ORIGINAL ARTICLE

INTERNATIONAL JOURNAL OF RESEARCH IN PHARMACEUTICAL SCIENCES

Association of gender with missing tooth surfaces - A record based study

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ABSTRACT

Dental caries remains a common disease worldwide. There is evidence indicating that many caries risk factors provide a gender bias, placing men at a higher caries risk. Generally, dental caries disproportionately affects the poor and racial or ethnic minorities worldwide, with men and women suffering more from the disease. This study aims to associate gender with missing tooth surfaces. Two thousand four hundred forty data of the study population with missing tooth surfaces were collected. They were recorded in the DMFS index. This retrospective study was done using the data collected from the educational software of Saveetha Dental College; from June 2019 to April 2020. The results were tabulated, and graphs were obtained. Descriptive statistics and the chi-square test was done. 52.34% of the male study population were more prone to missing tooth surfaces than the 47.66% female study population. 90.45% had 0 to 32 missing tooth surfaces that were more common, 8.11% had 33 to 64 missing tooth surfaces, 1.35% had 65 to 96 missing tooth surfaces, and 0.08% had 97 to 128 missing tooth surfaces. Males had more percentage of 0 to 32 missing tooth surfaces when compared to females(48.46% vs 41.97%). This difference was found to be statistically significant (p=0.002). The study showed that the missing tooth surfaces were more common among males than females. Males have poor dietary habit and oral hygiene compared to females. Some of the contributing factors include diet, genes, oral environment, fluoride, caries, etc. More research is needed to define the role of all the contributors more clearly for us to understand the development of caries among both genders more thoroughly and to anticipate the disease process before it begins.

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INTRODUCTION

Dental caries is considered one of the most prevalent chronic diseases that affects nearly 100% of the population all over the globe, contributing to a burden of diseases (Petersen and Yamamoto, 2005). Caries formation is multifactorial, and it results in missing tooth surfaces (Ferraro and Vieira, 2010). Choice of instrument and tool used is crucial for treatment. For clinical and epidemiological studies, special tools have been introduced, such as DMFT and DMFS indices (Patturaja *et al.*, 2018).
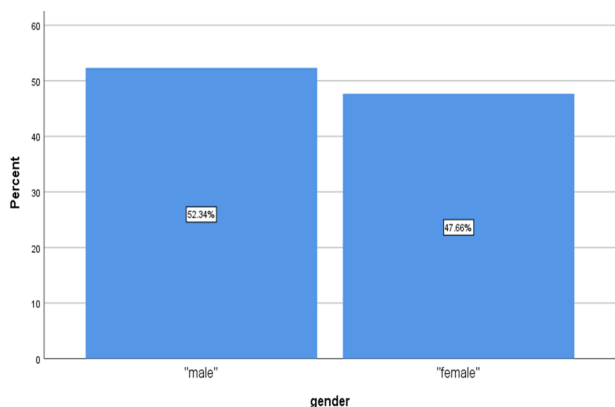
Figure 1: Bar chart showing the percentages of gender among the study population

The Decayed, Missing and Filled index has been used for almost 80 years and is one of the critical measures to record caries in dental epidemiology. The index is used for permanent detention. The scores can range in an individual from 0 to 128 or 148, depending on the presence or absence of third molars. Several studies bounce between whether males or females have the higher prevalence for missing tooth surfaces (Prabakar *et al.*, 2016), while some argue that they are irrelevant and purely due to their habits and systemic conditions. Besides these epidemiological studies, preventive methods can also be used to stop further caries spread (Prabhakar *et al.*, 2011; Prabakar *et al.*, 2016). The mechanisms underlying the reasoning of this trend can probably explain the factors causing caries development (Lukacs and Largaespada, 2006).
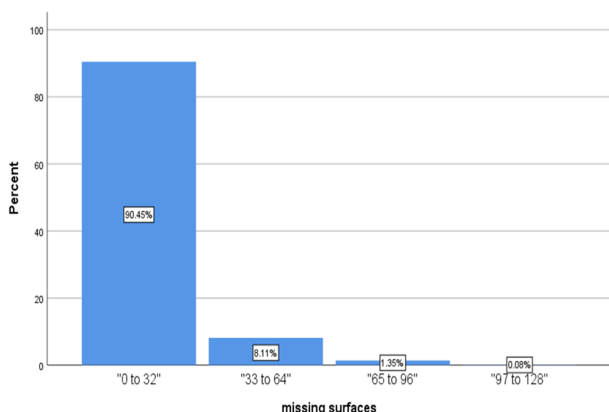

Figure 2: Bar chart showing the missing tooth surfaces among the study population

Several studies are present that show the relation of gender to missing tooth surfaces. Not enough study is present to confirm which gender was prone to losing tooth surfaces. Females have been shown to have more perception to taste than males causing them to be picky eaters and more aware of what they eat. However, females tend to do less exercise

than males, their diet being more organised results in females to be less prone to caries than males. The composition and flow rate of saliva in the host oral environment seems to be another source of the susceptibility of caries formation in women (Ferraro and Vieira, 2010). Though saliva plays a protective role in the oral cavity through its buffering, mechanical washing, antimicrobial, and remineralisation activities, the flow rates of saliva and compositional analysis are generally less protective in women than in men. Pregnancy can also have adverse effects on salivary flow, impairing the protective washing and buffering mechanisms of saliva against caries development.
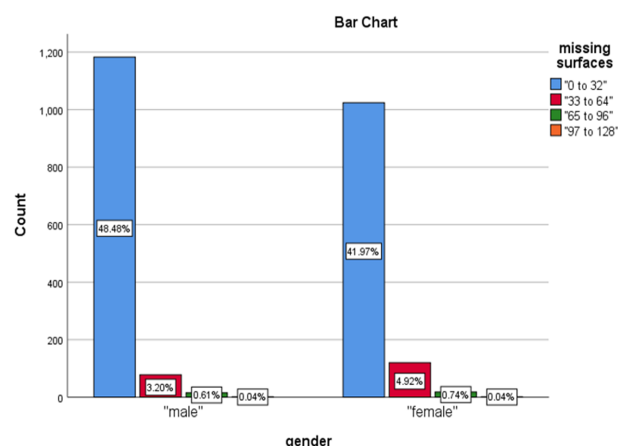

Figure 3: Bar chart showing the percentage of the different genders

 (Al-Sobayel *et al.*, 2015). AMELX is a gene present among females that disrupts the enamel matrix making them more prone to caries than males (Patir *et al.*, 2008). Underlying systemic conditions also play a role in the occurrence of caries (Mathew *et al.*, 2020).

Dental caries if left untreated results in loss of tooth surfaces which can compromise the ability to eat and function well. There will be difficulty in mastication and decreased swallowing (Guiglia *et al.*, 2010). It is alarming enough that dental caries can cause so much problem when it is not the only reason for missing tooth surfaces.

Recession, trauma are also significant factors, but DMFT and DMFS are only used to record loss of tooth surfaces due to caries (Smith and Lang, 1993). Dietary habits are one of the leading etiologies to dental caries. Unfavourable amount of sugar, not only causes adverse oral effects but other conditions like obesity and diabetes as well as to name a few (Ashi, 2017; Leelavathi *et al.*, 2015). Besides food, habits like smoking due to the presence of nicotine and drinks like coffee and carbonated beverages due to the presence of caffeine and high

Table 1: The percentages of missing tooth surfaces among both genders p<0.05 which shows that there was significant difference among gender

	Missing tooth surfaces			
Gender	0 to 32 missing tooth surfaces	33 to 64 missing tooth surfaces	65 to 96 missing tooth surfaces	97 to 128 missing tooth surfaces
Male	48.48%	3.20%	0.61%	0.04%
Female	41.97%	4.92%	0.74%	0.04%

(Pearson Chi-square value-15.344: p-value - 0.002)

sugar content will also affect the oral hygiene conditions (Harini and Leelavathi, 2019; Pratha and Prabakar, 2019). With an increase in caries, in developing countries, more adults are losing teeth early on in their lifespan. This can reflect their day to day health (Petersen and Yamamoto, 2005). The study also helps create awareness as it will help avoid loss of tooth surfaces at a very young age. This may result in psychological and functional consequences (Leelavathi *et al.*, 2016).

The objectives of this study are to

1. Determine the prevalence of dental caries by assessing the DMFS index score.

2. Assess the possible relationship of missing tooth surfaces with gender

MATERIALS AND METHODS

This was a crosssectional study which was conducted by using the data collected from the educational software of Saveetha Dental College, Chennai; from June 2019 to April 2020, and two examiners examined it.

Before the start of the study, ethical approval was obtained from the Scientific Review Board, Saveetha Dental College, SIMATS university. The study involved a total of 2440 sample sizes of DMFS scores were obtained of both genders. Patients with missing tooth surfaces attending the OPD of Saveetha Dental College were enrolled in the study by simple random sampling. Two thousand four hundred forty case sheets were reviewed of both genders, and cross-verification was done through photographs taken of the oral cavity. The internal validation of the study was established by the use of standardised and universally accepted indices like DMFS and DMFT. The external validation can be generalised among the south Indian population.

The data was collected from the health records system used at Saveetha Dental College, which was used to record and store information and oral health data of the patients reporting to the college. It helps in the retrieval of data as starting from diagnosis to treatments rendered, everything is stored and can be accessed by the physicians. The inclusion criteria were patients with missing tooth surfaces of both genders, and the missing surfaces should have been due to caries. Any other aetiology to losing tooth surfaces other than caries were in the exclusion criteria.

The data was imported to the software IBM SPSS Version 23.0 and analysed using descriptive statistics and Pearson's correlation. Graphs were obtained, and the results were tabulated. Statistical significance was set at <0.05. Ethical clearance was obtained and covered under the following ethical approval number - SDC/SIHEC/2020/DIASDATA/0619-0320.

RESULTS AND DISCUSSION

The present study is one of the first studies that was dedicated to assessing the association of gender with missing tooth surfaces. Though there have been several age-related studies, the relevance of gender to caries was very vaguely represented. Many studies had different opinions on their significance (Cagnani *et al.*, 2014).

From the obtained study population, according to Figure 1, (x axis = percentage and y axis = gender) 52.34% of the males were more prone to missing tooth surfaces due to caries. 52.34% of the study population were males, and 47.66% were females. Studies had shown that, when both the genders were compared, a more significant percentage of males were recorded to have missing tooth surfaces due to caries, as they were seen to have more snacks and sweets than females (Mennella, 2005). They implied that the males included were more to having more caries resulting in missing tooth surfaces (Al-Hazzaa *et al.*, 2011). Moreover, females were reported with increased taste perception and considered taste of food of great importance compared to males. This was linked with poor dietary habits (Al-Sobayel *et al.*, 2015; Drewnowski, 1997).

Females seemed to exercise less than males giving an illusion of them being unhealthy, but the poor dietary habits of males resulted in tooth surfaces loss (Mathew *et al.*, 2020). Some of the other factors include the AMELX(amelogenin) gene that resides in the sex chromosome 'x' and females are suspected of having a vaccination of the gene that disrupts enamel matrix formation making them more susceptible to caries and tooth surface loss (Patir *et al.*, 2008; Pavithra and Jayashri, 2019).

Saliva has a vital buffer and protective role but due to hormonal changes makes them less protective and more prone to caries. Some studies stated that females were more inclined to missing tooth surfaces due to certain factors. Saliva has a significant role as buffer and protector shows to be of less action among females due to its compositional analysis showing females to be more prone to caries and missing tooth surfaces (Percival *et al.*, 1994). The presence of sucrose for *Streptococcus mutans'* metabolism is an additional factor in the establishment of a cariogenic environment. Dietary habits can have a significant impact based on the form and frequency of the food. In many cultures, more open access to foods and snacks outside of mealtime provided bacteria in their oral flora with more substrate for caries development. Particular dietary routines have been shown to increase the incidence of caries. Indian subjects are of particular interest in nutritional habits because many have been vegetarian their whole life, offering a specific population. 71% of the people that were vegetarians were females who were evidence of females being more prone to caries and missing tooth surfaces than males. Other studies claim that they do not have much relevance and are simply a result of selection bias (Jaime, 2013).

According to Figure 2, (x axis = percentage and y axis = missing tooth surfaces) 90.45% of the population had 0 to 32 missing tooth surfaces that were most common.

90.45% of the study population had 0 to 32 missing tooth surfaces which were more prevalent and coincided with a maximum of 7 or less affected teeth, 8.11% had 33 to 64 missing tooth surfaces, 1.35% had 65 to 96 missing tooth surfaces, and 0.08% had 97 to 128 missing teeth surfaces. 48.46% were males, and 41.97% were females among 0 to 32 missing tooth surface, 3.20% were males, and 4.92% were females among 33 to 64 missing teeth surfaces, 0.61% were males, and 0.74% were females among 64 to 96 missing teeth surfaces, and 0.04% were males, and 0.04% were females among 97 to 128 missing teeth surfaces as shown in Figure 3. (x axis=

count and y axis = gender : color coded to show the different missing tooth surfaces) p<0.002 which shows that there was significant difference in missing tooth surfaces among gender.

This distribution was shown in Table 1. This clearly shows that males are more prone to having more missing tooth surfaces than females. Lack of awareness and less concern to oral hygiene has resulted in early tooth loss in adults, and hopefully, this study helps emphasise on the importance regardless of the gender (Bernabé, 2016). Maintaining proper diet, proper check-ups and oral hygiene are an essential aspect, especially in males due to the high risk of caries. Improper food intake and malnutrition can also result in poor oral hygiene (Neralla *et al.*, 2019).

P=0.002, which was P<0.05 that indicated the study to be of statistical significance.

The significant impact of caries on the world's population makes the disease an important topic of understanding (Prabakar *et al.*, 2018). Microorganisms like mutans and lactobacillus are usually responsible for caries (Prabakar *et al.*, 2018). The development of caries is multifactorial, depending on many interacting variables to promote its growth. It is also affected by their fluoride content in their day to day food intake and water (Kumar and Vijayalakshmi, 2017; Kumar and Preethi, 2017; Khatri, 2019). Lack of awareness about oral hygiene will increase the incidence resulting in more missing tooth surfaces (Kannan, 2017). In particular, the presence of bacteria, a substrate for the bacteria (food/sugars), the host's oral environment, as well as the passing of time are the main contributing factors in the formation of caries. The mechanisms underlying the reasoning for this trend can be explained by an investigation of the suggested factors involved in caries development (Samuel *et al.*, 2020). This will eventually result in loss of hardness of the enamel and eventually loss of tooth surfaces. This will affect their normal masticatory functions and ultimately affects the systemic conditions of the individuals. (Mohapatra, 2019).

Maintaining records is an efficient method of assessing change in caries status. The health care professionals are expected to provide treatment with all the knowledge and skill. Also, they are expected not to do any harm to the patient due to their carelessness or negligence. Trust and confidence form the basis for doctor-patient relationships. In the current era, there is increased universal access to information and this, in turn, raised a lot of legal concerns. It is crucial to create awareness among patients with more comparative studies for a better understanding. Understanding the association

of gender with missing tooth surfaces helps create awareness among the individual and the practitioner (Srudhy and Anitha, 2015).

CONCLUSION

Within the limits of the study, it was found that males have more missing tooth surfaces when compared to females based on the DMFT index, and this was found to be statistically significant. Further studies to be done considering the role of different factors such as diet, environmental factors etc. and its association with dental caries among different gender.

Conflict of Interest

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

Funding Support

The authors declare that they have no funding support for this study.

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