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PREVALENCE OF DENTAL FLUOROSIS AMONG CHILDREN OF BILASPUR DISTRICT, CHHATTISGARH

Dental Science

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ABSTRACT

BACKGROUND: Endemic fluorosis is an important public health problem in many states of India. It is caused by exposure to continuous high levels of fluoride leading to dental and skeletal deformities.

OBJECTIVES: The objective of this study was to find out the prevalence of dental fluorosis among the pediatric population of Bilaspur district in areas with different fluoride levels and to correlate it with dental caries.

METHOD : This survey was conducted on 1200 children in the age group of 8 to 13 years of both genders and from varied socioeconomic backgrounds.

RESULTS : The prevalence of dental fluorosis among the study population in areas with F levels varying from 0.5-6 ppm in drinking water was found to be 14.3% whereas total Caries Prevalence amongst these was 33.7%

KEYWORDS

Endemic fluorosis, Fluoride levels, Caries prevalence

INTRODUCTION:

Fluorine is a naturally occurring element and is one of the essential microelements required for fluoride. Fluoride is found most frequently in groundwater due to weathering and leaching of fluoride-bearing minerals from rocks and sediments. Fluoride content has always been a concern for health care professionals as the deficiency of the element fluoride has been associated with defective enamel formation in teeth and the excess has been associated with skeletal and dental fluorosis. The reason for this is that due to itsstrong electronegativity, fluoride is attracted to positively charged calcium in teeth and bones, resulting in fluorosis. In other words; Fluorine is often called a two edged sword as prolonged ingestion of fluoride through drinking water in excess of the daily requirement is associated with dental and skeletal fluorosis and inadequate intake of fluoride in drinking water is associated with dental caries.[1] Technically dental fluorosis has been described in literature as a 'developmental disturbance initiated by continuous exposure to high levels of fluoride during the development of teeth leading to formation of enamel with decreased mineral content and increased porosity.[2] Dental fluorosis manifests as opaque white spots or lines, and in severe cases enamel becomes discoloured and brittle leading to chipping. The hypomineralization caused by fluorosis can be attributed to altered metabolism in any one or all of the phases of amelogenesis, i.e. altered ameloblast activity, interference with enamel crystal nuclei, faulty enzymatic relationships, etc. This results in a variety of pathologic changes in the structure of teeth. Dental fluorosis if not prevented during childhood can lead to hampered dental aesthetics during adulthood. It alters the appearance of the teeth, therefore the potential consequences are cosmetic. While milder forms of dental fluorosis do not compromise oral health or function, an increase in dental fluorosis may be perceived to affect dental appearance and psychosocial well-being. Independent to the fluoride concentration in the drinking water, caries prevalence has been seen to increase with increasing severity of dental fluorosis in the second molars, first molars, premolars and canines. Therefore even though fluoride plays an important role in preventive dentistry due to its superior cariostatic potential, superfluous intake can lead to dental and skeletal fluorosis.[3]

Although it must be mentioned here that clinical manifestations depend on many host-related factors such as age, nutritional status and individual susceptibility. Hence, it is important that fluoride consumption should be at an optimum level for proper development of the calcified tissues. Fluorosis was first described by Shortt et al. as a public health problem in different parts of India.

It has been shown to be an important health problem in 24 countries, including India, which was part of the geographical fluoride belt that extends from Turkey to China and Japan through Iraq and Afganistan. In fact India is considered to be one of the worst fluoride affected countries, with large number of people suffering, primarily because a large number of Indians rely on groundwater for drinking purposes and water at many places is rich in fluoride. To be specific in India, the disease is endemic in about 275 districts of 20 states and UT's, with 66 million people at risk. A shocking 62 million people including 6 million children, are estimated to have serious health problems due to consumption of fluoride contaminated water. About 96% of the fluoride is found in bones and teeth. For this reason although the world health organization (WHO) has set the upper limit of fluoride concentration in drinking water at 1.5mg/l, the bureau of Indian standards has laid down Indian standards as 1.0mg/l as maximum permissible limit of fluoride with further remarks as 'lesser the better'[1]

The government and many international agencies have taken measures in the past to mitigate the problem. Small scale community defluoridation units have been installed in many of the fluorosis affected communities. These measures could not sustain because of poor community involvement.

Although extensive studies have been conducted in different parts of India, there had been no research carried out to ascertain the prevalence of fluorosis specifically in Bilaspur district of Chhattisgarh state, thereby necessitating the need for this particular study.

AIMS AND OBJECTIVES

- To assess the cross sectional prevalence of dental fluorosis amongst school children of Bilaspur district.
- To correlate the levels of water fluoride with the prevalence of fluorosis found.

- Caries experience correlation with fluorosis.

METHODOLOGY

This survey was conducted on 1200 children in the age group of 8 to 13 years of both genders and from varied socioeconomic backgrounds. Selection of children was done on the basis of simple random sampling of children enrolled in private and government schools of Bilaspur district. Approval to conduct the study was obtained from the concerned authorities.

Clinical examination was conducted in the selected schools. A single examiner evaluated the children assisted by a trained person for recording data throughout the study in order to eliminate intra-examiner variability. The children were made to sit on a stool during dental examination and were examined under natural light with sterilized screening instruments using Dean's Fluorosis Index. The children found to be suffering from fluorosis were further assessed for caries with the DMFT and deft indices. Subsequently water fluoridation levels of each school were done. The data was further submitted for statistical analysis in order to tabulate and correlate the results.

RESULTS

The prevalence and severity of dental fluorosis among the study population using Dean's index criteria in areas with different F levels in drinking water as well as the distribution of fluorosis and fluorosis free cases with dental caries in different locations where the water fluoride levels were found to range from 0.5ppm to 6ppm is shown in tabulated form.

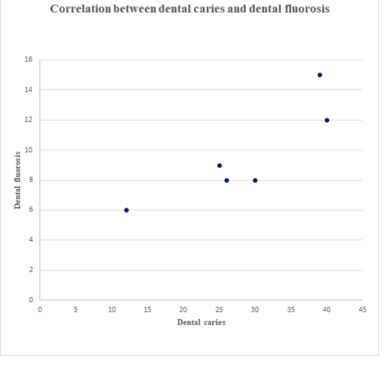
Prevalence of Dental Fluorosis was found to be = (172/1200) x 100 = 14.3% Total Caries Prevalence amongst fluorosis cases was found to be = (58/172) x 100 = 33.7% whereas total Caries Prevalence amongst fluorosis free cases was seen to be = (506/1028) x 100 = 49.2%

Figure 1 is a scatter diagram which was prepared to assess the correlation between dental caries and dental fluorosis. This showed a moderately positive correlation between the two with correlation coefficient (r) being 0.7.

Figure 2 shows the comparison of Dental Caries Prevalence between fluorosis and fluorosis free cases and the values were found to be significantly higher in fluorosis free cases. 33,7% caries prevalence was seen in fluorosis affected cases and 49.2% in fluorosis free cases.

TABLE:- Distribution of fluorosis and fluorosis free cases with dental caries

Locations	Total sample size	Dental fluorosis cases	Fluorosis free cases	Dental fluorosis cases with dental caries	Fluorosis free cases with dental caries
Sendari	196	30	166	8	80
Sarkanda	204	39	165	15	92
Pendra	169	12	157	6	75
Ratanpur	259	25	234	9	110
Bodri	167	26	141	8	70
Tarbahar	205	40	165	12	79
Total	1200	172	1028	58	506



Correlation coefficient (r) = 0.7 (moderately positive correlation)
Figure 1: Scatter diagram for the correlation between dental caries and dental fluorosis

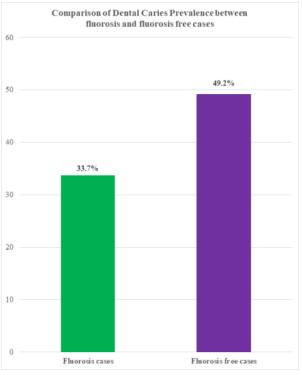


Figure 2: Comparison of Dental Caries Prevalence between fluorosis and fluorosis free cases

DISCUSSION

Dental caries remains a major public health problem in most of the industrialized countries, affecting 60-90% of school children and the vast majority of adults according to WHO report. The incidence of dental caries is increasing due to high consumption of sugars and inadequate exposure to fluoride (F).

If this is not prevented during childhood it can hamper dental esthetics and psychological well-being of the child.

Over the last decade, there has been some concern about the prevalence of fluorosis all over the world, India being one of them.Fluorosis is endemic in 20 states of India and it continues to remain a challenging national dental health problem.[4]

In Chhattisgarh state, Durg and Dantewada districts have been seen to have endemic fluorosis pockets[5] but no such data is available in the district of Bilaspur. Therefore the aim of this survey was to collect the epidemiological data on fluorosis and to evaluate its concentration in prime drinking water sources with the objective of initiating suitable intervention.[6]

Fluorosis prevalence here was found to be 14.3% whereas water fluoridation ranged from 0.5 ppm to 6 ppm. Whereas total Caries Prevalence amongst fluorosis cases was found to be 33.7%.

Globally, a higher prevalence of dental fluorosis has been associated with lower caries eg.in India, Iran and Japan).[6] However excessive fluoride exposure, followed by moderate to severe fluorosis, seems to lead to considerable increased caries.

'Diagnosis and risk prediction of dental caries' a book written by Per Axelsson[7] unequivocally states that ' Although mild to moderate fluoride mottling of the enamel is associated with resistance to caries on a population basis, at the individual's level it is at best a rough indicator of resistance'.Ekanayake L and Van der Hoek W evaluated the dental caries and developmental defects of enamel in relation to fluoride level in drinking water in an arid area of Sri Lanka and the findings revealed that children with the mildest form of opacities had the lowest DMFS and the highest DMFS was found in those with the most severe form of opacities.[8] This supports the results of this study although it would be pertinent to mention here that practically all cases of fluorosis recorded were mild when recorded according to Dean's fluorosis index.

Bhalla A, Sonal Malik, Sharma S, conducted a study on prevalence of dental fluorosis among school children residing in Kanpur city in Uttar Pradesh and 18% of school children, residing were found to be having mild dental fluorosis.[9] Gitte SV, Sabat R, Kamble K carried out an epidemiological survey of fluorosis in Dimrapal village of Bastar division of Chhattisgarh state, and found the prevalence of dental fluorosis was 12.6%. The fluoride level in surveyed ground water sources ranged from 0.1 to 7.30 ppm.[4]Pagaria S, Lodha R, Dubey A, Avinash A, Baranwal R, Mujoo S conducteda study on fluoride estimation in drinking water and its correlation with severity of dental fluorosis in 1200 school going children aged 12–15 years in 3 districts of Chhattisgarh (Durg, Raipur and Rajnandgaon) revealedthe prevalence of fluorosis in Durg to be highest at 18.75%.[10]

Patil SD, Bhowate RR, Rawlani SM, Khubchandani M, Rawlani S

Conducted a study on correlation between fluorosis and dental caries in endemic areas of Wardha district. In present study, 1100 school going children were studied. The prevalence of dental fluorosis in the study population was 20.09%, and prevalence of dental caries was 26.4%.Level of fluoride in drinking water at two different was 1.9ppm and 2.5 ppm, respectively.[11]

Golgire SM, Shetti SS, Patil A, Khairnar M, Varekar A, Doijad V conducted a study on estimation of fluoride level in drinking water and prevalence of dental fluorosis in Vairagvillage of Solapur District, Maharashtra,India. Dental fluorosis was assessed in 950 subjects out of which 149(15.68%) subjects suffered from various grades dental fluorosis.The fluoride concentration in the water samples collected ranged from 0.64-7.8ppm.[12]

CONCLUSION

Current knowledge of all oral diseases affecting children and application of recent scientific advancements in prevention or further spread of oral afflictions is the need of the hour. Also since children and adolescents are most commonly affected by fluorosis and dental caries therefore, constant update of the prevalence of caries and fluorosis is required.In conclusion it appears to be imperative to conduct oral health educative and preventive programs on dental fluorosis and its effects on oral health not only to bring about awareness among the general public but also in order to quantify the treatment needs of the affected population and bring it to the notice of the government to initiate immediate preventive measures to this pressing issue.The active involvement of the government is of utmost importanceto fight this menace at the national level considering the endemic nature of this problem.

This study conducted has certain limitations such as the fact that it is a cross-sectional study which makes it difficult to determine associations as does the relatively small sample size therefore further research would be required to authenticate these findings further.

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