



## WATER, ENVIRONMENT AND MANAGEMENT

### Fluorosis control programme in India

A K Susheela and K Majumdar



The Indian Sub-continent has a serious health problem due to drinking water contamination with fluoride and causing Fluorosis. The main source of fluoride is the minerals in the geological crust. An estimated 25 million people are leading a painful, crippled and vegetative life in 150 districts spread over 15 States of the Indian Union. Young and old are affected alike. The permissible upper limit of Fluoride is 1.5 ppm in drinking water.

The national programme on "Control of Fluorosis" has been formulated and executed with a specific objective viz. to provide safe drinking water and control of fluorosis.

#### Scarcity of Resource Persons in India

One of the major tasks undertaken at the very outset was to develop adequate Human Resource, both in the Health and Public Health Engineering Sectors so that the problem is dealt with effectively.

During Human Resource Development, special focus is laid on updating the information for the Doctors to recognize the disease correctly as invariably the disease is misdiagnosed. In a similar manner, the focus for Public Health Engineers is to practise water quality testing through reliable and simple tests and the various procedures for defluoridation, its advantages and limitations. Human Resource Development Programme has been initiated at the Regional level, percolating to the State and District levels, actual programme implementation begin at the Village level.

Emphasis is laid on establishing district level Water Testing Laboratories, provision is made for fluoride testing Ion Meters, manpower trained for its operation, use and maintenance so that drinking water testing for fluoride and the data are reliable.

A Village level house to house epidemiological health survey through a pre-coded questionnaire provides the statistics and the magnitude of the health problem which was never before attempted in the country.

Table 1: Prevalence of various forms of Fluorosis and Fluoride Toxicity manifestations in 5 districts endemic for Fluorosis in 4 States:

	Dharwad (Karnataka)	Raichur (Karnataka)	Amreli (Gujarat)	Gurgoan (Haryana)	Kurnool (Andhra Pradesh)
Total population examined:	72,744	1,50,215	56,189	85,792	14,91,791
Afflicted with					
- Dental Fluorosis	12,266	12,933	9,919	6,970	43,927
- Skeletal Fluorosis	3,747	2,999	6,762	600	8,833
- Gastro-intestinal problems	6,304	1,882	245	200	30,400
- Range of Fluoride in drinking water:	0.3 - 15.0 ppm	0.2 - 7.5 ppm	1.8 - 11 ppm	0.2 - 19.6ppm	0.1-9.6 ppm

The survey results reveal that in endemic areas for fluorosis, a large percentage of people suffered from Gastro-intestinal complaints (viz. loss of appetite, nausea, vomiting, pain in the stomach, constipation and intermittent diarrhoea and flatulence) as a result of fluoride toxicity, besides Dental and Skeletal fluorosis. The expectant and lactating mothers are the most vulnerable groups of the community. Two major approaches are adopted for recognizing the disease viz. (1) Hospital based approach (2) Field based approach.

#### 1. Hospital based approach:

The hospital based approach involves, carrying out the following tests for correct diagnosis of the disease:

1. Estimation of Fluoride content in
  - Serum (blood)
  - Urine
  - Drinking Water
2. Radiographs of the
  - forearm
  - pelvic region
3. SA/GAG test of the blood serum (Sialic acid/Glycoaminoglycon)
  - for early detection of Fluoride Toxicity.

#### 2. Field based approach:

In the field based approach, where there is no provision for carrying out laboratory tests, the following approach is adopted for arriving at presumptive diagnosis of the disease in an endemic area:

- History taking which involves
  - (a) 3 simple physical tests to check rigidity and pain of the neck region, back cum knee joints and shoulder joints.

- (b) Muscular weakness, anemia and inability to carry out routine domestic/other activities, if any;
- (c) Gastro-intestinal complaints, if any to assess early warning signs of Fluoride Toxicity.
- (d) Correlation of health complaints, mentioned at a, b and c above - with fluoride content of drinking water.
- (e) Provision of safe water (defluoridated water - through domestic defluoridation procedure) relieves Gastro-intestinal discomfort within 15-20 days, if fluoride is the casual factor for the ill health.

Subsequent to the history taking, adequate emphasis is laid on communication on preventive approaches viz. awareness generation on the disease and its early symptoms, health education, importance of drinking safe water, water conservation, importance of Calcium and Vitamin C nutrition among the community.

During water quality survey, it is emphasised that every source of drinking water, whether private/Government owned are checked for quality and the data reveals:-

1. Total number of sources in a village and their location.
2. Number of Good sources (safe sources).
3. Number of sources contaminated with Fluoride; extent of Fluoride contamination.
4. Sources ideal for defluoridation; plant site.
5. Sources which can be mixed and diluted for supply through stand posts.

Based on the above information, provision for safe drinking water for the community is made in the following order of priority:

1. Safe water sources, if available, to be used for cooking and drinking purposes only - Sources to be "labelled safe" in the local language.
2. Tube-wells to be dug deeper; and may obtain safe water.
3. To mix different sources which are having marginally higher fluoride levels with that of low fluoride levels and provide drinking water through stand posts.
4. No good source available in the village, distance source and pipe water supply scheme to be explored.
5. If the above 4 alternatives are not technically feasible and economically viable, community defluoridation procedure to be adopted.

#### Defluoridation Technologies

Two kinds are being practised -

1. Based on the addition of Lime and alum (Nalgonda Technique).
2. Based on adsorption using activated alumina (Prasanti Technique).

The following types of defluoridation plants are adopted:

1. Community defluoridation plants.
2. Hand-pump attached defluoridation system.
3. Domestic defluoridation procedure.

#### Status of implementation of defluoridation plants in India:

Table 2: Number of defluoridation plants sanctioned, installed and commissioned as on 31.5.92.

	<u>Sanctioned</u>	<u>Commissioned</u>
Fill and Draw	104	40
Hand-pump attached	376	161

The advantages and limitations of all the 3 approaches of the two technologies are discussed.

After sensitizing the community with information on fluorosis, its mode of affliction and early warning signs and importance of drinking safe water, the impact of the programme in the foreseeable future is likely to be as follows:-

1. Children are unlikely to have Dental Fluorosis/dicoloured teeth.
2. Still birth/abortions to decline.
3. Gastro-intestinal complaints to disappear.
4. Those already affected, are likely to suffer less from pain and rigidity of the joints; progression of the disease would be arrested.
5. Those crippled, would continue to suffer, except their children and grand-children are unlikely to suffer from the disease.

#### REFERENCE

SUSHEELA A.K., GHOSH G, 1990. FLUORIDE too much can cripple you. Health for the millions. XVI, 5, September - October 1990.