IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)
e-ISSN: 2279-0853, p-ISSN: 2279-0861.Volume 15, Issue 1 Ver. IV (Jan. 2016), PP 34-37
www.iosrjournals.org

Prevalence of dental Fluorosis among children aged 12 to 17 years in an endemically affected area of Rural Bangalore – a Cross Sectional study

Padma K Bhat[1] , MDS, Jayachandra M Y[2] ,BDS, Amrita K[3],BDS, Jayanth Kumar K[4] ,MD, Naveen S Nair[5] ,MBBS ,.

[1-] *Professor & Head, Dept. of Public Health Dentistry, RajaRajeswari Dental College & Hospital*
[2-] *Post graduate student, Dept. of Public Health Dentistry, RajaRajeswari Dental College & Hospital*
[3-] *Post graduate student , Dept. of Public Health Dentistry, RajaRajeswari Dental College & Hospital*
[4-] *Professor, Dept of Community Medicine, RajaRajeswari Medical College and Hospital*
[5-] *Post graduate student , Dept of Community Medicine, RajaRajeswari Medical College & Hospital*

Abstract:
Objective: *This study was undertaken to assess the prevalence and severity of Dental Fluorosis among children aged 12 -17 years in an endemically affected area in Rural Bangalore and to determine the public health significance of Dental Fluorosis.*
Introduction: *Ground water has been a significant water source for domestic, irrigating, and industrial purposes in India. More than 85% of rural and 50% of urban domestic water requirements is met from ground water resources [1]. Presence of excess amount of fluoride in drinking water leads to dental fluorosis.*
Methodology: *This was a cross sectional study conducted in the rural field practice area of RajaRajeswari Medical College and Hospital Bangalore. A total of 250 study subjects belonging to the age group of 12 to 17 years were studied. The dental Fluorosis was assessed in the mixed dentition and was graded using Dean's index and Community Fluorosis Index calculated.*
Results: *The prevalence of dental Fluorosis was 60.8%. The highest percentage of study subjects suffered from Grade 2 Dental Fluorosis i.e., Mild Fluorosis (25.2%) as per Dean's Index and the least seen was Severe Dental Fluorosis (5.2%). The Community Fluorosis Index was 0.45 suggesting the concerned issue as a Borderline public health problem.*
Conclusion: *It was concluded that Dental Fluorosis is a public health problem among children of villages coming under Ittamadu Primary Health Centre, Ramnagar District. It needs to be rectified at the earliest for implementation of policy.*
Keywords: *Dental fluorosis, Endemic, Rural, Community Fluorosis Index*

I. Introduction:

Ground water has been a significant water source for domestic, irrigating, and industrial purposes in India. More than 85% of rural and 50% of urban domestic water requirements is met from ground water resources [1]. Fluoride is a salt of the element fluorine; fluorine is the most highly reactive element of halogen family. Fluoride is the one of the very few chemicals that has been shown to cause significant effects in people through drinking water [2]. Fluorosis, an endemic disease, is caused due to excess ingestion of fluoride. Fluoride acts as an essential component for normal mineralization of bone, teeth, and formation of dental enamel in minute amounts and at the same time when consumed in higher doses it has been a danger. Fluoride content of water sources above the permissible limits (1.5 mg/L) may lead to dental and skeletal fluorosis.

Globally, 23 nations have the problem of excess fluoride in drinking water, principally involving the developing countries including India [1]. India lies in a geographical fluoride belt, which extends from Turkey up to China and Japan through Iraq, Iran and Afghanistan. In India, the disease is endemic in about 275 districts of 20 states and UT's, with 66 million people, at risk [3]. Andhra Pradesh, Rajasthan, Punjab, Tamil Nadu, and Karnataka have reported highest endemicity rate [1]. Approximately 25 million people are already affected by Fluorosis. As per Central Ground Water Boards report (2009), a Government of India organization under the Ministry of Water Resources, in Karnataka, Dharwad, Gadag, Bellary, Belgaum, Raichur, Bijapur, Gulbarga, Chitradurga, Tumkur, Chikmagalur, Mandya, Bangalore Rural and Mysore districts are identified to be endemic for Fluoride and the range of fluoride concentration varies from 0.2 to 18.0mg/L in these districts [2].

Clinical dental Fluorosis being the most convenient biomarker of Fluoride exposure [4] evoked the thought of conducting the present study with the following objectives:

1. To assess the prevalence and severity of Dental Fluorosis among children aged 12 -17 years in an endemically affected area in Rural Bangalore.
2. To determine the public health significance of Dental Fluorosis in the study area using Community Fluorosis Index.

II. Materials and Methods:

This cross sectional study was conducted among children aged 12 to 17 years in two randomly selected villages of Ittamadu, namely Thoraidoddy and Banandur, an endemically affected area in Rural Bangalore, coming under the field practice area of RajaRajeswari medical College and Hospital, Bangalore. The study was conducted during January to March 2015. Two villages coming under Ittamadu Primary health centre were selected randomly and complete enumeration of all the children aged 12-17 years were done. The number of study subjects hence came up to be 250. Institutional Ethical Clearance and informed consent from the study participants was obtained prior to the study.

The dental Fluorosis was assessed in the mixed dentition and was graded using Dean's index. Oral examination was performed by two trained and calibrated dentists. Each tooth in the mouth was rated according categories of Dean's index, and the individual's dental Fluorosis score was arrived at based on the severest form recorded for two or more teeth.

Community Fluorosis Index (CFI) was calculated to quantify public health significance of dental Fluorosis [1]. CFI was computed by summing up the scores of individual grades of dental Fluorosis as described by Dean and dividing the sum by the total sample size.

The public health significance of CFI values was as below:

Sl. No	CFI value range	Public health significance
1	0.0-0.4	Negative
2	0.4-0.6	Borderline
3	0.6-1.0	Slight
4	1.0-2.0	Medium
5	2.0-3.0	Marked
6	3.0-4.0	Very marked

The data was entered into Microsoft Excel 2010 and analyzed using SPSS version 20.0. The data was expressed in percentages and chi square test of significance was applied wherever possible. A p value <0.05 was considered as statistically significant.

III. Results:

A total of 250 school going children in the age group of 12-17 years were studied. 30.8% were in less than 14 years of age, 36.4 % were in the age group 14-16 years and 32.8% were > 17 years of age. There were 140 male children (56.0%) and 110 female children (44.0%) among the study subjects (Table No. 1).

Table No. 1 - Socio-Demographic Details of Study Subjects

AGE WISE DISTRIBUTION		
Age	**Number**	**Percentage (%)**
<14 years	77	30.8
14-15 years	91	36.4
> 16 years	82	32.8
TOTAL	**250**	**100.0**
GENDERWISE DISTRIBUTION		
Gender	**Number**	**Percentage (%)**
Males	140	56.0
Females	110	44.0
TOTAL	**250**	**100.0**
DISTRIBUTION ACCORDING TO RELIGION		
Religion	**Number**	**Percentage (%)**
Hindu	250	100.0
Others	0	0.0
TOTAL	**250**	**100.0**
DISTRIBUTION ACCORDING TO CLASS OF STUDY		
Class of Study	**Number**	**Percentage (%)**
8th Std	77	30.8
9th Std	91	36.4
10th Std	82	32.8
TOTAL	**250**	**100.0**

The prevalence of dental Fluorosis was 60.8%. The highest percentage of study subjects suffered from Grade 2 Dental Fluorosis i.e., Mild Fluorosis (25.2%) as per Dean's Index and the least seen was Severe Dental Fluorosis (5.2%). The Community Fluorosis Index was 0.45 suggesting the concerned issue as a Borderline public health problem (Table No. 2)

Table No. 2 – Distribution of Study Subjects according to grading of Fluorosis

	Grading of Dental Fluorosis					**Total**
	No Fluorosis	**Questionable Fluorosis**	**Mild Fluorosis**	**Moderate Fluorosis**	**Severe Fluorosis**	
Number	98	56	**63**	20	13	**250**
Percentage	39.2	22.4	**25.2**	08.0	05.2	**100.0**
CFI	-	0.13	**0.45**	0.24	0.21	**-**

It was found that occurrence of Dental Fluorosis was significantly associated with gender (chi-square test 9.59, $P < 0.05$) (Table 3). The prevalence of dental Fluorosis was more in males when compared to females. However, there was no significant association between occurrence of Dental Fluorosis and the age of study participants.

Table No. 3– Association of Dental Fluorosis with Age and Sex of Study participants

AGE	**Grading of Dental Fluorosis**					**TOTAL (%)**
	No Fluorosis (%)	**Questionable Fluorosis (%)**	**Mild Fluorosis (%)**	**Moderate Fluorosis (%)**	**Severe Fluorosis (%)**	
13-14 years	29 (29.6)	22 (39.3)	17 (27.0)	06 (30.0)	03 (23.1)	**77 (30.8)**
14 – 15 years	36 (36.7)	23 (41.1)	22 (34.9)	06 (30.0)	04 (30.8)	**91 (36.4)**
15 -16 years	33 (33.7)	11 (19.6)	24 (38.1)	08 (40.0)	06 (46.1)	**82 (32.8)**
TOTAL	**98 (100.0)**	**56 (100.0)**	**63 (100.0)**	**20 (100.0)**	**13 (100.0)**	**250 (100.0)**
chi-square = 7.11 degrees of freedom = 8 probability = 0.577						
SEX	**No Fluorosis (%)**	**Questionable Fluorosis (%)**	**Mild Fluorosis (%)**	**Moderate Fluorosis (%)**	**Severe Fluorosis (%)**	**TOTAL (%)**
Male	52 (53.1)	34 (60.7)	39 (61.9)	11 (55.0)	04 (30.8)	**140 (56.0)**
Female	46 (46.9)	22 (39.3)	24 (38.1)	09 (45.0)	09 (69.2)	**110 (44.0)**
TOTAL	**98 (100.0)**	**56 (100.0)**	**63 (100.0)**	**20 (100.0)**	**13 (100.0)**	**250 (100.0)**
chi-square = 9.59 degrees of freedom = 4 probability = 0.047						

IV. Discussion:

Dental Fluorosis is hereby found out to be a borderline public health problem in Ittamadu Primary health centre area of Ramnagar District.

The findings from the present study imply 60.8 % prevalence of dental Fluorosis, significantly being associated with male gender. However, a study conducted by Shruthy Narayanamurthy *et al*., on Prevalence of dental Fluorosis in school children of Bangarpet taluk, Kolar district has concluded the prevalence of dental Fluorosis to be 31.05% which had significant association to age and gender of the children studied. When our study revealed that Dental Fluorosis was a borderline public health problem, it was seen that in Kolar it was a slight Public Health problem [1].

According to a study conducted by C B Shivayogimath *et al.,* on the prevalence of dental Fluorosis among residents of Gadag District in Karnataka, it was revealed that out of the 2001 people surveyed, maximum number i.e., 28.18% suffered from mild levels of Dental Fluorosis. This was similar to our study in which maximum number i.e. 25.2% suffered from mild levels of Dental Fluorosis [2].

Sunil V Gitte *et al.,* in their study on prevalence of Fluorosis in endemic village of Chhattisgarh found out a higher prevalence of Dental Fluorosis among the male study subjects. This observation was in sync with that from this present study wherein there was significant association between occurrence of Dental Fluorosis and male gender [3].

S Saravanan *et al.*,[4] in Chidambaram Taluk, Cuddalore district, Tamil Nadu, among 5-12 years age group, reported 31.4% prevalence of dental Fluorosis and a significant association with age ($P < 0.001$) . This was in total contrast to our study where the prevalence of dental Fluorosis was 60.8% with no significant association with the age of study participants [4].

Gopalakrishnan *et al.,* [6] in Alappuzha district, Kerala showed 35.6% prevalence of dental Fluorosis with female preponderance and an inverse association with age. This was also in contrast with our study showing 60.8 % prevalence of dental Fluorosis with male preponderance and no significant association with age.

Bhat and Kumar [7] in their study on dental Fluorosis among residents of Hanumantharayanaplaya, Ramnagar district, Karnataka in 2011 showed that 36.4% were affected with mild grade Fluorosis and community Fluorosis index of 1.76.

V. Conclusion:

Fluorosis is a public health problem among children of villages coming under Ittamadu Primary Health Centre, Ramnagar District.

References:

[1]. Shruthy Narayanmurthy, Anil Navale Santhuram. Prevalence of dental Fluorosis in school children of Bangarpet taluk, Kolar district. Journal of Oro facial sciences.2013;5(2):105-8.

[2]. Shivayogimath C B, Hiremath M N, Shivalingappa S N. Prevalence of dental Fluorosis among residents of nine villages in and around mundaragi of Gadag district in Karnataka, India. Elixir International Journal.2012; 410-3.

[3]. Sunil V Gitte, kmable K M, Ramanath N sabat. Study of Prevalence of Fluorosis in endemic village of Kankar district of Chhattisgarh state, India. National Journal of Community Medicine. 2014; 5(4):486-9.

[4]. 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.

[5]. Isaac A, Silvia WDCR,Somanna SN, Mysorekar V, Narayana K, Srikantaiah P. Prevalence and manifestations of water-born Fluorosis among schoolchildren in Kaiwara village of India: a preliminary study. Asian Biomedicine 2009; 3(5):563-6

[6]. Gopalakrishnan P, Vasan RS, Sharma PS, Nair KS, Hankappan KR. Prevalence of dental Fluorosis an associated risk factors in Alappuzha district, Kerala. National Medical Journal of India 1999; 12:99-103.

[7]. Bhat PK, Kumar A. Prevalence and severity of dental Fluorosis in an endemically affected district of Karnataka, South India. Indian Journal of Contemporary Dentistry. 2011; 2:96-100.

[8]. Sudhir K M, Prashant G M, Subba Reddy V V, Mohandas U, Chandu G N. Prevalence and severity of dental Fluorosis among 13-to 15-year-old school children of an area known for endemic Fluorosis: Nalgonda district of Andhra Pradesh. J Indian Soc Pedod Prevent Dent.2009;4(27):190-6

[9]. Raghavan R, Bipin N, Abraham A. Prevalence of Dental Fluorosis and Fluoride content of drinking water in Rural Areas of Malappuram District, Kerala. International Journal Of Medical Science And Public Health 2014;3(1):27-30

[10]. Peter S. Essentials of Preventive and Community Dentistry. 4th ed. New Delhi: Arya Medi Publishers; 2009. 237–82.

[11]. Mythri H, Dinesh, Bennadi D. Current public health perspective of Fluorosis mitigation project in Pavagada taluk, Karnataka. Indian J Occup Environ Med. 2012; 16:124-6.