

Comparative Study of Physicochemical Properties of Drinking and Sewage Water of Durg District of Chhattisgarh

Satpathy Sneha Shriparna¹, Mishra Alka²

¹(Asst. Professor, Swami Shri Swaroopanand Saraswati mahavidyalaya, Hudco, Durg, Chhattisgarh, India)

²(HOD, Zoology and Microbiology, Swami Shri Swaroopanand Saraswati mahavidyalaya, Hudco, Durg, Chhattisgarh, India)

Abstract: In this work we study the comparative Physico-chemical parameters of drinking and sewage water of some selected areas of Durg district. These samples were compared with the standard desirable limit of the parameter in drinking water as prescribed by different agencies. The water quality parameters we have selected are Temperature, Ph, Acidity, Alkalinity, Hardness, phenol, DO, COD, BOD and Total coliform. After the study significant level of variation was found.

Key words: Drinking water, Physico-chemical analysis, Sewage water.

I. Introduction

Water is the vital essence, miracle of nature, and the great sustainer of life. The essentiality of water for living system is quite evident as without water, there is no life.

One of the greatest concerns for the water consumers with respect to the quality of drinking water is contamination with pathogenic microorganisms. Certain microorganisms, including various bacteria, viruses, and parasites, are well-known water contaminants, of which several may lead to waterborne disease and epidemics. Bacteria are probably the most frequently studied group of microorganisms with respect to the quality of drinking water. In the past, fungi were infrequently considered when discussing pathogenic microorganisms in water.

Fungi in water have mostly been overlooked, but may be regarded as a chronic problem in drinking water distribution systems, and are possibly an underestimated problem. Fungi have received increased focus as drinking water contaminants in the last decades.

Some fungi are primarily adapted to aquatic environments, and will, therefore, naturally be found in water. These fungi are zoosporic, and many belong to the phyla Chytridiomycota. Fungi belonging to the other phyla in Eumycota are primarily adapted to terrestrial environments. These fungi can also enter drinking water from various locations.

The knowledge of the occurrence of fungi in drinking water was limited, but has increased due to the various studies performed.

Due to their tolerance of oligotrophic environments, some species of fungi are able to colonize drinking water distribution systems, which are typically low in nutrients. The significance of drinking water as an exposure pathway to pathogenic, allergenic or toxic fungal species or their metabolites is not well known.

Sewage is a water carried waste, in solution or suspension, that is intended to be removed from a community.

A slimy growth found in sewage and sewage polluted waters are due to sewage fungus.

Durg district is situated in Chhattisgarh state of India.

We have selected some area viz. Subhashnagar, Sindhiyanagar, Shankar nagar, Mohan nagar, Shikshaknagar.

II. Materials And Methods

Drinking and sewage water samples were collected from different areas of Durg district and analyzed for physicochemical, bacteriological quality and chemical characteristics by the methods of WHO and APHA AWWA 1985.

III. Result And Discussion

The comparative physicochemical properties of water samples are shown in table 1.1.

3.1 Physico-chemical characteristics- The Physico-chemical quality of drinking and sewage water totally depends on the geological condition of the soil and ground water pollution of the area. The comparison of

Physico-chemical parameters of the ground water of different location in durg district are shown in table 1.1 which shows that :-

3.1.1 Temperature - Ranged of temperature is between 28°C to 33°C for drinking water and 28°C to 34°C for sewage. The minimum temperature value of drinking water recorded from sample site A1, A3, A4 was 31°C while the maximum value observe from sample site A3 was 33°C.

The minimum temperature value of sewage water recorded from sample site A3 was 30°C while the maximum value observe from sample site A1 was 33°C

The desirable limit of drinking water has set by BIS-10500 (1991) 16-27.8°C, and WHO (1993) to be 25-31°C.

3.1.2 pH-Ranged from 6-7 for drinking water and from 7.1-7.9 for sewage water. The minimum pH value of drinking water recorded from sample site A2 was 6.7 while the maximum value observe from sample site A3, A4 was 7.4.

For Sewage it ranged from 7.1 to 7.9. The minimum pH value of sewage water recorded from sample site A5 was 7.1 while the maximum value observe from sample site A1 was 7.6.

The desirable limit of drinking water has set by BIS-10500 (1991), and WHO (1993) to be 6.5 to 8.5.

3.1.3 Acidity- Range of acidity is between 14.9 to 38.25 mg/l. for drinking water. The minimum acidity value of drinking water recorded from sample site A1 was 14.9mg/l while the maximum value observe from sample site A5 was 31.54mg/l.

For sewage it varies from 24.59-36.45mg/l. The minimum acidity value of sewage water recorded from sample site A4 was 25.76mg/l while the maximum value observe from sample site A1 was 34.26mg/l.

3.1.4 Alkalinity- Range of alkalinity of drinking water is between 8.98 to 73.46 mg/l. The minimum alkalinity value of drinking water recorded from sample site A2 was 8.98mg/l while the maximum value observe from sample site A5 was 72.18mg/l.

For sewage it ranges from 10.84-409.2mg/l. The minimum alkalinity value of sewage water recorded from sample site A1 was 10.84mg/l while the maximum value observe from sample site A5 was 66.37mg/l.

BIS has set on desirable level of alkalinity in drinking water to be 200mg/l and permissible value has been prescribe to be 600mg/l while according to WHO (1993) it is to be 120mg/l. Pondhe et.al and alkalinity in sewage water to be 200mg/l and permissible value has been prescribe to be 600mg/l while according to WHO (1993) it is to be 120mg/l. Pondhe et.al

3.1.5 Total hardness- The total hardness value of drinking water is from 34.4 to 770 mg/l. The minimum hardness value of drinking water recorded from sample site A3 was 34.4mg/l while the maximum value observe from sample site A4 was 832mg/l.

The total hardness value of sewage water is from 206.8 to 798.8 mg/l. The minimum hardness value of sewage water recorded from sample site A2 was 206.8mg/l while the maximum value observe from sample site A4 was 781.6mg/l.

The standard permissible limit of total hardness value of drinking water has set by BIS-10500 (1991) to be 600mg/l and according to WHO (1993) to be 500mg/l and the standard permissible limit of total hardness value of sewage water has set by BIS-10500 (1991) to be 600mg/l and according to WHO (1993) to be 500mg/l.

3.1.6 Calcium – The calcium value of drinking water is ranged between 140 to 840 mg/l. The minimum calcium value of drinking water recorded from sample site A2 was 161.2mg/l while the maximum value observe from sample site A3 was 834.4mg/l

The calcium value of sewage water is ranged between 156 to 941.2 mg/l. The minimum calcium value of sewage water recorded from sample site A2 was 156mg/l while the maximum value observe from sample site A3 was 941.2mg/l

The standard permissible limit of calcium value of drinking water has set by BIS-200mg/l (1991).

3.1.7 Magnesium- The magnesium value of drinking water is ranged between 0.5 to 280 mg/l. The minimum magnesium value of drinking water recorded from sample site A5 was 0.4mg/l while the maximum value observe from sample site A4 was 280mg/l

The magnesium value of sewage water is ranged between -590.8 to 192.4 mg/l. The minimum magnesium value of sewage water recorded from sample site A3 was -590.8mg/l while the maximum value observe from sample site A4 was 155.2mg/l

The standard permissible limit of magnesium value of drinking water has set by BIS-100mg/l (1991).

3.1.8 Phenol- The phenol ranged between 0.2 to 0.8 mg/l. The minimum phenol value of drinking water recorded from sample site A4 was 0.2mg/l while the maximum value observe from sample site A3 was 0.8mg/l.

The phenol ranged between 0.1 to 0.8 mg/l for sewage. The minimum phenol value of sewage water recorded from sample site A2, A4 was 0.1mg/l while the maximum value observes from sample site A3, A5 was 0.4mg/l.

The desirable limit of drinking water has set by (IS:8076-1976) (1991) is 1000mg/l of phenol so that this value is under permissible limit.

3.1.9 DO- The range of DO is between 0.44 to 5.6 mg/l. The minimum DO value of drinking water recorded from sample site A1 was 0.44mg/l while the maximum value observe from sample site A3 was 5.2mg/l. The range of DO is between 0.4 to 6.4 mg/l for sewage. The minimum DO value of sewage water recorded from sample site A1 was 0.4mg/l while the maximum value observe from sample site A2, A4, A5 was 4.4mg/l. The standard permissible limit of total DO value of drinking water has set by WHO (MPL >5) and BIS value was 4-6mg/l.

3.1.10 COD- The range of COD is between 34.4 to 770 mg/l. The minimum COD value of drinking water recorded from sample site A3 was 100.8mg/l while the maximum value observe from sample site A1 was 206.4mg/l.

The range of COD is between 68.8 to 280 mg/l. The minimum COD value of sewage water recorded from sample site A5 was 99.2mg/l while the maximum value observe from sample site A2 was 280mg/l.

The standard permissible limit of total COD value of drinking water has set by WHO(1993) 10MG/L and BIS value was 4-6mg/l. Pondhe et al

3.1.11 BOD- Ranged of BOD is between 0.1 to 0.23 mg/l for drinking water. The minimum BOD value of drinking water recorded from sample site A1,A2 was 0.04mg/l while the maximum value observe from sample site A5 was 0.13mg/l.

Ranged of BOD is between 0.03 to 1.97 mg/l for sewage. The minimum BOD value of sewage water recorded from sample site A2 was 0.03mg/l while the maximum value observe from sample site A1 was 1.97mg/l.

The standard permissible limit of total BOD value of drinking water has set by WHO (1993) 5-6mg/l and IS value is 30mg/l. and Golterman (1969)

3.1.12 Total coliform- The range of MPN is between 2 to 16 in drinking water. The minimum total coliform value of drinking water recorded from sample site A1 was 2MPN/100ml while the maximum value observe from sample site A5 was 16MPN/100ml.

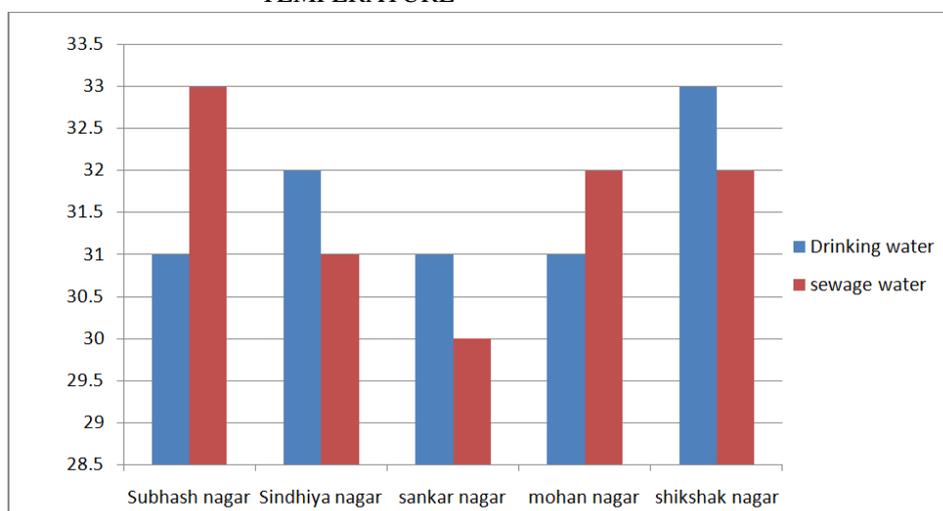
The range of MPN is between 2 to 43. The minimum total coliform value of sewage water recorded from sample site A2 was 2MPN/100ml while the maximum value observe from sample site A3, A5 was 20MPN/100ml.

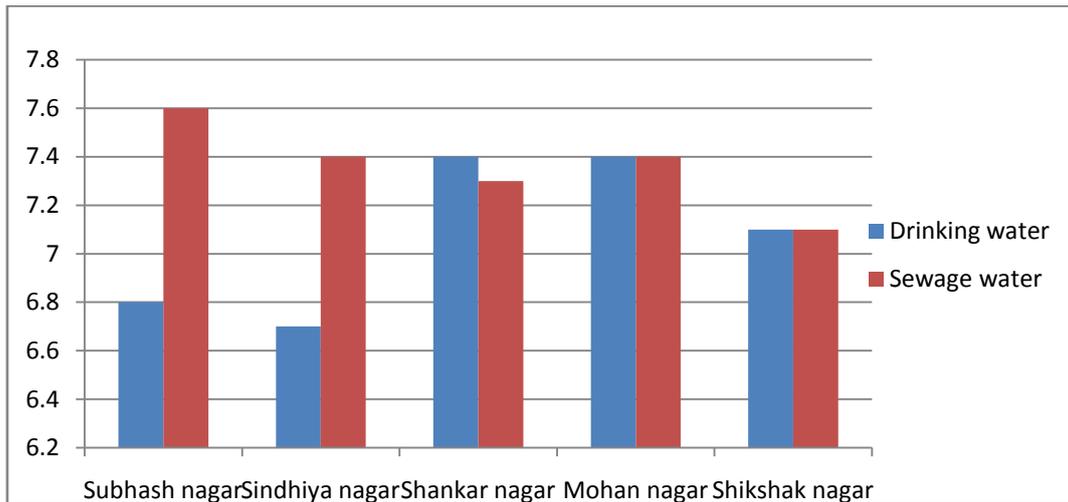
The desirable limit of MPN of coliform is 0 MPN/100ml in drinking water recommended by WHO.

TABLE 1.1: Comparative Physiochemical characteristics of sampled site of DurgDist

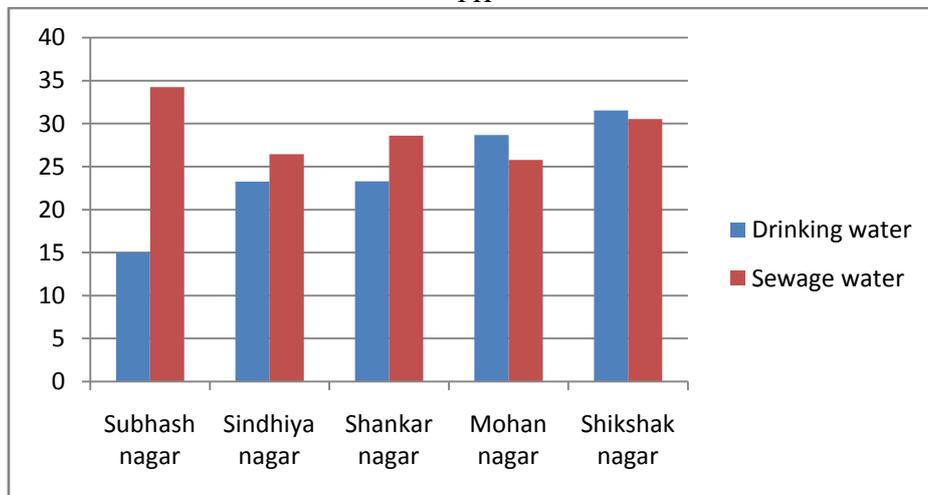
S · N O	PARA METER S	Subhashnagar (A1)		Sindhyanagar (A2)		Sankarnagar (A3)		Mohanagar (A4)		Shikshaknagar (A5)	
		Drinking water	Sewage water	Drinking water	Sewage water	Drinking water	Sewage water	Drinking water	Sewage water	Drinking water	Sewage water
1	Temperature	31°C	33°C	32°C	31°C	31°C	30°C	31C	32°C	33°C	32°C
2	PH	6.8	7.6	6.7	7.4	7.4	7.3	7.4	7.4	7.1	7.1
3	Acidity	14.99	34.26	23.26	26.46	23.27	28.6	28.69	25.76	31.54	30.52
4	Alkalinity	21.11	10.84	8.98	16.72	36.23	28.4	40.55	64.47	72.18	66.37
5	Hardness	156	302.4	185.2	206.8	34.4	350.4	832	781.6	330.8	332.8
6	Ca	244	204	161.2	156	834.4	941.2	552	626.4	330.4	312
7	Mg	-88	98.4	24	50.8	-800	-590.8	280	155.2	0.4	10.8
8	Phenol	0.3	0.2	0.4	0.1	0.8	0.4	0.2	0.1	0.6	0.4
9	DO	0.44	0.4	3.6	4.4	5.2	4	3.2	4.4	4.8	4.4
10	COD	206.4	232	161.6	280	100.8	144	113.6	208	105.6	99.2
11	BOD	0.04	1.97	0.04	0.03	0.1	0.07	0.4	0.03	0.13	0.04
12	MPN	2	7	4	2	13	20	9	7	16	20

TEMPERATURE

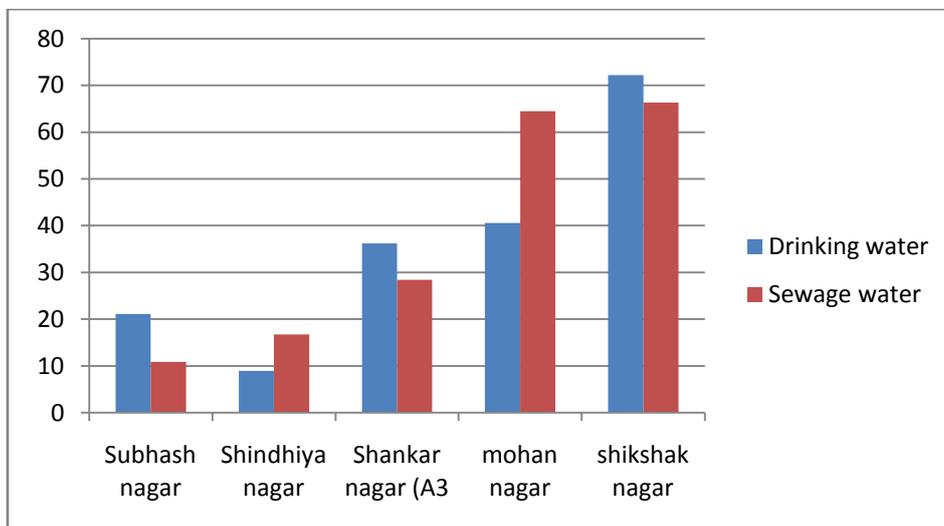




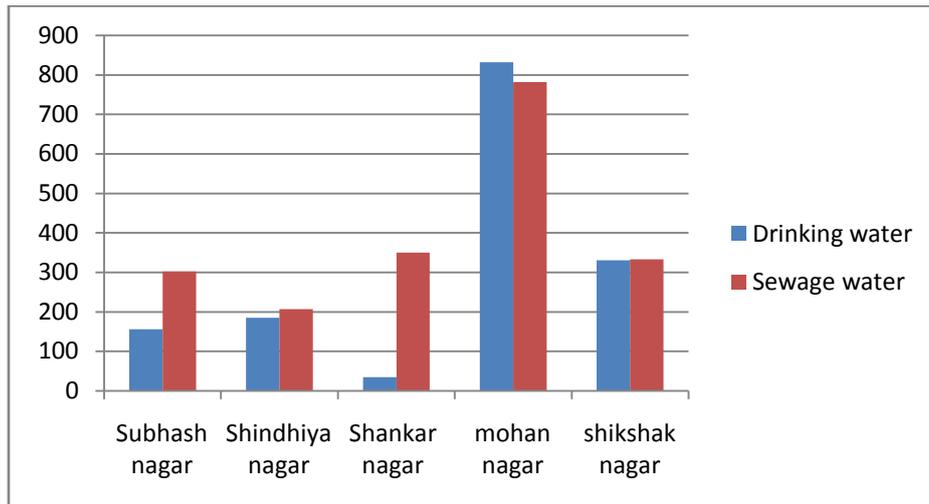
PH



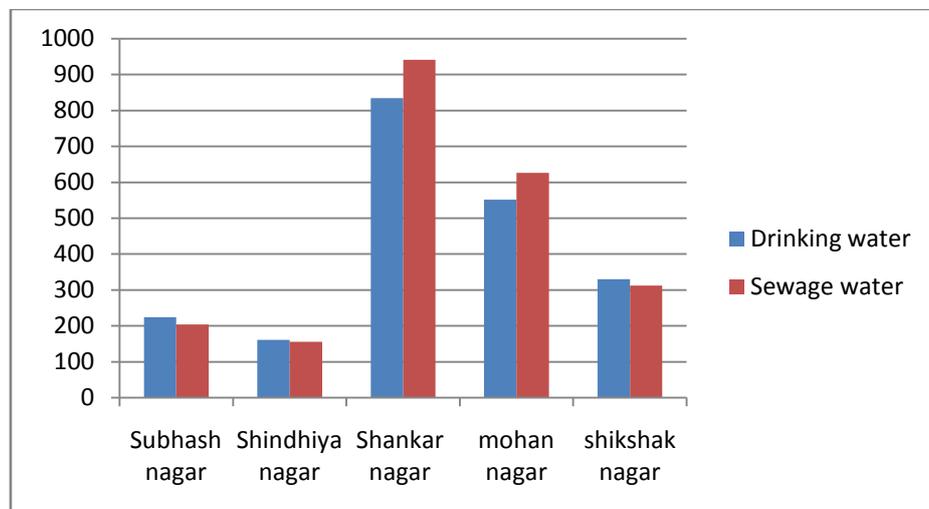
Acidity



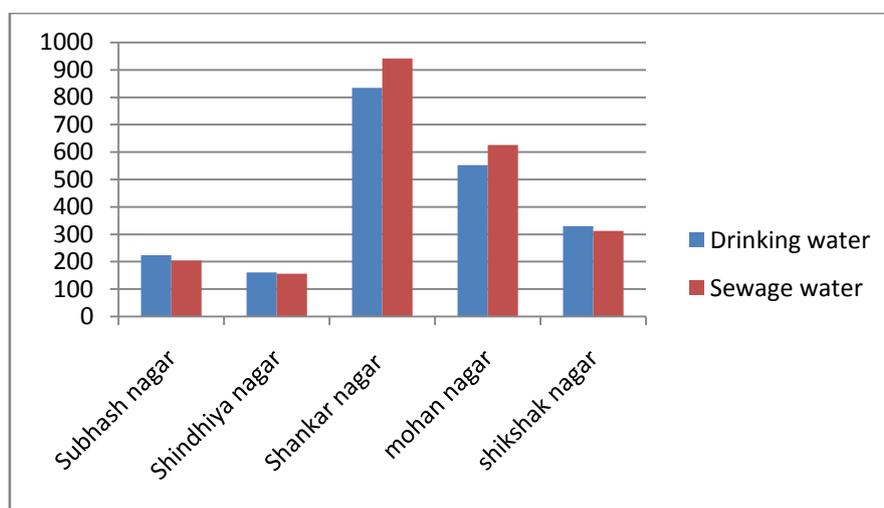
Alkalinity



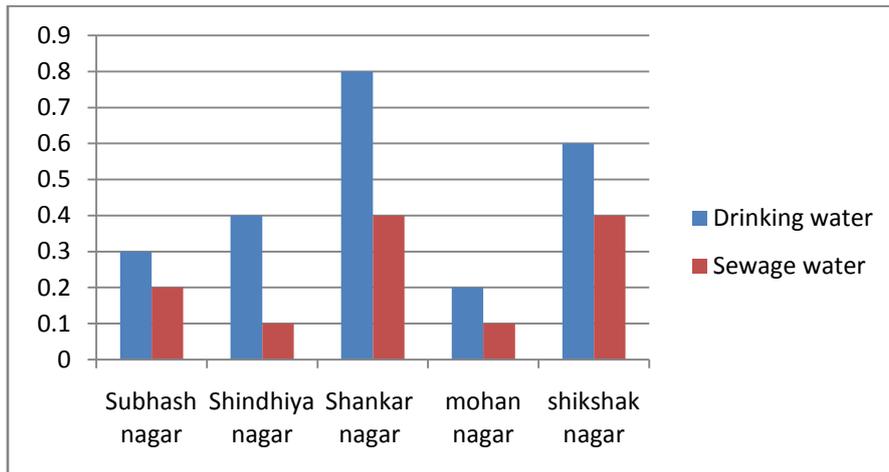
Hardness



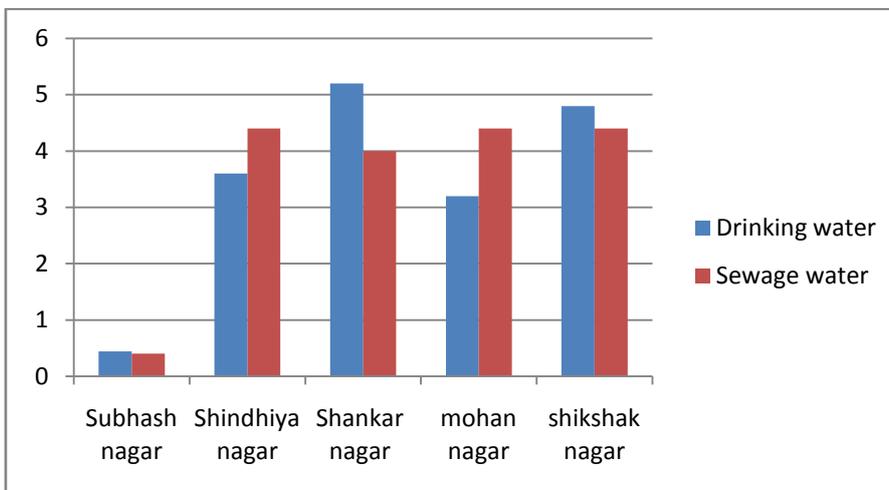
Calcium



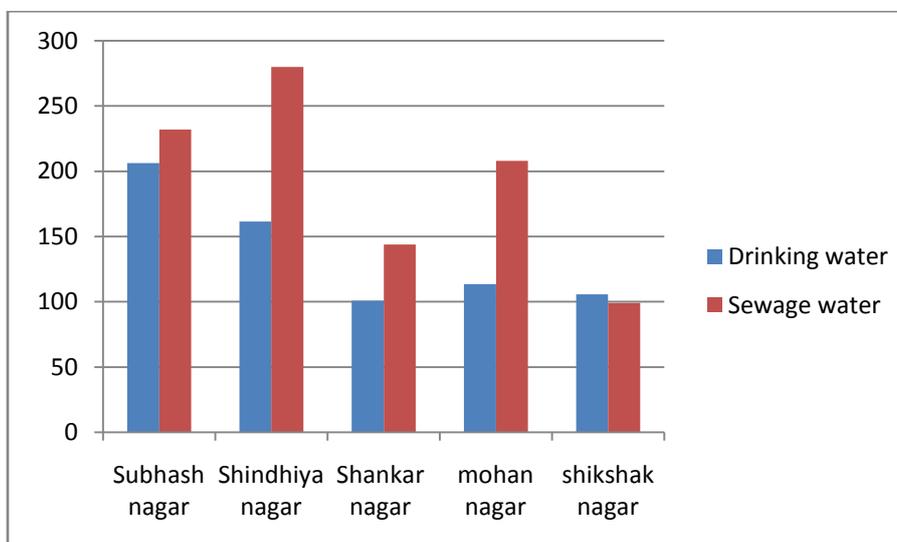
Magnesium



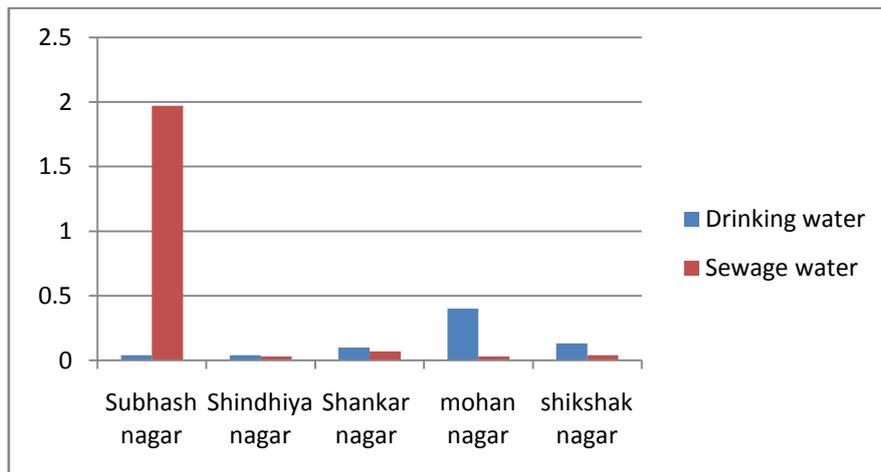
PHENOL



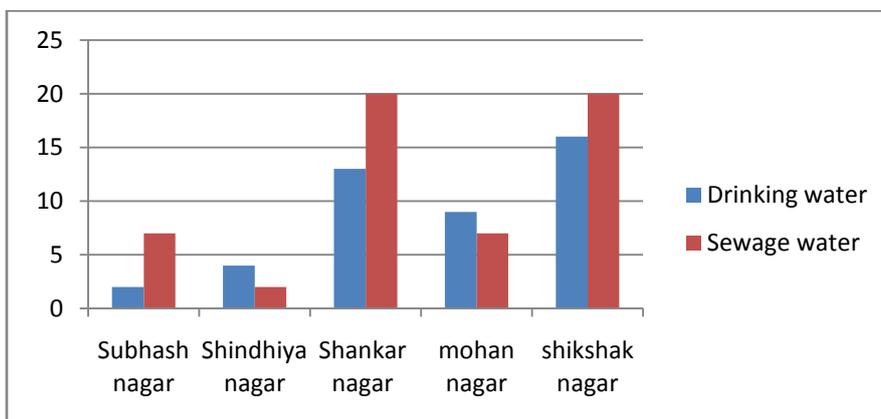
DO



COD



BOD



MPN

IV. Conclusion

After the comparison of both we find out the naturally sewage water is more polluted compare to drinking water and if this water is directly mix with the drinking water found near the source of sewage water it carry toxic effects on it. So, that it would be try to check it.

References

- [1] APHA 1998. Standard method for the examination of water. American public health association Washington D.C. 874.
- [2] Joshi B.D. & et.al studied physico-chemical characteristics of river Bhagirathi in the upland of Garhwal, Himalaya., *Himalayan J. Env. Zoo.* 7 (1): 64-75
- [3] Pondhe, G.M., Chembare, A.J. and Payil, R.P. 1995. The physicochemical characteristics and quality of water from the Pravara area in A HEMEDNAGAR DISTRICT, Maharashtra. *J. Auqa. Biol.* 10 (1) : 40-43.
- [4] Golterman, H.I. and Clymo, R.S. 1969. *Methods for physical and chemical analysis of freshwater*. IBP Handbook No. 8. Blackwell scientific publication, Oxford, Edinburgh.
- [5] ISI, Indian Standard specification for drinking water, IS10500, ISI, New Delhi, 1983.
- [6] W.H.O, Guidelines for drinking water quality, Vol.1, Recommendations WHO, Geneva, 1984.
- [7] Food and Agriculture Organization (FAO) (1997a). Chemical analysis manual for food and water, 5th Ed, FAO ROME 1:20-26.
- [8] APHA(1985). Standard methods for examinations of water and waste 16th ed. APHA Washington D.C.

- [9] The study of fungi in drinking water, GunhildHAGESKALa,* , Nelson LIMAb, Ida SKAARa, National Veterinary Institute, Section of Mycology, P.O. Box 750 Centrum, 0106 Oslo, Norway, IBB-Institute for Biotechnology and Bioengineering, Centre of Biological Engineering, Universidade do Minho,
- [10] A REVIEW OF FUNGI IN DRINKING WATER AND THE IMPLICATIONS FOR HUMAN HEALTH, Final Report April 2011