

Fluorosis (*Shyavdanta*) - An Ayurvedic View



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Abstract:

Fluorosis is the accumulation of excessive fluorides in the body which produces toxic effects. It is a commonest public problem, endemic in 15 states of India. It causes the enamel to become abnormally porous and weak. It also injures bones and may create anaemia by decreasing red blood cell production as it is difficult to completely cure the effects of dental fluorosis. No detail description has been found in Ayurveda regarding fluorosis which resemble with *Shyavdanta* in terms of similar causes, features, treatment and prognosis. Hence an attempt has been made to correlate both. This article aims to review the studies conducted on fluorosis with Ayurvedic treatment approach. *Shyavdanta* has *Pitta, Vata* dominance and is mentioned as incurable by Sushrut when it progresses to whole body. Different modalities for local action like *Pratisaran* (application), *Gandush* (oil pulling), *Kawal* (gargling) to generalized *Shodhan*(eliminative) procedures, *Shamanopchar* (curative) medications mentioned for *Shyavdant* can be used for Fluorosis which starts from teeth and spreads to all over the body. Proper awareness is important to prevent its serious hazards as there is no permanent treatment once manifested in chronic form. It can be concluded on the basis of scientific review that Ayurvedic interventions of *Shyavdant* can be applied with other treatment modalities to treat endemic fluorosis which needs urgent, economical and effective intervention.

Key words- Dental Fluorosis, *Shyavdant*, *Pratisaran*, *Gandush*, *Kawal*

Introduction-

Dental fluorosis is a biomarker of exposure to fluoride (F⁻). It is an endemic disease prevalent in 20 states out of the 28 states in which Andhra Pradesh, Rajasthan, Gujarat states are the most prevalent [1,2] and 7 Union Territories of the Indian Republic. The WHO standards and BIS 10500 1991 permits only 1.5mg/l as a safe limit of fluoride in drinking water for human consumption [3,4]. Usually, it is through contaminated water and food that the fluorides enter the system[5] with oral care products, brick tea, inhaling toxic industrial fumes containing fluorides. It serves as a friend as it strengthen teeth, prevent caris and cavities when

optimum level lies up to 1 ppm and beyond this level acts as a 'corrosive poison' [6]. A review of recent scientific literature reveals an evidence of brown teeth staining, arthralgia, hip fractures, skeletal fluorosis, and osteosarcomas pointing to the existence of causal mechanisms by which fluoride damages bones [7]. Children less than 2 years old, are exposed to high fluoride level, their enamel formation- odontogenesis get affected in turns leads to defective matrix and alteration in ameloblast which leads to improper calcification, teeth stains, porous, brittle enamels and bones[8]. Highly reactive F⁻ attracts to cations Ca⁺⁺ of teeth and bones, resulting in skeletal and dental fluorosis entities[9,10]. The diagnosis is mainly

confirmed with history of fluoride intake, clinical examination, serum, bone, urinary, and drinking water fluoride content, forearm X-ray radiograph showing calcified intra-osseous membrane sticking out from radius. As teeth staining and pain, rigidity in joints are the commonest prodromal features[11,12] but the major cause of concern is wrong diagnosis and treatment to arthritis or osteomalacia. Less attention is being paid on teeth staining by patients as well as a physician on account of abundance use of gutkha by virtue of dental practice is flourished. Patients use to take analgesics and then once condition becomes chronic, turns to skeletal fluorosis represents as irreversible bone changes, contractures which is very difficult to treat. *Shyavadant* is first mentioned by *Acharya* Sushruta in Nidansthan chapter 16/34 very briefly declared as incurable[13]. Therefore for the better understanding of Fluorosis and *Shaydanta* and their incurability in later stage one ought to know about them thoroughly for early diagnosis which is need of the hour. This paper aims to compare *Shyavdant* with endemic dental fluorosis and to find out the application of Ayurvedic treatment modalities in dental and skeletal fluorosis management. The main objective is to disseminate the scientific information for awareness of the disease for early diagnosis before it becomes incurable.

Methodology-

A review of Ayurvedic classics and research work to publicize thorough information about fluorosis and *Shyavdanta*. Few scientific studies overview [14,15,16,17,18] are presented to indicate their potential to mitigate fluoride toxicity

Observations-

After clinical examination of child's teeth, gums and history specifically about child's fluoride intake, any medication, or trauma, porosity of tooth enamel with arthralgia and stiffness of joints [19] help to decide if the discoloration is due to fluorosis or other cause. Clinical features: dental staining – White, yellow, brownish in color. If fluoride level is greater than 4ppm it leads to skeletal fluorosis and if

it is greater than 8ppm, irreversible bone changes and deformities occur. The severity depends on the amount of fluoride exposure, age, individual response, weight, degree of physical activity, nutrition, and bone growth.

The dental pigmentation can be classified as

1. Mild changes in enamel, arthralgia
2. Moderate - Brown discoloration, gray or black spots on the enamel, generalized arthritis,
3. Severe- Tooth surface irregularities (pitting, brown, gray or black spots) with skeleton changes of bedridden state. Other clinical features are great loss of memory, forgets almost everything, loss of confidence, mental weakness, mental excitability, fear of apoplexy (stroke), anxiety, irritable, disagreeing mood, vertigo with sickness of stomach. Fluoride may cause secondary hyperparathyroidism, metabolic bone disorders, associated with endemic skeletal fluorosis, osteoporosis (bone resorption), rickets, osteomalacia, and parathyroid bone disease. Studies demonstrates that serum PTH level is increased in patients with endemic fluorosis. Fluoride, by interfering calcium balance, may be the cause of secondary hyperparathyroidism[20].

Investigation: 1. Urinary and bone fluoride content [21] (Normal values are 0.4ppm and 500-1000ppm or mg/kg respectively).

2. Serum fluoride level- Drinking water fluoride and serum fluoride were measured by ion selective electrode method. (Normal-0.002-0.008/100ml)

3. Bone Mineral Density (B.M.D.), CT,MRI

4. Bone and dental x-rays, specially forearm radiograph to see intraosseus calcification

Differential Diagnosis- Skeletal fluorosis should be ruled out before diagnosing the labels of osteoporosis, osteomalacia, rheumatoid arthritis, ankylosing spondylitis, renal osteodystrophies, and rickets. Precautions for Treating Fluorosis: There are a few precautionary measures to avoid this problem [22]. One of the most common reasons for dental fluorosis is swallowing the toothpaste while teeth brushing. Instruct kids to use pea-sized amount of unsavoury taste toothpaste and spit out the foam of

the toothpaste, must rinse mouth thoroughly with water after brushing the teeth. It is also beneficial to increase the consumption of calcium, vitamin C, D through natural sources like milk and dairy products, citrus fruits as well as through supplements, as these minerals help in absorbing the excess fluoride ions[23].

Treatment:

Mild cases may not need any treatment. If the stains are on the front teeth that are bothersome it can be treated by removing the surface-stained areas with tooth whitening or home remedies. Bleaching and micro-abrasion are the usual methods of treating dental fluorosis. Severe fluorosis will need to be masked using bonding, crowns or veneers.. Tooth, micro abrasion, and conservative composite restorations or porcelain veneers are commonly used treatments[24].

Discussion:

Charak has categorically mentioned that new diseases nomenclature should be framed as per Dosha dominance and be treated likewise[25]. In spite of no detailed description of *Shyavdanta* and Fluorosis in Ayurved, it can be elaborated in Table 2

As the causes except F- consumption, clinical features and prognosis of fluorosis are same that of *Shyavdanta*, therefore can be correlate with disease as well as its treatment aspect also. As like fluorosis, *Shyavdanta* may also spread all over the body owing to rakta, vata involvement which circulate throughout the body also relation of *Asthi* and *Danta* (*Asthi Mala* is *Danta*). The herbs and natural supplements, the use of calcium supplements and vitamin D has proven successful in diminishing the clinical manifestations of fluorosis. [26,27] In this regard some studies has been carried out which prove the efficacy also. *Tamarindus indica*, *Moringa olifera* extract mobilizes bone fluoride and increases urinary fluoride excretion [28].

Neem, lavang (clove), *Cinnamomum zylenicum* extracts, oil application charcoal, camphor, alum, charcoal, citrus fruits extract application are also useful proved by studies. As far as any endemic problem is concerned, emphasis on

prevention is necessary. Different modalities for local action have good effect, like Pratisaran means powder/paste application on teeth by Khadiradi, Jatyadi Tail. Gandush (oil pulling or holding the medicine in mouth), for ex. *Patoladi*, *Khadiradi Gandush*. In *Kawal* the decoction/medicated oil/ghee is to be rotated inside the mouth, *Saptachhadadi kwath* can be used as *kawal*. *Vati/tab* like *Rasendra*, *Sahkaradi*, *Mukhrognashak Vati*, *Triphaladi vati* can be used for generalized action and in complications of *Shyavdanta*. Also necessary *Panchkarma* is required [29,30]. The aim of the *Panchkarma* is to expel the toxins for cure of *Shyavdanta*. As *Pitta* and *Rakta* are main *Dosha* involved in disease process, *Raktamokshan*- blood- letting through nearest blood vessel or Leech application can be done. *Nasya*- Nasal drops instillation by *Anutail* or *Panchedriy Vardhan Tail* described in Sushrut samhita for prevention and cure of *Urdhvajatrugat vyadhi*. *Pitchu dharan* means to hold medicated swab in between teeth, *Swedan*- hot fomentation, *Vaman*- Expulsion of gastric content and in *Virechan* expulsion of rectal content is desirable, *Dhumpan*- to inhale medicated smoke etc. are procedures having great potential for curing *Shyavdanta* due to elimination of *Dushit Doshas*

Conclusion:

It is concluded that *Shyavdant* can be compared and treated with endemic fluorosis on the basis of causes, clinical features and prognosis having similarity of spread from teeth to whole body. In fluorosis/ *Shyavdant* management, further case control or cohort study with higher population is recommended. There is crying need to overcome endemic fluorosis by supplement of Vitamin C, D, calcium, magnesium.

Also use of defluoridation methods, early and correct diagnosis of skeletal fluorosis and prevention of consumption of fluoride intoxication should be undertaken. Every district hospital should have investigations facility for fluorosis confirmation. This review provides disease understanding with cost effective, safe Ayurvedic treatment approach and many unexplored avenues to

address fluorosis alleviation.

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Table-1

Sr	Researcher et al	Material & methods	Assessment parameter	Result
1	R. Ranjan et al	Aq. Extract of <i>Tamarind indica</i> fruit pulp (100 mg/kg). <i>Mognifera oleifera</i> seeds 50mg/kg	rabbits receiving fluorinated drinking	extract indicate potential to reduce F ⁻ toxicity
2	Maheshwari et al	de-fluoridation of contaminated water- <i>Tulsi</i> fresh leaves , stem & dried leaves	Water fluorine level.	<i>Tulsi</i> is a very good cost effective F ⁻ fighting herb
3	P.Sudhakar Reddy et al	Herbs like Karanj, Awla, Neem, Miswak, khadir etc Oil pulling, gargling.	Infection control, strength, inflammation	Antiseptic, antimicrobial, strengthening capacity and anti-plaque efficacy.
4	AK Susheela et al 1 st July 14, JAPI Vol 62	Essential nutrients, antioxidants and micronutrients through fruits, vegetables and dairy products.	Monitoring patients at intervals to assess fluoride level in body fluids.	Reduction in fluoride levels has a direct relationship with disappearance of health complaints and subsequent recovery.
5	Teotia et al	Nutritional interventions Vit D3, Ca, Mg, for F ⁻ mitigation under INREM foundation	Bone x-ray, F ⁻ level	Good nutritious habits protect and prevent F ⁻ toxicity, absorbs F ⁻ & control para thyroid hormone level.

Table-2

Nidan	Poorvarupa	Roopa	Dosh/dushya/ Strotas	Samprapti
Intake of <i>Pitta</i> , <i>Vataj</i> or fluoride rich water and food on regular basis	whitish decolouration of teeth	yellowish and brown or blakish stains	DDi Dosh: <i>Pitta, Vata</i> , Dus Duhya: <i>Rasa, Rakta</i> , <i>Asthi, Majja</i> Strotas: <i>Annavaha</i> , <i>Raktavaha, Asthivaha</i>	Nidan sevan—F ⁻ deposition, <i>Strotorodha</i> of <i>Strotas</i> leads to appearing clinical features