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Arsenic content in some groundwater sourcesof Nagaon district of Assam, India

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Abstract: The contamination of groundwater and by heavy metals such as arsenic has received great significance during recent years due to their toxicity and accumulativebehaviour. A study has been carried out in Nagaon district environs, Assam to ascertain the cause for the origin and distribution of arsenic content in the groundwater. Fifteen groundwater samples are collected and analyzed for arsenic. The content of arsenic ranges from 1.011 to 21.36 µg/L in the different bore well and hand pumps of the study area. A comparison of groundwater data with rock-soil chemistry suggests that this concentration is taken as natural occurrences of groundwater of the study area.

Keywords: Groundwater. Arsenic-content. Nagaon district.

Introduction:

The groundwater arsenic (As) contamination and its related toxicology has been recognized as a key public health concern in several parts of the world threatening the wellbeing and livelihood of more than a hundred million people worldwide. In the recent years, the environmental problem of As toxicity in groundwater of entire Bengal delta of Ganga-Padma-Meghna-Brahmaputra river plain, covering several districts of West Bengal and Bangladesh creates apprehension among the scientificcommunity and considered as the worst As affected alluvial basin. The present study was carried out to examine as contamination in different drinking watersources of Nagaon district, a region of the Brahmaputra river basin. There is no medicine to cure chronic arsenic toxicity except healthy diet and safe water. However, community participation to make understand the signs and symptoms of chronic arsenic toxicity to the people of the affected regions is utmost necessary.

Geology of the study area:

The study area is the Nagaon district. The area lies between latitude $25^0$56’30”N - $26^0$40’20”N and longitude $92^0$15’E - $93^0$20’E.The study area, Nagaon district is the central part of Assam, occupies a unique position amidst complex geologic and physiographic make-up of the north-eastern region of India. The geologic formation belongs to Archaean, Pre-Cambrian, Tertiary and Quaternary periods. The Archaean rocks comprise the metamorphic rock types of gneisses and schists which are introduced by younger acidic and basic intrusive. These rocks are found to occur in *the northern and central part of the Karbi-Plateau(Bhagabati et al., 2001), which is the study area. Apart from Karbi Plateau the rest*

part of the study area is made up partly of early Tertiary sedimentary deposits and partly of Late Tertiary and Quaternary alluvial deposits. The sediments are mostly shale, sandstone, limestone and conglomerate (Taher and Ahmed 2005). The geological set-up of the study area develops two distinct parallel ranges, one, with the young alluvial soils which contain a high percentage of silt and tend to be sticky and other with old alluvial & red loamy soils having Pre- Cambrian metamorphic rock genesis which tend to be acidic. The older alluvium soil contains clay, sand, shingle and pebble (Taher and Ahmed 2005).

Materials and Method

A total of 15 groundwater samples have been collected from ring wells and bore wells during March and April 2023 and analyzed to understand the chemical variations of water quality parameters using standard methods (APHA, 1995). Pre- cleaned polythene container of 2.5L capacity was used for groundwater sample collection. The water samples were tested in Atomic Absorption Spectrophotometer (AAS; Model Perkin Elmer Analyst 200), in the laboratory to examine the concentration of arsenic. Arsenic concentration was read directly by operating the instrument at photometry mode calibrating against a blank and a standard arsenic solution.

Result and discussion:

Table-1 shows the results of iron content determined from the groundwater of the study area. Arsenic in element form is insoluble in water, but soluble in oxidised form. It can exist in inorganic or organic form. Inorganic arsenic occurs naturally in many kinds of rocks and it is most commonly found with sulphide ores (NIH & CGWB, 2010).

Table-1: Arsenic concentration in some wells of Nagaon-district environs

Sample No	Source type	As(µg/L)	Sample No	Source type	As (µg/L)
S1	DTW	2.414	S9	DTW	8.116
S2	TW	1.320	S10	RW	1.102
S3	TW	2.711	S11	TW	9.453
S4	DTW	1.011	S12	TW	6.767
S5	DTW	6.485	S13	TW	5.112
S6	TW	6.117	S14	TW	21.36
S7	TW	2.121	S15	DTW	1.891
S8	DTW	5.628			

DTW=Deep tube well, TW=Tube well, RW= Ring well

Comparatively higher concentration of As was recorded in tube well and deep tube well water than surface water sources. The average As contents in the groundwater sources of the study

area is found to be 6.89 µg/L. Sing (2004) reported the presence of high As content in the groundwater in various locations of Assam and its neighbouring states. The Bureau of Indian Standards has recommended 50 µg/L arsenic as the desirable limit for drinking water (BIS, 1991). WHO has recommended 10 µg/L as the provisional guideline value for As in drinking water (WHO, 1993).

The transport and distribution of As in environment is complex due to its different chemical forms in which it may present and because there is continuous cycling of different forms of As through air, soil and water. In well-oxygenated water, nearly all As is present in the stable form of As (V). Some As (III) and As (V) forms are less stable and are interchangeable, depending on the chemical and biological condition (NIH & CGWB, 2010).

Chronic As exposure is harmful to human health being associated with cancer of skin, lung, liver, urinary bladder, and kidney (Tchounwou et al., 2003; Bunnell et al., 2007; Jie and Waalkes, 2008) and other diseases, including cardiovascular and peripheral vascular diseases, diabetes, peripheral neuropathies, portal fibrosis, and adverse birth outcomes (Xia et al., 2009). Over withdrawal of groundwater for agricultural practice and house hold uses might be another strong reason for the As mobilization (Bhattacharya et al., 2005). Again unhygienic soap use in tube wells facilitated microorganisms to release arsenic-involving bio-electrochemical reactions (Dey et al., 2005).

Conclusion:

The present study carried out in Nagaon district of Assam to assess the causes for the origin and distribution of arsenic content in the groundwater sources of the studyarea. The distribution pattern of As indicates that in some parts of the study area elevated As concentration is due to geochemical action of groundwater with soils and rocks by geogenic process.

References:

1) APHA, (1995). Standard methods for the examination of water and wastewater; 19th Edn. Washington DC, American Public Health Association.

2) Bhagabati, A. K., Kar, B. K., & Bora, A. K. (2001). Geography of Assam. Rajesh Publication, New Delhi.

3) Bhattacharya, S., Chakravarty, S., Maity, S., Dureja, V., & Gupta, K. K. (2005). Metal content in groundwater of Sahebgunj district, Jharkhand, India, with special reference to arsenic. Chemospere, 58, 1203-1217.

4) BIS (1991). Indian standard specification for drinking water. IS: 10500, Bureau of Indian Standards.

5) Bunnell, J. E., Finkelman, R. B., Centeno, J. A., & Selinus, O. (2007). Medical geology: A globally emerging discipline. Geologica Acta, 5(3), 273-281.

6) Dey, S., Chatterjee, S., & Sarkar, S. (2005). Direct and indirect arsenic release from soaps by unhygienic use in Tubewells. Current Science, 89 (11), 1913- 1917.

7) Jie, L., & Waalkes, M. P. (2008). Liver is a target of arsenic carcinogenesis. Toxicological Sciences, 105(1), 24-32.

8) NIH & CGWB (2010). Mitigation and Remedy of Groundwater Arsenic Menace in India : A Vision Document, National Institute of Hydrology, Roorkee and Central Ground Water Board, Ministry of Water Resource, Government of India.New Delhi.

9) Tchounwou, P. B., Patlolla, A. K., & Centeno, J. A. (2003). Carcinogenic and systemic health effects associated with arsenic exposure – A critical review. Toxicology Pathology, 31(6), 575-588.

10) WHO (1993). Guidelines for drinking water quality (2nd edn., Vol. 1). Recommendations. Geneva: World Health Organization. ISBN94-4-154503.

11) Xia, Y., Wade, T. J., Wu, K., Li, Y., Ning, Z., et al. (2009). Well water arsenic exposure, arsenic induced skin-lesions and self-reported morbidity in Inner Mongolia. International Journal of Environment Resource Public Health, 6, 1010-1025.

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