PREVALENCE OF FLUOROSIS AMONG CHILDREN AND ADULTS

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ABSTRACT

A total of 50 domestic water sources (hand pump, jet pump, tube well and open well water) of 5 villages in Agra Sadar Tehsil of Agra District have been investigated for the evidence of fluoride content. Most of the water sources of these villages showed the presence of fluoride in the range of 1 to 18.3 ppm simultaneously. In these villages fluoride is much more than the prescribed limit of B.I.S. and W.H.O. Only 10% (village Patti Pachgain & Barara), 13.33% (village Nagla laljit & Mirhakur) and 46.66% (village Sahara) samples were found to be safe for drinking purposes from the point of view of fluoride concentration. Villagers are suffered from different types of fluorosis, prevalence of dental and skeletal fluorosis in villagers has also been observed. The prevalence of dental and skeletal fluorosis in both sexes was not much variable. However, male subjects showed relatively higher prevalence of dental and skeletal fluorosis.

Key Words: Fluoride, Drinking water, Fluorosis, Agra

INTRODUCTION

Fluorine is the seventeenth element in the order of abundance of elements in the earth's crust. Small concentration of fluoride (1-1.5mg/l) in drinking water has beneficial effect on human body, preventing dental caries. If concentration of fluoride is more than 3mg/l, it causes dental and skeletal fluorosis[1]. The effect of fluorides on the human health of man stem largely from dissolved fluoride present in many species of drinking water. However, particulate fluorides suspended in water may have a health importance that has largely been over looked and given adequate attention. An estimated 62 million people in India from 16 states are affected with dental, skeletal and non skeletal fluorosis[2].

The incidence of dental fluorosis in small village population was studied[3]. Endemic fluorosis in the village Ralla Anantpuram in Andhra Pradesh was reported[4]. It was reported, varying amount of fluoride ranging from 0.1-20 mg/l in water resource of Andhra Pradesh[5].

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Fluorosis has also been reported from Rajasthan, but only from a few districts[6,7,8,9,10&11].It was observed that municipal water can reduce the incidence of dental caries as compared to ground water[12].Similar water borne public health problem in Turkey, it is concluded that osteosclerosis was due to fluoride content[13]. Dental fluorosis was observed[,14,15,16&17] .High fluoride levels were reported in many regions like Saudi Arabia[18],Brazil[19], Europe[20] , Euthopia[21], China[22] , Australia[23], Tanzania[24].Liver and Kidney diseases or non skeletal fluorosis were observed[25].

A detailed study of 3500 ground water samples of Agra District revealed that more than 35% sources contain fluoride beyond the permissible limit of 1.5ppm[26]. In the Agra District, 80 ground water samples of few villages were assessed and critically examined different types of fluorosis in them.[27]

In Agra district of Uttar Pradesh, most of the villages depend on ground water for their drinking and other requirements. In view of the reported presence of dental and skeletal fluorosis in the rural population of district Agra and on account of lack of data on the fluoride content of their drinking water , an extensive survey of

Figure 1 (Proforma for Assessing Fluorosis in rural population)

PROFORMA FOR ASSESSING FLUOROSIS IN RURAL POPULATION

1. Name of person
2. Source of water
   a. Ground water – i) Hand pump ii) jet pump iii) open well iv) tube well
      (Depth of source)
   b. Tap water
3. Family members
4. People is having any type of fluorosis
5. Quantum of fluorosis
6. Types of fluorosis- a) Dental fluorosis b) skeletal fluorosis
7. Educational status
8. Duration of operation
9. Water- a) operational b) Non-operational
10. Past occurrence
11. Any other information

This proforma includes the information about people to rural area with special reference to fluorosis. A face to face interview of people was carried out and collected information.

water quality in the five villages of Agra district , have been performed. Water samples (n=50) from almost all the drinking sources (hand pump, open well, tube well, jet pump) were collected from the 5 villages of the Agra Sadar Tehsil of Agra District.

MATERIALS AND METHOD

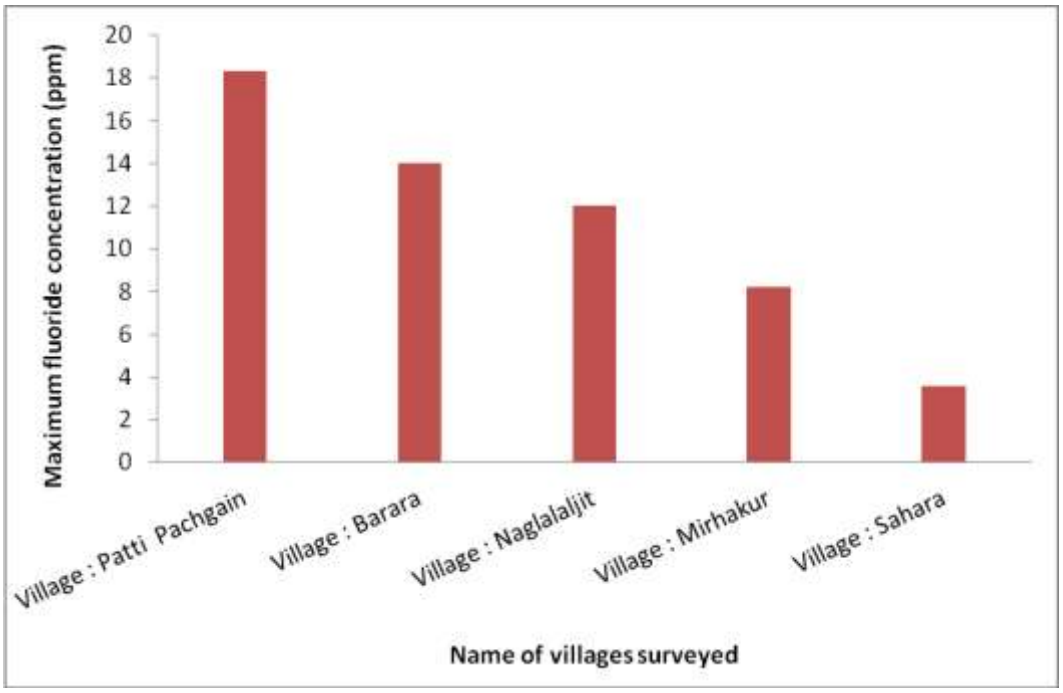
All the ground water samples of 5 villages of district Agra were collected from different wells, hand pump and jet pump of the area in the year 2010-11. All the samples were collected in the pre cleaned polythene bottles from existing ground water sources. Fluoride concentration was measured by Fluoride meter (Elico-CL352).

This study was conducted in 5 villages of Agra Sadar Tehsil of Agra District. A total of 50 domestic water sources (hand pumps, open wells, tube wells and jet pumps) were collected and analyzed them by fluoride meter. It has been observed that the fluoride concentration in ground water of studied villages ranged between 1.0 to 14 mg/L. During the survey it was found that the people were consuming this water for long time. People were critically examined and particulars were filled in the specific Proforma (Fig.-1).

RESULTS AND DISCUSSION

1) Village: Patti Pachgain

Figure 2 Maximum fluoride concentration (ppm) in various villages of Agra district



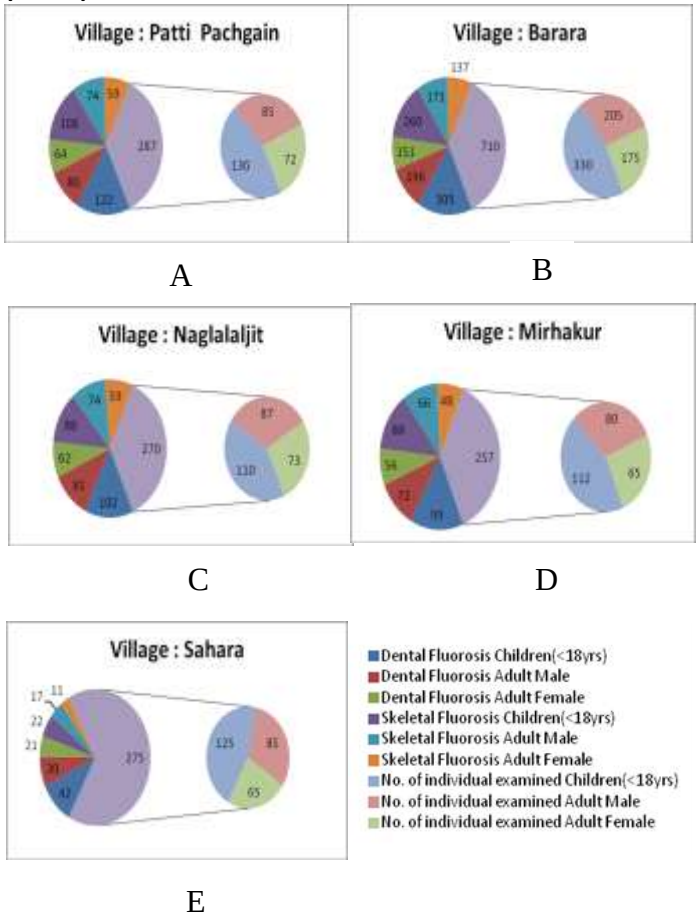
Of the samples analyzed, 10%, 15%, 30%, 20% and 25% fall in the category 0-1.5, 1.5-3, 3-6, 6-10 and > 10 respectively for fluoride. It has been observed that only 10% samples were safe for drinking purpose in this village from the point of view of fluoride concentrate ion in them. The maximum concentration of fluoride in water of this village was 18.3mg/L (Fig.-2). It is observed that 25% samples are found to be alarming and only 10% samples are safe for drinking purpose.

Symptoms of different type of fluorosis

Dental Fluorosis: Symptoms of dental fluorosis were found in 122 of 130 children (93.84%), in 80 of 85 adult male (94.11%) and in 64 of 72 adult female (88.89%), where drinking water contained > 1.5 mg/L fluoride. The occurrence of dental fluorosis was 93.84% in children and 91.50% in adults. The prevalence of dental fluorosis in both sexes was not much variable. However, male subjects showed relatively higher prevalence of dental fluorosis. None of the children showed evidence of a further stage of dental fluorosis (corrosion of the tooth material with brown or black staining). This type of dental fluorosis was seen, however in older people, but only on the posterior teeth and in areas where fluoride in drinking water exceeded 3.5mg/L. As fluoride concentrations increased, the anterior teeth were sometimes affected as well. State of dental fluorosis among these individual were chalky white, brownish yellow and brownish black. The yellow discoloration near the gums was due to dirty teeth. Some villagers lost their teeth due to drinking high fluoride contaminated water since long time. The numbers of affected individuals is mentioned in Fig.-3.

Skeletal Fluorosis: Symptoms of skeletal fluorosis were found in 108 of 130 children (83.08%), in 74 of 85 adult male (87.06%) and in 59 of 72 adult female (81.94%), where drinking water contained >1.5mg/L. The occurrence of skeletal fluorosis was 83.08% in children and 84.52% in adults. The prevalence of skeletal fluorosis in both sexes was not so much variable. However, male subjects showed relatively higher prevalence of skeletal fluorosis. The individual was unable to touch and bend the toes without bending the knees, touch the chest with the chin and stretch the arms sideways. They were affected from pain or stiffness in the backbone, hip joints and neck. The number of individuals is indicated in Fig.-3.

Figure 3 (A-E) Distribution of different type of fluorosis among children (<18 yrs), Male (Adult) and Female (Adult)



2) Village: Barara

Of the samples analyzed, 10%, 30%, 40%, 5% and 15% fall in the category 0-1.5, 1.5-3, 3-6, 6-10 and > 10 respectively for fluoride. It has been observed that only 10% samples were safe for drinking purpose in this village from the point of view of fluoride concentrate ion in them. The maximum concentration of fluoride in water of this village was 14mg/L (Fig-2).It is observed that

15% samples are found to be alarming and only 10% samples are safe for drinking purpose.

Symptoms of different type of fluorosis

Dental Fluorosis: Symptoms of dental fluorosis were found in 305 of 330 children (92.42%), in 196 of 205 adult male (95.61%) and in 151 of 175 adult female (86.28%), where drinking water contained > 1.5 mg/L fluoride. The occurrence of dental fluorosis was 92.42% in children and 90.95% in adults. The prevalence of dental fluorosis in both sexes was not much variable. However, male subjects showed relatively higher prevalence of dental fluorosis. None of the children showed evidence of a further stage of dental fluorosis (corrosion of the tooth material with brown or black staining). This type of dental fluorosis was seen, however in older people, but only on the posterior teeth and in areas where fluoride in drinking water exceeded 3.5mg/L. As fluoride concentrations increased, the anterior teeth were sometimes affected as well. State of dental fluorosis among these individual were chalky white, brownish yellow and brownish black. The yellow discoloration near the gums was due to dirty teeth. Some villagers lost their teeth due to drinking high fluoride contaminated water since long time. The number of affected individuals is mentioned in Fig.-3.

Skeletal Fluorosis: Symptoms of skeletal fluorosis were found in 260 of 330 children (78.78%), in 171 of 205 adult male (83.41%) and in 137 of 175 adult female (78.29%), where drinking water contained >1.5mg/L. The occurrence of skeletal fluorosis was 78.78% in children and 80.85% in adults. The prevalence of skeletal fluorosis in both sexes was not so much variable. However, male subjects showed relatively higher prevalence of skeletal fluorosis. The individual was unable to touch and bend the toes without bending the knees, touch the chest with the chin and stretch the arms sideways. They were affected from pain or stiffness in the backbone, hip joints and neck. The number of individuals is indicated in Fig-3.

3) Village: Nagla Laljit

Of the samples analyzed, 10%, 15%, 30%, 20% and 25% fall in the category 0-1.5, 1.5-3, 3-6, 6-10 and > 10 respectively for fluoride. It has been observed that only 13.33% samples were safe for drinking purpose in this village from the point of view of fluoride concentrate ion in them. The maximum concentration of fluoride in water of this village was 12mg/L (Fig-2).It is observed that 13.33% samples are found to be alarming and only 13.33% samples are safe for drinking purpose.

Symptoms of different type of fluorosis

Dental Fluorosis: Symptoms of dental fluorosis were found in 102 of 110 children (92.73%), in 81 of 87 adult male (93.10%) and in 62 of 73 adult female (84.93%), where drinking water contained > 1.5 mg/L fluoride. The occurrence of dental fluorosis was 92.73% in children and 89.02% in adults. The prevalence of dental fluorosis in both sexes was not much variable. However, male subjects showed relatively higher prevalence of dental fluorosis. None of the children showed evidence of a further stage of dental fluorosis (corrosion of the tooth material with brown or black staining). This type of dental fluorosis was seen, however in older people, but only on the posterior teeth and in areas where fluoride in drinking water exceeded 3.5mg/L. As fluoride concentrations increased, the anterior teeth were sometimes affected as well. State of dental fluorosis among these individual were chalky white, brownish yellow and brownish black. The yellow discoloration near the gums was due to dirty teeth. Some villagers lost their teeth due to drinking high fluoride contaminated water since long time. The number of affected individuals is mentioned in Fig-3.

Skeletal Fluorosis: Symptoms of skeletal fluorosis were found in 88 of 110 children (80.00%), in 74 of 87 adult male (85.06%) and in 59 of 73 adult female (80.82%), where drinking water contained >1.5mg/L. The occurrence of skeletal fluorosis was 80.00% in children and 82.94% in adults. The prevalence of skeletal

fluorosis in both sexes was not so much variable. However, male subjects showed relatively higher prevalence of skeletal fluorosis. The individual was unable to touch and bend the toes without bending the knees, touch the chest with the chin and stretch the arms sideways. They were affected from pain or stiffness in the backbone, hip joints and neck. The number of individuals is indicated in Fig 3.

4) Village: Mirhakur

Of the samples analyzed, 0%, 20%, 30%, 40% and 10% fall in the category 0-1.5, 1.5-3, 3-6, 6-10 and > 10 respectively for fluoride. It has been observed that only 10% samples were safe for drinking purpose in this village from the point of view of fluoride concentrate ion in them. The maximum concentration of fluoride in water of this village was 14mg/L (Fig.-2).It is observed that 10% samples are found to be alarming and only 0% samples are safe for drinking purpose.

Symptoms of different type of fluorosis

Dental Fluorosis: Symptoms of dental fluorosis were found in 99 of 112 children (88.39%), in 70 of 80 adult male (90.00%) and in 56 of 65 adult female (86.15%), where drinking water contained > 1.5 mg/L fluoride. The occurrence of dental fluorosis was 88.39% in children and 88.08% in adults. The prevalence of dental fluorosis in both sexes was not much variable. However, male subjects showed relatively higher prevalence of dental fluorosis. None of the children showed evidence of a further stage of dental fluorosis (corrosion of the tooth material with brown or black staining). This type of dental fluorosis was seen, however in older people, but only on the posterior teeth and in areas where fluoride in drinking water exceeded 3.5mg/L. As fluoride concentrations increased, the anterior teeth were sometimes affected as well. State of dental fluorosis among these individual were chalky white, brownish yellow and brownish black. The yellow discolouration near the gums was due to dirty teeth. Some villagers lost their teeth due to drinking high fluoride contaminated water since long time. The number of affected individuals is mentioned in Fig.-3.

Skeletal Fluorosis: Symptoms of skeletal fluorosis were found in 88 of 112 children (78.57%), in 66 of 80 adult male (82.50%) and in 48 of 65 adult female (73.85%), where drinking water contained >1.5mg/L. The occurrence of skeletal fluorosis was 78.57% in children and 78.18% in adults. The prevalence of skeletal fluorosis in both sexes was not so much variable. However, male subjects showed relatively higher prevalence of skeletal fluorosis. The individual was unable to touch and bend the toes without bending the knees, touch the chest with the chin and stretch the arms sideways. They were affected from pain or stiffness in the backbone, hip joints and neck. The number of individuals is indicated in Fig-3.

5) Village: Sahara

Of the samples analyzed, 44.66%, 20%, 33.33%, 0% and 0% fall in the category 0-1.5, 1.5-3, 3-6, 6-10 and > 10 respectively for fluoride. It has been observed that only 46.66% samples were safe for drinking purpose in this village from the point of view of fluoride concentrate ion in them. The maximum concentration of fluoride in water of this village was 12mg/L (Fig-2). It is observed that 0% samples are found to be alarming and 46.66% samples are safe for drinking purpose.

Symptoms of different type of fluorosis

Dental Fluorosis: Symptoms of dental fluorosis were found in 42 of 125 children (33.60%), in 30 of 85 adult male (35.29%) and in 21 of 65 adult female (32.30%), where drinking water contained > 1.5 mg/L fluoride. The occurrence of dental fluorosis was 33.60% in children and 34.10% in adults. The prevalence of dental fluorosis in both sexes was not much variable. However, male subjects showed relatively higher prevalence of dental fluorosis. None of the children showed evidence of a further stage of dental fluorosis (corrosion of the tooth material with brown or black staining). This type of dental fluorosis was seen, however in older people, but only on the posterior teeth and

in areas where fluoride in drinking water exceeded 3.5mg/L. As fluoride concentrations increased, the anterior teeth were sometimes affected as well. State of dental fluorosis among these individual were chalky white, brownish yellow and brownish black. The yellow discoloration near the gums was due to dirty teeth. Some villagers lost their teeth due to drinking high fluoride contaminated water since long time. The number of affected individuals is mentioned in Fig-3.

Skeletal Fluorosis: Symptoms of skeletal fluorosis were found in 22 of 125 children (17.60%), in 17 of 85 adult male (20.00%) and in 11of 65 adult female (16.92%), where drinking water contained >1.5mg/L. The occurrence of skeletal fluorosis was 17.6% in children and 18.46% in adults. The prevalence of skeletal fluorosis in both sexes was not so much variable. However, male subjects showed relatively higher prevalence of skeletal fluorosis. The individual was unable to touch and bend the toes without bending the knees, touch the chest with the chin and stretch the arms sideways. They were affected from pain or stiffness in the backbone, hip joints and neck. The number of individuals is indicated in Fig-3.

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