Original Article

Dentistry

Prevalence of Dental Fluorosis among School Going Students of District Khairpur

1. Abdul Bari Memon 2. Kashif Ali Channar 3. Feroze Ali Kalhoro 4. Shahid Ali Mirani

1. Resident Community Dentistry, 2. Asstt. Prof. of Oral & Maxillofacial Surgery 3. Assoc. Prof. of Operative Dentistry 4. Resident Community Dentistry, Institute of Dentistry, LUMHS Jamshoro

ABSTRACT

Objectives: The objectives of this study were to determine the prevalence and severity of dental fluorosis among school students

Study Design: Descriptive cross sectional survey

Place and Duration of Study: The study was carried out in the government and private (male & female) primary, high and higher secondary schools of district khairpur sindh from 04 October 2010 to 20 December 2010

Materials and Methods: The school selection was made according to number of registered school children from the total population of 3311658 school children; a statistical calculation was made to determine an appropriate sample size. The minimum sample size was calculated 345 based on confidence interval of 95%. The expected prevalence was 34%.

Results: The results of this study showed that the prevalence of dental fluorosis was 10.8% (1295 males and 609 females) being higher in males than females. 1699 (89.2%) students were at normal level, 87 (4.6%) were at questionable level, 64 (3.4%) were at very mild level, 30 (1.6%) were at mild level and 24 (1.3%) were at moderate level.

Conclusion: It is concluded that prevalence of DF is 10.8%, more common in male gender and there was no any case of severe DF according to Dean`s community fluorosis index

Key Words: Dental fluorosis, prevalence, dean's index, severity,.

INTRODUCTION

Dental fluorosis (DF) is well-recognized hypo-mineralized condition, characterized by surface and sub-surface porosity of enamel. DF develops if the amount of fluoride in drinking water is greater than 1-2 parts per million (ppm) during developmental stage of tooth, this can lead to metabolic damage to ameloblasts, low quality enamel matrix formed and resulting in improper calcification of teeth, the porosity of the sub-surface enamel is increased.[1,2] initially DF appear as small spot , Negligence in early detection may proceed to pitted, cracked, and brittle enamel .[1,3] With more severe forms of fluorosis, caries risk increases because of pitting and loss of the outer enamel.[4]

The discoloration induced by fluorosis particularly in its advanced forms, can cause significant embarrassment and stress to the affected child, resulting in adverse effects on emotion, esteem, health and career success.[5]Fumes from aluminum industry, fluoride dust inhalation, supplements, too much consumption of tea, heavily fluoridated water and unjustified use of fluoridated toothpastes are important factors in development of DF.[3]

Prevention is extremely important in fluorosis endemic areas like Pakistan, India and China. [6] In Pakistan, the most effected sporadic areas are in, Mianwali, Khoshab, Chawinda, Jhang, Chakwal, and LakkiMarwat. However, in LakkiMarwat, a southern district of Khyber Pakhtoonkhwa province which was plagued in the past with severe form of dental fluorosis is brought under full control.[3]The Prevalence of Dental Fluorosis observed 32%, among 12-year-old students of Karachi, Pakistan in year2004[7]. Over the past 50 years, the prevalence of dental fluorosis has increased quite dramatically and with this increase, esthetic concerns pertaining to fluorosis should be taken into consideration.[8]

As the number of dental fluorosis patients is increasing day by day, esthetic concerns and non availability of the latest data of this problem in rural areas of Sindh made it necessary to conduct a study to report the prevalence of DF and to stimulate those who are answerable for the prevention of this hazard. The information of this study will be beneficial for developing the future policies against the various factors in preventing the DF.

MATERIALS AND METHODS

Descriptive cross sectional survey on DF was performed in the government and private schools of district Khairpur Sindh from 04 October 2010 to 20 December 2010.

The school selection was made according to number of registered school children from the total population of 3311658 school children; a statistical calculation was made to determine an appropriate sample size. The minimum sample size was calculated 345 based on confidence interval of 95%. The expected prevalence was 34%. The schools and children were randomly chosen. The Inclusion Criteria were students of either gender with age ranges from 09-18 yearsand permanent

teeth only whereas the exclusion criteria were thestudents above the age of eighteen years and the guardians/ parents of the students below the fourteen years who refused to participate in this research study, primary teeth and Patients of rampant caries, Anodontia, orthodontic fixed appliance patients and full crown wearing patients

After getting permission from local heads of the schools written Informed consents were obtained from father /guardian of the students under the age of fourteen years where as it was taken from students themselves above the age of fourteen years as per university ethical committee instruction/policy for including the data in research study.

Students were seated in an ordinary chair at their school and teeth were examined wet with wooden tongue spatula in natural light, illumination was enhanced withnokia 1203 mobile set light where there was insufficient illumination and a CPITN (Community Periodontal Index Treatment Needs) probe was used to remove food debris or exclude any plaque, calculus or foreign body and The prevalence and severity of DF was assessed by using the Dean's index, with levels from 0 to 4 following the WHO recommendations as suggested by Khan AA and others.[11,]

All the information about the variables of the study like age, gender and prevalence and severity were recorded in the proforma. The data were analyzed by SPSS version 16. Severity of fluorosis was measured in percentage .Chi square test was applied. The level of significance was set to ≤ 0.05.

RESULTS

Out of 2000 students 1904 agreed for examination and the rest of the students were excluded from the study. DF was seen in 206 (10.8%) students. Male female ratio was 2.1:1 (Figure 1)

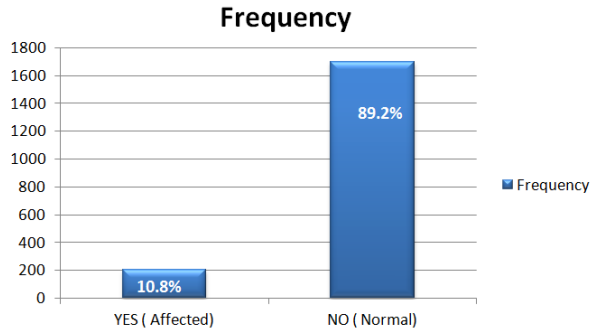

Figure No. I: Prevalence of Dental Fluorosis

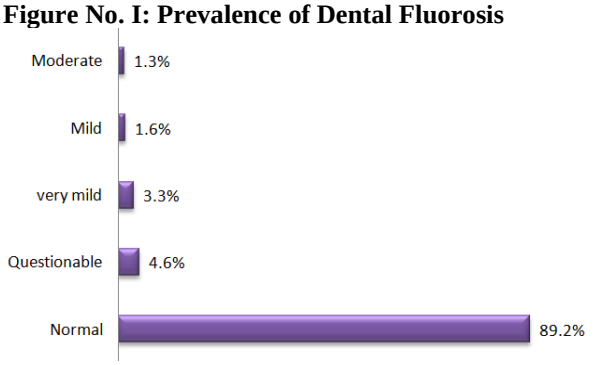

Figure No.2: Severity of dental fluorosis according to Deans Community Fluorosis Index (CFI)

According to Deans Community Fluorosis Index severity of fluorosis was categorized in to six groups .Majority of cases were at questionable level and there was no case of severe fluorosis found in the region of this study (Figure 2)

All selected students were divided in to two groups according to age, group A(9-12 years) and group B (13 to 18 years). It was found that 6.75% students were affected with dental fluorosis with different levels of DF in Group "A" While 12.46% were affected in group B. Whereas 13.0% male & 6% female students were affected with dental fluorosis (Table I)

Table No.1: Prevalence and severity of dental fluorosis according to age and gender

Age & gender	Number Examined	Normal	Affected	Questionable	Very Mild	Mild	Moderate
Group A (9-12 years)	548 (28.8%)	511 (93.2%)	37 (6.75%)	13 (2.37%)	15 (2.73%)	04 (0.72%)	05 (0.91%)
Group B (13-18 years)	1356 (71.2%)	1188 (87.6%)	169 (12.46%)	74 (5.45%)	48 (3.53%)	26 (1.91%)	19 (1.4%)
Male	1295 (68%)	1126 (87%)	169 (13.0%)	71 (5.48%)	52 (4.01%)	23 (1.77%)	21 (1.62%)
Female	609 (32%)	572 (93.9%)	37 (6.0%)	16 (2.6%)	11 (1.8%)	07 (01.14%)	03 (0.49%)

P=0.000 value of severity of dental fluorosis in gender is statistically significant

P= 0.000 age of the students is statistically significant in relation to dental fluorosis

P= 0.000 gender of the students is statistically significant in relation to dental fluorosis

DISCUSSION

The prevalence of DF was found 10.8%. The results of this study cannot be compared favorably with other studies of DF conducted in various institutes and cities of Pakistan[3,7] and abroad [10], it might be due to different geographic location, variable concentration of fluoride level in water.

However the other study conducted in Pakistan in Lahore by Sadia Rizwan[11] reported the 12% incidence

of dental fluorosis among the patients visiting the department of operative dentistry of university of Lahore, the results are much similar to this study, might be due to fluorosis is asymptomatic, and rarely patients seeks treatment for DF.Another study accredited by Akosu TJ, Zoakah AI[12] in Nigeria among 12-15 years old children the prevalence of DF was 12.9% which is also similar with this study.

The distribution of DF score for all the children examined in among 12-13 year-old schoolchildren in Klang District, Malaysia by R. Esa, I. A. Razak.[13]817 (54.0%) did not have fluorosis, 200 (13.2 %) had questionable fluorosis, 389 (25.7 %) had very mild fluorosis, 84 (5.6%) had mild fluorosis. 1.4% had moderate fluorosis and only 0.1 % exhibited severe fluorosis.

The results of this Malaysia study are not favourably compared with this study might be due to the prevalence of dental fluorosis has been increasing in a number of countries in recent years [14-16]. Although this increase is well documented elsewhere, local data of rural areas of Sindh is lacking to reflect the present scenario of fluorosis.

Saravanan et al [17] and PushpaBharati et al[18]in India obseverd 31.4% and 34.37 respectively the prevalence rate of DF among the children of age from 5-12 years, which cannot be compared with the results of this study among the age from 9-12, in which we found the 06.75% dental fluorosis. It might be due to the area of study Tamil Nadu and Karnataka; fluorosis has been reported to be endemic.

A study conducted by Akosu TJ, Zoakah AI[12] in Nigeria among 12-15 years old children the prevalence of DF was 12.9% which is in favour of this study among the age from 13-18 in which the prevalence was12.46%. They stated that occurrence of DF in Central Plateau could be because of the high altitude of the area and the fluoride concentration of the waters consumed in the district.

Pushpa, Bharati and Meera Rao[18] In Karnataka India found the prevalence of DF 45.24% and 60.61% among the 13-15 and 16-18 years old age respectively which is not in favour to this study in which the prevalence of DF was 12.46% among the age from 13-18 years, This could be due to the area of study in their study (Dharwad district), where an average annual rainfall is about 600 mm. The maximum temperature during April or May is 40± 1° C. Low rainfall accompanied with high temperature makes sorghum as staple food crops of the region. The high temperature leads to excess consumption of water thus augmenting the intake of fluoride. While in this area of study whether is not that much hot and rainfall is also not more than their area. The less amount of water is consumed that's why prevalence of fluorosis is low in this area.

In this study the prevalence of DF found increasing with age. The reasons for higher prevalence in older age group is greater body size and weight, the increase physical activity and the kind of food consumed may lead to a higher water intake [19]on the other hand the lower prevalence in younger age groups may be that the period of enamel formation for primary teeth is shorter for this reason the experience to fluorides is shorter[20], enamel of primary teeth is thinner than that of permanent teeth[20] , the rapidly growing skeleton of fetus may absorb more fluoride since fluoride is hard tissue seeker and is thus less presented for primary teeth[21].

A study was done on prevalence and severity of DFin kingdom of saudiarabia by Kh. Almas et al [22] showed the results of number and percentage of rural subjects with severity of fluorosis by age according to Dean`s CFI and categorized the type of fluorosis as 41% and 44% were fluorosis free, 3% and 4% were having questionable type of fluorosis, 16% and 19% were having very mild type of fluorosis, 22% and 16% were having mild type of fluorosis, 10% and 05% were having moderate type of fluorosis and 8% and 9% were having severe type of fuorosis in the age of 12 years & 15 years respectively are in contrast to our study this indicates the presence of higher concentration of fluoride in rural water sources of Al- Qaseem province according to akpata[23] the fluoride level in different parts of al-qaseem region is ranging from 2-3 ppm and might be due to the area of study, people have access to, well water and very little to the piped water supply by the authorities, now bottled water is in great use but being expensive, not affordable by all rural population. as tea is the most common drink and on an average daily basis, adult population drink more than four times a day (may be up to 20 times a day) with good amount of sugar, so the additional source of fluoride from tea and fluoride toothpastes should also be considered, because it will have effect on aesthetic management of dental stains and discolored teeth.

Bardal et al[19]gave the results of severity (%), of DF according to age as 3.4% had questionable type of fluorosis, 2.08% had very mild, 0.69% had mild and 0.23% had moderate type of fluorosis among 7-12 year old school children.

The results of this study can be favourably compared with group A of this study. These authors found scores very mild and mild DF in a population living in a region with 1 ppm of fluoride in water of supply, which is similar to our results.

La Gl. Bagratnian RA [24] in Singapore showed the results of severity in 16 years old children as 3.4% children were affected .The results of Singapore children are contrasting with our study results of age group B due to possible contributing factors that have been suggested by other researchers include inappropriate prescription of fluoride supplements, ingestion of fluoride toothpaste, increasing amounts of

fluorides in food or atmosphere and individual physiological and metabolite factors

One more interesting finding which emerged from the results of this study was that although boy students outnumbered the girl students as participants of this study, which favourably compares with the results of gender differences by S Saravanan et al [17] in India and Marwat H J et al [3] in Lahore. Where as in contrast to this study results, study at Lahore by SadiaRizwanet al[11] reported the incidence of dental fluorosis was 12 % being higher in females than males. Boys outnumbered in suffering than the girls with no apparent reason.

The study conducted by Bardal et al [19]predilicted the results in Males 33.33% had Questionable fluorosis, 0.93 had Very mild, 0.46% had Mild fluorosis and there was no case in the category of moderate and severe type of fluorosis while in females 34.72% had Questionable fluorosis, 3.24% had Very mild fluorosis, 0.46% had Mild fluorosis and 0.46% had moderate type of Fluorosis.

This study can be favourably compared with study of Bardal et al [19] may be due to possible exposure of these children to other sources of fluoride, which was not investigated in study.

CONCLUSION

It is concluded that prevalence of DF is 10.8%, more common in male gender and there was no any case of severe DF according to Dean`s community fluorosis index

Limitations:

As with other studies, this study had the same limitations like this study was limited to school children and the literacy index in Pakistan is almost 57% reported in 2011-12[25], so we have no data of the rest of children which are of same age group but not attending the school. There was no data of all potential sources of fluoride.

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Address for Corresponding Author:
Kashif Ali Channar,
Assistant Professor,
Oral & Maxillofacial Surgery Department,
Institute of Dentistry, LUMHS Jamshoro
Kashif_omfs@yahoo.com
Cell No. 0334-9756506