



ORIGINAL RESEARCH PAPER

Dental Science

CARIES SUSCEPTIBILITY OF INDIVIDUAL TYPES OF PERMANENT TEETH IN CHILDREN: A CROSS SECTIONAL STUDY

KEY WORDS: Dental caries, Molars, Pre-molars, Canines, Incisors, Intra oral camera, Hyderabad, Cross-sectional study

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ABSTRACT

Background: Dental caries is a multifactorial disease, but due to anatomy, differences in time of eruption and other factors, the susceptibility of individual types of teeth to caries varies. **Aim:** The aim of the study is to determine the caries susceptibility of individual types of permanent teeth **Materials and Methods:** This study was conducted by OroGlee Solutions Private Limited, Hyderabad. A total of 5332 subjects aged 8-16 years were examined. Oral examination was done using an intraoral camera. **Results:** At 16.39%, molars are the most commonly affected teeth. Premolars, canines, and incisors all have a relatively low distribution of caries, with respective caries susceptibility of 1.05%, 0.1%, and 0.7%. **Conclusion:** The etiology of caries is multifactorial. However, this study shows that molars are more susceptible to caries because of their morphology, post-eruptive enamel maturation, and early eruption. Public awareness should be raised by educating people about proper brushing technique and preventive treatments for caries of molars such as pit and fissure sealant applications.

INTRODUCTION

Dental caries (also known as tooth decay or dental cavity) is the most common non-communicable disease worldwide. 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.^[1]

Dental caries is defined as a multifactorial, transmissible, infectious oral disease caused primarily by the complex interaction of cariogenic oral flora with fermentable dietary carbohydrates on the tooth surface over time.^[2]

The occlusal (pit and fissure) surfaces of individual teeth are the most vulnerable to caries, whereas the smooth (labial and lingual) surfaces are the least susceptible.^[3]

Dental caries occurs over time; the bacterial metabolism of sugars results in the formation of acid, which leads to the loss of tooth substance (enamel and dentine). Early stages of dental caries sometimes go unnoticed, but later stages can cause discomfort, infections, abscess, and even sepsis.^[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.^[3]

The process of caries formation can be considered as a dynamic imbalance between demineralization and remineralization, and a lesion develops as a sign of the decay if more minerals are lost from the hard tissues over time than are acquired.^[4]

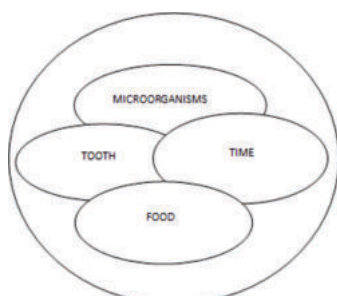


Figure:1 Interrelation Between Components Responsible For Caries

Dental caries is a disease caused by complex inter-relationship between five components including the Biofilm, time, diet, saliva, and tooth^[2]

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.

MATERIALS AND METHODS

A cross-sectional survey was conducted by OroGlee Solutions Private Limited, Hyderabad. A total of 5332 school going children (aged between 8 - 16 years) of different schools in the city of Hyderabad were examined at their respective schools. A survey questionnaire was prepared to acquire details such as age, gender, and relevant dental and medical history. An oral examination was carried out by the dentist using an intraoral camera. The intraoral camera is very useful for recording the minute details of the oral cavity. Approval from school administration was taken for the same.

Inclusion Criteria

Participants of the age group 8 to 16 years were included in the study.

Exclusion Criteria

Participants below 8 years and above 16 years of age were excluded from the study.

RESULTS

A total of 5332 school going children, aged between 8 and 16 years, participated in the study. Caries distribution in individual types of teeth was noted.

874 children were affected with dental caries in molars (16.39%). 56 children (1.05%) were found to have decay in premolars, 42 children (0.79%) were affected with dental caries in incisors. Only 6 children (0.11%) had caries in canines.

Table 1: Caries Susceptibility Of Individual Types Of Permanent Teeth

TYPE OF TEETH	PARTICIPANTS WITH CARIES (TOTAL 5332)	PERCENTAGE
MOLARS	874	16.39%
PREMOLARS	56	1.05%

CANINES	6	0.11%
INCISORS	42	0.79%

DISCUSSION

Dental caries is a microbial disease of the hard structure of the tooth that leads to demineralization of the inorganic portion and destruction of the organic substance of the teeth. Plaque plays a crucial role in dental caries; the teeth that are more prone to plaque accumulation are at higher risk of caries.^[5]

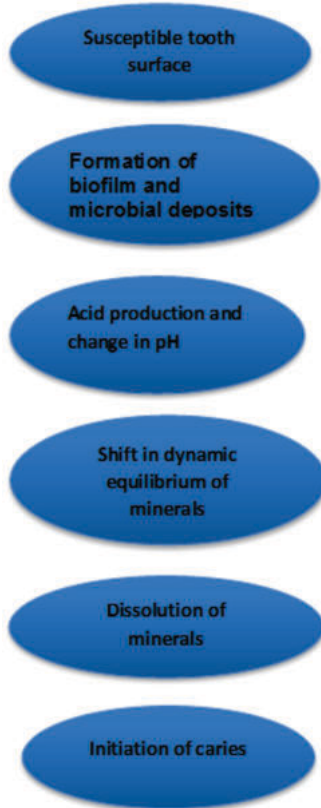


Figure:2 Steps Of Pathogenesis Of Dental Caries^[5]

The occurrence of dental caries differs from person to person of same age, gender, geographical area, similar diet and similar living conditions because of various factors that manipulate the etiology of dental caries.

Factors affecting the incidence of caries are:

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

Tooth: Developmental defect of tooth increases the risk of caries. Defects in tooth anatomy lead to plaque formation, which contains bacteria that produces acid, leading to demineralization of enamel. Morphologically, deep fissures and pits in molars lead to food retention. Improper oral hygiene later leads to caries. Less fluoride content in the tooth is a high-risk factor for caries.^[5]

Saliva: Saliva has a natural protective mechanism against decay. Salivary proteins get deposited on the teeth and protect the enamel from the acidic dissolution. Saliva contains minerals such as calcium, phosphate, and fluoride. These minerals help in remineralization of the enamel. Saliva acts as a buffer and balances the acid produced by bacteria.^[5]

Diet: Carbohydrates or sugars on the tooth structure favour bacterial growth, leading to dental caries.^[5]

Microorganisms: Acidogenic bacteria are the causative agents of decay. These acidogenic bacteria produce acid,

which changes the pH leading to dissolution of the enamel.^[5]

Our study showed that dental caries affects molars most commonly, whereas canines are least affected. Out of a total of 5332 children, 874 children (16.39%) had dental caries in their molars, making them the most commonly affected teeth. The distribution of caries in premolars, canines, and incisors is relatively insignificant. Premolar decay has been observed in 56 children, with a 1.05% prevalence. Dental caries in the incisors was seen in 42 children (0.7%). With 6 children affected (0.11%), canines are the least affected teeth.

Due to their morphology, molars are more susceptible to caries. As the first molars are the first permanent teeth to erupt, because of early exposure to the oral environment, the chances of caries increase. The erupting adjacent teeth create an acidic environment around the gingiva, leading to high plaque formation, which may affect the erupted teeth.^[3]

Variable post-eruptive enamel maturation and different tooth shapes have both been proposed as contributing factors to the differential caries susceptibilities. The vulnerability of a tooth surface to caries alters over time. It was shown that the susceptibility to caries is lowest in the first year following its eruption and increases to its highest rate two to three years later.^[3]

Our study results concur with other studies.

According to the study conducted by Demirci et al. at Istanbul University, Turkey, between 2001 and 2004, the maxillary jaw has a higher prevalence of caries (62.4%) than the mandibular jaw (37.6%). The highest caries rates were seen in molars (45%).^[3]

Similar results were found in the study conducted by G. Chestnutt et al. on Scottish adolescents, who showed high decay on molar teeth (35.8%).^[6]

CONCLUSION

There are many factors associated with the etiology of caries; this study indicated that molars are more prone to caries. This is due to 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.

Conflict of Interest: There are no conflicts of interest.

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