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FLUOROSIS IN SOME VILLAGES OF DUDU TEHSIL OF JAIPUR DISTRICT

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ABSTRACT

For the observation of fluoride toxicity in both sexes of children and adults from five villages of dudu tehsil, a survey was made by dividing the population surveyed i.e. 600, age wise for collecting baseline information of fluorosis. Fluoride concentration in the five villages varied between 0.19 mg/L to 3.70 mg/L. From the survey reports of the five villages, it was found that there were 100% symptomatics in Gadoti region and in Sheoshingpura Basadi; 41.67% in Chandpura; 87.50% in Kapadiawas region while 91.67% in Nasnoda region of the total population surveyed. Survey results of fluorosis prevalence by sex, revealed that fluorosis was significantly more prevalent in males than females.

Keywords:- Fluorosis survey, Five villages, Dudu Tehsil, Fluoride Toxicity.

Introduction:

Fluorosis is a worldwide health problem. It was detected in India, among cattle (bullocks used for plughing land) by the farmers of Andhra Pradesh state during early 1930's; later the same disease was detected in human beings. In Rajasthan the first case of skeletal fluorosis was reported from Jobner near Jaipur city by Kalsiwal and Soloman (1959) (Ozha et.al, 2003). In this state, >80% of the districts have high fluoride levels (12-90 mg/L in Thar region and 1.44-28.1 mg/L in Aravalli hilly region) in their drinking/ground water (Choubisa et. al, 2001).

Factors like use of chemical fertilizers (especially Phosphatic fertilizer) in agricultural field, discharge of industrial waste (especially from aluminium industry) into the soil increases the fluoride content into the ground water and excessive intake of this ground water and food habits like tea, jowar, red gram dhal, and cereals containing high fluoride content, are

responsible for causing fluorosis. Fluorosis is a crippling disease, which causes dental and skeletal fluororsis, or non-skeletal manifestations.

In dental fluorosis, the increased fluoride content of the enamel and dentine reduces calcium deposition in those tissues and may cause the mottling of enamel, discoloration, corrosion, stratification of enamel and formation of pits in teeth. Skeletal fluorosis involves abnormal mineralization of bone and soft tissues or the disruption of normal activity of the osteocytes. In children, dental fluorosis is commonly observed as compared to skeletal fluorosis.

Apart from dental and skeletal fluorosis, a considerable number of other ailments like gastrointestinal disorders, reduced fertility, cataract development, cardiovascular symptoms etc. (non-skeletal manifestations) have been reported in many other studies. (Chand, 1999, Sharma and Yadav, 2005, Arif, 2013, Kataria, 2014)

The present study was undertaken to assess the prevalence of dental, skeletal fluorosis and non-skeletal manifestations in villagers of five villages of Dudu tehsil of Jaipur district at different fluoride concentrations in drinking water. Geographically, the Dudu tehsil is located in between 26°25’ and 26°57’ N latitude and 74 55’ and 75 30’ E longitude. It lies in south west region of Jaipur district and covers an area of 1,870.64 sq. km. The study area is semi-arid and the annual mean rainfall is 490 mm.

Materials and Methods:

To record the symptoms of fluorosis on the people residing in the five villages of the tehsil, a survey was conducted from January to November, 2014, but before the survey, a preliminary analysis of fluoride content in the study areas was done. To analyse the fluoride content, twenty five ground water samples (five from each village) were collected from the study areas.

The five villages selected (located on National Highway-8) were

1. Chandpura
2. Kapadiawas
3. Gadoti
4. Nasnoda
5. Sheoshingpura Basadi

Fluoride concentration was determined with the help of selective ion meter 9 (Toledo MA 235 pH/ion Analyzer) and followed the standard procedure (APHA, 2012). Total Ionic

Strength Adjustment Buffer (TISAB) was used to maintain a suitable ionic strength and also to avoid complex formation. Distilled water and AR grade chemicals were used to prepare all reagents.

For the survey a questionnaire was developed with the help of available literature and under the guidance of experts. The symptoms were recorded on the basis of physical appearance, personal interview and the questionnaire filled by the population.

Sample selection:-

For this, the population in each village was divided in four age groups-

First age group- 1-15 years

Second age group- 16- 30 years

Third age group- 31-45 years

Fourth age group- 46 years and above

From each village 60 males and 60 females were selected to study the symptoms i.e in total one hundred twenty people from each people.

Tools and techniques of collection of data:-

The developed questionnaire was distributed among the local people. Personal information of each individual like name, age, sex, name of village etc. and information related to the food habits including eating of tobacco, black rock salt, and use of fluoridated toothpaste and source of water supply in the village was gathered through a performa.

For the evidence of dental fluorosis, teeth of children and adults of both the sexes were examined in day time and recorded.

Results:

From the survey reports of the five villages, it was found that there were 100% symptomatics in Gadoti region and in Sheoshingpura Basadi; 41.67% in Chandpura; 87.50 % in Kapadiawas region while 91.67% in Nasnoda region of the total population surveyed (Table 1).

More than 84% of people were found to be suffered from symptoms of skeletal fluorosis in the five villages giving a prevalence rate of 500, 437, 572, 437 and 489 per 1000 population exposed respectively in the villages. The prevalence of non-skeletal fluorosis was found to be 442, 364, 489, 437 and 401 per 1000 population in the villages. The percentage of males suffering from skeletal and non-skeletal manifestations was found to be significantly higher

as compared to females in the five villages (Table 2) Lower prevalence in females might because of that females immigrated to the study areas consequent to their marriage, therefore probably were not exposed to high fluoride during their childhood. Same results were obtained earlier by Choubisa et al (1996), Jain and Chaudhary, 1999, Choubisa et al, 2001, Sinha and Kant, 2003 and Ozha et.al, 2003.

Prevalence of skeletal fluorosis according to the age was found to be significant. At high fluoride level, skeletal fluorosis appeared at initial stages of life whereas at low fluoride level it occurs at later stages of life. As the age increased, prevalence of skeletal fluorosis also increased because consequently the length for the residence in study areas also increased.

People were also suffering from dental fluorosis. The common symptoms observed were discoloration, yellow stains etc. initially followed by dental carries, tooth ache and reduction in overall strength (Fig.2). Total prevalence of skeletal fluorosis was low as compared to dental fluorosis and sex wise there was difference in the occurrence of skeletal fluorosis (Fig.1)

These problems are dominant in the study areas from last several years. Almost whole population surveyed had one or more of the above symptoms. The villages near to the study areas were also affected by excess fluoride. Some of these villages are worst affected by dental fluorosis.

distribution of persons with any symptoms of fluorosis as found in the survey of five	**Nasnoda (F^--2.40 ±0.04 ppm)**	Male	Female	Total
		15 (66.6%)	5	20
		15 (100%)	15	30
		15 (100%)	15	30
		15 (100%)	15	30
		60 (91.6%)	50	110

Age (in years)	Gadoti (F^--3.50 ± 0.01 ppm)			Chandpura (F^--0.67 ± 0.02 ppm)			Sheoshingpura Basadi (F^--3.70 ± 0.01 ppm)			Kapadiawas (F^--0.19 ± 0.07 ppm)		
	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total
1-15	15 (100%)	15	30	10 (50%)	5	15	15 (100%)	15	30	12 (66.6%)	8	20
16- 30	15 (100%)	15	30	7 (33.3%)	3	10	15 (100%)	15	30	20 (83.3%)	5	25
31-45	15 (100%)	15	30	5 (33.3%)	5	10	15 (100%)	15	30	15 (100%)	15	30
>45	15 (100%)	15	30	8 (50%)	7	15	15 (100%)	15	30	15 (100%)	15	30
Total	60 (100%)	60	120	30 (41.6%)	20	50	60 (100%)	60	120	62 (87.5%)	43	105

Table 2:

Sexwise prevalence of skeletal and non skeletal fluorosis in the five villages

Name of Village	Skeletal fluorosis			Non-Skeletal fluorosis		
	Male	Female	Total	Male	Female	Total
Gadoti	60.4%	39.5%	50%	53.1%	35.4%	44.2%
Chandpura	52%	37%	43.7%	46.8%	26%	36.4%
Sheoshingpura Basadi	60.4%	54.1%	57.2%	61.4%	36.4%	48.9%
Kapadiawas	56.2%	43.7%	50%	58.3%	29.1%	43.7%
Nasnoda	52%	45.8%	48.9%	46.8%	33.3%	40.1%

Fig.1 Skeletal Fluorosis in people of five villages

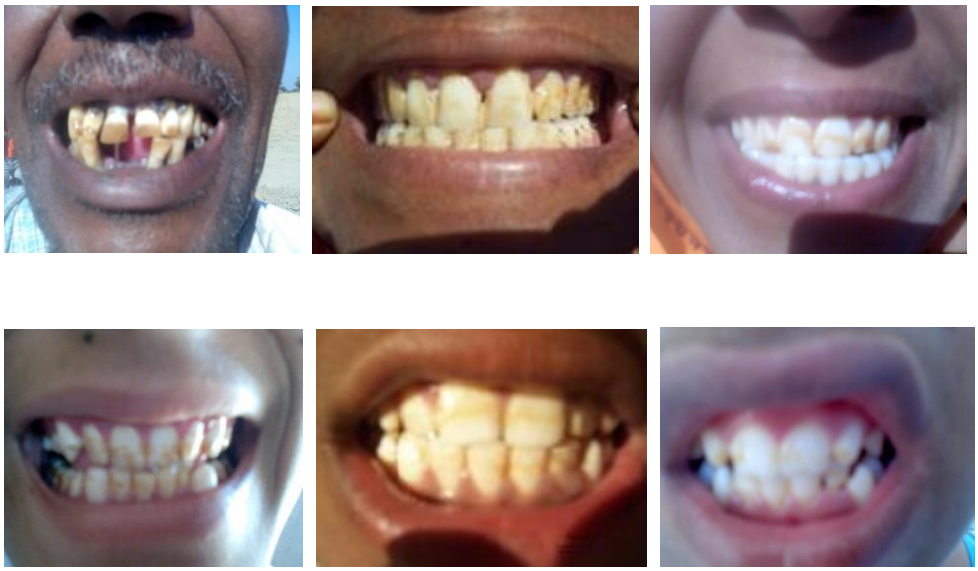

Fig. 2 Dental Fluorosis in people of five villages

The study of the questionnaire which was filled by the villagers of different age groups of the study areas showed that 66.0% of males and 63.67% of females of the five dahnis consumed tea or black tea. Among males 30.84% had tobacco and 5.3% had black rock salt, whereas in case of females 18.84% of them had tobacco and 2.84% had black rock salt. And the fluoridated toothpaste was used by approximately whole of the population (Table 3 and 4).

The fluoride concentration was ranged from 0.19 mg/L to 3.70 mg/L, respectively. Based on the available data, prevalence of high fluoride was observed in Gadoti, Sheoshingpura basadi, Nasnoda (table 1). Fluoride is beneficial to certain extent i.e. 0.6-1.2mg/L. But, despite of Fluoride concentration within the permissible limits in drinking water (0.67 mg/L) both dental and skeletal fluorosis was observed in Chandpura. The possible reason may be

more intake of fluoride through food materials like tea, tooth paste, jowar, red gram dhal, and cereals containing high fluoride content or fewer intakes of calcium supplements.

Table 3:

Age wise frequency distribution of males of five villages consuming fluoride rich foods.

Age group (years)	Tobacco	Black tea or Tea	Black rock salt	Fluoridated tooth paste
1-15 years	-	-	-	150
16- 30 years	23	100	-	150
31-45 years	65	146	29	125
46 years and above	97	150	3	76
Total	**185 (30.84%)**	**396 (66.0 %)**	**32 (5.3%)**	**501 (83.5%)**

Table 4:

Age wise frequency distribution of females of five villages consuming

Black tea or Tea	Black rock salt	Fluoridated tooth paste
-	-	150
90	-	150
142	17	110
150	-	85
382 (63.67%)	**17 (2.84%)**	**495 (82.5%)**

	Tobacco	- - 53 60	**115 (18.84%)**
	Age group (years)	1-15 years 16- 30 years 31-45 years 46 years and above	**Total**

Now, it is clear from the study that fluoride bearing water is not only the source of fluorosis, but food also contributes towards fluorosis.

Control and preventive measures of fluorosis

1. To save the villagers of Dudu tehsil from fluorosis, there is a need to educate people to adopt the remedial measures.
1. Public awareness programs in rural areas may be lauched.
2. People must avoid consumption of food items rich in fluoride eg. Maize, red gram, red chilli.
3. People must avoid preparation of tea in aluminium container (black tea).
4. Agriculturists should avoid use of fertilizer (phosphate).
5. People must adopt techniques to defluoridate water at household.
6. People must take diet rich in calcium and vitamin C.

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