

ASSOCIATION BETWEEN QUADRANT AND INCIDENCE OF DENTAL CARIES

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ABSTRACT

BACKGROUND: Dental caries is a debilitating disease that has an increased prevalence throughout the world. Dental caries has been shown to affect over half of the population in most of the industrialized and developed countries as it is a cumulative process. The number of caries affected individuals increases with age. Prevention of caries among all age groups is required, along with determining the sequelae of dental caries, as it will identify those patients at risk and will indicate when and where intervention is most required. This study aims to evaluate association between quadrant and incidence of dental caries.

MATERIALS AND METHODS: This retrospective study was conducted among patients who were diagnosed with dental caries in a university teaching hospital in Chennai during the period of December 2020 to May 2021. The collected data was then subjected to statistical analysis using Statistical Package for Social Science (SPSS). Descriptive statistics and Chi square tests were used.

RESULTS: Dental caries were most frequent in the age group 21-40 years with 56.3% of the total population. In quadrant 1 it was noted that only one tooth was infected with 34.98%. In quadrant 3 it was noted that the number of teeth was infected 4 with 55.02% of the population. In quadrant 4, it was noted that the number of teeth infected was 4 with 68.22% of the population. Also in the younger age groups dental caries were more frequent in the upper arch and as the age progressed, in the older age groups both the arches had dental caries.

CONCLUSION: Within the limits of the study, it was observed that it was observed that dental caries were most frequent in the age group 21-40 years with 56.3% of the total population, the number of teeth with dental caries in quadrant 3 and 4 were more when compared to the number of teeth infected in quadrant 1 and 2. It was observed in our study that in the younger age groups dental caries were more frequent in the upper arch and as the age progressed, in the older age groups both the arches had dental caries.

INTRODUCTION

Dental caries is a debilitating disease that has an increased prevalence throughout the world. Dental caries has been shown to affect over half of the population in most of the industrialized and developed countries as it is a cumulative process. The number of caries affected individuals increases with age (1-4). Recent studies have shown that dental caries in adult populations affect at least five to ten teeth per individual, also making it the most significant reason for

tooth loss in most adult patients. Dental caries is an irreversible infection and the damage caused by it can lead to a decreased quality of life along with high economic costs and treatment, which makes this disease an important public health problem. The World Health Organization (WHO) states that there is an increase in the chronic diseases associated with poor oral health, especially in the developing countries, in which higher incidence of caries, periodontal disease and edentulousness, have been mentioned (5–8). Many studies concerning epidemiology in dentistry show that dental caries is said to be the most prevalent pathology that affects the oral cavity. Studies performed by American researchers had previously suggested that dental caries was one of the main reasons for exodontia, and other literature studies conducted in Brazil, and even in New Zealand have confirmed that dental caries may lead to tooth mortality (9–11). Many studies have been conducted in different countries to determine the causes behind extraction of teeth.

Dental caries is an oral condition that leads to aesthetic, functional and social damage negatively impacting people's quality of life (12,13). Studies have shown that dental caries is one of the most common chronic diseases. In the United States, it has been estimated that dental caries are five times as common as asthma and seven times as common as allergic rhinitis (14). The recent Global Burden of Disease (GBD) study has found that dental caries of the permanent dentition was said to be the most prevalent condition worldwide, that affects 35% of the world population (15). A large number of cross-sectional studies have been conducted to determine the cause for tooth loss in different countries. Dental caries was found to be the main cause for tooth loss in England and Wales, Kuwait, Taiwan, Scotland, Hong Kong, Afghanistan, Brazil (14–19).

Severe dental caries have negatively impacted the growth and development of a child (20,21). Amongst adults and older people, tooth loss caused due to dental caries has shown to severely restrict dietary intakes such as fresh fruits and vegetables (22). From the clinical aspect, dental caries are caused due to poor oral hygiene, lack of fluoride, consumption of foods high in added sugars, tobacco use and excess alcohol. The number of teeth may result in poor dietary habits and lead to decreased quality of life. The number of teeth extracted can serve as an indicator of socio-economic and oral hygiene level (23). Dental caries, periodontal disease, impacted teeth, orthodontic reasons, prosthetic indications have been one of the several reasons for the extraction of permanent teeth. It is important to understand the reasons for extraction of teeth as it is essential to improve oral health outcomes (24). Our team has extensive knowledge and research experience that has translate into high quality publications (25–34),(35–38),(39–43) (44). Prevention of caries among all age groups is required, along with determining the sequelae of dental caries, as it will identify those patients at risk and will indicate when and where intervention is most required. This study aims to evaluate association between quadrant and incidence of dental caries.

MATERIALS AND METHODS

Study Setting

This university hospital-based retrospective study was carried out by reviewing the dental records of patients diagnosed with dental caries who visited a university teaching hospital in Chennai. Since this was a university hospital setting the large sample size and distribution of population contributed a major advantage for this study. Data collected was reliable and with evidence. The study was conducted after obtaining approval from the Institutional Ethical Review Board.

Sampling

Data was reviewed and collected from 50,000 patient records over a period of six months from December 2020 to May 2021. . Data of those patients who were diagnosed with dental caries was collected. 1169 patients who were diagnosed with dental caries and in the age group of 1-60 years, were included in the study while those with incomplete hospital records were excluded from the study. Cross verification was done using photographs and radiographs.

Data Collection

The following patient data were recorded as follows: hospital record number, gender, age at which diagnosis was done, quadrant, radiographic/dental diagnosis and number of teeth. The Total population of patients who were diagnosed with dental caries was 1169. Data collected was then exported to Microsoft Excel 2010.

Data Analytics

The acquired data was subjected to statistical analysis. Microsoft Excel 2010 data spreadsheet was used for tabulation of parameters and later exported to the Statistical Package for Social Science (SPSS version 20.0) for Windows. Descriptive statistics were applied to the data and chi-square tests were applied at a level of significance of 5% ($P < 0.05$).

RESULTS

Dental caries were most frequent in the age group 21-40 years with 56.3% of the total population (Figure 1). In quadrant 1 it was noted that only one tooth was infected with 34.98% (Figure 2). It was noted that only one tooth was infected in quadrant 2 with 47.64% of the population. In quadrant 3 it was noted that the number of teeth was infected 4 with 55.02% of the population (Figure 4). In quadrant 4, it was noted that the number of teeth infected was 4 with 68.22% of the population (Figure 5). Also in the younger age groups dental caries were more frequent in the upper arch and as the age progressed, in the older age groups both the arches had dental caries (Figure 6).

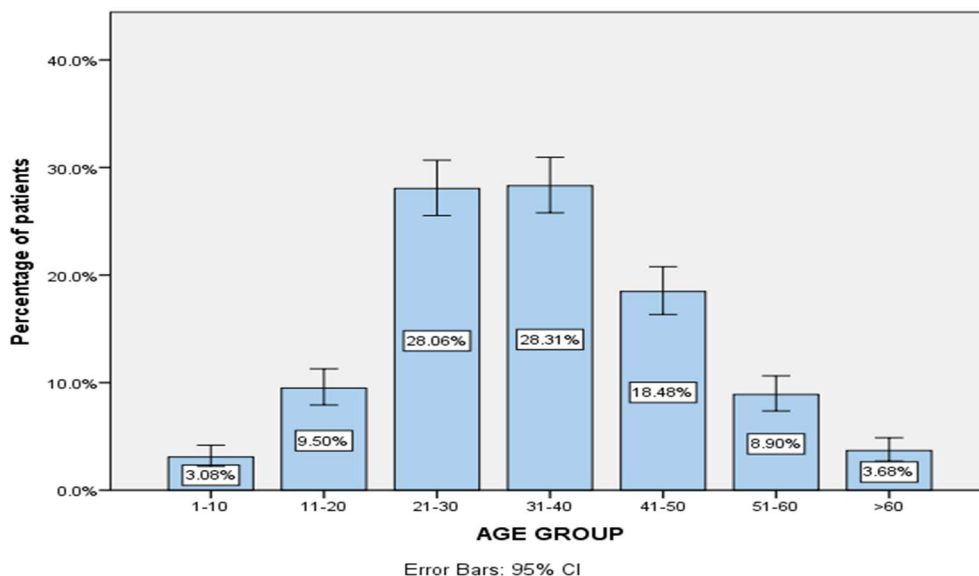


Figure 1: Age distribution of patients who were diagnosed with dental caries. It was noted to be 1-10 age group: 3.08%, 11-20 age group :9.5%, 21-30 age group: 28.06%, 31-40 age group: 28.3%, 41-50 age group: 18.4% ,51-60 age group: 8.8% and >60 age group: 3.6% . X-axis represents the age group and the y-axis represents the percentage of patients. Dental caries was most frequent in the age group 21-40 years with 56.3% of the total population.

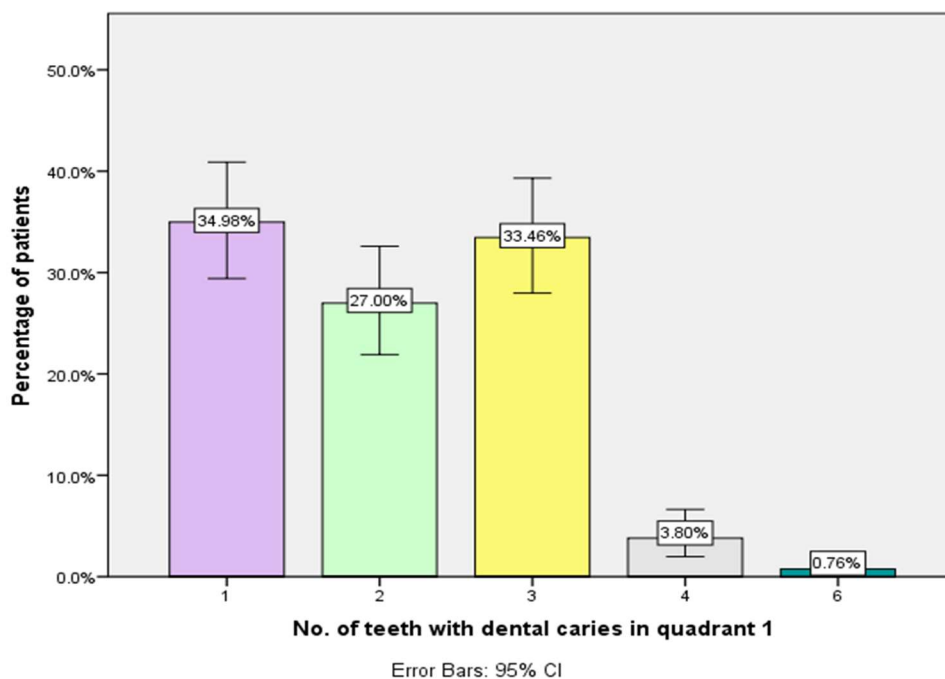


Figure 2: This bar graph represents the number of teeth with dental caries in quadrant 1. Purple depicts one tooth, green depicts two, yellow depicts three, grey depicts four and teal depicts

six. X-axis represents the number of teeth and the y-axis represents the percentage of patients. It was noted that only one tooth was infected with 34.98% of the population.

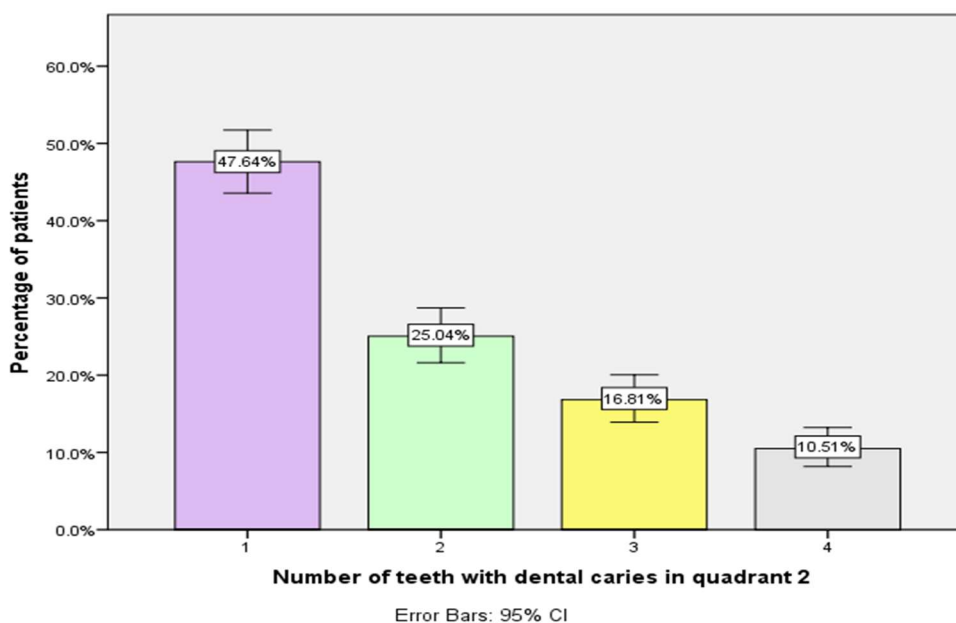


Figure 3: This bar graph represents the number of teeth with dental caries in quadrant 2. Purple depicts one tooth, green depicts two, yellow depicts three and grey depicts four. X-axis represents the number of teeth and the y-axis represents the percentage of patients. It was noted that only one tooth was infected with 47.64% of the population.

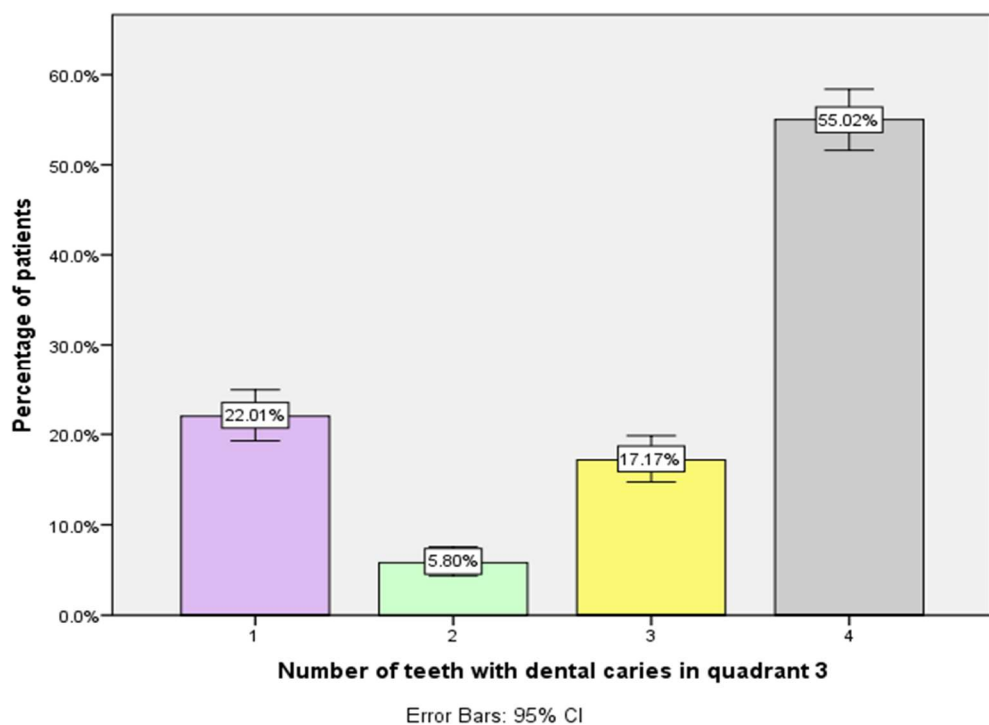


Figure 4: This bar graph represents the number of teeth with dental caries in quadrant 3. Purple depicts one tooth, green depicts two, yellow depicts three and grey depicts four. X-axis represents the number of teeth and the y-axis represents the percentage of patients. It was noted that the number of teeth infected was 4 with 55.02% of the population.

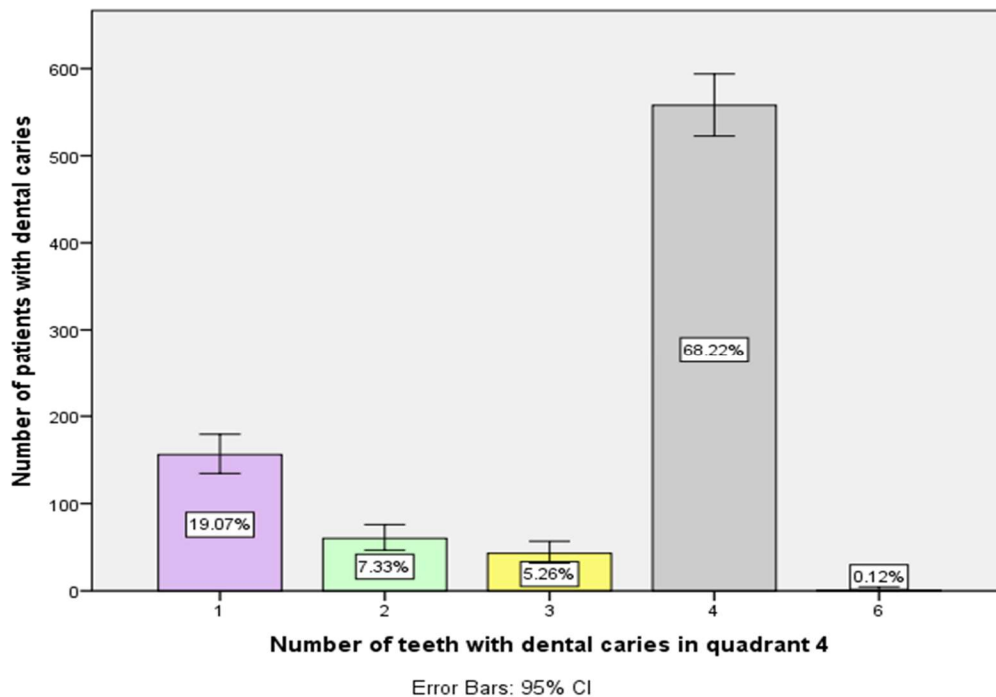


Figure 5: This bar graph represents the number of teeth with dental caries in quadrant 4. Purple depicts one tooth, green depicts two, yellow depicts three, grey depicts four and teal depicts six. X-axis represents the number of teeth and the y-axis represents the number of patients. It was noted that the number of teeth infected was 4 with 68.22% of the population.

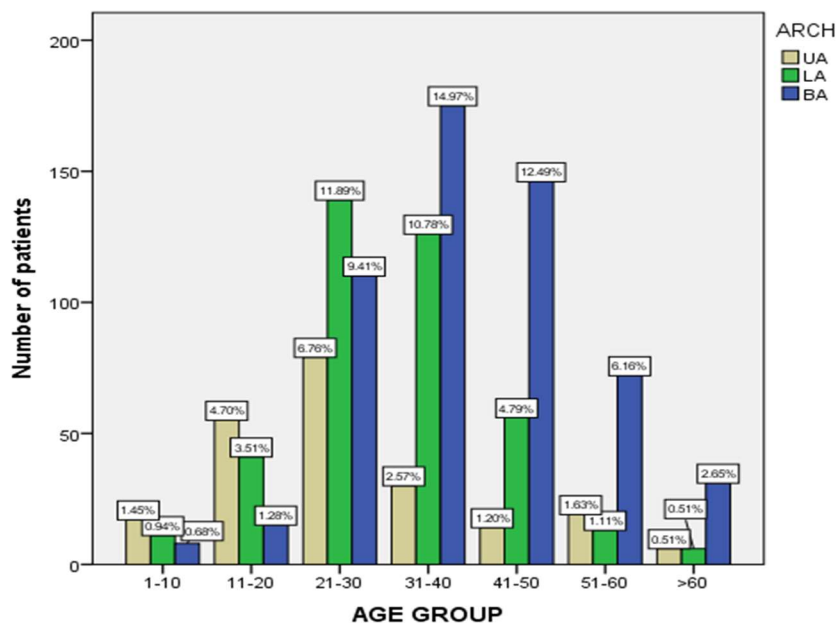


Figure 6: Bar graph depicting association between age group and arch. X-axis represents the age group with the arch in the X cluster and Y-axis represents the number of patients who had dental caries. Beige colour denotes upper arch, green colour denotes lower arch and blue denotes both arch. Chi-square test was done and the association was found to be statistically significant. Pearson chi square value: 224.4; df: 12; p value: 0.000 (<0.05), hence statistically significant proving there was significant association between age group and arch. However it was noticed that in younger age groups dental caries were more frequent in the upper arch and as the age progressed, in the older age groups both the arches had dental caries.

DISCUSSION

Evaluating the age wise distribution of dental caries, a study by Jafarian et al. (45) states that the highest rate (36.9%) of dental caries occurred for those in 41-60 years old, supporting our study results. From our study it was observed that, dental caries were most frequent in the age group 21-40 years with 56.3% of the total population. Montandon et al. (46) also reported that age groups from 35 to 44 years, 45 to 54 years, and 55 to 64 years revealed a significantly greater number of teeth extractions due to dental caries than other age groups and the results were statistically significant. However, a study by Hamagharib et al. (47) does not support our study findings by stating that the most number of dental caries was in the age group of 41-50 yrs (23.5%). Results in this study was in accordance with the results found in a study conducted by Doifode et al. in Nagpur (48.6%) in the same age-group and by Chakraborty et al. in Siliguri (57.03%) in the age-group of 35-40 years.

In quadrant 1 it was noted that only one tooth was infected with 34.98%. In quadrant 2 it was noted that only one tooth was infected with 47.64% of the population. In quadrant 3 it was noted that the number of teeth was infected 4 with 55.02% of the population. In quadrant 4, it was noted that the number of teeth infected was 4 with 68.22% of the population. Caries form most often on the enamel surface, in the pits and fissures of the crown, beneath the contact areas of proximal surfaces of teeth or in the cervical third of the crown between the gingival margins and the point of maximum convexity of the crown. This is because it is in these areas that bacteria in the plaque adhere to the teeth and are relatively protected from being brushed off. Caries development in healthy individuals is usually slow compared with the rate in compromised patients. A polarization is occurring worldwide, where the prevalence of caries is declining in developed countries, is increasing in developing countries and is epidemic in countries with emerging economics (48). Mandibular molars are the 1st teeth to erupt, at six years of age and hence have a longer exposure to the oral cavity. The mandibular teeth also have deep developmental grooves which are more numerous and exaggerated and hence are more likely to develop caries. It was found that susceptibility to caries is low during the first post eruptive year, but rises rapidly to the maximum rate approximately two to three years post eruption (49). The mandibular 1st molars have control over the teeth erupting later behind and

in front of them. They also have the maximum root surface area and are considered to be the best source of anchorage for moving the tooth, they support the main masticatory duty and influence the vertical distance of upper and lower jaws, the occlusal height and esthetic proportions (50). It may be due to these reasons that in our study, the number of teeth with dental caries in quadrant 3 and 4 were more when compared to the number of teeth infected in quadrant 1 and 2.

It was observed in our study that in the younger age groups dental caries were more frequent in the upper arch and as the age progressed, in the older age groups both the arches had dental caries. This may be due to the fact that younger age groups are more prone to trauma and nursing bottle caries, as the age progresses because of the long term exposure of teeth in the oral cavity, both arches tend to have caries.

CONCLUSION

Within the limits of the study, it was observed that:

1. It was observed that dental caries were most frequent in the age group 21-40 years with 56.3% of the total population.
2. The number of teeth with dental caries in quadrant 3 and 4 were more when compared to the number of teeth infected in quadrant 1 and 2.
3. It was observed in our study that in the younger age groups dental caries were more frequent in the upper arch and as the age progressed, in the older age groups both the arches had dental caries.

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