RESEARCH ARTICLE                                                          OPEN ACCESS

# Impact of Dental Fluorosis on School Going Children in Nekarikallu Mandal, Guntur District

Dr. Suneetha Chatla[1], Dr.Pandu.Brahmaji Rao [2],
*Department of Environmental sciences, Acharya Nagarjuna universityGuntur, Andhra Pradesh, India*
*Corresponding Author: Dr. Suneetha Chatla*

**ABSTRACT:**
The decline in dental Fluorosis prevalence and incidence in the last two decades is considered to be largely due to the widespread use of fluoride. However, the prevalence of dental fluorosis has increased simultaneously. The increase is in the mild and very mild forms of fluorosis, both in fluoridated and in non fluoridated areas. A large amount of epidemiological data demonstrates that the occurrence of dental fluorosis is associated with excessive fluoride intake throughout the period of tooth development. Multiple sources of fluoride intake have been identified. This review describes the condition and summarizes the recent literature on the risk factors for dental fluorosis. Four major risk factors have been consistently identified: use of fluoridated drinking water, fluoride supplements, fluoride dentifrice and infant formulas. In addition, some manufactured children foods and drinks may also be important contributors to total daily fluoride intake.
**Key Words:** Fluoride, Dentin, Enamel, Dental fluorosis, milk.

## I. INTRODUCTION:

**D**ental fluorosis (DF) is a tooth malformation believed to be caused by chronic ingestion of high levels of fluoride (F) during tooth development (**Murray et al., 1991a; Den Besten, 1994**). However, in addition to the major risk factors previously identified (related to ingestion of Fluoriides) (**Mascarenhas, 2000),** other factors, such as genetic susceptibility, have also been shown to be important (**Everett et al, 2002**) in Dental Fluorosis prevalence. DF prevalence has increased throughout the world (**Angmar-Mansson et al., 1994),** ranging between 7.7% and 80.9% in areas with fluoridated water and between 2.9% and 42% in areas without fluoridated water (**Clark, 1994; Mascarenhas, 2000; Pendrys, 2000; Everett et al., 2002). Olsen and Johansen (1978**) analyzed human teeth and showed that the Fluoride concentrations in enamel were essentially independent of surface appearance. On the other hand, a study by **Richards et al. (1992),** looking at un erupted human teeth, Dentin, especially coronal, may be the best marker for the estimation Fluoride intake and the most suitable indicator of total F body burden.

Dentin contains only the Fluoride that has been incorporated through systemic ingestion. It does not normally undergo resorption, continues to accumulate fluoride throughout life, is more easily obtained than bone, and is also protected from Fluoride exposure in the fluoride and surrounding bone by the covering enamel and cementum (**Ten Cate, 1994; (WHO** (world health organization) **Expert Committee on Oral Health Status and Fluoride Use, 1994**). The purpose of our study was to determine the relationship between Fluoride concentration in teeth (dentin and enamel) and the Dental Fluorosis severity in unerupted 3rd molars from areas with different Fluoride concentrations in the drinking water. The correlation between dentin and enamel Fluoride concentration in the same tooth was also determined.

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 hypo mineralized. Simply put, dental fluorosis is a condition in which an excess of fluoride is incorporated in the developing tooth enamel. Fluorosis has a characteristic appearance and distribution in the mouth. The severity of dental fluorosis depends on when and for how long the over exposure to fluoride occurs, the individual response, weight, degree of physical activity, nutritional factors and bone growth . However, the most important risk factor for fluorosis is the total amount of fluoride consumed from all sources during the critical period of tooth development. In 1906, in North America Dr. Fredrick McKay first observed a discoloration called ―Colorado Brown Stain‖ which led to the discovery of fluoride's caries preventive action. Dr. GV Black later got involved in 1909 and by 1916 . HT Dean and Black conducted a study and hypothesized that an

unidentifiable factor in drinking water was responsible for the enamel mottling, and in 1931, HV Churchill identified fluoride as the causative agent. Dean conducted a survey in 1931 and develop an index for fluorosis in 1934 known as Dean's index

## II.    METHODOLOGY:

The present survey was carried out in 6 villages of Nekarikallu mandal. Guntur district, Andhra Pradesh. Nekarikallu consist of 6 Villages and 6 Panchayats . Kunkalagunta is the smallest Village and Chemalamarri (Rural) is the biggest Village . It is in the 26 m elevation (altitude) . This Place is in the border of the Guntur District and Krishna District. Krishna District Vijayawada is east towards this place.

I have identified some villages in Guntur district, out of 57 mandals in Guntur district 1 mandals (sub district unit) viz Nekarikallu were selected  purposively  based on the reports  of the rural water supply and sanitation department Guntur.

Dean's fluorosis index was first published in 1934 by H. Trendley Dean  The index underwent two changes, appearing in its final form in Rojier RJ 1942. Dental fluorosis is endemic and continues to occur at an alarmingly higher rate. Water obtained from in depth sources is the cause for the elevated levels of fluoride in some of the regions of this district. Much to the surprise, the people living over here are not aware of the disease of this kind for which act their drinking water is the main causative agent. With the problem continuing to be unrecognized and neglected, guidance is sorely needed.

Classification of the dental fluorosis severity degrees according to **DEAN's** fluorosis

Index:
**Questionable.** The enamel represents the usual translucent semivitriform (glass-like) type of structure. The surface is smooth, glossy and usually of pale creamy white color

**Very Mild.**  Small, opaque, paper white areas scattered irregularly over the tooth but not involving as much as approximately 25% of the tooth surface. Frequently included in this classification are teeth showing no more than about 1 – 2mm of white opacity at the tip of the summit of the cusps, of the bicuspids or second molars.

**Mild.** The white opaque areas in the enamel of the teeth are more extensive but do involve as much as 50% of the tooth.

**Moderate.**  All enamel surfaces of the teeth are affected and surfaces subject to attrition show wear. Brown stain is frequently a disfiguring feature

**Severe.**  All enamel surfaces are affected and hypoplasia  is so marked that the general form of the tooth  may  be affected. The major diagnostic sign of this classification is discrete or confluent pitting. Brown stains are widespread and teeth often present a corroded-like appearance.

Dean's fluorosis index was first published in 1934 by H. Trendley Dean. The index underwent two changes, appearing in its final form in 1942. An individual's fluorosis score is based on the most severe form of fluorosis found on two or more teeth.

**Questionary**

Keeping in view of the scope and objectives of the study, interview schedule was prepared. A structurally well prepared and pre tested questionnaire was developed after perusal of the available literature. Thus, the final interview schedule consists of all the relevant items such as profile characteristics, etc., for measuring the variables included in the study. After pre-testing the questionnaire at the proposed study area necessary  modifications were incorporated. The finalized questionnaire which was used in the interview schedule for obtaining the primary data is appended herewith. Name, Age, Sex, Habitate, Education, No. of family members, occupation, sources of drinking water, amount of water consumed type of toothpaste, residence, how many times brushing per day, have you ever considered teeth whitening, how often do you make dental visit, consumption of tea and sea fish per day, etc..

Severity of the dental fluorosis was assessed by deans index with the help of dentist and total  samples are tested and classified according to the severity of dental fluorosis[5].the classification was divided questionable, very mild, mild, moderate and sever   the study involves collection of both primary and secondary data. The primary data was collected from the selected victims of dental fluorisis with the help of duly pre-tested questionnaire. The secondary data was regard to reports of the rural water supply and sanitation department Guntur in the study area.

## III.    RESULT:

Nekarikallu mandal in Guntur district, Andhra Pradesh India seems to be threaten area of fluoride in dental fluorosis total 6 fluoride effected villages has been find out with the help of rural water supply and sanitation department Guntur and water samples had been taken for the analysis of water fluoride content. Water samples from different bore wells of 6 villages which showed a maximum range of 1.51 to 3.59 ppm by DEAN's method. Among 12 villages 6 are showing high

levels of fluoride. Almost all the selected villages are higher than the permissible level of 1 ppm according to WHO (World Health organization, 1984).

The Moderate type is higher (30.06%), and Mild type is lower(10.05%), Questionable type is (20%), Very mild is (15.23%), Sever is(25.02%).
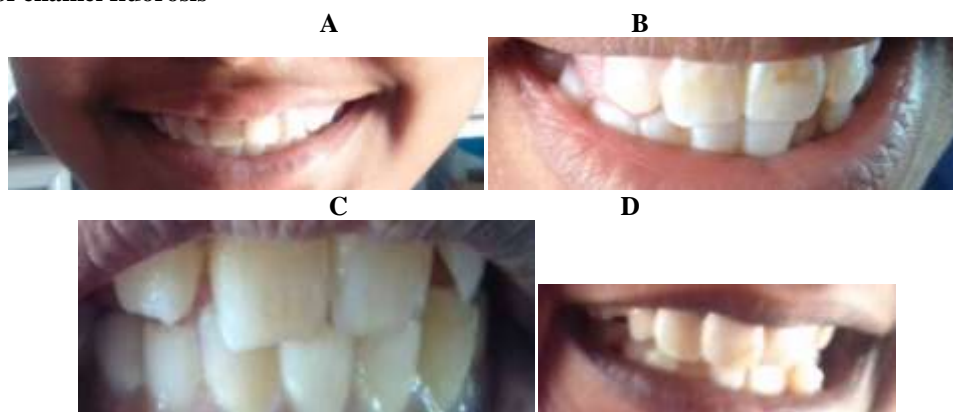
**Table: 1** Systematic representation of the sample

| S.NO | NAME OF THE VILLAGE | BOYS | GIRLS |
|---|---|---|---|
| 1. | Chimalamarri | 35 | 20 |
| 2. | Challagundla | 49 | 50 |
| 3. | Kunkalagunta | 23 | 27 |
| 4. | Thripurapuram | 27 | 20 |
| 5. | thurakapalem | 24 | 15 |
| 6. | Lingamguntla | 15 | 10 |
| Total | | 173 | **142** |

Detailed information and classification of the samples according to boys and girls are represented in the table: 1.The total number of the villages are 6, number of the boys are 173 are (58%) and girls are 142(42%).

**Table: 2.** Classification of effected children in the region

| NAME | QUESTIONABLE | | VERY MILD | | MILD | | MODERATE | | SEVER | |
|---|---|---|---|---|---|---|---|---|---|---|
| | boys | girls | BOY | GIRLS | BOY | GIRLS | BOY | GIRLS | BOY | GIRLS |
| Chimalamarri | 2 | 4 | 3 | 2 | 10 | 4 | 18 | 7 | 3 | 2 |
| Challagundla | 4 | 6 | 7 | 5 | 18 | 7 | 27 | 13 | 6 | 1 |
| Kunkalagunta | 2 | 4 | 6 | 3 | 12 | 3 | 9 | 8 | 2 | 0 |
| Thripurapuram | 1 | 4 | 6 | 2 | 8 | 1 | 16 | 6 | 2 | 1 |
| Thurumella | 3 | 3 | 5 | 2 | 7 | 3 | 8 | 4 | 2 | 2 |
| Lingamguntla | 0 | 3 | 4 | 1 | 5 | 2 | 7 | 3 | 0 | 0 |

The responds of every village of the region are classified according to dean's index and **Accurate of enamel fluorosis**

Particularly Challagundla (3.96ppm), Chemalamarri (2.70ppm) ,in Nekarikallu mandal has excess levels of fluoride in Drinking water.

We find mean standard deviation of the total children of the sample and the mean value is and the standard deviation is the data was presented in percentage to understand the nature of the level of knowledge about the diseases of dental fluorosis.

gender represented in the table: 2. In this classification the questionable type of the represents is The above table represents to effected children in the region. Total 14 villages Children were observed according to Dean's index.

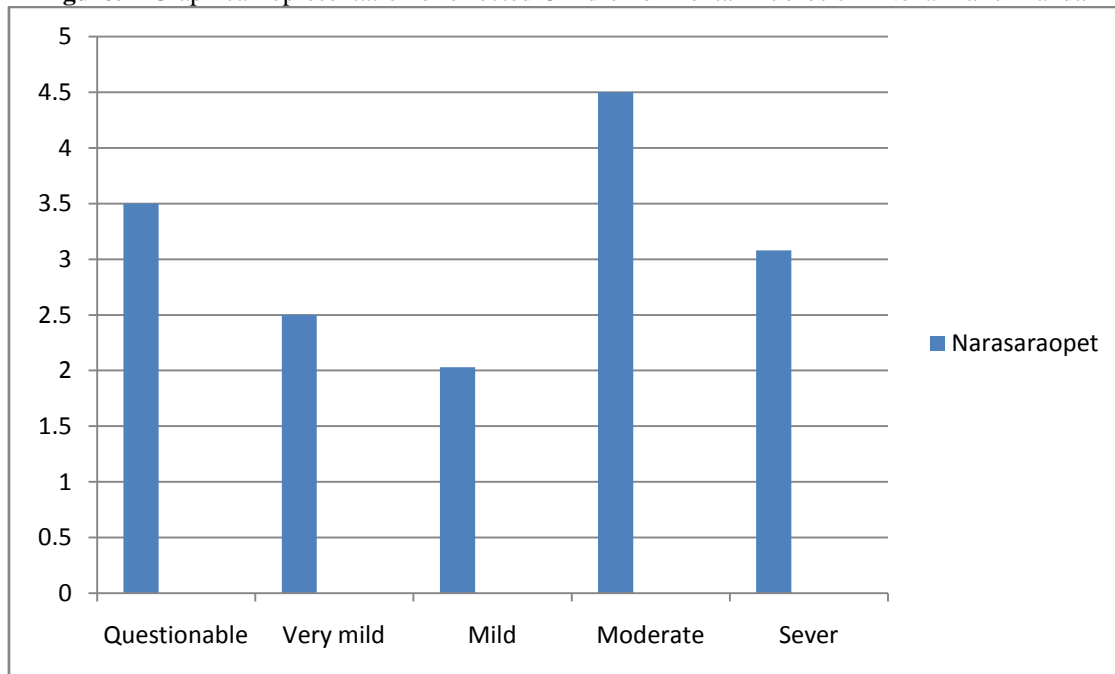**Table: 3.**Classification of effected children in the age

| TYPE | 7-9 Years | | 10-12 years | | 13-15 YEARS | | TOTAL | PERCENTAGE |
|---|---|---|---|---|---|---|---|---|
| | Boys | Girls | Boys | Girls | Boys | Girls | | |
| QUESTIONABLE | 10 | 11 | 10 | 10 | 8 | 10 | 69 | 20% |
| VERY MILD | 8 | 10 | 10 | 8 | 5 | 10 | 51 | 15.23% |
| MILD | 5 | 2 | 6 | 3 | 5 | 2 | 23 | 10.05% |
| MODERATE | 23 | 10 | 33 | 14 | 17 | 10 | 107 | 30.06% |
| SEVER | 15 | 12 | 10 | 15 | 10 | 15 | 77 | 25.12% |
| TOTAL | 120 | 141 | 139 | 134 | 109 | 103 | | |

The information represented based on the age view and it is tabulated as above table: 3. Based on the age it was divided into Three types. Those are 7-9 tears, 10-12 years and 13-15 yrs. Boys and Girls data are represented separately. The percentage was calculated and recorded in the table. Questionable (20%), Very Mild (15.23%), Mild (10.05%), Moderate (30.06%), Sever (25.12%).


A  B  C  D

**E**



**Fig.1: Dental Fluorosis (Deans grading) (A) Questionable (Grade1), (B) Very mild(grade2), (C)Mild(Grade3), (D) Moderate (Grade 4), (E)Sever(Grade 5).**

**Figure: 1** Graphical representation of effected Children of Dental Fluorosis in Nekarikallu Mandal



## IV.     DISCUSSION:

This could have been achieved via reduced frequency of tooth brushing, use of pea-sized amount of fluoride toothpaste for tooth brushing as well as ensuring that the children spit out the dentifrice after tooth brushing (14,15,16,17)

## V.     CONCLUSION:

Dental fluorosis not merely a cosmetic problem but a serious condition that affect the aesthetic emotional, social even psychological aspects of an individual's life. What ever it may be the source fluoride has a detrimental effect on teeth enamel leading to premature loss of teeth at large further more, how doe s dental fluorosis affect the central nervous system and lower the IQ level among children needs further investigation.

## REFERENCE:

[1]. Murray JJ, Rugg-Gunn AJ, Jenkins GN (1991a). Epidemiology and measurement of dental fluorosis. In: Fluoride in caries prevention. Oxford: Wright, pp. 222-261.

[2]. Den Besten PK (1994). Dental fluorosis: its use as a biomarker. Adv Dent Res 8:105-110.

[3]. Mascarenhas AK (2000). Risk factors for dental fluorosis: a review of the recent literature. Pediatr Dent 22:269-277.

[4]. Everett ET, McHenry MA, Reynolds N, Eggertsson H, Sullivan J, Kantmann C, et al. (2002). Dental fluorosis: variability among different inbred mouse strains. J Dent Res 81:794-798.

[5]. Angmar-Månsson B, Jong E, Sundstrom F, Bosch J (1994). Strategies

[6]. for improving the assessment of dental fluorosis: focus on optical techniques. Adv Dent Res 8:75-79.

[7]. Clark DC (1994). Trends in prevalence of dental fluorosis in North America. Community Dent Oral Epidemiol 22:148-152.

[8]. Mascarenhas AK (2000). Risk factors for dental fluorosis: a review of the recent literature. Pediatr Dent 22:269-277.

[9]. Pendrys DG (2000). Risk of enamel fluorosis in nonfluoridated and optimally fluoridated populations: considerations for the dental professional. J Am Dent Assoc 131:746-755

[10]. Everett ET, McHenry MA, Reynolds N, Eggertsson H, Sullivan J, Kantmann C, et al. (2002). Dental fluorosis: variability among different inbred mouse strains. J Dent Res 81:794-798..

[11]. Olsen T, Johansen E (1978). Fluoride content of human fluorosed enamel (abstract). J Dent Res 57:281.

[12]. Richards A, Likimani S, Baelum V, Fejerskov O (1992). Fluoride concentrations in unerupted fluorotic human enamel. Caries Res 26:328-332.

[13]. Ten Cate AR (1994). Oral histology: development, structure, and function. 4th ed. St. Louis: Mosby

[14]. WHO Expert Committee on Oral Health Status and Fluoride Use (1994). Fluorides and oral health. World Health Organ Tech Rep Ser 846:1-37.

[15]. Dr. Fredrick McKay , F ManjiandVBaelum,. The nature and mechanism of dental fluorosis in man, Journal of Dental Research ,69( Special issue), 1990, 670-692.

[16]. HT Dean , FA Arnold , and E Elvove , Domestic water and dental caries V. Additional studies of the relation of fluoride domestic water to dental caries experience in 4,425 white children aged 12-14 years in 13 cities in 4 states, Public Health Report, 1557, ,1155-1179.

[17]. A Thyistrup, and O Fejerskov, Clinical appearance of dental fluorosis in permanent teeth in relation to histological changes, Community Dentistry and Oral Epidemiology,6, 1978,315-328.

[18]. O Fejerskov , J Kragstrup ,and A Richards, Fluorosis of bone and teeth, in: J Ekstrand , O Fejerskov , IM Silverston (Ed), Fluoride in dentistry, (Copenhagen : Munksgaard 1989) 190-228.