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Physico-Chemical Analysis of Ground Water Parameters of Selected Area Himayathnagar, Dist Nanded (MS) India and its Impacts on Human Health

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Abstract The present study deal with assessment of ground water physico-chemical parameters of a Himayathnagar, Municipal Panchayat City, Dist Nanded, Marathwada region MS, India. Ground water samples were collected from different location in the radius around 6 km this city, water samples selected the 14 sampling points in different area, these were slam affected area, due to the small activities such as industrial waste water, hospital, human activities, municipal waste water, these are directly recharging ground water contaminated to a highly concentration. This is serious problem. The present work to assessment the ground water quality here examine the various physico-chemical parameters i.e. pH, total dissolved solids, electrical conductivity, total alkalinity, total hardness, chlorides, fluorides sulfates obtained result were compared a drinking water quality standards with Indian Council of Medical Research (ICMR), and World Health Organization (WHO). It found that some of parameters' were potable or non potable water. To we find that ground water quality of Himayathnagar Municipal City, some of area suitable or unsuitable for drinking purpose.

Keywords Physico-chemical, Ground water, Water quality standards.

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Introduction

Ground water is the major source of drinking water in both urban and rural areas (Gupta et al. 2009). Ground water used for domestic and industrial water supply and also for use irrigation purpose in the

world. According to WHO organization, about 80% of all of the disease in human being caused by water. Ground water is valuable natural resources that are essential for human health. In India present day water scarcity is becoming common in several part of country, due to the rapid growth of population and anthropogenic activities, decreasing the water quality day by day. Only small fraction (about 2.5%) of earth water is fresh and suitable for human consumption. Nation ground water use irrigation 63%, commercial 1% domestic supply 4%, mining 3%, industrial 55, public supply 20%. The quality of ground water which depends on various chemical present ground water and their concentration, ground water is use the ultimate and it is most suitable a fresh resources, it is balances of concentration of the salt for human consumption day by day over burden of human population, pressure unbalanced, urbanization, unstrictly polices and dumping of the polluted water, its towards negate the government to a issues, pollutes water directly recharging surface to ground water. It contains the infiltration of harmful compounds to the ground water. Ground pollition depends upon factors such as rainfall pattern, depth of water table, soil properties such as texture/structure and filtration rate. Ground water quality analysis has been made by many authors like Gupta et al. (2009). in municipal waste water contain solids and liquids wastes due to lack of un strict rules and losses of government authorities cause decreasing of ground water quality. Himayathnagar Municipal Panchayat village to provide drinking water to limited areas, alternate facilities to provide bore well, and wells. This city maximum people were use the JAR water bottle for drinking purpose. Some areas of city water quality is in bad condition.

Materials and Methods

Water sample from the selected site only were collected during rainy seasons (from June to September 2014) and winter seasons (from October to January 2015). Sample collect from different 14 sampling points or different area. Water sample from different location were collected in cleaned polyethylene bottles. Samples were analyzed within 6 h from Municipal Panchayat village /city water supply from bore wells, and open wells. Ground water samples were analyzed different physico-chemical parameters such as, temperature, pH, total dissolved solids, electrical conductivity, turbidity total alkalinity, total hardness, chlorides, fluorides, sulfates.

Table 1. Detail of sampling location.

Sample no.	Name of location	Sample no.	Name of location
S-1	Janatha colony	S-8	Sardar colony
S-2	Nehru Nagar	S-9	Mourathuja Nagar
S-3	Ganeshwadi	S-10	Rukhmini Nagar
S-4	Ambedkar colony	S-11	Parmeshowre colony
S-5	Lokhadaba chook	S-12	Ganesh chook
S-6	Rahem colony	S-13	Bajarang chook
S-7	Khoba chook	S-14	Kalika colony

Study area

Himayathnagar is located in the east and west direction in Nanded district, Maharashtra, India. Himayathnagar is located between 19.422°N, 77.865°E. Taking total sampling points 14, each of 8 open bore well , and 6 open wells. Sampling was done in the rainy season and winter seasons from June to September 2014, October to January 2015 (Table 1).

Physico-chemical analysis

The collected samples were analyzed for major physical and a chemical water quality parameters pH, total dissolved solids, electrical conductivity, turbidity, total alkalinity, total hardness, chlorides, fluo-

Table 2. Methods used for estimation of various physico-chemical.

Parameters	Methods
pH	pH metery
Total dissolved solids	Conductivity meter
Electrical conductivity	Conductometry
Turbidity	Turbidity meter
Total alkalinity	Titration
Total hardness	EDTA titration
Chlorides	Silver nitrate method
Fluorides	Ion Selective Electrode
Sulfates	Turbidometric methods

Table 3. The data analysis of ground water in rainy season from June 2014 to September 2014.

Sample no.	Types of samples	Tem C	pH	TDS	EC	Turbidity	Total alkalinity	Total hardness	Cholorides	Fluorides	Sulfates
S-1	OB	26.4	7.2	542	1113	0.88	320	304	180.5	1	180
S-2	OW	25.2	7.5	568	1176	4.23	370	307	210.5	0.9	166
S-3	OB	27.5	8.6	670	1235	3.33	550	404	167.5	0.5	150
S-4	OB	28.2	6.8	690	1245	3.4	437	702	190.5	1.8	190
S-5	OW	27.3	7.5	700	1346	0.75	327	150	180.55	1.4	1156
S-6	OB	27.3	6.5	590	1441	5.96	232	250	195.5	1.3	174
S-7	OW	28.4	6.5	534	1341	4.7	620	445	266	1.2	230
S-8	OW	26.1	7.2	571	1236	3.7	367	825	124.25	1	245
S-9	OB	27.2	7.1	672	1270	0.33	670	580	267	1.9	230
S-10	OW	27.3	7.5	873	1636	2.7	409	670	525	0.8	170
S-11	OB	28.3	8.2	688	3641	5.24	499	720	425	1.4	190
S-12	OB	28.2	8.5	588	1809	4.22	438	525	670	1.2	210
S-13	OW	27.8	8.2	617	2847	4.2	390	325	270	1.2	233
S-14	OB	27.5	7.9	658	1207	5.73	567	256	320	1.5	199

rides, sulfates following methods for examination for water and waste water. (APHA 1992) (Table 2).

Results and Discussion

Physico-chemical parameters of ground water sample collected from different area of Himayathnagar. Estimated parameters were compared with those of WHO (2004) and ISI (10500-1991). Tables 3 and 4 show all the estimations and given in mg/l, EC-µmhos/cm,turbidity-NTU, temperature, except pH.

pH

pH was analysis the ground water quality in rainy season and winter seasons, present study values were investigation of the open Bore well and open well, the open bore well pH values were minimum of 6.5 and maximum values were 8.7. Other in open well pH values were minimum in 6.5 and maximum values in 8.9. The low pH values higher is corrosive of water (Patil et al. 2012). The present investigation maximum pH values indicates that a alkaline (Mahananda et al. 2010). Higher pH values increased due to dissolved the carbon dioxide, carbonate, bi-

Table 4. The data analysis of ground water in winter season from October 2014 to January 2015.

Sample no.	Types of samples	Tem C	pH	TDS	EC	Turbidity	Total alkalinity	Total hardness	Chlorides	Fluorides	Sufates
S-1	OB	27.28	8.4	670	1050	0.9	280	250	210	0.9	130
S-2	OW	28.3	8.9	837	1380	1.2	275	230	190	1.2	122
S-3	OB	29.2	7.4	917	1220	4.5	320	340	135	1.3	140
S-4	OB	27.1	8.7	350	1350	3.2	450	780	198	1	218
S-5	OW	30.1	8.5	470	1470	3.3	325	280	210	0.7	118
S-6	OB	28.1	7.4	565	1625	3.1	342	222	230	0.8	169.3
S-7	OW	28.9	8.9	1470	1170	2.2	450	365	267	0.9	151
S-8	OW	27.4	7.5	1670	1520	4.2	670	387	270	1	216
S-9	OB	28.9	6.5	1835	1780	5	361	390	220	1.3	130
S-10	OW	27.9	8.2	1670	2840	4.9	499	270	233	1.4	93.8
S-11	OB	30.9	7.5	980	2370	3.7	400	470	240	1.9	165.2
S-12	OB	27.9	7	1900	618	2.6	429	650	280	1.3	199
S-13	OW	28.4	8.2	2200	670	2.7	320	499	255	1.5	180.5
S-14	OB	29.2	8.3	2233	580	2.9	680	361	1700	125	170.6

carbonate it is more affective to physico-chemical parameters.

Total dissolved solids

Total dissolved solids of ground water quality in rainy and winter season. In the open bore well and open well, TDS minimum values was 350mg/l and maximum value was 1835 mg/l. In open well, minimum value was 470 mg/l and maximum value 2,200 mg/l. TDS is increased due to the presence of organic matter and salt (Mahananda et al. 2010).

Electrical conductivity

Electrical conductivity is the capacity of water carry electrical current in samples present various ions type present (Dohare et al.2014). It directly functions depending upon dissolved salt, which shows the level of electrical conductivity. Present study analyzed in open bore well and open well, in rainy seasons and winter seasons. The open bore well,minimum values were 580 µmhos/cm and maximum values EC 3641 µmhos/cm and in open well, minimum value was 670 µmhos/cm and maximum values were 2847 µmhos/cm ground water contain the inorganic and acids and bases and salt which was regulative the good conductors.

Turbidity

Suspended particles in water interfering light visilerlity is called the turbidity. The present study ground water turbidity analysis in rainy and winter seasons both were in open bore well and open well. To study turbidity in open bore well minimum values were 0.9 NTU and maximum value was 5.96 NTU. Other in open well, minimum value was 0.75 NTU and maximum values were 4.23 NTU. Our estimated values of Turbidity compared with WHO (2004) standards permissible limit 5 NTU.

Total alkalinity

Total alkalinity is to neutralize the strong acid and it is normally due to presence of bicarbonate, carbonate, calcium, sodium and potassium. The minimum values were in the open bore well 232mg/l and maximum values in the 680mg/l and open well minimum values were 275mg/l and maximum values 670mg/l. Increase alkalinity was due to the presence of carbonate, bicarbonate, calcium sodium, potassium.

Hardness

In water hardness is due to the present of carbonate, bicarbonate, calcium and magnesium. The hardness desirable and permissible limits as compared to Indian standard (BIS) 200 to 600 mg/l. The hardness was in there categories, the excellent hardness is <300mg/l, good in 300-600 mg/l,600-900mg/l, unaccetable >1700mg/l (Karthikeyan et al. 2011). Minimum values of open bore well of 222 mg/l and maximum value was 780 mg/l. Maximum values of open well were 825mg/l and minimum values were 150 mg/l.

Chlorides

All type natural water and raw water contain the chlorides, it comes from water agricultural, industrial activities and chlorides concentration indicates that water was polluted (Gaur et al. 2009). Chlorides values compared with the World Health Organizaton (WHO 2004). Chlorides desirable limit is 250mg/l to permissible limit is 1,000 mg/l. As per our present study investigation in rainy and winter season the values of chlorides in open 6 bore well, and open well. Minimum values were 135 mg/l and maximum values was 1,700 mg/l. Open well minimum values were 124 mg/l, maximum value was 523 mg/l.

Fluorides

Ground water usually contains fluoride found as fluorspar (fluorite) rock, phosphate, phosphorus crystals (Ullhah et al. 2009). Desirable limit of fluorides is 1 to 1.5 mg/l. Present investigated values were in rainy and winter season, in open bore well and open well show minimum values in open bore well 0.5 mg/l and maximum values were 1.25 mg/l. In open well minimum values in 0.7 mg/l and maximum values were 1.5 mg/l.

Table 5. Comparison of drinking water quality with drinking water standards and its impact on human health.

Parameters	Present study value of max and minimum	WHO	BIS	Parameters effects on human health
pH	OB.6.5-8.7 OW.6.5-8.9	6.9-8.5	6.5-8.5	Affects mucous membrane, bitter, taste;corrosion.
Total dissolved solids (mg/l)	OB.350-1850 OW.470-2200	500-1500	500	Undesirable taste; gastro-intestinal Corrosion Incrustation
Electrical conductivity (µmhos/cm)	OB.580-3641 OW.670-2847	300	—	More salty, its effects, Hypertension
Turbidity (NTU)	OB.0.9-5.96 OW.0.75-4.23	10	10	—
Total alkalinity (mg/l)	OB.232-680 OW.275-670	600	600	Boiled rice turns yellowish
Total hardness (mg/l)	OB.222-780 OW.150-825	100-500	300	Poor lathering with soap;deterioration o The quality of clothes; scale forming
Chloride (mg/l)	OB.135-1700 OW.124-523	200-600	250	Taste affected corrosion
Fluorides	OB.1 to 1.5 OW.0.7 to 1.5	1-1.5		Dental and skeletal fluorosis; non skeletal manifestations
Sulfates	OB.130-230 OW.93.8-1156	200-250	200	Taste affected; gastro-intestinal irritation

Sulfates

Sulfates occurs in natural water due to geological formation such as pyrite, lignite, and coal (Patil et al. 2012). In rainy and winter seasons in the open bore well, minimum value were 130 mg/l and maximum value were 230 mg/l and in open well minimum value was 93.8 mg/l and maximum values were 1156 mg/l indicating that the values are above safe limits. (Table 5).

Conclusion

Study shows that some respect the water was highly contaminated. some of Himayathnagar area lost portability of open bore well and open well. Location of wells for drinking water supplies should be decided with most caution, surrounding contaminated source and flow dirction should be considered.

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