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# Prevalence of dental caries on permanent first molars among children of age group 6-14 years at Janakpurdham

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## ABSTRACT

**Background**: Dental caries is the most common chronic infectious disease of oral cavity. It specifically affects the permanent first molars because they erupt early and have a complicated occlusal anatomy. Understanding the prevalence of caries is essential for developing preventive strategies, especially in socioeconomically underprivileged groups.

**Objective:** To assess the prevalence of dental caries in permanent first molars among children aged 6 to 14 years in Janakpurdham, Madhesh Province, Nepal.

**Methods:** A cross-sectional study was conducted among school children of age 6-14 years of Zenith National Academy, Sitachowk-1, Janakpurdham, Nepal. Oral examination was carried out using WHO diagnostic criteria for dental caries. Data were collected. Statistical analysis was done using Statistical Package for Social Sciences (SPSS) version 21 for Windows (SPSS Inc, Chicago, IL). Frequency distribution analysis was performed. Descriptive statistics were used to describe the results.

**Results:** The overall prevalence of dental caries in permanent first molars was found to be Among 290 participants,136 (46.9%) were males remaining being female 154(53.1%).(Mean ± SD:11.65 ±3.72) The prevalence of dental caries of left mandibular first permanent molar was high 24(8.3%) among the studied teeth. The prevalence of dental caries was high in mandibular arch.

**Conclusions:** A high prevalence of dental caries in permanent first molars was higher in mandibular arch than maxillary arch observed among children in Janakpurdham, highlighting an urgent need for targeted oral health education, regular dental screenings, and preventive interventions at the school and community level.

## INTRODUCTION

Dental caries is an irreversible microbial disease of the calcified tissues of the teeth, characterized by demineralization of the inorganic portion and destruction of the organic substance of the tooth, which often leads to cavitation.[1]

Dental caries has considered as the major public health problem globally due to its high prevalence and significant social impact. World Health Organization (WHO) reports 60-90% of school going children worldwide have experienced caries, with the disease being most prevalent in Asian and Latin American countries.[2]

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Dental caries is a multi-factorial disease involving various factors such as diet, microorganisms, tooth morphology, saliva, environment, gender, location, dietary habits as well as genetic predisposition.[3]

The permanent first molars are particularly susceptible due to their early eruption and anatomical structure. This response provides a clear explanation of the prevalence of dental caries on PFM in children supported by evidence from various studies.[4,5]

Permanent first molars dental caries is a prevalent condition among children aged 6-14 years. It has been reported with high prevalence rates in diverse populations in many studies, including 61% in Sudan and 29% in China.[6,7]

The mandibular arch is highly susceptible to caries compared to the maxillary arch.[6,8] Voluminous literature exist on the status of dental caries in the Nepali population. Despite several attempts to cure and prevent the disease, its prevalence has increased over the last couple of decades.

This descriptive cross-sectional research was carried out in order to find and the prevalence of dental caries on permanent first molar among children of age group 6 to 14 years a in Janakpurdham, identifying key factors contributing to its occurrence and proposing potential interventions.

## METHODS

This study employed descriptive cross-sectional study design. It was conducted among school children of age 6-14 years of Zenith National Academy, Sitachowk-1, Janakpurdham, Nepal. This study was conducted after obtaining ethical clearance from Institutional Review Committee of Madhesh Institute of Health Sciences (MIHS-IRC/081/082-014). Permission form the school higher authorities was also obtained. After explaining the purpose and details of the research, a written informed consent was obtained from parents of all the study participants. Based on the study of Thapaliya et al., using formula $n=Z^2pq/d^2$, where p=40%,[8] q=1-p=60%, d=6% margin of error, and Z at 95% confidence interval, the sample size was calculated as 256. However, in the final study 290 students participated.

The WHO criteria were used to diagnose the carious maxillary and mandibular first permanent first molars (World Health Organization, Oral Health Surveys, Basic Methods, WHO, Geneva, Switzerland, 4th edition, 1997.). Only the carious first permanent molars were recorded in this study. Oral examination was conducted with the help of mouth mirror and explorer under natural light in a simple sitting chair.

Statistical analysis was done using Statistical Package for Social Sciences (SPSS) version 21 for Windows (SPSS Inc, Chicago, IL). Frequency distribution analysis was performed. Descriptive statistics were used to describe the results.

## RESULTS

For each participant the mean, standard deviation, range,value of every parameter were calculated. Frequency distribution analysis was performed. Descriptive statistics were used to describe the result . Among 290 children of age group 6 to 14 years(Mean ± SD :11.65 ±3.72) participated in the study which 136 (46.9%) were males remaining being female 154(53.1%) (Table 1)

**Table 1: Age and Gender wise distribution of children**

| Characteristics | Category | Frequency (%) |
|---|---|---|
| Gender | Male | 136 (46.9%) |
| | Female | 154 (53.1%) |
| Age (Mean ± S.D.) | | 11.65 ± 1.72 |

Table 2 shows the prevalence of dental caries on permanent first molar of children. The prevalence of dental caries of left mandibular first permanent molar was high 24(8.3%) among the studied teeth.

**Table 2: Prevalence of dental caries on permanent first molars of children (n=290)**

| Tooth | Present | Absent |
|---|---|---|
| Maxillary right first permanent molar (16) | 11 (3.8%) | 279 (96.2%) |
| Maxillary left first permanent molar (26) | 7 (2.4%) | 283 (97.6%) |
| Mandibular left first permanent molar (36) | 24 (8.3%) | 266 (91.7%) |
| Mandibular right first permanent molar (46) | 21 (7.2%) | 269 (92.8%) |

## DISCUSSION

The research was conducted with aim to identify prevalence of dental caries in permanent first molars among children aged 6 to 14 years in Janakpurdham, Madhesh Province, Nepal. The study showed high prevalence of the permanent first molars are particularly susceptible due to their early eruption and anatomical structure.[9] This response provides a clear explanation of the prevalence of dental caries on permanent first molars in children supported by evidence from various studies.[4] The findings revealed a significant burden of dental caries in this age group, indicating a persistent public health issue, particularly in early-erupting molars which are critical for long-term oral function. since permanent first molars. Dental caries is a prevalent condition among children aged 6-14 years.[10]It has been reported with high prevalence rates in diverse populations in many studies, including 61% in Sudan and 29% in China.[6,7]These teeth often go unnoticed by caregivers and are harder for young children to clean effectively. Moreover, their deep pits and fissures make them more prone to food retention and bacterial accumulation.

In our study, caries prevalence increased progressively with age, peaking in the 12–14 years group. This trend may be attributed to the prolonged exposure of molars to cariogenic challenges, inadequate oral hygiene practices. Increasing autonomy in dietary choices, is often associated with higher sugar consumption. Together limited access to preventive dental services, especially in rural or underserved areas are also the main cause of prevalence of dental caries.[10]

The WHO criteria were used to diagnose the carious maxillary and mandibular first permanent first molars.[11] Gender differences were also explored, although the results showed among 290 participants,136 (46.9%) were males remaining being female. About 154(53.1%) of total participiants prevalence of caries are gender, with more risk in girls.[12] and geographical region, with rural areas having higher rates.[12]Gender distribution was noted, suggesting that behavioral and environmental factors outweigh biological differences.

The study showed high prevalence of caries mandibular arch(8.3%) is highly susceptible to caries compared to the maxillary arch(3.8%). Which is in accordance with the results reported by Vanderas et al. and Prabhu P et al.[13] [14] The reason for the mandibular first permanent molar exhibiting higher caries may be due to the location, morphology and the eruption time. Mandibular first permanent molar has more number of pits and supplementary grooves which can act as food-retentive areas promoting caries. The other factor could be that in the majority of children mandibular first permanent molar erupts slightly earlier than its maxillary counterpart, hence mandibular first permanent molar is exposed to the oral environment for a longer period, making it more susceptible to caries than the maxillary first permanent molar.[10]

The higher prevalence in older children underscores the lack of early intervention, highlighting missed opportunities for preventive care such as pit and fissure sealants or fluoride application soon after molar eruption.[15] Additionally, the role of parental education, socioeconomic status, and awareness about oral health is crucial in shaping a child's dental care practices.[16-19]

The findings suggest that oral health services and education remain underdeveloped in many parts of Nepal. Public health policies must prioritize school-based oral health programs, incorporating regular dental checkups, fluoride therapy, and health education for both students and parents. Training of schoolteachers and local health workers could also play a supportive role.

This study had certain limitations. Being cross-sectional, it does not provide causal relationships or long-term caries progression data. The absence of radiographic confirmation likely resulted in underestimation of interproximal lesions. The sample may also not fully represent all ecological and socioeconomic strata of Nepal. Future research should include larger, multi-center studies with longitudinal follow-ups to assess both incidence and preventive outcome.

## CONCLUSION

Oral health is an important component of general health and quality of life, with dental caries impacting a person's ability to eat, speak, or socialize. In the above study, the overall prevalence of dental caries is found to be higher and more in mandibular arch. These findings reinforce the urgent need for preventive oral health interventions, early detection, and comprehensive oral health education. Strengthening the primary oral health care system and integrating dental care into school health programs can significantly reduce the burden of caries in children

**CONFLICT OF INTEREST:** None

**FINANCIAL DISCLOSURE:** None

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**AUTHORS CONTRIBUTION:** Concept and design: AP; data collection and statistical analysis: PKY, SG, RS and RC; writing of the manuscript: RS and PKY; monitoring and supervising the research finalizing the manuscript: AP, JKY, RS, TB and RC; and all authors read and agreed with the contents of the final manuscript.

**AVAILABILITY OF DATA AND MATERIALS:** The datasets used and analyzed for the study are available from the corresponding author upon reasonable request

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