

## Fluorosis — Early Warning Signs and Diagnostic Test

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Ever since fluorosis was detected in India in the early 1930s, it has been considered a disease affecting exclusively the teeth and bones. Diagnosis of the disease when it affects the teeth can be made from overtly visible discolouration and does not pose any problem. However, in skeletal fluorosis, there have been practical problems and difficulties in early detection.

The diagnosis of skeletal fluorosis, until recent years, was made with the help of radiographs which reveal interosseous membrane calcification, enhanced bone density and bone mass. These are, however, late characteristics of the disease. Recognising the disease at such late stages does not help prevention. The disease is usually irreversible by then.

Due to extensive field studies and basic researches conducted in this country, it is now possible to identify subjects living in endemic areas for fluorosis and having early warning signs due to fluoride toxicity. It is also possible to conduct a blood test for early detection and differentiation from other bone disorders.

**Early warning symptoms and signs:** The early warning signs of fluoride toxicity are the following: nausea, loss of appetite, gas formation and nagging pain in the stomach, chronic diarrhoea, chronic constipation, persistent headache. The gastro-intestinal system is one of the most sensitive systems in the body to react adversely to fluoride toxicity. It is possible that an individual may have either one or a few of the complaints listed above. There are any number of case histories now available to establish the correlation of fluoride toxicity and gastro-intestinal problems.

Other early complaints relate to the neuro-muscular systems. These are: unusual fatigue, loss of muscle power and weakness and pain, excessive thirst and frequent urination, depression, tingling sensation in fingers and toes

The teeth, though not discoloured, tend to fall off and an individual may

become edentulous at an early age.

Allergic manifestations are also likely.

Most of these manifestations are, no doubt, nonspecific, but their occurrence in subjects living in fluorosis-endemic areas should alert suspicion. These early warning signs have been extremely helpful in early detection of large numbers of cases in rural areas; prompt intervention programmes (i.e. providing safe drinking water) in these cases have provided considerable relief within a short span of time.

**Diagnostic test for fluorosis:** It has been established that fluoride therapy brings about certain biochemical abnormalities in the bone matrix with reference to two important matrix constituents viz. sialic acid (SA) and glycosaminoglycans (GAG). As it is not possible to delve into biochemical deviations of the bone tissue for diagnostic purposes, the circulatory levels of SA and GAG are assessed. The test is designated as SA/GAG test. The value of SA/GAG will be reduced to almost 30 percent compared to normal, in fluoride toxicity and fluorosis<sup>1,2</sup>.

The test is useful in distinguishing fluorosis from ankylosing spondylitis, a clinical condition which has manifestations almost similar to that of fluorosis. The value for SA/GAG will be significantly elevated in ankylosing spondylitis<sup>3</sup> unlike in fluorosis where it is depressed. The SA/GAG value shows no significant change in arthritis, osteoporosis and spondylosis. This test ought to be introduced as a routine blood test in hospital laboratories located in endemic states for fluorosis so that misdiagnosis of fluorosis and ankylosing spondylitis which is quite common, can be avoided.

**The hazards of fluoride therapy** Sodium fluoride is prescribed for treating otospongiosis, a condition in which the patients have hearing impairment. Besides, sodium fluoride is also prescribed by itself or in combination with calcium/estrogen/vitamin D, for treating osteoporosis, a condition in which there is bone atrophy, specially in women

after menopause. Fluoride tablets, varnish, mouth rinse and swabs are used for prevention of dental decay or caries.

Sodium fluoride therapy in the above conditions may continue for long periods of time and the dose may vary from a few milligrams to almost 80 mg per day depending upon the condition and the age of the patient. Patients receiving fluoride therapy suffer invariably from gastro-intestinal complaints. Long term treatment results in secondary skeletal fluorosis. Osteoporotic patients receiving fluoride therapy do accept the treatment as some patients get relieved of the excruciating pain. However, some patients develop pain as a result of sodium fluoride therapy and they abandon the treatment by themselves. In children, when fluoride tablets, mouth rinse, paste and swabs are applied on teeth either at the dental clinic or at bed time for preventing tooth decay, some children are extremely sensitive and have lapsed into coma, convulsions and even cardiac arrest.

It is the normal obligation of the treating clinician to explain the side effects of fluoride therapy to the patients. However, this is seldom done in this country possibly due to the fact that most of our patients are illiterate and perhaps the doctors hardly have the time.

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### References

1. Jha M., Susheela A.K., Krishna N., Rajyalakshmi K., and Venkiah K.: *J. Clin. Toxicol.*, 1982, 19(10), 1023-1030; Susheela A.K., and Jha M.: *Fluoride*, 1982, 15, 4, 199-202.
2. Susheela A.K., Das T.K., Khurana J.S., Jayaswal A. and Dave P.K.: *Annals of the Rheumatic Diseases*, 1988, 47, 833-837.

## FOUNDATION NEWS

- Meetings:** 1. The General Body of the Nutrition Foundation of India held its annual meeting at the India International Centre on February 23, 1989.
2. Programme advisory committee on studies on "Women and Nutrition" met at the India International Centre on March 7, 1989, under the chairmanship of Dr. Shanti Ghosh.