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Sources and Quality of Drinking Water in Relation to its Impact on Health with Reference to Tribal Groups of Chotanagpur Plateau.

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Abstract

Sources and quality of drinking water were studies in the tribal belts of Chotanagpur plateau of Bihar. The main sources of drinking water are: supply water, wells handpumps, streams, ponds, rivers and pitwater. Physico-chemical parameter are within the permissible limits. But, the bacterial contamination was recorded in all the water sources. Due to the use of such contaminated water, the population suffers from diseases like diarrhoea, jaundice, amoebic dysentry, typhoid etc. It is advisable that such water must be treated before use.

Key Words: Chotanagpur plateau, tribal, drinking water, sources and quality ,water borne diseases.

Introduction

Water is the prerequsite of life. A regular supply of neat and clean water is essential for different metabolic activities. The general scarcity of safe potable water has become a global problem. Supply of potable water has been affected by contamination of water sources in most developing countries. Rivers, lakes and ground water have been polluted by industrial effluents, run-off, and urban waste. Ground water is the major source of drinking water in many parts of India. Due to direct or indirect interferences of human beings, the water has been found to contain various pollutants that cause harmful effects on drinking water and adverse impact on human health and aquatic life as well (Telliard and Rubin 1987). The increase in human population and fast development has led to the scarcity of drinking water. Much of the ill health in the underdeveloped countries is largely due to lack of safe drinking water. In India, only 12%of people get good clean water (Kudesia 1986). Chotanagpur platue belt of Bihar is highly industrialised area. The area is mainly dominated by tribes. The objective of present study is to analyse the sources and quality of drinking water in relation to its impact on health.

Materials and Methods

Water reasources were seen with the personal visit of the sites as well as interview with villagers. Water sampels from different areas were collected and analysed for different parameters according to APHA 1975 and Trivedy and Goel 1984. Ten water sampels were colleced from each study area. Sterilized tubes were used for collection of water samples for bacterial count.

Sources of Drinking Water

During our field survey we found following sources of drinking water in this zone.

a) **Supply water:** This mode of drinking water is confined to industrial and bureaucratic areas like Jamshedpur, Rakha, Jadugoda, Ghatshila, Dhalbhumgarh, Musabani, Chakylia, Bharagora,etc. Water is of high quality. In Jamshedpur, supply water comes from two sources, one from Dimna lake and another from Swarnarekha river.

b) **Wells:** The most common source of drinking water is well. This may be either Kuccha or Pukka. Pukka wells are made by government or by other agencies. Generally, Kuccha wells dry in summer. Kuccha are unhygenic in conditions. Kai, Lichens, Mosses, generally grows on the mouth of wells and during the water use, used water diffuses into it. Tribals are since not aware of hygiene, this causes severe gastrointestinal problem. In Chakuria itself there are 78124 wells out of which only 464 are used for drinking purposes.

c) **Ponds :** This area since gets 150-200 cm rainfall annualy. This becomes a good source of drinking water in remote villages. During the visit, we observed a number of ponds filled with water. Some of the ponds are

perennial while other dries in summer. Water of these ponds is used to prepare food at home by nearby residents. Number of ponds are greater in Potka block.

d) **Hand pump :** In most of the area Government has provided hand pumps as a source of drinking water. But during our survey work we found that most of the hand pumps were not working in lack of proper maintenance. The tribal people are so poor that they are even unable to provide valve and washer for the functioning of the hand pump. As the water level in this region is very low, most of the pumps become dry during summer season.

e) **Streams:** East Singhbhum is fortunate to have many small streams. These streams are the major (better to say only one) source of drinking water in remote tribal villages. Water of Bakai and Jog streams caters the need of the villagers of Kulamara, Rowam and Kumirmuri region.

f) **Pit water :** The situation becomes worst during summer season when most of the small rivers and Hand pump as well as wells dry up. Villagers have to travel miles to fetch drinking water. During our visit, we noticed that in many areas villagers dig river beds to a depth of 5' to 6' for water. Many villagers reported that water of such pit in the bed of river becomes so dirty that it is not possible to drink it. They filtered the water with the help of cloth and then use it. We noticed that such stagnant water becomes a very suitable breeding ground of mosquito.

g) **Artesian Well :** These are very rare sources. We have seen (rare sources) only one artesian well in Kulamara village. Water from this well flows and after tresspassing paddy fields joins with Bakai stream. We have noticed that people were using water for daily purpose.

Results and Discussion

The pH of water samples varies between 7.10 and 7.69 which is well within the safe limits. Turbidity is also within permissible limits. Total hardness below 300 mg/ L is considered potable. In the present study hardness is within the permissible limits. Total alkalinity and TDS are also within the permission. The sulphate content of natural water is an important considration in determining their suitability for public water supplies. Higher concentration of sodium sulphate in water can cause misfunctioning of alimentary canal. The cloride values varies between 3-60 mg/L which is within the permissible limits (40-160mg/ L). There has been a considrable research work related to nitrate contamination of ground water due to point, non-point and natural sources. Increasing nitrate contamination in ground water is associated with a diseas known as Methamoglobinema (infant cynosis), if it is present in concentration above 44 mg/ L (WHO,1984). The nitrate value in the present investigation is within the permissible limits (28-35mg/ L).

High iron concentration has been associated with gastrointestinal disturbances (Babcock 1951and Sharmah 1994). Beside this, high iron concentration is also associated with hepatic and pancreatic troubles as well as abortion and mental disorders. High concentration of iron in drinking water has been reported by many workers in various parts of India (Aowal 1981, Kakati *et al.* 1990, Das *et al.*1992, Pandey *et al.* 1992, 1994 and 1998). Endemic flurosi continues to be a challenging problem. It is one of the common oral healthproblem of humanity in developing countries. Water with high content of fluorides is the main cause of fluorosis. According to Rao 1998 about 225 million indian scattered in different status are affected with fluorosis. In the present study the fluoride value ranged between 0.6-0.65 mg/ L which is within the permissible limits.

In the present study the MPN values are found to vary from 5-62 MPN /100ml. The highest MPN value was found in Kulamara. It is an established fact that the very high mortality rate is found among the population using pond/ reservoirs/ streams/ rivers and earthen wells as the main source of drinking water (Ghosh 1985, ICMR 1985). Further, water contamination is an integral factor, which cognizably increased with urbanization and industrialization by direct and indirect means. This poses a threat to water sources which have evolved into a formidable factor in the spread of human and animal diseases. The causitive agents for typhoid, fever, bacillary dysentery, amoebic dysentry, paratyphoid fever and cholera spread by water (Charles and Alice 1957). The prevalence of water borne diseases in these tribal population is not surprising because major sources of drinking water in these tribal villages are river, lakes, ponds, pits and wells.

The coliform values in the present study are found to exceed the standard permissible limits and, therefore, indicates a high degree of pollution at these points. The water of these villages are potentially hazardous to the

health of the public. During the course of present study we have noticed that the tribal population residing in these areas are victims of a large number of diseases such as Diarrhoea, Jaundice, Amoebic dysentery, Cholera etc. The percentage of these diseases in the local tribal population have been shown in the Table 2.

Coliform MPN /100 ml of sample, in most of the areas is very high which indicates the poor quality of water in turn indicating possible fears of sewage mixing with water. On the whole, it can be concluded from the present study that tribals are prone to several diseases due to consumption of such polluted water. If the adequate use of alum and other disinfectants is made and villagers are made fully aware about hygenic use of potable water, then only water borne diseases can be controlled. The Government must also take care of ecologically undeveloped tribals of Chota Nagpur plateau to improve the quality of drinking water.

Table 1. Average physico – chemical and bacteriological quality of tribal villages of Chotanagpur Plateau.

Sl. No	Parameters / Spots	Colour	Turbidity	pH	Total Hardness	Total Alkalinity	Fluoride	Chloride	Nitrate	Sulphate	Total Dissolved Solids	Iron	MPN/ 100 ml
	E. SINGHBHUM												
1	Deosol	Clear	7.0	7.69	145	140	0.80	148	34	35	275.0	Trace	32
2	Borodih	Clear	22	7.38	150	158	0.60	048	28	40	375.0	0.20	25
3	Kulamara	Clear	20	7.58	170	172	0.70	160	38	60	550.0	0.20	62
4	Borakata	Clear	8.0	7.50	155	160	0.60	145	35	50	525.0	Trace	45
	GUMLA												
5	Chainpur	Clear	6.0	7.10	100	140	0.80	040	-	05	180.6	0.25	5.0
6	Kurumgarh	Clear	5.0	7.35	80	80	0.70	060	-	05	185.5	0.12	10
7	Tigawal	Clear	8.0	7.45	70	70	0.65	040	-	05	163.4	1.00	12
8	Tetardipa	Clear	7.0	7.25	120	120	0.70	120	-	03	240.6	0.25	18
9	Jate	Clear	5.0	7.20	60	60	0.60	050	-	20	0.120	0.12	09

All the values are in mg/L except pH

Table 2. Distribution of water borne diseases among Tribal populations of Chotanagpur Plateau

Sl. No	Diseases / Tribal Population	Population (no.)	Diarrhoea	Jaundice	Amoebic Dysentry	Typhoid
	E. SINGHBHUM (Jamshedpur)					
1	Santal	844	22.86 %	16.94 %	37.44 %	22.74%
2	Oraon	134	22.38 %	14.92 %	26.11 %	36.56 %
3	Bhumij	257	23.34 %	19.45 %	37.35 %	19.84 %
4	HO	302	19.20 %	17.21 %	43.04 %	20.52 %
5	Kharia	117	25.64 %	17.09 %	34.18 %	23.07 %
6	Munda	87	28.73 %	17.04 %	32.18 %	21.83 %
	GUMLA & RANCHI					
7	Oraon	371	11.90 %	7.01 %	15.90 %	3.50 %
8	Munda	238	19.33 %	7.14 %	21.43 %	5.46 %
9	Korwa	103	21.36 %	9.71 %	28.16 %	7.77 %
10	Kharia	47	27.66 %	8.51 %	34.04 %	6.38 %

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