



Lead, Fluoride and Iron Contaminants in Drinking Water of North Bihar (Katihar) and Their Impact on Human Health

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ABSTRACT

Katihar district is an important industrial town of North Bihar, situated on 87°4' E longitude and 25°3' N latitude. The source of drinking water in this district is mainly hand pumps. The water of this district may be categorised under "hard water". Its lead concentration was recorded in the range of 0.112mg/L to 4.91mg/L, while fluoride and Fe³⁺ were recorded in the range of 0.004-0.012 and 0.40-1.27 mg/L respectively. The high value of lead in drinking water of Katihar is responsible for kidney damage, neuro problems, and mental retardation in children. The low fluoride in the drinking water is responsible for large number of dental carries patients while very high value of iron in drinking water is responsible for colouring of teeth, clothes and potteries. In major portions of Katihar, the people have golden coloured teeth due to deposition of iron on the enamel of the teeth.

INTRODUCTION

Due to pollutional load, the availability of good quality freshwater is becoming scarce day by day. In Bihar, people depend for drinking water mostly on handpumps, rivers, ponds and wells. The quality of drinking water of Katihar district is very poor in comparison to other districts of Bihar. The water of Katihar district may be categorised under hard water. Katihar is northeastern district of Bihar situated on 87°4' eastern longitude and 25°3' northern latitude. It is an important industrial town of Bihar. Due to high amount of lead in drinking water, cases of kidney damage, neuro problems and mental retardation in children are on rise.

During a survey, amount of lead was recorded high in drinking water in whole Bihar but specially in Katihar. It made highly polluted situation which works as a sweet poison. Due to fluoride and high iron in the drinking water, dental carries and teeth colouring are prominent ailments of this district. In the present investigation, an attempt has been made to estimate the levels of lead, fluoride and iron in drinking water of different sectors of Katihar district and their impact on the human health.

MATERIALS AND METHODS

The estimation of lead, iron and fluoride were made following the standard methods of (APHA 1981, Vogel, 1979). The water samples were collected from 10 different sites of Katihar township, viz., Mangal Bazar, Binodpur, Baniatola, Bara Bazar, Nayatola, Gamitola, Colony No. 1 and 2 and Lalkothi. The collecting of water samples was made from the hand-pumps, as it is the only source of drinking water in Katihar.

RESULTS AND DISCUSSION

Average values of the three parameters in collected samples are given in Table 1. The value of lead was recorded lowest in Binodpur (0.112 mg/L), while highest in Colony No. 2 (4.91 mg/L). As per WHO, permissible amount of lead in drinking water is 0.05 mg/L, but in most of the districts of Bihar lead is reported to be higher than the normal value.

The high amount of lead in drinking water is causative for kidney damage, neuro problem, and mental health retardation in children. Low F⁻ ions in drinking water are responsible for dental carries in Britain (Leech 1974). In Katihar, the dental carries is most prevalent in the areas where F⁻ is comparatively in lower range such as Binodpur, Bara Bazar and Gamitola. Due to moderate values of F⁻ in the Colony No. 1 and 2, Mirchaibari and Mangal Bazar, the dental carries was less prevalent. The fluoride content of teeth is about 0.05%. Due to continual exposure to very high F⁻ ions in these areas, there is fair chance that F⁻ content of human organs may increase and fluorides may be common cause of certain ailments among the people of Katihar district. This chance can be reduced by removal of excess of F⁻ by addition of alum, lime or magnesia (Singh et al. 1992).

The higher values of iron are responsible for teeth colouring among the people of Katihar. The iron also colours clothes and pots yellow. The level of iron was recorded in higher range in the Mirchaibari, Mangal Bazar, Colony No. 1 and 2 and Lalkothi areas, so colouring of teeth is common in these areas. As these areas comprise most of the portion of Katihar township, so Katihar was popularly known as 'Kalapani' in the British period.

The Katihar township needs an urgent settlement of water treatment plant to save the dental diseases, kidney problems, mental retardation and neuro problems among the people.

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Table 1: Presence of contaminants in water samples of different areas of Katihar township.

Location	Pb	F ⁻	Fe
Mirchaibari	2.21	0.008	0.9
Mangal Bazar	0.117	0.007	0.81
Binodpur	0.112	0.003	0.72
Bania Tola	0.216	0.006	0.74
Bara Bazar	0.119	0.004	0.70
Naya Tola	0.128	0.005	0.73
Gami Tola	2.95	0.004	0.40
Colony No. 1	3.71	0.010	1.08
Colony No. 2	4.91	0.019	1.25
Lalkothi	4.02	0.008	0.98

Values are in mg/L.