



Bacteriological and Physico-chemical characteristics of Ground water in Chikhli town Buldana District, Maharashtra (India).

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Abstract

Water is an essential constituent of all animals, plants and human beings. Different sources of water like rain water spring water and mineral water meet requirement of each living organisms, inspire of abundant water resources 1/3rd population has to depend on drinking water scarcity, is always burning problem. The present study was conducted for bacteriological and physico-chemical analysis of drinking water. The bacteria isolated from bore well and well water. The people from interior of Buldana district of Maharashtra states uses well and bore well water for spread of water born diseases so it is necessary to analyzed the present water. The physico-chemical analysis Buldana district revealed that PH of ranging from 5.9 to 6.9. the nitrate values were ranging from 0.25 to 17.1 Mg/l. the total solid and TDS values were ranging from 200 to 400 Mg/l and 300 to 500 Mg/l respectively. The result reveals that PH, nitrate, total solid and TDS were above permissible limits in accordance with world health organization standards.

Keywords –Ground water, Bacterio & physico-chemical study, well & bore well, standard limit.

INTRODUCTION

Water is indispensably and intricately connected to life without which there is no life. This is the reason for which water must given the necessary attention at all time. World is covered by water and land, about 28.89%area is covered by land 71.11%area is covered by water if we distribute the percentage of all water we can see about 97%wateris saline, 3% is freshwater and out of which about 30.1% is ground water, this percentage shows the minimum availability of different pathogenic bacteria(E.coli).we will discuss from ground water and preventive measures to avoid the pathogen city.

Good quality water is an essential resource for the continuity of ecosystem. it is prerequisite to healthy living hence the development of water resources is a significant part of integrated community development police report by indicated that water borne diseases killed more than six million children every yearly arising from lack of access to save drinking water. Various researchers have reported on the serious and severe illness liked typhoid fever, cholera and dysenry as being caused by the use of contaminated water. Also water of poor physico-chemical quality may have adverse health effect causing unavoidable economic and human losses. Indicated that around 2.6(6,000 people a day),90% of whom are children, die of faecally-transmitted diseases while statistics revealed inadequate sanitation as the underlying cause of 2,213000 deaths per year due to unsafe water and hygiene especially in developing countries.(Talabie et al.,2014)

In 1990, WHO and UNICEF pooled resources and experience to form a joint monitoring program (JMP) in water supply and sanitation. The JMP has persuaded and helped many developing countries to designs and establish national monitoring

operations for drinking water and sanitation. It collects its data from 38 African, 23 Asia-pacific, 5west Asia, and 18 Latin American and Caribbean national monitoring centers, and issues regular status reports using 1990 as the baseline year. It is widely considered the best source of global data on water and sanitation access and availability in the developing countries .Water borne infection diseases are transmitted primarily through contamination of the water sources with excreta of human and animals who are either active cases or carriers of the diseases (Doyle and Erickson et al., 2006).

Materials and Methods

Collection of sample:- Drinking water samples were collected from different points of chikhli city, ie.well water and bore well water, 50 samples were collected to analyzed, and samples were collected in sterilized bottle. An analysis was carried out after 2 hrs of collection keeping in view the standards of world health organization (WHO)

Enumeration and Isolation of total and faecal coliform:

The bacteriological analysis of collected water samples was carried out for the presence of coliform E.coli was determined by using methods as recommended by APHA.the microbial quality of the drinking water samples were assessed by making use the multiple tube fermentation test (MPN/100ml) (APHA,1998).

Total coliforms were estimated by using the 5-tube most probable number (MPN) method. Macconkey broth was used for the presumptive tests. Inoculates the tube of macconkey broth are incubated at 37°C for 24hrs and 48 hrs. Positive presumptive tests were confirmed by lactose fermenting with acid and gas production in macconkey broth with color change. Colonies with characteristic in macconkey broth as well as

reaction to indol, methyl red, voges-proskauer and citrate utilization test and also carbohydrate fermentation tests were used as confirmation of present of E.coli positive tubes are inoculated on macconkey agar and EMB and inoculated at 37°C for 24hrs. After incubation observe the colony characteristics and select the well isolated colony and sub-cultured it on EMB agar .perform the gram staining and motility by using 24hrs old cultured of nutrient broth by hanging drop preparation method. Then biochemical characteristics were used for identification of e.coli. (Gadgil et al, 1998).

Physico-chemical Analysis-

The physico-chemical tests included the determination of PH, TDS, total dissolved solid and nitrate content using the methods of FAO (1997a).

Physico-chemical analysis of well water:-

The physico-chemical results of well water were given in table 3. The total value of total solid and TDS value of samples were ranging 200 to 400 mg/l and 300 to 500 mg/l respectively. The nitrate was ranging from 2.7 to 17.1 mg/l. All the values showed of nitrate within the permissible limit. The PH of all well water ranging from 7.1 to 8.5. these value were within the permissible limit in accordance with world health organization standards.

Physico-chemical analysis of bore well water:-

The PH of bore well water was ranging from 6.5 to 6.8. All the values of PH were below the permissible limit. The total solid values ranging from 150 to 300 mg/l within the permissible limit. The TDS values ranging from 150 to 300 mg/l. All the sample of bore well water showed lower than well water nitrate ranging from 0.25 to 1.62 mg/l within permissible limit.

Table-3. Physico-chemical characteristics of well water.

Parameter	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	S13	S14	S15	S16	S17	S18	S19	S20	S21	S22	S23	S24	S25
Ph	7.1	7.2	7.2	7.1	7.6	7.2	7.1	7.4	7.1	7.7	7.1	7.8	7.3	7.3	7.9	8	8.1	8.3	8.3	7.2	7.4	8.4	8.3	8.4	8.5
Total Solid (Mg/L)	200	210	215	220	230	218	250	280	240	300	310	330	320	350	400	310	400	398	255	250	335	330	350	400	400
TDS	300	312	320	310	315	350	300	322	340	330	321	350	370	362	398	410	420	498	440	420	450	430	455	460	400
Nitrate	5.39	4.43	3.02	4.02	5.12	6.03	7.8	5.01	7.23	5.01	5.24	3.10	4.17	2.50	6.4	7.6	11.1	4.4	2.7	6.7	4.4	17.1	3.6	4.2	3.7

S-sample.

Table 4:- Physico-chemical characteristics of bore well water.

Parameter	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	S13	S14	S15	S16	S17	S18	S19	S20	S21	S22	S23	S24	S25
Ph	6.5	6.6	6.5	6.5	6.7	6.8	6.5	6.6	6.8	6.6	6.7	7	6.5	6.8	6.5	6.5	6.3	6	6.8	6.5	6.4	6.1	6.7	6.8	7
Total Solid (Mg/L)	150	180	155	165	170	200	210	230	225	200	220	243	260	250	240	200	150	190	240	270	265	285	290	298	300
Tds	150	155	165	190	200	205	200	210	230	240	265	280	180	178	145	150	200	250	260	205	290	230	240	260	290
Nitrate	0.25	0.39	3.10	1.62	2.17	2.46	2.16	1.29	1.02	1.08	1.24	0.84	0.64	0.39	1.2	0.62	0.35	0.1	0.4	0.5	0.8	1.63	1.30	0.57	0.84

S-sample

Table 3: Bacteriological quality of Ground water.

Sr. no.	Water sample	MPN	EMB	Mot	I	M	V	C	TSI			Carbohydrate ferment			E. coli												
									A	G	H ₂ S	G	L	M													
A	Well water																										
1	Sample-1	110	Gms	Sm	+ve	+ve	-ve	-ve	+	+	-ve	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+ve	
2	Sample-2	130	Gms	sm	+ve	+ve	-ve	-ve	+	+	-ve	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+ve
3	Sample-3	250	Gms	Sm	+ve	+ve	-ve	-ve	+	+	-ve	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+ve
4	Sample-4	170	Gms	Sm	+ve	+ve	-ve	-ve	+	+	-ve	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+ve
5	Sample-5	210	Gms	Sm	+ve	+ve	-ve	-ve	+	+	-ve	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+ve
6	Sample-6	350	Gms	Sm	+ve	+ve	-ve	-ve	+	+	-ve	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+ve
7	Sample-7	280	Gms	Sm	+ve	+ve	-ve	-ve	+	+	-ve	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+ve
8	Sample-8	120	Gms	Sm	+ve	+ve	-ve	-ve	+	+	-ve	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+ve
9	Sample-9	150	Gms	Sm	+ve	+ve	-ve	-ve	+	+	-ve	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+ve
10	Sample-10	180	Gms	Sm	+ve	+ve	-ve	-ve	+	+	-ve	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+ve
11	Sample-11	140	Gms	Sm	+ve	+ve	-ve	-ve	+	+	-ve	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+ve
12	Sample-12	210	Gms	Sm	+ve	+ve	-ve	-ve	+	+	-ve	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+ve
13	Sample-13	130	Gms	Sm	+ve	+ve	-ve	-ve	+	+	-ve	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+ve
14	Sample-14	240	Gms	Sm	+ve	+ve	-ve	-ve	+	+	-ve	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+ve
15	Sample-15	430	Gms	Sm	+ve	+ve	-ve	-ve	+	+	-ve	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+ve
16	Sample-16	150	Gms	Sm	+ve	+ve	-ve	-ve	+	+	-ve	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+ve
17	Sample-17	180	Gms	Sm	+ve	+ve	-ve	-ve	+	+	-ve	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+ve
18	Sample-18	170	Gms	Sm	+ve	+ve	-ve	-ve	+	+	-ve	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+ve
19	Sample-19	350	Gms	Sm	+ve	+ve	-ve	-ve	+	+	-ve	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+ve

20	Sample-20	110	Gms	Sm	+ve	+ve	-ve	-ve	+	+	-ve	+	+	+	+ve
21	Sample-21	210	Gms	Sm	+ve	+ve	-ve	-ve	+	+	-ve	+	+	+	+ve
22	Sample-22	120	Gms	Sm	+ve	+ve	-	-	+	+	-ve	+	+	+	+ve
23	Sample-23	220	Gms	Sm	+ve	+ve	-ve	-ve	+	+	-ve	+	+	+	+ve
24	Sample-24	280	Gms	Sm	+ve	+ve	-ve	-ve	+	+	-ve	+	+	+	+ve
25	Sample-25	350	Gms	Sm	+ve	+ve	-ve	-ve	+	+	-ve	+	+	+	+ve
B	Borewell water														
1	Sample-1	150	Nil	-	-	-	-	-	-	-	-	-	-	-	-
2	Sample-2	280	Gms	Sm	+ve	+ve	-ve	-ve	+	+	-ve	+	+	+	+ve
3	Sample-3	150	Nil	-	-	-	-	-	-	-	-	-	-	-	-
4	Sample-4	140	Gms	Sm	+ve	+ve	-ve	-ve	+	+	-ve	+	+	+	+ve
5	Sample-5	460	Gms	Sm	+ve	+ve	-ve	-ve	+	+	-ve	+	+	+	+ve
6	Sample-6	150	Nil	-	-	-	-	-	-	-	-	-	-	-	-
7	Sample-7	250	Gms	Sm	+ve	+ve	-ve	-ve	+	+	-ve	+	+	+	+ve
8	Sample-8	350	Gms	Sm	+ve	+ve	-ve	-ve	+	+	-ve	+	+	+	+ve
9	Sample-9	540	Gms	Sm	+ve	+ve	-ve	-ve	+	+	-ve	+	+	+	+ve
10	Sample-	150	Nil	-	-	-	-	-	-	-	-	-	-	-	-
11	Sample-12	210	Gms	Sm	+ve	+ve	-ve	-ve	+	+	-ve	+	+	+	+ve
12	Sample-13	140	Gms	Sm	+ve	+ve	-ve	-ve	+	+	-ve	+	+	+	+ve
13	Sample-13	150	Nil	-	-	-	-	-	-	-	-	-	-	-	-
14	Sample-14	220	Gms	Sm	+ve	+ve	-ve	-ve	+	+	-ve	+	+	+	+ve
15	Sample-15	280	Gms	Sm	+ve	+ve	-ve	-ve	+	+	-ve	+	+	+	+ve
16	Sample-16	150	Nil	-	-	-	-	-	-	-	-	-	-	-	-
17	Sample-17	150	Nil	-	-	-	-	-	-	-	-	-	-	-	-
18	Sample-18	350	Gms	Sm	+ve	+ve	-ve	-ve	+	+	-ve	+	+	+	+ve
19	Sample-19	240	Gms	Sm	+ve	+ve	-ve	-ve	+	+	-ve	+	+	+	+ve
20	Sample-20	540	Gms	Sm	+ve	+ve	-ve	-ve	+	+	-ve	+	+	+	+ve
21	Sample-21	280	Gms	Sm	+ve	+ve	-ve	-ve	+	+	-ve	+	+	+	+ve
22	Sample-22	140	Nil	-	-	-	-	-	-	-	-	-	-	-	-
23	Sample-23	180	Gms	Sm	+ve	+ve	-ve	-ve	+	+	-ve	+	+	+	+ve
24	Sample-24	130	Nil	-	-	-	-	-	-	-	-	-	-	-	-
25	Sample-25	150	Nil	-	-	-	-	-	-	-	-	-	-	-	-

MPN-most probable number, Gms-gram staining, Mot-motility, I-indole, M-methyl red, V-voges proskauer, C-citrate, G -glucose, L-lactose, M-mannitol.

The E.coli play a main role in the presence of potential pathogens in drinking water E.coli can be as one of the microbiological parameter to be determined order to control the quality of water for human consumption (European Union, 1998).

Table no.2-Source wise contamination of E.coli in ground water sample.

SOURCE	TOTAL SAMPLE	NO. OF POSITIVE SAMPLES	PERCENTAGE
WELL WATER	25	25	100%
BORE WELL WATER	25	10	40%

The well water were analysed,out of 25,25sample were found contaminated and shows presence of E.coli and percentage is 100% the second 25 sample of bore well were analysed,out of which 10 samples were found contaminated and shows presence of E.coli and percentage is 40%. From the above table we could say that the contamination of bacteria is very high.

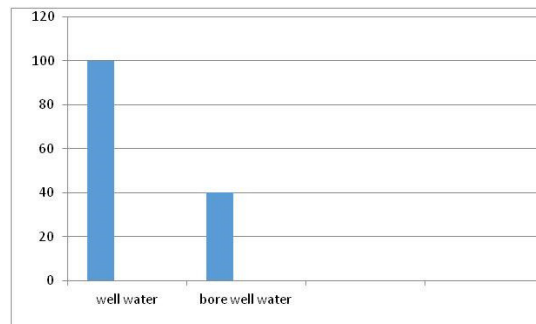


Figure 1: Sourcewise contamination of water sample.

Result and Discussion

In present study, all 50 samples tested from different sources of water supply in chikhli city. These were taken from different localities of chikhli city including areas with high, intermediate and low. All 50 samples were positive for bacterial contamination.

The bacteriological quality of drinking water in chikhli city. According to WHO there should be no coliform bacteria/ 100 ml of treated water in distribution as tested by multiple tube test. the present study 100% water samples were positive for bacterial contamination unfit for human consumption. This shows that there was a no improvement in all bacteriological quality of drinking water in chikhli over the past year; through not unsatisfactory at all. However, the figure of 100% in the present study is much higher than that of ICMR standards of drinking water.

Bacterial contamination of drinking water is a significant problem in other parts of the world. It is essential that water be examined regularly and frequently throughout year as contamination may be intermittent. At the same time there is need for making the water supplies safe for human use by regular chlorination and taking immediate appropriate remedial measures whenever contamination observed. It may be pointed out that even drinking water from water dispensers has also been observed to be contaminated with bacteria. Therefore, there is a need for adopting appropriate routine monitoring system to prevent or to diminish the chances of contamination of this water source. Conclusion- on the basis of the present study, analysis of water samples of chikhli in buldana district shows that 100% of water samples have been contaminated within the permissible limits. According to WHO the presence of E.coli in ground water indicates potentially dangerous situation and required immediate attention. Bacterial

contamination is significant problem in chikhli. The results also suggested that the study area as regular monitoring and chlorination/establishment of before use the water for drinking.

REFERENCES:-

- APHA, 1998. Standard methods for the examination of water and wastewater. 20th Ed. American Public health Association, Washington, USA. Page no.-14-35.
- A.M.Garode and N.A.Sonune (2013) - isolation and identification of amylase producing bacterium from domestic waste water of buldana district (M.S.) Int.J.Sci.Res.,2(5): page no.-11-12.
- A.M.Garode and N.A.Sonune (2015)-bacteriological and physico-chemical assessment of municipal waste water from buldana district, India. International journal of current microbiology and applied sciences .volume 4. page no.-577-584.
- I.R. Mather, (1984). Water resources distribution and uses. 3rd Ed. page no.-265-268.
- P.bongartz, S.M.Musyoki, A.Milligan and H.Ashley, (2010). overview: Tales of shit: community-led total sanitation in Africa: participatory learning and action, page no.-27-50.
- S.B.Borul; and P.S.Tayde, (2013). bacteriological studies of drinking water from lonar town of Buldana district of Maharashtra, journal of chemical and pharmaceutical research, page no.-108-111.
- A.Takabai, A.Ogundana, (2014). bacteriological evaluation of groundwater in ekiti state, southwestern Nigeria, international journal of scientific and technology.
- Twas, (2002). safe drinking water the need, the problem, solution and action plan. 3rd world academic of sciences, Italy, page no.-8-12.
- WHO, (2004). Guideline for drinking water quality, 3rd edition, world health organization, Geneva, page no.-34-40.

