BMR Microbiology

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Research Article

WELL WATER QUALITY OF CHINTAPALLI MANDAL, VISAKHAPATNAM, INDIA

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Received March 31, 2016; Accepted April 07, 2016; Published April 26, 2016;

Cite This Article: S.Geetha.,T, Reddy. Byragi (2016). Well water quality of chintapalli mandal, visakhapatnam india. BMR Microbiology, 2(1).1-6

ABSTRACT

The present study to determine the quality of well water sources in different villages of chntapalli mandal, Visakhapatnam, India. The results were compared with BSI and WHO standards for drinking water. The physic-chemical parameters includ pH, Turbidity, Electric conductivity (EC), Total Dissolved Solids (TDS), Total Hardness, Calcium, Magnesium, Chloride, Sulphate, Phosphate, and Dissolved Oxygen (DO)were tested. It was found prescribed limits while that some parameters were higher than the prescribed limits while other parameters were lower than the limits. In the microbiological examination, all samples were found to be contaminated with coliforms. Although fecal coliforms were found to be contaminated with coliforms. These contaminated waters pose threats to the health of the tribal people. The results showed that, some of the parameters below and some of them above the limits. The water samples needed treatment before it is consumed.

KEY WORDS: Well water, Physico-chemical, coliforms, WHO.

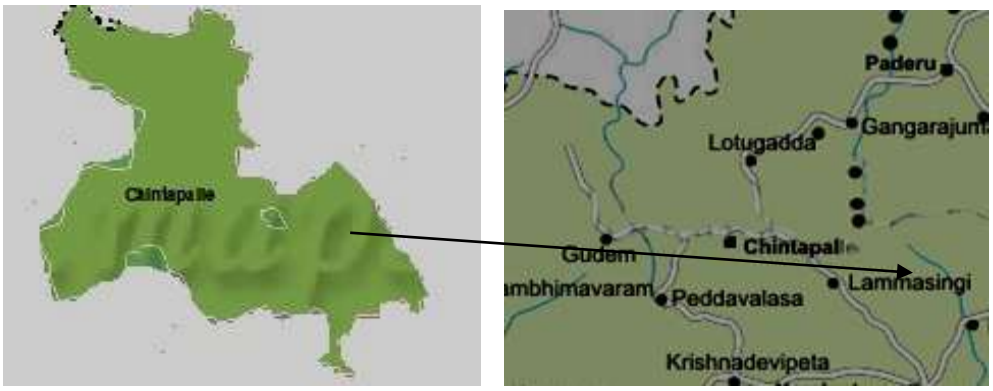
INTRODUCTION

Water is the second essential factor for life. People acquire drinking water from surface and underground sources. The quality of water rapidly alters as a response to alteration in the surrounding environment. The quality of drinking water fall from physico-chemical and microbiological parameters. Potable water is free from disease producing microorganisms and chemical substances that are dangerous to health (1). The study area chintapalli is a tribal area, majority of the people live in hilly terrain. They depend on bore, spring and well water for drinking and domestic use. According to the report of Byragi reddy et al., in this area unsatisfactory with coliform counts far exceeding the level recommended by WHO (2). This poses a risk to human health. Bacteria are often responsible for water contamination and subsequent disease. Many infectious diseases are transmitted by water through the fecal- oral route. Diseases contacted through drinking water kill about 5 million children annually and make 1/6th of the world population sick (3). So the aim of the present study is to determine the well water quality in chintapalli area.

MATERIALS AND METHODS

Study Area

Chintapalli located at North Easter part of India between 17°44′22″ east to 82°38′04″. The temperature in the hill track village by deducting 2 to 30°C recorded at the local agriculture research station, chintapalli. Lambasingi area is referred to Andhra Kashmir by sightseers as temperature dip as low as 0°C during December and January (5).



Analysis of Water samples

The studies on physic-chemical and microbial analysis of well water samples were carried out during the period of 2010 to 2015. Ten well samples were examined for various physic-chemical parameters such as pH, Electric Conductivity (EC), Total Dissolve Solids (DS), Total Hardness (TH), Calcium (Ca), Magnesium (Mg), Chloride (Cl_2), Sulfate (So_4), Phosphate (Po_4) , Dissolved Oxygen (DO) and Microbial parameters Most Probable Number (MPN) , Total Fecal colifrom Count(TFC) were analyzed as per standard APHA 2005 (6).

RESULTS

The result of physic-chemical and microbial analysis of the well water samples were given in Table 1 and 2. These results were comparing with the drinking water quality standards lead by BIS and WHO.

pH of well water samples were found to range from 6.12to 7.96. Low pH values 6.12 were recorded in well water samples of Lambasingi and Lingalagudi and high pH value 7.96 was recorded in well water sample of Parikalu. This indicates they were within desirable limits. The electric conductivity range from 37 to 360 µs/cm. The present study results show that all water samples EC below the limits of WHO standards.

The Total dissolved solid ranged from 98 to 186 mg/L, the low level of TDS

Indicates that the recharging of underground water through either rain water or by the water from nearby canals and still indicated the pollution (7,8). The maximum prescribed a limit (WHO) is 300-600mg/L.

The highest value for Total hardness 80 mg/L and the lowest value 42.7 mg/L present in Kothapalem and Lambasingi water samples. Calcium of the sample ranged from 18.8 to 24 mg/L, the values were below permissible limit. In nature calcium obtain water through soil and rock containing large amounts of these elements in mineral deposits (9). The magnesium concentration is in 15to 18.2 mg/lit. When compared with WHO standards magnesium below the permissible limit, according to the WHO the limit is 30mg/L. The possibilities of dissolution of minerals are very low in the study area (7).

In the study chlorides contents in the samples is 10 to 18 mg/L which are below the WHO & BSI levels. The chloride concentrations above 0.5ppm in water considered as pollution hence the drinking water requires treatment before use (8).

The sulphates concentration ranged from 2 to 5mg/L values were present. The phosphate values range from2.8 to 5.2 mg/Lin all water samples were above the prescribed limit. There are number of ways by which phosphates contaminate to ground water. These include anthropogenic input like chemical fertilizers household detergents, human and animal wastes while the major geological source is appetite, a principal rock mineral in which phosphorous is a chief component (10). The higher level of phosphate is indicative of eutrophication and pollution and water with high PO_4 contents causes health hazards' (11). As 0.1mg/L is the recommended standard of phosphate for the drinking water.

Dissolve Oxygen is one of the most important aspects in evaluating water quality and signifies physical and biological process dealing with the water (12). In the study DO values found between 4 to 6.4 mg/L values, the DO concentration was higher than the prescribed standards laid by BIS.

Table 1: Physico-chemical Analysis of Well water samples

S. No	Well water sample (Village name)	pH	EC	TDS	TH	Ca	Mg	Cl_2	SO_4	PO_4	DO
1	Anthrala I	6.89	178	182	74.5	22	16	8	5	3.5	5
2	Anthrala II	7.02	182	152	72.3	20	18	8	5	4	4.9
3	Chowdupalli	6.89	171	183	48.2	20	15	17	2.5	4.2	5.2
4	Bailukinchangi	6.88	163	146	57	24	18.2	18	2.7	2.8	4
5	Lambasingi	6.12	137	183	42.7	18.8	16	12	2.5	3.2	4.9
6	Parikalu	7.96	360	186	78.3	19.8	16	10	5	4	5.9
7	Kothapalem	6.42	187	106	80	22	16	12	2	5.2	6.4
8	Kinnerla	6.22	143	98	74.6	24	15	10	2	4.2	6.2
9	Mamidipalli	6.49	186	180	74.2	26	18	11.9	2.9	3	5.2
10	Lingalagudi	6.12	182	178	57	20	15	12.6	2	3.6	5.4

Table 2: MPN Count and Total Fecal Coliform Counts in Well Water Samples

S. No	Well water sample (Village name)	MPN Index /100ml	TCF(CFU) /100ml
1	Anthrala Well I	2400	$4.24X10^2$
2	Anthrala Well II	93	$0.56X10^2$
3	Chowdupalli Well	120	$1.56X10^2$
4	Bailukinchangi Well	1100	$3.68X10^2$
5	Lambasingi Well	240	$2.56X10^2$
6	Parikalu Well	460	$2.16X10^2$
7	Kothapalem Well	1100	$3.46X10^2$
8	Kinnerla Well	2400	$4.65X10^2$
9	Mamidipalli	1110	$4.08X10^2$
10	Lingalagudi	2400	$4.55X10^2$

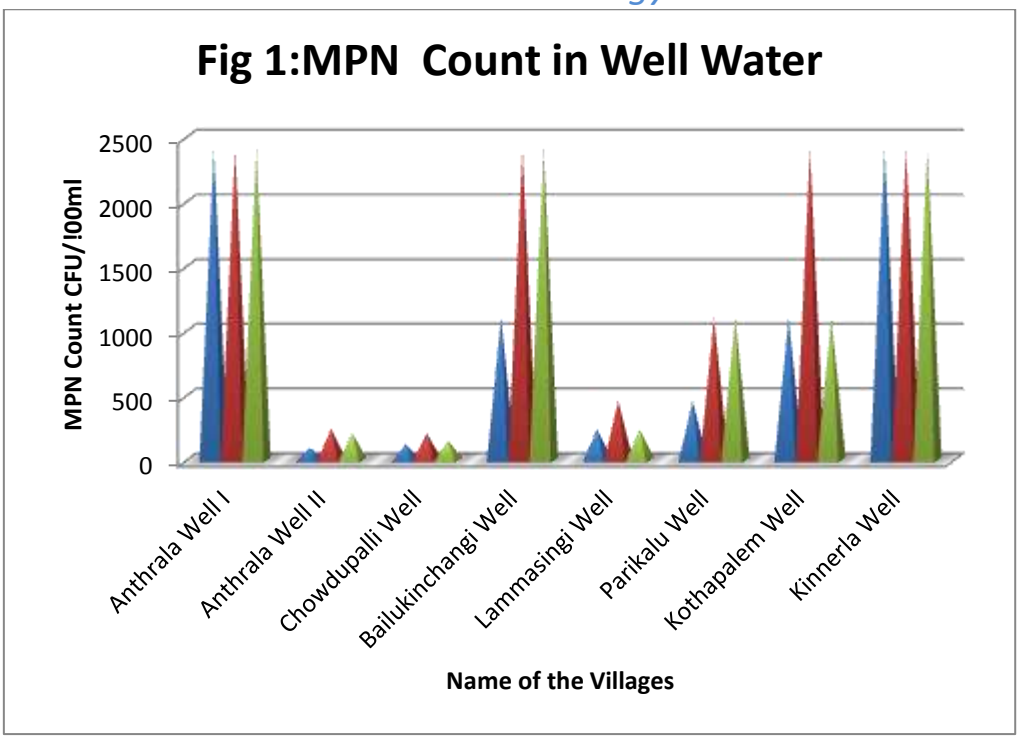
Chowdupalli Well

Parikalu Well

Mamidipalli Well

Anthrala Well- II

Lambasingi



The coliform population in the range of 93 to 2400 MPN/100 ml. Minimum coliform population 93MPN/100ml was detected in Anthrala Well IIsample, whereas, a maxium coliform population was found in Anthrala Well I, Kinnerla Well and Lingalagudi 2400 MPN/100ml followed by the Bailukinchangi, Kothapalem and Mamidipalli Wells having 1100 MPN/100ml (Fig.1). WHO permissible limits for coliform, and E.coli is 0MPN/100ml. in present study well water samples cross the permissible limits of WHO (13). The presence of coliforms shows the danger of faecal pollution and consequent hazard of contracting diseases through pathogenic organisms. None the less, the disease- causing organisms (pathogens) mostly transmitted via drinking water are predominantly of faecal origin (14). The fecal coliform counts on EMB agar plat ranged between $0.56X10^2$ and $4.55X10^2$ CFU/100ml, which also exceeds the standard limit for water. This result compared favorably with the report of Banwo 2006(15) which indicates that the presence of bushes and shrubs makes likely possible that smaller mammals may have been coming around these water bodies to drinking water, there by passing out feces into the water.

CONCLUSION

The well water quality of the study area showed that mostly physio-chemical and microbiological parameters of drinking water were found above the permissible limits of WHO. Presence of colifrom indicates that drinking water is focally polluted. The poor sanitary condition in tribal area is mainly responsible for change in water quality. Hence there is a need of treatment of drinking water before it is used for consumption.

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