



ASSESSMENT OF DRINKING WATER QUALITY OF SELECTED SCHOOLS IN GADCHIROLI TOWN OF MAHARASHTRA, INDIA.

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ABSTRACT

Water samples are collected from selected schools in Gadchiroli town of Maharashtra and analysed for physico-chemical parameters, to assess the potability of water to school children. Nine different water samples from different schools are assessed in the month of October 2013. These samples are analysed for physico-chemical parameters like pH, electrical conductivity (EC), total dissolved solids (TDS), dissolved oxygen (DO), total alkalinity (TA), total hardness (TH), chloride (Cl⁻), sulphate (SO₄²⁻), nitrate (NO₃⁻) and phosphate (PO₄³⁻) are determined. The results are compared with standards prescribed by WHO/BIS. On comparing, it is found that maximum water samples are potable for children. However sample S₅ showing certain parameters above the permissible limits indicating that, it is not potable.

Key words : *Selected Schools, Physico-chemical parameters, pollution study, drinking water, Gadchiroli town.*

Introduction

Water the precious gift of nature and which sustains life is gradually getting contaminated with increasing urbanization, industrialization and anthropogenic activities. Thus the quality of drinking water is a major public health concern¹. According to the latest estimate, two million child deaths occur every year due to contaminated water². It is considered that “child is a father of man” thus child must be protected from health hazards due to contaminated water. Thus taking in view to safeguard, the growth of school going children an attempt was made to analysed the quality of water samples from selected schools in Gadchiroli town .



The hydrological cycle is the most important cycle of all natural cycles in biosphere. Nearly 97% of water in the biosphere is found in the oceans, the remaining 3% is found on the continent and in the atmosphere. The water on which human depend so heavily- lakes, streams and ground water accounts for less than 1% of the total supply and it is this water which is currently being used and reused in many parts of world. In Gadchiroli different schools provide water to their students from tube wells, shallow wells and tap water. These sources have hardly being analysed so as to ansure potability of drinking. The water which is consumed by school children be assessed, so as to deprive them from health hazards. Therefore the present paper deals with the study of physico-chemical parameters of water from various sources of Gadchiroli town.

Study area

Gadchiroli town is located at Eastern region of Maharashtra state. The population density of this district is low and district is gifted with green forest and annually flowing rivers. The present investigation was carried out by selecting nine different sites from Gadchiroli town.

Material and Method

- i) **Sampling and Collection of water samples** : In present investigation nine water samples from nine different Schools at Gadchiroli town, Maharashtra are collected in polythene bottles which were cleaned with acid water, followed by rinsing twice with distilled water. The water samples are analyzed using the standard methods.

Table 1 : Sampling sites and places

Sampling sites	Place
S ₁	Saraswati Vidyalaya, Complex Gadchiroli.
S ₂	Primary School, Visapur, Gadchiroli.
S ₃	Jawaharlal Nehru Nagar Parishad Primary School, Ramnagar, Gadchiroli
S ₄	Nagar Parishad Shivaji Primary School, Gadchiroli.
S ₅	Vidyabharati Kanya High School, Gadchiroli
S ₆	Saint Jagnade Primary School, Lanjeda, Gadchiroli.
S ₇	Zillah Complex Nagar Parishad Primary School, Gadchiroli.
S ₈	Dr. Babasaheb Ambedkar Primary School, Sankul, Gadchiroli.
S ₉	Shivaji High School Gokul Nagar, Gadchiroli.

ii) Methodology : The temperature, pH, conductivity and dissolved solids of the water samples are determined on the spot using a thermometer, pH meter, conductometer and TDS meter respectively. The physico-chemical analysis of samples of drinking water are carried out according to standard methods ³ .

Table2 : Physico-chemical analysis of drinking water of nine different selected School (S₁-S₉) of Gadchiroli Town.

Sr. No.	parameters	Sampling sites									Range of results		WHO/BIS
		S ₁	S ₂	S ₃	S ₄	S ₅	S ₆	S ₇	S ₈	S ₉	Min.	Max.	
1	pH	7.63	7.60	6.95	7.40	6.96	7.08	7.26	7.28	7.38	6.95	7.63	6.5-8.5
2	EC	801	378	881	223	1630	814	241	1050	1092	223	1630	1400
3	TDS	598	253	606	148	1140	538	164	713	684	148	1140	500-1000
4	TA	300	160	210	50	250	320	55	410	290	50	410	200
5	TH	255	152	320	75	585	321	69	283	288	69	585	500
6	DO	6.0	5.6	5.9	5.8	5.8	5.8	5.9	5.4	5.7	5.4	6.0	4-6
7	SO ₄ ²⁻	70	65	55	45	110	36	38	62	45	36	110	200
8	NO ₃ ⁻	4.7	6.2	7.8	6.4	43	5.3	3.5	3.4	5.9	3.4	43	45
9	Cl ⁻	20	35	50	10	255	80	15	45	65	10	255	250
10	PO ₄ ³⁻	0.21	0.22	0.16	0.20	0.41	0.18	0.24	0.26	0.32	0.16	0.41	-

(all parameters are in mg/l except pH & EC, EC is in micro-siemens,)



Result & discussion:

Total nine water samples from selected schools are analysed for physico-chemical parameters like pH, EC, TDS, TA, TH, DO, SO_4^{2-} , NO_3^- , Cl^- , and PO_4^{3-} . The results are compared with WHO⁴ / BIS⁵.

pH

pH is the term used to express the intensity of acidity and alkaline conditions. It is the expression of hydrogen ion activity. It is the important parameter in assessing the water quality. Acidic condition will prevail as pH value decreases and alkaline condition will prevail as the pH value increases. The low pH value does not cause any harmful effect⁶. The present result shows that all the water samples have pH within the permissible limit.

EC

Electrical conductivity (EC) is always related to amount of dissolved solids⁷. EC value varies from 223 to 1630 micro-siemens.

TDS

Total dissolved solids (TDS) indicates the general nature of water quality. In present investigation TDS value varies from 148 to 1140 mg/l which reveals that EC and TDS values for S₅ sample are comparatively higher value than other, indicating the presence of high amount of dissolved inorganic substances in ionized form.

TA

Total alkalinity (TA) values of water is important in calculating the dose of alum and biocides in water.⁸ The alkalinity values varies from 50 to 410 mg/l. Maximum water samples shows comparatively higher value than the permissible limit given by WHO/BIS.



TH

The sum of calcium and magnesium ion concentration in water is termed as total hardness (TH). In present study TH value varies from 69 to 585 mg/l, in which sample S₅ shows much higher value which might be due more calcium and magnesium ion concentration⁹.

DO

Dissolve oxygen (DO) is one of the most important pollution parameter in water quality assessment. In present investigation DO values varies from 5.4 to 6.0 mg/l, which shows that all the samples are having DO value within the permissible limit.

SO₄²⁻

The values of Sulphate varies from 36 to 110 mg/l. All the water samples are within the desirable limit of 200 mg/l thereby suggesting to be free from sulphate contamination.

NO₃⁻

Nitrate, nitrogen is one of the major constituent of organism along with carbon & hydrogen as amino acids, proteins & organic compounds present in the tube well water¹⁰. Nitrate value varies from 3.4 to 43 mg/l, these values are within the permissible limit.

Cl⁻

Chloride is an anion found in variable amount in ground water. It produces salty taste when ranges between 250 to 500 mg/l. The chloride value varies from 10 to 255 mg/l. S₅ sample shows somewhat higher value.



PO₄³⁻

Phosphate occurs in natural water in low quantity as many aquatic plants absorb and store phosphorus many times their actual immediate needs. Phosphate value varies from 0.16 to 0.41 mg/l.

Conclusion:

In this study characterization of physico-chemical parameters of water samples from selected schools of Gadchiroli town are examined. The results are compared with WHO / BIS standards. On the basis of above discussion it may be concluded that the pH value DO value, chloride, sulphate, nitrate, phosphate value for all the samples are within the permissible limits. The EC, TDS, TA and TH value of all samples are within the desirable limits except S₅. The S₅ sample which shows the comparatively higher values are due to suspended particles, nearby waste material storage and accumulation of organic matter in water sample.

Hence as per this report drinking water in maximum schools in Gadchiroli town, Maharashtra are suitable for drinking purpose except S₅, which requires purification treatment before drinking.

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