of WHO Statistics on DMFT in Pakistan is scarce, particularly in adolescents. Studies conducted on adolescents from Karachi and Peshawar reported 1.26, 1.4 and 1.75 DMFT score[7, 8, 17]. This nationwide fluctuation in DMFT is due to difference in age, sample size and distribution, rural-urban and cultural differences, local customs and traditions regarding diet and lifestyle.

Individual assessment of DMFT components revealed that decayed teeth, as expected, accounted for 97% of total DMFT, which is a typical pattern observed in developing countries, highlighting the absence of preventive services (Table 2). The filled teeth accounted for 1.5%, which explain the fact that curative dental services hardly available are not being utilized. The missing component consists of 0.25%, this is because the examination was carried out on adolescents who are in the early stages of permanent dentition, and the missing component is supposed to increase as the age advance.

Caries experience increased as the age of participants increased from 50% in 12 years old to 89.2% in 18 years old (Table 3). Similarly, DMFT also increased with age and showed a positive correlation on bivariate analysis. Similar results are reported by Drummond et al, after analyzing Brazilian adolescents, and Abbass et al reported a positive correlation between DMFT and increasing age in Egyptian adolescents[18, 19].

Teeth erupt earlier in girls making them exposed to the cariogenic environment for longer times than boys besides, the inconstancy of hormones during puberty, affection towards sweets especially chocolates and frequent snacking during cooking increases the risk of dental caries in girls. Many studies throughout the world have shown an increased prevalence of dental caries in girls. Nevertheless, the results are contrasted in our study in which frequency of dental caries among girls 54.7% as well as mean DMFT 2.11 was significantly lower as compare to boys where prevalence was 76.7% with mean DMFT 3.60 (Table: 4). It is because the girls in study setting are cosmetically conscious and maintain proper oral hygiene moreover, lack of freedom particularly in rural setup/culture and shorter outdoor stays as compare to boys results in

reduced exposure to cariogenic factors such as supari, pan, smoking and cool drinks

Students from government schools experienced significantly higher caries 77% with mean DMFT 3.59 as compared to 65.3% with a mean DMFT 2.87 in students from the private school (Table 5). Ahmed et all., reported the same situation in schools of Hyderabad, Pakistan and Ingle et all., in schools of Bharatpur city in India[20,21].This decreased proportion of caries in private schools can be attributed to health education, treated water, improved sanitation and health promotion activities. Moreover, the impact of economic status and culture of government school students cannot be isolated.

Limitation of study

This study initially designed to be conducted in two private and two government schools, but school authorities did not permit, which resulted in the unequal distribution of variables in the sample, such as gender. Radiographs were not taken in the study, which may have decreased the sensitivity to detect early carious lesions and interproximal lesions.

CONCLUSION

Like many other parts of the world, dental caries is a public health threat to adolescents who are passing through the critical phase of life. Nearly 3 out of 4 adolescents are the victim of dental caries. Robust preventive strategies incorporating health education, school health services and legislation should be adopted to overcome the problem.

ETHICS APPROVAL: The ERC gave ethical review approval

CONSENT TO PARTICIPATE: written and verbal consent was taken from subjects and next of kin

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CONFLICT OF INTEREST: No competing interest declared.

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