

## PREVALENCE, ETIOLOGY AND CLINICAL FEATURES OF SKELETAL FLUOROSIS: A CRITICAL REVIEW

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### ABSTRACT

Fluorosis occurs due to excessive fluorine entry into the body. Dental, skeletal and non-skeletal fluorosis are different types of fluorosis. Dental fluorosis is a developmental disturbance of dental enamel caused by excessive exposure to high concentration of fluoride during tooth development. The over exposure to fluorine may occur at any age, but it is higher in young age group. Prevalence of dental fluorosis varies in different parts of the world and there is wide geographic variation in prevalence of dental fluorosis in different geographic locations of the world. Like dental fluorosis, skeletal fluorosis also has different distribution in different parts of the world.

**Keywords:** Fluorosis, prevalence, etiology, skeletal fluorosis

### INTRODUCTION

In a systematic review in Iran by Azami-Aghdash S they have found that overall prevalence of dental fluorosis in Iran to be as high as 61% with 1% having severe fluorosis<sup>1</sup>. In a study by Kotecha PV et al in Gujarat, India, they have found the prevalence of dental fluorosis to be 59.31% in areas having high fluoride content in the water while 39.21% in the areas having low fluoride content in water<sup>2</sup>. Choubisa SL in his study in Rajasthan, India has found the prevalence of dental fluorosis to be as high as 49.26%<sup>3</sup>. In another study from Maharashtra revealed the prevalence to be 43%<sup>4</sup>. In a study by Majumdar KK, prevalence of dental fluorosis found was 66.7% in Rampurhat Block I, Birbhum district, West Bengal, India<sup>5</sup>. The prevalence in Tanzania is much higher (96.3%) as reported by Vuhahula et al in a study in Tanzania<sup>6</sup>. A study highlighted the prevalence of school going children in Mexico to be 60%<sup>7</sup>. Among 12-14 years old children in Turkey the prevalence of dental fluorosis is 29% in normal fluoride area and 77% in high fluoride area<sup>8</sup>. Irigoyen ME et al in 1995 found in Mexico that in 93 children aged 10-12 years in Mexico, resident of a community at 2066m height from sea level, 100% showed evidence of dental fluorosis, 57% had moderate fluorosis and 19% had severe fluorosis<sup>9</sup>. In a study in a fluorotic area of central Rajasthan, Hussain J et al have found the prevalence of dental fluorosis to be 76.9%<sup>10</sup>.

#### Prevalence of skeletal fluorosis

Majumdar KK has found prevalence of skeletal fluorosis to be 4.8-23.8% in a study from West Bengal, India<sup>5</sup>. In a study by Choubisa SL et al, they have found the prevalence of skeletal fluorosis to be 7.4% and 37.7% adults aged more than 21 years in areas having mean water fluoride concentration of 1.7 ppm and 6.1 ppm respectively<sup>11</sup>. In another study from Rajasthan, India it was revealed that the incidence of skeletal fluorosis was 27.6% in Dungarpur and 12% in Udaipur among people aged 21 years<sup>12</sup>. This study also showed that the maximum incidence of skeletal fluorosis occurred in 44 years and the minimum incidence was found in the age group of 21-28 years<sup>12</sup>. Hussain J et al have found the prevalence of skeletal fluorosis to be 47.5% in a fluorotic area of central Rajasthan<sup>10</sup>. A study by Pandey A has revealed that prevalence of skeletal fluorosis increased with age<sup>13</sup>. The higher prevalence of skeletal fluorosis among people with older age was also revealed in other studies like study by Gopalkrishnan P et al and Shashi A et al<sup>14, 15</sup>. Shashi A et al have found the prevalence of skeletal fluorosis to be high in 30-40 years and 50-60 years age group<sup>15</sup>. They have found the prevalence was higher among men than among women<sup>15</sup>. In another study by Krishnamachari et al also found the prevalence among male was higher than female and

this difference was more obvious in children than among adolescents and adults<sup>16</sup>. Bharati and Rao conducted a study in Dharwad district of Karnataka which revealed the prevalence among male was significantly higher in males (66%) as compared to females (57.94%)<sup>17</sup>. In a study in southwestern China, Watanabe et al have also found the prevalence among female (30%) to be less than among male (66%)<sup>18</sup>. In a study from Tanzania, where prevalence of juvenile skeletal fluorosis was 4.4%, its prevalence was found to be more common in male<sup>19</sup>.

#### Etiology of skeletal fluorosis

There are different factors which were described by different scientists to be associated with skeletal fluorosis. Fluoride level in water is one important factor. Hussain J et al have shown that prevalence of skeletal fluorosis was increased with the increase in fluoride concentration in water<sup>10</sup>. Hussain J et al also showed the prevalence to be higher among people of poor socio-economic status and those using tobacco, betel nuts and alcoholic drinks<sup>10</sup>. In contrast the people having good nutritional status and those consuming citrus fruit, prevalence is less among them<sup>10</sup>. Huber AC et al also found the association of high fluoride content of water with high prevalence of skeletal fluorosis<sup>20</sup>. Long occupational exposure can also lead to development of skeletal fluorosis<sup>21</sup>. In a review by Krishnamachari KA in 1986, he reported that total quantity of ingested fluoride as the single most important factor in the development of the disease<sup>22</sup>. Kakumanu N et al mentioned excessive tea drinking as the reason of skeletal fluorosis<sup>23</sup>. Whyte MP et al mentioned consumption of well water having fluoride more than 4ppm as well as consumption of green tea as the causes of development of skeletal fluorosis<sup>24</sup>.

#### Clinical features of skeletal fluorosis

Most common symptoms of skeletal fluorosis are low back pain (73%) and leg pain (71%) followed by arm pain (67%) according to Shashi A et al<sup>15</sup>. Other symptoms are tingling sensation of hands and feet (48%), loss of appetite (44%), muscle weakness (38%), neck pain (34%), nausea (31%), abdominal pain (24%), polyuria (29%), polydipsia (27%) and constipation (19%)<sup>15</sup>. Majority of cases were affected by grade II skeletal fluorosis (51%), followed by grade I type (29%) and 20% were affected by grade III type of skeletal fluorosis<sup>15</sup>. Genu valgum and osteoporosis are common in skeletal fluorosis which is reported since long back in a study in 1973<sup>16</sup>. Bharati P et al have reported symptoms like vague pains in hands, feet and knees, numbness and tingling sensations in extremities,

restricted trunk movement, difficulty in movement of neck, kyphosis, inability to close fist, spine rigidity, difficulty in walking and crippling with varied severity<sup>25</sup>. Susheela AK et al have reported gastrointestinal disturbances like abdominal pain, constipation, and intermittent diarrhoea, loss of appetite, nausea and mouth sores among patients suffering from skeletal fluorosis<sup>26</sup>. Gupta R et al in their study described the mimicking features of skeletal fluorosis with seronegative arthritis<sup>27</sup>. Nemeth L et al have reported the development of osteosclerosis especially of spinal and pelvic bones and calcification of spinal ligaments among patients with skeletal fluorosis<sup>21</sup>.

Skeletal fluorosis prevalence can be decreased by decreasing the fluoride content of the water<sup>28</sup>. Decreased consumption of tea also has shown improvement of the condition. Providing decreased fluoride content water to the community can be useful in the management of this condition as a whole.

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