

Frequency Of Dental Caries On Individual Tooth Surfaces Of First Permanent Molars Between 6-13 Years Old Children

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ABSTRACT

Objective: To determine the frequency of dental caries of first permanent molars and compare its distribution by age, arch and involved surface of the tooth.

Materials and Methods: This observational study was carried out in the Operative Department of Bahria Dental College, Karachi during the period of January 2014 -December 2014. Total of two hundred and twenty one first permanent molars were examined for caries on different tooth surfaces. (Occlusal, Mesial, Distal, MOD). Children were divided into three groups on the basis of their ages. Data was entered in SPSS version 17 for descriptive analysis and to check statistically significant relationship between different age groups and involved surfaces of the tooth.

Results: There were 134 males and 87 females. Frequency of caries in left mandibular first molars was 33.50%, highest among all molars. In 6-8 years old children, frequency of caries was 14%, this percentage increased to 41.63% in 9 to 11 years old, and further increased to 44.34% in 12-13 year old children. Highest occurrence of caries was observed on the occlusal surface 50% in all age groups, followed by MOD surface 21.74%. Significant relationship was found between ages and involved surface of teeth with p-value 0.000.

Conclusion: Based on this study's results, it can be concluded that the risk of developing caries on the permanent first molars' occlusal surfaces was high around the age of 12 year.

Keywords: Caries, First permanent molars, Occlusal caries, Mesial surface, Distal surface.

INTRODUCTION:

Dental caries is a transmissible infection of the teeth and is one of the most prevalent chronic diseases of childhood.¹ The first permanent molars are very vulnerable to caries attack because of their early eruption in the mouth, their anatomical structure and their positioning in the mouth which makes it difficult for a young child to keep it plaque free.² If left untreated, dental caries can lead to pain, infection, loss of function, and eventually loss of the tooth.^{1,3} These molars are acknowledged by many authors as a mirror of the entire oral health status, predicting the condition of other teeth and if one of the first permanent molars gets decayed in the first year after its eruption, it will predict with high probability caries extension to the other first permanent molars.⁴ Many studies show high prevalence of caries in the first permanent molars, even shortly after their eruption.^{5,6}

Even in countries where local and general caries preventive measures are routinely applied, occlusal surface of the first permanent molar remains the place of choice for the carious process.⁷

The prevalence of caries amongst young children has been reported in many publications. A study done in China concluded that the prevalence of dental caries in the deciduous and permanent dentitions of 7- to 8-year-old children was high.⁸ Various studies explained that susceptibility of the first permanent molar is related to factors such as tooth eruption time and type, special anatomy and incomplete enamel calcification.⁹ Seyedein in a study involving 43772 students of fifth grade from all provinces and districts of Iran, classified by gender and place of residence, found that the DMFT index in 12-year-old students was 1.67 in 1994 and the highest prevalence of caries was seen in the first permanent molars.¹⁰ The prevalence of early childhood caries in Clifton cantonment area of Karachi, Pakistan was known to be 29.1% with the mean DMFT of 1.14 ± 2.223 .¹¹ A study done in Iran reported 21.8% occlusal surface of the samples was decayed and there was a significant correlation between the amount of plaque on the occlusal surface and also DMFT with occlusal caries ($p=0.03$).¹² Knowledge of disease epidemiology and pattern of caries in population aids in disease diagnosis and prevention. It is essential to obtain base line data regarding the condition of the first permanent molars in young adolescents so that appropriate prevention and treatment options can be planned.¹³

The aim of this study was to determine the frequency of dental caries developed on the first permanent molars of 6- to 13-year-old children and compare their age groups with the arch and individually involved surfaces of the tooth.

MATERIALS AND METHODS:

It was a descriptive study carried out from Jan 2014-to December 2014 in children attending the outpatient department of operative dentistry of Bahria Dental College. The study group included two hundred and twenty one children (aged 06 to 13 years) with carious lesion in first permanent molars. Convenience sampling technique was used. Informed consent

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of all subjects was obtained after explaining the nature of the study. Inclusion criteria include children with age range of 6-13 years old, co-operative children with carious lesion only on one first permanent molar. Children with pain and infection in their first permanent molars, children who had systemic diseases as confirmed by their medical records and those with visible calcification disturbances of the dentition were excluded from the study.

The first permanent molars were examined in standard lighting conditions provided by the dental unit. Visual examination was performed on clean and air-dried teeth. Proforma designed to record the information regarding age, gender, arch, tooth numbers and surface involved was used. The data was collected and analyzed with SPSS software version 17. Mean and standard deviation for age was determined. Chi-square test was used to assess significant relationship between age and involved tooth surface.

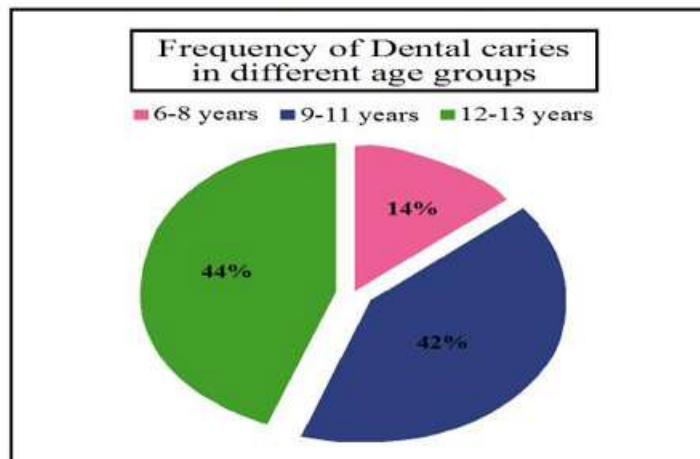
RESULTS:

The total numbers of subjects were 221 (Table. 1), out of which 134 (60.6 %) were males and 87 (39.4 %) were females with age ranged from 06 to 13 year old. Children were divided into three age groups, 31 out of 221 children belonged to age group 6-8 years, 92 to age group 9-11 years and rests of 98 were 12-13 years old. As one may notice, 14% of the 6-8 years old children had caries in their first molar, this percentage increased to 41.63% in 9 to 11 years old, and further increased to 44.34% in 12-13 year old children. (Fig 1)

Table: 1
Frequencies and Percentages of Different Variables

	Variables	Frequency	Percent
Gender N=221	Male	134	60.6
	Female	87	39.4
Age N=221	6-8 Years	31	14.0
	9-11 Years	92	41.6
	12-13 Years	98	44.3
Arch N=221	Maxillary	84	38.0
	Mandibular	137	62.0
Teeth No. N=221	Upper right first molars	48	21.7
	Upper left first molars	36	16.3
	Lower left first molars	74	33.5
	Lower right first molars	63	28.5
Surface Involved N=221	Occlusal	125	56.6
	Mesial	45	20.4
	Distal	13	5.9
	MOD	38	17.2

Figure: 1
Percentages of Dental Caries in 6- 13 Year Old Children in their First Permanent Molars



In the 6-8 years age group: Out of 31 children, 74.19% were males and 25.81% were females. The anatomic distribution of the involved teeth; frequency of right mandibular first molars (n=14) were highest in all teeth followed by left mandibular first molars (n=9). (Table 2) Highest prevalence of caries was noticed on the occlusal surface 38.71%, followed by MOD surface 22.58%.

In the age group of 9-11 years: 92 children were examined in this group, 44 were males and 48 were female. 38 maxillary molars and 54 mandibular molars had caries. The anatomic distribution of the involved teeth; frequency of left mandibular first molars (n=46) were highest in all teeth followed by right mandibular first molars (n=36). Highest frequency of caries was observed on the occlusal surface 50%, followed by MOD surface 21.74%.

(Table 2)

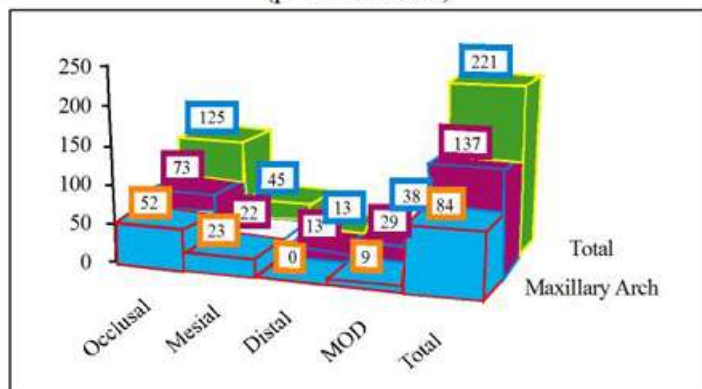
In the age group of 12-13 years: Out of 98 children, 67 were males and 31 were females. Frequency of caries in maxillary and mandibular molars was 39 and 59 respectively. Frequency of left mandibular first molars (n=32) were highest in all teeth followed by right mandibular first molars (n=27). Highest frequency of caries was found on the occlusal surface 68.37%, followed by mesial surface 20.41%. Significant relationship was present between different age groups and involved surface of teeth with p-value 0.000 (Table 2). Out of 221 examined molars, 61.99% mandibular molars had carious lesion (53.29% on occlusal surface, 16.06% on mesial surface, 9.49% on distal surface, 20.17% on MOD surface). 38.01% Maxillary molars were affected by carious lesion, (61.91% located on occlusal surface, 23.81% on mesial surface, no caries on distal surface, and 10.72% on MOD surface). Chi-square test showed a significant relationship (Fig 2) between tooth numbers and involved surfaces with p- value 0.004.

Table: 2
 Frequencies & Cross Tabulation Between Different Age
 Groups and Variables
 (Gender, Arch, Tooth Numbers, Tooth Surfaces)

Variables		6-8 Years	9-11 Years	12-13 Years	Chi-Square test P-Value
Gender	Male	23	44	67	0.004
	Female	8	48	31	
	Total	31	92	98	
	N=221				
Arch	Maxillary	7	38	39	0.158
	Mandibular	24	54	59	
	Total	31	92	98	
	N=221				
Tooth number	Upper right first molars	7	19	22	0.259
	Upper left first molars	1	18	17	
	Lower left first molars	14	33	27	
	Lower right first molars	9	22	32	
	Total	31	92	98	
	N=221				
Surface Involved N=221	Occlusal	12	46	67	0.000
	Mesial	6	19	20	
	Distal	6	7	0	
	MOD	7	20	11	
	Total	31	92	98	
	N=221				

Figure: 2

Cross tabulation between Arches and involved surfaces in first permanent molars in 6- 13 years old children (p- value 0.000)



DISCUSSION:

Dental caries is a multi-factorial disease influenced by many factors including age, sex, diet, microorganisms, trace elements, saliva, genetic predisposition and tooth morphology.¹⁴ In this study, only the first permanent molars were evaluated since they are a key to the permanent dentition and have almost erupted for about 6 years in the mouth. In addition, the first permanent molars are at greater risk of damage and loss, because of their special morphology. This study showed that majority of the patients reporting to operative department had carious lesion in mandibular first

molars. This might be due to improper oral hygiene measures or mandibular first molar erupting earlier than maxillary first molar.

Dental caries is a disease that shows a strong relationship with age as stated by Simon Hilson's study.¹⁵ Similar result was observed in our study, dental caries occurrence has been increasing in children with age. The present study also shows a higher percentage of caries in males compared to females. The number of males attending the hospital was higher compared to females. Lukacs and Largaespada in their study showed that when dental caries rates are reported by sex, females are typically found to exhibit higher prevalence rates than males.¹⁶

This study demonstrated that caries was predominantly located on the occlusal surfaces in maxillary and mandibular first molars. An explanation for this finding is that dental caries is an infectious disease, and it is likely that the permanent first molars' occlusal surfaces are easily colonized by bacteria due to their special morphology and functional characteristics, as well as to the surrounding conditions the newly erupted permanent molars have to face (e.g. immediate proximity of carious primary molars). Also, the significant positive relationship between the child's age and permanent first molars' occlusal surface caries implied that as age increases, the probability of developing caries is greater¹⁷. Even in countries that traditionally apply general and local caries prevention programs, the occlusal surface of the first permanent molar remains the choice location for caries shortly after its emergence.¹⁸ Thus, McDonald pointed out the high frequency of occlusal caries on the first permanent molar for all age groups.¹⁹ Anne Norblad stated that the "high risk" dental surfaces in children under 10 years of age are the occlusal surfaces of the first molars²⁰ while another study reported that by the age of six 4.9% of the children already have caries on the first permanent molar²¹. Epidemiological studies conducted in Romania show similar results.²² Grivu reported for Timisoara high caries prevalence in first permanent molars – 33.33% at the age of 7, 72.52% at the age of 8 and 91.66% at the age of 9.²³ Luca et al. reported a 77.67% frequency of occlusal caries on the first permanent molar in children aged 6 to 9 years old living in a rural area and a similar figure, of about 70%, for groups of children aged 6 to 12 years old examined and treated in the Clinic of Pedodontics in Bucharest.²⁴ In terms of caries topography on the first permanent molar, this study is consistent with many existing studies in the literature^{25,26,27,28} indicating caries development in the occlusal pits and fissures and also with those that note caries occurrence shortly after the eruption of the teeth.²⁹

CONCLUSION:

Caries of the first permanent molar grafted mostly on the pits and fissures at shortly after their eruption arcade. Dental health status of children from our study draw attention to the need of establishing certain national and community caries preventive programs for children starting at kindergarten-age in order to decrease the prevalence and severity of tooth decay in permanent dentition.

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