

Assessment of Dental Fluorosis Prevalance among 7-15 Years School Going Children in Kondapuram Mandal, Spsr Nellore District

Dr. Suneetha Chatla¹, Dr.Pandu.Brahmaji Rao²,

Department of Environmental sciences, Acharya Nagarjuna university
Guntur, Andhra Pradesh, India.

Corresponding Author: Dr. Suneetha Chatla

ABSTRACT

Background: Dental fluorosis is considered one of the dental public health problems in many countries especially those with high level of fluoride in drinking water. **Objective:** The objective was to find the prevalence of dental fluorosis among school going children residing in Kondapuram mandal, Nellore district, Andhrapradesh, India. **Materials and Methods:** A total of 496 school children, residing in the villages of kondapuram mandal since childhood and consuming the groundwater, in the age group of 7–15 years was selected from various schools. Schools were selected from all the villages of Kondapuram mandal. Children were categorized in five age groups and were examined for dental fluorosis. Dean's criteria for assessment of dental fluorosis were used, and observations were recorded on a study specific performa. **Results:** Among the 496 children examined, 260 (52%) were found to be having dental fluorosis, among which number of males (140.) was more than females (120). Among the different grades of fluorosis observed, moderate dental fluorosis was observed in most of the cases (81). **Conclusion:** It was evident from the results that kondapuram mandal villages had a good number of cases of dental fluorosis and that the groundwater in certain areas water fluoridation above 1.2ppm was cause of dental fluorosis

Key words: Dean's fluorosis index, dental fluorosis, Kondapuram mandal, school going children

Date Of Submission: 02-04-2019

Date Of Acceptance: 18-04-2019

I. INTRODUCTION

Fluorine is a naturally occurring element and is one of the essential microelement required for proper growth and function of the body. It exists in nature as complex form referred to as fluoride. Fluoride is found most frequently in groundwater due to weathering and leaching of fluoride bearing minerals from rocks and sediments. India lies in the geographical fluoride belt that extends from Turkey to China and Japan through Iraq, Iran, and Afghanistan. [1]. 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. Hence, it is important that the fluoride consumption should be at an optimum level for proper development of the calcified tissues. In India, 62 million people including 6 million children, are estimated to have serious health problems due to consumption of fluoride contaminated water [2]. About 96% of the fluoride is found in bones and teeth [3]. When ingested in small quantities (<0.5 mg/L or 0.7 ppm) fluoride is beneficial for teeth by reducing dental caries, where as ingestion of higher

concentrations (>1.5 mg/L) may cause fluorosis. Dental fluorosis manifests as opaque white spots or lines, and in severe cases, enamel becomes discolored and brittle, leading to chipping. [4,5]. In India, Prakasam district of Andhra Pradesh was the first place where fluorosis was detected [6], and at that time, the disease was prevalent in only four states, namely Andhra Pradesh, Tamil Nadu, Punjab, and Uttar Pradesh. Now, fluorosis has been reported endemic in 20 out of 32 constituent states of India [7], and day by day more new areas have been engulfed by this problem

Dental fluorosis is a chronic fluoride – induced condition in which an excess of fluoride is incorporated in the developing tooth enamel and disrupt the enamel formation of the tooth. Prevalence of dental fluorosis due to high levels of fluoride in drinking water is an endemic global problem. Although, definite mechanism of dental fluorosis is yet to be confirmed, hypomineralization of teeth enamel is the real fact and so the teeth enamel become more porous and softer than the normal counterparts [8]. Water fluoridation was once heralded as one of the best public health achievements in the twentieth century. Since this practice is not feasible or cost effective in many

regions, especially rural areas, researchers and policy makers have explored other methods of introducing fluoride to the general population such as adding fluoride to milk and table salt. Lately, major concerns about excessive fluoride intake and related toxicity were raised worldwide, leading several countries to ban fluoridation. Health-care professionals and the public need guidance regarding the debate around fluoridation[9].

The earliest manifestation of dental fluorosis is an increase in enamel porosity along the striae of Retzius.[10]. Clinically, the porosity in the subsurface of enamel reflects as opacity of the enamel. With an increased exposure to fluoride during tooth formation, the enamel exhibits an increased porosity in the tooth surface along the entire tooth surface. Very severely hypo mineralized enamel will be very fragile and hence as soon as they erupt into oral. They undergo surface damage as a result of mastication, attrition and abrasion. Thylstrup and Fejerskov proposed a way of recording dental fluorosis (Dean's index) based on the histopathological features[11]. Human and animal studies have shown that the enamel hypomineralization in fluorotic teeth are due to aberrant effects of fluoride on the rates at which enamel matrix protein breakdown or rates at which the byproducts of enamel matrix degradation are withdrawn, resulting in retardation of crystal growth in enamel maturation stage.[12]. Fluoride was identified to have caries preventive properties and was widely used for fluoridation of water since 1940, especially in developed countries. After this there was sudden increase in the use of fluorides in food items and in oral medicinal products like toothpastes and mouth washes. Inadvertent use of above has lead to increase in fluorosis as a public health problem. In many places high fluorides are naturally present in earth crust leading to high water fluoride content increasing the risk of fluorosis. Maintaining a fine balance of fluorides in the body is mandatory for exploiting its advantages. World Health Organization (WHO) has fixed permissible limit of fluorides in water to 1.5 mg/L as a preventive step to contain fluorosis.[13]

It is well documented that fluoride can have both beneficial and detrimental effects on the dentition ever since Mc Kay and G.V. Black in 1916 published the effect of fluoride on dentition. [14]. The beneficial effects of fluoride on dental caries are due primarily to the topical effect of fluoride after the teeth have erupted in the oral cavity. In contrast, detrimental effects are due to systemic absorption during tooth development resulting in dental fluorosis..[15] developed a classification for fluorosis, which is still widely used, based on his interpretation of clinical

appearance. [16]. Dean and McKay suggested that optimum level of water fluoride should be below 0.9 - 1.0 PPM.[17]. The severity of dental fluorosis depends on the amount of fluoride exposure, the age of the child, individual response, as well as other factors including nutrition[18]. Although water fluoridation can cause fluorosis, most of this is mild and not usually of aesthetic concern. [19]. Severe cases can be caused by exposure to water that is naturally fluoridated to levels well above the recommended levels, or by exposure to other fluoride sources such as brick tea or pollution from high fluoride coal. [20]

Fluorosis has attained an alarming dimension all over the world. In India 19 states have been identified as endemic fluoride areas and Andhra Pradesh state is one among them which is facing serious health problems. The fluoride level in water in India ranges from 2- 29ppm, where as the permissible level in drinking water according to WHO standard is 1.0-1.5ppm. High incidence of endemic fluorosis in India is due to fact that large area of the water supplies are having high level of fluoride.2,3. In Andhra Pradesh state alone 17 districts are affected by fluorosis, among them Nellore district is one of the affected district. The major water source in the district is As there were no studies conducted in this area, even though it is severely affected with fluorosis, hence the present study was conducted to assess the awareness of dental fluorosis and to evaluate the prevalence of dental fluorosis.

II. MATERIALS AND METHODS:

Study area :

Kondapuram Mandal of Nellore district, Andhra Pradesh we had selected villages that effected by fluoride in ground water, boarwell and where there is significant occurrence of dental fluorosis. That report indicating that the area was dental fluorosis. Majority of people oin study area belong to low socio economic class. Gudavalluru, Iskapalem, and Perikapalem villages are the most effected by fluorosis. This villages are located at northern part of Nellore district. It is about 78 km away from the Nellore city[21,22].

This study was aimed to estimate the prevalence and severity of dental fluorosis among 7-17 years old school going children of Kondapuram mandal, Nellore district, Andhrapradesh, India. For study purpose, Data was collected from 5-17 years old childre who were life long residence of Gudavalluru, Iskapalem and Perikapalem villages of Kondapuram Mandal of Nellore district, Andhra Pradesh and who consumed drinking water from the some source of there life. Data was collected to the observed by school children. This survey carried out for

problem causes due to high fluoride concentration in drinking water which causes dental fluorosis in children. Most of the children with clinical signs of dental fluorosis had moderate to severe dental according to dean's index.

In 1942, H.T. Dean developed an index to describe and diagnosis enamel fluorosis [23,24]

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 bicuspid 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. 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 fluorosis with the help of duly pre-tested questionnaire. the secondary data was regard to reports of the rural water supply and sanitation department Nellore in the study area.

III. RESULT AND DISCUSSION:

Kondapuram mandal of Nellore district, Andhra Pradesh India seems to be threaten area of fluoride in dental fluorosis total 10 fluoride effected villages has been find out with the help of rural water supply and sanitation department Nellore and water samples had been taken for the analysis of water fluoride content. Water samples from different bore wells of 10 villages which showed a maximum range of 0.8 to 4.0 ppm by DEAN's method. Among 10 villages 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)[25]

Of total 496 children examined, 260 children (52%) had dental fluorosis [Table 2]. Among the 260 affected children, 140 (53.8%) were males and 120 (46.2%) were females [Table 2]. The number of children having dental fluorosis also varied according to the grades of fluorosis and age [Table 3]

The Moderate type is higher (36%), and Mild type is lower (10%), Questionable type is (18%), Very mild is (16%), Severe is (20%). Particularly Gudavalluru (3.12), Iskapalem (3.05), in Kondapuram mandal, has excess levels of fluoride.

Table: 1 Systematic representation of the sample

S.NO	Name of the village	Boys	Girls
1.	Gudavalluru	31	30
2.	Ganugapenta	16	15
3.	Iskapalem	32	28
4.	Thurpu yarraballi	29	27
5.	Perikapalem	32	28
6.	Satyavolu	24	19
7.	Yarrabotlapalli	28	22
8.	Garimenapenta	21	23
9.	Iskadamerla	24	19
10.	Komupalem	23	25
TOTAL.		260	236

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 10, number of the boys are 260 are (52%) and girls are 236(48%).

Table: 2. Classification of effected children in the region

Name	Questionable		Very mild		Mild		Moderate		Severe	
	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls
Gudavalluru	3	2	3	2	2	1	9	5	5	3
Ganugapenta	2	1	1	2	1	1	4	4	4	3
Iskapalem	3	2	3	3	2	2	8	6	6	5
Thurupuyarraballi	2	2	1	1	2	2	3	2	2	2
Perikapalem	2	1	2	2	2	1	3	6	4	4
Satyavolu	3	3	2	2	2	2	4	3	2	2
Yarrabotlapalli	4	4	2	3	1	1	3	2	5	1
Gariminapenta	2	2	4	2	1	1	4	1	2	2
Iskadamerla	3	3	2	1	2	2	4	3	2	3
Komupalem	2	2	3	2	1	2	3	4	3	2

The responds of every village of the region are classified according to deans index and gender represented in the table: 2 Total 10 villages Children were observed according to Dean's index.

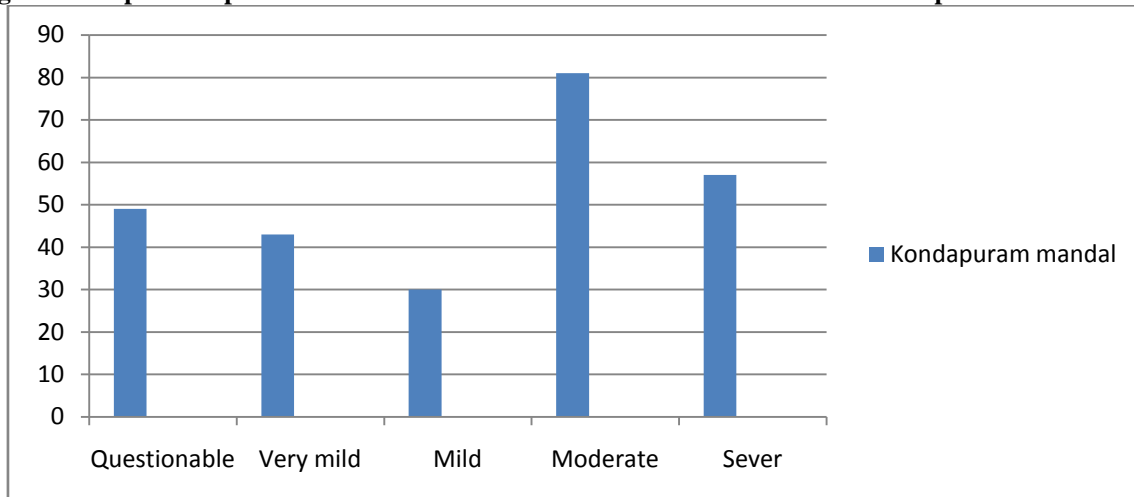
Table: 3. Classification of effected children according to the age

Type	7-9 Years		10-12 Years		13-15 Years		Total	Percentage
	Boys	Girls	Boys	Girls	Boys	Girls		
Questionable	9	7	12	10	5	6	49	18.8%
Very mild	8	8	9	7	7	4	43	16.5%
Mild	5	3	8	7	4	3	30	11.5%
Moderate	13	14	14	12	16	12	81	31.3%
Severe	8	9	14	10	8	8	57	21.9%
Total	43	41	57	47	40	32		

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 years, 10-12 years and 13-15 yrs. Boys and Girls data are represented separately. The percentage was

calculated and recorded in the table. Questionable (18.8%), Very Mild (16.5%), Mild (11.5%), Moderate (31.3%), Sever (21.9%).

Figure1: Graphical representation of effected Children of Dental Fluorosis in Kondapuram mandal



IV. CONCLUSION:

Dental fluorosis still exist as a major dental public health in India: measures need to be taken to control this by introducing defluorodisation plants in various parts of the country. The great need for introducing various small scale methods of defluorodisation in the present study area to prevent dental fluorosis. In the present study, it can be concluded that children of Gudavalluru, Iskapalem and Perikapalem village's of consuming water more than 1.5 ppm of fluoride ranges from 1.53-3.5ppm are suffering from dental fluorosis

REFERENCES:

- [1]. Saravanan S, Kalyani C, Vijayarani M, Jayakodi P, Felix A, Nagarajan S, et al. Prevalence of dental fluorosis among primary school children in rural areas of Chidambaram taluk, Cuddalore district, Tamil Nadu, India. *Indian J Community Med* 2008;33:146-50
- [2]. Available from: <http://www.articles.timesofindia.com/2012-07-26/nagpur/33286988771-fluoride-dental-fluorosis-groundwater>. [Last accessed on 2014 Nov 10].
- [3]. Peter S. *Essentials of Preventive and Community Dentistry*. 4th ed. New Delhi: Arya Medi Publishers; 2009. p. 237-82.
- [4]. Beltrán-Aguilar ED, Barker L, Dye BA. Prevalence and severity of dental fluorosis in the United States, 1999-2004. *NCHS Data Brief* 2010; 53:1-8.
- [5]. Jha SK, Singh RK, Damodaran T, Mishra VK, Sharma DK, Rai D. Fluoride in groundwater: Toxicological exposure and remedies *J Toxicol*
- [6]. Shortt HE, McRobert TW, Bernard AS, Mannadinayer AS. *Environ Health B Crit Rev* 2013;16:52-66 Endemic fluorosis in the Madras Presidency. *Indian J Med Res* 1937;25:553-61.
- [7]. Choubisa SL, Choubisa L, Choubisa DK. Endemic fluorosis in Rajasthan. *Indian J Environ Health* 2001;43:177-89
- [8]. Abhimanyu Mohanta*¹ and Prafulla K Mohanty² Dental Fluorosis- Revisited¹Biju Pattnaik College, Mayurbhanj, India. ²Department of Zoology, Utkaluniversity, India. Received: January 06, 2018; Published: January 17, 2018 DOI: 10.26717/BJSTR.2018.02.000667
- [9]. Antoine Aoun, Farah Darwiche, Sibelle Al Hayek, and Jacqueline Doumit (2018); *The Fluoride Debate: The Pros and Cons of Fluoridation*. *Prev foodscience* 2018 Sep; 23(3): 171-180. Published online 2018 Sep 30. doi: 10.3746/pnf.2018.23.3.171
- [10]. Anurag Tewari, Ashutosh Dubey. Defluoridation of drinking water: Efficacy and need. *J Chemical and Pharmaceutical Research*. 2009;1(1):31-37.
- [11]. M.C Cay (2010) Monitoring of fluoride concentration in ground water of Prakasham district in India: correlation with physic chemical parameter. *Journal of environ. Science and engg*. 2006; 48(2); 129-139.
- [12]. Shortt WE. Endemic fluorosis in Nellore district, south India. *Indian Medical Gazette*, 1937; 72: 396
- [13]. 1 M. M. Patil, 1 Bhavana B. Lakhkar, 2 Shailaja S. Patil (2018); Cure of fluorosis *The Indian Journal of Pediatrics* May 2018, Volume 85, Issue 5, pp 375-383.

- [14]. Dean HT. Classification of mottled enamel diagnosis. *J Am Dent Assoc.* 1934;21:1421–6.
- [15]. Dean HT, McKay FS. Production of mottled enamel halted by a change in common water supply. *Am J Public Health.* 1939;29:590–6.
- [16]. Fejerskov O, Johnson NW, Silverstone LM. The ultrastructure of fluorosed human dental enamel. *Scand J Dent Res.* 1974;82:357–72. [PubMed]
- [17]. Richards A, Kragstrup J, Josephsen K, Fejerskov O. Dental fluorosis developed in post-secretory enamel. *J Dent Res.* 1986;65:1406–9. [PubMed]
- [18]. Thylstrup A, Fejerskov O. Clinical appearance of dental fluorosis in permanent teeth in relation to histologic changes. *Community Dent Oral Epidemiol.* 1978;6:315–28. [PubMed]
- [19]. Aoba T, Fejerskov O. Dental fluorosis: Chemistry and Biology. *Crit Rev Oral Biol Med.* 2002;13:155–70. [PubMed]
- [20]. William J. Butler, Vincent Segreto and Edwin Collins. Prevalence of dental mottling in school aged lifetime residents of 16 Texas communities. *American journal of Public Health* 1985;75(12):1408-1412.
- [21]. Hand book of statistics s.p.s. nellore district 2014 ,compiled and published by chief planning officer Sri Potti Sriramulu Nellore District
- [22]. <http://www.census2011.co.in/data/subdistrict/5156-kondapuram-sri-potti-sriramulu-nellore-andhra-pradesh>.
- [23]. Subcommittee on Health Effects of Ingested Fluoride (National Research Council) Health Effects of Ingested Fluoride. National Academy of Sciences; Washington: 1993
- [24]. Dean HT. Fluorine in the control of dental caries. *J Am Dent Assoc.* 1956;52:1–8. [PubMed]
- [25]. Guidelines for drinking-water quality (Fourth edition), Fluoride, chapter 12.1, pp. 371-373

Dr. Suneetha Chatla " Assessment of Dental Fluorosis Prevalance among 7-15 Years School Going Children in Kondapuram Mandal, Spsr Nellore District" *International Journal of Engineering Research and Applications (IJERA)*, Vol. 09, No.04, 2019, pp. 63-68