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Research Article

COMPARATIVE STUDY OF GROUNDWATER QUALITY OF URBAN ANDRURAL AREAS OF AJMER DISTRICT

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ABSTRACT

Safe drinking water is the primary need of every human being. Ground water is believed to be clean and free from pollutants as compared to the surface water. So it is being used invariably as amajor source for drinking, domestic and irrigation purposes in both urban and rural are as (Gupta *et al*., 2009). In the present investigation the ground water quality of the urban and rural areas of Ajmer district of Rajasthan state of India has been extensively studied & comparative study is also carried out assess the ground water quality is to the rural and urban blocks with in the districts. Ground water samples were collected from 28 different locations of urban area and 21 samples from rural areas of the district and analyzed for physicochemical characteristics such as pH, Total Dissolved Solids, Calcium, Magnesium, Total Hardness, Electrical Conductivity, Chlorides, fluoride, Nitrate, Sulphate, Sodium,Potassium, Total Alkalinity, etc. The results of analysis obtained were compared with the water quality standards specified by World Health Organization and Bureau of Indian standard (BIS). Statistical interpretation of the data through correlation studies showed that ground water of some of the areas arenot suitable for drinking purposes as they exceed the permissible limits. Thus it can be concluded that some of the water sources in present study area need a proper primary and secondary treatment prior to consumption and preventive steps should also be taken to prevent these sources from contamination.

INTRODUCTION

Water is the basic need for sustenance of life on this planet earth. Groundwater is the easily available fresh resource for drinking, domestic and other purpose. Although the WHO reports that approximately 36% of urban and 65% of rural population in India are without access to safe drinking water[1].In India most of the people living in rural areas, depend on ground water for drinking and other purpose. It is also an important source of water for the agricultural and industrial sector. During last decade, it has been observed that ground water gets polluted drastically because of increased human activities (Pratima Rani Dwivedi1 and Augur, 2014; Abdul Jameel, 1998; Sirkar, 1996). The quality of drinking water may predominantly depends on its physico-chemical and micro-biological characteristics (Bhandari and KapilNayal, 2008). The physico-chemical analysis of water samples had been done extensively by many scientists by using standard methods (Silvia Fernandez UnaiVillanveva, 2008; Korfali and Jurdi, 2003; Khanna et al., 2003; Manivaskam, 1986; Trivedi and Goel, 1986; NEERI, 1988; Khanna, 1993; APHA, 1998).

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Good quality of drinking water is of basic importance to human physiology and evenman's continued existence depends very much on its availability. The importance of ground water for the existence of human society need not be overemphasized. Human and ecological use of ground water depends upon ambient water quality. Human alteration of the landscape has an extensive influence on watershed hydrology. Consequently the probability of water borne diseases are seen which is a cause of human health hazard (Desai, 1995; Elizabeth and PremnathNaik, 2005; Muller et al., 2001). Pollution of ground water from pesticides and fertilizers poses a major environmental health. So basic assessment on water quality has been necessitated to observe pollution level of ground water. In recent years an easier and simpler approach based on statistical correlation, has been developed using mathematical relationship for comparison of physicochemical parameters (Shihab, 1993; Iyer et al., 2003; Mayur et al., 2007; MitaliSarkar et al., 2006).

Study area

This chapter deals with the ground water quality of Ajmer district. Ajmer was founded by Ajaypal Chouhan in seventh century. Ajmer derives its name from Ajayameru (the invincible hill). The Ajmer city is located in Ajmer district in Rajasthan at latitude 26^0 27' N and longitude 74^0 42' E. at an elevation of about 486.0 m above mean sea level (MSL).

The city lies 135 km SW of Jaipur, the state Capital. It is thickly populated both in intensity and density. The climate of the town is semi-arid with dry and hot summer and cool winter. The hottest months are May and June with maximum temperature of around 45^0C, while in winter the maximum mean temperature is 25-10^0C, during January, the coldest month with little or no humidity. During the months of April to September string winds prevail resulting in the formation of sand dunes. The prevailing wing direction is south west to north east. The Monsoon season is relatively short from July to August. Annual rainfall in the area is about 470 mm while the average annual temperature is 33^OC. The rainfall is highly erratic. The annual maximum rainfall was recorded in 1975 when it recorded 120 cm leading to severe floods.

For comparison of urban and rural ground water quality and seasonal variation, Ajmer City areas of Subhash Nagar, Khanpura, Taragarh Road, Ramganj, Meena Colony, Kali Mata Mandir, BalajiMandir, Railway Colony, HazariBagh, Johnsganj, Narishala Road, Dharmtalai, Kaiserganj, golchakkar, Chand baori, Mahaveer Circle, Babu Mohalla etc.were selected and Rural areas were selected form Srinagar block, which are located 16 km towards East from district headquarters Ajmer. From this block nearby villages of Ajmer City Ghooghra, Kankarda, Bhuna-bhay, Ladpura were selected for studies. The purpose behind this study is to create awareness among people for use of safe water, for drinking, domestic and irrigation purposes for specific area to minimize the problems created by polluted water.

COLLECTION OF WATER SAMPLES

Total forty nine ground water samples were collected from Tube wells, Open walls and Hand pumps located at different locations for present study. Among 49 samples, twenty eight water samples were collected from Ajmer City area and twenty one from nearby rural areas of Ajmer district. These samples represent the ground water quality of Ajmer district. The samples were collected in pre-monsoon season (May-June) and post-monsoon season (Sept. to December) of the year 2013 to study the seasonal variation also in ground water quality.The water sources, from which samples have been collected, are being extensively used for drinking and other domestic purposes. About 1.5 L of each sample was collected in 1: 1 acid washed clean plastic containers for chemical examination, for bacteriological examination, samples were collected in pre sterilized bottles of 125 ml capacity. The collected samples were labelled and brought to the laboratory for analysis. The samples were analyzed for various physico-chemical parameters e.g. pH, EC, Total Dissolve Solids (TDS), Total Alkalinity (TA), Total Hardness (TH), Chloride (Cl^-), Nitrate ($NO3^-$), Fluoride(F^-), Sodium (Na^+), Potassium (K^+) etc.by following the procedures given in the standard methods (APHA, NEERI).

RESULTS AND DISCUSSION

The results of the of various physico-chemical characterization like pH, TDS, EC, Alkalinity, Total Hardness, Chloride, Nitrate, Fluoride, Sodium, Potassium etc.are summarized in the Table 1 (a) & (b) for Urban city area in Pre and Post monsoon season of 2013 respectively and in Table 2 (a) and (b) for rural areas of Ajmer district. The analysis and summary tables reveal great variation in the chemical quality of ground waters of study area.

Ph

As per BIS the permissible limit of pH value for drinking water is specified [17] as 6.5 to 8.5. The pH value in the urban area and the rural area varied between 7.5 to 8.1 and 7.2 to 8.5.respectively. Results of pH of all sampling points in these areas indicate slightly alkaline nature of ground water. However it lies within the permissible limit in all the samples. No significant variation in pH has been observed due to seasonal variation. Generally the pH of the water is influenced by geology of that particular area and buffering capacity of water. Water is buffered by the presence of bicarbonates, carbonates and hydroxyl ions (Rashmi shah and Abhaytiwari, 2012). Abnormal values of pH causes bitter taste to water, affects mucous membrane, causes corrosion in pipelines and also affects aquatic life.

Alkalinity

Acid neutralising capacity is alkalinity". The standard desirable limit of alkalinity in potable water is 200 mg/l.as per BIS. However the maximum permissible level is 600 mg/l. In present study alkalinity values in Urban and Rural areas varied between 220 to 760 mg/l and 110 to 880 mg/l. respectively.Almost all samples in study area exceeded the desirable limit but only 10 to 15 % of samples in urban and 20 to 23% of samples in rural areas showed higher alkalinity values more than the prescribed permissible limit. The value of alkalinity in water provides an idea of natural salts present in water. The cause of alkalinity is the minerals which dissolve in water from soil. Alkalinity is a big problem for industries, so by this study it can be concluded that any industry establishment in these areas do not need any type of alkalinity treatment plan prior to use of ground water (Rashmi shah and Abhaytiwari, 2012). Water with high amount of alkalinity results in unpleasant taste of water and it turns boiled rice to yellowish colour (Narasimha Rao, 2011). Excess alkalinity in water is also harmful for irrigation which leads to soil damage by altering the soil pH which enhancesoil pH to a great exert and reduce crop yields.

Electrical Conductivity

Electrical conductivity (EC) of water is a direct function of its total dissolved salts (Harilal et al., 2004). Hence it is an index to represent the total concentration of soluble salts in water (Purandara et al., 2003). The electrical conductivity value varies widely with about 65% samples having conductivity value above 1000 μS/cm indicating high mineralization in the region. EC (Electrical conductivity) ranges 791 to 3642 μS/cm, in urban areas while in nearby rural areas of Srinagar block nearly 50% well waters are moderately saline to saline having EC above 2250 μS/cm. Salinity of ground water varies considerably form village to village due to semi-arid climate, hilly terrain and weathered water bearing formation. The analysis indicate that the lowest EC of 400 μS/cm has been observed in ground water in village kankrada in pre monsoon season and highest value of 5000 μS/cm in village at bhuna-bhay in post monsoon season

Total Dissolve solids

High values of TDS in ground water are generally not harmful to human beings but high concentration of these may affect persons who are suffering from kidney and heart diseases (Kumaraswamy, 1999; Geetha et al., 2008).

Table 1. (a). Urban Block Pre Mansoon2013

S. No.	Parameter	Range	Mean	IS:10500 Desirable Limits	IS:10500 Permissible Limits	% of water samples exceeding the desirable IS Standards	% of water samples exceeding the permissible IS Standards
1	pH	7.6-8.1	7.9	6.5	8.5	100.0	0.0
2	EC µS/cm	791.4-3629	2147.0	750	2250	100.0	89.3
3	TDS mg/L	680-2540	1502.8	500	2000	100.0	21.4
4	TA mg/L	220-760	401.4	200	600	100.0	10.7
5	TH mg/L	180-760	458.6	200	600	85.7	10.7
6	Ca mg/L	40-176	94.0	75	200	67.9	0.0
7	Mg mg/L	19.2-86.4	53.7	30	150	89.3	0.0
8	SO4 mg/L	20-265	116.0	200	400	3.6	0.0
9	Cl mg/L	60-640	271.0	250	1000	50.0	0.0
10	F mg/L	0.5-3.1	1.4	1.0	1.5	60.7	42.9
11	NO3 mg/L	10-540	179.6	45	45	82.1	71.4
12	Na mg/L	54-500	244.2	200	200	53.6	53.6
13	K mg/L	4-202	44.2	75	200	17.9	3.6

Table 1. (b). Urban Block Post Mansoon2013

S. No.	Parameter	Range	Mean	Standard limits IS:10500 Desirable Limits	Standard limits IS:10500 Permissible Limits in absence of Alternate source	% of water samples exceeding the desirable IS Standards	% of water samples exceeding the permissible IS Standards
1	pH	7.5-8.1	7.8	6.5	8.5	100.0	0.0
2	EC µS/cm	971-3642	2194.3	750	2250	100.0	50.0
3	TDS mg/L	680-2550	1536.0	500	2000	100.0	17.9
4	TA mg/L	230-750	421.0	200	600	100.0	10.7
5	TH mg/L	260-770	460.0	200	600	89.3	10.7
6	Ca mg/L	48-152	85.7	75	200	60.7	0.0
7	Mg mg/L	21.6-98.4	59.1	30	150	96.4	0.0
8	SO4 mg/L	16-186	91.3	200	400	0.0	0.0
9	Cl mg/L	90-680	302.3	250	1000	57.1	0.0
10	F mg/L	0.0-2.9	1.4	1	1.5	64.3	39.3
11	NO3 mg/L	20-434	170.5	45	45	82.1	67.9
12	Na mg/L	78-570	264.0	200	200	57.1	57.1
13	K mg/L	2-186	38.5	75	200	10.7	0.0

Table 2. (a). Rural Block Pre Monsoon 2013

S. No.	Parameter	Range	Mean	IS:10500 Desirable Limits	IS:10500 Permissible Limits	% of water samples exceeding the desirable IS Standards	% of water samples exceeding the permissible IS Standards
1	pH	7.4-8.3	7.8	6.5	8.5	100.0	0.0
2	EC µS/cm	400-4921.4	2542.5	750	2250	90.5	47.6
3	TDS mg/L	280-3445	1779.8	500	2000	90.5	33.3
4	TA mg/L	110-880	464.8	200	600	85.7	19.0
5	TH mg/L	150-960	581.4	200	600	85.7	47.6
6	Ca mg/L	36-208	123.8	75	200	81.0	9.5
7	Mg mg/L	14.4-112.8	65.3	30	150	90.5	0.0
8	SO4 mg/L	12-440	122.4	200	400	19.0	4.8
9	Cl mg/L	40-1010	401.4	250	1000	61.9	4.8
10	F mg/L	0.4-2.4	1.1	1.0	1.5	47.6	19.0
11	NO3 mg/L	5-375	115.2	45	45	71.4	38.1
12	Na mg/L	15-565	266.3	200	200	52.4	52.4
13	K mg/L	2-228	57.4	75	200	33.3	9.5

Table 2. (b). Rural Block Post Monsoon 2013

S. No.	Parameter	Range	Mean	IS:10500 Desirable Limits	IS:10500 Permissible Limits	% of water samples exceeding the desirable IS Standards	% of water samples exceeding the permissible IS Standards
1	pH	7.2-8.5	7.7	6.5	8.5	100.0	0.0
2	EC µS/cm	600-5000	2610.9	750	2250	95.2	47.6
3	TDS mg/L	420-3500	1827.6	500	2000	95.2	33.3
4	TA mg/L	160-880	497.6	200	600	90.5	23.8
5	TH mg/L	170-1100	594.3	200	600	90.5	38.1
6	Ca mg/L	36-240	112.2	75	200	81.0	4.8
7	Mg mg/L	16.8-136.8	75.3	30	150	90.5	0.0
8	SO_4 mg/L	18-285	95.6	200	400	14.3	0.0
9	Cl mg/L	70-1060	430.0	250	1000	66.7	9.5
10	F mg/L	0.5-2.5	1.2	1.0	1.5	52.4	14.3
11	NO_3 mg/L	10-335	109.0	45	45	71.4	38.1
12	Na mg/L	56-632	295.4	200	200	57.1	57.1
13	K mg/L	2-194	39.1	75	200	19.0	0.0

Table 3. (a). Correlationma Trixamong Different water quality variables of urban block of ajmercity

PRE MONSOON2013

	pH	EC	TDS	TA	TH	Ca	Mg	SO4	Cl	F	NO3	Na	K
pH	1												
EC	-0.435	1											
TDS	-0.435	1.000	1										
TA	-0.221	0.670	0.670	1									
TH	-0.363	0.767	0.767	0.457	1								
Ca	-0.320	0.579	0.579	0.326	0.892	1							
Mg	-0.317	0.779	0.779	0.484	0.863	0.541	1						
SO_4	-0.172	0.744	0.744	0.292	0.657	0.509	0.652	1					
Cl	-0.436	0.905	0.905	0.409	0.669	0.489	0.696	0.607	1				
F	-0.284	0.390	0.390	0.433	0.160	-0.042	0.344	0.197	0.291	1			
NO_3	-0.473	0.819	0.819	0.330	0.688	0.562	0.650	0.688	0.706	0.247	1		
Na	-0.355	0.946	0.946	0.601	0.564	0.371	0.633	0.695	0.891	0.417	0.773	1	
K	-0.308	0.392	0.392	0.536	0.056	-0.038	0.147	0.092	0.275	0.209	0.216	0.302	1

Table 3. (b). Correlationma Trixamong Different water quality variables of urban block of ajmercity

POST MONSOON 2013

	pH	EC	TDS	TA	TH	Ca	Mg	SO4	Cl	F	NO3	Na	K
pH	1												
EC	-0.382	1											
TDS	-0.382	1.000	1										
TA	-0.108	0.794	0.7936	1									
TH	-0.245	0.843	0.8427	0.772	1								
Ca	-0.249	0.571	0.5706	0.515	0.796	1							
Mg	-0.174	0.820	0.8205	0.758	0.880	0.414	1						
SO_4	-0.199	0.734	0.7341	0.399	0.682	0.398	0.714	1					
Cl	-0.444	0.939	0.9389	0.631	0.719	0.472	0.711	0.636	1				
F	-0.203	0.404	0.4036	0.340	0.346	0.051	0.481	0.216	0.394	1			
NO_3	-0.439	0.763	0.7625	0.390	0.586	0.467	0.516	0.712	0.650	0.250	1		
Na	-0.371	0.957	0.9565	0.668	0.673	0.403	0.696	0.702	0.946	0.432	0.773	1	
K	-0.328	0.422	0.4215	0.573	0.323	0.173	0.350	0.165	0.322	-0.136	0.214	0.282	1

Table 4. (a). Correlationma Trixamong Different water quality variables of rural block of ajmercity

PRE MONSOON 2013

	pH	EC	TDS	TA	TH	Ca	Mg	SO4	Cl	F	NO3	Na	K
pH	1												
EC	0.233	1											
TDS	0.233	1.000	1										
TA	0.286	0.635	0.6346	1									
TH	0.0725	0.925	0.9245	0.647	1								
Ca	0.0602	0.886	0.8858	0.656	0.98	1							
Mg	0.0825	0.925	0.9254	0.609	0.978	0.917	1						
SO_4	0.2807	0.821	0.8211	0.587	0.717	0.685	0.7197	1					
Cl	0.146	0.935	0.9351	0.338	0.84	0.787	0.8606	0.689	1				
F	0.1519	-0.059	-0.059	0.139	-0.076	-0.142	-0.003	0.06	-0.13	1			
NO_3	0.145	0.802	0.8015	0.424	0.786	0.774	0.7648	0.463	0.774	-0.24	1		
Na	0.2998	0.946	0.9463	0.518	0.805	0.75	0.8282	0.817	0.922	-0.02	0.7	1	
K	0.2647	0.75	0.7499	0.582	0.557	0.532	0.5583	0.773	0.634	-0.04	0.49	0.668	1

Table 4. (b). Correlationma Trixamong Different water quality variables of rural block of ajmercity

POST MONSOON 2013

	pH	EC	TDS	TA	TH	Ca	Mg	SO4	Cl	F	NO3	Na	K
pH	1												
EC	0.1479	1											
TDS	0.1479	1.0000	1										
TA	0.2917	0.7709	0.7709	1									
TH	0.0316	0.9297	0.9297	0.7837	1								
Ca	-0.0350	0.8081	0.8081	0.6448	0.9401	1							
Mg	0.0910	0.9425	0.9425	0.8287	0.9470	0.7807	1						
SO_4	0.1507	0.8545	0.8545	0.6739	0.7627	0.5967	0.8357	1					
Cl	0.0889	0.9614	0.9614	0.5845	0.8479	0.7409	0.8560	0.779	1				
F	0.0296	-0.229	-0.229	-0.032	-0.240	-0.302	-0.155	-0.238	-0.253	1			
NO_3	0.0167	0.7625	0.7625	0.5169	0.8520	0.8728	0.7391	0.612	0.702	-0.333	1		
Na	0.1723	0.9628	0.9628	0.6806	0.8093	0.6498	0.8711	0.840	0.964	-0.196	0.640	1	
K	0.3448	0.8027	0.8027	0.6737	0.6662	0.5403	0.7120	0.803	0.753	-0.147	0.476	0.766	1

A high content of dissolved solids elevates the density of water, influences osmoregulation of fresh water organism, reduces solubility of gases (like oxygen) and reduces utility of water for drinking, irrigation and industrial purposes (Kumaraswamy, 1999). According to Indian Specifications for Drinking water IS:10500 the desirable limit of TDS is 500 mg/l and the permissible limit is 2000 mg/l.

The total dissolved solids (TDS) in the urban study area ranged from 680 to 2550 mg/l, while in Rural area it varied from 280 to 3500 mg/l. All the samples in the urban areas have TDS value beyond the desirable limit and 21% samples have TDS more than permissible limit. In Rural areas 90% samples have TDS beyond the Desirable limits and 33% samples have TDS value above permissible limit of 2000mg/ L. A perusal of above summary tables suggest that only 60 to 70% water samples are potable after considering relaxed limits of TDS. The water is mostly saline.

Total Hardness

Total hardness in water is due to the presence of Calcium, Magnesium, Chloride and Sulphate ions. Hardness is reported in terms of $CaCO_3$. Hardness is one of the very important properties of ground water from utility point of view for different purposes (Narasimha Rao, 2011). The desirable and permissible limits of total hardness as per BIS is 200 and 600 mg/l. respectively. High amount of hardness in drinking water leads to heart diseases and kidney stone formation (Lalitha and Barani, 2004). Hardness values varied between 180-770 mg/l. in urban areas and 150 to 1100 mg//l. in rural areas. of Ajmer district studied. Hardness in Mostly samples of both urban and rural areas exceeded the desirable limit, and 45% sampling points of rural areas and 10% sampling points of urban areas showed hardness values more than the permissible limits. Exceeding the permissible limits of hardness causes poor lathering with soap, deterioration of the quality of clothes, scale formation and skin irritation (ShashankSaurabh et al., 2014).

In hardness calcium and magnesium serve as function of bone development, maintaining blood pressure etc. but it doesn't mean that it should be present in water in excess quantity. Its excess creates many problems (Rashmi shah, 2012).

Calcium

Calcium values varied between 40 to 176 mg/l in the studied urban area and 36-240 mg/l. in rural areas.Only 5% of Total samples analyse dexceeded the permissible limit. If calcium is present beyond the maximum acceptable limit, it causes incrustation of pipes, poor lathering and deterioration of the quality of clothes.

Magnesium

Magnesium value in the studied area varied between 19.2 to 98.4 mg/lin urban area and 14.4 mg/l to 136.8 mg/l. in rural area. All samples are within permissible limits prescribed by Indian standards.

Fluoride

Most of the fluoride found in groundwater receives from the naturally occurring from the breakdown of rocks and soils or weathering and deposition of atmospheric volcanic particles. Fluoride can also come from Runoff and infiltration of chemical fertilizers in agricultural areas and Liquid waste from industrial sources. Fluoride varied from 0.0 to 3.1 mg/l in urban areas of district, while in rural areas fluoride varied between 0.4 to 2.5 mg/l. The results found from the sample analysis, about 55% of samples collected of both areas have Fluoride beyond the desirable limit and about 40% in urban and 19 % samples of rural areas have Fluoride above the permissible limits.as per BIS. Fluoride helps in prevention of tooth decay, However, continuing consumption of higher concentrations of 1.5 mg/L or more can cause dental fluorosis and in extreme cases even skeletal fluorosis.

Nitrates

Groundwater contains nitrate due to leaching of nitrate with the percolating water and by sewage and other wastes rich in nitrates. Nitrate value in the urban and rural study area varied between 10-540 mg/l and 5-375 mg/l. respectively. About 70% samples in urban area and 38 % in rural areas exceeded the permissible limit of 45 mg/l prescribed by IS:10500. In the present study, the sampling points in which nitrate has been found to be high, can result in formation of nitroso-amines which are carcinogenic.

Chlorides

Soil porosity and permeability also has a key role in building up the chloride concentration (Elizabeth and PremnathNai, k2005). Excessive chloride concentration increases rates of corrosion of metals in the distribution system. This can lead to increased concentration of metals in the supply (Muller et al., 2001). Chloride value in the study area varied between 60-680 mg/l in urban and 40-1060mg/l. in rural area. According to Indian standards for drinking water, desirable limit of chloride is 250 mg/l, and the permissible limit is 1000 mg/l. About 10 % samples in rural area showed higher chloride values than the prescribed limit. The higher values of chloride can cause corrosion and pitting of iron pipes and lates (ShashankSaurabh et al., 2014).

Sulphate

Sulphate occurs naturally in water as a result of leaching from gypsum and other common minerals. Sulphate content in drinking water exceeding the 400 mg/L impart bitter taste and may cause gastro-intestine irritation and cantharsis (Manivaskam, 2005). Sulphate values varied between 16-265 mg/l in urban area and 12-440 mg/l. in rural area studied of Ajmer district. Sulphate values in all water samples have been found to be within permissible limits laid by Indian Standards.

Correlation Studies

Interrelationship studies between different water quality parameters are very helpful in understanding geochemistry of the studied area. The regression equations for the parameters having significant correlation coefficients are useful to estimate the concentration of other constituents. Correlation coefficient values of samples are presented in table 1.3(a), (b) and 2.3(a), (b).which showed the correlation matrix of the thirteen physico-chemical variables. It is clear from the results that the Fluoride was not correlated with all the variables and was not significantly correlated with any of the studied parameters. All the variables were positively and significantly correlated (at 0.05 level) with all the studied parameters. The test of significant difference between urban and rural ground water was found to be significant at 5% level. There was a significant difference found between the variables of urban and rural ground water. In order to find out the relationship amongst physicochemical parameters of the water samples, correlation coefficients were worked out and a large number of significant correlations were obtained. The statistical analysis results are recorded in Tables 3 (a), (b) and Table 4 (a), (b))

Conclusion

Over exploitation of resources and improper waste disposal practices have affected the drinking water quality. According to WHO, nearly 80% of all the diseases in human beings are caused by water (Manivaskam, 2005; Dilli Rani et al., 2011). Based on the results obtained for physicochemical analysis of ground water samples collected from different locations in the studied urban and rural areas of Ajmer district, it can be concluded that mostly parameters analysed are beyond the desirable and permissible (BIS & WHO) range except sulphate and potassium. It is not necessary that these para meter must be within permissible limit. Their deficiency can also create troubles. Hence, drinking water in the studied area requires precautionary measures before consumption for drinking so as to protect human beings from adverse health effects.So it is very much necessary to take precautionary measures for removal of harmful contents for us. Remediation methodology should be carried out as soon as possible by government/ local bodies because if water will remain contaminated in these sampling locations it may be used by people and account for health hazards and many diseases.

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