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Original Article

Prevalence of tooth mortality among 6-13 year old school children

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Abstract

Background: Tooth mortality is the loss of teeth due to decay, trauma, or extraction. It represents a significant oral health issue with potential long-term consequences. The objective of this study was to assess the prevalence of tooth mortality among 6-13-year-old school children in the West Godavari district of Andhra Pradesh.

Methods: Children were recruited through multistage cluster sampling. A total of 3997 children, including 2117 males and 1880 females, were screened for the presence of tooth mortality in the present cross-sectional observational study. The data were analyzed using Chi-square test.

Results: Tooth mortality was observed in 15.2% of the study population. No significant difference was observed in terms of tooth mortality between males and females. The males had a prevalence of 15.4% and females had a prevalence of 14.2%. Seven years old children had the highest prevalence of tooth mortality (18.4%). The lowest prevalence was observed in 12-year-old group (12.9%). However, no significant difference was observed between different age groups. The prevalence of tooth mortality was higher in permanent dentition (13.38%) compared to primary dentition (5.40%). Mandibular first permanent molars exhibited the highest tooth mortality among the study population.

Conclusion: The prevalence of tooth mortality in the study population is 15.2%. The results recommend comprehensive caries prevention programs targeting children at an early age. Implementation of community-based interventions may help reduce tooth mortality among children.

Keywords: Child, Oral health, Prevalence, Tooth loss

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Introduction

Tooth mortality, defined as the loss of teeth due to various reasons such as decay, trauma, or extraction, represents a significant oral health issue with potential long-term consequences. Understanding the prevalence and patterns of tooth loss is crucial to designing effective preventive and treatment strategies to improve oral health outcomes in children.[1] Tooth loss, primarily attributed to dental caries, periodontal diseases, or trauma, poses a significant barrier to oral health. In case of multiple tooth loss, it not only disrupts the normal chewing function but also affects dietary intake and compromises nutritional status, thereby causing systemic effects and impacting the overall health and well-being of a child.[2]

Early loss of anterior teeth causes developmental impairment in speech, leading to low self-esteem decreased social interactions, and making a child psychologically ill. Early loss of the first permanent molar has a severe impact on dental arches and occlusions like the drifting of adjacent teeth. The prevalence of tooth loss is influenced by various demographic factors, including age, gender, geographical location, and social status. Tooth loss is categorized into partial and complete loss, leading to the functional loss of the affected tooth. This situation represents oral disability of a person.[2]

Globally, approximately 2.3 billion people are affected by permanent teeth caries, with over 530 million children suffering from caries of primary teeth, 39.5% of permanent tooth loss is attributed to caries-related issues, while 28.4% is due to periodontal disease. Orthodontic reasons account for 19.4% of tooth loss, and a smaller percentage (1.6%) is caused by impaction.[3] The prevalence of oral diseases continues to rise in developing countries, particularly in low and middle-income countries. According to the Global Burden of Disease study in 2016, decay of permanent teeth ranked as the top oral health issue, affecting approximately half of the world's population (3.58 billion people), while decay of deciduous teeth ranked 12th, impacting 560

million children.[4]

Despite the magnitude of this issue, there is limited evidence available on the prevalence of tooth loss, especially in India.[5] The age group of 6–13 years represents a critical window in a child's dental development, transitioning from primary to permanent dentition. Early identification of tooth loss in this group is essential to prevent long-term oral and systemic health issues. Given the regional variation in prevalence, the current study was undertaken to assess the prevalence of tooth loss among 6–13-year-old school children in the West Godavari District of Andhra Pradesh.

Methods

The present clinical trial was carried out among 3997 children aged 6-13 years attending government schools in West Godavari district of Andhra Pradesh in India. The trial was conducted from 2021 to 2023. The study design and methodology were reviewed and approved by the Institutional Review Board and the Ethics Committee of Vishnu Dental College, India (IECVDC/19/PG01/PPD/IVV/37).

An effective sample size of 3,997 individuals was obtained using G*power 3.1.9.2 software for analysis (corresponding to achieving 80% power with 95% confidence). Children willing to participate were included in the study. Children eligible for inclusion in the study were those, present on the day of examination, and willing to participate, with informed consent obtained from their parents or guardians. Children who were medically compromised, undergoing ongoing dental treatment, or exhibited pre-shedding mobility of teeth were excluded from the study. Prior to the recruitment permissions were obtained from school authorities and consent was obtained from parents.

Oral Examination of children was carried out in accordance with the WHO Oral Health Survey basic methods (2016) using sterile diagnostic instruments under natural light while the child was seated on a chair. Apart from routine dental check-ups, children were assessed for the presence of tooth mortality.[6] The children were considered to have tooth mortality whether they had grossly decayed teeth, including extraction, root stumps or any missing teeth (due to caries/extraction). The examinations were conducted by trained and calibrated dental professionals. At least two researchers (MS, CV) examined each participant, and the results were reviewed to reach a consensus in case of disagreement. If consensus could not be achieved, a third examiner (PC) was involved to make the final decision.

Statistical analysis

The data were entered into a Microsoft Excel spreadsheet and were analyzed using the Statistical Package for Social Sciences (SPSS) version 22.0 (SPSS Inc., Chicago, IL, USA). The comparison of the qualitative variables (age and gender) was done using Chi-square test. A p-value of < 0.05 was considered significant.

Results

An overall tooth loss of 15.2% was observed in the study population. Among them, the highest prevalence (18.4%) was observed in the 7-year-old group, and the least (12.9%) was observed in the 12-year-old group. However, there was no significant difference ($p = 0.529$) in the prevalence of tooth loss between different age groups. Among the mortal teeth in the study population, the prevalence of tooth loss was higher in the permanent teeth (13.4%) compared to the primary teeth (4.8%). No significant difference was observed ($P = 0.722$) in the prevalence of tooth loss between males and females in the study population (Table 1). The highest prevalence of tooth loss among primary teeth was observed in lower first molars followed by lower second molars. The least prevalence was observed among primary lower anterior teeth. The prevalence was higher in the right side of both arches compared to the left side (Table 2). Among the permanent teeth, the highest prevalence was observed in the lower left first molar (25.23%) followed by upper right first molars (14.2%) (Table 3).

Discussion

Tooth mortality in children is a multifactorial issue influenced by various causes such as dental caries, trauma, and extractions due to orthodontic needs or severe periodontal disease.[7] Dental caries, often resulting from poor oral hygiene and high sugar consumption,

Table 1. Prevalence of Tooth Mortality by Age, Gender, and Dentition

Age (Years)	Total Subjects	Tooth Mortality		*P* value
		Teeth (n)	Prevalence (%)	
6	344	54	15.7%	0.529
7	343	63	18.4%	
8	390	60	15.4%	
9	480	70	14.6%	
10	519	75	14.5%	
11	678	105	15.5%	
12	650	84	12.9%	
13	593	95	16%	
Total	3997	606	15.2%	
Gender		**Teeth (n)**	**Prevalence**	
Males		325	15.4%	0.722
Females		281	14.9%	
Dentition		**Teeth (n)**	**Percentage**	
Primary		216	5.4%	-
Permanent		535	13.4%	
Total		751	100%	

Chi-square test; $P<0.05$ was significant.

Table 2. Distribution of Tooth Mortality across the Primary Dentition

Maxillary Teeth					
Right Side			Left Side		
Tooth (FDI)	Tooth Mortality		Tooth (FDI)	Tooth Mortality	
	No. of Teeth (n)	Percentage of teeth (%)		No. of Teeth (n)	Percentage of teeth (%)
11	32	5.98	21	37	6.91
12	17	3.17	22	8	1.49
13	2	0.37	23	0	0
14	5	0.93	24	5	0.93
15	1	0.18	25	1	0.18
16	76	14.20	26	66	12.22
17	1	0.18	27	3	0.56
Mandibular Teeth					
Right Side			Left Side		
Tooth (FDI)	Tooth Mortality		Tooth (FDI)	Tooth Mortality	
	No. of Teeth (n)	Percentage of teeth (%)		No. of Teeth (n)	Percentage of teeth (%)
41	0	0	31	2	0.37
42	0	0	32	3	0.56
43	0	0	33	0	0
44	0	0	34	3	0.56
45	2	0.37	35	2	0.37
46	132	24.67	36	135	25.23
47	1	0.18	37	1	0.18

Table 3. Distribution of Tooth Mortality across the Permanent Dentition

Maxillary Teeth					
Right Side			Left Side		
Tooth (FDI)	Tooth Mortality		Tooth (FDI)	Tooth Mortality	
	No. of Teeth (n)	Percentage of teeth (%)		No. of Teeth (n)	Percentage of teeth (%)
51	12	5.5	61	11	5.09
52	14	6.4	62	1	0.46
53	4	1.85	63	0	0
54	20	9.25	64	3	1.38
55	23	10.64	65	2	0.92
Mandibular Teeth					
Right Side			Left Side		
Tooth (FDI)	Tooth Mortality		Tooth (FDI)	Tooth Mortality	
	No. of Teeth (n)	Percentage of teeth (%)		No. of Teeth (n)	Percentage of teeth (%)
71	1	0.46	81	0	0
72	0	0	82	0	0
73	0	0	83	0	0
74	35	16.20	84	38	17.59
75	24	11.11	85	32	14.81

remains the leading cause. In the present study, among the 3997 participants surveyed, the prevalence of tooth loss was found to be 15.2%. This relatively high rate of tooth loss can largely be attributed to the socioeconomic background of the children involved, as all participants were enrolled in government schools and predominantly belonged to lower-middle, upper-lower, and lower socioeconomic strata. Socioeconomic status is a well-recognized determinant of oral health outcomes, with numerous studies indicating that individuals from higher socioeconomic groups generally have better access to dental care services, greater awareness of oral hygiene practices, and are more likely to utilize preventive dental services. This, in turn, translates to lower rates of untreated dental caries and tooth loss.

In contrast, children from socioeconomically disadvantaged backgrounds often encounter multiple barriers that negatively impact their oral health, including limited access to affordable dental care, low health literacy, inadequate parental supervision regarding oral hygiene, and poor dietary habits. These factors collectively contribute to an increased risk of dental decay progressing to stages requiring tooth extraction. The findings of this study are consistent with earlier research conducted in similar contexts. Oginni[1] reported a tooth loss prevalence of 12.3% among school children in rural Nigeria, emphasizing the influence of limited healthcare infrastructure and low-income settings on pediatric oral health. Similarly, George B et al[7] observed a comparable trend in suburban Chennai, India, where children from economically disadvantaged backgrounds experienced higher rates of tooth loss, further underscoring the strong association between low socioeconomic status and adverse oral health outcomes. These findings highlight the urgent need for targeted public health interventions, including school-based oral health education programs, accessible preventive dental services, and policies aimed at reducing socioeconomic disparities in oral healthcare utilization. Addressing these determinants is crucial to reducing the burden of tooth loss and promoting long-term oral health among school-aged children.

In the present study, the highest prevalence of tooth loss (18.4%) was observed among 7-year-old children. This finding likely reflects the cumulative burden of early childhood caries and delays in seeking dental treatment during the early years. At this age, children are still developing oral hygiene habits, and parental supervision may not always be optimal. Moreover, primary teeth are often undervalued by caregivers who may not perceive the urgency of treatment, assuming that these teeth will naturally shed. Such misconceptions, combined with limited access to preventive dental services and underutilization of routine check-ups, result in untreated caries progressing to the point of requiring extraction. Younger children also face difficulties in articulating dental discomfort, which further contributes to delayed care and increased risk of tooth mortality. Conversely, 12-year-olds exhibited the lowest prevalence of tooth

loss (12.9%), possibly due to a combination of factors such as improved oral hygiene practices, greater parental awareness, and increased access to dental services. At this stage, children are more capable of recognizing and reporting dental pain, prompting caregivers to seek timely treatment. Furthermore, school-based oral health education initiatives often target older children, reinforcing preventive behaviors and encouraging regular dental visits. This age-related trend is consistent with patterns observed in Indian populations and emphasizes the need for early, preventive dental interventions. Longitudinal studies can provide deeper insight into these dynamics and support the development of age-specific strategies to reduce the risk of tooth loss throughout childhood.

Gender analysis in the present study revealed a marginally higher prevalence of tooth loss among male participants (15.4%) compared to females (14.2%), though the observed difference did not reach statistical significance. This subtle gender disparity aligns with the findings reported by George B et al[7] suggesting a similar pattern in suburban Indian populations. However, it contrasts with other international studies conducted in Kenya,[8] Saudi Arabia,[9] and Nigeria,[10] where higher prevalence rates were recorded among females. These inconsistencies across studies may be influenced by a multitude of factors including cultural, behavioral, and socioeconomic differences that vary regionally.

In some settings, girls may have earlier or more frequent dental visits due to heightened parental concern for aesthetics or oral health, while in others, sociocultural dynamics may restrict their access to healthcare. Boys, on the other hand, maybe more prone to trauma or have dietary behaviors that increase their risk of caries and subsequent tooth loss. Additionally, gender roles and perceptions regarding health and hygiene practices, as well as parental investment in children's dental care, can differ significantly between societies. These variations underscore the importance of considering contextual and cultural influences when interpreting gender-related oral health outcomes and tailoring public health interventions accordingly. Tooth-specific analysis in the present study revealed that the permanent first molars, particularly tooth 36, exhibited the highest prevalence of tooth loss among participants. This finding is clinically significant and can be attributed to multiple interrelated factors. First permanent molars erupt as early as six years of age and are often exposed to the oral environment before children have fully developed effective oral hygiene practices. Their occlusal surfaces are characterized by deep pits and fissures, which create an ideal niche for plaque accumulation and bacterial colonization, making them particularly vulnerable to caries.[11,12] Compounding the issue is the lack of parental awareness and limited access to preventive dental care in lower socioeconomic groups, leading to untreated decay and eventual tooth loss.

The loss of permanent first molars during the developmental years carries serious functional and structural consequences. These teeth are critical for maintaining vertical dimension, proper occlusion, and arch integrity. Their premature loss can initiate a cascade of complications including mesial drift or tilting of adjacent teeth, supra-eruption of opposing teeth, midline discrepancies, and an increased risk of malocclusion.[12] Furthermore, children may adapt by developing unilateral chewing habits, which can lead to temporomandibular joint stress and associated dysfunctions. These outcomes not only affect oral health but also have long-term implications on facial growth and psychosocial well-being. Therefore, the findings strongly reinforce the necessity of early detection through school-based screening, targeted preventive strategies like sealant application, and focused educational efforts for parents and caregivers. Emphasizing the preservation of first permanent molars, particularly in socioeconomically disadvantaged populations, is key to reducing the burden of tooth loss and its sequelae in childhood.

Limitations

This study was conducted exclusively among government school children, which may limit the generalizability of the findings to the broader population of school children in Andhra Pradesh. This study did not evaluate the potential association between tooth loss in primary (deciduous) and permanent dentition, which could provide further insights. Future research should explore the multifactorial nature of tooth loss, including genetic, environmental, and lifestyle influences. Longitudinal studies are also recommended to track dental health over time and provide insights into the progression and underlying causes of tooth mortality. Although oral hygiene practices like brushing and flossing are key contributors to oral health, the current study focused on clinical assessment to estimate prevalence. Behavioral factors were not included due to logistical challenges in large-scale field settings and the young age of participants, which may compromise the accuracy of self-reported data. The use of objective clinical indicators such as grossly decayed teeth, root stumps, and missing teeth ensured a standardized and reliable evaluation of tooth loss.

Conclusion

The study results highlight the importance of early intervention and preventive measures to mitigate the risk of tooth loss in children. Dental caries, as the leading cause of tooth loss, highlights the critical need for comprehensive prevention programs that target children at an early age. The findings could guide clinical practices and inform policy decisions aimed at reducing the prevalence of tooth loss, especially among school children

in the West Godavari district of Andhra Pradesh. Future cost-effectiveness analyses or intervention strategies may refine these recommendations. Encouraging regular dental check-ups, promoting oral hygiene practices, and implementing community-based interventions targeting children at an early age can help reduce the burden of dental caries and tooth mortality, and prevent unnecessary tooth loss in children.

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Authors' Contribution

Conceptualization: Meka Giridhara Srikanth, Chandrappa Vinay, Penmatsa Chaitanya.
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Competing Interests

None.

Data Availability Statement

The data will be available by the corresponding author(s) upon a reasonable request.

Ethical Approval

The study protocol was approved by the Institutional Review Board and Ethics Committee of Vishnu Dental College, India (IECVDC/19/PG01/PPD/IVV/37).

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References

1. Oginni FO. Tooth loss in a sub-urban Nigerian population: causes and pattern of mortality revisited. Int Dent J. 2005;55(1):17-23. doi: 10.1111/j.1875-595x.2005.tb00027.x.
2. Cardoso PC, Mecenas P, Normando D. The impact of the loss of first permanent molars on the duration of treatment in patients treated with orthodontic space closure and without skeletal anchorage. Prog Orthod. 2022;23(1):32. doi: 10.1186/s40510-022-00427-2.
3. Anand PS, Kuriakose S. Causes and patterns of loss of permanent teeth among patients attending a dental teaching institution in south India. J Contemp Dent Pract. 2009;10(5):E057-64.
4. Pandey P, Nandkeoliar T, Tikku AP, Singh D, Singh MK. Prevalence of dental caries in the Indian population: a systematic review and meta-analysis. J Int Soc Prev Community Dent. 2021;11(3):256-65. doi: 10.4103/jispcd.JISPCD_42_21.
5. GBD 2016 Disease and Injury Incidence and Prevalence Collaborators. Global, regional, and national incidence, prevalence, and years lived with disability for 328 diseases and injuries for 195 countries, 1990-2016: a systematic analysis for the Global Burden of Disease Study 2016. Lancet. 2017;390(10100):1211-59. doi: 10.1016/s0140-6736(17)32154-2.
6. Klein H, Palmer CE, Knutson JW. Studies on dental caries: I. Dental status and dental needs of elementary school children. Public Health Rep (1896-1970). 1938;53(19):751-65. doi: 10.2307/4582532.
7. George B, John J, Saravanan S, Arumugham IM. Prevalence of permanent tooth loss among children and adults in a suburban area of Chennai. Indian J Dent Res. 2011;22(2):364. doi: 10.4103/0970-9290.84284.
8. Sanya BO, Ng'ang'a PM, Ng'ang'a RN. Causes and pattern of missing permanent teeth among Kenyans. East Afr Med J. 2004;81(6):322-5. doi: 10.4314/eamj.v81i6.9183.
9. Orfali SM, Alrumikhan AS, Assal NA, Alrusayes AM, Natto ZS. Prevalence and severity of dental caries in school children in Saudi Arabia: a nationwide cross-sectional study. Saudi Dent J. 2023;35(8):969-74. doi: 10.1016/j.sdentj.2023.09.008.
10. Wang JD, Chen X, Frencken J, Du MQ, Chen Z. Dental caries and first permanent molar pit and fissure morphology in 7- to 8-year-old children in Wuhan, China. Int J Oral Sci. 2012;4(3):157-60. doi: 10.1038/ijos.2012.34.
11. Gomes MC, Perazzo MF, Neves ÉT, Siqueira M, Paiva SM, Granville-Garcia AF. Premature primary tooth loss and oral health-related quality of life in preschool children. Int J Environ Res Public Health. 2022;19(19):12163. doi: 10.3390/ijerph191912163.
12. Alhabdan YA, Albeshr AG, Yenugadhati N, Jradi H. Prevalence of dental caries and associated factors among primary school children: a population-based cross-sectional study in Riyadh, Saudi Arabia. Environ Health Prev Med. 2018;23(1):60. doi: 10.1186/s12199-018-0750-z.