



Relationship between class 1 dental caries and sextant involving caries among patients visiting the outpatient department of Saveetha Dental College, Chennai, India

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ABSTRACT



Depending upon the site of the tooth, accessibility of oral hygiene products like toothbrush, tooth floss etc. different teeth have varying susceptibility to getting infected by cariogenic bacteria. Plaque accumulation, occlusal morphology, oral hygiene practices etc. play an important role in determining the susceptibility of teeth towards caries. A retrospective cross-sectional study was conducted using patient records from the Dental College, Chennai after reviewing and analysing the data of 86000 patients between June 2019 and March 2020. The variables involved were age, gender and site of carious teeth. Data were then exported to the Statistical Package for Social Sciences (SPSS) for Windows (Version 19, 2010) for further analysis. The total sample size was 19014. The sample had a gender distribution of 55.56% males and 44.44% females. Class 1 dental caries was found to be most prevalent in sextant 6 that is the lower right posterior teeth region. Least incidence of class 1 DC was noted in sextant 5, which is the lower anterior teeth. Young adults (18-35 years) had the highest incidence of class 1 dental caries ($p < 0.05$). Among males and females, respectively, class 1 caries was most prevalent in sextant 6 ($p < 0.05$). Within the limits of the study, it can be concluded that caries experience is highest in mandibular posteriors. There was a slight male predilection in the prevalence of class 1 dental caries. Young adults in the age group, 18-35 years, have the highest incidence of class 1 DC.

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INTRODUCTION

Dental caries is one of the most prevalent chronic diseases of people worldwide. Individuals are susceptible to this throughout their lifetime. (Selwitz *et al.*, 2007) It is a cause of great pain and discomfort if left untreated for a long period of time. (Ramamoorthi *et al.*, 2015) Dissolution of tooth structure weakens the crown often resulting in fracture of the tooth. (Jose *et al.*, 2020)

The susceptibility of individual tooth surfaces to dental caries varies vastly. (Hannigan *et al.*, 2000)

Also, the spread of dental caries varies greatly from tooth to tooth and surface-to-surface. There is evidence that occlusal caries precedes other types of caries in the spread. It has the highest prevalence in molars. (Eklund and Ismail, 1986)

Caries prevalence also varies based on gender. There is a higher prevalence seen in females due to various factors such as the early eruption of teeth in girls, frequent snacking during food preparation, pregnancy etc. Due to hormonal fluctuations during several events such as puberty, menstruation, pregnancy etc., the oral environment is highly cariogenic in women. (Lukacs and Largaespada, 2006)

There are various other factors that may lead to caries. (Rajakeerthi and Nivedhitha, 2019) These include inadequate salivary flow and composition, high numbers of cariogenic bacteria, insufficient fluoride exposure, gingival recession, immunological components, genetic factors, among others. (Selwitz et al., 2007) Host matrix metalloproteinases get activated, leading to dentin matrix breakdown in the course of dental caries. (Ramesh et al., 2018)

Diagnostic tests such as thermal test, electric pulp test, pulse oximeter etc. are employed to check the vitality of the tooth. (Janani et al., 2020) Efficient removal of carious lesions is necessary to prevent recurrence of caries. (Manohar and Sharma, 2018; Teja and Ramesh, 2019) The treatment of dental caries depends on various factors such as remaining dentin thickness, pulpal involvement, vitality tests etc. (Ramanathan and Solete, 2015) Commonly used dental materials used for cavity filling are resin composite, flowable composite, GIC, amalgam, gold etc. (Nasim et al., 2018; Kumar and Antony, 2018) Veneers and laminates can be used for the aesthetic management of caries in anterior teeth. (Ravinthar and Jayalakshmi, 2018) Traditional medicines such as neem, tulsi, grape seed extract etc. have been advised for the prevention of dental caries. (Nasim and Nandakumar, 2018) In the case of the incipient lesion, remineralisation pastes can be used to reverse the cariogenic activity. (Rajendran et al., 2019) Proper brushing technique, frequent usage of floss, chlorhexidine mouthwash should be advised to prevent dental caries. (Noor and Pradeep, 2016)

MATERIALS AND METHODS

Study design and setting

This is a retrospective cross-sectional study in which patient records from a Dental College, Chennai were obtained. Data was collected for patients reporting to the Department of Conservative Dentistry and Endodontics after reviewing patient records

and analysing the data of 86000 patients from June 2019- April 2020 who had class 1 dental caries.

Data Collection

A total of 19014 cases of class 1 dental caries were identified. Other relevant data such as age, gender, patient ID, patient name etc., were also recorded. Repeated patient data and incomplete records were excluded. Clinical photos and radiographs were used to verify the site of dental caries. Data was also verified by an external reviewer.

Statistical analysis

Data were recorded in Microsoft Excel and later exported to the Statistical Package for Social Sciences for Windows (Version 19, 2010) after proper coding of the variables involved. These variables included were gender (1. Male, 2. Female), age (1. 18-35 years, 2. 36-55 years, 3. >56 years) and site of caries involvement (1. Sextant 1- 18-14, 2. Sextant 2- 13-23, 3. Sextant 3- 24-28, 4. Sextant 4- 38-34, 5. Sextant 5- 33-43, 6. Sextant 6- 44-48). Thereafter, the data were subjected to statistical analysis using the Statistical Package for Social Sciences (SPSS) for Windows (Version 19, 2010). Chi-square test was employed with the level of significance set at $p < 0.05$. Appropriate graphs, tables and charts were constructed using the same software for a clear representation of the results obtained.

RESULTS AND DISCUSSION

The final data consisted of 19014 cases of patients with class 1 dental caries (DC). Gender distribution among the patients was found to be - 55.56% males and 44.44% females. (Table 2, Figure 2) Incidence of class 1 DC in the different age groups was 72.6% in 18-35-year-olds, 25.2% in 36-55 years olds and 2.2% in > 56-year-olds. (Table 1, Figure 1) The distribution of site of occurrence of class 1 DC in decreasing order of incidence was 31.51% in sextant 6, 30.95% in sextant 4, 18.31% in sextant 1, 18.08% in sextant 3, 1.09% in sextant 2 and 0.06% in sextant 5. (Table 3, Figure 3) Chi-square test done between gender and site class 1 DC (Table 4, Figure 4), and age and site of class 1 DC (Table 5, Figure 5) had $p < 0.05$ making the data statistically significant.

From Figure 4, X-axis denotes gender and Y-axis denotes the site of Class 1 Dental Caries. This graph represents the correlation of gender and site of class 1 dental caries where blue colour denotes sextant 1, and green denotes sextant 2, white denotes sextant 3, purple denotes sextant 4, yellow denotes sextant 5 and red denotes sextant 6. It shows that most Class 1 DC have occurred in sextant 6 in both males and females followed by sextant 4. Least number of

Table 1: Age distribution in patients with Class 1 Dental Caries. 18-35 years (72.6%), 36-55 years (25.2%) and 56+ years (2.2%)

Age groups	Frequency	Percent
18-35 years	13796	72.6
36-55 years	4792	25.2
56+ years	426	2.2
Total	19014	100.0

Table 2: Gender distribution among patients with Class 1 Dental Caries. Females 44.4%, Males 55.6%

Gender	Frequency	Percent
Male	10564	55.6
Female	8450	44.4
Total	19014	100.0

Table 3: Distribution of site of Class 1 Dental Caries. Sextant 1 (18.31%), Sextant 2 (1.09%), Sextant 3 (18.08%), Sextant 4 (30.95%), Sextant 5 (0.06%) and Sextant 6 (31.51%)

Site	Frequency	Percent
Sextant 1	3481	18.2
Sextant 2	207	1.1
Sextant 3	3438	18.1
Sextant 4	5885	31.0
Sextant 5	11	0.1
Sextant 6	5992	31.5
Total	19014	100.0

Table 4: Cross-tabulation of gender and site of class 1 dental caries (DC)

Gender	Site						Total	P-value
	Sextant 1	Sextant 2	Sextant 3	Sextant 4	Sextant 5	Sextant 6		
Male	1879	130	1813	3329	7	3406	10564	0.000
Female	1602	77	1625	2556	4	2586	8450	
Total	3481	207	3438	5885	11	5992	19014	

Chi-square test - Gender vs Site of class 1 dental caries. p=0.000. Data is statistically significant

Table 5: Cross-tabulation of age and site of class 1 dental caries (DC)

Age	Number of missing teeth						Total	P-value
	Sextant 1	Sextant 2	Sextant 3	Sextant 4	Sextant 5	Sextant 6		
18-35 years	2570	152	2525	4241	5	4303	13796	0.000
36-55 years	845	46	849	1504	5	1543	4792	
56+ years	66	9	64	140	1	146	426	
Total	3481	207	3438	5885	11	5992	19014	

Chi-square test - Age vs Site of class 1 dental caries. p=0.029. Data is statistically significant

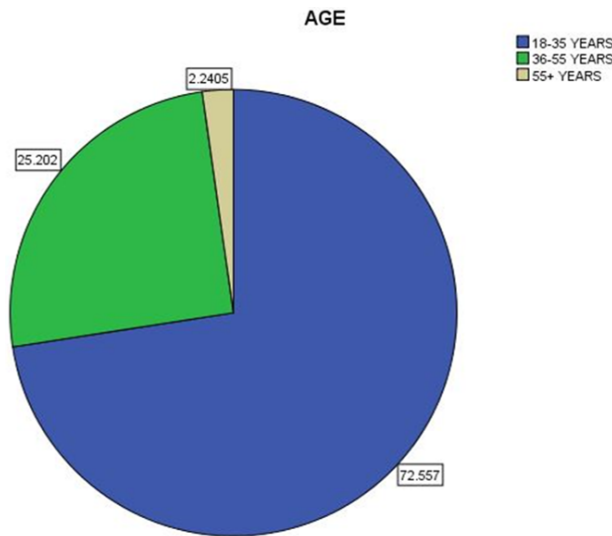


Figure 1: Pie chart showing age distribution in patients with Class 1 Dental Caries. 18-35 years (72.6%), 36-55 years (25.2%) and 56+ years (2.2%).

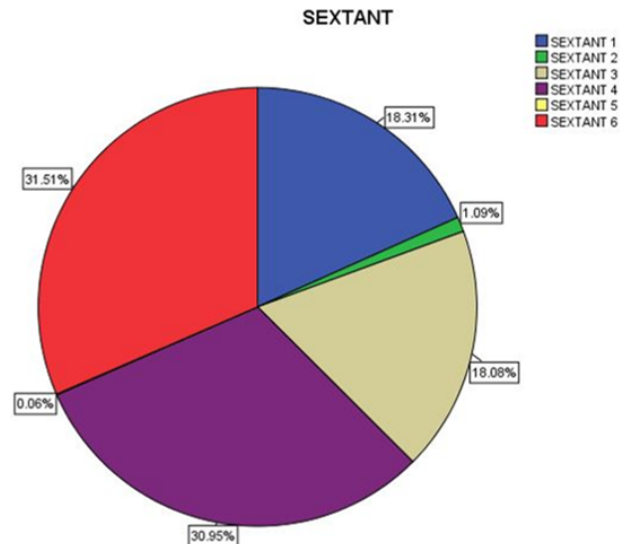


Figure 3: Pie chart showing distribution of site of Class 1 Dental Caries. Sextant 1 (18.31%), Sextant 2 (1.09%), Sextant 3 (18.08%), Sextant 4 (30.95%), Sextant 5 (0.06%) and Sextant 6 (31.51%)

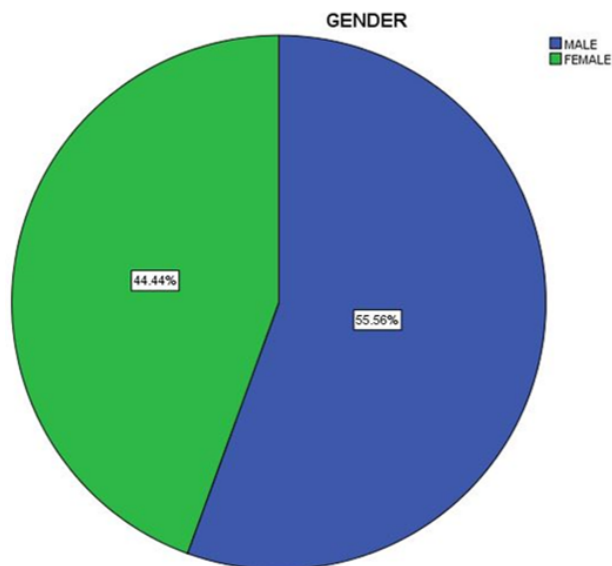


Figure 2: Pie chart showing gender distribution among patients with Class 1 Dental Caries. Females 44.4%, Males 55.6%

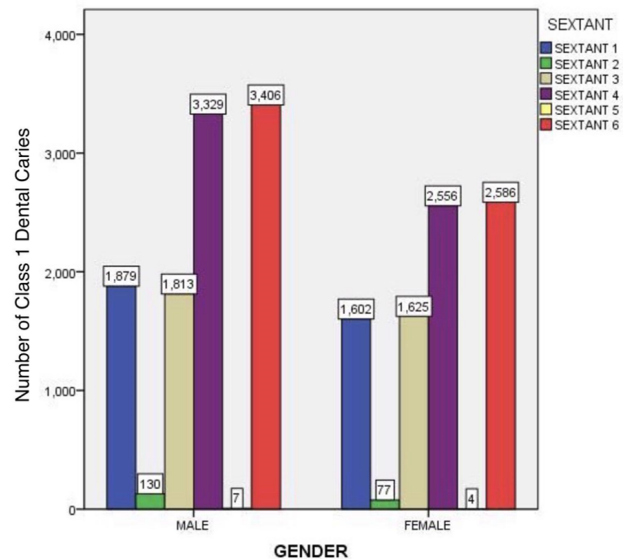


Figure 4: Bar graph showing an association between gender and site of class 1 dental caries

Class 1 DC was seen in sextant 5 among both genders. (Chi-square test; p-value=0.000; statistically significant) Data has a statistically significant association.

From Figure 5, X-axis denotes age and Y-axis denotes the site of Class 1 Dental Caries. This graph represents the chi-square analysis of age and site of class 1 dental caries where blue colour denotes sextant 1, and green denotes sextant 2, white denotes sextant 3, purple denotes sextant 4, yellow denotes sextant 5 and red denotes sextant 6. The most common site of class 1 DC among all 3 age groups was sex-

tant 6 followed by sextant 4. Least common sites were sextant 5 and sextant 2 in all age groups. (Chi-square test; p-value=0.029; statistically significant) Data has a statistically significant association.

In the present study, it is revealed that the incidence of class 1 DC is higher in the mandibular posterior region than other areas. When comparing incidence between upper and lower jaws, caries is seen more frequently in the mandible (62.52%) than the maxilla (37.48%). Also, caries incidence shows a male predilection. (Table 2, Figure 2)

According to a study by Demirci et al., the caries inci-

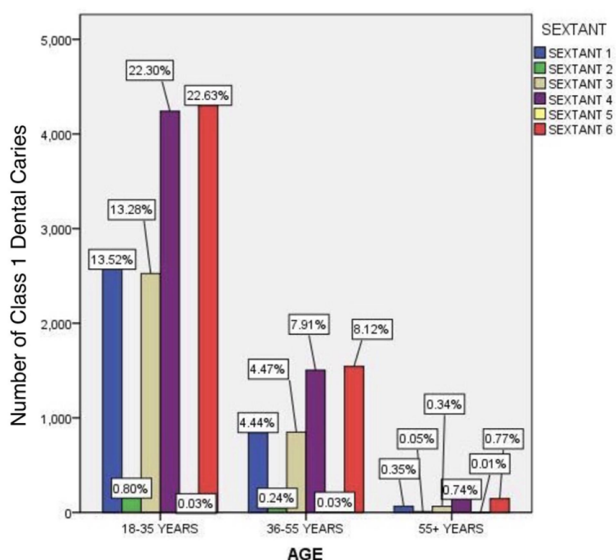


Figure 5: Bar graph showing an association between age and site of class 1 dental caries

dence is higher in the maxillary jaw (62.4%) than the mandibular jaw (37.6%) (Demirci et al., 2010). This contradiction could be due to the high sample size in the present study. However, an interarch analysis of caries revealed that the mandibular arch was more affected by dental caries than the maxillary arch. In the mandibular arch, the molars were most commonly involved. (Goyal et al., 2007)

In the same study by Demirci et al. (2010), it was reported that caries had a slightly higher female predilection (59.1%) among genders. The reason for such opposing findings could be the high prevalence of certain oral habits such as tobacco chewing, smoking etc. among males in the Indian subcontinent, which is known to increase the susceptibility of dental caries. (Vellappally et al., 2007)

A study by Chestnutt et al. suggested that molar occlusal surfaces have the highest susceptibility to attack by cariogenic bacteria. Also, the highest incidence of caries in this study was in pit and fissures, which are most commonly found in molars and premolars (Chestnutt et al., 1996). The first molar was reported to be the most commonly affected tooth, followed by the second molar. (Manji et al., 1986) These studies are in line with the present study as the incidence of class DC in posterior teeth is 98.95%. (Table 3, Figure 3)

Hopcraft et al. reported that first molar teeth had the highest caries experience and caries was present more frequently on the occlusal surfaces than on the proximal surfaces. (Hopcraft and Morgan, 2006)

CONCLUSION

Within the limits of the study, it can be concluded that class 1 dental caries is most prevalent in mandibular molars and premolars. There is a male predominance in its occurrence and is seen mostly in the age group of 18-35 years.

Conflict of Interest

The authors declare that they have no conflict of interest for this study.

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