Fluoride Related Disorder and Nutritional Status of School Children in Endemic Area of the Purulia-Review

ParthaSarathiKarmakar, Dr.DilipKr.Nandi
[1]Research Scholar
SSSUTMS, Sehore
[2]Research Guide
SSSUTMS, Sehore

Abstract

Fluoride can enter the body through drinking water. Fluorosis is a slow, progressive and crippling malady affecting most of the organs in the body where flouride in drinking water is > 1.0ppm. Fluoride has been identified in 25 Countries like India. But West Bengal has identified for most fluoride affected district namely Purulia. Fluorosis is a disease caused by excessive ingestion of fluoride in drinking water injuries for health. High fluoride concentration in the District is commonly associated with rural area, arid and semi-arid climate, granites and granites and gneisses. A cross sectional survey of school going children will be conducted at 45 Primary schools of Purulia District to find out the range of fluoride level urine and water and biochemical analysis of urine and water sample will be carried out of high level of fluoride in same school of Purulia District. A school survey was conducted has been carried out in 45 fluoride affected schools in Purulia district. Urine and water sample has been collected from School under purulia district.

Keywords:Fluoride,**Environmental Impacts,Child Development Structure,Nutritional**

Introduction

Fluorosis is a disease caused by excessive ingestion of fluoride though water and or food. The upper limit of optimum fluoride level in drinking water for tropical country like India is 0.5 PPM or 0.5 milligram per liter. The upper limit of safe total intake of fluoride per day for an adult is 8 milligram. It is the total daily intake though water and food that determines the development of fluoride. Fluorosis is an important public health problem in 24 countries, including India, which lies in the geographical fluoride belt that extends from Turkey to Chine and japan though Iraq, Iran and Afghanistan. Feil first mentioned fluorosis in humans as an occupational disease in 1930. This was substantiated when the occurrence of skeletal fluorosis in cry lite miners in Denmark was reported. In India Fluorosis was first reported in the then Madras Presidency in 1937. The incidence of fluorosis has been reported in 17 countries of the world including India. The worst sufferer countries are USA Italy, Holland, Spain, France, Germany, Switzerland, Chine, Japan, Thailand and South America due to the presence of excessive fluorides (beyond permissible limited) in drinking water.

MATERIAL AND METHODS

The present study was conducted to find out various health hazards related to high consumption of fluoride either by water or food in endemic areas of Endemic Area of Purulia, WB, India. The study revealed high levels of serum/urine fluoride content and relevant clinical outcome like mottling of teeth and skeletal deformity on prolonged exposure of fluoride. Consumption of fluoride causes lowering of Hemoglobin and serum protein levels. There are no significant changes of serum cholesterol whereas circulating testosterone is decreased without affecting the reproductive functions. We have carried out surveys in the fluoride endemic areas of Endemic Area of Purulia (W.B) by the help of Department of Biochemistry, B.S. Medical College. & Hospital, Endemic Area of Purulia, WB, India.

Sample Selection

Similar consumable water and blood samples are collected from urban area of Purulia town, WB where fluoride content in water follows permissible limit recommended by Indian Bureau of Standards.

ANALYZING DIFFERENT PARAMETERS

Fluoride content of drinking water and blood are determined with an Ion selective electrode, made by Orion Model 9609BNWF, and expressed as ppm (parts per million)[Reitman S, 1957]. Haemoglobin was **determinedbySahli'smethod hemoglobin meter, and** expressed in g%. Serum protein estimated by biuret method and expressed in g/dl [Reitman S, 1957].Serum cholesterol **determined by Pearson's method and expressed as mg/dl.** Serum glutamate pyruvate transaminase (SGPT) and serum glutamate oxaloacetate transaminase (SGOT) are estimated by Reitman and Frankel"method [Dean NA. 1960] and expressed as IU (International Unit). Serum. Calcium, sodium and potassium levels were estimated by a Flame Photometer (Systronic digital unit type 125) [Kemp HA, John R 1965] and expressed in mEq/L.

Serum Hormones

Serum Testosterone is assayed by the ELISA method [Von Euler, 1965] and expressed as ng/mL Serum. Tri-iodothyronine and thyroxine (T3 and T4) are determined by ELISA method and expressed as ng/mL. Thyroid stimulating hormone (TSH) serum levels are determined by the ELISA method and expressed in uU/mL. Serum **catecholamine's** are determined by Von Euler and Hamberg method and expressed ug/mL serum [Guy WS 1976]. Surveys conducted in 52 villages of Purulia (W.B) revealed symptoms of fluorosis in the majority of the individuals studied. 74% of the individuals showed slight to severe mottling of teeth. 59% had stiffness of spinal cord. Other skeletal problems such as stiff hands and fingers (60%), stiffness of legs and joints (65%) were also common and 93% of the cases studied having the habit of regular tea intake.

Water Fluoride Content

Water samples from various places of Purulia town showed fluoride levels within the permissible limit (recommended level of fluoride 0.6 ppm) whereas samples collected from endemic villages of Endemic Area of Purulia revealed high fluoride contents, ranging in this survey (Table 1.1) from 1.0 to 6.53 ppm. In 52 villages 18 (35%) had fluoride content below 2ppm and 26 (50%) had fluoride content within the range of 2-4 ppm while 8 (15%) had fluoride levels above 4 ppm. Bore water samples had higher fluoride concentrations than well water samples [Singer L, 1979].That fluoride exposed individuals,when compared to controls, had significantly increased serum levels ($P < 0.001$) of fluoride, SGOT, SGPT, sodium and potassium, and serum cholesterol levels were essentially the same in both populations. In this survey, there was a decrease in mean of serum testosterone levels in the fluoride exposed individuals, compared to controls.

Parameter	Control	Endemic Population
Water fluoride	0.638 ± 0.013	2.70 ± 0.18
Range	0.56 - 0.72	1.0 - 6.53
No of cases	15	52
Serum fluoride	0.04 ± 0.002	0.284 ± 0.032
Range	0.03 ± 0.05	0.131 ± 0.552
No of cases	15	76

Table 1.1. Water and serum fluoride levels (ppm) in control and endemic population

Name of School	Sex	Nutritional Status(BMI)	Water fluoride content
Layekdih Primary School	M	6.816 ± 1.15	1.05
	F	6.413 ± 0.61	1.05
Udaypur Primary School	M	7.49 ± 1.004	1.23
	F	6.747 ± 0.72	1.23
Bero Primary School	M	7.345 ± 1.754	1.06
	F	6.291 ± 0.99	1.06
Daulatpur Primary School	M	6.609 ± 1.097	1.47
	F	6.074 ± 0.662	1.47
Bhatbandh Primary School	M	5.84 ± 0.602	1.11
	F	7.213 ± 0.821	1.11

Table 1.2 Relations between Water Fluoride Content and Nutritional Status

Name of School	Sex	Nutritional status (BMI)	Water fluoride content in urine	t value	Remarks
Layekdih Primary School	M	6.816 ± 1.15	3.03 ± 0.9	2.658	Significant
	F	6.413 ± 0.61	3.08 ± 1.1	2.716	Significant
Udaypur Primary School	M	7.49 ± 1.004	4.12 ± 1.11	2.498	Significant
	F	6.74 ± 0.72	2.88 ± 0.80	3.979	Significant
Bero Primary School	M	7.34 ± 1.754	2.62 ± 0.819	2.521	Significant
	F	6.29 ± 0.99	4.40 ± 1.18	1.263	Not Significant
Daulatpur Primary School	M	6.60 ± 1.097	2.62 ± 0.819	3.553	Significant
	F	6.07 ± 0.662	2.85 ±0.98	3.319	Significant
Bhatbandh Primary School	M	5.84 ± 0.602	3.57 ± 1.067	1.963	Not Significant
	F	7.21 ± 0.821	3.93 ± 1.77	1.772	Not Significant

Table 1.3 Relations between Fluoride Content in Urine and Nutritional status

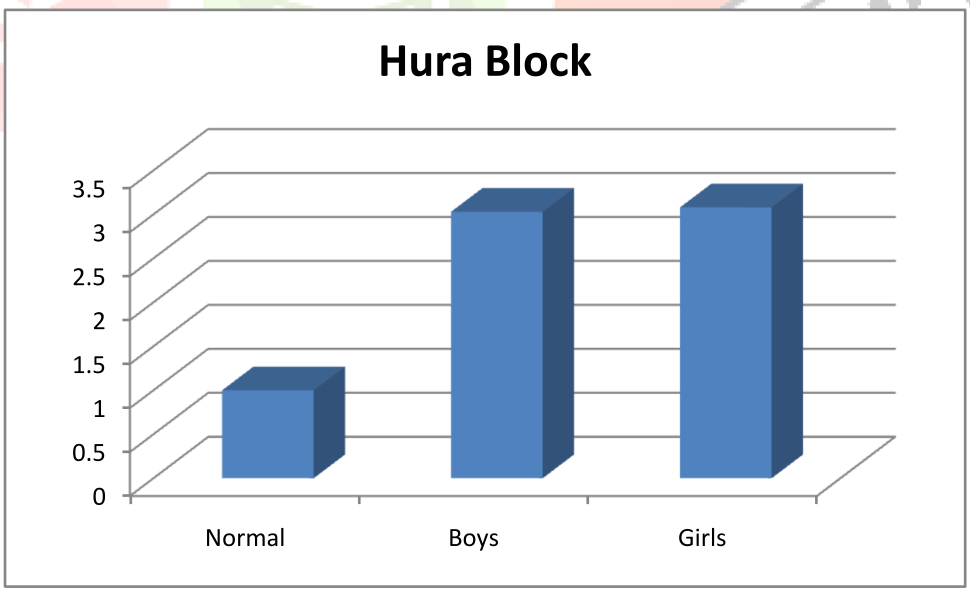

Figure 1.1 Comparison of Fluoride level in urine with normal level (Normal level-1 ppm (parts per million): Hura Block

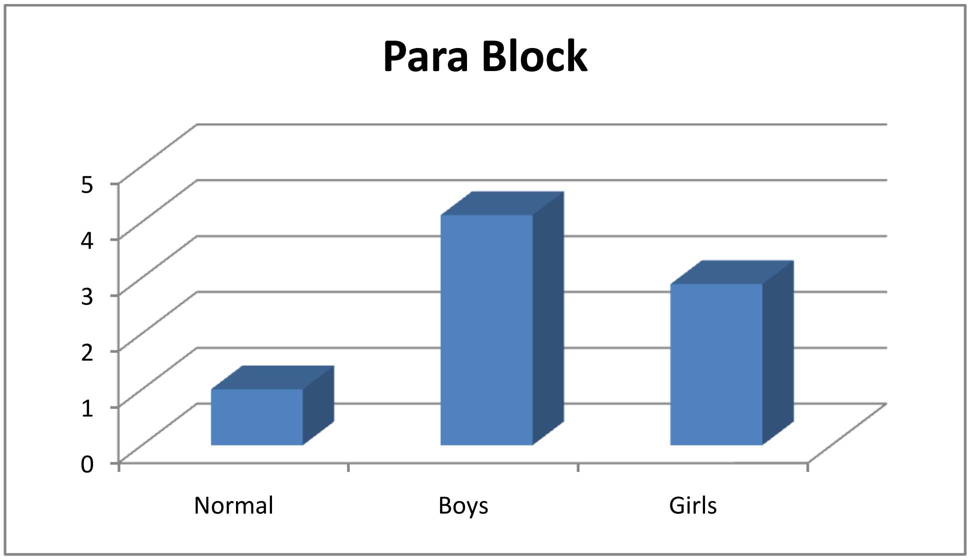

Figure 1.2 Comparison of Fluoride level in urine with normal level (Normal level-1 ppm(parts per million): Para Block

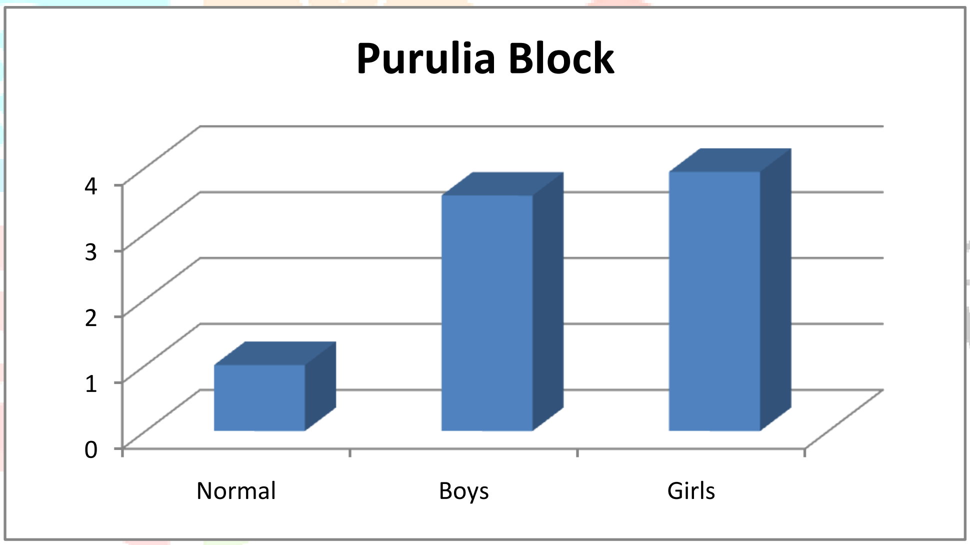

Figure 1.3 Comparison of Fluoride level in urine with normal level (Normal level-1 ppm(parts per million): Purulia Block

Discussion

Our proposed a framework combining the public action model with analytical tools from the participatory tradition in poverty studies. I found that when applied critically and in a process-oriented manner, the public action framework is fruitful in order to understand the root causes of malnutrition. However, a narrow interpretation of Drèze and Sen's argument – that democracy and public action extract effective responses from governments to human deprivations like malnutrition – does not hold ground. I have tried to increase the model's relevance by exploring the functioningandrelativerelationships betweenthree overlapping spheres of public action – state, civil society and citizen action. I further assumed that viewing public action from 'outcast' angles provides new and important insights. By mapping poverty and 'voice' among Adivasi women of Eastern India, I was able to critically consider my second question: How effective is public action in reducing malnutrition in India The majority of the world's poor live in formalistic democracies like India, which attained independence from colonial rule more than five decades ago. Yet, the real freedoms of the poor in the country are severely constrained by poverty and hunger, diminishing their real-life choices and their ability to voice their concerns as right-holding members of society. Citizenship in a formal democratic setting is no guarantee for government accountability. Thus, an important contribution of this study – of general relevance to poverty research – is how public action in a formal democratic setting produces interesting permutations and combinations in terms of public interaction. Public action is embedded in local contexts, where political culture, norms and clashes of economic class and identity-based interests shape its effectiveness in enhancing the freedoms of the poor. The crux of the public action puzzle is that its effectiveness relies quite substantially on how the 'outcasts' are targeted vis-à-vis the non-poor. 'Targeting' has become a buzzword in the poverty reduction business. Paradoxically, the techniques used for targeting can easily produce the opposite effect i.e. more exclusion. While the case study areas are so called 'Tribal ICDS project blocks' – and supposed to be given high priority – they seldom are. On the contrary, Adivasi women suffer from a double exclusion of public services. They are not 'poor enough' to be targeted through BPL cards, and the areas they live in are not adequately targeted in terms of, for example, increased ICDS and health centres. Such facilities fill the landscape inhabited by non-Adivasi groups. This is an example of how 'blindfolded' targeting can have a negative effect on both redistribution of resources and the societal inclusion of the 'outcast'. To avoid 'boomerang' targeting, i.e. policies that actually produce new forms of exclusion, food security policies need to be designed in solidarity with the poor and based on knowledge. Neither biased 'pro-poor' 'radical' policies nor neoliberal blindness of the active state's potential to empower the poor should be left uncontested. While there is an increasing awareness of poverty being multidimensional, research, especially applied research produced for practitioners, is lagging behind in terms oftackling and understanding deprivation in a more comprehensive manner. This study has, however, benefited immensely from the voices of the poor. An increased interdisciplinary focus on the study of poverty and related problems like malnutrition is urgently needed. With regards to public action, collaborations between political scientists, economists, historians and social anthropologists may shed more light on how structures of legitimacy are negotiated, affecting the public participation of the poor themselves. In the fight against malnutrition, a most pressing task is to break the silence about its causes by unmasking the politics behind it.

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