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Prevalence of Caries in First Permanent Molars in South West Coastal Population of India

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First permanent molar, Caries, Location, Prevalence, Age.

A B S T R A C T

Aim of the study was to analyse the prevalence of caries in first molars in south west coastal population in India. A total of 2000 patients were examined after obtaining the ethical clearance from the central ethical committee of NITTE University. Written consent was obtained and the patients who had caries on first molar teeth were questioned with a standard questionnaire to find its relation with age, gender, dietary habits and location. Data was recorded on prepared survey form based on WHO Oral Health Assessment Form 2013. Data was analyzed using IBM SPSS Statistics 20. Results. The present study showed that among the 2000 people, 1676 had caries in first molar which was 83.8 % of total population. Prevalence of first molar caries was highest among 26-35 year olds with 89.6% having first molar caries. The total number of first molar caries in mandible was more than in maxilla and the occlusal surface had maximum lesions (42.2%) followed by mesial surface (18.4%). More than three fourth of the population in south west coast of India was affected by first permanent molar caries.

Introduction

Dental caries is an infectious microbiologic disease of the teeth that results in localized dissolution and destruction of the calcified tissues. Dental caries and periodontitis are probably the most common chronic diseases of the world. In 1986, Loesche described caries and periodontitis as “perhaps the most expensive infections that most individual have to contend during lifetime”. Caries result in other significant intangible costs in

the form of pain, suffering and cosmetic defects (Sturdevant’s Art and Science of Operative Dentistry).

The prevalence of the disease is the number of population having a disease at a specific point in time (Sturdevant’s Art and Science of Operative Dentistry). The prevalence of dental caries is a principal subject of many epidemiological researches being carried out

all over the world (Hegde and Shija, 2011). In this study, only the first permanent molars were evaluated since they are the most important tooth in the dental arch. The first permanent molars erupts by 6 years of age, thus becoming the earliest permanent tooth to erupt in the oral cavity. First molar is important in mastication of food. It is the most important tooth in maintaining the vertical dimension of the face and is used for anchorage in orthodontic treatments. They play a major role in occlusion and have mighty control over the teeth erupting later behind and in front of them (Mostafa Sadeghi, 2007). The first molars are at greater risk of caries because of their special morphology. Caries in first molar may lead to their loss, which can lead to drifting of adjacent teeth and supra-eruption of opposing teeth (Kumar *et al.*, 2014; Mostafa Sadeghi, 2007). Permanent first molars are the biggest teeth and occupies a strategic position in the dental arch, so it is necessary to know the caries prevalence in this tooth and adequate measures to prevent its progression or development of new carious lesions (Kumar, 2014). The health of these teeth can be considered as a good basis to study the oral health status of the population (Mostafa Sadeghi, 2007).

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. So the aim of the present study was to evaluate the prevalence of caries in first permanent molars (FPM) in south west coastal population in India.

Materials and Methods

This study was conducted from June to November 2015 among patients from the Out Patient Department of Conservative

Dentistry and Endodontics and rural satellite centres of A. B. Shetty Memorial Institute of Dental Science, under NITTE University, Mangalore. A total of 2000 patients were examined after obtaining the written consent, in which 1390 were examined from the Out Patient Department of Conservative Dentistry and Endodontics and rest 610 were examined in rural satellite centres of A.B. Shetty Dental College to avoid the rural population dominance.

Ethics clearance was obtained from the central ethics committee of the institute. Patients were examined for prevalence of caries in first molars using sterilized mouth mirror, explorer, cotton rolls, tweezer and gloves in dental chair under a good illumination. Clinical oral examinations were performed on the dental chair by well-trained dentists. Presence of caries was recorded when a lesion in a pit or fissure, or on a smooth tooth surface, has an unmistakable cavity, undermined enamel, or a detectably softened floor or wall. A tooth with a temporary filling, or one which is sealed but also decayed, should also be included in this category.

The patients who had caries on first molar teeth were questioned with a standard questionnaire to find its relation associated with age, gender, dietary habits and location. Data was recorded on prepared survey form based on WHO Oral Health Assessment Form 2013. Data was analyzed using IBM SPSS Statistics 20. The results were subjected to statistical analysis by chi-square test and p value 0.05 is used throughout the study.

The inclusion criteria was all healthy patients above 15 years of age. Exclusion criteria includes patients with completely edentulous arch and loss of permanent first molars.

Results and Discussion

Study was conducted among a sample of 2000 people which included 1081 males and 919 females. The study population was divided into different age groups. It was observed that 1676 people have caries in first molar which is 83.8 % of total sample. Prevalence of first molar caries was highest among 26-35 year olds with 89.6% having first molar caries (Table 1).

On comparing the rate of caries in different surfaces of the first permanent molar (FPM), the occlusal surface had maximum lesions (57.9%) followed by mesial surface (18.4%) (Fig 1).

The total number of FPM caries in mandible was more than in maxilla. 32% of the FPM caries was in maxillary arch and 68% in

mandibular arch (Fig 2).83.35% of the reported males (901) had FPM caries while 84.33% females (775) had FPM caries (Table 2).Prevalence of first molar caries was higher among vegetarians as compared to people who consume mixed diet (Table 3) Prevalence of FPM caries in rural population (85.1) and in urban population (81.8%) (Table 4).

Prevalence of caries was more in horizontal brushing method as compared to vertical brushing method. Among the 1343 people who brushes only once daily, 87.7% had caries whereas only 78.9% people who brushes twice daily had lesions (Table 5). Root caries is more prevalent in older age group above 66 years(21.9%),followed by 56 to 65 year old showing a prevalence of 8.4 %. So 3.3% of the total population had root caries in first molars (Table 6).

Table.1 Prevalence of First Molar Caries Versus Age Group

			Presence of Caries in First Molar		Total
			Present	Absent	
AGE	15-25 Y	Count	215	49	264
		% within AGE	81.40%	18.60%	100.00%
	26-35 Y	Count	380	44	424
		% within AGE	89.60%	10.40%	100.00%
	36-45 Y	Count	427	82	509
		% within AGE	83.90%	16.10%	100.00%
	46-55 Y	Count	263	54	317
		% within AGE	83.00%	17.00%	100.00%
	56-65 Y	Count	252	56	308
		% within AGE	81.80%	18.20%	100.00%
	66+ Y	Count	139	39	178
		% within AGE	78.10%	21.90%	100.00%
Total		Count	1676	324	2000
		% within AGE	83.80%	16.20%	100.00%
Chi-square value			Df	p value	
17.004			5	0.004	

Table.2 Prevalence of Caries in First Molar Versus Gender

			Presence of Caries in First Molar		Total
			Present	Absent	
GENDER	Male	Count	901	180	1081
		% within GENDER	83.35%	16.65%	100.00%
	Female	Count	775	144	919
		% within GENDER	84.33%	15.67%	100.00%
	Total	Count	1676	324	2000
		% within GENDER	83.80%	16.20%	100.00%

Chi-Square value	Df	p value
0	1	0.988

Table.3 Prevalence of First Molar Caries in Relation to Dietary Habits

			Presence of Caries in First Molar		Total
			Present	Absent	
DIETARY HABITS	Vegetarians	Count	315	55	370
		% within DIETARY HABITS	85%	15%	100.00%
	Mixed diet	Count	1281	349	1630
		% within DIETARY HABITS	78.60%	21.40%	100.00%
Total		Count	1676	324	2000
		% within DIETARY HABITS	83.80%	16.20%	100.00%

Chi-Square value	Df	p value
8.874	1	0.003

Table.4 Prevalence of Caries in First Molar in Relation to Location

			Presence of Caries in First Molar		Total
			Present	Absent	
LOCATION	Rural	Count	1053	185	1238
		% within LOCATION	85.10%	14.90%	100.00%
	Urban	Count	623	139	762
		% within LOCATION	81.80%	18.20%	100.00%
Total		Count	1676	324	2000
		% within LOCATION	83.80%	16.20%	100.00%

Chi-Square value	Df	p value
3.779	1	0.052

Table.5 Prevalence of First Molar Caries in Relation to Brushing Method and Frequency

			Presence of Caries in First Molar		Total
			Present	Absent	
BRUSHING METHOD	Horizontal	Count	1328	231	1559
		% within BRUSHING METHOD	85.18%	14.82%	100.00%
	Vertical	Count	348	93	441
		% within BRUSHING METHOD	78.91%	21.09%	100.00%
BRUSHING FREQUENCY	Once daily	Count	1178	165	1343
		% within BRUSHING FREQUENCY	87.70%	12.30%	100.00%
	Twice daily	Count	498	149	647
		% within BRUSHING FREQUENCY	77.00%	23.00%	100.00%

Table.6 Prevalence of Root Caries in First Molars in Relation to Age

			Root Caries		Total	
			No	Yes		
AGE	15-25 Y	Count	264	0	264	
		% within AGE	100.00%	0.00%	100.00%	
	26-35 Y	Count	424	0	424	
		% within AGE	100.00%	0.00%	100.00%	
	36-45 Y	Count	504	5	509	
		% within AGE	99.00%	1.00%	100.00%	
	46-55 Y	Count	307	10	317	
		% within AGE	96.80%	3.20%	100.00%	
	56-65 Y	Count	282	26	308	
		% within AGE	91.60%	8.40%	100.00%	
	66+ Y	Count	139	39	178	
		% within AGE	78.10%	21.90%	100.00%	
	Total		Count	1935	65	2000
			% within AGE	96.80%	3.30%	100.00%

Fig.1 Distribution of Caries on First Molar

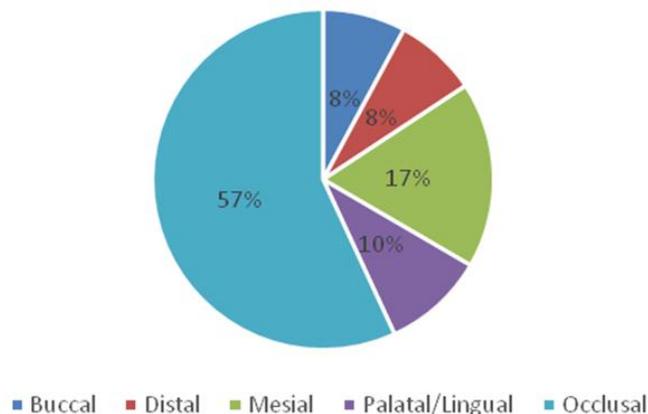
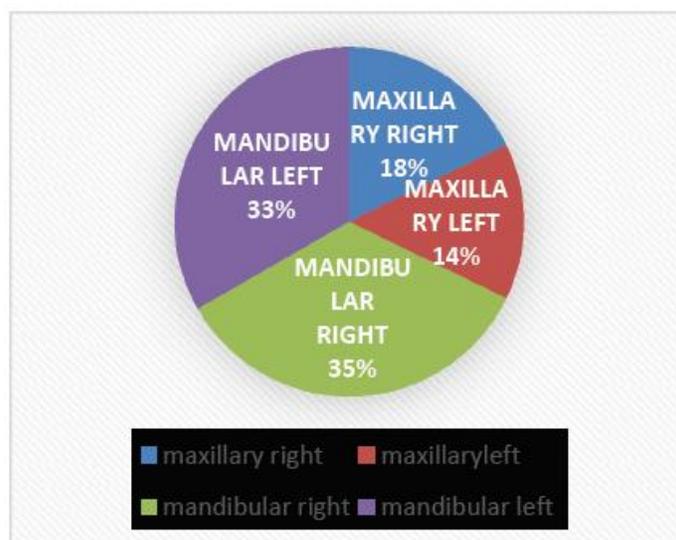


Fig.2 Distribution of First Molar Caries in the Dental Arch



This oral health survey was conducted among the people of south west coastal population of India, namely Kerala and Karnataka and patients from the rural centres of dental colleges to assess the prevalence of dental caries in first permanent molars.

A 2000 population was examined from different age groups 15-25, 26-35, 36 -45, 46- 55, 56-65 and 66+ years. Of these 1676 subjects had first molar caries. The average prevalence rate among the different age groups was 83.8%. This is supported by a study conducted by Noronha *et al.* (1999) in Brazil and Wayne (2004) in Saudi Arabia reported 87% and 86 %of caries in first permanent molars in 12 years (Noronha *et al.*, 1999). According to Table 1, 26-35 age group had maximum caries of 89.60% and 81% of caries was noted among 15 to 25 year age group. Wayneetal reported 73 %caries in first permanent molars in 15 to 19 year old.

High caries prevalence rate in first molars can be attributed to the deep pits and fissures on the occlusal surface, its large size and the

early eruption of the tooth (Khalid). It leads to more acid accumulation on the occlusal surface compared to other teeth (Khalid). So most of the pits and fissures of first molars shows early signs of caries soon after eruption. Occlusal surface had more caries than other surfaces (Demirci *et al.*, 2010). 57.9% of the caries were found in occlusal lesions. 18% of the population had mesial caries followed by 9.9% lingual caries, 8.5% distal caries, and 8.3% buccal caries (Fig 1). This is similar to the study conducted by Eklund *et al.* (1986) in U.S population. They reported that occlusal caries exceed all other types and increased most rapidly and to the highest levels in molars (Eklund and Ismail, 1986; Chestnutt *et al.*, 1996). Comparable to the present study's results, occlusal surfaces of the permanent first molars were the most commonly involved surface, over two-thirds of these being affected according to the study (Demirci *et al.*, 2010).

According to fig 2, mandibular molars were commonly affected than maxillary molars with a prevalence of 64% in lower arch. Hegde *et al.* (has reported that lower first molars were frequently involved with caries

when compared to upper first molars in a study conducted in South Canara population (Hegde and Shija, 2011). In most people, 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 of time, making it more susceptible to caries than maxillary first permanent molar (Kumar *et al.*, 2014). Also less caries prevalence in maxillary first molar might be due to the flushing action of saliva from parotid gland opening near maxillary molar (Noronha *et al.*, 1999).

As per table 2, there was no significant difference in prevalence of caries among males and females. Similar observations are made by Hegde *et al.* (2011) in South Canara population (Hegde and Shija, 2011).

Prevalence of first molar caries is high in rural (85.1) as compared to urban (81.8%) but there was no significant difference between the prevalence. (Table 3)

With respect to table 4, 370 people were vegetarians and the remaining 1630 were having mixed diet. In this 85% of vegetarians had dental caries whereas only 78.6% from the other group had caries. Vegetarian diet is relatively low in protein, long-chain n-3 fatty acids, retinol, vitamin B12, saturated fat, Ca, Zn and usually rich in carbohydrates, carotenoids, n-6 fatty acids, dietary fiber, folic acid, vitamin E, vitamin C and Mg (Key *et al.*, 2006.) Sea food forms the major portion of non-vegetarian diet in these study subjects from South Canara, located in the southern west coast of India. It has been reported that people who eat proteinaceous foods in their diet are relatively free from root caries as the amount of acid produced in the mouth is less, when compared to the sugar intake

which makes it one of the reason for decrease in the incidence of root caries among the population that consume mixed diet (Miller, 1890) (Ranjith Ranjith Shetty *et al.*, 2015). The probable reason for decreased caries prevalence in the population on mixed diet could be attributed to the higher intake of sea food, rich in fluoride (Hegde *et al.*, 2014).

Table 5 showed an inverse relationship between the incidence of caries and the frequency of brushing (Mithra *et al.*, 2014). This result is according to the study by Hegde *et al.* that the population who observed brushing once daily had a caries incidence of 77.96 % and those who brushed twice daily was found to be 22% (Mithra *et al.*, 2014). Therefore, it can be concluded as better oral hygiene habits lead to a decrease in the prevalence of caries which was also reported in a study conducted by Petti *et al.* (1997) in Italy (Petti Panfili Pierluigi and Simonetti D'Arca Adele, 1997).

Conclusion

The prevalence of caries in first permanent molars in South West Coast of India is 83.8%, more than three fourth of the population is affected by caries. It is high in rural area and younger adults. A study published in 2011 by Hegde and A.S. Shija reports a caries rate of 59.4% among South Canara population. Higher rate this time could be due to the increased level of oral health awareness and hence more patients are seeking dental treatments compared to previous years. Survey was conducted among patients visited outpatient department of A. B. Shetty Memorial Institute of Dental Sciences and its rural centres. Since first molars erupts as early as 6 years of age, sufficient dental care must be taken from childhood to improve general oral health and to prevent dental caries.

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