

STUDY OF VARIOUS WATER QUALITY PARAMETERS WITH REFERENCE TO HUMAN HEALTH- A CASE STUDY OF BIKANER CITY OF RAJASTHAN

Ajay Singh Solanki*

Research Laboratory, P.G.Department of Chemistry, Dr. Tanveer Malwat College of Biosciences, Bikaner (Rajasthan)- 334001

*E-mail: ajay22solanki@yahoo.co.in

ABSTRACT

This study consisted of the determination of the water quality parameters of different types of untreated water in bikaner city of Rajasthan. The aim was to ascertain the quality of drinking water with especial reference to human health as problems like gastro intestinal, stomach ulcers occurrence of kidney stones and fluorosis that are prevailing in area. Study reveals that out of the total quality parameters determined two parameters calcium, & fluoride concentration are above the maximum permissible limit set by WHO (1993) and BIS-10500:1993 in all the areas of bikaner city.

Keywords: Water quality parameters, Bikaner, Toxicity, Permissible limit, Diseases.

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INTRODUCTION

Population growth, rapid industrial and technological development, urbanization and injudicious planning without due regard to sustainable development have induced numerous changes in the environment. Water is the basis of life & essential for human life. Ground water is the source of 90% country's drinking water. In rural areas almost all of the water supply comes from ground water and more than one third of our 100 largest cities depend on it for at least part of their supply. Ground water is polluted by industrial effluents discharged on land as well as on septic systems. Water become contaminated by various sources, and such water when used for drinking purpose bring's various disorders in human beings. Most of the disorders like gastro- intestinal, stomach ulcers, kidney stones and fluorosis are prevailing in area under study.

The parameters pH,EC, total dissolved solids, total hardness, chloride, calcium, magnesium fluoride were measured to compare them with WHO & BIS standards in order to estimate whether the water are suitable for human use and to give control measures to the general public to minimize the intake of pollutants.¹⁻⁵

EXPERIMENTAL

Sample collection

Bikaner city which is a part of 'thar desert' is taken as a study area. Whole city was divided into eight major zones i.e. Beechwal area, Murlidhar vyas colony, Hanuman Hatha, Jassusargate, Rani Bazar, Jai narayan vyas colony, Mukta parsad and Sadulganj. Samples were collected in pre washed (with detergent, dilute nitric acid and double distilled water respectively) high density polyethylene bottles. Samples were obtained directly from the water pumps and water wells after allowing it to run for at least ten minutes and each bottle and its cap were rinsed three times. Suspended matter, sediment, micro organisms were removed at the time of sampling by filtration before acidification. Samples were preserved according to EPA,1983. A.R. grade reagents were used for the preparation of all solutions. All the parameters were carried out following standard methods, 2002.⁶⁻¹⁰

RESULTS AND DISCUSSION

Various water quality parameters obtained during investigation are shown in table-2. The pH of beechwal area found to be 10.0, which is beyond the permissible limit. Such high pH causes aesthetic problems. High pH may be due to dissolve of various alkali in water. Very low chloride concentration 35.45 ppm is reported in Mukta parsad area. Low level of chloride causes metabolic alkalosis, apathy and dehydration, while in children less amount of chloride results in slowed growth. Low chloride is also responsible for growth of coliform bacterias which causes various water borne diseases viz. hepatitis, dysentery in users.¹¹

Very high level of Magnesium and Total hardness was observed during analysis in some areas, while concentration of Calcium remain high in whole city.. High level of hardness have many ill effects on health such as excess of calcium may effect Fe and Zn absorption. The absorption of vitamin D decreases by excess hardness. Excess hardness causes stomach disorder and finally weakens stomach permanently, high hardness causes risk of Ca stone and 50% increase calcium concentration in urine. Excess Ca interferes with muscle movement, hormone release, brain functions. It causes abnormality in the parathyroid glands.¹²⁻¹⁵ High level of Mg cuses neurotoxicity disorders. Except sadulganj area, rest all study area of bikaner city have high level of fluoride, which causes fluorosis, osteosclerosis, delayed brain development, nausea, gastro intestinal irritation, stomach ulcers.¹⁶

Table-1: Standard Table of Water quality Parametrs

Parameters of drinking water	WHO (1993)	BIS-10500:1993	
		Acceptable Limit	Maximum Permissible Limit
pH	Not mentioned	6.5-8.5	No relaxation
Electrical conductance mmhos/cm	1400	Not mentioned	Not mentioned
Total Hardness (mg/l)	500	300	600
Ca (mg/l)	Not mentioned	75	200
Mg (mg/l)	Not mentioned	30	100
Chloride (mg/l)	250	250	1000
Total dissolved solids (mg/l)	No guidelines	500	2000
Fluoride (mg/l)	1.5	1.0	1.5

Table-2: Water quality parameters of Bikaner city of Rajasthan

Parameters	Beechwal	Murlidhar Vyas Colony	Hanuman-hatha	Jassusargate	Rani Bazar	Jai Narayan Vyas Colony	Mukta Parsad	Sadulganj
pH	10.0	6.0	6.8	6.0	8.0	7.0	7.0	8.0
Electrical conductance mmhos/cm	0.62	0.12	0.44	0.09	0.07	0.31	0.14	0.61
Total Hardness (mg/l)	1760.0	540.0	840.0	1240.0	740.0	900.0	600.0	1120.0
Ca (mg/l)	235.49	134.56	201.85	454.16	377.54	210.26	243.90	117.74
Mg (mg/l)	285.96	42.45	81.98	25.86	11.46	91.50	12.44	825.75
Chloride (mg/l)	262.4	269.5	248.2	177.3	127.6	148.9	35.5	226.9

Total dissolved solids (mg/l)	393.80	76.80	281.60	57.60	44.80	198.40	89.60	390.40
Fluoride (mg/l)	4.5	5.5	4.0	2.3	5.7	4.32	2.0	1.0

CONCLUSION

From the above study it is concluded that due to use of such hard and fluoride concentration water, people of this area mainly suffers from gastro-intestinal problems and bone problems. therefore, such water requires proper treatment before use.

AKNOWLEDGEMENTS

I am highly acknowledged to DR. Suruchi Gupta, SR. Lecturer, Department Of Chemistry, Govt. Dungar College Bikaner, for her keen interest and necessary help required during completion of the work.

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[RJC-1009/2013]

Water: Research & Development [Water R&D]

www.waterrnd.com

ISSN: 2249-2003

[Abstracted in : Chemical Abstracts Service, USA and CAB(I) , UK]

Periodicity : April, August and December

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