



AN INTERESTING CASE OF FLUOROSIS

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Abstract :

Fluorosis is a disease caused due to excessive ingestion of fluoride. India is one among the 23 nations around the globe where health problems due to fluorosis have been reported. Consequently, fluorosis is an endemic condition prevalent in 17 states of India. Permissible limit of drinking water fluoride level WHO and IS 10500 (1991) standards permit only 1.5 mg/L and 1.0 mg/L respectively as a safe limit for human consumption. In Tamil Nadu, fluorosis has been reported to be endemic in the 8 districts namely Dharmapuri, Erode, Salem, Coimbatore, Trichy, Madurai, Vellore and Virudhunagar. Here we report a case of FLUOROSIS from Madurai (usilampatti area). This case was reported to create an awareness among public regarding manifestations of fluorosis and to adopt remedial measures to the people on the risk of fluorosis.

Keyword : Fluorosis, Usilampatti, Skeletal, dental fluorosis, water fluorine

INTRODUCTION :

Fluorosis is the state of chronic fluoride intoxication caused by high intakes of natural fluoride through drinking water. Fluoride are the compounds of fluorine. Fluorine is the 13th most abundant element available in the earth crust. Intake through beverage is also harmful, depending on its contents of high fluoride water. Intake through foods is not of practical nor clinical importance, even in the endemic areas where the fluoride concentration in crops is relatively high. Excess fluorine consumption will cause dental, skeletal and non skeletal fluorosis.

CASE REPORT :

70 year old male patient from Usilampatti presented with complaints of breathlessness (on and off) for past 1 year. History of cough with expectoration was present for past 2 months. He also gave history of constipation, low back ache and both knee joint pain. History of falling of tooth at 45 years of age. He also gave a history of similar joint pain and spinal deformity in around 20 persons of nearby families and relatives in same village who consume same borewell water. No history of weakness of limbs, sensory disturbances, bowel and bladder disturbances, chest pain, palpitation, abdominal pain, abdominal distension, nausea, vomiting, haematemesis, melena.

Not a known case of Diabetes mellitus, Hypertension, CAD, Pulmonary tuberculosis, CKD, seizure disorder. No history of any drug intake, non smoker and not an alcoholic. He consumes water from borewell since childhood.



PHYSICAL EXAMINATION :

Patient was conscious, moderately built and nourished, oriented, afebrile, **edentate**, not anaemic, not jaundiced, no cyanosis, no clubbing, no pedal edema, no generalized lymphadenopathy.

Kyphoscoliosis present in the upper thoracic region.

Multiple pressure sores present over bony spines in the back

Vital signs: Pulse rate -80/mt, temperature 98.6°F, Respiratory Rate -16/mt

BP - 120/80 mmHg in right upper limb in supine position

SYSTEMIC EXAMINATION:

CVS-S1S2+, no murmur

RS- Bilateral supraclavicular fossa hollowness present and normal vesicular breath sound heard and bilateral expiratory wheeze was present.

P/A - soft, no organomegaly and no free fluid.

CNS-Higher functions, cranial nerves, bulk, tone was normal. He had a power of 4/5 with normal reflexes.

LAB INVESTIGATIONS :

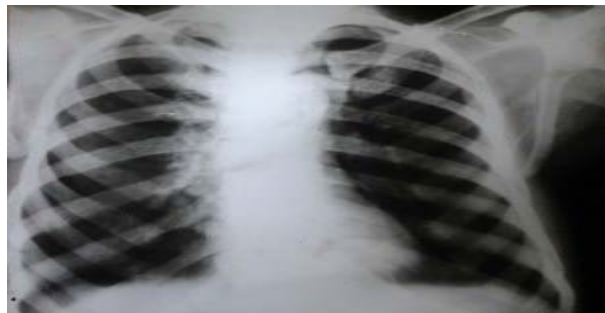
Blood : Hb - 10 gm, TC - 6500 cells/mm³, DC- P58% / L38% / E4%, ESR- 35 mm/hr

Urine : Albumin - +, Sugar and Deposits were nil.

Blood sugar -96 mgs%, Urea-19 mgs%, Creatinine -0.9 mgs%

Serum Sodium 118 mEq/L, Potassium 3.4 mEq/L

ECG shows Right atrial enlargement. ECHO – normal study
 Sputum AFB was negative
 Thyroid profile – normal
 24 hrs Urine protein – 400mg /d
 Urine spot PCR – 2.4
 Serum calcium – 8.6 mgs /dl
 Serum phosphorus – 6.0 mgs /dl
 Serum ALP – 38 IU/L
 Serum Uric acid – 4.9mgs/dl
 ELISA for HIV – non reactive ,RA factor – 8.6 , CRP – 2
 USG Abdomen & Pelvis – B/L Chronic Medical Renal Disease
 Pulmonary function test – Restrictive lung Disease.



X-RAY CHEST PA VIEW:

X-ray Chest PA view shows increased hyperlucency of all ribs with multiple lytic lesions and unfolding of aorta.



X-RAY FOREARM WITH ELBOW JOINT AP AND LATERAL VIEW

X-ray forearm with Elbow joint shows forearm bones with increased bone density , interosseous membrane ossification , vascular calcification of radial artery.



X-RAY LUMBOSACRAL SPINE - AP AND LATERAL VIEW



X-RAY CERVICAL SPINE AP VIEW



X-RAY CERVICAL SPINE LATERAL VIEW

X-ray Lumbosacral spine AP, Lateral view shows increased bone density, marginal osteophytic changes, vertebral height and disc space maintained ,sacrospinous ligament calcification. X-ray cervical spine shows increased bone density, Exaggerated lordosis of cervical spine and kyphosis of thoracic spine, Anterior longitudinal ligament ossification.

DRINKING WATER FLUORINE LEVEL FROM PATIENT RESIDING AREA– 1.8 mg/L which is more than permissible safe limit of human fluoride consumption:WHO and IS 10500 (1991) standards permit only 1.5 mg/L and 1.0 mg/L respectively . All these x-ray findings and drinking water fluorine level were suggestive of **FLUOROSIS Hence based on history of early tooth loss, similar complaints of joint pain and spinal deformity in his relatives from same residing area, x-ray and ultrasonogram findings , drinking water fluorine level, a diagnosis of **FLUOROSIS** with skeletal (kyphoscoliosis causing Restrictive lung diseases) ,dental (edentate) and extraskeletal manifestations (Chronic interstitial nephritis) was established and treated with tablet calcium 300mg tds and vitamin D and advised to take alternative defluorinated and purified water.Patient showed improvement in his extraskeletal manifestations and is on follow -up.**

DISCUSSION :

Fluorine, a member of the halogen family, is an element essential for normal growth, development and maintenance of human health. However, excessive intake of fluoride leads to dental , skeletal and non-skeletal fluorosis. India lies in a geographical fluoride belt, which extends from Turkey up to China and Japan through Iraq, Iran and Afghanistan; of the 85 million tons of fluoride deposits found on the earth's crust, nearly 12 million tons are in India.[1,2]

Excess fluoride in groundwater is mainly the key factor. About 62 million people are at risk of developing fluorosis from drinking high-fluoride ion water in India. Six million children below the age of 14 years are affected. [3,4] Dental fluorosis is endemic in 150,000 villages in India. In India, fluorosis was identified in 1937 in Nellore of Andhra Pradesh by Shortt *et al.* [5] Geological crust of India, especially South India, has fluoride rich bearing minerals which can contaminate underground aquifers. [6] Nearly 73% of Tamil Nadu is hard rock crust. [7] In Tamil Nadu, Madurai is a known endemic fluorosis area and has fluoride level in drinking water of about 1.5 - 5.0 ppm. [8] More than 90 % of the ingested fluoride is absorbed from the gut. Approximately 50 % of the fluoride absorbed is deposited in the bones and teeth. The remaining is excreted in urine. About 99 % of the fluoride retained in the body is stored in the mineralised bones and teeth on account of its affinity for calcium phosphate. Increased fluorine ingestion causes raise in blood fluorine level which causes calcium sequestration and lowering of serum calcium. These increases serum parathyroid hormone which increases osteoclast formation and it results in increased collagen removal, bone resorption and decreased bone calcification. Fluorosis may cause Skeletal fluorosis, Clinical fluorosis, Dental fluorosis, Non Skeletal manifestations, or any combination of the above and in final stages it causes premature aging.

Dental fluorosis : White opacities, Faint yellow stain, Pitting, chipped off, Black discoloration, Enamel hypoplasia, Delayed eruption. Incidences of mottled teeth were observed even with range of 0.7-1.5 mg F/l in drinking water. The minimal daily fluoride intake in infants that may cause very minimal disease in human beings was estimated to be about 0.1 mg per kg body weight(9).

Skeletal fluorosis : Radiological presentations: Osteosclerosis, Periosteal bone formation, Calcification of interosseous membrane, ligaments, capsules, muscular attachments, tendons. Exostoses, Osteophytosis, Associated metabolic bone disease.

Clinical presentation: Heel pain, Painful and restricted joint movements, Deformities in Limbs, Hunch back.

Non skeletal manifestations are Nervousness & depression, headache, muscle weakness, wasting and stiffness, kyphoscoliosis, tingling sensation in fingers and toes, polydipsia, polyuria, oliguria, acute abdominal pain, diarrhea, constipation, blood in Stool, Loss of Teeth at an early age, anaemia (due to echinocyte formation), ligaments and blood vessel calcification.

DIAGNOSIS was made based on High fluoride contents of the drinking water, Endemicity of the fluorosis in the area, Clinical manifestations of fluorosis in the population - Dental, Clinical, Skeletal fluorosis and by Clinical examination. Examination of teeth and three simple diagnostic tests. First, the individual is made to bend and touch the toes without bending the knees. If there is pain or stiffness in the backbone, hip and joints, this exercise will not be possible. Second, the individual is made to touch the chest with the chin. If there is pain or stiffness in the neck, this exercise will not be possible. Third, the individual is made to stretch the arms sideways, fold the arm and try to touch the back of the head. If there is pain or stiffness in the shoulder joint and backbone, this exercise will not be possible(9). And also on Biochemical evaluation, Radiological evaluation, Histopathological evaluations e.g. bone biopsy, muscle biopsy etc.

TREATMENT modality includes health education regarding defluoridation techniques such as Nalgonda technique and Activated Alumina process. Vitamin C, Vitamin D and Salts of Calcium or Magnesium or Aluminium can be used in reversing the disease process and use of alternate source of drinking water and intake of food rich in vitamin c, calcium and proteins(10).

CONCLUSION : Fluorosis can cause dental, skeletal and non skeletal manifestations as in our case. Fluorosis is an important public health problem, So it is essential to create awareness among the public regarding its manifestations and the simple ways of preventing the diseases caused by fluorosis.

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