



RELATIVE CONTENTS OF FLUORIDE AND NITRATE IN DRINKING WATER SAMPLES IN DIFFERENT LOCALITY OF LAKHIMPUR DISTRICT OF ASSAM

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ABSTRACT

The present investigation has been undertaken to determine the fluoride and nitrate contents in drinking water samples of the study area. Twenty water samples were analysed during May-June 2008 for pH, total hardness, fluoride and nitrate contents by adopting standard methods (APHA-AWWA-WPCF, 1995). The data obtained were within the standard permissible limits of WHO. Average nitrate contents was higher than average fluoride contents in case of most of the tube wells. In ring wells, the fluoride content exceeded the nitrate content.

Key words: pH, Hardness, Fluoride, Nitrate.

INTRODUCTION

Water is essential for all living things. For human beings living in a civilized society, water is needed in every walk of life. The quality of water used by man may vary from purpose to purpose. Contamination of drinking water, either directly or indirectly by sewage and other waste or by human and animal excrement is the most common and wide spread problem associated with drinking water quality; particularly in the under developed world. Fluoride pollution is a significant global problem and WHO (1999) suggest that over 60 million people are affected by fluorosis in India and China and that the total global population affected as being 70 million from nitrate is also of concern. Although there remains uncertainty about the scale of adverse health effects from nitrates as few countries include methemoglobinaemia as a noticeable disease¹. Raised nitrate is, however, identified as a potential public health problem in countries, where concentrations in ground water reach extremely high values². Water provided for direct consumption and ingestion via food

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should be of a quality that does not represent a significant risk to human health. Water pollution studies in India have received tremendous momentum in recent times. Most studies are, however, related to rivers. Sarma and Bhattacharya² studied the quality of drinking water in Darrang district of Assam with respect to fluoride and nitrate content in some locations. Drinking water quality in various locality of Dhemaji district of Assam with respect to fluoride, nitrate, arsenic and iron content was studied by Buragohain *et al.*³ There is no earlier data available for various water quality parameters in Lakhimpur district, Assam. The present research is undertaken with a specific view to strengthen the national and local water quality database.

Study area

The study area, Lakhimpur district, is situated in the Eastern parts of India on the North-East corner of Assam, located between the latitudes of 27° 00' (N) and 27° 18' (N) and the longitude of 94° 13' (E) and 94° 32' (E).

EXPERIMENTAL

Materials and methodology

The need for careful sampling techniques varies according to the constituent being tested. Separate water samples were selected by random selection and compiled together in plastic bottles to set a representative sample. Samples were protected from direct sun light during transportation. Standard methods (APHA-AWWA-WPCF, 1995)⁴ were followed during the analysis of pH, total hardness, fluoride and nitrate contents in the water samples. The results were evaluated in accordance with the WHO Standards⁵.

Table 1: Water parameters in tube-well waters

Sample No.	pH	Total hardness (mg/L)	Fluoride (mg/L)	Nitrate (mg/L)
T-1	6.5	65.0	0.75	1.04
T-2	6.3	69.0	0.06	0.08
T-3	6.7	94.0	0.45	0.76
T-4	6.6	34.0	0.84	0.73
T-5	6.6	77.0	0.70	0.84

Cont...

Sample No.	pH	Total hardness (mg/L)	Fluoride (mg/L)	Nitrate (mg/L)
T-6	6.7	80.0	0.41	0.36
T-7	6.6	60.0	0.71	0.86
T-8	6.5	69.0	0.50	0.47
T-9	6.3	75.0	0.62	0.71
T-10	6.6	70.0	0.53	0.90

Locations: T-1: Dhakuakhana Chariali, T-2: Kekuri, T-3: Ghilamara, T-4: Bordoi, T-5: Laokuth, T-6: Baginadi, T-7: Saboti, T-8: NLP town, T-9: Bandardewa, T-10: Narayanpur

Table 2: Water parameters in ring-well waters

Sample No.	pH	Total hardness (mg/L)	Fluoride (mg/L)	Nitrate (mg/L)
R-1	6.7	55.0	0.75	0.29
R-2	6.5	60.0	0.12	0.28
R-3	6.5	74.0	0.63	0.50
R-4	6.6	39.0	0.31	0.40
R-5	6.7	75.0	0.34	0.06
R-6	6.6	70.0	0.42	0.09
R-7	6.5	50.0	0.40	0.11
R-8	6.6	59.0	0.54	0.13
R-9	6.4	55.0	1.02	0.26
R-10	6.5	80.0	0.50	0.34

Locations: R-1: Matmora, R-2: Bebejia, R-3: Mahbol, R-4: Chauldhua, R-5: Laluk, R-6: Badati, R-7: Kadam, R-8: Dhalpur, R-9: Bihpuria town, R-10: Khelmati

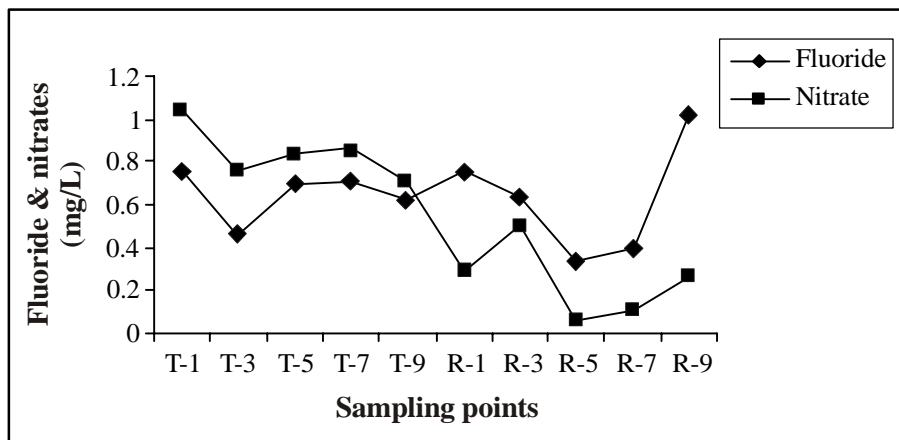


Fig. 1: Relative contents of fluoride & nitrate in tube-well and ring-well waters

RESULTS AND DISCUSSION

The pH is an important water quality parameter measuring the acid-base equilibrium of the dissolved components. In natural waters, the pH is controlled by the carbon dioxide-bicarbonate – carbonate equilibrium and generally the values lie in the range 6.5 to 8.5. Low pH causes corrosion in the distribution system and increases the metal contamination of drinking water. High pH levels may impart a bitter taste to the water. In most of the cases, the value were within the WHO guideline values for safe drinking water and it was towards the acidic side with a narrow variation.

Hard water is not a health hazard, but dealing with hard water in the home can be a nuisance. When hardness exceeds 180 mg/L, it generally causes problems, and a water softener should be considered. However, water softened to zero hardness is corrosive. The water hardness of the study area ranged from 34.0 mg/L to 94.0 mg/L, which were found to be within the permissible limit prescribed by W.H.O (250 mg/L) for potability purposes.

All the water sources have nitrate and fluoride contents within permissible limit. Average nitrate content was higher than average fluoride content in case of most of the tube wells. In ring wells, the fluoride content exceeded the nitrate content.

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