
Brief Reports

Endemic Fluorosis with Genu Valgum Syndrome in a Village of District Mandla, Madhya Pradesh

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An epidemiological survey carried out in a village of Mandla district of Madhya Pradesh revealed a high prevalence of genu valgum (51.1%) and dental fluorosis (74.4%) among the children below 20 years. Notably, 16.3% children below 10 years were affected and fluorosis was documented with deep bore well water (more than 43 meters deep) consumption. However, it is generally believed that supply of water from deep bore well is a method to protect individuals from endemic fluorosis(1). Recently, from Nairobi also two children were reported with genu valgum due to exposure to high fluoride (10 ppm) in water(2). In the present communication, we report our findings on endemic genu valgum syndrome due to fluorosis from Madhya Pradesh.

Subjects and Methods

The village Tilaipani is about 12 Km

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from District headquarter Mandla in the State of Madhya Pradesh, India. The village comprises 542 persons in various age groups. Evaluation comprised recording of history, clinical and radiological examination and estimation of biochemical parameters of blood and fluoride content in the water from deep bore wells. Fluoride contents were estimated using fluoride ion selective electrode (Orion Research Inc.). Biochemical investigations included serum alkaline phosphatase, inorganic phosphorus and calcium.

Results

The percentage distribution of genu valgum and dental fluorosis is shown in *Table 1*. The overall prevalence of genu valgum (*Fig. 1*) below 20 years was 51.1%; more in males than females (2:1). The maximum sufferers were in the age groups between 6 to 10 years and 11 to 20 years. Marked dental fluorosis (*Fig. 2*) was seen in 74.4% children below 20 years. A male child aged 7 years exhibited marked genu varum deformity. The fluoride content of the deep bore wells ranged from 9.22 to 10.83 ppm. The depth of deep bore wells ranged from 37 meters to 43 meters, as per the records of Public Health Engineering Department, Mandla. Radiographs of lower and upper extremities revealed osteosclerosis with coarse trabecular pattern in most of the cases, A few showed juxta articular bone resorption of metacarpals and phalanges. Periosteal reaction with thickening of cortex was seen in some cases. Multiple horizontal lines of trabeculae (growth arrest lines) suggesting repeated arrests of osteoblastic activities were visible in long bones. Bony exostosis which is considered to be severe form of skeletal

TABLE I—Age and Sex wise Distribution of Genu Valgum and Dental Fluorosis in Village Tilaipani, District Mandla.

Age (yrs)	Sex	No. examined	No. with GV	Prevalence (%)	Percentage Distribution of GV	No. with DF	Prevalence (%)	Percentage distribution of DF
0-5	M	7	0	0	0	0	0	0
	F	7	2	28.6	10.5	3	42.8	9
	T	14	2	14.3	3.8	3	21.4	3.9
6-10	M	20	16	80	48.5	19	95	43.2
	F	13	7	53.8	36.8	11	84.6	33.4
	T	33	23	69.7	44.2	30	90.9	38.9
11-20	M	25	13	52	39.4	21	84	47.7
	F	14	6	42.8	31.5	10	71.4	30.4
	T	39	19	48.7	36.5	31	79.5	40.2
21+	M	32	4	12.5	12.1	4	12.5	9.1
	F	34	4	11.7	21	9	26.5	27.2
	T	66	8	12.1	15.4	13	19.7	16.9
Total	M	84	33	39.2	100	44	52.4	100
	F	68	19	27.9	100	33	48.5	100
	T	152	52	34.2	100	77	50.6	100

GV - Genu valgum; DF - Dental fluorosis; M - Male, F - Female; T - Total.

fluorosis(3) was seen in two cases (*Fig. 3*). Serum alkaline phosphatase, serum calcium and serum inorganic phosphorus were within normal limits.

Discussion

Endemic fluorosis has been reported from different parts of the country(4-6). Dental fluorosis has also been reported from Jhabua district of Madhya Pradesh(7). However, there has been no report of endemic genu valgum induced by fluorosis from the State of Madhya Pradesh. Occurrence of genuvalgum because of fluorosis was documented from the State of Andhra Pradesh in 1973(8). However, in that series a majority of the cases were between 10-30 years of age, while in our study a preponderance was seen in the age group of 6-10 years and 11-20 years.

The etiological factor in the earlier report(8) was the contamination of surface water by underground water because of change in soil strata where top soil became underground soil and vice versa due to construction of a dam in a nearby area(7). However, in the present study, fluorosis occurred due to consumption of water from deep bore wells. The deep bore wells were dug in the village five to seven years ago, and the first case of lower limb deformities was observed two years later. Thereafter, within a short span of three years, the number of cases were added in quick succession to reach the present magnitude of 51.1% for genu valgum and 74.4% for dental fluorosis among children below 20 years.

In the present report, the limb deformities, were mostly genu valgum. However, a

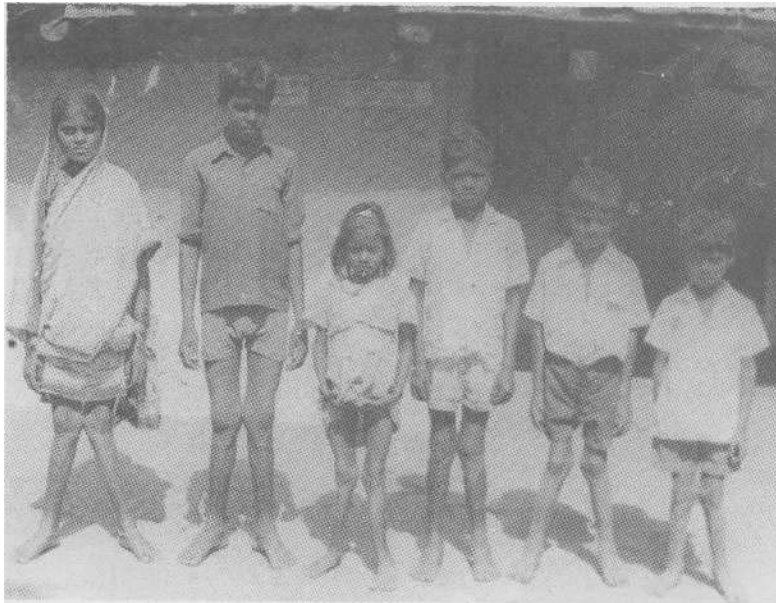


Fig. 1. A group of children with severe genu valgum.

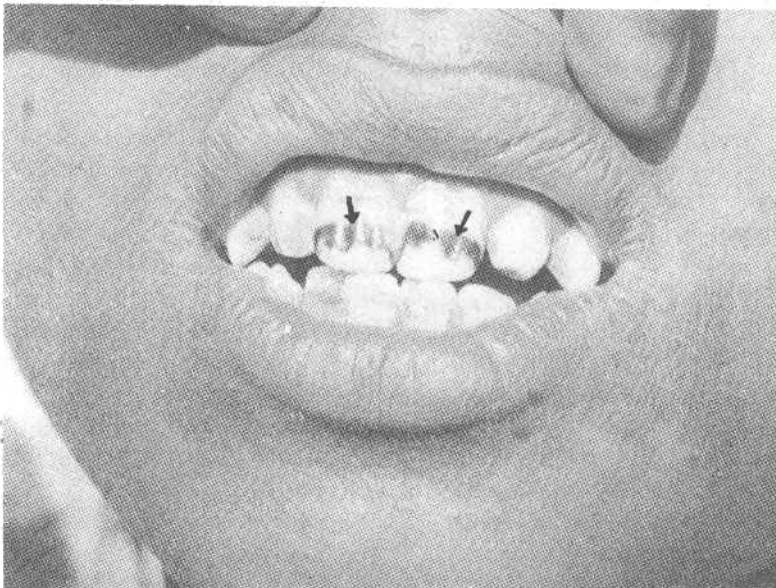


Fig. 2. A case of dental fluorosis.

male child aged 7 years showed genu valgum deformity while a few girls showed thickening and anterior bending of tibial

and fibular shafts. In the present series, the duration of development of osteopathy was shorter than the earlier reports.



Fig. 3. X-ray of a 8 years old child with bony exostosis in tibia.

The serum calcium values were within normal limits, but the dietary calcium intake was much lower than the recommended daily allowances among these children. This could also be another factor responsible for aggravating the syndrome(9). However, except one child there were no obvious clinical signs of rickets. The high contents of fluoride in the water and typical radiological and clinical findings confirm fluoride toxicity as the cause of the observed deformities. Earlier reports(7) have stated that fluorosis *per se* can cause genu valgum syndrome and rickets like radiological features. However, it is still not clear why in a few endemic areas children manifest genu valgum deformities with a short duration of consumption of fluoride rich water

whereas in other endemic areas, only the adults manifest skeletal fluorosis other than genu valgum after prolonged exposure to fluoride.

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Zinc Supplementation in Severe Malnutrition

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Zinc is an essential trace element and acts as a cofactor for more than 200 enzymes in the body. In view of the widely prevalent malnutrition, it is felt that the sub-clinical zinc deficiency could be existing in developing countries, contributing to intrauterine and postnatal growth retardation⁽¹⁾. The objective of the present study was to determine the effect of zinc supplementation on serum zinc levels and weight gain in children with severe malnutrition.

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Subjects and Methods

This study was designed as a double blind placebo controlled trial. The subjects were selected from the children attending the Outpatient Division of Department of Pediatrics, Medical College, Baroda, between the ages of 8 to 24 months and suffering from protein energy malnutrition (PEM) Grades III and IV(2). Other concurrent causes of malnutrition were excluded by history, physical examination and investigations and informed consent was obtained from the parents.

A total of 72 children divided into two groups (zinc supplemented and placebo) were recruited in the study. However, only 62 cases (31 in each group) could complete the designated follow up period of 3 months. The recruited children in the two groups were matched for age (within 3 months) sex, weight for age, socio-economic status and ethnic background. The initial evaluation included weight of the child and serum zinc analysis by calorimetric method using a kit obtained from Randox Laboratories, UK(3).

Twenty apparently normal, healthy children who were not malnourished or in any way ill and who were healthy siblings