

Existence of Arsenic in Ground water and its Effect on Health

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Abstract—Quality criteria of water are evaluated on the basis of Chemical characteristics. Lithium, Sodium, Arsenic, Fluorine, Iron, etc. may have the bad effect on living being. The presence of higher contamination of Arsenic is confirmed in Assam by UNICEF. Arsenic (As) is a ubiquitous bio accumulative toxic element. It is widely distributed throughout the earth & crust. Arsenic is induced into water through the dissolution of minerals and ores and in ground water in some areas it elevates as a result of erosion of local rocks, combustion of fossil is another source of arsenic in the environment. Inorganic arsenic can occur in the environment in several forms but in natural way, in ground water it is mostly found as trivalent arsenite [As(III)] or pentavalent Arsenite [As(v)].

Arsenic and its compounds are naturally present in low concentration at places with high geothermal activities. These are not injurious to health. The compound of Arsenic has been used as medicine, insecticides, wood preservation etc. But long term exposure to elevation level of Arsenic may cause serious health hazards. Worldwide, the main reason of chronic human intoxication with Arsenic is the intake of contaminated ground water.

Keywords—Arsenic, Ground water, natural.

I. INTRODUCTION

Arsenic contamination of ground water is a natural occurring. High concentration of arsenic in deeper levels of ground water, which became a high-profile problem in recent years due to the use of deep tube-wells for water supply in the Ganges Delta, Causing serious arsenic poisoning to large numbers of people. A 2007 study found that over 137 million people in more than 70 countries are probably affected by arsenic poisoning of drinking water. Arsenic contamination of ground water is found in many countries throughout the world including the USA.

Approximately 20 incidents of ground water arsenic contamination have been reported from all over the world. Of these, four major incidents were in Asia, including locations in Thailand, Taiwan and Mainland China. South American Countries like Argentina and Chili have also been affected. There are also many locations in the United States where the ground water contains arsenic concentrations in excess of the environmental protection Agency Standard of 10 parts per billion adopted in 2001. Accordingly to a recent film funded by the US Super fund, "In small Doses", millions of private wells have unknown arsenic levels,

and in some areas of the US, over 20% of wells may contain levels that are not safe.

Arsenic is a carcinogen which causes many cancers including skin, lung and bladder as well as cardiovascular disease.

Ground water arsenic contamination and sufferings of people have been reported in 20 countries in different parts of world. The magnitude is considered highest in five Asian Countries and the severity in the order of Bangladesh> India>Mongolia>China>Taiwan. In all these countries more and more ground water withdrawal is taking place because of increase of agricultural irrigation. In India after West Bengal and the bordering districts of Bangladesh, arsenic in ground water was detected in part of Assam, Arunachal Pradesh, Manipur, Nagaland and Tripura.

Maximum arsenic content was observed in Jorhat (Titabor, Dhekorgorah, Selenghat and Mariani Block), Golaghat district (Podumoni Block) and Lakhimpur (Boginodi, Lakhimpur Block) in Assam, west Tripura (Triania Block) Dhalai (Salema Block) and North Tripura (Dharmanagar Block) districts in Tripura. Thoubal (Kakching Block) in Manipur and Dibang valley (Midland) in Arunachal Pradesh. The ground water of these blocks of five states in affected with arsenic contamination. A long-term environmental planning is essential to blunt the danger from such pollution.

In the North Eastern region of India, natural springs and dug wells are the only cost effective and viable means of fulfilling the needs of freshwater for present population. In hilly areas, most of the drinking water is used to be harnessed from rivers, ponds and natural springs. Many springs are reportedly becoming seasonal. In valleys, most of the domestic water is harnessed from ground water through shallow tube wells and dug wells. Availability of drinking water in summers is severely marred and the overall quality is questionable.

Information on ground water quality of North Eastern India is scanty. Available literature shows that ground water of Assam valleys are highly ferruginous (Aowal 1981). The incidence of high fluoride in ground water of Karbi Anglong and Nagaon district of Assam and its manifestation in the form of fluorosis were already (Akoijan 1997, Sengupta, 1999, Sushella 2001)

reported. These alarming pictures of the water quality in the region and continuous consumption of this water has the potential of poisoning serious health hazard to the local population. The observation warrants an extensive and exhaustive study to identify the contamination sites both from the standpoint of protecting public health and preserving the natural resource.

The concentration of Arsenic in ground water exceeds the permissible level (50mg/L based on water consumption of 2 liter per day, WHO) in parts of Assam (20 districts out of 24 districts), Tripura (3 districts out of 4 districts), Arunachal Pradesh (6 districts out of 13 districts) Nagaland (2 districts out of 8 districts) and Manipur (1 districts out of 9 districts).

In Assam, the maximum arsenic was observed in Jorhat, Lakhimpur, Nalbari and Nagaon districts. In Jorhat district, the contamination of arsenic was highest in the range of 194-657µg/L.

An attempt has been made to study the existence of Arsenic in ground water in the district of Jorhat and the effects of arsenic in health.

II. OBJECTIVES OF THE STUDY

The objectives of the present study are as follows:-

- To examine the existence of Arsenic in the ground water in the district of Jorhat, Assam.
- To study the effect of Arsenic in health.

A. Methods

Spectroscopic method has been applied to find out the concentration of Arsenic in the ground water. Samples have been collected from each Goan Panchayat. Samples are collected in three seasons of the year pre monsoon, monsoon and post monsoon to see seasonal variation of Arsenic concentration in ground water.

III. DISCUSSION

It was found that in Jorhat district maximum Arsenic content was observed in Titabor, Dhekorgorah, Selenghat and Mariani area. In Jorhat district, the contamination of Arsenic was highest in the range of 194-657 µg/L.

Severe health effects have been observed in populations drinking arsenic-rich water over a long period in countries worldwide. Arsenic may cause some health problems. These are as follows:

- Chronic arsenic poisoning, as occurs after long-term exposure through drinking- water is very different to acute poisoning. Immediate symptoms on an acute poisoning typically include vomiting, oesophageal and abdominal pain, and bloody "rice water" diarrhoea. Chelation therapy may be effective in acute poisoning but should not be used against long-term poisoning.

- The symptoms and signs that arsenic causes appear to differ between individuals, population groups and geographic areas. Thus, there is no universal definition of the disease caused by arsenic. This complicates the assessment of the burden on health of arsenic. Similarly, there is no method to identify those cases of internal cancer that were caused by arsenic from cancers induced by other factors.
- Long-term exposure to arsenic via drinking-water causes cancer of the skin, lungs, urinary bladder, and kidney, as well as other skin changes such as pigmentation changes and thickening (hyperkeratosis).
- Increased risks of lung and bladder cancer and of arsenic-associated skin lesions have been observed at drinking-water arsenic concentrations of less than 0.05 µg/L.
- Absorption of arsenic through the skin is minimal and thus hand-washing, bathing, laundry, etc. with water containing arsenic do not pose human health risk.
- Following long-term exposure, the first changes are usually observed in the skin, pigmentation changes, and then hyperkeratosis. Cancer is a late phenomenon, and usually takes more than 10 years to develop.
- The relationship between arsenic exposure and other health effects is not clear-cut For example, some studies have reported hypertensive and cardiovascular disease, diabetes and reproductive effects.
- Exposure to arsenic via drinking-water has been shown to cause a severe disease of blood vessels leading to gangrene in China (Province of Taiwan), known as "black foot disease". This disease has not been observed in other parts of the world, and it is possible that malnutrition contributes to its development. However, studies in several countries have demonstrated that arsenic causes other, less severe forms of peripheral vascular disease.
- According to some estimates, arsenic in drinking-water will cause 200,000 — 270,000 deaths from cancer in Bangladesh alone (NRC. 1998. Smith, *et al.* 2000).

The study reveals that in the above mentioned areas in the district of Jorhat the existence of Arsenic is found in the ground water and it can create the above health problems among the people.

IV. CONCLUSION

As Arsenic is detected in most of the districts of Assam, so more studies in the aspect is needed to know more data on this particular aspect. Hence, this study cannot be generalized. Keeping in view of unusual high

concentrations of the Arsenic in some parts of the State, it is advisable to test the portability of ground water before using it for drinking/cooking purposes. A long term environmental planning is also essential to blunt the danger from such pollution.

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