



Gender variation in the prevalence of class III dental caries in mesial and distal aspects of teeth: A hospital based retrospective study

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ABSTRACT

Dr Greene Vardiman Black in the year 1896 classified dental caries into VI classes based on the site of occurrence, among which class III and class IV are exclusively associated with anterior teeth. There are very minimal studies in the literature emphasising on the prevalence of dental caries in the anterior teeth region. Caries involving the anterior teeth significantly affects aesthetics and which in turn affects the confidence levels of the affected person. Grossly decayed anterior teeth also affect phonetics and mastication. The aim of this study was to determine the prevalence and gender variations of class III dental caries among patients who have visited Saveetha Dental College and have undergone treatment for the same. A Retrospective study was conducted, and data collection was done from dental archives pertaining from June 2019 to April 2020. Data consisted of all the patients who underwent therapeutic procedures for class all dental caries. Data was imported to IBM SPSS Version 20 for statistical analysis. Results were tabulated. Prevalence of class III dental caries was more among females as compared to males. Maxillary anterior are more affected than mandibular anterior. Prevalence was more among patients belonging to the third and fourth decade of life. There was a statistically significant association between age, and proximal surface –majority of mesial caries decreases with age and distal caries increases with age. As the age increases, the number of decayed surfaces increases (not statistically significant). This study was conducted in a single centre. Extensive multi-centre studies need to be done.

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INTRODUCTION

Dental caries is the localised destruction of the susceptible hard tissues of teeth by acidic by-products produced by bacterial fermentation of dietary carbohydrates (Longbottom *et al.*, 2009; Fontana *et al.*, 2010). It is a bacterial driven disease, which is chronic in nature, the multifactorial, site-specific, dynamic disease process that results due to imbalance in physiologic equilibrium between the tooth mineral content and the plaque fluid, i.e. when the pH drop results in net mineral loss over time (Fejerskov *et al.*, 2008; Fontana *et al.*, 2010). Over 100 years ago Dr Greene Vardiman Black in the year 1896 classified dental caries into VI classes based

on the site of occurrence, among which class III and class IV are exclusively associated with anterior teeth (Black, 1920). The proximal contacts between the anterior teeth (Hudson, 1956) and the presence of malocclusion (Helm and Petersen, 1989) greatly influence the development of proximal caries in the anterior teeth. In infants, frequent nocturnal bottle or breastfeeding leads to the development of caries in the anterior teeth – “nursing bottle caries” (Ripa, 1978; Veerkamp and Weerheijm, 1995) Caries starts as a white spot lesion (demineralization of enamel - Remineralizing agents are used for treatment) (Nasim and Nandakumar, 2018; Rajendran *et al.*, 2019), which progress towards dentin leading to dentin hypersensitivity and Ellis class II fracture (Jose *et al.*, 2020), in case of class IV caries. Treatment is done by composite restorations or veneering (Ravinthar and Jayalakshmi, 2018) along with pulp protecting agents (if required) (Nasim *et al.*, 2018) Caries may further progress into the pulp causing severe pain (Ramesh *et al.*, 2018) and in long-standing cases, the pulp becomes non-vital (Janani *et al.*, 2020). In these cases, root canal therapy is the treatment of choice (Ramamoorthi *et al.*, 2015; Ramanathan and Solete, 2015; Teja and Ramesh, 2019). Long-standing class III or class IV caries involving pulp weakens (Noor, 2016; Kumar and Antony, 2018) the tooth structure often leading to crown/root/crown and root fractures (Rajakeerthi and Nivedhitha, 2019).

This study was done for epidemiological significance to check the prevalence of class all dental caries among patients who visited Saveetha Dental College and have undergone therapeutic treatment for the same. To check the prevalence pattern of class III dental caries among different age groups and gender. To check if gender has any statistically significant association with the prevalence of class III dental caries and site involved – maxilla/mandible; Tooth number (to check the most vulnerable tooth developing caries), surface – mesial/distal.

MATERIALS AND METHODS

Study setting

A retrospective study was conducted in Saveetha Dental College by obtaining data from dental archives (single centre study). Ethical approval was obtained from the institutional ethics committee.

Sampling, data collection and tabulation

Non-probability convenience sampling method was employed. The data included records of patients

who presented with class III dental caries and underwent restorative treatment for the same. Data entries from June 2019 to April 2020 were obtained for the same and were tabulated. All the available data were included (without any sorting process) to reduce sampling bias. Data were analysed, and censored data were excluded. The data was then verified by one external reviewer. A data of 708 patients (males - 36.9%; females – 261%) 18 years – 75 years with 1457 proximal restorations (Mesial - 66.3%; Distal - 491%) was obtained.

Data analysis

The tabulated data were statistically analysed by IBM SPSS Version 20 to check the prevalence of class III dental caries among different age groups, gender, location – maxilla, mandible; tooth involved – to determine the tooth which is more vulnerable to develop class III caries; proximal surface – mesial or distal; also the check it's a correlation with gender. Data was imported and variables were analysed. Pearson's Chi-square test, Phi and Cramm's test were used. Results were tabulated, and bar charts were plotted.

Graph 1, The X-axis shows gender, and Y-axis indicates the number of patients with class III dental caries. This graph shows that there is an increase in the female predilection (63.1%) to class III dental caries compared to males (36.9)

Graph 2, The X-axis represents the age groups, and Y-axis represents the number of patients with class III dental caries. It is found to be high in the 3rd and 4th decade. Also, there is a progressive decrease in the prevalence with increasing age. < 21 years – 4.4%, 21-30 years – 27.5%, 31-40 years – 26.8%, 41-50 years 23.4%, 51-60 years – 13.1%, 61-70 years – 4.4%, 71-80 years -0.3%

Graph 3, The X-axis represents the number of decayed bodies, and Y-axis represents the number of patients with class III dental caries. Majority of the patients had only one degraded surface followed by two decayed surfaces. One decayed surface 41%, two decayed surfaces 32.9% three decayed surfaces 12.9%, four decayed surfaces 8.1%, five decayed surfaces, 3.2%, six decayed surfaces 1.6%, seven decayed surfaces 0.4%.

Graph 4, The X-axis represents the proximal side mesial/distal, and Y-axis represents the number of patients with class III dental caries. Mesial caries was more prevalent (66.3%) compared to distal caries (33.7%).

Graph 5, The X-axis shows the site of caries occurrence - maxillary/mandibular anterior. Y-axis shows the number of patients with class III den-

tal caries. Caries in maxillary anterior was more prevalent (86.9%) compared to mandibular anterior (13.1%).

Graph 6, The X-axis shows the tooth involved, and Y-axis shows the number of patients with class III caries. Predominantly involved tooth - 11 (21.7%) followed by 21 - 20.6%, 12 - 16%, 22 - 14.9% 23 - 7.3%, 13 - 6.5%, 32 - 2.7%, 33 and 43 - 2.5%, 42 - 2.4% least involved - 31 and 41 (1.5%).

Graph 7, The X-axis shows age group and Gender. Y-axis shows the number of patients with class III dental caries. Here the green bar represents Males, and the blue bar represents females. There is a female predilection in all age groups with an exception in the second decade. It shows a statistically significant association between gender and age ($p=0.000$; chi-square test - $p<0.05$ - statistically significant).

Graph 8, The green bar represents males, and the blue bar represents females. There is a significant female predilection. 11 is the most commonly affected tooth in both males and females. There is a statistically significant association between tooth number and gender ($p=0.000$; chi square test - $p<0.05$ - statistically significant).

Graph 9, The X-axis denotes the proximal surface and gender. Y-axis shows the number of patients with class III dental caries. Blue bar represents females, and the green bar represents males. There is a statistically insignificant association P value 0.192 ($p>0.05$; chi square test - statistically insignificant).

Graph 10, The X-axis shows the number of decayed surfaces and gender. Y-axis shows the number of patients with class III dental caries. Blue bar represents females, and the green bar represents males. It is not statistically significant P value 0.174 ($p>0.05$; chi square test - statistically insignificant).

Graph 11, The X-axis shows the number of decayed surfaces and age groups. Y-axis shows the number of patients with class III dental caries. There is an increase in the number of surfaces affected with an increase in age. The association is statistically insignificant, P value 0.530 ($p>0.05$; chi square test - statistically insignificant).

Graph 12, The X-axis shows age groups and Y-axis shows the number of patients with class III dental caries. Blue bar represents mesial caries, and the green bar represents distal caries. This shows that as the age increases, there is an increase in the prevalence of distal caries and decrease in the prevalence of mesial caries. It is statistically significant ($p=0.000$; chi square test)

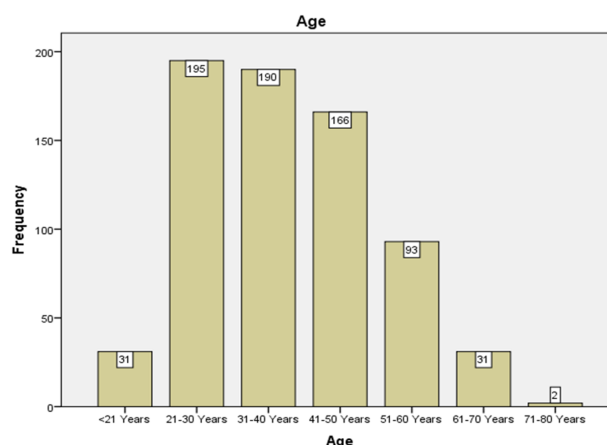
RESULTS AND DISCUSSION

Age and Gender

This study comprised 708 patients who were diagnosed with class III dental caries and underwent restorative treatment. Among the 708 patients, 447 (63.1%) were females, and 261 (36.9%) were males (Graph 1). Among the 708 patients, 31 patients (4.4%) belonged to the second decade. One hundred ninety-five patients, i.e., 27.5% belonged to the third decade, followed by 190 patients (26.8%) belonged to the fourth decade. 166 patients (23.4%) in the fifth decade, 93 patients (13.1%) in the sixth decade, 31 patients (4.4%) in the seventh decade and 2 patients (0.3%) in the eighth decade (Graph 2).



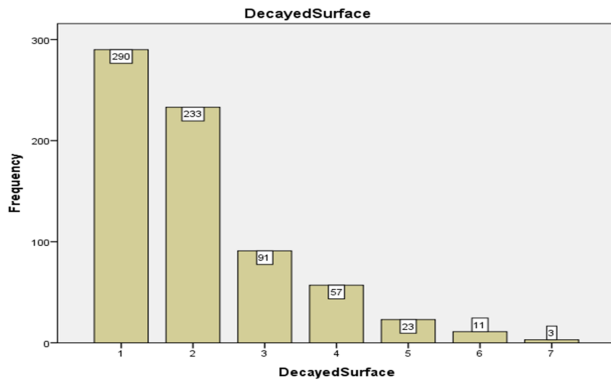
Graph 1: This bar graph represents the gender variations among patients presenting with class III caries



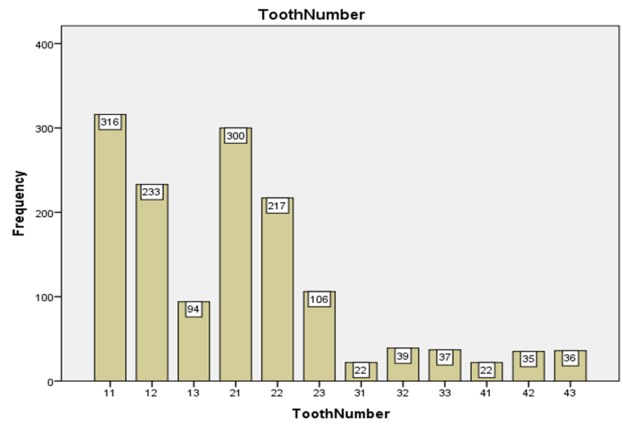
Graph 2: This bar graph represents the trends of class III dental caries pertaining to different age groups

The number of decayed surfaces and location

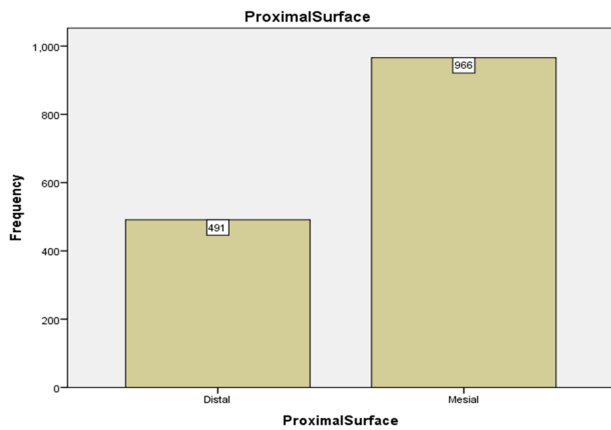
Among the 708 patients, 290 patients (41%) had only one decayed surface. 223 (32.9%) had two decayed surfaces, followed by 91 patients (12.9%)



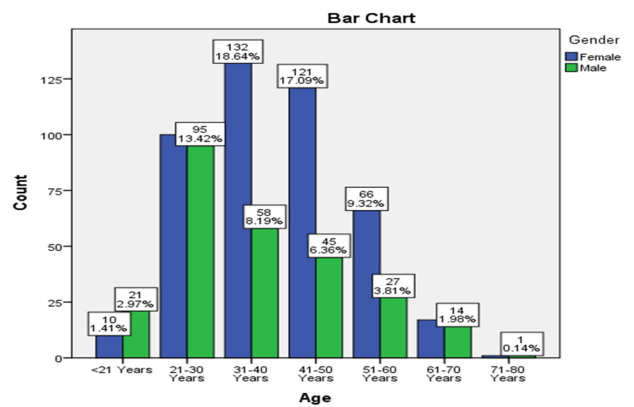
Graph 3: This bar graph represents the number of decayed surfaces in the given population with class III dental caries



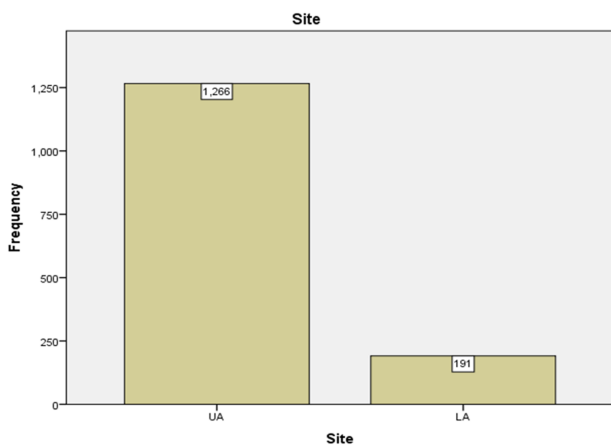
Graph 6: This bar graph represents the tooth that is predominantly involved and least involved in class III dental caries



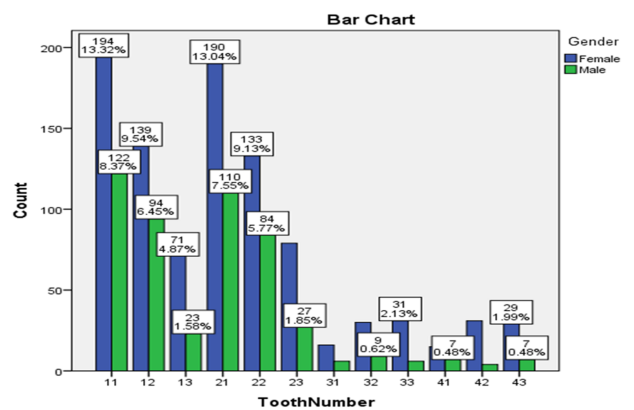
Graph 4: This bar graph represents the proximal surface predominantly affected among class III dental caries patients



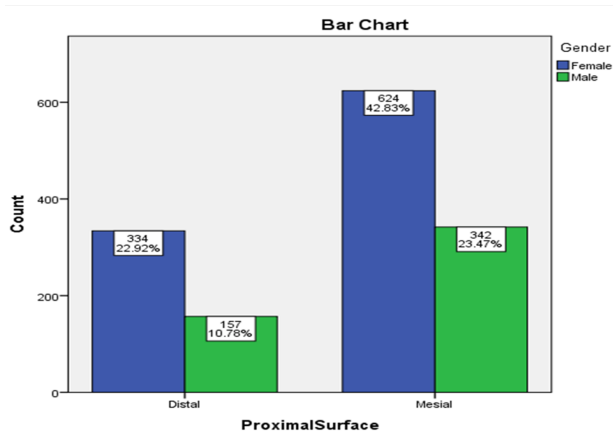
Graph 7: This bar graph represents the association between age and gender



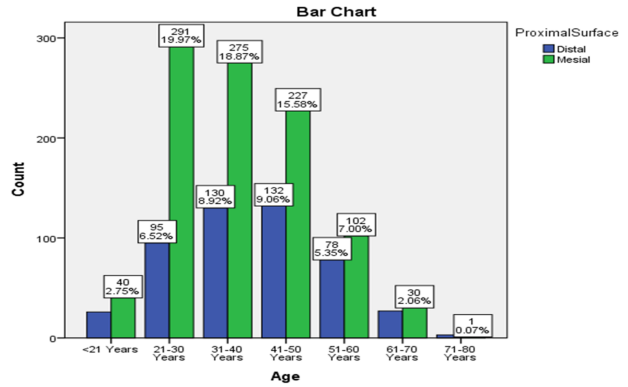
Graph 5: This bar graph represents the involvement of maxillary and mandibular teeth



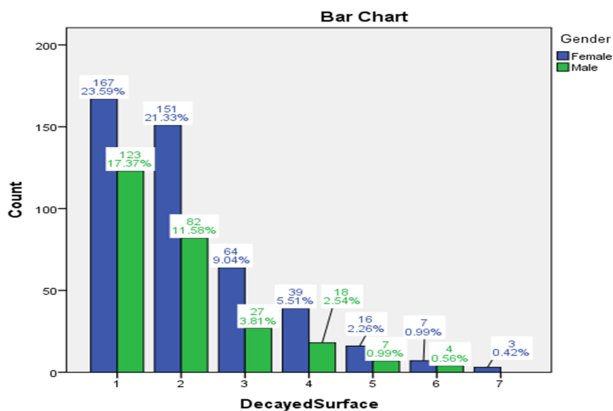
Graph 8: This bar graph represents the association between tooth number and gender



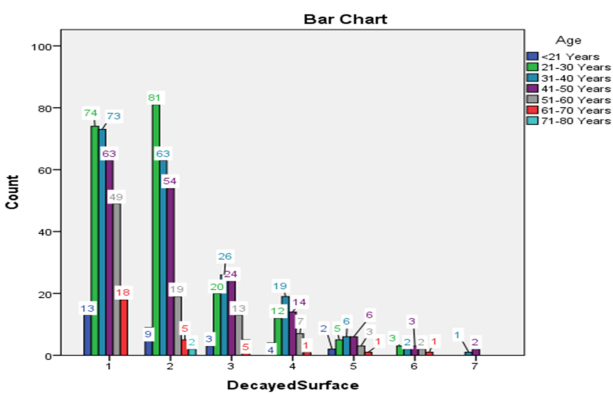
Graph 9: This bar graph depicts the association between gender and proximal surface, i.e., mesial and distal surface



Graph 12: This graph shows the association between age group and proximal surface involved



Graph 10: This Bar Graph represents the association between a number of decayed surfaces and gender



Graph 11: This bar graph represents the association between the number of decayed surfaces and age group

with three decayed surfaces. Fifty-seven patients (8.1%) with four decayed surfaces. 23 (3.2%) with five decayed surfaces. Eleven patients (1.6%) with six surfaces and three patients (0.4%) with involvement in 7 surfaces (Graph 3). Among the 1457 restorations, 996 belonged to the mesial surface (66.3%), and 491 restorations (33.7%) belonged to the distal surface (Graph 4). 1266 restorations (86.9%) belonged to maxillary teeth with 316 (21.7%) restorations involving 11, 233 restorations (16%) involving 12, 94 (6.5%) restorations involving 13, 300 restorations (20.6%) involving 21, 217 restorations (14.9%) involving 22 and 106 restorations (7.3) involving 23. Among the 191 restorations (13.1%) pertaining to mandibular teeth, 22 restorations (1.5%) belonged to 31, 39 restorations (2.7%) belonged to 32, 37 restorations (2.5%) were pertaining to 33, 22 restorations (1.5%) were associated with 41, 35 restorations (2.4%) with respect to 42 and 36 restorations (2.5%) in 43 (Graphs 5 and 6).

Associations

Graph 7 shows a statistically significant association between gender and age which shows a female predilection (p=0.000). Female predilection seen in all age groups except in the 2nd decade. There is a statistically significant association between the tooth involved and the gender (p=0.000). Maxillary teeth are predominantly affected in both the genders (Graph 8). There is a statistically insignificant association between the proximal surface involved (mesial/distal) and gender (Graph 9); a number of decayed surfaces and gender (Graph 10); a number of decayed surfaces and age (Graph 11) (p>0.005). There is a statistically significant association between the site of the decay (proximal surface – mesial/distal) and age. As the age advances, there is a simultaneous increase in the prevalence of distal caries and decrease in the prevalence of mesial

caries ($p=0.000$) (Graph 12).

The study shows that the prevalence of class III dental caries is more in females (63.1%) compared to males (36.9) (Graph 1). This can be due to two reasons: the first reason being that females are more aesthetically concerned compared to males. This is in accordance with a survey done by (Vallittu *et al.*, 1996) where females were more concerned with dental aesthetics compared to males. This concern makes female patients report more frequently for dental visits, especially to those concerns pertaining to anterior teeth compared to males who usually neglect dental visits. This reason is in accordance with a study done by (Fukai *et al.*, 1999) where subjects who had not visited a dentist in the previous year were more in males (52.7%) compared to females (36.7%) also with a study done by R Pradeep (Kumar and Shristi, 2015) where females visited more frequently and early compared to males. The second possible reason for female predilection might be poor maintenance of oral health in females. This reason is not in accordance with studies done by Kateeb (2010) and QD (Al-Omari and Hamasha, 2005) where females exhibited better oral hygiene practices compared to males. In a study done by (Poorani and Chandana, 2015), the prevalence of caries is more in females. There was increased female predilection in all the age groups (statistically significant $p=0.000$) studied except for patients belonging to the second decade, where males (8.04%) were more compared to females (2.23%) (Graph 7). The possible reason may be due to the growing concern and awareness about dental health among younger generations which makes the males report more to dental clinics.

In this study, it's been reported that patients belonging to the third decade have increased prevalence, followed by patients belonging to the 4th decade. In Graph 2, it is seen that as age increases, the prevalence is decreased with the 2nd decade as an exception. The decreased prevalence in the second decade may be due to the better oral hygiene measures taken by younger patients. The decrease in prevalence with increasing age may be because patients are becoming less aesthetically concerned with increasing age. This is in accordance with a study done by (da Costa *et al.*, 2017), where older subjects exhibited lesser aesthetic concerns.

Majority of the patients had only one decayed surface (41%) followed by two decayed surfaces (32.9%) (Graph 3). There is a statistically insignificant association between the number of decayed surfaces and gender ($p>0.05$) as seen in (Graph 10). This may be due to the increased female samples

in the study. Also, there is a statistically insignificant association between the number of decayed surfaces and age group. There is an increase in the number of surfaces affected with the increase in age (Graph 11) which is not statistically significant ($p>0.05$), especially in patients belonging to the fourth and fifth decade. This again explains that there is a lack of concern towards dental health with increased age.

It has been observed that mesial caries occurs more commonly (66.3%) compared to distal caries (33.7%) (Graph 4). According to (Jackson *et al.*, 1972), the prevalence of distal caries increases with age and prevalence of mesial caries decreases with age. This is in accordance with the study where an increase in the prevalence of distal caries with a simultaneous decline in the prevalence of dental caries was observed and is statistically significant ($p=0.000$) (Graph 12). There is a statistically insignificant association between the site (proximal side) and gender ($p>0.005$) (Graph 9). This is in accordance with a study done a by (Demirci *et al.*, 2010), where there was the equal predilection of caries in the proximal surfaces of both genders.

It is observed that the prevalence of caries is higher in the maxilla (86.9%) compared to the mandible (13.1) (Graph 5). This is in accordance with the studies done by (Demirci *et al.*, 2010; Tanner *et al.*, 2013) this could be due to the increased salivary flow to the lower anterior compared to upper anterior. Prevalence pattern in individual teeth was found to be higher in 11 (21.7%) followed by 21 (20.6%), and the least affected tooth is 31 and 41 (1.5%) (Graph 6). There is a statistically significant association between tooth number and gender ($p>0.005$). (Graph 8).

The study is a single centered study and samples were collected from a fixed time frame. Extensive research to be conducted – multi-centre approach with a larger time frame to improve the scope of research. Also, to evaluate the impact of geographical variations, race and habits in the prevalence, pattern and severity of class III dental caries.

CONCLUSION

From this study, it has been observed that prevalence of class III dental caries is more among females compared to males. Maxillary anterior are more affected than mandibular anterior. Prevalence is more among patients belonging to the third and fourth decade of life. There was a statistically significant association between age, and proximal surface the prevalence of mesial caries decreases with age and distal caries increases with age. As the age

increases, the number of decayed surfaces increases (not statistically significant).

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Conflict of Interest

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

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