



## Fluorosis

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### Editorial

This Editorial on fluorosis is focusing on a complex ailment afflicting the human beings, their teeth, besides the skeletal system due to fluoride poisoning, reported from Europe since 1932 and India since 1937. Over the past 8 decades, the investigations led to the understanding of “Fluorosis Linked Disorders”, a third entity besides dental and skeletal fluorosis originated through oral biology.

The oral biology plays a very prominent role in spreading the disease to upper and lower extremities through the rich blood vessels in the oral mucosa; the most importantly the sublingual a branch of bifurcation of the lingual artery connecting the oral cavity to the superior vena cava enabling fluoride entry into systemic circulation within seconds of its entry. The use of fluoridated gel, varnish, toothpaste, drugs and/or food and beverages are the various sources for fluoride. It may be appropriate to mention the sublingual blood vessel is also used for administering the drug sorbitol, to patients of angina (pain in the heart) and get relief within a few seconds. The oral biology has a predominant role to play in the health arena. The major changes in the 3 forms of fluorosis due to fluoride toxicity are examined and highlighted; so that there is a better understanding for achieving human well-being.

### Dental fluorosis

In the tooth the matrix of the dentin is loaded with inorganic and organic constituents. Upon exposure to fluoride, the matrix gets demineralized leading to formation of pits, perforations and chipping off the teeth. These are overtly visible disease manifestations. This along with exposure to food intake and mastication leads to discoloration of the teeth in an orderly fashion. The discoloration is in streaks, horizontally aligned following developmental pattern. The discoloration may be spots as well but retained horizontal alignment. Demineralization due to loss of calcium, the inorganic constituent of the matrix besides an organic constituent, viz. Glycosaminoglycans raises the level of the isomer Dermatan sulphate which does not occur in normal tooth matrix except during early developmental stages.

The sulphated isomer appeared in the matrix led to cartilaginous lesions loaded with chondrocytes, never to get remineralized. One of the concepts popularized in the past is that fluoride addition to toothpaste is to remineralize the teeth has been conclusively proven that it is a myth and not science. The problem of pits, perforations and chipping off the teeth, along with discoloration affected cosmetics and social problems adversely. However, technological developments led to masking the ugly looking teeth with various approaches, viz. bleaching, capping, laminating veneering options for solving the problems. It is possible to opt for white shiny teeth without revealing the reality that it is hidden beneath.

### Skeletal fluorosis

Fluoride entering the body through systemic circulation causes a slow progressive disease designated as skeletal fluorosis afflicting the bones and joints. This condition can afflict young and old, men and women of all age groups, living in rural and urban areas. A misconception prevailed for a long time that fluoride arising through drinking and cooking water is the only cause for the disease. It is clearly evident now that the source of fluoride could be food, beverages, habit forming substances besides use of fluoridated drugs and dental products. It has incapacitated individuals through crippling and paralysis. However, during the last three decades, the research revelations have changed the scenario. In the 21<sup>st</sup> century, the victims recover in a fortnight as early detection of the disease is possible and dietary interventions (Diet editing and Diet Counseling) are introduced for attaining complete recovery from the disease.

It is important to mention that the human skeletal system has two distinctly different bones from the structural point of view, the one with copious blood supply, i.e., the cancellous or spongy bone

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get afflicted first compared to the other bone i.e., compact or cortical with scanty blood supply. The joints in the skeletal system get afflicted as the epiphysis (the extremities) of long bones are cancellous, with a copious blood supply, accumulate more fluoride and get deposited in the joint region, resulting in joint pain and stiffness.

In skeletal fluorosis, unlike dental fluorosis, the pathogenesis has varied presentations, manifestations and is complex. The cancellous bony regions in the skeleton, as in dental fluorosis, not only there is loss of mineralization and the Glycosaminoglycans produce Dermatan Sulphate isomer leading to cartilaginous lesions with chondrocytes in the cancellous bony regions. The cartilaginous lesions are dematerialized areas would never dematerialize, rendering the bones weak and resulting in multiple fractures in the individual. The Dermatan Sulphate isomer formation appears to be the entity causing the major health problems both in the teeth and bones.

### Fluorosis linked disorders

“Fluorosis Linked Disorders” are an entity involving all the soft tissues in the body. In fluoride poisoning of the body led to the development of different forms of diseases. These disorders are a result of Fluoride being a • hormone disruptor, • enzyme inhibitor and • neurotoxin. One element which is an environmental poison, upon its entry would damage the whole human body in innumerable ways was not envisaged. The diseases that have surfaced and confirmed are (1) Non-ulcer dyspepsia, (2) Weakness and fatigue, (3) Anemia, (4) Thyroid hormone abnormalities, (5) Renal failure, (6) Hypertension, (7) Polyuria & Polydipsia and others. Each time, a patient seeks consultation, ought to be tested for fluoride in urine, serum and drinking water to understand the cause of the disease, for correct diagnosis as it often baffles the physician/dental surgeon to arrive at a definitive conclusion.

“Fluorosis Linked Disorders” are a cause for concern as it is a leading reason for maternal and infant mortality due to anemia. The patients waiting for renal transplant and/or blood transfusion is on the increase. Yet another agonizing experience. Hypertension connects to fluoride affects great majority across the globe. Fluorosis is an overburden due to multiplicity of health issues arising through

environmental toxin, fluoride with multiple routes of entry to the body. It may be reasonable to state, never in medicine and dentistry; such a complex scenario may have been envisaged. The information highlighted in this Editorial should benefit dental and medical professionals, dental and medical students besides scientists from diverse disciplines to view Oral Biology and its linkages with health problems due to one element, fluorine. The issues highlighted in the Editorial are only some food for thought.

### Conclusion

Contributions from research led to early diagnosis in which history retrieval of the patient led to suspect the disease. Dental Fluorosis can be an early warning sign caused by  $F^-$ . Testing of fluoride in blood, urine and drinking water along with forearm X-ray radiograph led to the confirmation of the disease and differentiation from other diseases. A new pathway for the patients of Skeletal Fluorosis and Linked Disorders has been opened for recovery. A new healthy life is possible for such patients in a short span of time through practice of interventions, are the recent developments.

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