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Original Article

Assessment of Oral Hygiene and Dental Decay among School Children of Rural Area of Pakistan

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ABSTRACT

Background: Oral health is a fundamental component of overall health and well-being, with dental caries recognized as a prevalent issue affecting a large number of populations globally. The study aimed to assess Oral Hygiene and Dental Decay among School Children.

Methods: This community based cross-sectional study was conducted among children of government schools in rural area of Punjab tehsil and, District Attock using non-probability consecutive sampling technique. The duration of the study was 6 months. A Self designed questionnaire were developed based on the literature were used. Data were analyzed with Datatab.

Result: A total of 134 school children including 89 females (66.42%) and 45 males (33.58%). The mean age of the all children was 10.75±1.04 years; with age of female respondents to be 10.65 ± 1.06 years, and male to be 10.93 ± 0.99 years. Majority of the children belonged to the middle class families (n=115, 85.82%), whereas, 19 were from low income families (14.18%). results showed 45.52% (n=61) of school children to have varying level of dental decay. Out of these 61 individuals, 34.33% had initial, 8.21% had moderate, and 2.99% had some advanced stage of dental decay. A significantly strong association was found between the oral hygiene and dental decay ($p<0.001$), concluding that those children having good oral hygiene showed good dental health. There was no significant association between dental decay and gender ($p=0.763$), showing that the oral health is irrespective of the gender.

Conclusion: Poor oral hygiene is significantly associated with some form Dental caries and is independent of gender.

Keywords: Children, Dental caries, Oral Hygiene.

INTRODUCTION

Periodontal pathologies are a major public health problem, as they have a great impact on personal and social life of an individual as well as general health(1),(2). Dental plaque formation is one of the most common risk factor responsible for periodontal diseases specifically tooth decay(3). The micro-organisms from the oral surface along with the food particles together make the dental plaque that accumulates on gingival margin causing acute gingivitis (gingival inflammation) that can become chronic later(4). Gingivitis can be treated without leaving any permanent damage, however, it can lead to periodontitis if remains untreated. Periodontitis can cause destruction of alveolar bone that can ultimately lead to loss of tooth. Studies show that proper oral hygiene plays a significant role in controlling the dental plaque and ultimate oral health maintenance(5),(6),(7). Therefore management of gingivitis management is crucially important in preventing periodontal pathologies which in turn has a positive impact on general health as gingival inflammation leads to release of certain inflammatory mediators in circulation system(8),(9). Plaque control can be attributed to routine tooth and tongue brushing as well as dental flossing. Dental floss has a great impact on plaque removal. According to American Dental Association (ADA), 80% of the plaques can be removed by regular dental flossing(10),(11),(12). The oral hygiene practices mainly depend on socioeconomic status, which is closely related to the oral health knowledge, attitudes and behaviors. Periodontal diseases should be managed as early as possible in both children and adults to improve oral health and to avoid associated systemic diseases. Most of the periodontal diseases can be prevented and treated at earliest stage to prevent lifetime complications. Community should be made aware of the benefits of maintaining oral health through different channels like social media, awareness campaigns in teaching institutes and general communities, and oral health professions (13),(14).

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METHODS

This community-based cross-sectional study was conducted over a three-month period from October to December 2023. The study setting was government schools in the rural area of Punjab, Pakistan (Tehsil Jand, District Attock). The study population comprised school children aged 9-12 years from the government sector in the rural area of Tehsil Jand, District Attock, Punjab, Pakistan.The sample size was calculated using the Raosoft online sample size calculator and the following formula:

n = \frac{N}{1+N(e)^2}

where n is the sample size (134), N is the population size (205), and e is the margin of error (0.05). The confidence interval was set at 95%. Probability cluster sampling techniques were used for sample selection. The inclusion criteria were children aged 9 to 12 years from government schools in the rural area. The exclusion criteria were children with congenital disorders like cleft lips and palate, accidental cases, and any systemic disease that affects oral health. Operational definitions were as follows: Oral hygiene was defined according to the World Health Organization (WHO) as the state of the mouth, teeth, and oro-facial structures that enable individuals to perform essential functions. In this study, children with no tooth decay, no sensitivity, no toothache, and no halitosis were considered to have good oral hygiene. Dental decay was defined according to the WHO as a condition that can lead to caries, pain, and sometimes tooth loss and infection due to a continued high intake of free sugars, inadequate exposure to fluoride, and a lack of plaque removal by tooth brushing. A child was defined according to the United Nations International Children Emergency Fund (UNICEF) as any person aged 0 to 15 years. A rural area was defined as an area with low population, open land, agricultural activities, and limited services and facilities in close vicinity. Data was collected using a structured questionnaire that included questions regarding demographics and oral hygiene practices. The dependent variable of the study was dental decay, while the independent variables included age, gender, socioeconomic status, years of education, knowledge to adopt healthy oral practices, eating habits, and oral hygiene practices. After obtaining informed consent from the teachers at school, a complete history of the children was recorded, including brushing technique, brush timings, and eating habits. The children were then subjected to a complete oral examination by a professional dentist. The degree of dental decay was measured using a dental mirror and dental probe.

The collected data was coded and entered into an Excel sheet, which was then analyzed using Datatab. Mean and standard deviation were reported for all continuous variables, while frequencies and percentages were reported for all categorical variables. A Chi-square test of association was used to find the association of dental decay with oral hygiene and gender. Ethical considerations were taken into account throughout the study. The study was approved by the Ethical Review Board of the People University of Health Sciences for Women. Formal permission was also obtained from the administration of the schools included in the study. The study was carried out under the strict criteria of the Declaration of Helsinki, and no human being was harmed during the study. The data collected was kept confidential and used only for research purposes.

RESULTS

Table 1 Oral Health Practices, Awareness, and Dental Decay Classification among Children: A Descriptive Analysis

Variable	Frequency	Percentage %
Children	134 (10.75 ± 1.04)	100%
Gender		
Male	45 (10.93 ± 0.99)	33.58%
Female	89 (10.65 ± 1.06)	66.42%
Socio-economic Status		
MIDDLE	115	85.82%
Low	19	14.18%
Classification of Dental Decay among study participants		
Sound	73	54.48%
Initial	46	34.33%
Moderate	11	8.21%
Advanced	4	2.99%

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Variable	Frequency	Percentage %
(Mean ± Standard deviation)		

Table 1 presents a descriptive analysis of oral health practices, awareness, and dental decay classification among children. The variables include gender, socio-economic status, and classification of dental decay. The study involved a total of 134 children, with an average age of 10.75 ± 1.04 years. The gender distribution was 33.58% male (average age 10.93 ± 0.99 years) and 66.42% female (average age 10.65 ± 1.06 years). In terms of socio-economic status, 85.82% belonged to the middle class, while 14.18% were from the low-income group. The classification of dental decay among the study participants was as follows: 54.48% had sound teeth, 34.33% had initial decay, 8.21% had moderate decay, and 2.99% had advanced decay. The data provides valuable insights into the oral health status and awareness among children in the studied population.

Table 2 Oral Health Practices and Awareness Among a Study Population

Variables	Yes frequency(%)	No frequency(%)
Dental Hygiene practices among study population		
Toothbrush twice/day	5(3.73%)	129(96.27%)
Soft Brush	134(100%)	
Toothpaste Fluoride Based	128(95.52%)	6(4.48%)
Know Proper procedure for Brushing	11(8.21%)	123(91.79%)
Change your Brush after 3-4 months	6(4.48%)	128(95.52%)
Using Mouthwash		134(100%)
Traditional modalities for tooth cleaning	46(34.33%)	88(65.67%)
Snacks/sweets/Cold drinks	134(100%)	
Awareness regarding Dental Hygiene	65(48.51%)	69(51.49%)
Oral Health and Dental care practices among subjects		
Had ever Tooth cavity/Sensitivity/Ache	62(46.27%)	72(53.73%)
Visit Dentist for a check-up.	38(28.36%)	96(71.64%)
Any dental care facility in your location	128(95.52%)	6(4.48%)
Satisfaction with Oral Hygiene	65(48.51%)	69(51.49%)
Awareness of Diseases due to Poor Oral Hygiene	61(45.52%)	73(54.48%)

Table 2 presents the frequency distribution of responses to various questions related to oral health practices and awareness among the study population. The variables include daily dental hygiene practices such as frequency of brushing, type of toothbrush and toothpaste used, and knowledge of proper brushing procedure. It also includes information on the use of mouthwash, traditional modalities for tooth cleaning, and consumption of snacks/sweets/cold drinks. The table further provides data on the participants' awareness regarding dental hygiene, their experiences with oral health issues like tooth cavity, sensitivity or ache, their dental check-up habits, availability of dental care facilities in their location, their satisfaction with their oral hygiene, and their awareness of diseases due to poor oral hygiene. The responses are categorized into 'Yes' and 'No' with their respective frequencies and percentages. This data can provide valuable insights into the oral health behavior and awareness level of the study population.

Table 3 Chi-Square Test Results for Oral Hygiene, Dental Decay, and Gender

Variable	X^2	Df	P-value
Oral hygiene and Dental decay	12.19	1	<.001
Dental decay and Gender	0.09	1	.763

Table 3 presents the results of Chi-square tests examining the associations between oral hygiene and dental decay, and between dental decay and gender. The variables are compared using the Chi-square statistic (X2), degrees of freedom (Df), and the associated P-value. The results suggest a significant association between oral hygiene and dental decay ($P < .001$), while no significant association is found between dental decay and gender ($P = .763$). These findings can provide insights into the relationships between these variables in the study population.

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Table 4 Logistic regression model summary and performance metrics

	Coefficient	Odds Ratio
Intercept	0.44	
Variable Yes	-1.25	0.29
Model Fit		
-2 Log-likelihood Cox & Snell R2 Nagelkerke R2 Mc Faddan's R2	172.61 0.09 0.12 0.07	
Overall Test	Chi Square	P-value
	12.41	<0.001
Total number of cases	Correct Assignment	In Percent
134	87	64.93%
Classification table predicted	No	Yes
Observed	45 62.5%	27 67.64%

Table 4 shows logistic regression analysis aimed to assess the impact of the variable "Yes" on the likelihood of having ever experienced tooth cavity/sensitivity/ache. The model demonstrated overall significance (Chi Square = 12.41, $p < 0.001$) based on a total of 134 cases. The classification table revealed that out of the predicted outcomes, 62.5% were correctly assigned for "No," and 67.74% were correctly assigned for "Yes." The model summary includes -2 Log-Likelihood, Cox & Snell R2, Nagelkerke R2, and McFadden's R2 values. The coefficients for the variable "Yes" and the constant were -1.25 and 0.44, respectively. The odds ratio for "Yes" was 0.29, indicating a decrease in the probability of the dependent variable being "Yes." The prediction table presented the probability of the predicted outcome being "Yes." The ROC curve, with an area under the curve (AUC) of 0.524, displayed sensitivity and specificity coordinates. Overall, the logistic regression analysis provides insights into the significant influence of the variable "Yes" on predicting the likelihood of experiencing tooth cavity/sensitivity/ache.

DISCUSSION

This study aimed to investigate the oral health status and related factors in 9-12-year-old school children in Tehsil Jand, District Attock, Punjab, Pakistan. The study was carried out to identify the oral health problems, oral hygiene practices and factors associated with poor oral hygiene. The study included a total of 134 school children including 89 females (66.42%) and 45 males (33.58%). The mean age of the all children was 10.75±1.04 years; with age of female respondents to be 10.65 ± 1.06 years, and male to be 10.93 ± 0.99 years. Majority of the children belonged to the middle class families (n=115, 85.82%), whereas, 19 were from low income families (14.18%).

The results showed 45.52% (n=61) of school children to have varying level of dental decay. Out of these 61 individuals, 34.33% had initial, 8.21% had moderate, and 2.99% had some advanced stage of dental decay. A significantly strong association was found between the oral hygiene and dental decay ($p<0.001$), concluding that those children having good oral hygiene showed good dental health. There was no significant association between dental decay and gender ($p=0.763$), showing that the oral health is irrespective of the gender. Regarding awareness, only 45.52% children had knowledge regarding oral diseases due to poor oral hygiene while 48.51% showed awareness regarding dental hygiene. There were a small proportion of children carrying out proper dental hygiene practices including use of toothbrush twice a day (3.73%), knowledge about brushing technique (8.21%), replacing toothbrush every 3 months (4.48%), use of mouthwash (0%), sugary diet intake (100%). All the enrolled children were using toothbrush with soft bristles (100%), out of which 95.52% were using Fluoride containing toothpaste, however, 34.33% were also some traditional tooth cleaning modalities.

The study also concluded oral health and dental care practices being carried out in the children. A total of 62 children have had suffered from tooth ache, cavity or sensitivity (46.27%), from which 38 children visited the dental clinics at some stage for assistance (28.36%). The presence of dental facility in their locality was reported by 128 children (95.52%). Out of 134 children enrolled, 65 expressed satisfactions with their oral hygiene (48.51%), and 61 demonstrated awareness of diseases related to poor oral hygiene (45.52%).

A number of studies have been conducted in the past to find out the prevalence of dental caries among children and adults in various regions of the world. The results of the present study were found in accordance with the past studies. Doley et al., (2022) conducted

a study on 1,501 children with age group of13–14 years. Their study reported similar results and showed the prevalence to be 33.6% among school children with greater percentage among the urban (33.1%) based individuals than in rural (30.1%)(15). Similar results were reported by Mehta et al., (2018), who found a pooled prevalence of caries to be 50.84% and 62.41% at 5-year interval in a meta-analysis(16). In another study conducted in South India (Rajesh et al., 2016), the prevalence of children with caries was similar to that reported in this study (32.9%), from which the majority cases were with the age group 6-10 years (49.7%). The study reported a higher prevalence in females (34%) than in males (31.8%)(17).

John et al., (2015) reported the prevalence to be very high i.e., 89.3% in the tribal school children , 77% in suburban while 55% in the urban school children. The study was carried out in school children with age group of 9-12 years(18). Another study conducted in India by Shailee et al., 2013, included a sample of 1,011 school children (with both genders) showed similar results. Dental caries was prevalent as 32.6% among children with age 12 years and 42.2% among 15 year-old children(19). Similar results were reported by Saravanan et al., (2008), who reported 71.7% caries in primary and 26.5% caries in permanent teeth(20). In another study, conducted in the year 2004 by Varenne and colleagues, a total of 1,914 individuals were enrolled with different age groups. Of these 1,914 individuals, 424 were 6 years old, 505 were 12 years old, 492 were 18 years and 493 were from age group 35-44 years. Their results showed that 38% children were found to have caries with prevalence being higher in urban locality as compared to the rural areas(21).

Yee and colleague (2002), found the results to be similar to those reported in our study. They included a total of 5409 school children, from which 2,177 were with age group 5–6-years and 3,323 were 12–13-year-old from both the rural and urban locality. The caries prevalence among children aged 5–6-years was 67%, from which 64% belonged to the urban areas and 78% were from the rural locality(22). The prevalence was found to be 41% among the children with older age group(23). The prevalence of caries was found to be as high as 68.5% in a study conducted by Retnakumari (1999) in Kerala, India. However, the prevalence was highest

CONCLUSION

There is a notable link between poor oral hygiene and the development of various types of dental caries. This association is significant and exists irrespective of gender. Thus, maintaining good oral hygiene is crucial for all individuals, regardless of their gender, to prevent dental caries. This emphasizes the need for education about proper oral hygiene practices and their impact on dental health.

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