ORIGINAL ARTICLE

COMPARATIVE EVALUATION OF DENTAL CARIES AMONG PATIENTS OF 6-15 YEARS AGE PRESENTING TO THE OUTPATIENT DEPARTMENT OF AYUB COLLEGE OF DENTISTRY, ABBOTTABAD

Abdur Rehman[1], Hina Ashraf[2]✉, Nadia Munir[3], Rabia Syed[4], Kiran Nayyar[5], Afifa Tariq[1]

[1]Department of Oral Pathology,[2]Department of Dental Material, [3]Department of Oral Biology, [4]Department of Oral Surgery, Ayub College of Dentistry, Abbottabad-Pakistan, [5]Department of Oral Pathology, Demont Morency, College of Dentistry Lahore-Pakistan

Background: Dental caries in the mixed dentition stage is a common problem leading to tooth decay and extractions. This study aimed to evaluate the pattern of caries among children of 6-15 years age presenting to Ayub College of Dentistry and its association with different factors such as age, dietary habits, snacking habits, and previous dental visits. **Methods:** It was cross-sectional research on 250 participants of 6–15 years presenting to Ayub College of Dentistry from November 2023 to April 2024. Dental caries was examined and DMFT index calculated with the help of questionnaires. DMFT was correlated with age, tooth brushing habits, gender, snacking habits, and previous dental visits. Data was analyzed using SPSS software version 22. Statistical correlation tests were applied to find the association between different variables such as age group, brushing habits, snacking habits and prevalence and severity of caries. **Results:** Dental caries was prevalent among 79.7 percent whereas the mean DMFT of sample was 5.82±4.48. There was a trend of higher DMFT scores among male population than females. A greater DMFT score of 4.2±1.8 was seen among children of 13–15 years followed by 10–12 years (3.8±1.7) and 6–9 years (2.7±1.5). **Conclusion:** This study highlights the high prevalence of dental caries among children and adolescents and its association with brushing habits, snacking habits, age, gender, and previous dental visits. Regular dental check-ups, proper oral hygiene practices, and a healthy diet low in sugar are key factors in preventing dental caries in elementary school students.

Keywords: Dental caries; DMFT index; Mixed dentition

Citation: Rehman A, Ashraf H, Munir N, Syed R, Nayyar K, Tariq A. Comparative Evaluation of dental caries among patients of 6-15 years age presenting to the Outpatient Department of Ayub College of Dentistry, Abbottabad. J Ayub Med Coll Abbottabad 2024;36(4):768–72.

DOI: 10.55519/JAMC-04-13381

INTRODUCTION

Dental caries, commonly known as tooth decay or cavities, is a prevalent oral health concern among school going children aged six to fifteen years.[1] It is a bacterial infection that causes demineralization of tooth enamel, leading to the formation of cavities. If left untreated, caries can progress and affect the deeper layers of the tooth, resulting in pain, infection, and potential tooth loss. It can also have a significant impact on a child's overall well-being, including eating habits, speech development, and self-esteem.[2]

The mixed dentition stage typically occurs between the ages of 6–12 years old, where a child has a combination of primary (baby) teeth and permanent teeth. This stage is crucial for monitoring dental health as it sets the foundation for a lifetime of good oral hygiene habits. Dental caries can have a significant impact during the mixed dentition stage, affecting both primary and permanent teeth if left untreated. It is essential to educate children and their caregivers about the importance of maintaining healthy oral practices during this developmental period.[3]

Studies have shown that one of the most widespread diseases of oral cavity is dental caries that affects individuals of every age particularly children, affecting their overall health and well-being.[4] According to recent statistics, the prevalence of dental caries in this age group varies from country to country, with some regions reporting higher rates than others. Several factors contribute to the high prevalence of dental caries among school-going children aged six to fifteen years. These factors include poor oral hygiene practices, high consumption of sugary and acidic foods and beverages, lack of access to dental care services, and limited awareness about the importance of oral health.[4]

Other contributing factors may include socioeconomic status, parental education level, and environmental factors such as water fluoridation and availability of dental health programs in schools. Addressing these factors is trivial in reducing the prevalence of dental caries and promoting good oral health habits among children.[5]

The decayed, missing and filled teeth (DMFT) index is a widely used method for evaluating

dental caries. It is used to quantify the prevalence of caries in a population. The sum of these three components (DMFT) gives an overall score that reflects the dental caries experience in an individual or a group. Using the DMFT index, researchers or dentists can evaluate the severity of caries, track changes over time, and assess the effectiveness of interventions such as oral health education programs or fluoridation initiatives.[3,6]

By emphasizing the importance of regular dental check-ups, proper brushing and flossing techniques, and a healthy diet low in sugar, we can help reduce the prevalence of dental caries and improve the overall oral health of children in the six to fifteen years age group.[7] Teaching children the importance of proper oral hygiene, including brushing twice a day and flossing, can significantly reduce the risk of dental caries. Using fluoride toothpaste and mouthwash can also help strengthen the teeth and prevent decay. Encouraging children to follow a balanced diet rich in fruits, vegetables, and dairy products can promote good oral health. Limiting sugary and acidic foods and drinks can minimize the risk of dental caries.[8,9]

Many schools going children daily report to the dental outpatient department (OPD) of Ayub College of Dentistry with the complaint of carious lesions in their teeth. This study aimed to evaluate the prevalence of dental caries with the help of DMFT scores, and its association with brushing habits, snacking habits, age, gender, and previous dental visits. Scarce data is available on caries prevalence in Abbottabad district. This research was aimed to signify the development of caries, its relative association with different factors and subsequently, the management of dental caries by prompt treatment suggestions to the participants. The findings of this study could help patients in seeking appropriate treatment when needed and hence the prevalence of caries could be effectively managed. It is important for parents, schools, and healthcare providers to work together to promote good oral health practices and ensure the well-being of children [10].

MATERIAL AND METHODS

The research type was descriptive cross-sectional research The sample size in this research was 250 participants ranging in age from 6 to 15 years reporting to the outpatient department of Ayub College of Dentistry from November 2023 till April 2024. The sampling technique was convenience sampling technique. Ethical approval was taken by the ethical committee of Ayub Medical College, Abbottabad. The confidence interval for sample was kept at 95% with a precision of 0.05 and design impact of 2. The desired sample size calculated for the research was 250.

Dental caries assessment procedure began with the provision of informed written consent given by the research subject/parents. Tools used in this research were DMFT forms for intra oral examination results, cotton, mouth mirror, dental explorer, excavator, mask, gloves, alcohol on the concentration of 70% disinfectant, and flashlight.

The caries status data was obtained by examination using DMFT index. The record obtained was represented as D (decayed) for the carious teeth, where the dental explorer tip was pointed to the cavity; M (Missing) for the revoked teeth due to caries, teeth extraction trace or presence of root residue; and F (Filling) for restored teeth. The designed questionnaire was a proforma that included name, gender (male or female), age (6-9 years, 10-12 years, 13-15 years), tooth brushing (once/twice/rarely or never), and previous dental visits (yes/no). Based on this proforma, DMFT scores were calculated for all the study participants.

Children aged 6-15 years visiting the OPD for dental complaints or routine checkups were included in the study. Children with compromised medical health were excluded from the study. Children undergoing any orthodontic treatment were also excluded from the research.

Data analysis was done by using Statistical Package for the Social Sciences software (IBM, SPSS Statistics, version 24, Chicago, IL, USA). Categorical variables were presented in the form of frequencies and percentages. Numerical variables were presented by means and standard deviation. For comparative variables between and within groups, one-way ANOVA was used. The Chi- square test was applied to determine the correlation between dependent and independent variables such as age group, brushing habits, snacking habits and prevalence and severity of caries. A p-value of < 0.05 was considered to be statistically significant.

RESULTS

Two hundred and fifty children were the participants of this study with a mean age of 9.8±1.1 years. Predominant study population were males (54.8%), whereas female population was 45.2% as shown in Figure 1. Among the study participants, 58% of the children belonged to the 10–12 years age group, however 29.6% participants were below 9 years and above 12 years were found to be 12.4% only as shown in figure 2. As far as the brushing habits were concerned, 64.4% of the children among research subjects brushed once daily, while 22.8% of children brushed two times a day whereas, 12.8% rarely/never brushed their teeth, before. Among the study population, only 42% children had visited the dentist for regular dental checkups and 58% had never undergone dental checkup. While calculating results, it was established that dental caries was prevalent among 79.7% of the research population. The mean DMFT score for this study population was found to be 5.82±4.48. Among individual teeth, mean value for decayed teeth was 3.903±3.69,

whereas mean value of 1.18±1.69 was calculated for missing teeth, and 0.73±1.35 for filled teeth. Male population had higher mean DMFT scores (4.54±1.8) than females (3.68±1.4) with a statistically significant difference (p=0.0014). As far as individual age groups were concerned, the participants in the age group of 13-15 years were noticed to have higher mean DMFT scores of 4.2±1.8, whereas participants among 10–12 years age group had DMFT scores of 3.8±1.7 and 6-9 years had mean scores of 2.7±1.5, with a p value of (0.002. While calculating brushing habits comparison, it was established that the children practicing twice a day brushing had lower DMFT scores (2.67±1.5). In contrast, children who never brushed before had higher DMFT scores (4.5±1.9), and children who brushed only once a day had DMFT scores of 3.24±1.8. The comparison of tooth brushing and DMFT score was statistically significant (p =0.0009). It was observed that children who used to snack on sugary foods or drinks once a day had a low value of DMFT (2.24±1.5). This trend increased with the frequency of snacking with children taking snacks two times a day having a DMFT score of (3.5±1.8), while more than two times snacking took DMFT score to (4.47±1.7). A low DMFT score (3.6±1.24) trend was observed among children who had paid visit to the dentist at least once before, however children who had never seen a dentist before had a high value of DMFT (4.54±1.8), with a statistically significant difference (p =0.0012). The comparison of the DMFT based on gender, age, tooth brushing, and the previous dental visit are summarized in Table-1.

Regarding individual teeth, high DMFT scores were seen in mandibular right second molar, while low value of DMFT was observed for mandibular central incisors. On observation, the most frequently damaged tooth by dental caries was mandibular right first permanent molar, and the less commonly decayed teeth were mandibular central incisors. It was seen that mandibular right first permanent molar was the most frequently filled tooth while less commonly filled teeth were the maxillary canines. Maxillary left primary central incisor was the tooth that was commonly found missing whereas less commonly missing tooth was the maxillary right primary canine.

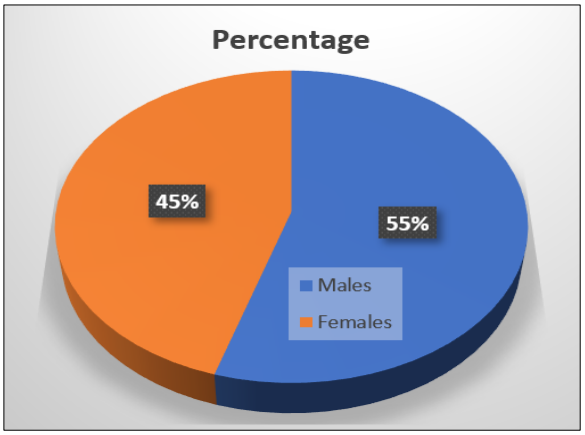

Figure-1: Participants' distribution according to gender

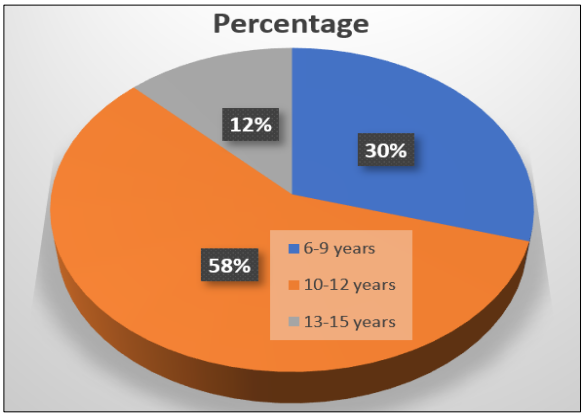

Figure-2: Mean percentage distribution of study participants according to age

Table-1: Comparison of DMFT with age, gender, brushing frequency, snacking habits and previous dental visits

Independent variables	Groups	Percentage (n)	DMFT	*p*-value
○ gender	male	137(54.8)	4.54(1.8)	0.0014
	female	113(45.2)	3.68(1.4)	
○ age	6-9 years	74 (29.6)	2.7(1.5)	
	10-12 years	145 (58)	3.8 (1.7)	0.0002
	13-15 years	31 (12.4)	4.2(1.8)	
○ brushing frequency	once	156 (64.4)	3.24(1.8)	0.0009
	twice	62 (22.8)	2.67(1.5)	
	never/rarely	32 (12.8)	4.54(1.9)	
○ snacking habits	once a day	125 (50)	2.24(1.5)	0.001
	twice a day	85(34)	3.5(1.8)	
	more than 2 times	40(16)	4.47(1.7)	
○ previous dental visits	yes	105(42)	3.6(1.24)	0.0012
	no	145 (58)	4.54(1.8)	

DISCUSSION

Dental caries remains a significant public health problem worldwide, affecting individuals of all ages.[11] It is a microbial disease of the calcified tissues of the teeth, characterized by demineralization of the inorganic component and destruction of the organic content of the tooth. The prevalence of dental caries is on a surge in many developing countries and remains a matter of deep concern for clinicians. The prevalence of dental caries among school-going children is a growing concern worldwide. According to research studies, children in this age group often face challenges in maintaining good oral hygiene practices, leading to an increased risk of developing cavities.[12]

The results of current research show a high prevalence of dental caries among the study population, with a mean DMFT score of 5.82. This is consistent with previous studies that have reported a high prevalence of dental caries among children and adolescents. The high prevalence of dental caries in this study can be attributed to inadequate oral hygiene practices, frequent snacking, and limited access to dental care.[13]

Sugar consumption and frequency has a direct impact on dental caries development and progression. In the current study, participants who consumed sugary snacks frequently had a higher DMFT score, emphasizing the role of dietary habits in the development of dental caries. Age and gender were also found to be significant predictors of dental caries. The mean DMFT score increased with age, indicating a higher prevalence of dental caries among older children and adolescents. This is consistent with previous studies that have reported an increase in dental caries with age.[3] Gender-wise, males had a higher DMFT score compared to females, which may be attributed to differences in oral hygiene practices and dietary habits.[14]

Previous dental visits were also found to be associated with dental caries. Participants who had regular dental visits had a lower DMFT score compared to those who had not visited a dentist in a long time. This highlights the importance of regular dental check-ups in preventing and detecting dental caries. Previous researchers have emphasized on the importance of regular dental checkups and oral health.[15] Participants who visited dentist at least once earlier had a better oral hygiene status than the ones who never visited the dentist before. Thomson *et al*. reported that regular dental check-ups might be associated with better oral health.[16] Paying visit to the dentist has a multifactorial benefit, therapeutic as well as incorporating awareness among the people about good oral hygiene practices. It is of prime importance to take children to a pediatric dentist on a regular basis as soon as the first tooth appears in oral cavity.

This study reported that the most decayed teeth were mandibular 1st and 2nd molars followed by maxillary 1st and 2nd molars. Previous studies reported that mandibular first molars were the most frequently affected by carious lesions.[17] Another study reported that the most frequently involved teeth in dental caries were molars. The rate of caries was higher in the mandibular teeth than in the maxillary teeth.[18] This may be attributed to the effect of gravity on mandibular teeth which leads to plaque deposition at a more rapid pace than maxillary teeth. Pertaining to the type of tooth involved, mandibular right second molars were discovered to have higher dmft scores, while the mandibular central incisors had lower dmft scores. This is in accordance with previous study conducted in Saudi Arabia who observed similar results.[19]

The findings of this study indicate a significant association between brushing habits and dental caries. Participants who brushed their teeth twice a day had a significantly lower DMFT score compared to those who brushed less frequently. This highlights the importance of regular toothbrushing in preventing dental caries.[20] Mean DMFT scores of at least once brushing participants were low as compared to those who never/rarely brushed their teeth. This is in accordance with the previous studies conducted in China, Hong Kong, and Ireland. Another study also reported that children with poor brushing habits had higher caries rates and plaque deposits.[21] These findings are in agreement with the present study. The results of the present study suggest that tooth brushing habit is one of the substantial factors that can have a profound impact on DMFT scores of the participants.

CONCLUSION

In conclusion, this study highlights the high prevalence of dental caries among children and adolescents and its association with brushing habits, snacking habits, age, gender, and previous dental visits. The findings of this study emphasize the need for promoting good oral hygiene practices, healthy dietary habits, and regular dental check-ups to prevent and control dental caries. It is important for parents, teachers, and caregivers to be aware of the signs and symptoms of dental caries, as well as the preventive measures that can be taken to protect children's oral health. Regular dental check-ups, proper oral hygiene practices, and a healthy diet low in sugar are key factors in preventing dental caries in elementary school students. By promoting good oral health habits from a young age, we can help children maintain healthy smiles and avoid unnecessary pain and discomfort associated with dental caries. It is crucial to prioritize oral health in children to ensure their overall well-being and quality of life. Dental awareness campaigns and surveys must be carried out among schools frequently to timely

asses the development of caries and their early management and prevention.

Recommendations for future research:

Prevention and management of dental caries are crucial to ensure the overall well-being of children. It is essential to focus on both prevention and occurrence of dental caries with the aim of effective management it if it develops. Scheduling regular dental check-ups for children is key to early detection and prevention of dental caries. Dentists can identify any signs of tooth decay and provide necessary treatment to prevent further progression. Dental sealants are protective coatings applied to the chewing surfaces of the back teeth to prevent decay. Fluoride treatments can also help strengthen the enamel and make it more resistant to acid attacks. If the decay is in its early stages, fillings can be used to restore the tooth and prevent further decay. For more extensive decay, crowns may be recommended to cover and protect the affected tooth. In severe cases where the decay reaches the tooth's pulp, root canal treatment may be necessary to save the tooth followed by crowning procedure.

AUTHORS' CONTRIBUTION

AR, HA: Conceptualization of the study design, Literature search. NM, RS: Data collection, data interpretation. AR, KN, AT: Write-up, proof reading.

REFERENCES

1. Asad AK, Barman RK, Huq MM, Ali MN, Wahed MI. Prevalence of Dental Caries, Oral Hygiene Status, and Associated Risk Factors Among Schoolgoing Children of Rajshahi District in Bangladesh. J Teach Assoc 2022;35(1):125–36.
2. Ravishankar PL, Jayapalan CS, Gondhalekar RV, Krishna BJ, Shaloob KM, Ummer PF. Prevalence of dental caries and oral hygiene status among school going children: an epidemiological study. J Contemp Dent Pract 2013;14(4):743–6.
3. Ahmad FN, Moutam N, Sowmya K, Parvatham BB, Rajesh D, Kumar S. Evaluation of DMFT in school going children of mixed dentition stage: an original research. Int J Health Sci 2022;6(S8):2847–52.
4. Supriatna A, Fadillah RP, Nawawi AP. Description of dental caries on mixed dentition stage of elementary school students in Cibeber Community Health Center. Padjadjaran J Dent 2017;29(3):153–7.
5. Al-Bluwi GS. Epidemiology of dental caries in children in the United Arab Emirates. Int Dent J 2014;64(4):219–28.
6. Jindal L, Dua P, Mangla R, Gupta K, Vyas D, Gupta P. Dental caries in relation to socioeconomic factors of 6 and 12-year-old schoolchildren of Paonta Sahib, Himachal Pradesh, India: An epidemiological study. Int J Clin Pediatr Dent 2020;13(4):395–8.
7. Dhindsa A. Eruption Status of First Permanent Molar and Prevalence of Dental Caries among School Going North Indian Children: An Epidemiological Study. J Dental Health Oral Res 2022;3(2):1–9.
8. Parasuraman G, Krishna YG, Kaviya M, Jain NA, Rajendiran P, Dutta R. A study on the prevalence of dental caries among the school-going children in Tamil Nadu. Int J Community Med Public Health 2017;4(10):3582–9.
9. Karunakaran R, Somasundaram S, Gawthaman M, Vinodh S, Manikandan S, Gokulnathan S. Prevalence of dental caries among school-going children in Namakkal district: A cross-sectional study. J Pharm Bioallied Sci 2014;6(Suppl 1):S160–1.
10. Devaki T. Permanent first molar caries status and treatment need among school going children aged 6-14 years in Tenali, Guntur (DT)-A cross sectional study. J Indian Assoc Public Health Dent 2011;9(Suppl 3):S455–61.
11. Bagramian RA, Garcia-Godoy F, Volpe AR. The global increase in dental caries. A pending public health crisis. Am J Dent 2009;22(1):3–8.
12. Kazeminia M, Abdi A, Shohaimi S, Jalali R, Vaisi-Raygani A, Salari N, *et al*. Dental caries in primary and permanent teeth in children's worldwide, 1995 to 2019: a systematic review and meta-analysis. Head Face Med 2020;16(1):1–21.
13. Reddy P, Krithikadatta J, Srinivasan V, Raghu S, Velumurugan N. Dental caries profile and associated risk factors among adolescent school children in an urban South-Indian city. Oral Health Prev Dent 2020;18(1):379–86.
14. Valenzuela MJ, Waterhouse B, Aggarwal VR, Bloor K, Doran T. Effect of sugar-sweetened beverages on oral health: a systematic review and meta-analysis. Eur J Public Health 2021;31(1):122–9.
15. Qu X, Houser SH, Tian M, Zhang Q, Pan J, Zhang W. Effects of early preventive dental visits and its associations with dental caries experience: a cross-sectional study. BMC Oral Health 2022;22(1):150.
16. Thomson WM, Williams SM, Broadbent JM, Poulton R, Locker D. Long-term dental visiting patterns and adult oral health. J Dent Res 2010;89(3):307–11.
17. Prabakar J, Arumugham IM, Sakthi DS, Kumar RP, Leelavathi L. Prevalence and Comparison of Dental Caries experience among 5- to 12-year-old school children of Chandigarh using dft/DMFT and SiC Index: A Cross-sectional study. J Family Med Prim Care 2020;9(2):819–25.
18. Stoica SN, Moraru SA, Nimigean VR, Nimigean V. Dental Caries in the First Permanent Molar during the Mixed Dentition Stage. Maedica (Bucur) 2023;18(2):246–56.
19. Desai VC, Shaik RE, Saheb H. Prevalence of dental caries in first and second permanent molars. Int J Res Med Sci 2014;2(2):514–20.
20. Mallineni SK, Alassaf A, Almulhim B, Alghamdi S. Influence of tooth brushing and previous dental visits on dental caries status among Saudi Arabian children. Children (Basel) 2023;10(3):471.
21. Panwar M, Gupta S, Bharti K, Gumro M, Dutta S. Prevalence of dental caries in the primary dentition, mixed dentition and permanent dentition and associating factors in school children in Mathura city. Prevalence 2023;9(7):386–90.

Submitted: May 16, 2024	*Revised: August 1, 2024*	*Accepted: November 24, 2024*

Address or Correspondence:

Dr. Hina Ashraf, Department of Dental Material, Ayub College of Dentistry, Abbottabad-Pakistan.
Cell: +92 334 8983 386
Email: hinazeeshan.ha@gmail.com