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Association between Dental Caries Prevalence And Dental Fluorosis

Research Article

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Abstract

The aim of the study is to evaluate the association between dental fluorosis and caries risk at different levels of dean fluorosis score. This retrospective study was done using case records of patients visiting Private Dental College and Hospital. Patients with dental fluorosis 18years to 35 years old were included in this study. Patients who were medically compromised and with other developmental anomalies of teeth were excluded from the study. The data on patient age, gender, Dean's fluorosis score and DMFT score were retrieved from case sheets and tabulated. Analysis of the data was performed using SPSS version 20.0, Descriptive statistics and Chi square tests were done.The results proved that there is a significant association found between DMFT and Dean's fluorosis score($p<0.05$).Thus the patients with following Dean fluorosis score, questionable,very mild and mild had lesser DMFT scores when compared to patient with moderate and severe score. Within the limits of the present study. It can be concluded that there was a strong positive association between dental fluorosis and dental caries, the more severe the fluorosis level, more is the caries rate.

Keywords: Association; Dental Fluorosis Index; Dental Caries; DMFT Score.

Introduction

Dental caries is an ancient disease, dating back to the time agriculture was replaced by hunting and gathering as the primary food source. Still the prevalence and severity were much less than what we see today. Recent reports demonstrate a decline in dental caries, mainly due to the use of fluorides in different forms [1]. The use of fluoride is the only known practical measure for controlling dental caries at the population level. However, the ingestion of fluoride during the development of teeth is associated with an increased risk of development of enamel fluorosis.

Endemic fluorosis resulting from high fluoride concentration in groundwater is a public health problem in India. The available data suggest that 15 States in India are endemic for fluorosis (fluoride level in drinking water >1.5 mg/l), five of these have category III (>50% of the districts affected) which includes Gujarat [2]. The Assam region of North East India has also been recognized as a fluoride-affected area. It is still a disease of high propensity in many developing and developed countries like India and countries in Africa.

Human clinical treats may not be feasible because of ethical and many other practical obstacles. Endemic fluoride belt serve as laboratories to study the effect of dental fluorosis on dental caries [3]. In the early 1950's it was predicted that about 10% of the population would have experience milder forms of enamel fluorosis in the population with introduction of water fluoridation [4]. This is considered a trade-off , as dental caries was a widespread disease in 20th century [5] and inverse relationship between mottled enamel and caries was evident from Deans ecological studies of 1930's [6]. The question is to whether enamel fluorosis have any beneficial effect in today's caries activity in India, however, has not been answered properly, It is important to investigate the relationship between enamel fluorosis and dental caries.

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Fluoride intake during the tooth development will result in dental fluorosis, which has a wide range of clinical signs. Advanced stages - stained, pitted, porous enamel [2]. "Fluoride is often termed as a double edge weapon". It offers caries protection whereas excessive consumption may lead to chronic fluoride toxicity, which manifest as skeletal/ dental fluorosis [7].

The association between enamel fluorosis and caries risk has been investigated in many literatures [8]. Previously our team had conducted numerous clinical trials [9-23] over the past 5 years. Now we are focusing on epidemiological surveys. The idea for this survey stemmed from the current interest in our community. Hence,the aim of this study was to assess the association of dental caries prevalence and dental fluorosis.

Materials and Method

Study Setting & Design

It is a university setting study, conducted by Private Dental College and Hospitals. Ethical approval (SDC/SIHEC/2020/DIAS-DATA/0619-0320) was obtained from the Institutional ethical committee. Number of people involved in this study were 2 examiners. Patients with fluorosis reported to saveetha dental college and hospital were included in the study. Those patients who were medically compromised were excluded.

Sampling

The data were collected from June 2019 to March 2020. Patients with dental fluorosis 18 years to 35 years old were included in this study. Patients who were medically compromised and with other developmental anomalies of teeth were excluded from the study. Out of 2000 patient case sheets reviewed, 130 patients were included in this study after considering the inclusion and exclusion criteria and elimination of the incomplete records. Telephonic and photographic cross verification was done by 2 examiners.

Data Collection

The data was collected by reviewing the case sheets of patients visited Saveetha dental college and hospitals for the past one year, DMFT score, dean's fluorosis score were retrieved. Data was verified by two external examiners. Data was tabulated in excel and was imported to SPSS where the variables were defined.

Analysis

IBM SPSS version 20.0 was used for statistical analysis. Descriptive analysis was used, Chi-Square test was performed to compare the association between Dean's fluorosis and DMFT index. Dependent and independent variables were set.

Results and Discussion

The positive effects that fluoride has on dental caries reduction are well documented. The results revealed that most of the population were affected with very mild and mild categories as the most prevalent cases. These results reveal the existence of a relationship between fluorosis and caries, which was of benefit to children with fluorosis ranging from very mild and mild.Patient with fluorosis of moderate to severe levels had a higher proportion of caries, which is due to advancing demineralisation and greater inclination for lesions.

In the present study overall prevalence of dental fluorosis patients in the study population based on gender was represented in figure1 males (68.5%)were more prevalent to dental fluorosis than females(31.5%) (Figure 1) which is in accordance to the previous studies conducted by Michel E that males were more prevalent to dental fluorosis [24]. In contrast Singh and singh [25] and sukhabogi [26] found out that females were more prevalent than males.Dean's fluorosis index measures severity of dental fluorosis on a scale ranging from 0 to 4. (0 -normal, 0.5- questionable, 1 - very mild, 2- mild, 3- moderate, 4- severe). The severity of dental fluorosis in the study population was represented in figure 2 which showed questionable (6.9%), very mild (7.7%), mild (50.8%), moderate (29.2%), severe (5.4%).

As far as association between fluorosis and dental caries is concerned,both positive [27, 28] and negative relationship [29] have been documented. It was identified that teeth with moderate and severe fluorosis had dental caries more frequently than no mild fluorosis [27, 28] where similar results were proved in this present study.

Our results proved that there is a significant association found between DMFT and Dean's fluorosis score ($p<0.05$). Thus the patients with following Dean fluorosis score, questionable,very mild and mild had lesser DMFT scores when compared to patient with moderate and severe scores (Figure 3). This was supported

Figure 1. Bar diagram depicts the gender distribution of the population of the present study. X axis represents the gender and Y axis represents the percentage distribution of the present study.Out of 130dental fluorosis patients, 89(68.46%) were males and 41(31.54%) were females.

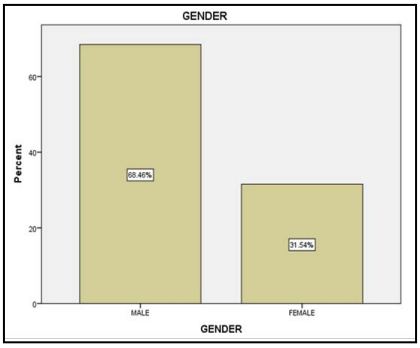


Figure 2. Pie chart depicts the Dean's fluorosis index score distribution out of 130 patients, 9(6.9%) were questionable(red), 10(7.7%) were very mild(green), 66(50.8%) were mild(white), 38(29.2%) were moderate(violet), 7(5.4%) were severe(yellow).

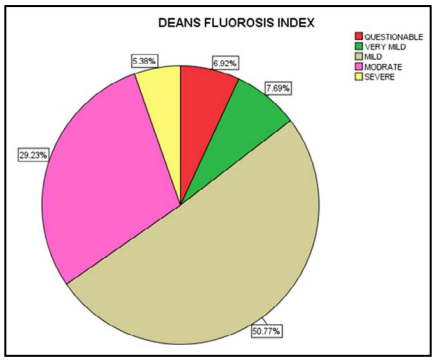
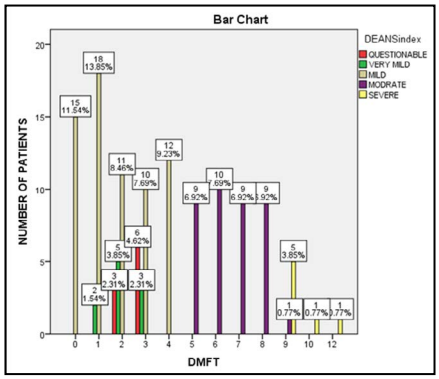


Figure 3. Bar chart depicts the association between DMFT score and Dean's index. X axis represents DMFT index and Y axis represents the total number of fluorosis patients in the present study. There is a significant association between dean score and DMFT index(Pearson Chi-Square=279.748 , p value= 0.000(<0.05) ; statistically significant).Mild and very mild score of fluorosis had resistant to decay or with reduced DMFT scores when compared to moderate and severe which showed increased incidence of dental caries.



by another study [30] which states that F content in the surface decreases the susceptibility to the dental caries thereby decreasing the DMFT score significantly [31, 9-23] .

The use of fluoride is considered an important factor in the prevention and management of dental caries, inhibiting demineralization and stimulating remineralization. Due to the widespread of other fluoride sources a decline in dental caries and an increase in the prevalence of dental fluorosis have been documented in communities.

Some studies stated an increase in prevalence of dental fluorosis. Enamel is susceptible when its pre-eruptive maturation has not been completed [32]. Historically, a predominance of very mild and mild forms of dental fluorosis has been considered a minor consequence in relation to the substantial protection against dental caries [33] which is in accordance to the present study.

The degree and extent of the porosity depends on the concentration of fluoride in the tissue fluids during tooth development. The structural arrangement of the crystals appears normal, but the width of the inter crystalline spaces is increased, causing pores. With increasing severity of fluorosis, the fluoride concentration throughout the enamel, the depth of enamel involvement, and the degree of porosity of the enamel also increases.

Fluorine is often called a two-edged sword. Prolonged ingestion of fluoride through drinking water in excess of the daily requirement is associated with dental and skeletal Fluorosis. Similarly, inadequate intake of fluoride in drinking water is associated with dental caries. Excess of fluoride consumption leads to mottled enamel which also in turn increases the risk of dental caries.Dental caries was low with a predominance of tooth decay. We conclude that it is useful to continue using fluoride products, which have proven beneficial in reducing caries.

Dental caries prevalence is more as the severity of dental fluorosis increases. Dental fluorosis is a hypocalcified condition which is prone to caries and destruction [34]. Mann et al proved that statistically significant association between caries prevalence and fluorosis [35]. Also another study proved by Nelly Molina-Frechero et al., 2012 questionable and very mild fluorosis teeth were resistant or had a lesser degree of decay [36] which is in accordance with our study.

The limitations of the study include geographic isolation subject to error/bias and sample size. Extensive study to be done in larger sample size, improve the way of diagnosing the dental fluorosis and various treatment modalities for the same. Exposure to different sources of fluoride, was a risk factor for the development of fluorosis and a benefit with regard to dental caries.

Conclusion

Within the limits of the present study, it can be concluded that there was a strong positive association between dental fluorosis and caries prevalence, the more severe the fluorosis level, the more is the caries rate. Also the present study proved Mild and very mild fluorosis had resistance to decay or lesser DMFT scores when compared to moderate and severe which showed increased

incidence of dental caries.

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