



Prevalence of Endemic Fluorosis and Enamel Hypoplasia In The South Canara Population

KEYWORDS

Dental Fluorosis, Enamel Hypoplasia, South Canara Population

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ABSTRACT High fluoride concentration in groundwater is a major public health problem in India; resulting in endemic fluorosis. This study was carried out to measure and compare the prevalence of Dental Fluorosis and Enamel Hypoplasia in the South Canara population. A cross-sectional study was carried out in the South Canara population where both urban as well as rural population was studied. A total of 2000 individuals were made a part of the study. Detailed history of each individual was recorded.

The prevalence of Dental Fluorosis and Enamel Hypoplasia was more in males of the age group 14-27 years.

The risk of Dental fluorosis was higher in areas that showed more fluoride content in the drinking water. However longitudinal studies should be conducted to confirm the findings.

INTRODUCTION:

"Dental fluorosis", a specific disturbance in tooth formation and an esthetic condition, is defined as a chronic, fluoride-induced condition, in which enamel development is disrupted and the enamel is hypomineralised.¹ Significant epidemiological data demonstrates that the occurrence of fluorosis is associated with excessive fluoride intake during the period of tooth development.^{2, 3, 4,5,6,7}

The most relevant risk factor that determines its occurrence and severity is the sum of the amount of the fluoride consumed from all the sources during tooth development.^{4,8} It has a characteristic appearance on the tooth surface and varies from localized spots to general distribution in the mouth.

At a microscopic level, fluoride makes the forming enamel porous.⁹ As the fluoride concentration in the in the tissue fluids during tooth development increases, the extent and degree of porosity increases.^{9,5} The arrangement of the crystals structurally appears normal, however the width of the spaces between the crystals increases owing to pores. This makes the forming enamel highly porous. The post-secretory or early maturation phase of tooth development has been demonstrated as the most critical period for development of fluorosis.^{3,5,10,11,12,13}

Clinically they may appear as white spots, opaque lines or striations on the tooth surface. Brown stains may indicate the uptake of extrinsic stains mainly from the diet, as the enamel surface is porous. This is seen in moderate to severe fluorosis. Discrete or confluent pitting of the enamel surface accompanied by extrinsic stains, giving a mottled appearance is also seen in severe fluorosis.¹¹

Another unaesthetic defect affecting the entire enamel of permanent as well as deciduous teeth is Enamel Hypoplasia. It is the most common form of Amelogenesis Imperfecta. The affected teeth may or may not be discolored, however reveal considerable occlusal wear^{14,15}. Enamel Hypoplasia is the result of a defect in the mineralization leading to formation of a defective enamel matrix¹⁶. The affected teeth

appear dull and chalky and exhibit a cheesy consistency and may break down rapidly. Clinically the affected teeth may be attrited and thus sensitive.

This study was aimed to test the hypothesis whether high fluoride level in drinking water is a risk factor leading to fluorosis and also to determine the prevalence of enamel hypoplasia.

METHODOLOGY:

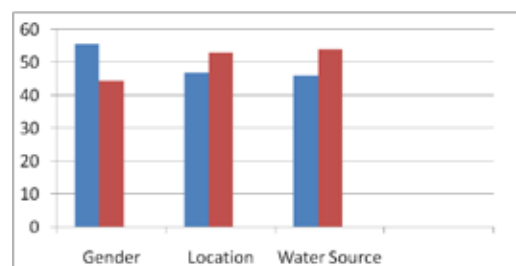
A survey was conducted on 2000 out-patients over the period of one year from June 2012 to June 2013, to collect information on the prevalence of Dental Fluorosis and Enamel Hypoplasia in the South Canara population. The patients selected were those who reported to the out-patient department of A.B. shetty Memorial Institute of Dental sciences, NITTE University and to the rural satellite centres.

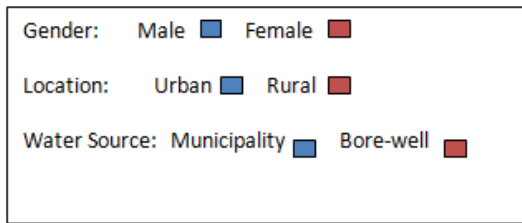
Ethical clearance was taken from the central ethical committee of the institution under NITTE University. Materials used for the clinical examination mainly comprised of mouth mirrors, probes, cotton and illuminating light. The patients were examined for dental fluorosis and enamel hypoplasia under good illumination.

All the data obtained was then coded and the prevalence of dental fluorosis and enamel hypoplasia was evaluated according to age, gender, source of drinking water and area; whether bore-well or municipality or rural or urban respectively.

Results:

Fig 1: Depicts the Fluorosis results.

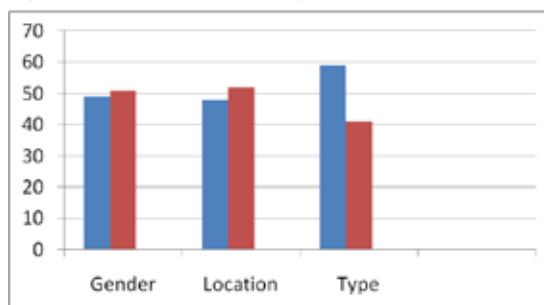




Out of the individuals affected by Fluorosis, 55.5% of them were males compared to the remaining 45.5% of females.

Individuals who were from rural areas and who consumed Bore-well water were more prone to Fluorosis as compared to the individuals who consumed municipality water and those who lived in urban areas.

Fig 2: Depicts the Enamel Hypoplasia results



Out of the individuals affected by Enamel Hypoplasia, 51% were females.

The most common type of Enamel Hypoplasia was Hereditary.

And individuals from rural areas were more affected.

Discussion:

Enamel hypoplasia manifests due to defective or incomplete formation in the organic matrix of the enamel and remaining certain areas susceptible to decay; making it highly responsible for a major proportion of lesions¹. The irregularities present provide favorable conditions for plaque retention and early development of caries.¹⁸

Diminished enamel luster and eroded enamel surfaces are one of the signs of hypoplastic lesions. This is due to the loss of the microstructure affecting the morphology and texture of teeth.

Occasionally, hypoplasia is mistaken for fluorosis. However hypoplasia is a defect in the mineralization leading to formation of a defective enamel matrix whereas fluorosis is a fluoride-induced condition, in which enamel development is disrupted and the enamel is hypomineralised. Moreover hypoplasia is triggered by diseases, systemic disorders, trauma and infections in the pulp of deciduous teeth¹⁹.

It may manifest with complete or partial absence of the enamel. It can be systemic (group of teeth are effected) or

local (single tooth and asymmetric distribution).¹⁹

The teeth that develop and mineralize later in life such as premolars, are more prone to fluorosis and are more severely affected.^{7,19,20,21} The probability of fluorosis was more when 0.1mg F/kg body weight was taken in during infancy.²⁰ In 1937, Roholm suggested that 0.07 mg F/kg body weight would cause macroscopic changes in teeth.²²

Altitude²³, renal insufficiency, and possibly malnutrition are some of the factors that increase the susceptibility of populations to dental fluorosis.

The fluoride tooth paste variables associated with fluorosis are: beginning tooth-brushing at a relatively early age;^{6,24,25} amount of toothpaste used measured as either tooth brushing frequency;^{26,27} amount swallowed. The association between toothpaste use and fluorosis is not always significant statistically; many studies taken together are compelling evidence that use of fluoride toothpaste before the age of six is a risk indicator for dental fluorosis.

The results of our study revealed that population residing in rural areas of South Canara population were more prone to dental fluorosis as compared to the urban population. This was attributed to the drinking water in their area.

The underground drinking water in the rural areas had more fluoride content as compared to the drinking water in urban areas. The males were more affected than the females. Highest prevalence was seen in 14-27 yr age group.

This study is in accordance with the study conducted by P.V. Kotecha et al in 2012²⁸.

The enamel Hypoplasia results of our study revealed that females as well as individuals from rural areas were more affected.

The most common type of Enamel Hypoplasia was Hereditary as compared to environmental.

CONCLUSION:

In conclusion, our findings showed that the risk of dental fluorosis was significantly higher in the areas showing more fluoride content in drinking water. Highest prevalence was seen in males of the age group 14-27 years.

Enamel hypoplasia was seen in both males and females with a slight increase in females. Hereditary type of Enamel Hypoplasia was more common and individuals from rural areas were more susceptible. Such individuals were advised esthetic rehabilitation with the help of ceramic crowns.

It is recommended to reduce the fluoride content of drinking water in the high fluoride area by making either alternative source available or providing water with reduced fluoride content.

Further longitudinal studies need to be done to confirm these findings.

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