Type of Manuscript: Original Study

Quantitative and Qualitative Analysis of Dental Caries among Different Age Groups of Patients in a Private Dental College Hospital, Chennai, India

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Abstract

Dental caries is the major health disorder caused by the interaction of oral microbes on the dental hard tissues. Dental caries are multifactorial in nature of etiology and pathogenesis. According to WHO almost 36% of the population have dental caries. Thus the aim of the current study is to quantitatively and qualitatively analyse the prevalence of dental caries among different age groups of patients visiting Saveetha dental college and hospital outpatient department services. All the cases reported between the month of June 2019 to March 2020 for dental caries of different classes were chosen for this study. Data of patients were retrieved from dental records. Data of patients with class I to class VI dental caries and root caries were included and age, gender, tooth affected were analyzed, tabulated and was subjected to statistical analysis. From the data analysis through SPSS it is observed that, the overall incidence of dental caries were higher among male patients (54.7%), between the age group of 15 to 30 years (45.4%) and was commonly seen in primary and permanent posterior tooth.(72.6%). Within the limitations of the present study, dental caries had male predilection, predominantly between the age group of 15 to 30 years,Class 1 caries primarily reported in the molars.

Keywords: *Dental caries, Multifactorial, Caries susceptibility, Caries index*

Introduction

Dental caries is a multifactorial infectious disease caused by the interaction of bacteria on enamel.[1-2] Dental caries is defined as an irreversible and a microbial disease of the tissues of the teeth, which is marked by demineralization of the inorganic portion of the tooth and destruction of the organic substance of the tooth, which often leads to cavitations.Of late, caries is on the increasing trend to become a major public health problems worldwide, with nearly 60–90% of young adults and about 100% of adults have dental cavities, often resulting in pain and discomfort.[3] According to the World Health Organization (WHO) report, approximately 2.43 billion people (36% of the population) have an active tooth Caries. Additionally, nearly all adults have dental caries at some point in their lifetime. Caries is prevalent in children, as well.[4] WHO has reported that 9% of youngsters (620 millions) have tooth caries.[4] There are several indices to ascertain dental caries; decayed, missed, and filled teeth (dmft) index and prevalence of untreated dental caries are of foremost significance.[5] With regard to the Histopathology of caries lesions, both enamel and dentine have different zones including the dark zone, transitional zone, body and surface zone.[6]

There are numerous theories explaining the pathogenesis of dental caries, and it is one established as a multifactorial disease with many risk factors.They have revealed several etiological factors for caries like oral cavity bacterial components; anti- oxidant activity [7-8],overall oral health status, including the frequency and efficacy of plaque removal; the quantity and frequency of sugar consumption; and components of saliva.[9-10] Additionally, there are several studies that have reported

the connection between oral health and a few demographic and socioeconomic factors like the age, sex, race, case history.[9,10] Oral microorganisms that ferment sugars[11] , host susceptibility, Dietary habits, have to coexist for caries to initiate and develop.[12-13] Also,the effect of nocturnal feeding is an important factor for increased prevalence of untreated caries lesions among children with Early childhood caries.[14] To add on, patients with OSMF often present with compromised oral hygiene, thus are more susceptible to dental caries.[15-17] Besides there are studies that states that, children with cleft lip/ palate face predisposing factors to acquire dental caries, and patients with cleft palate conditions generally shows high susceptibility to caries and poor oral hygiene, because of the difficulty in achieving adequate plaque control associated with dental anomalies and defects.[18] There is also a significant association of enamel defects with dental caries. The defect identified to be more frequently associated with dental caries was a variant showing both opacity and enamel hypoplasia.[19]

Even though the general prevalence of dental caries decrease in developed countries, caries continue to be an important oral health defect in most of the developing countries.[20] A study conducted in Lithuania showed that the general prevalence of cavities was 78.3% .[21] A study in 2013 in Brazil showed that 75% of the participants had enamel defects.[22] The survey on oral health (2016) indicated that the incidence of caries among adolescents in urban and rural areas of Tamil Nadu was 61.4%, with a mean DMFT score of 2.03.[23] In the 5- to 7-year age bracket, 34.9% children were found to be caries-free, while 65.1% showed one or more carious lesions. Within the 8 to 10 years age limit , the prevalence of dental caries was found to be 56.7%. 45.4% of individuals between the 11 to 13 year age bracket had caries involved teeth. The caries prevalence among males was found to be 59.3%. At an equivalent time, 51.7% of females were found to be suffering from caries.[24] In a study conducted in China in 2013 on caries prevalence it was concluded that the prevalence of tooth decay was 67.5% in elderly population in northeast China, and therefore the DFT index was 2.68±3.40.[25] Also, with regard to metabolome of caries, metabolic derivatives related to oxidation and chemical degradation are found at higher levels in archaeological dental calculus than fresh samples.[26]

At different ages, caries intensity may vary. The carious process often develops during the primary months after the tooth eruption but much less in adulthood and adulthood. These processes are mainly related to the mechanisms of ionic exchange between the mouth and hard dental tissues. Age is one of the most important factors influencing the structure ,and chemical composition of dental hair tissues. Not only the structure of enamel, but also the metabolic process in it alters with air leading to difference in caries incidence among different age groups.[27] While discussing the consistent trend of caries rates being higher in females than males, all associated factors must be considered. Women's roles in their community alongside other social factors, like differing salivary flow rates and compositions, dietary habits, hormonal changes during pregnancy, and particular variants of the AMELX gene must all be included within the assessment of woman's caries risk assessment.[28]

Thus there are so many studies done previously on the incidence of dental caries among different age groups, genders and also on assessment of different etiological factors of dental caries. This prompted us to conduct a study in a private dental college and hospital in chennai, India, so as to chart out the magnitude of the dental caries among different age groups within the population. Thus, the aim of the current study was to quantitatively and qualitatively analyse the prevalence of dental caries among different age groups of patients Saveetha dental college and hospital outpatient department which is a private college hospital in chennai, India.

Materials and Methods

This was a retrospective study conducted under a university setting. Ethical approval for the current study was obtained from the institutional ethical board (Ethical approval number: SDC/SIHEC/2020/ DIASDATA/0619-0320). This study had advantages of easy access to the software, large data availability yet also had disadvantages of smaller sample size and geographic limitation. In the current study the data of patients who visited Saveetha dental college from June 2019 to April 2020 were retrieved from the dental records.The Sample size for the study was n = 30232. Patients of all age groups (from 2 to 86 years) and genders (both male and females) with dental caries of all classes along with root

caries were included in the current study. Other patients without dental caries were excluded from the study.

All the case sheets included in the study were approved and verified by an external reviewer to avoid errors while recording. Also Cross- verification of data was done with photographs[29] and direct communication with dentists. Data for the study was retrieved and the collected data were tabulated in the excel sheet. Parameters such as age, gender, the tooth affected and the class of dental caries were included, correlated and analysed. This data was then imported to SPSS by IBM after coding. Frequency of all the parameters considered were drafted. Parametric and non- parametric correlations were done. Following which graphs were made. Non parametric tests were generated by clicking onto legacy dialogue, chi square test was run and P value was determined to verify the significance of each of the variables considered and the results were interpreted and analysed statistically.

Results and Discussion

Out of the total patients who visited Saveetha dental college between June 2019 to April 2020, 30232 patients were found to have dental caries of various class types. Of the total patients, male patients were observed to have a higher incidence of dental caries (54.7%) in comparison to females (45,3%), p value is less than 0.05 and shows statistical significance (graph1). It was also observed that the Caries generality between 1 to 15 years were 11.7% , between 15 to 30 years were 45.4%, among people of 30 to 50 years were 33.7%, and was 9% in the age group between 50 to 80, and 4% above the age of 80 years with p value less than 0.05 (graph 2). Occurance of dental caries were reported to be higher in primary and permanent molars (72.6%)with $p<0.05$. With regard to the class of caries, dental caries class 1 (according to GV BLACK' S classification) was higher (74.7%) followed by class 3 dental caries with $p<0.05$ (Graph3).

Dental caries is a chronic, non-communicable disease requiring attention for prevention and treatment. In the current study the Prevalence of dental caries based on the gender was observed to have a higher male predilection**.** Dental caries are in higher incidence in male (54.7%) than females (45.3%). The overall prevalence of dental caries in the study conducted by Jayashri prabakar et al in 2016, showed that the total caries prevalence was 47.3% which is less than the reported caries prevalence of India (i.e. 53.8%) in National Oral Health Survey [30] and proved that males (47.5%) were slightly more affected by caries than females (46.9%). This was similar to the study done by Goenka P, 2018 who stated that incidence of caries was 59.3% in males and, 51.7% in females[31], yet there were other studies contradicting this results such as the one conducted by Marina Ferraro et al, 2010 proved that Dental caries had female predilection and the reasons owing to differing salivary flow rates, compositions, dietary habits, hormonal changes during pregnancy, and particular variants of the AMELX gene in women.[32] Other study done by John R Lukacs et al, 2006, shows that Higher caries prevalence was among females due to earlier eruption of teeth and pregnancy pregnancy.[33] Also according to Mustafa Demirci et al, 2010 Females (59.1%) showed a higher incidence of caries than males (40.9%).[34] This lack of Similarity in the results could be attributed to unbiased data, social factors, area of study (South Indian population) considered.

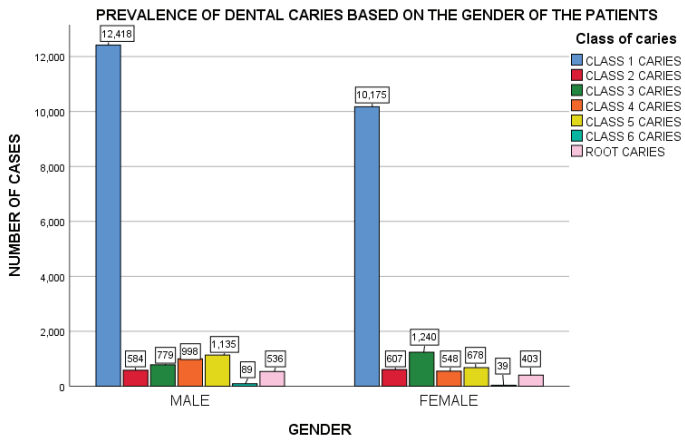
The Maximum occurance of dental caries was between 15 to 30 years (45.4%), followed by 30 to 50 years (33.7%) and least among 50 to 90 years(9.4%) of age, this proves that prevalence is higher in adolescents and young adults. This was in concordance with the study done by Mustafa Demirci et al, 2010 who stated that prevalence of Caries was most common among individuals aged between 17 to 25 years.(34) And according to Reifur KD et al, The prevalence of dental caries were higher among adolescents that ranged from 59% to 90.4%.[35] This was in concordance with the results of Subha poorani et al, 2015, who concluded that the incidence of dental caries in the age-group of 36-45 years to be 63.4%.[36] The reasons for higher prevalence of dental caries among adolescents were attributed to increased consumption of sugary beverages and foods, low home water fluoridation, lower parental education. It is also narrated that pulp stone occurring in adolescents is significantly associated with carious teeth, which suggests a causative relationship of chronic pulp irritation leading to the formation of pulp stones.[37] Thus with this study, it can also be concluded that higher emphasis had to be made regarding the purpose of fluoridation and consumption of carbohydrates among children and young adults.

On commenting about the frequency of dental caries in different tooth and tooth surfaces it could be analysed that the occurrence of dental Caries was higher in primary and permanent posterior teeth (72.6%). This result is in concordance with the study conducted by Mustafa Demirci, 2010, who stated that molars were the most significantly affected by dental caries at 45%.[34] Generally human teeth present anatomical details related to their function during mastication with elevations, depressions, convexities and concavities. Grooves and depressions in the teeth are always the most significant anatomical landmarks of concern for dental caries, along with occlusal contact points. The sulci of the human teeth are V- shaped, thus impaction of food and debris are not uncommon, contributing to microbial colonisation. Especially in molars the anatomical landmarks like the mesial and distal surfaces below the contact points, grooves, fissures, sulci, cervical thirds, triangular and central fossa are the major areas for dental caries.[38-39] Thus, regular dental check up and better oral hygiene practices should be emphasised by the dentists.

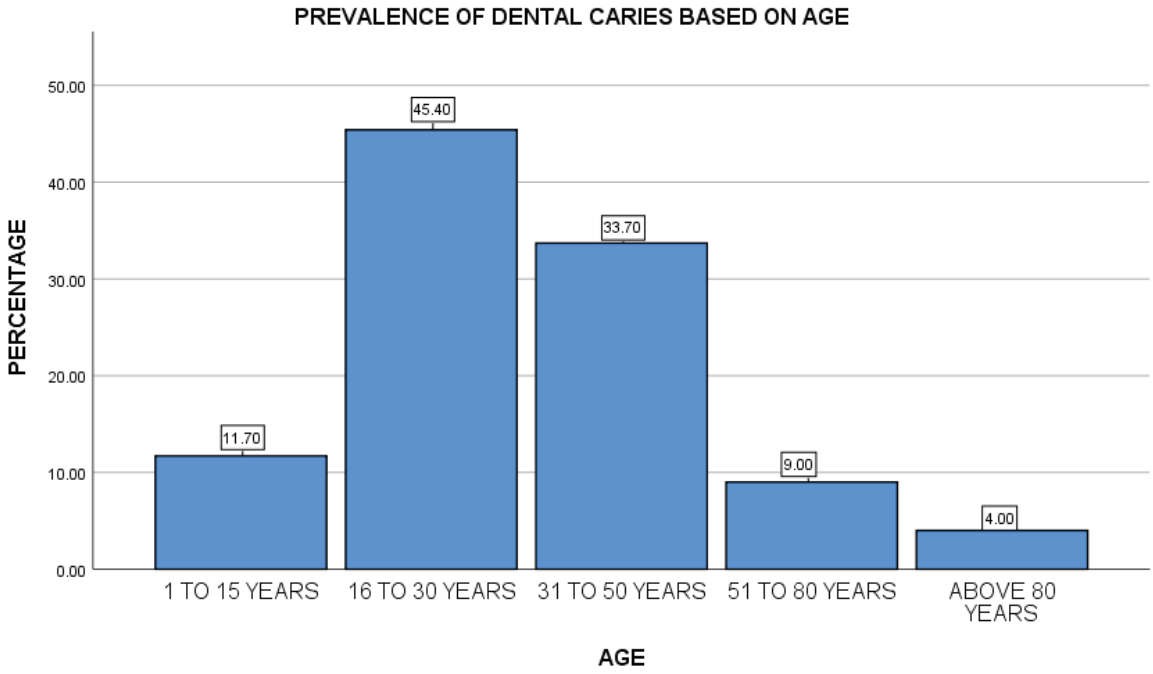
Establishing the relationship between different class of queries dental caries of class one type is higher (74.7%) followed by class three caries. And class six type of care is being the least prevalent. This result is in concordance with the one conducted by Mustafa Demirci 2010, Who stated that occlusal fissures contribute significantly to carries involvement with the frequency of 52.7% to 66.3%.[34] Also Talabani et al, 2015 concluded that Higher caries class is of class 1 Type involving occlusal surface (61.3%).[40] The reason can be attributed to easy food impaction on fissures and anatomical landmarks that results in higher class 1 type of caries and class 6 is low as debris impaction will not be higher on the Cuspal planes and in lines of the tooth. Thus, Awareness on food impaction and brushing techniques can be brought by the dentist to improve oral health and to avoid formation of periapical granulomas with further caries progression.[41] This was also quoted by Gheena sugumaran et al, in 2015 who stated that Cumulative analysis exposed a lacunae in the awareness of oral hygiene and knowledge regarding oral health thus, implying an urgent need for awareness initiative for oral health at the grassroots level in primary educational institutions.[42]

Limitations of this study include Geographic limitation as predominantly South Indian population were only considered, and was a Unicentric study with few Incomplete and unclear data. The Future scope of this study will yield a better and more accurate result when Different ethnic populations are considered.

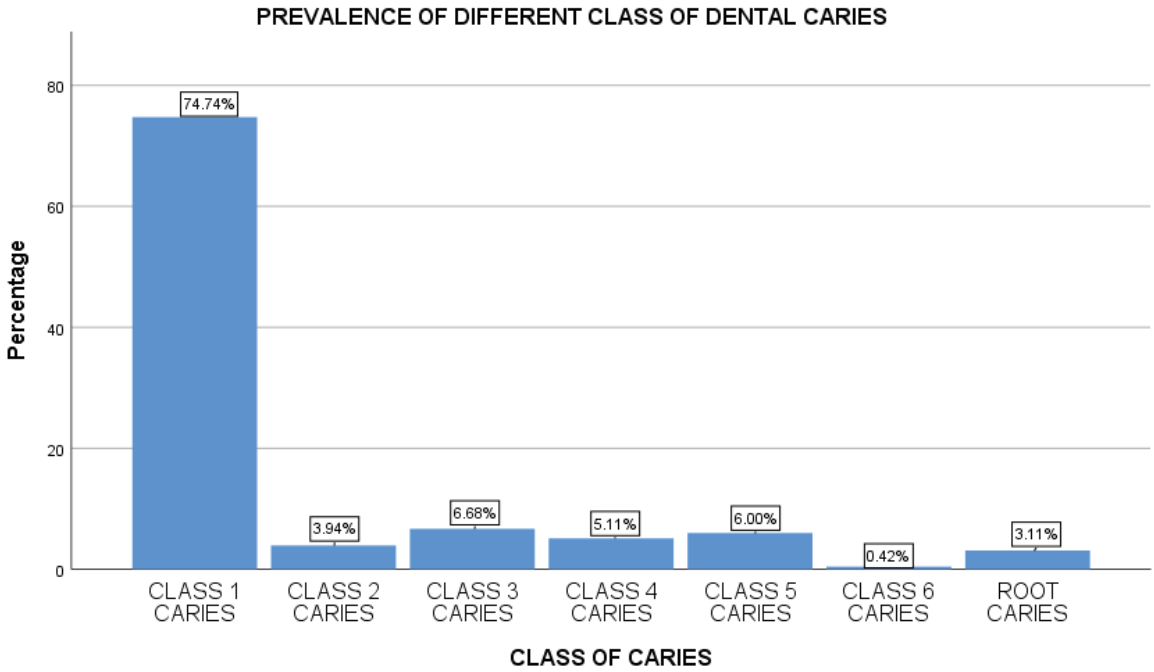
With the current study as a platform, a newer classification of dental caries according to its incidence based on age, gender, class type can be formulated to enable dentists gain a thorough knowledge on susceptibility groups and will also aid in improving general public oral health.



Graph 1 : Bar graph showing the correlation between the gender of patients and different class of dental caries. Class 1 caries are represented in blue, class 2 caries in red, class 3 caries in green, class 4 caries in orange, class 5 caries in yellow, class 6 caries in turquoise and root caries in pink. The X axis represents the frequency of dental caries among male and female patients and Y axis scale shows the total count of cases from 0 to 12,000. From the graph it is evident that all the class of dental caries except class III were highly prevalent among male patients and class III dental caries had slight female predilection. This finding is statistically significant. (Pearson Chi-SquareValue:347.5 ;p=0.000- statistically significant).



Graph 2: Bar graph showing the Prevalence of dental caries based on age. Dental caries are represented in blue. The X axis shows caries prevalence among different age groups and Y axis scale shows the percentage of dental caries from 0 to 100. From the graph it is evident that dental caries were prevalent highly among the patients of age group 15 to 30 years. This finding is statistically significant. (Pearson Chi-SquareValue:12704.2 ;p=0.000- statistically significant).



Graph 3 : Bar graph showing the Prevalence of different classes of dental caries. Dental caries are represented in blue. The X axis shows the prevalence of different classes of caries and the Y axis scale shows the total percentage of dental caries from 0 to 100. It is evident that dental caries of class 1 type are higher than other class of caries followed by class III dental caries while class VI has had the least occurrence.

Conclusion

Within the limitation of the present study, caries had male predilection, predominantly between the age group of 15 to 30 years, primarily reported in molars and in majority was class 1 type. Thus, as a clinician, it is important to evaluate every surface of the tooth while examining the oral cavity and better brushing techniques and awareness on oral health should be brought by dentists to maintain public oral health.

Acknowledgements: The authors would like to acknowledge the help and support rendered by the department of conservative dentistry and Information technology of Saveetha Dental College and Hospitals, SIMATS.

Conflict of Interest: Nil.

Ethical Clearance: It is taken from "Saveetha Institute Human Ethical Committee" (Ethical Approval Number- SDC/SIHEC/2020/DIASDATA/0619-0320)

Source of Funding: Self.

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