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Dental Fluorosis And Oral Hygiene Status Among 15-30 Years Old Patients Attending Private Dental College - A Retrospective Study

Research Article

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Abstract

The high prevalence and severity of oral disease such as dental caries and periodontal disease can affect the oral health related quality of life. In addition, endemic oral disease such as dental fluorosis may worsen the oral health of an individual. This study is conducted to evaluate association of dental fluorosis and oral hygiene status among index age group 15-30 years individuals. A retrospective was conducted using the patient records of University hospital from June 2019 until March 2020. A total of 96 consecutive case records of patients who had been diagnosed with dental fluorosis and with the information on their oral hygiene status were retrieved and analysed using SPSS version 20.0. Descriptive statistics was done to find the prevalence and chi-square association was done to find association between dental fluorosis and oral hygiene status. Prevalence of dental fluorosis was high in males (67.71%) compared to females (32.29%). Mild type of dental fluorosis (32.39%) was prevalent among the patients. Among the age groups, prevalence of dental fluorosis was high in patients of age group 21-25 years. Based on gender, males reported with higher incidence of 'very mild' and 'mild' dental fluorosis and in females 'moderate' dental fluorosis were more common. 'Fair' oral hygiene status recorded in most patients. No significant association between age, gender with dental fluorosis and oral hygiene status among the patients ($p>0.05$). Similarly there was a significant association between dental fluorosis and oral hygiene status ($p<0.05$). Thus individuals with moderate and severe dental fluorosis had poor oral hygiene. Severity of dental fluorosis has a significant role on the oral hygiene status.

Keywords: Caries; Fluorosis; Fluoride; Oral Health; Prevalence.

Introduction

Water is one of the most valuable natural resources for sustaining life. Its chemical composition is adjusted to make it competent to be used in domestic, industrial or agricultural purposes. Fluoride in small quantities is a valuable component of water [1]. However, several health problems such as dental fluorosis, skeletal fluorosis and various neurological manifestations may occur when fluorides are in excess amounts [2, 3]. Dental fluorosis is a condition that creates changes in the appearance of tooth enamel [4]. It occurs due to excess ingestion of fluoride during tooth formation. Both enamel and primary dentin fluorosis take place during formation of teeth, thus fluoride exposure likely to occur during childhood [5]. Lower incisors primarily affected in permanent dentition in which mineralization completed as early as 2-3 years of age and ended with third molars. Appearance of white opaque fluorosed enamel occurs due to hypomineralized enamel subsurface [6]. Pitting and loss of the enamel surface occurs in more severe dental fluorosis which can lead to secondary staining, that appears as brown colour. Incidence of dental fluorosis closely related with fluoride level of drinking water [7]. Major risk factors of dental fluorosis are fluoridated supplements, fluoridated dentifrices, and infant formulas before seven years of age [8-10].

Low concentrations of fluoride ion in drinking water is known to have beneficial effects on teeth at low concentrations [11]. Addition of fluoride into public water supplies help to reduce incidence of dental caries. 1ppm fluoride is suggested to be the optimum level for reduction of caries along with minimizing levels of dental fluorosis as suggested by Dean and others [12][13]. Fluoro-

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sis may occur regardless of age, but its effects are greatly harmful to pregnant women and developing children. The adverse effects of fluorosis are irreversible, ranging from mild dental fluorosis and main risk factors for crippling skeletal fluorosis [2,14]. Concentration of fluoride in drinking water, daily intake, duration of exposure and climatic conditions influence the severity of fluorosis [15].

Oral health is important to overall health and may improve quality of life [16]. Good oral health care such as brushing with fluoride toothpaste, daily flossing, and frequent oral health check-up can improve quality of oral health. Oral health can be affected by social determinants. Generally, people with lack of education and earnings as well as individuals from particular racial or ethnic groups have greater influence of oral diseases including dental fluorosis [17] as well as recurrence of oral cancer [18]. Furthermore, the ability of these people to get access to oral health care centres is likely related to a few factors including education level, income, race and ethnicity. Individuals with incapacities and other severe health conditions such as diabetes are expected to have poor oral health. The oral health status depends on the diet we consume everyday [19]. Thus, good dietary habits should include low sugar consumption to avoid initiation of incipient lesions.

In the present study, we investigated the oral health indicators with risk of dental caries along with calculus and debris index. In addition to these measures of oral health, association of dental fluorosis among patients taken into consideration. Dental fluorosis is an irreversible hypomineralization of the tooth enamel and in the Chennai population occurs predominantly due to early life excessive intake of fluoride which occurs naturally in water. Previously our team has a rich experience in working on various research projects across multiple disciplines [20-34]. Thus, the present study aims to determine the prevalence and association of dental fluorosis and oral health status of 15-30 years old patients in the Chennai population.

Materials And Methods

Study setting and design

A retrospective study was conducted to evaluate dental fluorosis and oral hygiene status of 15-30 years dental patients. The study was employed by reviewing 86,000 records of patients visiting the authors University hospital from June 2019 to March 2020. This study has been approved by the University hospital research committee with ethical approval number SDC/SIHEC/2020/DIASDATA/0619-0320

Selection criteria

A total of 96 records with signed informed consent were sorted of which patients aged 15-30 years with information on dental fluorosis scores and their oral hygiene status were sorted and retrieved. We took an effort to confirm case records of patients with systemic diseases, physical and mental disabilities were excluded from the selection process with the help of an external reviewer.

Data collection

Data on patients' age, gender, severity of dental fluorosis and oral health status were collected and entered into excel spreadsheet. The fluorosis was assessed using Dean's fluorosis index and scored as questionable (0.5), very mild (1), mild (2) moderate (3) and severe (4). The data for oral health status was collected using the Oral Hygiene Index Simplified (OHIS) which includes two components such as Debri Index (DI) and Calculus Index (CI). Separate scores for both components were added together to give an oral hygiene index score. The final score is interpreted as good, fair and poor oral hygiene status. The age of the patients were categorized into 15-20 years, 21-25 years and 26-30 years.

Statistical analysis

Collected data was subjected to statistical analysis using SPSS version 20.0. Frequency distribution was performed to find the prevalence of dental fluorosis and oral hygiene status based on age and gender. Chi-square association was done to find the association between dental fluorosis and oral hygiene status.

Results And Discussion

This study involved 96 patients who reported in the outpatient department of University hospital.

In Figure 1, most of the patients were in the age group 21-25 years (54.2%), followed by 26-30 years (32.3%) and 15-20 years (13.5%). Prevalence of fluorosis was more frequent in younger individuals observed in the current study. A similar study by Doumit et al. 2018, 15 years individuals recorded greater incidence of fluorosis in comparison to other age groups [35]. Menta et al 2013 reported that index age group 8-17 years individuals were more exposed to development of dental fluorosis [36]. In the present study, there was a decline in the prevalence of the disease attributed to possible improvement in the treatment of fluorosis.

Figure 2 shows prevalence of dental fluorosis was higher in males, with a percentage of nearly 70% in comparison to females, 32%. In the context of our investigation, we found that most of the patients diagnosed with dental fluorosis were males. The present study is in line with Doumit et al. 2018, where males recorded higher frequency of dental fluorosis and dental caries based on gender distribution [35]. In Shetty et al 2017 study, males highly presented with dental fluorosis [15]. The present study is also in accordance with the study conducted by Teckle-Haimanit et al 2000 where the prevalence of fluorosis in males was higher when compared to females [17]. Prevalence of dental fluorosis among genders were varied in these studies due to different demographic features and different levels of fluoride concentration in drinking water.

Figure 3 showed that most of the patients had 'mild' dental fluorosis (32.3%). Lower incidences of 'moderate' (30.2%), 'very mild' (25%), 'severe' (11.5%) and 'questionable'(1%) dental fluorosis seen in other patients. A similar study by Shetty et al. 2017, most people had severe fluorosis in which severity was higher among females [15]. Baskerados et al. 2008, reported prevalence of dental fluorosis was more severe than the former study [37]. In comparison, the severity was higher than the present study probably due to the factors influencing the prevalence of fluorosis. The reasons could be due to the type and amount of dentifrice used, and quantity of fluoridated water consumption. Oral hygiene was poor among individuals with dental fluorosis than in individuals

Figure 1: Pie chart showing distribution of age groups. X axis denotes age group in years and Y axis denotes proportion of patients in each age group. Most of the patients were in the age group 21-25 years (54.17%).

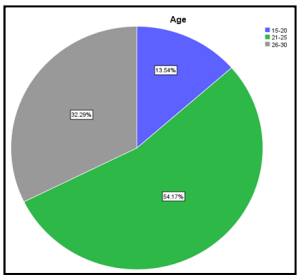


Figure 2: Bar chart showing distribution of gender. X axis denotes dichotomized nominal variable gender and Y axis denotes the proportion of patients. Males (67.71%) predominated the study population.

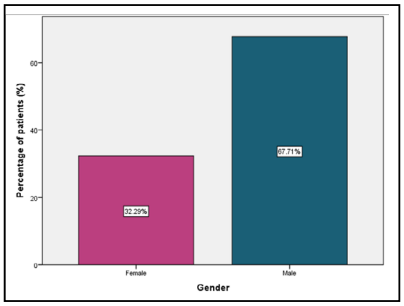


Figure 3: Bar chart showing distribution of severity of dental fluorosis. X axis - severity of dental fluorosis and Y axis - proportion of patients. Most of the patients had mild fluorosis (32.3%).

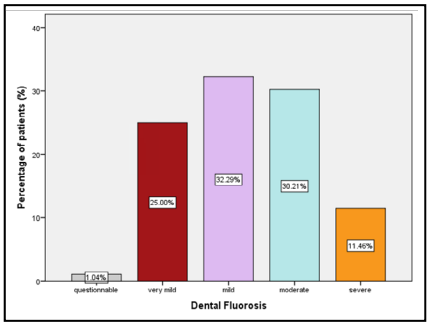
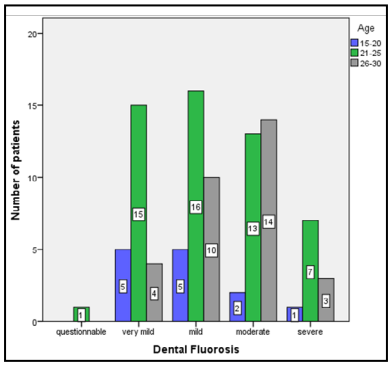


Figure 4: Bar chart showing association between age and severity dental fluorosis. X axis - severity of fluorosis and Y axis - number of patients . Chi-square association was done and found to be not significant [Chi square value=0.237, p=0.411;(p>0.05)]. However, milder type of fluorosis was more prevalent (16.6%) in the age group 21-25 years and moderate type of fluorosis was more prevalent (14.6%) in 26-30 years.



with no dental fluorosis [38] in addition to dental caries evidence. As reported in Doumit et al. 2018, dental caries history was very high, with prevalence of caries begun in children [35]. As reported by Yin et al. 2017, there was an increase in caries prevalence, DMFT mean as well as periodontal pockets.

21-25 years patients presented with higher incidence of 'very mild' and 'mild' dental fluorosis compared to other age groups. 'Moderate' dental fluorosis reported with a higher frequency among 26-30 years individuals as shown in Figure 4. The association between age and dental fluorosis was not statistically significant as (p=0.411);(p>0.05). Figure 5 displays the association of gender and dental fluorosis. Males presented with a greater number of patients with 'very mild', 'mild' and 'moderate' dental fluorosis. 'Questionable' and 'severe' dental fluorosis recorded with lower incidences. Females reported with a higher number of patients with 'moderate' dental fluorosis compared to other grades of dental fluorosis. The association between gender and dental fluorosis was not statistically significant (p=0.449);(p>0.05).

Figure 6 shows association of age groups and OHIS score. Overall, 'fair' oral hygiene status was reported in all age groups. 'Poor' oral hygiene status reported among 21-25 and 26-30 years age groups. The association between age and OHIS was not statisti-

Figure 5: Bar chart showing association of gender and severity of dental fluorosis. X axis - severity of fluorosis and Y axis - number of patients. Chi-square association was done and found to be not significant [Chi square value= 0.302, p=0.449;(p>0.05)]. However, severe form of fluorosis was more prevalent in males (9.3%) compared to females (2.08%).

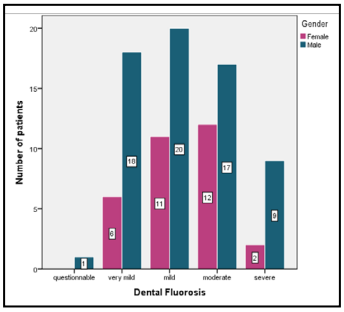


Figure 6: Bar chart showing association of OHIS score with age. X axis - OHIS score and Y axis - number of patients. Chi-square test was done and found to be not significant [Chi square value = 0.078, p=0.572;(p>0.05)]. However, the age group 21-25 years (2.08%) had poor oral hygiene status compared to 26- 30years (1.04%).

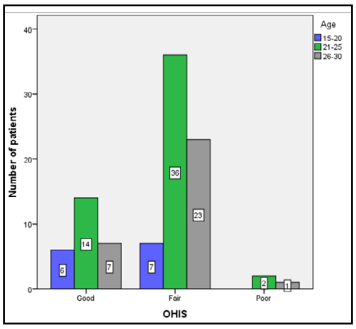


Figure 7: Bar chart showing association of OHIS score with gender. X axis - OHIS score and Y axis - the number of patients. The association between gender and OHIS was not statistically significant [Chi square value = 1.716, p=0.424;(p>0.05)]. Only males (3.12%) had poor oral hygiene. However, 24% of females and 44.8% of males had fair oral hygiene status.

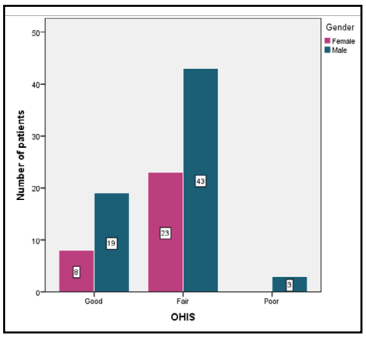
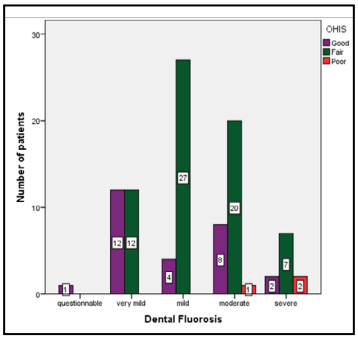


Figure 8: Bar chart showing association of dental fluorosis with OHIS score. X axis - severity of dental fluorosis and Y axis - the number of patients. Chi-square test was done and found to be significant [Chi square value = 22.078;p=0.005;(p<0.05)]. Only patients with moderate (1.04%) and severe (2.08%) dental fluorosis had poor oral hygiene status compared to patients with mild dental fluorosis.



cally significant as (p=0.572);(p>0.05).

'Fair' oral health reported a higher count of numbers in both males and females followed by 'good' oral health status. The association between gender and OHIS was not statistically significant as (p=0.424);(p>0.05) as shown in Figure 7. As displayed in Figure 8, the association between gender and OHIS was statistically significant (p=0.005);(p<0.05). 'Fair' OHIS is seen among patients with 'mild' and 'moderate' dental fluorosis whereas 'poor' OHIS is reported in 'moderate' and 'severe' dental fluorosis patients. In the present study, it was observed that dental fluorosis may or may not affect the oral health of an individual.

Dental caries is an incipient lesion and may progress from demineralisation to non-cavitated lesions to cavitated lesions [39]. As dental caries is a lifetime disease, and the school children being

the highest priority risk group, thus the need to treat dental caries should be done at its earliest possible stage and parents should be made aware of caries preventive measures for their children [40]. Prohibition and reducing high sugar consumption and daily supervised tooth brushing, with or without oral health education is effective in preventing oral diseases [41].

Treatment for dental fluorosis includes teeth whitening or bleaching, bonding, which coats the tooth with a hard resin that bonds to the enamel, crowns and veneer. Defluoridation is seen as a primary preventive measure and is one of the most effective, least invasive means [42]. It is reasonable to expect that fluorosis incidence can be decreased by these methods [43]. Awareness and training towards dental fluorosis management is essential for all in the health care delivery sector [44].Our institution is passionate about high quality evidence based research and has excelled in various fields [45-55].

The present study showed several limitations where excessive fluoride consumption through water ground sources would have been taken into account. Demographic features, small sample size and population, unequal distribution of participants among genders and age and limited time frame may lead to bias in data analysis. Therefore, comparisons in some cases may not be justified. As prevalence of dental fluorosis has seen to be prevalent among populations, thus improvement of oral hygiene and health, acceleration of de-fluoridation efforts should be done in society.

Conclusion

Within limitation of our study, it has shown that dental fluorosis has a significant influence on the oral hygiene status of an individual. The moderate and severe form of dental fluorosis with pitting rough enamel surface may act as a nidus for the plaque accumulation. Not only mottling enamel surface, other contributing factors such as oral hygiene behaviors and practices may play a role in oral hygiene of an individual. However, there is a need for awareness programs on oral hygiene measures among individuals with dental fluorosis.

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