

A Study on Dental Fluorosis in Guntral and Hirebuduru Village: A Persistent Public Health Problem

Shilpakala ¹, Narayana J ²

Department of environmental science

Kuvempu University Shankarghatta-577451

Corresponding author E-Mail: janaes@rediffmail.com

ABSTRACT:

Dental fluorosis is a developmental disorder of dental enamel, caused by consecutive exposures to high concentrations of fluoride at some stage in tooth development, leading to enamel with lower mineral content and increased porosity. The dental fluorosis severity depends on when and for how long the overexposure to fluoride occurs. The World Health Organization recommended level for daily fluoride intake is 0.5-1.5 mg/L, which is considered of great help in preventing dental caries, acting in remineralisation. A daily intake above this safe level leads to an increased risk of dental fluorosis. The present study was conducted in Guntral and a Hirebuduru village of Devadurga Taluk Raichur District to assess dental fluorosis. The prevalence of dental fluorosis was recorded by using Dean's fluorosis index. In Guntral Village 48.70% were males and 51.2% were females. Dental fluorosis, Dean's index shows normal in 19.51% ,questionable in 14.63%,very mild in 6.91% , mild in 17.07% ,moderate in 11.78% and severe in 30.08% of the people. Simultaneously In Hirebuduru village, 48.24% were males and 51.75% were females. Dental fluorosis, Dean's index shows normal in 24.13%, questionable in 14.91%, very mild in 17.10%, mild in 14.91%, moderate in 7.96%, severe in 21.05% of the people. Hence there is an urjant need to prevent dental fluorosis by having an adequate knowledge of the fluoride sources, knowing how to manage this issue and therefore, avoid overexposure.

KEY WORDS: *Dental fluorosis, Dean's index, Fluoride, Guntral Village, Hirebuduru village*

I. INTRODUCTION:

Fluorosis is an endemic disease characterized by excess deposition of fluorides in hard and soft tissues of the body. Dental fluorosis typically affects families residing in high-fluoride belt areas among excessive amount of fluoride present in drinking water. Dental fluorosis is a health condition and it can be described as a developmental conflict of enamel owing to the chronic exposure to fluoride habitually seen among children [1] throughout development of tooth, particularly during enamel formation high concentration of fluoride may affect the enamel forming cell, ameloblast [2]. Fluoride is vital constituent in the primary prevention of caries. It increases the resistance of the tooth to acid attack. Maintaining fluoride exposure at recommended levels is imperative in the main prevention of fluorosis and simultaneously to get pleasure from its valuable effects in caries avoidance.[3]

The World Health Organization (WHO) recommended every day intake of fluoride for primary prevention of fluorosis is 0.5 to 1.5 mg/L.[4] on the other hand, there are consequences among children if fluoride concentration is more than 1.5 to 4 mg/L, which is higher than WHO recommendation known as dental fluorosis.[5].Parents and pediatrician ought to play a significant role to reach a maximum protection against dental caries and minimizing the hazard of dental fluorosis in children. Fluoridated drinking water, toothpaste, supplements are the most common sources of ingested fluoride in children [6]. The children at the age of 1 to 4 years old are at high risk. The risk of fluorosis later decreases at around 8 years of age and it is highly prevalent among children below this age who is exposed to high fluoride.[7,8]

Dental fluorosis is characterized by the presence of mottled enamel, brownish discoloration of teeth, pitted enamel, and bilateral, diffuse, thin, horizontal white striations with stained plaque. [9] Besides, the severity of dental fluorosis depends on the thickness of enamel. Dental fluorosis is endemic in certain countries that has high concentration of fluoride, such as India, Sri Lanka, China, Eastern Africa, Middle East, and South America.[10] Dean's Index was widely used in the classification of fluorosis based on interpretation of clinical appearance [11].

Table 1: Classification of fluorosis using Dean's Index [11]

Questionable	occasional white flecking and spotting of enamel
Mild	white opaque areas involving more of tooth surface
Moderate	pitting and brownish staining of tooth surface
severe	Corroded appearance of tooth.

Therefore various treatment approaches have been introduced and practiced among the dental practitioner to treat mottling, pitting, and opacity of enamel. Still, their efficacy has not been compared to facilitate any clinical recommendations to treat dental fluorosis. Hence, the aim of present study was to assess the dental fluorosis in Guntral village.

II. METHODOLOGY

Study Design

In the present study two villages viz., Guntral and Hirebudur of Devadurga taluk, Raichur district, Karnataka, were selected to investigate the fluorosis health problems associated with fluoride exposure in the study areas.

Description of study area

Site-I: Guntral Village

Guntral village is located in Devadurga taluka of Raichur district in Karnataka, India. It is situated 14 km away from sub-district headquarter Devadurga and 48 km away from district headquarter Raichur. Masarkal is the Gram Panchayat of Guntral village. The total geographical area of village is 654.9 hectares. Guntral has a total population of 1,104 people, out of which, male population is 549, while female population is 555. Literacy rate of Guntral village is 53.08%, out of which, 65.39% males and 40.90% females are literates. There are about 217 houses in Guntral village.

Site-II: Hirebudur Village

Hirebudur village is located in Devadurga taluk of Raichur district in Karnataka, India. It is situated 28 km away from sub-district headquarter Devadurga and 38 km away from district headquarter Raichur. Hirebudur village is also a Gram Panchayat. The total geographical area of village is 2143.75 hectares. Hirebudur has a total population of 2,209 people, out of which, male population is 1,122, while female population is 1,087. Literacy rate of Hirebudur village is 47.58%, out of which 57.75% males and 37.07% females are literates. There are about 424 houses in Hirebudur village.

Sample Size

In Hirebudur village, a total of 228 people who are living in the endemically fluorosed area were evaluated. People who participated in the study were in the age group of 10-80.

Among this, 21.05% of the people were between 1-9 years, 25.90% of the people were between 10-20 years, 21.05% of the people were between 21-30 years, 11.84% of the people were between 31-40 years, 10.08% of the people were between 41-50 years, 5.70% of the people were between 51-60 years, 1.75% of the people were between 61-70 years, 2.20% of the people were between 71-80 years and 0.43% of the people were between 81-90.

In Guntral village, a total of 246 people in who are living in the endemically fluorosed area were evaluated. People who participated in the study were in the age group of 10 to 80.

Among this, 9.3% of the people were between 1-9 years, 23% of the people were between 10-20 years, 18.6% of the people were between 21-30 years, 15% of the people were between 31-40 years, 16.2% of the people were between 41-50 years, 8.5% of the people were between 51-60 years, 4% of the people were between 61-70 years, 2% of the people were between 71-80 years and 0.4% of the people were between 81-90 years.

Data Collection and Sampling

To collect data from respondents, investigated the public health problems associated with fluoride contaminated areas, appropriate and standard survey and questionnaire methods (NPPCF Revised Guidelines, 2014) were followed. It was consisting of a series of questions to gather information from respondents. This investigation was carried out directly in the field and collecting the data related to fluorosis disease in selected villages. Dental fluorosis was assessed on the basis of modified dean's index in this study.

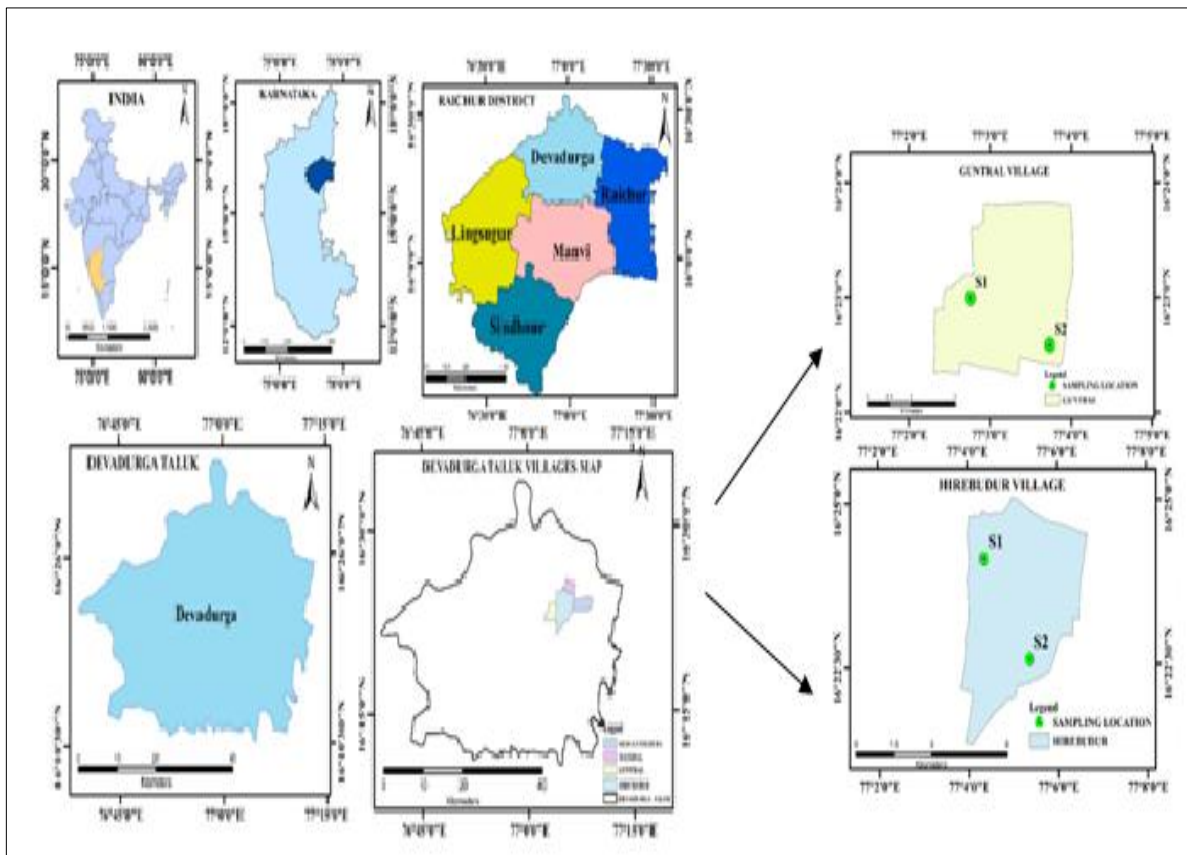


Fig 1. Location Map of study area

III. Experimental Results

1. Guntral village

In the present study, a total of 246 people in Guntral village who are living in the endemically fluorosed area were evaluated. People who participated in the study were in the age group of 10 to 80.

Among this, 9.3% of the people were between 1-9 years, 23% of the people were between 10-20 years, 18.6% of the people were between 21-30 years, 15% of the people were between 31-40 years, 16.2% of the people were between 41-50 years, 8.5% of the people were between 51-60 years, 4% of the people were between 61-70 years, 2% of the people were between 71-80 years and 0.4% of the people were between 81-90 years (Table 2.) (Fig 3)

Out of these, 48.70% were males and 51.2% were females (Table 3) (Fig 4). Dental fluorosis, Dean’s index shows normal in 19.51% people, questionable in 14.63% of the people, very mild in 6.91% of people, mild in 17.07% of the people, moderate in 11.78% of the people and severe in 30.08% of the people (Table 4) (Fig 5).

Table 2. Age-wise distribution of the study population in Guntral village

Age (Year)	Guntral	
	n	%
1-9	28	11.38
10-20	58	23.57
21-30	46	18.70
31-40	37	15.04
41-50	40	16.26
51-60	21	8.53
61-70	10	4.06
71-80	05	2.03
81-90	01	0.40
Total	246	100

Table 3. Sex-wise distribution of the study population in Guntral village

Sex	Guntral	
	n	%
Male	120	48.78
Female	126	51.22
Total	246	100

Table 4. Prevalence of dental fluorosis in the study population using Dean’s index

Dean’s index	Guntral	
	n	%
Normal	48	19.51
Questionable	36	14.63
Very mild	17	6.91
Mild	42	17.07
Moderate	29	11.78
Severe	74	30.08
Total	246	100.00

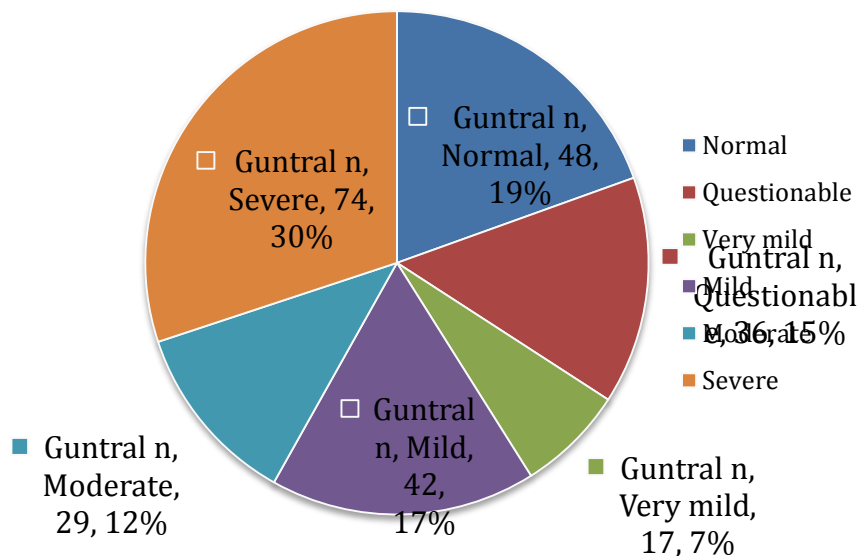


Fig 2. Prevalence of dental fluorosis in the study population using Dean’s index

1. Hirebudur village

In the present study, a total of 228 people who are living in the endemically fluorosed area of Hirebudur village were evaluated. People who participated in the study were in the age group of 10-80. Among this, 21.05% of the people were between 1-9 years, 25.90% of the people were between 10-20 years, 21.05% of the people were between 21-30 years, 11.84% of the people were between 31-40 years, 10.08% of the people were between 41-50 years, 5.70% of the people were between 51-60 years, 1.75% of the people were between 61-70 years, 2.20% of the people were between 71-80 years and 0.43% of the people were between 81-90 (Table 12).

Out of these, 48.24% were males and 51.75% were females (Table 12.1). Dental fluorosis, Dean’s index shows normal in 24.13% people, questionable in 14.91% of the people, very mild in 17.10% of people, mild in 14.91% of the people, moderate in 7.96% of the people, severe in 21.05% of the people (Table 12.2).

Table 5. Age-wise distribution of the study population in Hirebuduru village

Age (Year)	Hirebuduru	
	n	%
0-9	48	21.05
10-20	59	25.90
21-30	48	21.05

31-40	27	11.84
41-50	23	10.08
51-60	13	5.70
61-70	04	1.75
71-80	05	2.20
81-90	01	0.43
Total	228	100.00

Table 6. Sex-wise distribution of the study population in Hirebudur village

Sex	Hirebudur	
	n	%
Male	110	48.24
Female	118	51.75
Total	228	100.00

Table 7. Prevalence of dental fluorosis in the study population using Dean’s index

Dean’s index	Hirebudur	
	n	%
Normal	55	24.13
Questionable	34	14.91
Very mild	39	17.10
Mild	34	14.91
Moderate	18	7.90
Severe	48	21.05
Total	153	100.00

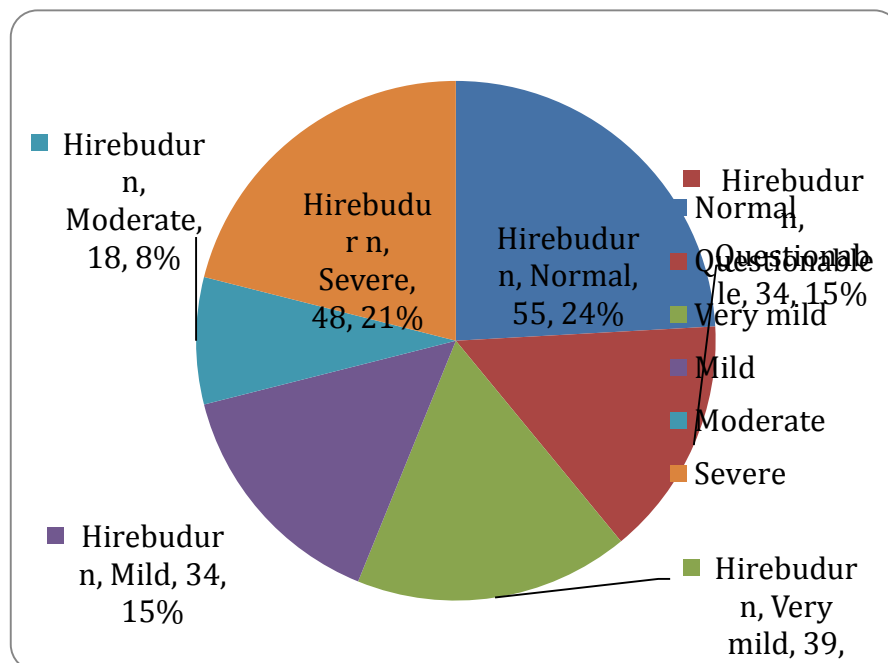


Fig 3. Prevalence of dental fluorosis in the study population using Dean’s index



Fig 6. Dental fluorosis in Guntral Village



Fig 7. Dental fluorosis in Hirebudur Village

IV. CONCLUSION

In conclusion our findings showed, the increased Prevalence of dental fluorosis in our endemic fluoride areas with 17.07% of people were mild to 30.8% of people were severe respectively. Prevention of is the most essential key to treatment. for this reason, there is a require to take measures to prevent dental fluorosis through safe drinking water supply and by teaching enhanced nutritional practice with different effective Medias. If the exposure to high fluoride level is reduced, Vitamin D and calcium nutrition are balanced, medical improvement occurs. Just the once the symptoms increase, treatment largely ruins symptomatic. Hence there was an urgent need to reduce the fluoride concentration of drinking water using appropriate defluoridation techniques and aesthetic management of dental fluorosis.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of inter

REFERENCES

- [1]. Chaudhry M, Prabhakar I, Gupta B, Anand R, Sehrawat P, Thakar SS. Prevalence of dental fluorosis among adolescents in schools of Greater Noida, Uttar Pradesh. *J Indian Assoc Public Health Dent* 2017;15:36-41.
- [2]. Guideline for drinking water quality. World Health Organization (WHO) 2011
- [3]. Bhagavatula P, Levy SM, Broffitt B, Weber-Gasparoni K, Warren JJ. Timing of fluoride intake and dental fluorosis on late-erupting permanent teeth. *Community Dent Oral Epidemiol* 2016;44:32-45.
- [4]. Anguilar-Díaz FC, Irigoyen-Camacho ME, Borges-Yáñez SA. Oral-health-related quality of life in schoolchildren in an endemic fluorosis area of Mexico. *Qual Life Res* 2011;20:1699-706.
- [5]. Tellez M, Santamaria RM, Gomez J, Martignon S. Dental fluorosis, dental caries and quality of life factors among schoolchildren in a Colombian fluorotic area. *Community Dent Health* 2012;29:95-9.
- [6]. Kotecha PV, Patel SV, Bhalani KD, Shah D, Shah VS, Mehta KG. Prevalence of dental fluorosis and dental caries in association with high levels of drinking water fluoride content in a district of Gujarat, India. *Indian J Med Res* 2012;135:873-7.

- [7]. Ramesh M, Narasimhan M, Krishnan R, Chalakkal P, Aruna RM, Kuruvilah S, et al. The prevalence of dental fluorosis and its associated factors in Salem district. *Contemp Clin Dent*. 2016;7:203–8.
- [8]. Mobarak, H., Pulak, K. P. Hydrogeochemical characterization and health hazards of fluoride enriched groundwater in diverse aquifer types. **Environmental Pollution**. 258. 2020:113646.
- [9]. Peeyush, K., Anil, K. S. Study of fluorosis problems in Horida Sector D (Jaipur Village) of Rajauli Block of Nawada District, Bihar. **An International Biannual Refereed journal of life sciences**. 16(1).2021:37-40.
- [10]. Ramesh, M., Malathi, N., Ramesh, K., Rita, M. A., Sarah, K. Comparative evaluation of Dental and skeletal fluorosis in an endemic fluorosed district, Salem, Tamil Nadu. **Journal of Pharmacy and BioAllied Sciences**. 9(1).2017:S88-S91.
- [11]. Gupta A, Dhingra R, Chaudhuri P, Gupta A. A comparison of various minimally invasive techniques for the removal of dental fluorosis stains in children *J Indian Soc Pedod Prev Dent*. 2017;35:260–8
- [12]. Shafiei F, Tavangar M, Alavi A. Direct esthetic rehabilitation of teeth with severe fluorosis: A case report *J Dent (Shiraz)*. 2014;15:44–7