STUDY OF PHYSICO-CHEMICAL PARAMETERS OF DRINKING WATER OF SCHOOLS IN RAJA GAON UNDER KAMPUR CIRCLE OF NAGAON DISTRICT, ASSAM

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ABSTRACT: The paper aims at analysing the quality of water consumed from tube wells in the schools of Raja Goan under Kampur circle in the district of Nagaon, Assam**.** It has been observed that most of the school going children of the study area have no option than to use tube well water. Ten samples were collected from ten different schools under the study area and physico-chemical parameters such as pH, turbidity, TSS, TS, TDS, DO, BOD, Hardness, Conductivity, iron and manganese content were determined. The prime objective of this paper was to know whether the water consumed from tube wells in those schools is safe or not.

Key words - **Drinking water, Raja Gaon, Kampur, Nagaon, Assam**

1.   INTRODUCTION

Water is the vital component needed by human and other living systems to survive. There has been reports from many quarters that quality of surface as well as underground water have been polluted. Increasing amounts of discharged sewage, progressing urbanization, as well as anthropogenic activities have affected the quality of underground water. Though safe water provides no calories, it is necessary to human and other life forms. Some observers have estimated that by 2025 more than half of the world population will be facing water-based vulnerability. The Joint Monitoring Programme (JMP) for Water Supply and Sanitation, implemented by the World Health Organisation (WHO) and UNICEF, reports that 783 million people in the world (11% of the total population) have no access to safe water, 84% of whom live in rural areas [1].So, to determine the quality of water and to analyse the data statistically and to correlate the data of various parameters are of immense importance.   Water should be free from the various contaminations viz. organic and inorganic pollutants, heavy metals, pesticides etc. as well as all its parameter like pH, electrical conductivity, calcium, magnesium, total hardness, carbonate, bicarbonate, chloride, total dissolved solid, alkalinity, sodium potassium, nitrate, DO should be within a permissible limit[2]. With growing Indian population the per capita availability of water is steadily reducing; and when this drops below 1700 m^3 /person/year, India will be water stressed [3].

2.   EXPERIMENTAL

Area selected for present research : Nagaon district is centrally located in the state of Assam in North-East India. It extends at a latitudinal stretch of $25^0 45'$ to 26^0 45' North and 92^0 33' 6" East longitude. Nagaon is bounded by the district of Sonitpur and the Brahmaputra in the North, West Karbi Anglong and North Cachar hills in the south, East Karbi Anglong and the district of Golaghat in the east and the district of Marigaon to the west. The National Highways 36 and 37 intersect the district. Large numbers of shallow and deep tube wells have been constructed in the district which provides us with valuable information regarding aquifer characteristics. Bored wells 20 to 40 m deep and fitted with hand pump normally yield 3 to 6 m^3/hr which is considered sufficient for domestic supplies [4]. The present study has been carried out to access the quality of drinking water in Raja Gaon area under Kampur circle located at the south of Nagaon district of Assam.
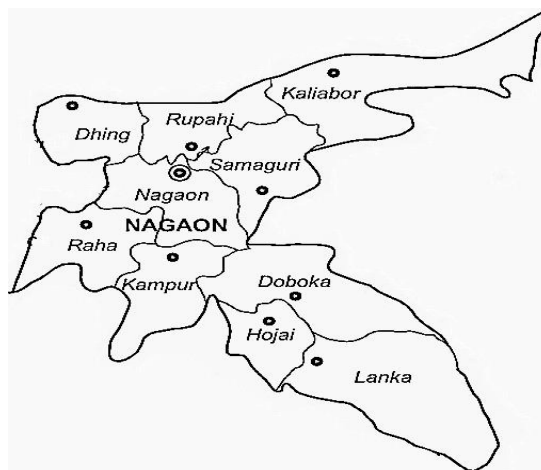
Fig 2.1 : Map of Nagaon District ofAsam

Fig 2.2 : Kamrup Town Map

Ten different schools of the stated area were selected for collection of water samples during March and April, 2018 from dug tube wells present in the premises of the schools.

Sl. No	Sample	Name of the school
1	S_1	Borapani Tribal Primary School
2	S_2	Sitalmari Primary School
3	S_3	1 No. Rajapahar LP School
4	S_4	Borapani Colony Primary School
5	S_5	Borapani Forest Primary School
6	S_6	Singimari High School
7	S_7	Singimari Girls ME School
8	S_8	Singimari Primary School
9	S_9	Jongthong Primary School
10	S_{10}	Singimari Primary School(Bengali Medium)

Table 2.1: List of Schools selected for collecting water samples

METHODOLOGY

The samples were taken into sterilized containers and transferred in sterilized bottles in required quantity and for different physicochemical analyses.Samples were collected in sterilized bottles. Temperature was determined at the site of collection itself with the help of digital pH meter. Turbidity was determined by Sacche disc Method/TurbidityTube Method and conductivity was determined by Digital conductivity meter Model- NDC-736. Dissolved Oxygen was determined by Membrane electrode method (Oxygen sensitive electrode-D.O. Meter) Model-NDO-34/Winkler Method. BOD was determined by adopting the procedure in APHA, 16th edn., 1985,(B.O.D. incubator Winkler Method). Hardness were determined by EDTA- titrimetric methods. Total solid(TS) was determined by evaporation method. Total suspended solid (TSS) is determined by weighing the dried residue left on the filter paper after filtration of a fixed volume of water sample. Toal dissolved solid was determined by evaporating a fixed volume of water after filtration and weighing the residue. Iron and manganese contents were determined following standard procedure with the help of spectrophotometer.

Twelve parameters were determined for the present research work. All these parameters were analyzed using the laboratory infrastructure of the Chemistry department and Advanced Institutional Level Biotech Hub of Nowgong College. The Indian Standards: 10500(drinking water specifications) was referred to in order to check the acceptability of water.

3. RESULT AND DISCUSSION

The various chemical, physical and biological parameters in water quality were examined in their respective proper method and procedure and well identified formulae were used to calculate their respective values. Tables II, III and IV show the values of the physico-chemical parameters.

Sample	Temp (^{0}C)	p^H	Turbidity (NTU)	Conductivity (µS/cm)
S_1	28	6.81	18	826.3
S_2	30	6.92	28	258.2
S_3	31	7.15	12	583.2
S_4	32	5.88	23	396.3
S_5	29	6.83	10	352.9
S_6	31	6.17	8	602.5
S_7	32	7.08	25	403.9
S_8	29	7.29	13	611.7
S_9	29	6.56	17	783.4
S_{10}	31	6.33	15	780.8

Table 3.1: Values of the parameters of the collected water samples

Sample	Total Solids (g/L)	Total suspended solids(g/L)	Total Dissolved Solids(g/L)	Hardness(mg/L)
S_1	20	9	9	106
S_2	17	17	1	116
S_3	5	5	4	88
S_4	13	13	3	14
S_5	4	4	2	110
S_6	1	1	4	30
S_7	16	15	3	94
S_8	5	5	5	96
S_9	9	9	7	48
S_{10}	6	6	6	52

Table 3.2: Values of the parameters of the collected water samples

Samples	Iron content (mg/L)	Manganese content(mg/L)	Dissolved Oxygen(mg/L)	BiologicalOxygen Demand(BOD) (mg/L)
S_1	1.06	0.257	5.08	1.4
S_2	1.12	0.477	4.87	0.61
S_3	0.56	0.317	3.86	0.81
S_4	0.60	0.230	7.11	0.61
S_5	1.19	0.377	3.04	0.61
S_6	0.50	0.286	5.28	1.01
S_7	0.47	0.251	5.08	0.81
S_8	0.97	0.312	8.94	4.87
S_9	1.03	0.399	5.48	1.01
S_{10}	0.95	0.364	4.87	1.01

Table 3.3: Values of the parameters of the collected water samples

Analysis of the parameters shows that the TS, TSS and TDS ranged from 1 to 20 g/L, 1 to 17 g/L and 1 to 9 g/L respectively. The conductivity ranges from 258.2 to 826.3 µS/cm. The pH range of the samples was from 5.88 to 7.29 and was

found that most of the samples are in acidic range. Turbidity ranged from 8 to 28 NTU. Hardness ranged from 14 to 116 mg/L. The DO and BOD were in the range of 3.04 to 8.94 mg/l and 0.61 to 4.87 mg/L respectively. The iron and manganese content ranged from 0.50 to 1.19 mg/L and 0.230 to 0.477 mg/L respectively.

The exploding population, increasing industrialization and urbanization are the causes of water pollution. The water pollution by agricultural, municipal and industrial sources has become a major concern for the welfare of mankind. Though the area covered under our study lacks big industries but fertilizers used in agriculture in this area besides a significant number of brick manufacturing units have contributed to pollution of underground water. Some people of the area under our study reported us that most of the people of that area have been suffering from acute abdominal disorders and they have been deprived of suitable drinking water and necessary steps for providing safe water from the concerned authority is yet to be met.

4.   CONCLUSION

In conclusion, from the analysis of the selected twelve parameters, it was observed that water samples in almost all the schools are not safe for drinking because most of the parameters are not in conformity with the permissible limits [5]. The TSS and TDS values have been found to be alarmingly higher than the permissible limits. Analysis of the pH states that most of the samples are in acidic range. It was observed that the samples collected from all the ten schools were found to have turbidity beyond the prescribed limit. Further it was observed that surface of each sample was found to be oily and opaque within an hour of collection. Iron content in drinking water should be within 0.3mg/L and manganese should be within 0.1 mg/L but both these parameters were found beyond the permissible limit in all the samples.   It was seen during a working day that the mid day meal preparation was done with the tube well water and students as well had no alternative than to consume water from the tube wells while consuming mid day meal. Some samples were found to be under the permissible hardness level while other were not in the range. It is only a base line study and hence more detailed study is needed to access the quality of drinking water.

5.   ACKNOWLEDGEMENT

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