

COMPARISON OF DENTAL FLUOROSIS BETWEEN RESIDENTS AND NON RESIDENTS OF QUETTA

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ABSTRACT

Objective: To compare the frequency of dental fluorosis between residents and non-residents of Quetta reporting to Dental Centre Quetta.

Study Design: Cross sectional comparative study.

Place and Duration of Study: The study was carried out in Dental Centre Quetta, from Dec 2015 to Apr 2017.

Methodology: On the basis of inclusion criteria; two groups of 500 patients each were selected. Dean's fluorosis index was used for scoring of the dental fluorosis. Chi square test was used for finding the association of fluorosis between residents and non-residents of Quetta.

Results: Out of the 1000 included patients 437 (43.7%) were males and 563 (56.3%) were females. The mean age was 12.25 ± 1.92 years. The mean fluorosis severity was 1.46 ± 1.67 years. For fluorosis comparison between residents and non-residents, our results showed that fluorosis was present in 71.4% of the resident and 24% of the non-residents, with a *p*-value of ≤ 0.001 .

Conclusion: There was a high frequency of dental fluorosis in residents of Quetta as compared to the non-residents (Pakistanis hailing from other parts of the country).

Keywords: Dental fluorosis, Fluoride.

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INTRODUCTION

Dental fluorosis which is a disturbance during amelogenesis, is mainly caused by excessive fluoride in tooth structures during tooth formative stages¹. Fluorosis is a worldwide phenomenon that can result in gross aesthetic problems and morbidity ie defective bone and enamel development (dental/enamel fluorosis)²⁻⁴.

For water to be considered safe for drinking, the normal permissible fluoride concentration level in water according to WHO guidelines is 1.5 mg/litre⁵. Due to the increased fluoride concentration a staggering prevalence of 98% of fluorosis had been reported in a study at some areas of KPK⁶. Due to non-availability of resources, fluoride concentration in water is one of the highest in the province of Baluchistan⁷ including Quetta city. Because of these facts there is a possibility of high frequency of dental fluorosis

amongst the residents of Quetta. This study was undertaken to compare the prevalence of dental fluorosis between residents and non residents of Quetta reporting to Dental centre in Quetta cantt.

METHODOLOGY

This was a cross sectional and comparative study. The study was performed on patients reporting to Dental Centre in Quetta, from December 2015 to April 2017. Non-probability convenience sampling method was used. Sample size was calculated using WHO sample size calculator. Considering the values of confidence level as 95%, anticipated population proportion as 35% and absolute precision as 0.03, a sample size of 972 was calculated. However, we took a sample size of 1000 for the current study.

The patients were divided into two groups of 500 patients in each group; ie residents of Quetta (those who were born and brought up in Quetta) and non-residents (patients who were not born in Quetta, came to Quetta after 6 years of age and stayed for three years or less due to parents posting).

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The inclusion criteria included patients from age 7 to 17 years. For the residents group patients should have been the inhabitants of Quetta in the tooth formation stages (crown) ie birth till 15 years of age. Non residents included patients from rest of Baluchistan and four provinces (Punjab, KPK, Sindh, Gilgit Baltistan) along with Azad Kashmir region. For simplicity and increase in sample size, all the 3 classes of malocclusion (class I, II and III) were included in present study.

The exclusion criteria included patients who had undergone major/minor restorative work done to their dentition like bleaching, fillings, root canal, veneers, crown or bridge. Patients with normal staining and enamel opacities were also excluded. As orthodontic treatment may cause opacities; patients who had undergone orthodontic treatment were not included. To avoid the confounding effect of different professions, patients having any occupation apart from being a student were excluded from study. Because of getting fluorosis from different eating habits; patients who did not have a history of abnormal eating/drinking habits like tobacco chewing, smoking, excessive tea consumption (ie more than 2 cups per day).

Fluorosis was diagnosed on the basis of clinical examination in good dental light. The Dean's index for fluorosis evaluation was used⁸. The aim was to note the distribution pattern of any enamel defects, then the findings were correlated with findings of fluorosis. Because of the ease of clinical examination only maxillary and mandibular six anterior teeth were considered for Dean's scoring Index. The following score was used for grading dental fluorosis;

For Scoring of fluorosis (Dean Index)⁸ the following scores were used;

Normal; Enamel is of translucent nature. The surface is shiny and usually is pale or white. Questionable; The enamel shows a variation from translucent to a bit opaque, some white spot lesions may be present. Very Mild; (about $\frac{1}{4}$ enamel surface); The opaque and white spots are distributed in all over the surface but the total

area involved by mottled opaque lesion is less than $\frac{1}{4}$ th of tooth surface. Mild; (About half of enamel surface); The white spot lesions are more extensive, but the total area involved is less than $\frac{1}{2}$ of tooth enamel surface. Attrition may or may not be present. Moderate; (All of enamel of surface); All enamel surfaces are affected by white spots and mottled stains. Enamel attrition is present. This type of dark brown colour of enamel is aesthetically not pleasing. Severe; (All of enamel surfaces) All enamel surfaces are affected. The general form of tooth may be changed. There is pitting all over enamel and attrition is present. Brownish discolouration is there all over the tooth surface. The tooth is aesthetically disfigured.

Descriptive statistics like mean and SD for quantitative variables while Frequency and percentages for qualitative variables were calculated. Pearson's chi-square test for association was used. Percentages and expected counts for both groups were found. A *p*-value of ≤ 0.05 was considered statistically significant. For effect size Cramer V and Phi was applied. SPSS-22 was used for statistical analysis.

RESULTS

The total number of patients in our study were 1000. Our results show that the minimum age of the patients was 7 years and maximum age of the patients was 17 years. The SD for age was 1.92 and mean age was 12.25. The mean age for the residents was 12.24 with SD of 1.76 and mean age for non-residents was 12.25 with SD of 2.06. Gender wise; there were 437 (43.7%) males and 563 (56.3%) females out of a total of 1000 patients. Resident sample included 223 male (45%) and 277 female (55%) patients. The non-residents included 214 male (43%) and 286 female (57%) patients. Fluorosis was present in 71.4% of the resident and 24% of the non-residents (table-I). The value for chi square test was 225.15 with a *p*-value of ≤ 0.01 which is statistically significant between the two groups. The result for Cramer V and phi for effect size was 0.475, which actually means a large effect size and a *p*-value of ≤ 0.001

thus indicating a statistical significance between native region and presence or absence of fluorosis.

The mean fluorosis index was 1.46 and SD for fluorosis was 1.67. Most of the fluorosis from

Table-I: Fluorosis Count and percentage between residents and non residents of Quetta (n=1000).

Fluorosis	Residents Count. & %	Non Residents Count & %
Present	357 (71.4%)	120 (24%)
Absent	143 (28.6%)	380 (76%)

Table-II: Fluorosis severity comparison between residents and non residents (n=1000).

Fluorosis Severity	Residents	Non Residents
Normal	143 (28.6%)	380 (7.6%)
Questionable	28 (4%)	22 (4.4%)
Very Mild	98 (9.6%)	38 (6%)
Mild	127 (25.4%)	28 (5.6%)
Moderate	86 (17.21%)	25 (5%)
Severe	26 (5.2%)	19 (3%)

$p < 0.001$

both groups was in very mild, mild and moderate group (table-II).

DISCUSSION

Fluorosis is an international phenomenon affecting millions of people mostly in developing countries². Globally the prevalence of fluorosis ranges from 8.53% to 69.84%⁹. Fluorosis is a condition caused by exposure to fluoride. Fluoride is available in large quantities in underground water source. Globally, there is agreement on the presence of fluorosis in at least 25 countries. It is not known with certainty the amount of people affected by fluorosis, but is estimated to be in millions. Fluoride mainly affects the bones and teeth when consumed in larger quantities beyond the permissible limit. Severe fluorosis of the bones, although rare may result in crippling and debilitating results¹⁰.

Although a very high prevalence of fluorosis had been reported in different studies⁶, the findings of this study indicates a 71.4% frequency in the residents of Quetta. The present study found a significant association of fluorosis with the native region of the children. Thus an

inference can be drawn that a high fluoride level of water in natives of Quetta is responsible for elevated number of fluorosis cases. Mainly the children were selected for this study to avoid other confounding variables like habits (tea, tobacco chewing) or occupation). The present study did not find any other contributors to fluorosis.

In Pakistani studies⁶ a cross sectional study was conducted to assess the level of dental fluorosis and Decaying, Missing, Filled Tooth (DMFT) of patients living in district Mardan village Rustam and district Mianwali village Harnoli. The age range of the patients was from 10 to 60 years. A total of 100 subjects were included in this study and they were observed for the extent of dental fluorosis, along with the number of decayed, missing and filled teeth (DMFT score). There was a strong association of underground drinking water the severity of dental fluorosis (98% population suffered from fluorosis). This study also stated that a high fluoride level in water resulted in a low DMFT score (3.3) thus indicating that patients who were suffering from dental fluorosis had a low incidence of dental carries, thus interestingly, fluorosis was assumed to be protective against dental caries. Our study however only found a fluorosis incidence of 71.4%. Similarly the present study didn't calculate DMFT score of children suffering from fluorosis.

In studies (performed in Quetta, Balochistan¹¹ on school children till age 12 years, to know the caries prevalence in areas that had excessive fluoride concentration in water) dental fluorosis was found in 63.6% of children of Quetta with majority of patients suffering from moderate degree dental fluorosis (50.5%). Dental caries was found in 81 children (23.2%) with mean DMFT of 0.61. Boys had a 1.6 times more chance to have dental caries than girls. Interestingly dental fluorosis was also associated with increased dental caries prevalence. The children who were suffering from dental fluorosis, had four times more chances to develop caries than those who did not suffer from dental fluorosis.

The findings of this study can be compared with our study ie 63.6% fluorosis vs 71.4% fluorosis in residents of Quetta. There was a strong relationship of Fluorosis with gender and socioeconomic status¹².

Another study was carried out in Gadap town Karachi, Sindh¹³. The aim of this study was to assess the severity and prevalence of fluorosis in children. There was a difference in male and female patient's incidence of fluorosis (Community fluorosis index, CFI) 0.64 vs 1.09-1.39. The incidence of dental fluorosis was lower in females than in males. The prevalence of dental fluorosis was 53.3% in the sample. In our sample we did not find any such difference between the incidence of fluorosis, a *p*-value of 0.141 \geq 0.05 and therefore is statistically non-significant.

The fluorosis studies, done in fluoridated and non-fluoridated areas, have identified four major risk factors; the use of fluoridated drinking water, fluoride supplements, fluoride toothpaste, and infant formulas before the age of eight years¹⁴. As a part of amelogenesis and matrix formation, the release of protons during the hyper mineralization has proven to cause dental fluorosis¹⁵.

A study was conducted on 1500 school children in India, with an age range of 9-12 years¹⁶. The results of this study showed that the prevalence of fluorosis was 74.9% in sample population. Those children drinking water from wells with bore had the highest incidence.

About the prevention from dental caries, fluoride in water is the only compound that is recognized for the prevention of dental caries¹⁷. However, being a known toxicant and due to the devastating¹⁸ and crippling effects of fluoride on population combined with the aesthetic impact and increased cost incurred on the treatment of Skeletal and dental fluorosis, the Centre for disease control (CDC) and American Dental Association (ADA) have proposed changes in their old recommendation of using fluoride in community drinking water to counter dental caries.

CONCLUSION

There was a high frequency of dental fluorosis in residents of Quetta as compared to the non-residents (Pakistanis hailing from other parts of the country).

CONFLICT OF INTEREST

This study has no conflict of interest to declare by any author.

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