

Prevalence of Dental Fluorosis amongst Young Adults and Adolescents in Chennai

Research Article

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Abstract

Many studies have been conducted to evaluate the prevalence of dental fluorosis in different states and countries. The purpose of this study is to evaluate the prevalence of dental fluorosis amongst young adults and adolescents in Chennai. In this retrospective study, case records of 564 patients of all ages who were diagnosed with dental fluorosis upon reporting to the University hospital in Chennai were reviewed. About 90 patient records of age group 15-20 years (adolescents) and 21-25 years (adults) were retrieved and analysed. Descriptive statistics and tests of association were done at a p value < 0.05. The results revealed the prevalence of dental fluorosis in adolescents was 4.07% and 11.8% amongst young adults. The study found no significant association between the age and prevalence of dental fluorosis (p=0.998) or between gender and prevalence of dental fluorosis (p=0.386). Age and gender has no influence on prevalence of dental fluorosis.

Keywords: Adolescents; Dean's Fluorosis Index; Dental Fluorosis; Young Adults.

Introduction

Dental fluorosis is defined as the hypomineralization of enamel that occurs due to the ingestion of excessive levels of fluoride during enamel formation. Drinking water is a major source of fluoride in India. It affects the population of 20 states in India [1] and about 62 million Indians suffer from dental, skeletal and non-skeletal fluorosis. Fluorosis is endemic in most of the states in India due to its tropical climate. Dental fluorosis requires aesthetic treatment since it affects the quality of life. In mild cases of fluorosis, tooth bleaching can be done, in moderate cases, enamel microabrasion is required and in severe cases, composite fillings, micro abrasion, crowns and veneers can be used [2-7].

Previous researchers found that the source of water till eight years of age was significantly associated with the prevalence of dental fluorosis and adolescents who drank water from a hand pump were more prone [8]. Prevalence of dental fluorosis in Kerala [9], Gujarat [10], Udaipur [11] and Haryana [12] were found to be 16.8 %, 17.7%, 36.3% and 92.7% respectively. In Greater Noida [13]

prevalence of fluorosis was 21% but the very mild form of dental fluorosis was more prevalent in adolescents with 27.6%.

In a study to assess the groundwater fluoride concentration in Kanchipuram, Tamil Nadu, it was found that the fluoride concentration ranged between 0.05-1.04 mg/l. In Madurai, Tamil Nadu, fluoride contents in all samples ranged between 0.12-1.2 mg/l, which is less than the optimum range of 1.5 mg/L, as recommended by WHO. Hence, fluoride contents in all the samples exhibit their suitability for drinking [14-16]. But districts in Tamil Nadu such as Salem, Dharmapuri and Krishnagiri have >3ppm of fluoride in drinking water. Previously our team has a rich experience in working on various research projects across multiple disciplines [17-31]. Now the growing trend in this area motivated us to pursue this project.

Since existing studies show a high prevalence of fluorosis in other states in India, we evaluate the prevalence of fluorosis among adolescents and young adults in Chennai.

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Materials and Methods

Study design and Study setting:

The present study was conducted in the author’s University hospital in Chennai to evaluate the prevalence of dental fluorosis amongst young adults and adolescents from June 2019 to March 2020. The retrospective study was done by reviewing 86,000 patient records with signed informed consent from University hospital.

Permission:

Prior permission was obtained from the University to utilize the data of case records for data analysis.

Sampling:

Of 86,000 case records, 564 consecutive case records of patients with dental fluorosis were retrieved. No gender restriction was placed. On subjecting to selection criteria about 90 case records of patients of age group 15-20 years and 21-25 years were sorted. An effort was taken to verify dental fluorosis using clinical photographs. The study contained regional data generalised to the South Indian population.

Data Collection:

The retrospective study involved 90 patients of 15-25 years who were diagnosed with dental fluorosis. The data on severity of dental fluorosis was measured using Dean’s Fluorosis Index upon reporting to the dental hospital by Trendley H Dean in 1942. They were categorised into Questionable (0.5), Very mild (1), Mild (2), Moderate (3), Severe (4). A calibrated single examiner reviewed the score and tabulated them. Data on age and gender were retrieved from the case records.

Statistical Analysis:

The collected data was validated, tabulated and analysed with Statistical Package for Social Sciences for Windows, version 20.0 (SPSS Inc., Chicago, IL, USA). Frequency distribution of severity of dental fluorosis among adults and adolescents was calculated. Pearson’s chi-square association was used to test associations between age, gender and dental fluorosis. P value < 0.05 was considered statistically significant.

Results & Discussion

The current study was conducted to evaluate the prevalence of dental fluorosis among adolescents and young adults in Chennai from June 2019 to March 2020. Among the 90 case records of patients 74.4% were adults of age group 21-25 years and 25.5% were adolescents of age group 15-20 years [Figure 1]. Males (71.1%) were more predominant in the study population than females (28.9%) [Figure 2].

The prevalence of dental fluorosis in adults was found to be 11.8% and 4.07% in adolescents. It was found to be higher among the young adults compared to adolescents. This statement was contradicted by Shruti MN [32] who found the prevalence to be higher in children and adolescents rather than adults.

The prevalence of the severity of fluorosis, based on the Deans Fluorosis Index in the 15-20 year age group was 8.6% with Questionable (Grade 0.5); 17.3% with very mild fluorosis (Grade 1); 47.8% with mild fluorosis (Grade 2); 21.7% with moderate fluorosis (Grade 3) and 4.3% of patients with severe fluorosis (Grade 4). In the 21-25 year age group the prevalence was 7.4% with Questionable (Grade 0.5); 14.9% with very mild fluorosis (Grade 1); 50.7% with mild fluorosis (Grade 2); 22.3% with moderate fluorosis (Grade 3) and 4.4% of patients with severe fluorosis (Grade 4). The present study did not find a statistically significant association between the prevalence of dental fluorosis and age of

Figure 1. Bar chart depicting the distribution of age of patients in percentage. X axis represents the age of patients and Y axis represents the number of patients with dental fluorosis. Most of the patients were young adults (74.4%).

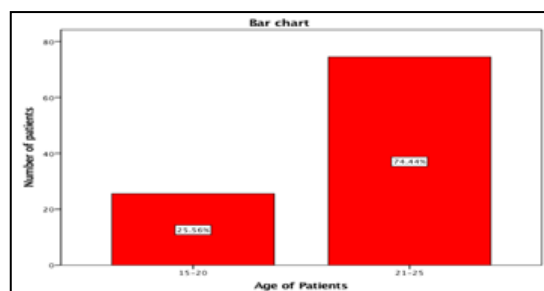


Figure 2. Bar chart depicting the distribution of gender of patients in percentage. X axis represents the gender of patients and Y axis represents the number of patients with dental fluorosis. Males (71.1%) predominated the study population.

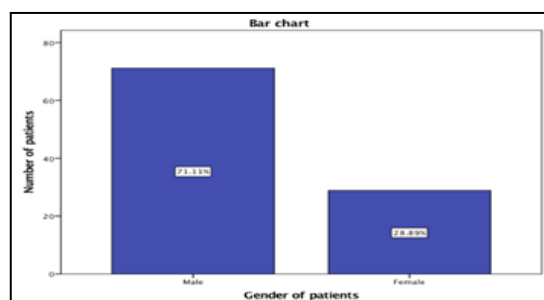


Figure 3. Bar chart depicting the association between dental fluorosis and age groups. X axis represents the age of patients and Y axis represents the number of patients reviewed for Dean's Fluorosis Index score. Association between dental fluorosis and age groups was done using Chi square test and it was not significant. Chi square association test (Fisher's exact test value = 0.131; p value = 0.988; not significant). Age has no role in the severity of dental fluorosis.

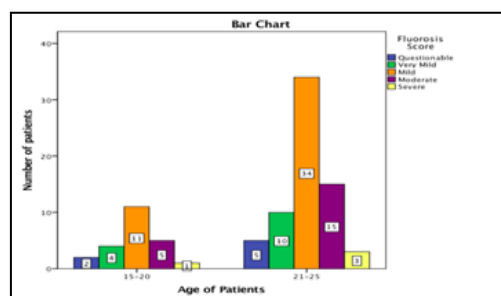
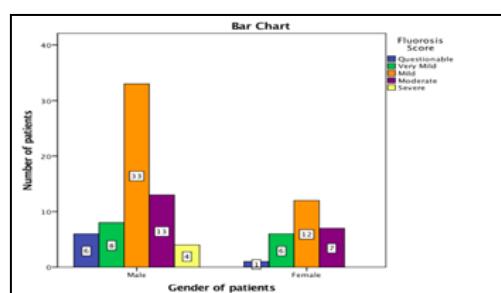


Figure 4: Bar chart depicting the association between dental fluorosis based on gender. X axis represents the Gender of patients and Y axis represents the number of patients reviewed for Dean's Fluorosis Index score. Association between dental fluorosis and gender was done using Chi square test and it was not significant. Chi square association test (Fisher's exact test value = 0.349; p value = 0.555; not significant). Gender has no role in the severity of fluorosis.



the patients ($p=0.998$) [Figure 3] This statement is supported by Arif et al., [33] who found that the prevalence varied significantly with age. However, a study conducted by Sukhabogi et al [34] disagreed with this statement.

In accordance with gender, overall, 71.1% of males and 28.9% of females were diagnosed with dental fluorosis. The prevalence of the severity of fluorosis, based on the Deans Fluorosis Index amongst the males was 9.3% with Questionable (Grade 0.5); 12.5% with very mild fluorosis (Grade 1); 51.5% with mild fluorosis (Grade 2); 20.3% with moderate fluorosis (Grade 3) and 6.2% of patients with severe fluorosis (Grade 4). Among the females, the prevalence was 3.8% with Questionable (Grade 0.5); 23% with very mild fluorosis (Grade 1); 46.1% with mild fluorosis (Grade 2) and 26.9% with moderate fluorosis (Grade 3). Severe fluorosis (Grade 4) was not seen in females. This study found no statistically significant association between gender and prevalence of dental fluorosis ($p=0.555$). [Figure 4] This statement was supported by Sarvaiya et al [(35)] who found no significant difference amongst both genders and the prevalence of fluorosis. It was also supported by many other studies that found a non-significant association [32-37]. In fact, in the Universally available literature, no tendency towards developing dental fluorosis was reported by either of the genders [13, 38-40].

In the present study, mild form of dental fluorosis (Grade 2) was seen in 47.8% of the adolescents as the most predominant type. Very mild type of dental fluorosis (Grade 1) was seen in 27.6% of the adolescents as the predominant type in the study by Chaudhury.M et al., [13]. Milder forms of fluorosis were more common than its severe forms. This finding was supported by studies done by Srivatsava et al., [41] and Naidu et al., [8]. Dental fluorosis is endemic in 150,000 villages in India [42-46].

A report described the interexaminer reliability achieved using Dean's Index in a study of dental fluorosis. Using Dean's definition of fluorosis, agreement on the presence or absence of fluorosis ranged from 92 to 97 percent and therefore the respective kappa values ranged from 0.75 to 0.94. Examiners showed good to excellent agreement beyond chance in the use of this index. Hence the index is very reliable to review dental fluorosis [47]. Our institution is passionate about high quality evidence based research and has excelled in various fields [48-58]. We hope this study adds to this rich legacy.

Limitations of the study include a restricted population group due to it being a single centered study. Another limitation includes the data only being collected for a period of 10 months. Also, since it is a retrospective study based on case records, the cases could not be reviewed clinically and we relied on the uploaded scoring of the Dean's fluorosis index by dentists in the hospital. However these scores were all reviewed by a single calibrated examiner with the help of clinical photographs as well. Future scope of the study could be improved by conducting a prospective cohort study considering the geographic location.

Conclusion

The prevalence of dental fluorosis is not dependent on the age and gender of the patients. The Mild form of dental fluorosis was found to be the most prevalent type in both adults and adolescents.

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