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Prevalence Of Fluorosis Among The Population Of Endemic Fluorosis Area Of Nalgonda District, Telangana –A Case Control Study.

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Abstract

Fluorosis has recently become more prevalent in areas of India where it is endemic. It is well known that drinking water with excessive fluoride levels may contribute to fluorosis. In the Nalgonda District of Telangana, India, 30 water samples from hand pumps and bore wells in chosen villages were collected in order to determine the fluoride concentration (ppm) in both fluorotic and nonfluorotic communities. Additionally, we gathered information from 168 persons in particular areas to assess the prevalence of skeletal and dental fluorosis. Surface and ground water samples from these villages' have fluoride amounts ranging from 0.46 to 11.4 ppm. The current study on fluorosis in the Nalgonda district found that both fluorotic and non-fluorotic individuals had greater incidences, more severe skeletal manifestations, and oral fluorosis. Aside from that According to the findings above 50% of residents of fluorotic villages in the Nalgonda area have skeletal fluorosis and dental fluorosis,

KeyWords : Fluorosis, dental fluorosis, skeletal fluorosis, fluorotic villages, nonfluorotic villages, and the Nalgonda district

INTRODUCTION

Fluorides occur naturally in large quantities in the air, water, soil, and plants (**Jha et al., 2011, Singh et al., 2018)**. Fluoride exposure in humans is mostly caused by food, dental products, and drinking water (**Guissouma et al., 2017, Srivastava and Flora., 2020**). Dental caries can be avoided with low-dose fluoride exposure (**Whelton et al., 2019**), but fluorosis can develop with high-dose fluoride exposure and long-term accumulation (**Wei et al., 2019**). The World Health Organization states that 1.5 mg/L is the maximum allowed amount of fluorine in drinking water (**Patil et al., 2018**). However, there is still a risk of chronic endemic fluorosis in many nations and areas of the world (**McGill., 1995, Saeed et al., 2020, Yuan et al., 2020**). In addition to dental

fluorosis and skeletal fluorosis (**Sellami et al., 2020**),In addition to causing fluorosis (**Moimaz et al., 2015**), excessive fluoride buildup in the body harms various other organs and tissues, including the brain (**Agalakova and Nadei., 2020**), liver (**Malin et al., 2019**), kidney (**Dharmaratne., 2019**), heart (**Quadri et al., 2018**), thyroid (**Kheradpisheh et al., 2018**), test (**Qing-Feng et al., 2019**).

Most fluoride absorption occurs in the stomach and intestines (**Buzalaf and Whitford, 2011**). Fluoride can cross the blood-brain barrier, disrupt brain metabolism, inhibit associated neural enzymes, and alter the shape of brain synapses, according to studies (**Niu et al., 2018**). Rat sperm density, morphology, and motility can all be impacted by fluoride (**Gupta et al., 2007**). The immune system may be harmed by fluoride, according to earlier studies. system, decrease the number of macrophages, raise lipid peroxidation, and raise pro-inflammatory cytokines (**De la Fuente et al., 2016**). Acute exposure to fluoride may also cause cardiac damage and myocarditis (**Panneerselvam et al., 2019**).

There are still not enough systematic and thorough investigations on the observation of metabolite alterations from the perspective of metabolomics, despite the fact that fluoride has a systemic impact on the body that affects a number of organs and tissues. In addition to being sensitive to organ-specific toxicity, metabolomics also provides details on the mechanisms operating in organs and tissues (**Johnson et al., 2016**). To the best of our knowledge, only two research (**Li et al., 2021**; **Yue et al., 2020**) have examined blood metabolites of fluoride exposure in rats. no investigation of the primary target organs of fluoride exposure using metabolomic methods. The harmful mechanism of fluoride exposure and its effects on metabolic levels will be further investigated through the metabolomics research of eight organs and tissues in this study.

Our earth has plenty of fluoride, which was ranked 13th. The World Health Organization and Indian Council of Medical Research defined the fluoride drinking water quality guideline value at 1.5 mg/l (WHO,1963) (ICMR,1975). Fluoride levels in drinking and ground water samples in the Nalgonda district ranged from 0.4 to 11.4 mg/L Endemic fluorosis is associated with A study by Li et al. to ascertain the relationship between fluoride's affect on environmental and biological systems was also conducted, however its potential genotoxic effects on animals are the subject of considerable debate.fluoride levels in water are greater. however, 65% Fluorosis cases have been reported in 25 different nations around the world, including Israel, some regions of Thailand, Africa, Asia, China, and Japan (Xu R et al.,1997) Fluorosis has afflicted 25 million people in 19 states and union territories, according to recent data by a number of researchers (Sangam,2003),However, fluorosis is a problem in several Telanagana regions. The district most badly impacted by this is Nalgonda.Telangana's Nalgonda district has endemic fluorosis, and numerous villages there have been designated as endemic fluorosis regions.

Only 75% of fluoride is absorbed from the small intestine through drinking water (Sarala K and Rao P.R. ,1993). (2001) Khandare et al. Because of fluoride's strong electronegativity, the positively charged calcium ions in bones and teeth are drawn to the fluoride ions. Fluoride is well known to produce skeletal fluorosis, tooth mottling, dental fluorosis, and bone deformation in both children and adults (Susheela A.K et al., 1993). However, excessive fluoride interferes with minerals, vitamins, enzymes, lipids, proteins, and carbs. metabolism. However, excessive fluoride consumption causes skeletal deformation and weakens joints (WHO, 1985).

According to several studies, sodium fluoride has anticholinesterase and anticurare that are in charge of its effects on muscle and nerve. Therefore, it has been demonstrated that sodium fluoride has no impact on the normal muscular membrane potentials (Koketsu K and Gerard RW, 1956). skeletal fluorosis in both is distinguished from dental fluorosis by a protracted 10 to 30 years of generally symptom-free time during which the skeleton continues to accumulate. fluoride, despite the possibility of non-skeletal effects including gastrointestinal ones. Skeletal fluorosis can progress to the point where it results in severe deformities and neurological issues such radiculo myelopathy, osteophytosis, a sclerosed vertebral column, and ossified ligaments that limit blood flow and injure the spinal cord and spinal roots (Raja Reddy,2013).

Low quantities of fluoride in drinking water have a positive impact on teeth, but excessive exposure to fluoride in drinking water or when combined with exposure to fluoride from other sources can have a number of negative effects. (James Fawell et al., 2006) The recommended maximum level of fluoride in drinking water by the World Health Organization is 1.5 mg/l (WHO,2004) The epidemiological data used to develop the guidelines shows that concentrations over this value are associated with an increased risk of dental fluorosis and that steadily greater concentrations are associated with an increased risk of skeletal fluorosis. The recommended value for artificially fluoridating water supplies is higher than the recommended value in the guidelines. which typically Twenty of the 35 states and union territories in the Indian Republic have an endemic fluorosis problem. (Fluorideandfluorosis.com,2009) 70–100% of the districts in Andhra Pradesh, which includes Telangana, Gujarat, and Rajasthan, are impacted. In Andhra Pradesh, water fluoride concentrations range from 0.4 mg/l to a relatively high level of 29 mg/l.

To deliver water with acceptable fluoride values, a new water source (River Krishna water from Nagarjunsagar dam) has been created from May 2007. This necessitates conducting a survey to determine the present fluoride levels in water supplies, the prevalence of fluorosis, and the associated epidemiological factors.

Consuming excessive amounts of fluoride during the formative period of tooth development causes enamel hypoplasia, which results in poor enamel formation (Fejerskov O, 2007). Fluorosis initially appears as chalky white spots that eventually turn brown. Thin white lines on the enamel to chalky and opaque enamel are clinical signs (Aminabadi N et al ., 2007),(J.P. Yadav et al.,2008) .The data on fluoride concentrations in hand pumps and bore well water from fluorotic and nonfluorotic villages in Telangana state of India's Nalgonda district have been reported in the current study. Field samples from six communities were gathered and examined for this investigation. The findings on skeletal and dental fluorosis that caused paralysed limbs and dental fluorosis in the six villages in the Nalgonda area are presented and analysed in this study. The current study was conducted as part of a disease mapping project in a few regions of Telangana state's Nalgonda district with the aim of determining the prevalence of fluorosis, mapping malformations, and identifying the fluoride content in key drinking water sources.

Material and Methods

Study Area

The six villages (Fluorotic villages are Yellareddy gudem, Chervugattu gudem, Dasari gudem and three non-fluorinated villages are Battapothula gudem, Motubhavi gudem, and Mirloni gudem) are selected as per data from district water analysis department of nalgonda ,telangana for the present study have red soils agriculture lands .The temperature in these areas in rising up to 43 degree calicoes in summer and between 18 to 20 degree calicoes in winter.The studied area location map is shown fig 1 and 2 .The people lived in the six villages are manual agricultural labours and residing from many decades in these villages .The Yielding of crops in these villages in poor due to unfertile fluorinated soil and so the people are bending fed with low nutritive diet.

The population in six villages are above 2000 and the survey made is shown fig 3 on sampling method .Before the survey, identified water samples were collected and tagged for confirmation in accordance with data from the Nalgonda district's water analysis department. Samples were taken from each paragraph's common water source hand pumps and borewells which are extensively used for drinking and other domestic purpose in bottles that had been cleaned with detergent. To estimate the water's fluoride levels, these water sample 30 were sent to the lab. Following the analysis of water samples, the fluoride content of the water sources in each hamlet of the surveyed villages was mapped, along with identified and confirmed the locations of three fluorotic villages (Yellareddy gudem, Chervugattu gudem, and Dasari gudem) and three non-fluorinated villages (Battapothula gudem, Motubhavi gudem, and Mirloni gudem) and used to determine the incidence of skeletal and dental fluorosis.

Table 1: Source of drinking water selected from study areas

District	mandal	Villages	Collection of water samples	Source of drinking wate
Nalgonda	Narket pally	Yellareddy gudem Chervugattu Dasarigudem	From three villages	Borewell ,Hand pump
Nalgonda	Nalgonda	Battapothulagudem Motubavigudem Mirlonigudem	From three villages	Borewell ,Hand pump

Estimation of Fluoride Concentration

Water samples were gathered in high-quality, one-liter polythene bottles and brought without any preservatives to the lab. The samples were taken straight in washed bottles to prevent contamination. Fluoride ion electrode (IRION) and IRION 407A ion metre measurements were made on the samples to estimate the concentration of fluoride. In a polythene beaker, a 25ml aliquot was added along with a 25ml addition of TISAB III (Total Ionic Strength Adjuster Buffer, IRION Application Solution). Ion metres were calibrated using a solution with a known amount of fluoride as the standard sample, and they were then read directly on the metre scale. The scale was calibrated in parts per million of fluoride in water.

As previously stated, a sample of water was taken to validate the presence of fluorine in a few selected settlements. In April 2022, a cross-sectional survey of the fluorotic and nonfluorotic villages in Telangana's Nalgonda District and Nalgonda Division was conducted. Key informants helped produce a village map for each community. Local community leaders and Multi purpose workers participated in the informal gathering. For a few days, a continuous house-to-house survey was conducted in the villages to provide a complete picture of the people. To cover the homes that were discovered to be locked and the people who were absent on the survey day, a follow-up visit was undertaken in the evening of the last day. During a house checkup, all members of the family underwent clinical go tour a home. Using a predesigned, pretested proforma, data were collected. The different kinds of fluorosis were classified using field case definitions.

a. Dental fluorosis, which causes teeth to appear mottled, chalky white, yellowish brown, or brownish black all over, is one type of the condition.

b. Genu varum: When standing, the legs are typically outwardly bent at the knee.

c. Genu valgum: Inward bending of the legs while standing.

d. Kyphosis: A forward bend in the spine accompanied with a hard, fixed thoracic cage.

Result and Discussion

Bore wells and dug wells are six settlements' primary sources of drinking water. The current survey is being undertaken to determine the level of fluoride in hand pumps and bore wells as well as the overall incidence of skeletal and dental fluorosis in six villages, including fluorosis and non-fluorosis.

According to the study's findings, fluoride levels in fluorotic communities are more than 5 ppm (Table.2).

Table 2:FLURIDE LEVELS (>5 mg) VILLAGE WISE IN THE NALGONDA DISTRICT:

Mandal	Gram panchayathi	Habitation	Fluoride
Chandur	Bangari gadda	Bangarugadda	5.69
	Narmata	Narmata	5.07
Chinthapally	Kistrainpally	Raingudem	5.1
Kattangur	Duginelly	Duginelly	5.41
Narketpally	Ammanabole	Ammanabole	7.59
	Chervugattu	Charvugattu	10.7
	M.Yadavally	M.Yadavally	5.6
	Mandra	Mandra	5.89
	Narketpally	Narketpally	5.26
		Choutabavi	6.6
	Yellareddy gudem	Yellareddy gudem	11.4
		Dasarigudem	7.64
		Sheribai gudem	5.23

The analysis information showed that the The research areas' groundwater is alkaline. According to the results of the epidemiological survey, In Fluorotic villages skeletal fluorosis affects 50 men and women in selected area out of 100 men and women. Skeletal fluorosis affects 50 % of both males and females (Table 7), In Non Fluorotic villages skeletal fluorosis affects 08 men and women in selected area out of 68 men and women, respectively. Skeletal fluorosis affects 11.76 % of both males and females (Table 7),Overall fluorotic villages skeletal fluorosis is more than in Non fluorotic villages. In Fluorotic villages dental fluorosis affects 57 men and women in selected area out of 100 men and women, dental fluorosis affects 57 % of both males and females from this area (Table 7), In Non Fluorotic villages dental fluorosis affects 15 men and women in selected area out of 68 men and women, Dental fluorosis affects 22.05% of both males and females (Table 7),Overall fluorotic villages dental fluorosis is more than in Non fluorotic villages (combined dental and skeletal fluorosis in fluorotic and non fluorotic villages are respectively 53.5%and 16.91%.).

Likewise, Table 1 The findings of the fluoride analysis of water samples taken from hand pumps and bore wells in the selected villages were demonstrated to the statistics show that both bore well and hand pump water maximum contain up to 11.4 ppm of fluoride. According to the findings in Table 6, 58 men and females (out of 104 males and 64 females) had skeletal fluorosis. In this, skeletal fluorosis affects 34.52% of males and females. Furthermore, dental fluorosis affects 72 women and men. In this, the overall prevalence of dental fluorosis is 42.85 % in both men and women (Table.6)from two selected group villages.

Fluorotic and Non fluorotic villages , the overall incidence of fluorosis is 53.5% and 16.91% in men and women combined dental and skeletal fluorosis) (Table.7). Fluorotic and Non fluorotic villages in the Nalgonda district are found to have excessive fluoride levels in their drinking water for the first time thanks to the current study. These villages' drinking water samples have 0.46 to 11.4 ppm, Mean of the fluorotic and Non fluorotic villages are 9.91and 0.61 ppm in them.

Table 3 : Shows that Fluorine levels in selected areas

Sno	**Selected area**	**Villages**	**Male**	**Female**	**Total**	**Fluorine**	**F.Mean**
1	**Fluorotic villages**	Yellareddy gudem-	28	17	45	11.4 ppm	9.91
2		Chervugattu	12	10	22	10.7ppm	
3		Dasari gudem	25	8	33	7.64ppm	
Fluorotic Total			**65**	**35**	**100**		
4	**Non Fluorotic villages**	Battapothula gudem	7	10	17	0.77ppm	0.61
5		Motabavi gudem	18	7	25	0.61ppm	
6		Mirloni gudem	14	12	26	0.46ppm	
	Non fluorotic total		**39**	**29**	**68**		
Total			**104**	**64**	**168**		

Since there are no fluoride-contaminating industries in the area or close by the fluoride pollution of the drinking water in the Nalgonda district is the result of geological origin. A successful strategy for reducing fluorosis is to provide these villages with clean drinking water. these villages is a fruitful way to minimize fluorosis .People of all age groups in these regions are exposed to more fluoride mean of the age is 47 (Table 4), in this selected areas are age distribution is below 24 age is 8.92% ,25 to 34 is 12.5% ,35 to 49 is 45.23% ,above 49 age percentage is 33.33% (Table 5)

Table 4:AGE DISTRIBUTION.

	N	Minimum	Maximum	Mean	Std. Deviation
Age in years	168	13	81	47	6.425

Table 5: A COUNT OF AGE DISTRIBUTION BASED ON AGE GROUPS

Age Group (in years)	Non fluorotic Frequency	Fluorotic Frequency	Frequency	Percentage
<24	8	7	15	08.92
25-34	9	12	21	12.5
35-49	35	41	76	45.23
>49	24	32	56	33.33
Total	76	92	168	100

Particularly all kinds of age persons It was noted in 58% that persons who had consumed higher levels of fluoride may get debilitating skeletal fluorosis. Skeletal fluorosis'and dental fluorosis frequency in people from fluorotic villages all sexes are 50% and 57%, respectively. High fluoride levels in both hand pumps and bore well waters have been linked to skeletal fluorosis , which is consistent with our Findings as shown in table 7 and graph 1,2,3 , Neck pain is 9.21%, Backache is 7.73% ,Joint pains are 38.69% ,Rheumatoid related problems are 5.95% ,Odema is 3.57% ,Learning disabilities are 6.54% ,thyroid problems are 18.45% ,Diabetis is 13.6% , Giddiness is 14.28% . Typically, skeletal fluorosis is not diagnosed in its early stages until it has evolved to stage (Badruka .k et al.,2011) Early skeletal fluorosis symptoms are thought to include joint and bone discomfort, muscle weakness, occasional pain, chronic weariness, and joint stiffness. Later phases result in hardening of the bones, osteoporosis in long bones, and bones that are more brittle. Denser and atypical crystalline structure develops. In In the later stages, bones and joints entirely deteriorate, making it difficult to move them (Arlappa N et al.,2013) The patient is left crippled and the vertebrae in the spine fuse together, which is the last stage. According to(Shashi et al., Chauhan D et al.,2013) the average person exposed to 0.6-1.0 ppm fluoride in drinking water is considered to be healthy. endemic regions that resulted in chromosomal abnormality. However, general skeletal fluorosis has a direct impact on the village's economy because it not only sickens and disables people but also their domestic animals, which provide them with their primary source of income. According to the current study, fluorosis affects above 70% of the population in the two communities. Other recent studies have found a correlation between rising fluoride levels in drinking water and an increase in the prevalence of dental fluorosis . Our findings are consistent with findings's(Hanumantha rao Y et al.,2011) Despite the possibility that the prevalence of dental fluorosis varies greatly among different geographic regions with essentially the same fluoride levels concentrations in water for drinking. These results revealed that the occurrence of dental fluorosis is affected by a number of factors in addition to water fluoride content and exposure time, including dissolved salts in water, nutrition, and lifestyle.

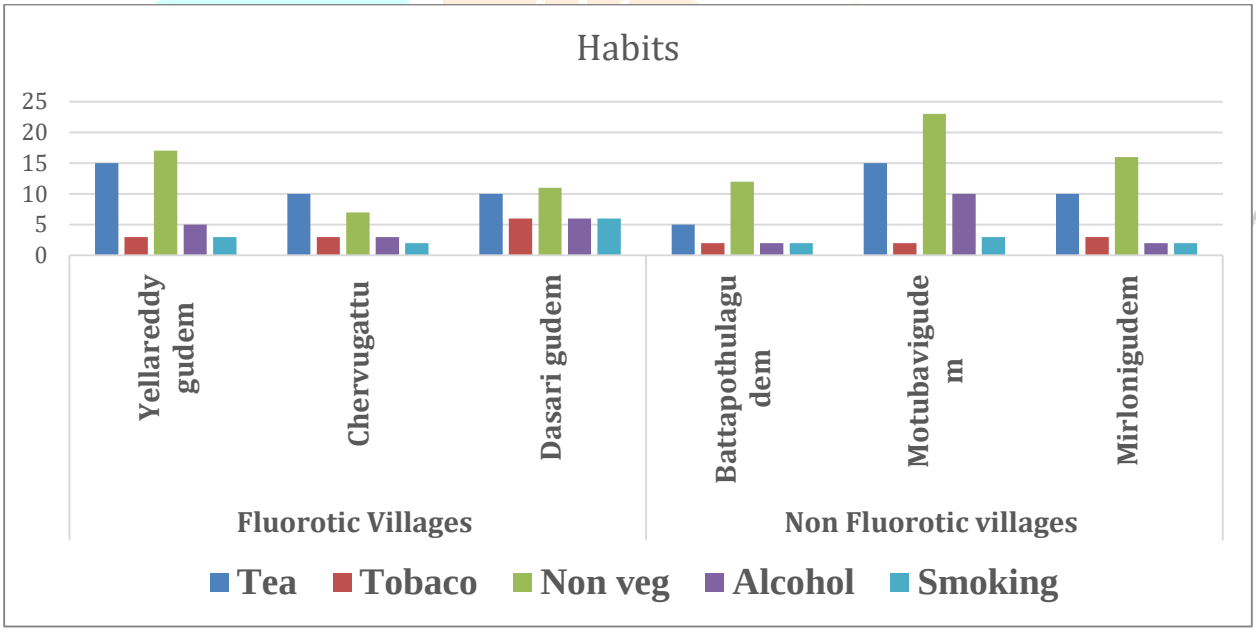
Table 6: INFORMATION ABOUT PRIOR MEDICAL ILLNESSES

S.No	Organ	Symptoms	Non Fluorotic villages (N=68)			Fluorotic Villages(N=100)			Total(N=168)	
			Number	Percentage	x-	Number	Percentage	x-	Number	Percentage
1	CNS	Tension	5	7.35	0.073	9	9	0.09	14	8.33
		Giddiness	14	20.58	0.20	10	10	0.1	24	14.28
		Learning disablilites	1	1.47	0.014	10	10	0.1	11	6.54
2	Endocrine system	Diabetis	5	7.35	0.073	18	18	0.18	23	13.6
		Thyroid	3	4.41	0.04	28	28	0.28	31	18.45
3	Excretary system	Kidney	1	1.47	0.014	1	01	0.01	02	1.21
4	Musculo skeletal system	Rheumatoid	2	2.94	0.02	8	08	0.08	10	5.95
		Joint pains	3	4.41	0.04	62	62	0.62	65	38.69
		Muscle Pain	3	4.41	0.04	51	51	0.51	54	32.14
		Skeletal	8	11.76	0.11	50	50	0.5	58	34.52
5	Lymphatic system	odema	2	2.94	0.02	4	04	0.04	06	3.57
6	Digestive system	dental	15	22.05	0.22	57	57	0.57	72	42.85
		Constipation	7	10.29	0.10	22	22	0.22	29	17.26
total			69			330			399	

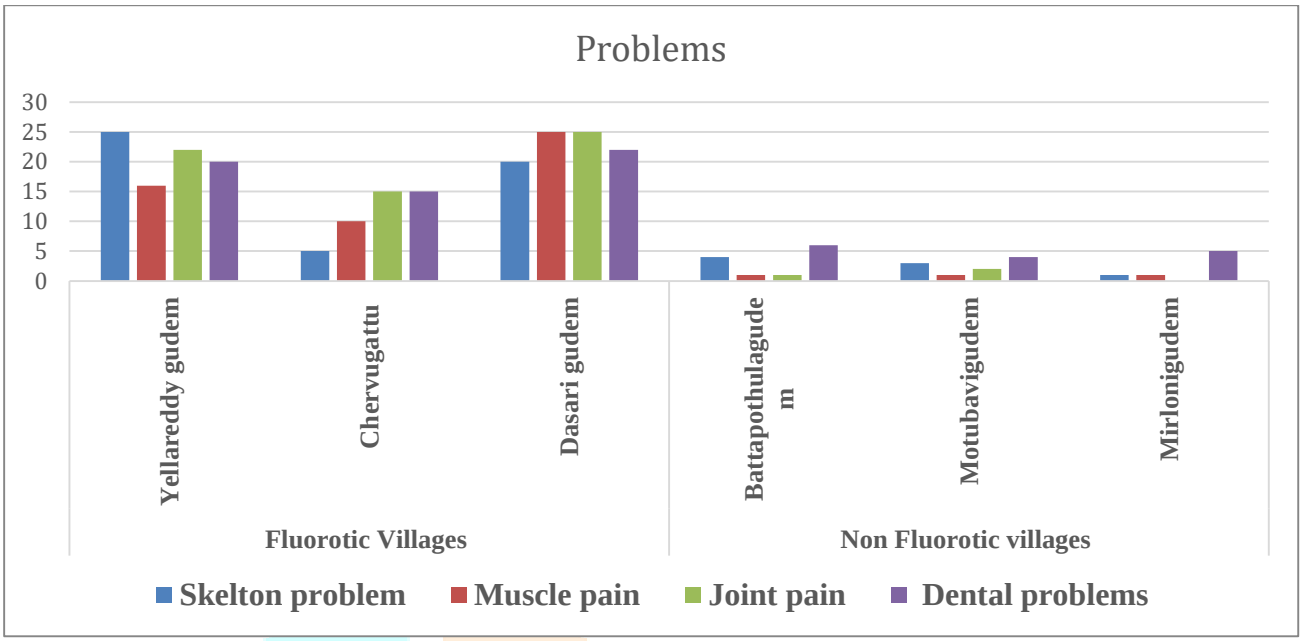
Table 7: Total incidence of fluorosis including gender distribution in the fluorotic villages and non fluorotic villages.

Gender	Total No. Surveyed	Affected with dental fluorosis	Affected with skeletal fluorosis	Total incidence of fluorosis
Fluorotic	100	57(57%)	50(50%)	53.5%
Non fluorotic	68	15(22.05%)	08(11.76%)	16.91%
Total	168	72(42.85%)	58(34.52%)	70.41%

Graph 1; shows that habit wise details in village wise .



Graph 2 shows that problem wise details in village wise



Graph 3 shows that problem wise details in village wise

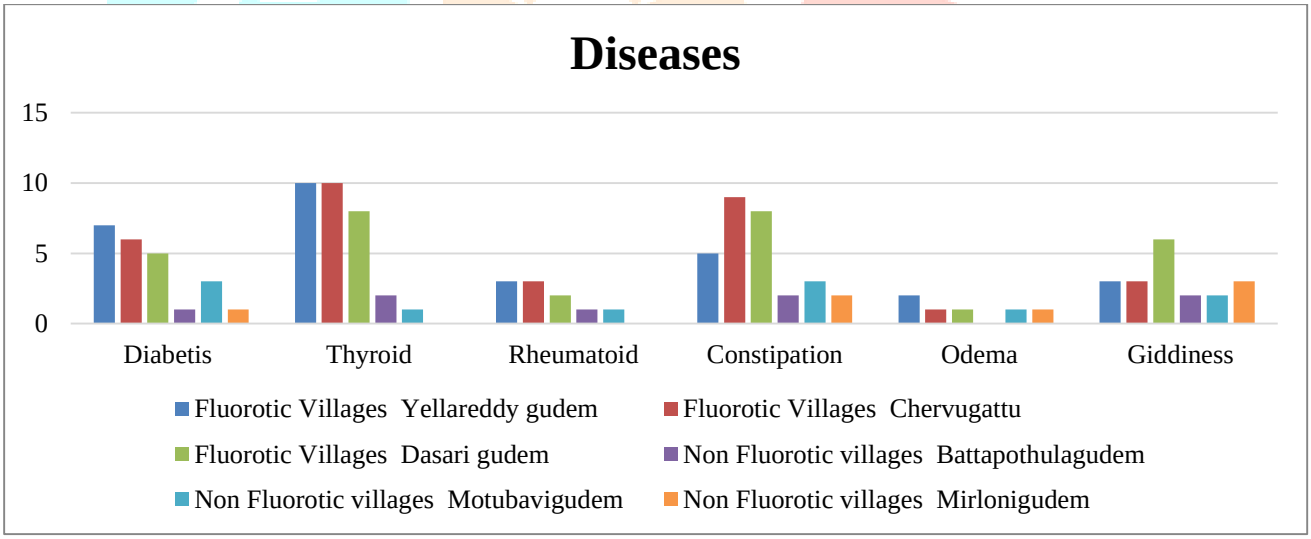


Fig 1 ; Telangana and Nalgonda maps

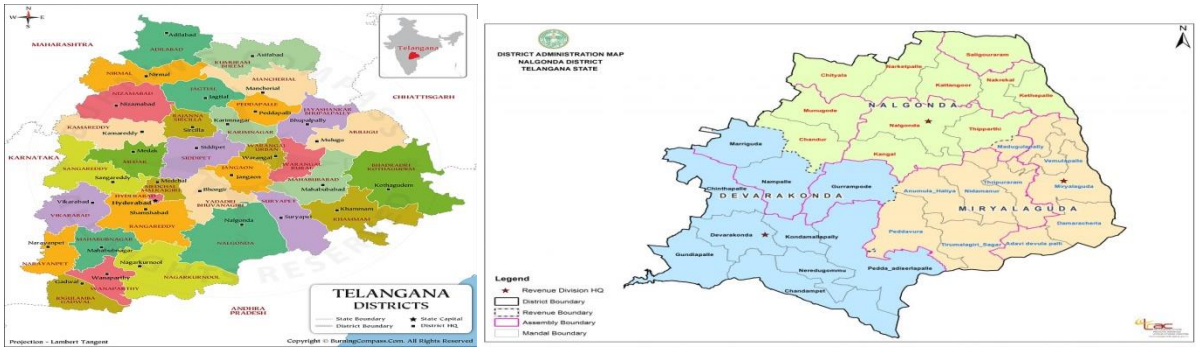
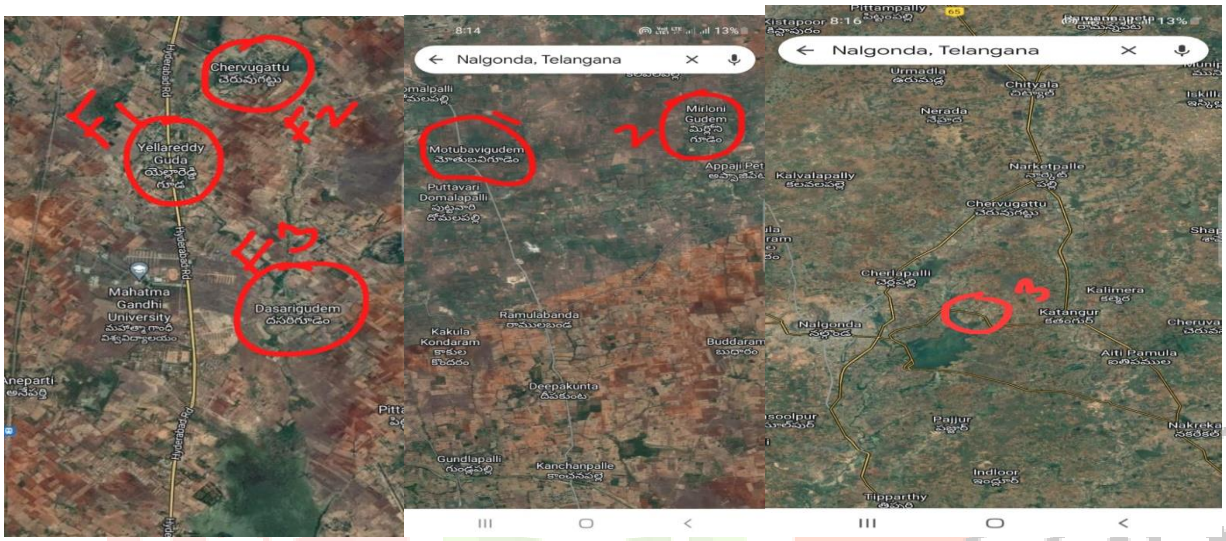


Fig 2 ; Fluorotic and Non Fluorotic villages location maps .



Between the fluorotic and nonfluorotic villages, skeletal and dental fluorosis was found to be more prevalent.According to the study's findings, Nagarjunsagar water with a permitted fluoride level is being provided to residents of the many regions in Nalgonda for drinking purpose but many people are using vegitables ,fruits and milk products from which are locally avaiable soil fluorinated water. In the fluorotic research area, the prevalence of skeletal and dental fluorosis is 50% and 57% respectively and other health problems have been identified. Future research could benefit from the amounts of fluoride in drinking water and the prevalence of skeletal and dental fluorosis that were established in this study.

Table 5: Shows the occurrence of skeletal issues in individuals from two different types of villages: non-fluorotic and fluorotic.

		Skeletal		Total	Chi-Square	Sign
		No	Yes			
Non Fluorotic villages	Count	61	7	68	25.470	.000
	% within Area Code	89.7%	10.3%	100.0%		
Fluorotic villages	Count	52	47	99		
	% within Area Code	52.5%	47.5%	100.0%		
Total	Count	113	54	167		
	% within Area Code	67.7%	32.3%	100.0%		

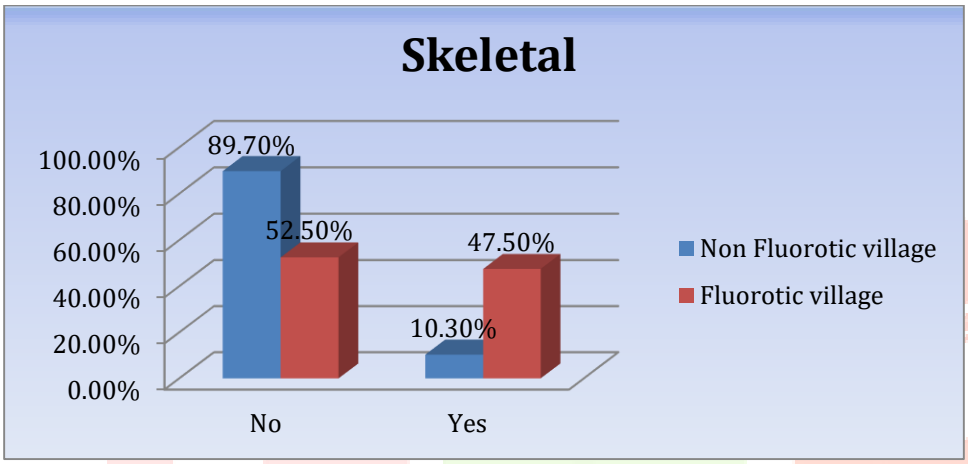


Figure: skeletal issues in individuals from two different types of villages: non-fluorotic and fluorotic.

The above table and figure show that, to see the association between Fluorotic areas and the Skeletal issues was performed by chi-square test. The calculated Pearson chi-square value is 25.470 and calculated p-value is .000 (2-sided) which is significant at 5% level that means there is an association between the Skeletal issues and fluorotic areas.

The non-fluorotic villages 61 (89.7%) do not have skeletal issues. 7 (10.3%) have skeletal issues, in Fluorotic villages 52 (52.5%) individuals do not have skeletal issues, 47 (47.5%) individuals do have skeletal issues, Overall Combining the two types of villages, 113 (67.7%) individuals have no skeletal issues, 54 (32.3%) individuals have skeletal issues.

A significantly higher percentage of respondents in fluorotic villages have skeletal issues (47.5%) compared to those in non-fluorotic villages (10.3%). This suggests a potential link between fluorosis and skeletal problems since fluorotic villages are typically characterized by high levels of fluoride in water, which can lead to fluorosis and related skeletal issues.

Overall, when looking at the total population from both types of villages, about a third (32.3%) have skeletal issues. This indicates that while skeletal issues are present in the general population, they are significantly more prevalent in areas with fluorosis.

Table 6: Shows the prevalence of dental issues in individuals from non-fluorotic and fluorotic villages.

		Dental		Total	Chi-Square	Sign
		No	Yes			
Non Fluorotic villages	Count	54	14	68	26.161	.000
	% within Area Code	79.4%	20.6%	100.0%		
Fluorotic villages	Count	39	60	99		
	% within Area Code	39.4%	60.6%	100.0%		
Total	Count	93	74	167		
	% within Area Code	55.7%	44.3%	100.0%		

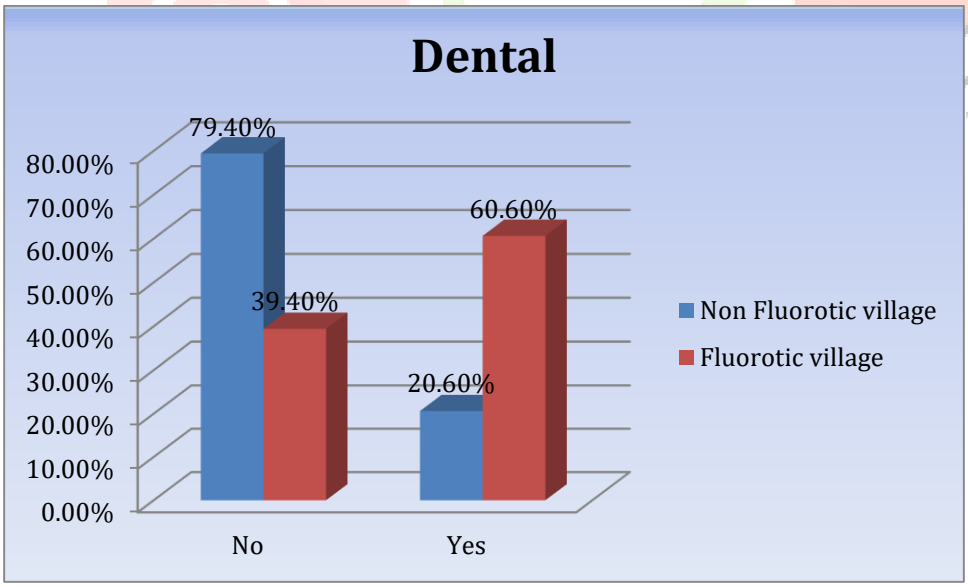


Figure: Shows the prevalence of dental issues

The above table and diagram shows that, to see the association between Fluorotic areas and the Dental issues was performed by chi-square test. The calculated Pearson chi-square value is 26.161 and calculated p-value is .000 (2-sided) which is significant at 5% level that means there is an association between the Dental issues and fluorotic areas.

The non-fluorotic villages 54(79.4%) do not have dental issues, whereas 14 (20.6%) have dental issues, in Fluorotic Villages 39 (39.4%) do not have dental issues, 60 (60.6%) have dental issues, across both village types 167 in 93 (55.7%) have no dental issues, 74(44.3%) have dental issues. There is a notable difference in the prevalence of dental issues between non-fluorotic and fluorotic villages. In non-fluorotic villages, the majority of the population does not have dental issues 54 (79.4%), while in fluorotic villages, the majority does have dental issues 60 (60.6%). Overall from both types of villages combined shows that dental issues are quite common, affecting nearly half of the population 74 (44.3%).

The high prevalence of dental issues in fluorotic villages might suggest a correlation with the fluoride levels in these areas, as excessive fluoride exposure is known to cause dental fluorosis, which can lead to tooth discoloration and enamel erosion.

Table 27: The table presents the prevalence of muscle weakness/stiffness among individuals in non-fluorotic and fluorotic villages

		Muscles weakness/Stiffness		Total	Chi-Square	Sign
		No	Yes			
Non Fluorotic villages	Count	61	7	68	5.823	.016
	% within Area Code	89.7%	10.3%	100.0%		
Fluorotic villages	Count	74	25	99		
	% within Area Code	74.7%	25.3%	100.0%		
Total	Count	135	32	167		
	% within Area Code	80.8%	19.2%	100.0%		

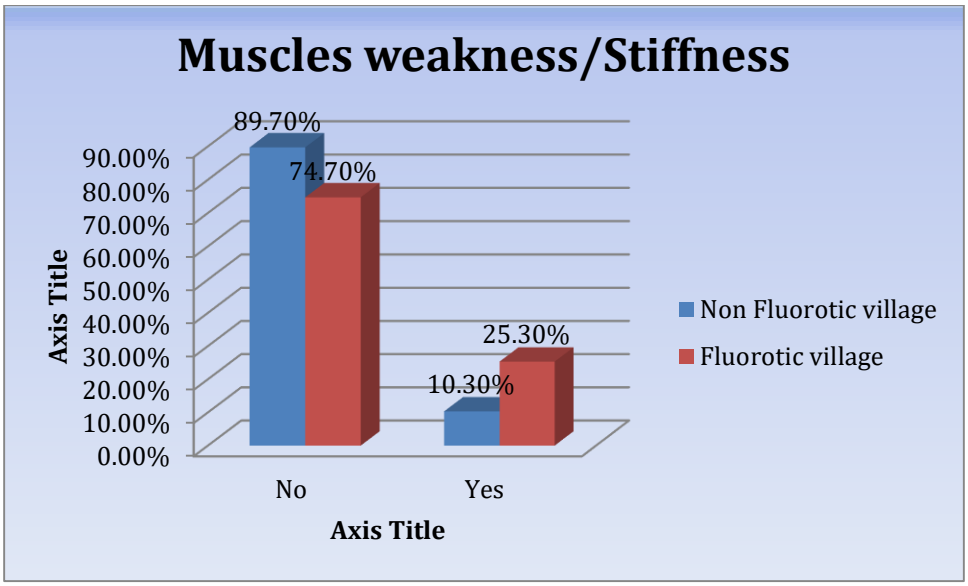


Figure: the prevalence of muscle weakness/stiffness among individuals in non-fluorotic and fluorotic villages

From the table and figure it reveals that, to check the association between Fluorotic areas and the prevalence of muscle weakness/stiffness among individuals was performed by chi-square test. The calculated Pearson chi-square value is 5.823 and calculated p-value is .016 (2-sided) which is significant at 5% level that means there is an association between the prevalence of muscle weakness/stiffness among individuals and fluorotic areas.

In non-fluorotic villages, out of 68 (100%), 61 (89.7%) did not report muscle weakness/stiffness, while 7 (10.3%) did report such symptoms. In fluorotic villages, out of 99 (100%), 74 (74.7%) did not report muscle weakness/stiffness, while 25 (25.3%) reported experiencing these symptoms. Combining both types of villages, out of a total of 167 (100%), 135 (80.8%) did not experience muscle weakness/stiffness, and 32 (19.2%) reported experiencing it.

It suggests that muscle weakness/stiffness is more commonly reported in fluorotic villages 25 (25.3%) than in non-fluorotic villages 7 (10.3%). This could imply a possible association between fluorotic conditions and the incidence of muscle weakness/stiffness. However, as with any observational data, it is important to consider other factors that might contribute to these findings and that correlation does not imply causation. Further study would be needed to establish any causal relationship.

Table 28: The table provides the occurrence of muscle pain and muscle loss among individuals in non-fluorotic and fluorotic villages

		Muscles pain and loss of muscle		Total	Chi-Square	Sign
		No	Yes			
Non Fluorotic villages	Count	64	4	68	35.392	.000
	% within Area Code	94.1%	5.9%	100.0%		
Fluorotic villages	Count	50	49	99		
	% within Area Code	50.5%	49.5%	100.0%		
Total	Count	114	53	167		
	% within Area Code	68.3%	31.7%	100.0%		

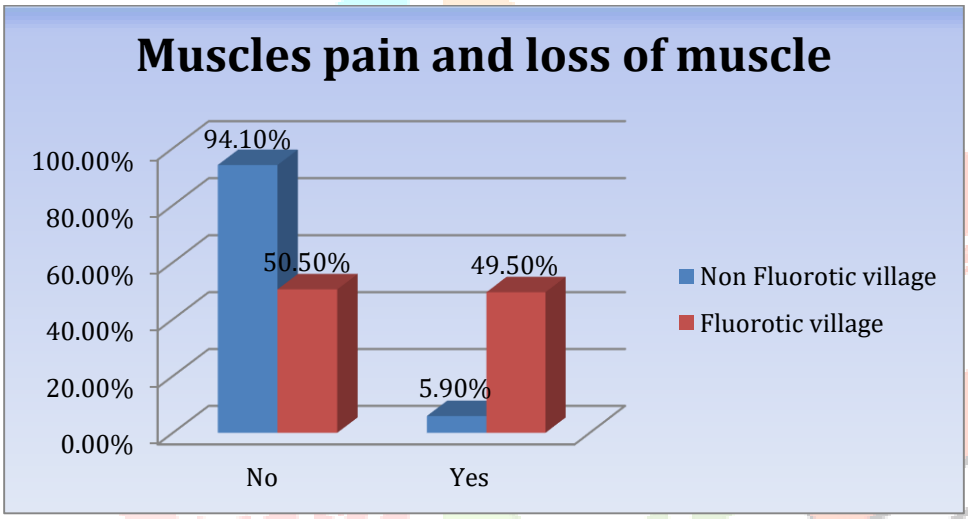


Figure: the occurrence of muscle pain and muscle loss among individuals in non-fluorotic and fluorotic villages.

The table and figure explain that, to check the association between Fluorotic areas and occurrence of muscle pain and muscle loss among individuals was performed by chi-square test. The calculated Pearson chi-square value is 35.392 and calculated p-value is .000 (2-sided) which is significant at 5% level that means there is an association between occurrence of muscle pain and muscle loss among individuals and fluorotic areas.

In non-fluorotic villages, from a total of 68 (100%), 64 (94.1%) reported no muscle pain or muscle loss, while 4 (5.9%) reported experiencing these issues. In fluorotic villages, out of 99 (100%), nearly half with 50 (50.5%) reported no muscle pain or muscle loss, but a significant number, 49 (49.5%), did report these symptoms. both non-fluorotic and fluorotic villages, 167 (100%), 114 (68.3%) did not experience muscle pain or muscle loss, whereas 53 (31.7%) reported having these symptoms.

It indicates that muscle pain and muscle loss are far more commonly reported by individuals living in fluorotic villages (49.5%) compared to those in non-fluorotic villages (5.9%). The significant difference in the reported rates of these symptoms could suggest an association between fluorotic conditions and muscular health issues. However, this table alone does not establish a causal relationship, and further investigation would be necessary to understand the underlying reasons for this disparity.

Table 35: The table shows the incidence of constipation among individuals in non-fluorotic and fluorotic villages:

		Constipation		Total	Chi-Square	Sign
		No	Yes			
Non Fluorotic villages	Count	63	5	68	7.284	.007
	% within Area Code	92.6%	7.4%	100.0%		
Fluorotic villages	Count	76	23	99		
	% within Area Code	76.8%	23.2%	100.0%		
Total	Count	139	28	167		
	% within Area Code	83.2%	16.8%	100.0%		

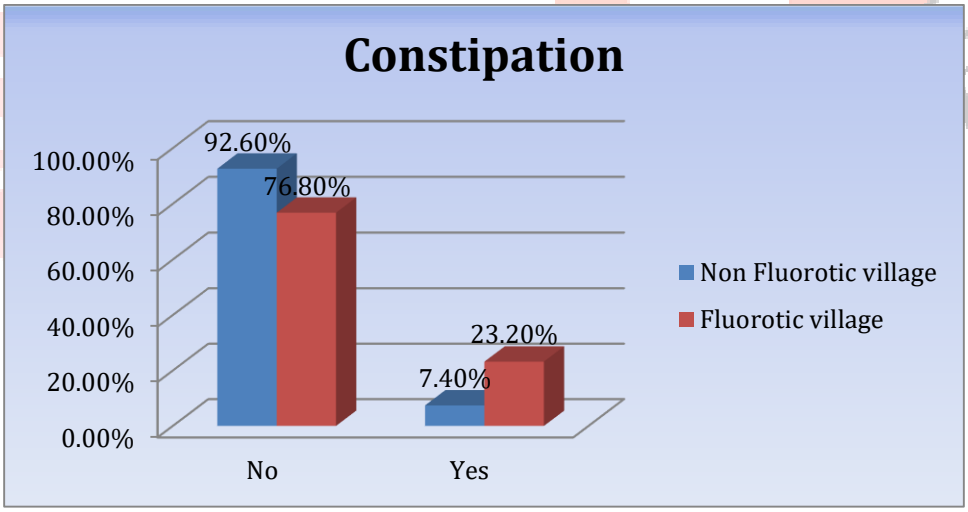


Figure: The incidence of constipation among individuals in non-fluorotic and fluorotic villages

From the table and figure shows that, to check the association between Fluorotic areas and the incidence of constipation among individuals was performed by chi-square test. The calculated Pearson chi-square value is 7.284 and calculated p-value is .007 (2-sided) which is significant at 5% level that means there is association between the incidence of constipation among individuals and fluorotic areas.

In non-fluorotic villages, out of 68(100%), 63 (92.6%) reported no constipation, while 5 (7.4%) reported experiencing constipation. In fluorotic villages, from the 99(100%), 76 (76.8%) reported no constipation, but a larger proportion, 23 (23.2%), reported experiencing constipation. Overall, from the total of 167 individuals surveyed across both types of villages, 139 (83.2%) did not experience constipation, while 28 (16.8%) reported having constipation.

It suggests a notable difference between the two village types, with constipation being reported more frequently in fluorotic villages 23 (23.2%) compared to non-fluorotic villages 5 (7.4%). This could indicate a potential link between fluorotic conditions and a higher incidence of constipation.

Conclusion

In fluorotic villages, both skeletal and dental fluorosis are extremely common. As the fluoride concentration in drinking water and food grew, there was a rise in the severity of skeletal, dental, and other health concerns in participants. The study determined a link between the consumption of fluorinated food and the prevalence of skeletal and dental fluorosis. Skeletal fluorosis causes impairment and disability, which makes the affected person handicapped.

As a result, they are unable to find work or labour to support themselves everyday and live as dependents. The young with skeletal and dental fluorosis, however, are in a very tough situation because they were unable to form an alliance with villages that were not afflicted by fluoride. As a result, they are forcing the youth from these villages harmed by fluoride or the same.

Therefore, we recommended that the government take prompt steps to protect residents of fluoridated villages from developing skeletal and dental fluorosis.

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Fig 3 shows that fluorosis awareness programme and epidomological survey photos in selected villages

ఉమ్మడి జిల్లాలో 19లక్షల మంది ఫ్లోరైడ్ బాధితులు

● ఉస్మానియా యూనివర్సిటీ ప్రొఫెసర్ జితేందర్

నార్కట్‌పల్లి, డిసెంబరు 8: ఉమ్మడి నల్లగొండ జిల్లాలో 19లక్షల మంది ఫ్లోరైడ్ బాధితులు ఉన్నారని ఉస్మానియా యూనివర్సిటీ జువాలజీ డిపార్ట్‌మెంట్ సీనియర్ ప్రొఫెసర్ ఎన్. జితేందర్‌కుమార్ తెలిపారు. 'బయోకెమికల్, సైటో జెనిటిక్ ఇన్వెస్టిగేషన్ ఇన్ ఎండమిక్ ఫ్లోరైడ్ ఆఫ్ నల్లగొండ జిల్లా' అనే అంశంపై రీసెర్చ్‌లో భాగంగా నార్కట్‌పల్లి మండలంలోని దాసరిగూడెంలో గురువారం ఫ్లోరైడ్‌పై జరిగిన అవగాహన సదస్సులో ఆయన మాట్లాడారు. భారతదేశ వ్యాప్తంగా 22మిలియన్ల మంది ఫ్లోరిన్ బారిన పడ్డారని, మరో 22 మిలియన్ల మంది ఫ్లోరిన్ సంక్రమణ బాధితులు కానున్నారన్నారు. ఫ్లోరిన్ నివారణలో నిర్లక్ష్యం వహిస్తే భవిష్యత్‌లో ఆందోళన కలిగించే వ్యాధిగా మారుతుందని హెచ్చరించారు తెలంగాణలో అత్యధికంగా ఫ్లోరైడ్ ప్రభావిత గ్రామాలుగా గుర్తించిన నార్కట్‌పల్లి మండలంలోని దాసరిగూడెం, చెర్వుగట్టు, ఎల్లారెడ్డిగూడెంలతో పాటు ఫ్లోరైడ్ తక్కువగా నమోదైన మిర్లోనిగూడెం, మోటుబావిగూడెం, బట్టుపోతులగూడెంలను ఎంపిక చేసుకుని నీటి నమూనాలను సేకరించి పరిశోధన చేశామన్నారు. ప్రపంచ ఆరోగ్య సంస్థ గుర్తించిన 0.5 పీపీఎం మోతాదుకు మించి నార్కట్‌పల్లి మండలంలోనిపై మూడు గ్రామాల్లో ఫ్లోరిన్ ఎక్కువగా ఉందన్నారు. ఈ నీటిని సేవించడం ద్వారా మానవ శరీరంలోకి సులభంగా ప్రవేశిస్తున్న భూతం దేహంలోని కణాలతో కలిసి ప్రమాదకర స్థాయి మార్పులను కలగజేస్తుందని హెచ్చరించారు. ఉమ్మడి నల్లగొండ జిల్లాలోని 1,108 ఆవాస గ్రామాల్లో సుమారు 19లక్షల మంది ఫ్లోరోసిస్ బాధితులున్నట్లు తమ పరిశోధనలో తేలిందన్నారు. ఫ్లోరిన్ పట్ల ఏ మాత్రం నిర్లక్ష్యం తగదని అప్రమత్తంగా లేకుంటే ఆందోళన పడాల్సి వస్తుందన్నారు. నీటిని కాచి చల్లార్చి తాగితే ఫ్లోరిన్ శాతం కొంత తగ్గే అవకాశం ఉందని సూచించారు. సురక్షిత నీరు, సంతులన ఆహారం తీసుకోవాలని ఇంకుడు గుంతలను తీసుకుని నిల్వ చేసిన వర్షపు నీటిని సేవించడం ఆరోగ్యానికి మంచిదన్నారు. కాగా ఫ్లోరోసిస్ బారిన పడిన బాధితులను పరిశీలించారు. ఈ సమావేశంలో ఫ్లోరైడ్ పరిశీలన జిల్లా అధికారి వీరారెడ్డి, సర్పంచ్ ఉప్పల అనంతలక్ష్మి, పంచాయతీ కార్యదర్శి రాంబాబు పాల్గొన్నారు. ఓయాకు చెందిన పరిశోధక విద్యార్థి చిరబోయిన లక్ష్మయ్య ఫ్లోరిన్‌పై చేస్తున్న పరిశోధనకు ప్రొఫెసర్ జితేందర్ గైడ్‌గా వ్యవహరిస్తున్నారు.

సమావేశంలో మాట్లాడుతున్న ఓయూ ప్రొఫెసర్ జితేందర్

ఫ్లోరిన్‌పై అవగాహన సమావేశం

నార్కట్‌పల్లి డిసెంబర్ 8 (ప్రభన్యూస్): తాగే నీటిలో ఫ్లోరిన్ అధిక శాతం ఉండడం మూలంగా వివిధ రోగాలు వస్తున్నాయని ప్రొఫెసర్ డా.ఎస్.జితేందర్ కుమార్ నాయక్ తెలిపారు. గురువారం మండలంలోని దాసరిగూడెంలో ఫ్లోరిన్‌పై జరిగిన అవగాహన సమావేశంలో మాట్లాడారు. ఫ్లోరిన్ శాతం అధికంగా ఉన్న ప్రాంతాల్లో నార్కట్‌పల్లి మండల ప్రాధాన్యత సంతరించిందని, ఇందులో ఎల్లారెడ్డిగూడెం, చెర్వుగట్టు దాసరిగూడెం గ్రామాల్లో ప్రజల నుండి రక్త నమూనాలు సేకరించి పరిశోధించామని, వీటి నివారణకు తగిన జాగ్రత్తలు, సూచనలు అందజేసినట్లు తెలిపారు. కార్యక్రమంలో రీసెర్చ్ చేరబోయిన లక్ష్మయ్య, సర్పంచ్ ఉప్పల అనంతలక్ష్మీ, వీరారెడ్డి, బిక్షంరెడ్డి, సరిత, రాంబాబు, సునీత, ఈశ్వరమ్మ పాల్గొన్నారు.

అవగాహన కల్పిస్తున్న జితేందర్‌కుమార్