

## TREATISE ON FLUOROSIS

by AK Susheela<sup>a</sup>

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Within a few years after the discovery in the early 1930s that fluoride in drinking water and other sources was the cause of endemic dental mottling and skeletal crippling, the distinguished Danish physician and health officer Kaj Roholm published his landmark treatise, *Fluorine Intoxication: A clinical-hygienic study with a review of the literature and some experimental investigations*.<sup>1</sup> Subsequently, many other books and reviews on the biomedical aspects of fluoride have appeared. Some of these have been directed mainly toward the interests and needs of persons engaged in fluoride research. Others, like my own book,<sup>2</sup> as well as a copiously documented one now in press,<sup>3</sup> are for the more general reader.

Professor Susheela's book, despite its title, falls somewhere between being a strictly technical reference work and a handbook of basic information. Although written primarily to help medical personnel learn how to recognize and take measures to prevent or alleviate fluoride intoxication or fluorosis, her book has very wide appeal. As might be expected, the first part of the book deals with the huge and growing problem of endemic fluorosis in India, which, although of interest to the Western World, is still largely a matter of local concern. But then the book expands to a global scale and clearly sets out the three principal features of fluorosis.

### DENTAL FLUOROSIS

This condition is rampant in India. Susheela's color photos are the best I have ever seen. In the Anglo-Saxon world where fluoridation is still practiced, dental fluorosis has become a major problem, as conceded by the recent York review from England.<sup>4</sup> Hardly an example of impeccable and unbiased evaluation, this report is more of a "save-what-can-be-saved" document. Yet it had to admit that in fluoridated regions 48 percent of the population, on average, has dental fluorosis, with 13 percent in the category of cosmetically objectionable. In the United Kingdom this means that 3 million people have mottled teeth, with three quarters of a million in a moderate to severe form. Far from being "only a cosmetic effect", as promoters of fluoridation like to say, it is far more than that. Susheela rightly says that persons with discoloured teeth develop an inferiority complex and, "in the case of females it can even be an impediment to matrimonial propositions."

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<sup>a</sup>Available from: Fluorosis Research and Rural Development Foundation, C - 103 Saransh, 34 - I.P. Extension, Delhi - 110092, India. Cost including shipping: \$45 USD (outside India) or Rs.375/- (in India). Email for order forms: susheela@ndf.vsnl.net.in

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She also deflates the myth that fluoride in drinking water at 1 ppm substantially reduces tooth decay or that the concentration must be above 1.5 ppm to cause problems. She points out that dental fluorosis and caries in India occur in combination and that a fluorosed tooth is a poorly mineralized tooth.

#### **SKELETAL FLUOROSIS**

Some of the greatest experts on this form of fluorosis are from India, Professor Jolly of Punjab having been one of the world's most renowned. Susheela rightly states that much of our knowledge about skeletal fluorosis and how it develops has come from India. In Holland during fluoridation in the early 1970s we saw patients with the first stages of skeletal fluorosis, mainly low back pain and pain in the small joints of the fingers. Happily it did not come to gross deformities as shown in Jolly's films and also in this book.

#### **NONSKELETAL FLUOROSIS**

Susheela first sums up lesser known facts about this form or stage of fluorosis. Her research on muscle degeneration is especially interesting. Her findings concerning the effect on red blood cell involvement provide a new dimension to our understanding of fluoride intoxication. Membrane degeneration induced by fluoride turns erythrocytes into what she calls "echinocytes" with a shrunken membrane and a much shorter lifespan, capable of causing severe anemia.

She then moves into (for me) an area of more familiar research. During 1972, when part of my own region was fluoridated, I founded a physicians group to examine what we then called the "side effects" of fluoridation. First I trained the doctors to recognize the symptoms with the help of the research reports by Dr George L Waldbott, that outstanding pioneer investigator of nonskeletal fluorosis. These symptoms were of such a general nature that they could be easily overlooked or misdiagnosed (insatiable thirst, gastrointestinal pains, migraine, skin irritation, depression, etc.).

Susheela takes her research one step further. She not only corroborates Waldbott's and our findings, but she uses the gastrointestinal complaints as a method to detect early fluorosis. She uses scanning electron microscopy of gastric and duodenal tissues as an early warning of fluoride intoxication. Her very clear pictures show a "cracked clay appearance" of the mucosa and a "loss of microvilli".

Another warning signal is the abnormal configuration of sperm cells, which could help explain male infertility when fluorosis is present. Although she also mentions neurological involvement, she does not mention erratic and hyperactive behavior in children, a symptom I saw regularly until prescription of fluoride tablets was banned in Holland in 1998.

In accordance with our findings, Susheela reports that the early, non-skeletal stages of fluorosis can be cleared up in about two weeks by giving the patients water with as low a fluoride content as possible. She also offers excellent advice about low-fluoride food because she believes that fluoride intake should be as low as possible.

Without doubt, this book is especially useful for how clearly it describes the origin and nature of dental, skeletal, and nonskeletal fluorosis. Other long-term effects like cancer and coronary involvement are not considered, but it is invaluable for training medical care personnel in how to recognize the symptoms of fluorosis.

#### REFERENCES

- 1 Roholm K. Fluorine intoxication: a clinical-hygienic study with a review of the literature and some experimental investigations. London: HK Lewis; 1937.
- 2 Moolenburgh H. Fluoride: the freedom fight. Edinburgh: Mainstream Publishing; 1987.
- 3 Groves BA. Fluoride: drinking ourselves to death? Dublin: Newleaf (Gill & Macmillan); 2001.
- 4 McDonagh MS, Whiting PF, Wilson PM, Sutton AJ, Chestnutt I, Cooper J, et al. Systematic review of water fluoridation. *BMJ* 2000;321:855-9.

Fluorosis: Indian scenario, a treatise on fluorosis. Fluoride. Vol. 34. New Delhi, India: Fluorosis Research and Rural Development Foundation; 2001. p. 181-3. 7. Ayoob S, Gupta AK. Fluoride in drinking water: A review on the status and tress effects. Crit Rev Environ Sci Technol 2006;36(6):433-87. 8. Mohapatra M, Anand S, Mishra BK, Giles DE, Singh P. Review of fluoride removal from drinking water. Skeletal fluorosis is a chronic metabolic bone disease caused by ingestion of large amounts of fluoride through either water or food in geographic areas where high levels of fluoride occur naturally. Radiographic features Plain radiograph/CT D...Â In more advanced fluorosis, the trabeculae are more generally thickened because of new bone formation on the trabecular surface. At this stage, radiographs show thickening and condensation of trabeculae, with coarse reticulum or woven bone striations. If the trabeculae are fused, focal round densities are seen in the medullary bone. Osteopenia (less common) also may occur in fluorosis, especially in younger patients at an earlier stage 6. Calcification of the sacrotuberous ligament is considered a characteristic feature. How Widespread Is Fluorosis? Fluorosis first attracted attention in the early 20th Century. Researchers were surprised by the high prevalence of what was called "Colorado Brown Stain" on the teeth of native-born residents of Colorado Springs. The stains were caused by high levels of fluoride in the local water supply. This was fluoride that occurred naturally in the ground water. People with these stains also had an unusually high resistance to dental cavities. This sparked a movement to introduce fluoride into public water supplies at a level that could prevent cavities but without causing fl...