International Journal of Global Science Research
Vol. 6, Issue. 1, April 2019, pp. 874-878
Available Online at www.ijgsr.com

ISSN: 2348-8344 (Online)
DOI: 10.26540/ijgsr.v6.i1.2019.114

Research Paper

A comparative study on quality of ground water resources of different rural areas of Ujjain

Vikas parmar and Madhubala Purohit
Department of Botany, Government Madhav Science P.G. College, Ujjain, M.P., India
Corresponding author Email: rishebdev@gmail.com

Received: 16/02/2019
Revised: 23/02/2019
Accepted: 18/03/2019

Abstract: Ground water has been used as safe source of source of drinking water as surface water does not possess certain properties. Many anthropogenic activities for socio-economic growth such as urbanization, industrialization and defective land use management practices specially in rural area may deteriorate the quality of ground water. According to World Health Organization report about 80% of all the diseases in human being are caused due to drinking of water contaminated by bacteria of faecal origin. Purpose of the study for measuring bacterial contamination of faecal origin was to educate and aware the rural people about the bacteria of faecal origin. For this ground water samples were collected from well, bore well and hand pumps from ten different sampling stations of three different subareas of nearby villages of Ujjain. For the assessment of bacterial contamination of faecal origin H_2S strip test of Manja, *et.al*., 1982 was used. Result clearly indicated that maximum contamination was reported in well samples (90%). Only 20% bore well samples showed contamination. Hand pump samples were found to be free from bacterial contamination.

Keywords: Bacterial contamination, faecal origin, Ground water, H_2S strip test.

INTRODUCTION

In rural area local people totally dependent upon ground water for drinking and domestic purposes as it is supposed to be the purest form of drinking water least susceptible to contamination. Due to upliftment of living standards and for socio-economic growth quality of ground water is deteriorated due to over extraction specially in Ujjain (CGWB,2013), microbiological and chemical contamination (Pedley and howard,1997 and Reid, *et..al*., 2003)

More than 80% population of rural India use raw and untreated ground water as potable water (Sudhakar and Mamatha, 2004). Therefore ground water sources are at higher risk (Rajankar, *et. al*., 2010). Along with the problem of ground water contamination, water conservation and water quality management are equally important for sustainable development of India. A study conducted by central ground water board in 2009 indicates that

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the quality of ground water was good to be used for drinking and irrigation purpose. However defective land use management practices like open disposal of sewage, flood irrigation, pits latrines, unhygienic condition in the surrounding areas etc. affect the quality of ground water. Therefore the present work was carried out to assess the bacterial contamination of faecal origin in the ground water resources of different rural areas of Ujjain.

MATERIALS AND METHODS:

The rural areas of Ujjain were selected as shown in fig.1 and fig.2. Coordinates of Ujjain are $21^{o}11'N$ and $75^{0}46'E$. Climate of Ujjain is warm, subtropical, where average temperature is $33^{0}C$ and average rainfall is 996 mm (Regional Meteorological Centre Nagpur).

Ujjain was divided in to three major areas viz. Mangalnath road area, Barnagar road area and Indore road area. These major areas were further subdivided in to ten sampling stations (Table no.1) from where ground water samples were collected. In Goyala chowki of Indore road area and Ajampura of Barnagar road area ground water was the only source of water for drinking, domestic and other purposes, as this area has no PHE supply of drinking water

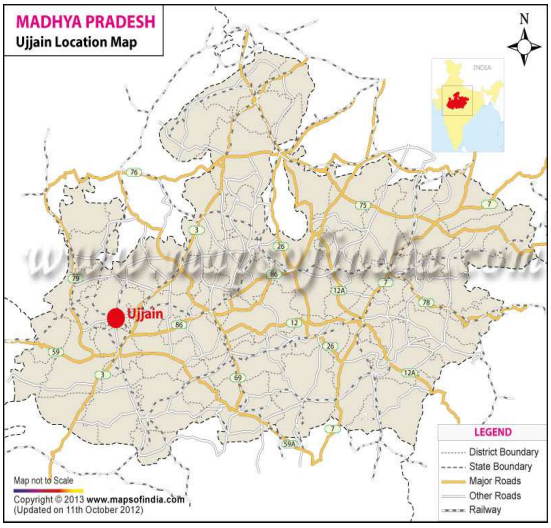

Figure 1 Study area map

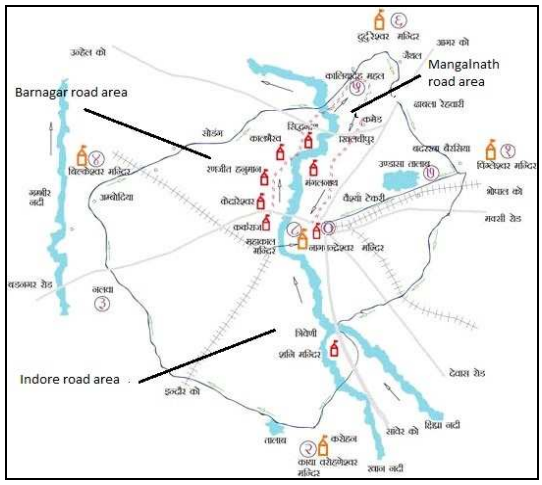

Figure 2 Study area (Map of Ujjain)

While in Mangalnath and Barnagar road area ground water was the alternative source of water for drinking, domestic and other purposes.

For the assessment of bacterial contamination of faecal origin, ground water samples were analyzed by H_2S strip test (Manja, *et. al*., 1982). This test detects the production of H_2S gas in volume of water by enteric bacteria associated with faecal contamination and formation of black precipitate by reaction of H_2S with iron in the medium. Ground water samples were collected from well, bore well and hand pumps in prescribed bottle (Vishal pharmamacutical Ltd.) Extreme care was taken to avoid contamination. After collection samples were immediately bought to the laboratory and kept in to incubator at $37^{0}C$ for 24 hrs.

RESULTS AND DISCUSSION:

Data showed that 90% of well samples were found to be contaminated while in bore well samples contamination was reported in 20% only (figure 3). Water samples from hand pump sources were found to be free from any bacterial contamination of faecal origin, as the result of H_2S strip test was negative here figure 4 (Table no.1).

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In Mangalnath proper and Kamed well water samples showed very high contamination (++++) while no contamination was reported in hand pump samples. Sadawal of Barnagar road area was the only sampling station in Rural of Ujjain where all the three ground water sources were found to be free from bacterial contamination where as in Jawasiya, Chintaman, Mullapura, Gonsa and Ajampura contamination was reported in well samples only. In contrast bore well and hand pump samples were reported to be free from faecal contamination.

Table No.1 Assessment of Faecal Contamination in Ground Water Resources of Different Rural Areas of Ujjain by H_2S Strip Test.

S.No.	Area	Sub area	Well	Bore well	Hand pump
1	Mangalath Road Area	Ankpat	++	++	-
		Mangalnath	++++	+	-
		Kamed	++++	-	-
2	Badnagar Road Area	Jawasiya	++	-	-
		Chintaman	++	-	-
		Mullapura	++	-	-
		Gonsa	++	-	-
		Sadawal	-	-	-
		Ajampura	++	-	-
3	Indore Road Area	Goyala chauki	+++	-	-

Note:- (-)No, (+)Slight, (++)Moderate, (+++)High, (++++)Very High Contamination

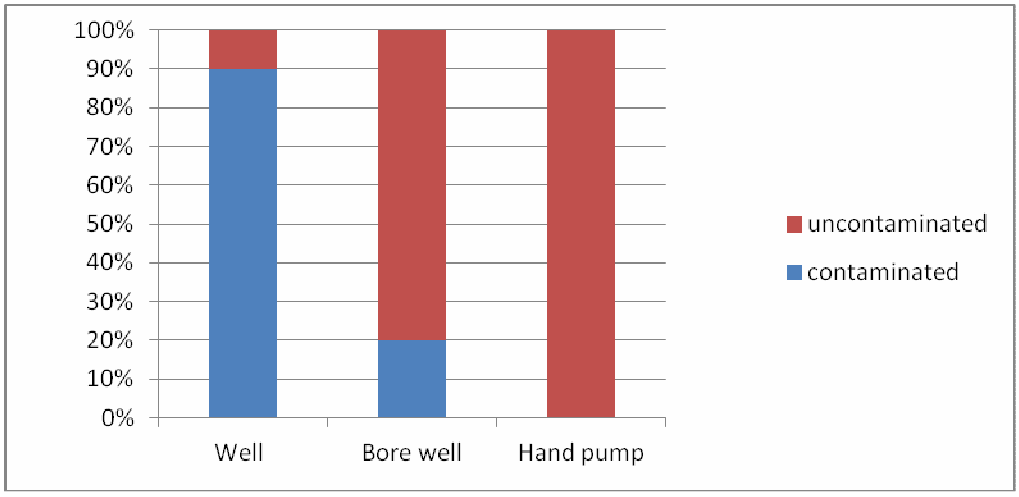

Figure 3 Contamination of Ground Water Resource in Different Rural Areas of Ujjain

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Figure 4 Ground Water Contaminations in Rural Areas of Ujjain

Bore well and hand pumps water samples of Ground water were reported to be free from bacterial contamination and water sample from well source was highly contaminated.

The most probable reason for the contamination of well samples in Rural areas of Ujjain might be the shallow depth of well, poor infrastructure (hand-dug well) without cement concrete platform, well without ring and pulley to uplift water. In most of the well solid wastes were dumped resulting in to the deterioration of ground water quality. Pit latrines and keeping animal near to water sources was another reason for the contamination of ground water.

Bore well samples of Ankpat and Mangalnath were reported to be contaminated. The reason might be the distribution channel (distance between the source and point of sample collection) using low grade of plastic pipes. In Ankpat distance was more therefore moderate contamination was reported whereas in Mangalnath distance was lesser showed traces of contamination (Table no.1).

Water samples from hand pumps of all ten sampling stations of Rural areas of Ujjain were found to be free from bacterial contamination of faecal origin. Hand pumps are the major source of drinking water in such areas. People are maintaining hygienic conditions around the sources. Secondly cement concrete platform around the source reduced the chances of contamination.

CONCLUSION:

The present study indicated that ground water contamination was largely dependent upon the infrastructure maintenance, proper sanitation and hygienic condition around water resources. This study might be helpful in educating the rural people about the bacterial

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contamination and water born diseases linked with intake of such contaminated water. These finding may give good opportunity to demonstrate the simple, cheaper, easier and reliable test (H_2S strip test) to monitor and evaluate the quality of drinking water in rural areas.

ACKNOWLEDGEMENT:

We are hereby acknowledge Mr. A. S. Nagori, PHE Department, Ujjain for his kind and whole hearted support during the entire tenure of present study. We are specially thankful to Miss Kena Bhonsale and Ranu Namdev for their help in water testing.

REFERENCES:

CGWB (2013) cgwb.gov.in/District profile/ Ujjain.

Pedley S. and Howard G. (1997) The public health implication of ground water microbiology. Q. J. Eng. Geol. 30 (2), 179

Reid D. C., Edwards A. C., Cooper D., Wilson E., Mcgaw B. A. (2003) The quality of drinking water from private water supplies in Aberdeen shire, UK. Wat. Res. 37(2), 245-254..

Sudhaker M. R and Mamatha P. (2004) Water quality in sustainable water management, Current science, 87(7), 942-947.

Rajankar P. N., Tambekar D. H. and Wate S. R. (2010) Ground water quality and water quality index at Bhandara District, Environ Monitoring Assessment, 179, (1-4), 619-625.

CGWB (2009) http://cgwb.gov.in/Distrct_ profile/Maharastra/Chandrapur.pdf.

Manja K. S., Maurya M. S. and Rao K. M. (1982) A simple field test for the detection of faecal pollution in drinking water. Bulletin of the world health organisation, 60 (5), 797-801.