

Dental Health Matters: Analyzing The Prevalence Of Dental Caries In Permanent Molars In The Adults Of Hyderabad

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Abstract:

Introduction: Dental caries is an irreversible microbial disease of the calcified tissues of the teeth, characterized by demineralization of the inorganic part and destruction of the organic substance of the tooth, which often leads to cavitation. Individual types of teeth have different tendency of dental caries possibly due to their morphological characteristics such as deep fissures, grooves and pits, creating challenges for maintaining healthy teeth.

Aim: To assess the association between dental caries in permanent molars and other permanent teeth in adult population of Hyderabad.

Materials and Methods: A cross-sectional survey was conducted by OroGlee Solutions Private Limited among the employees of corporate offices in the city of Hyderabad. A total of 2777 adults were examined at their respective places of work.

Results: A total of 2777 individuals both males and females, aged between 18 and 40 years, participated in the study. Caries distribution in individual types of permanent teeth was noted. The molars had the highest percentage of dental caries. 29.5% of the molars were affected. This was followed by incisors (0.62%), premolars (0.58%) and canines which had the lowest prevalence of dental caries (0.45%).

Conclusion: Our study found that the prevalence of caries in permanent molars is relatively higher than caries in other permanent teeth. Oral health promotion programs should start early to bring awareness about maintenance of oral health and early detection of oral health issues.

Key Word: Dental caries; Permanent molars; Intraoral camera; Prevalence; Hyderabad.

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I. Introduction

Dental caries is one of the most prevalent, chronic, progressive and non-communicable disease of the oral cavity, which affects children as well as adults worldwide. (1). The WHO Global Oral Health Status Report (2022) estimated that 2 billion people suffer from caries of permanent teeth, and 514 million children suffer from caries of primary teeth (2). Dental caries has become a global public health issue in developed and developing countries. When neglected, caries can cause infection, pain and ultimately the loss of the tooth, affecting quality of life physically as well as psychologically (1).

Dental caries is defined as a multifactorial, transmissible, infectious oral disease caused primarily by the complex interaction of cariogenic oral flora (biofilm) with fermentable dietary carbohydrates on the tooth surface over time. (3) The destruction of the tooth structure is a process resulting from the shift in balance between demineralization and remineralization occurring in the interface between hard tooth tissue and the surrounding environment.

Although the awareness regarding it has increased, dental caries continues to be a frequent condition. This is the reason it is necessary to make efforts for its prevention and to intercept it at an early stage. The frequency of caries varies depending upon the tooth, its eruption stage, its morphology and its position on the dental arch; which can favor or resist the accumulation of bacterial plaque (4).

Different tooth surface morphology and varying post eruptive enamel maturation of the surfaces have been suggested as factors for the disparate caries susceptibilities. A tooth surface's susceptibility to caries changes with time as well. Caries susceptibility is minimal in the first year after eruption but quickly increases to the maximum rate two to three years later. (5) It has been observed through many studies that the caries process in the first permanent molar starts as soon as they erupt and can be clinically observed within 1–2 years after eruption.

The aim of the present study was to determine the susceptibility of caries on individual tooth type. The findings of this study will be useful in developing patient awareness and educational programs for proper oral hygiene as well as in implementation of preventive treatments such as pit and fissure sealant applications, which helps in preventing caries.

II. Material And Methods

A cross-sectional survey was conducted by OroGlee Solutions Private Limited among the people of corporate offices in the city of Hyderabad. A total of 2777 adults were examined at their respective places of work. A survey questionnaire was prepared to acquire details such as age, gender, and relevant dental and medical history. An oral examination was done using an intraoral camera connected to a laptop to record video of all aspects of teeth. The intraoral camera is very useful for recording the minute details of the oral cavity. Informed oral consent of the participants was obtained before examination

Inclusion criteria:

1. Individuals in the age group of 18 to 40 years were included in the study.
2. Participants having all the permanent teeth (with or without third molar).

Exclusion criteria:

1. Individuals below the age of 18 years and above the age of 40 years were excluded from the study
2. Individuals having any missing permanent teeth (except third molar).
3. Third molar is excluded from the study.

III. Result

A total of 2777 individuals both males and females, aged between 18 and 40 years, participated in the study. Caries distribution in individual types of permanent teeth was noted.

The molars (1st & 2nd) had the highest percentage of dental caries. 29.5% of the molars were affected. This was followed by incisors (0.62%), premolars (0.58%) and canines had the lowest prevalence of dental caries (0.45%).

Table no 1: Percentage of individual teeth with caries

Individual type of teeth	Total no. of teeth	Teeth with dental caries	Percentage of teeth with caries (%)
Molars (1 st & 2 nd)	22,216	6,561	29.5%
Premolars	22,216	129	0.58%
Canines	11,108	53	0.45%
Incisors	22,216	139	0.62%

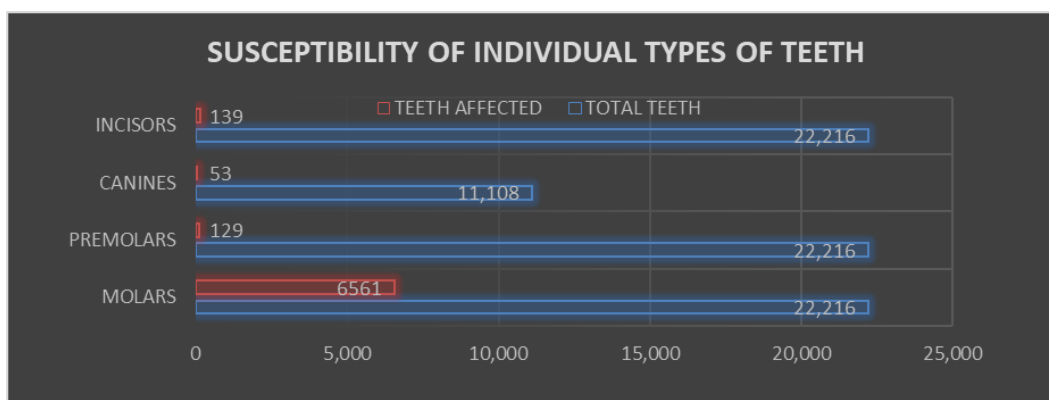


FIGURE 1: Pictorial representation of susceptibility of individual types of teeth with caries

IV. Discussion

Dental caries, otherwise known as tooth decay, is one of the most prevalent chronic diseases affecting human beings and persists to date as a challenge to the dental profession in particular and society in general. Providing information to dental professionals and public through research on dental caries is essential for staying up to date on the disease's latest developments, its treatment requirements, and the best strategies to prevent its development, limit its progression, and minimize its consequences. (6)

Dental caries is a microbiological infection that starts with the demineralization of the tooth's inorganic part and progresses to the destruction of its organic portion, resulting in the formation of cavities. The interaction between the biofilm and the tooth surface is called the caries process. (fig:2) (7)

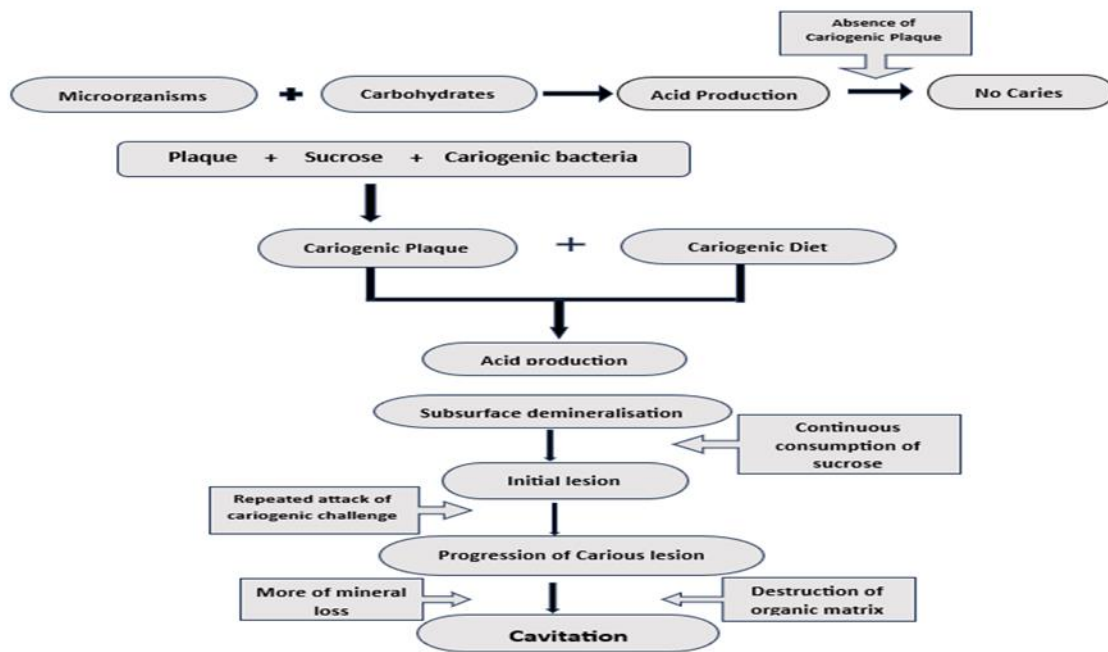


Fig 2: Flowchart representing the carious process

Dental caries is an oral disease that easily transmissible, most commonly seen in permanent molars and premolars. (8). There may be a relation between caries in permanent molars and other permanent teeth due to the buildup of dental plaque and the infectious nature of caries. In addition, dietary and oral hygiene habits also play a role in formation of caries in different teeth (9). According to various studies, 42% of tooth extraction occurs because of first permanent molar caries which is higher than for other teeth (10)

The relation of caries in the permanent molars may be attributed to various occlusal morphological characteristics such as deep fissures, grooves and pits, creating challenges for effective tooth brushing. These features can lead to the buildup of food debris on occlusal surfaces, thereby elevating the risk of developing caries (11). The onset and advancement of caries within the teeth and inter proximally can be linked to the existence of dental plaque. Research demonstrated that permanent molars displaying abundant plaque were 14.5 times more susceptible to caries than those with hardly detectable plaque (12).

Factors affecting the incidence of caries are: (13) (fig:3)

- Tooth (Host)
- Substrate (Environmental factors)
- Microorganisms (Agent)
- Time period

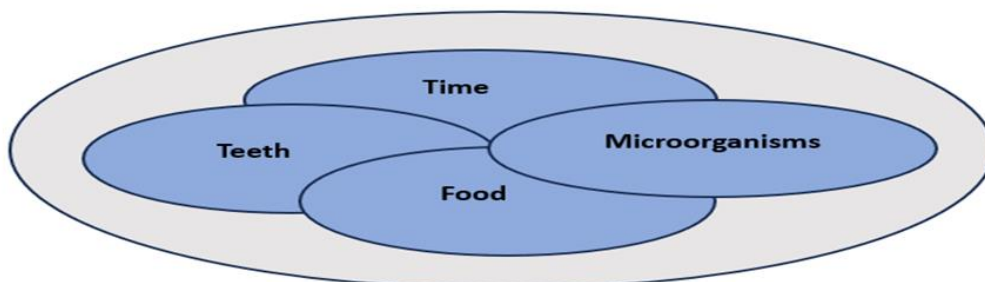


Fig:3 The factors affecting the incidence of caries

The increased incidence of caries in molars can be due to various factors like early eruption, deep pits and fissures of the occlusal surface, thinner enamel and dentin, relatively poor degree of mineralization and more retention of food particles, relatively protected from mechanical cleaning by the tongue and cheeks. These lead to the increased susceptibility of molars to dental caries. (4)

Caries prevention strategies should focus on oral health education and raising awareness about the importance of oral hygiene and proper nutrition, particularly to limit sugar intake. Along with that, the preventive programs should cover a wider age range as their target group of people. (14)

Proper brushing removes dental plaque and helps in maintaining good oral hygiene. Brushing teeth twice every day with fluoride toothpaste using the appropriate technique is considered the most acceptable and effective method of preventing caries. Fluoride prevents dental caries by promoting enamel remineralization, and affecting the metabolism of cariogenic bacteria. (1)

According to present study, a total of 2777 individuals both males and females, aged between 18 and 40 years were participated. Caries distribution in individual types of permanent teeth was noted. The molars (1st & 2nd) had the highest percentage of dental caries. 29.5% (6561) of the molars were affected. This was followed by incisors 0.62% (139), premolars 0.58% (129) and canines had the lowest prevalence of dental caries i.e., (53) 0.45%.

Macek et al published a landmark study done on oral examination component of the Third National Health and Nutrition Examination Survey that ranked the relative susceptibility to dental caries of various morphological tooth types. The caries susceptibility in permanent teeth was found that molars were higher than incisors, canines, or premolars. Their study was conducted when dental caries prevalence and severity were generally high in the United States, prior to the introduction of preventive measures such as fluoride and dental sealants (15).

A study conducted by Eklund and Ismail, analysis of surface and tooth-specific data from NHANES I and HHANES shows that the pattern of dental caries differs greatly from tooth to tooth and surface to surface. Occlusal caries precedes all other types, and increases most rapidly and to the highest levels in the molars (16).

A study by Li et al in 1979-1980 and the 1986-1987 National Institute of Dental Research (NIDR) surveys of school-aged children revealed dental caries patterns in school-aged children through two national surveys. It was found that the caries proportion was highest on occlusal surfaces of maxillary and mandibular permanent first molars, followed by second molars. Unlike the primary dentition, high caries rates in the permanent dentition were limited to pit and fissure surfaces of molars (17).

The study done by Chukwu GA et al., on Dental caries and extraction of permanent teeth, collected the data from the case notes of patients that underwent extraction at the Plateau State Dental Centre, Jos, Nigeria from January 2000 to December 2001, as a result of dental caries and its sequelae. 12696 patients attended the clinic, with a total of 11546-teeth extracted. 6145 (53.2%) permanent teeth were extracted due to caries and its sequelae within the period under review. In maxilla anteriors accounted for 3.2%, pre-molars 7.7% and molars 29.8% while in mandible accounted for 0.4%, pre-molars 3.3% and molars 55.6%, concluding that molar are more susceptible to caries. (18)

A study conducted by Warnakulasurriya S et al., on 683 school children in Sri Lanka aged 13-16 years and reported that out of 2732 first molars, 37 per cent were found to be carious and 11% of children had all first permanent molars affected by caries (19).

Molars are very crucial because of their significant role in maintaining a normal masticatory function and dentofacial harmony (14). The high incidence of molar caries is a cause of concern. A reason for this incidence rate could be the lack of awareness about oral health among public. Other probable explanations can be the dietary pattern and limited access to dental health services. Furthermore, the lack of conventional dental care such as brushing teeth twice a day, using dental floss etc., might give rise to higher rate of caries in permanent molars, suggesting the need of oral disease preventive programs in India in the future. A visit to the dentist will ensure the necessary preventive measures, such as the application of fluoride and fissure sealants and provision of oral hygiene instructions. (14)

V. Conclusion

Our study indicated that molars are more prone to caries. There are many factors associated with the etiology of caries which includes their morphology, post eruptive enamel maturation, and early eruption. The results of this study will be helpful in creating patient awareness and education programmes for good oral hygiene, as well as in bringing preventive measures into practice, like applying pit and fissure sealants, which helps in preventing caries in molars. Patients will also benefit from receiving education about treatment of caries, which helps to preserve their natural teeth. Oral health education should be raised in the community through oral health campaigns. Adequate access of the public to preventive and restorative dental programs and services should be ensured for all.

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