

Increased Incidence of Spina Bifida Occulta in Fluorosis Prone Areas

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Spina bifida is a congenital deformity of posterior wall of vertebra of spine. This is a midline defect of skin, vertebral arches and neural tube, usually in the lumbosacral region. The incidence usually ranges from 0.2-0.4/1000 live births(1). Little is known about the etiology of the spina bifida. It may take any of the following forms(2): (i) *Spina bifida occulta* is due to failure of neural arches to unite, but there is no protrusion of cord or membrane. The spina bifida occulta is an isolated, insignificant finding in about 20% of all spines examined roentgenographically; (ii) *Spina bifida manifesto* commonly takes one of the following forms (a) Meningocele, (b) Meningomyelocele. Other rare forms may be (c) Syringomyelocele, and (d) Myelocele.

Gupta, *et al.*(3) demonstrated that the placenta permits a limited passage of fluoride to the fetal circulation. Gedalia *et al.*(4) showed that once fluoride enters the fetal

circulation, it is incorporated into fetal bones and teeth undergoing calcification. Factors leading to fluoride deposition in bones during extrauterine life (continued intake of water and food having high fluoride content; poor nutrition; protein, calcium and ascorbic acid deficiency) also operate in fetal bones during intrauterine life(5).

Subjects and Methods

This study was undertaken to evaluate therapeutic effect of a proposed regimen on fluorosis, conducted on 30 children, selected randomly in July 1992, aged 4 to 12 years and ingesting high fluoride concentration (4.5 to 8.5 ppm) in drinking water. The children were evaluated for antenatal history, clinical, dental, radiological and biochemical examination for manifestations of fluorosis. The criteria for grading are summarized in *Table I*.

Results and Discussion

The children were conceived in the same area. Their mothers were also drinking fluoride rich water during the antenatal period. The children were manifesting clinical (Grades I & II), dental (Grades I to IV) and skeletal fluorosis (Grade 0 & I). The blood fluoride levels were 0.9 to 1.1 ppm while serum fluoride levels ranged from 1.6 to 1.9 ppm.

Of the 30 skiagrams of lumbosacral region, 14 (47%) were showing spina bifida occulta which was silent on clinical examination.

We have not come across literature correlating these two, which is much higher than the 20% reported in literature. Now we are proposing to conduct a randomized controlled study to evaluate a possible correlation between spina bifida and high fluoride intake.

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TABLE I—Grading of Fluorosis

(A) <i>Clinical Grading(6)</i>
(i) Mild—generalized bone and joint pain.
(ii) Moderate—generalized bone and joint pain, stiffness and rigidity, restricted movements at spine and joints.
(iii) Severe—symptoms of moderate grading with deformities of spine and limbs, knock knees, crippled or bedridden state.
(B) <i>Radiological Grading(6)</i>
(i) Mild—osteosclerosis only.
(ii) Moderate—osteosclerosis, periosteal bone formation, calcification of interosseous membrane, ligaments, capsules, muscular attachments, tendons.
(iii) Severe—findings as in moderate with exostoses, osteophytosis and associated metabolic bone disease.
(C) <i>Dental Fluorosis(7)</i>
Grade 0—normal, translucent, smooth and glossy teeth.
Grade I—white opacities, faint yellow line.
Grade II—Changes as in grade I and brown stains.
Grade III—brown line, pitting and chipped off edges.
Grade IV—brown, black and/or loss of teeth.

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