

Short Report on Fluoride

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Abstract: Dental fluorosis, which is characterized by discoloured, blackened, mottled or chalky-white teeth, is a clear indication of overexposure to fluoride during childhood when the teeth were developing. As no such treatment is present for this disease so prevention is one of the major procedure which can be used to prevent people from fluorosis by doing health education on ground level from school program to community level program, raise awareness regarding the fluorosis by educating the community with adverse health effect of fluoride for their body and how we can prevent it from small modifications in the daily eating and drinking habits and avoid using fluoride rich dental products and have more use of foods rich in calcium, vitamin C and antioxidants, etc.

Keywords: Fluoride; primary dentition; skeletal deformity; fluorosis.

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I. Introduction

Water is one of the most important element for the human body and with the fast growing of the population and economy of the world, there is a gap generating between demand and supply of water. Providing safe drinking water to the people is one of the major challenges throughout the developing countries. Due to contamination, natural disaster, water borne diseases etc., access to safe water is a challenge in day to day life of normal people. Fluoride exists fairly abundantly in the earth's crust and can enter groundwater by natural processes; the soil at the foot of mountains is particularly likely to be high in fluoride from the weathering and leaching of bedrock with a high fluoride content.¹ Fluoride is present in both surface layer and ground water. On surface layer its concentration can be recorded 0.01ppm to 0.03 ppm. The safe level of fluoride is 1.5ppm and the danger level is >1.5ppm. Any area having a fluoride level of more than 1.5ppm in their drinking water is referred to as fluoride endemic. It is possible that fluoride level is less than 1.5ppm is safe but people have problem of fluoride in that area because of food/beverages/snacks/street foods with black salt consumption which has fluoride level of 157ppm F.¹

Symptoms of Fluorosis

Dental fluorosis, which is characterized by discoloured, blackened, mottled or chalky-white teeth, is a clear indication of overexposure to fluoride during childhood when the teeth were developing. These effects are not apparent if the teeth were already fully grown prior to the fluoride overexposure; therefore, the fact that an adult may show no signs of dental fluorosis does not necessarily mean that his or her fluoride intake is within the safety limit. Chronic intake of excessive fluoride can lead to the severe and permanent bone and joint deformations of skeletal fluorosis. Early symptoms include sporadic pain and stiffness of joints: headache, stomach-ache and muscle weakness can also be warning signs. The next stage is osteosclerosis (hardening and calcifying of the bones), and finally the spine, major joints, muscles and nervous system are damaged. Whether dental or skeletal, fluorosis is irreversible and no treatment exists. The only remedy is prevention, by keeping fluoride intake within safe limits.²

Fluoride is one of the emerging problems around us, which affect the dental structure, skeletal structure as well as non skeletal structures (soft tissues or non calcified tissues) in our body which causes variety in health complaints. This occurs mostly due to consumption of untreated ground water, food containing high fluoride food for example black salt, use of fluoridated dental products specially in the fluoride endemic zone and drugs

besides inhaling of fluoride emission (mostly from phosphate fertilizers or burning of fluoride containing fuel) from industries.

India and Rajasthan

Nearly 12 million of the 85 million tons of fluoride deposit in the earth crust found in India. Therefore fluorosis is endemic in 17 states of India (UNICEF 1999). The most affected areas are Andhra Pradesh, Punjab, Haryana, Rajasthan, Gujarat, Uttar Pradesh and Tamil Nadu (Figure 1).^{3,4}

The first work for fluorosis was started in 1987-1993 by the name of Rajiv Gandhi National Drinking Water Mission by Ministry of Rural Development with the aim of education and awareness of fluorosis. In 2008-09, Ministry of Health and Family Welfare, Government of India launched a National Programme for Prevention and Control of Fluorosis (NPPCF) with the aim for prevention, diagnosis and management of fluorosis in endemic areas.¹ National program for prevention and control of fluorosis was revised in 2014. The program was initiated in 11th five year plan and then in 12th five year plan it covered more districts and has been brought under NCD flexi pool of National Health Mission. According to that guideline high levels of fluoride were reported in 230 districts of 20 states (after bifurcation of Andhra Pradesh in 2014). The population at risk as per population in habitations with high fluoride is 11.7 million as on 1.4.2014 (data from Ministry of Drinking Water and Sanitation). It affects men, women and children of all age groups.⁴ Rajasthan is the largest state of India having 342,239 km² area and with relatively low population density i.e., 165 persons per square kilometre in the north western part of India. According to physiographic divisions the north and western part of the state is under the great plains of north India while, south and middle as well as eastern part is classified under the peninsular plateau. Due to arid and semi arid climate and insufficient water resources, Rajasthan relies heavily on ground water for drinking as well as agriculture. The 69th report of National sample survey organization (December 2013) reported that 88.5% of rural household and 95.3% of urban household in India had improved drinking water sources.⁵

A study carried out in the northern part of Rajasthan suggested that 4.78 and 1.01mg/dl fluoride concentration were recorded when sample were taken from hand pumps and ground water sources which is one of the major source of drinking water in this area. The average concentration of fluoride were recorded to be 2.82mg/dl and according to the WHO and Bureau Indian standard 95% of water in this area was unfit for people.⁶

II. Discussion

As fluoride is a problem which has no treatment, if a person is affected by fluorosis then it is not possible to revert to the normal stage. For dental problems, dental prosthesis is done by using ceramic capping and veneering layer on tooth surfaces which is quite a costly procedure and not possible for a daily wages person to afford the same. Also once it affects the natural dentition no material can replace it with same satisfaction. For skeletal fluorosis, doctors are prescribing mostly pain killers for pain in joints and stiffness as there is no option available till now for the detection of fluorosis at an early stage and hence, it can be recorded and preventive steps can be taken for the upcoming generation. Diet counseling is one of the step which can be helpful in non skeleton fluorosis patient, by editing the routine diet by adding nutritional foods, reduction of black salt which is very common in Rajasthani households, by counselling them regarding harmful effects of tobacco chewing and smoking. Awareness program should be run through the community, schools and target population with the help of stake holders. Health education can be given to community regarding the food habits regarding better nutrition plan and it can be specially considered that all nutrition food suggested by experts should be in reach and easily available for the community.

Once a person is diagnosed with fluorosis, alternative water source must be suggested and water treatment plan can be suggested to government so it can be helpful for normal people to get treated water from some local point which is practiced very smoothly in Barmer district of Rajasthan where a NGO is doing a remarkable work for serving RO treated water to the community in a very low and minimal cost. Suggestion can be given to the government to take part in this and make safe drinkable water sources for the community. Widely used defluoridation methods include adsorption, ion exchange, precipitation, and other techniques such as reverse osmosis.^{1,7}

III. Conclusion

Government needs to uplift its already planned programs and also do more to reduce prevalence of fluoride. More focus has to be given in this part of health as this is an emerging problem around us which causes lots of difficulty for people in community in form of dental fluorosis, skeletal and non skeletal fluorosis. There is no record for fluorosis patient by which a proper plan can be generated for improving the status of fluoride. **Fluoride registry** is one of the important plans, which can be taken for the betterment of fluorosis treatment in country and government should make this mandatory for every hospital especially in the fluoride endemic district. This is one of the best ways to record and make proper prevention plan as per burden. Public health

professionals are required to pitch in at primary level and work towards the set goals. A complete training is required for ground level worker like ASHA and ANM as they are more in physically touch with community.

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Figures

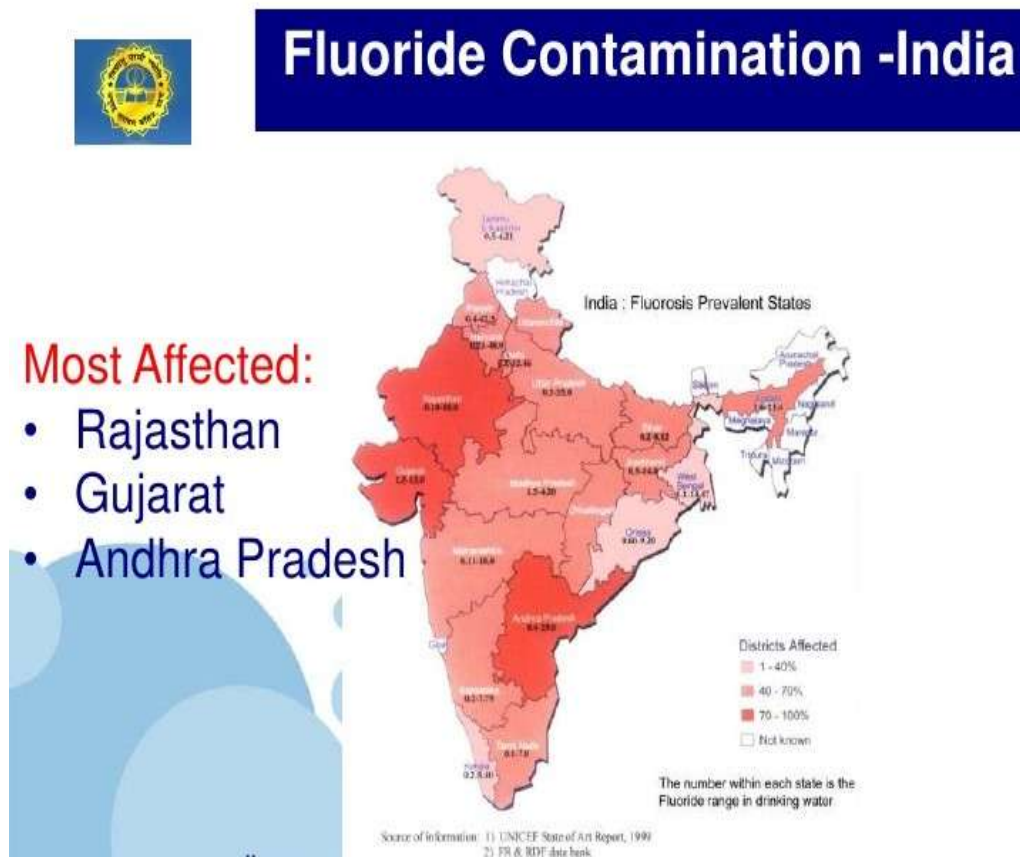


Figure 1: Map showing fluoride zones in India

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