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A Comparative study of Microbial Assessment and physicochemical Analysis of Drinking water of Durg District (CG).

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Abstract: *In this study we find out the microbial assessment and physicochemical analysis of drinking water of some selected area in Durg city. 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, Physicochemical Analysis, Microbial Assessment.*

I. Introduction

Water is an important element for human being and it provides a wonderful chemical medium in which all biological and biochemical processes occur. Water dissolves various nutrients, distributes them to cells and removes waste products. About 70% of the human body is composed of water. No One can survive without food for some weeks, but cannot survive without water more than a few days. The drinking water is easily polluted either by contamination or by indirect rain were pollutants from bank of water body. There are various sources of water, which are used by man for different purpose. If any undesirable elements are mixed in this water that time water became polluted. The drinking water is easily polluted either by contamination or by indirect rain were pollutants from bank of water body. Durg district is an important part of Chhattisgarh state it is famous for Bhilai Steel Plant, we have selected some area *viz*. Subhash nagar, Sindhiya nagar, Shankar nagar, Mohan nagar, Shikshak nagar, Katul board, Ganj para, Borsi, Civil line, Malviya nagar.

II. Materials And Methods

Water sample were collected from different areas of Durg district and analyzed for physiochemical, bacteriological quality and chemical characteristics by the methods of WHO and APHA AWWA 1985.
The media used for bacteriological analysis of water include Nutrient Agar medium (NAM), Potato Dextrose Agar (PDA), Lactose Broth Medium (LB), Brilliant Green Lactose Bile Broth, Eosine Methylene Blue Agar (EMB). All media were prepared with respect to given instructions and directions. Micro-organisms were identified by using morphological and biochemical method (Berge's manual).

III. Result And Discussion

The physiochemical properties of water sample are shown in table 1.1. The temperature ranges from 28ºC - 33ºC while PH ranges from 6-7. The acidity varies 14.99-38.25mg/l while alkalinity varies 8.98-73.46mg/l. The total hardness observed was between 34.4-832mg/l, whereas calcium varies from 140-834.4 and magnesium varies 0.4-(-800). The phenol ranges from the range of DO varies between 0.44-5.6, the COD varies 41.6-206.4, the range of BOD varies 0.1-0.24. MPN varies within 2-16.

3.1 Physio-chemical characterstics- The physico-chemical quality of drinking water totally depends on the geological condition of the soil and ground water pollution of the area. The 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. The minimum temperature value of drinking water recorded from sample site A6 was 28°C while the maximum value observe from sample site A5 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 of PH is between 6.7 to 7.9 The minimum pH value of drinking water recorded from sample site A2 was 6.7 while the maximum value observe from sample site A9 was 7.9.
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. The minimum acidity value of drinking water recorded from sample site A1 was 14.9mg/l while the maximum value observe from sample site A7 was 38.25mg/l.

3.1.4 Alkalinity- Range of alkalinity 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 A9 was 73.46mg/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

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 A6 was 769.2mg/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.

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 A8 was 140mg/l while the maximum value observe from sample site A3 was 834.4mg/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 standard permissible limit of magnesium value of drinking water has set by BIS-100mg/l (1991).
3.1.8 Phenol- The phenol ranged between 34.4 to 770 mg/l. The minimum phenol value of drinking water recorded from sample site A3 was 34.4mg/l while the maximum value observe from sample site A6 was 769.2mg/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 A8 was 5.6mg/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 34.4mg/l while the maximum value observe from sample site A6 was 769.2mg/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. The minimum BOD value of drinking water recorded from sample site A3 was 0.1mg/l while the maximum value observe from sample site A6 was 0.23mg/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. The minimum total coliform value of drinking water recorded from sample site A1 was 2MPN/100ml while the maximum value observe from sample site A7 was 16MPN/100ml. The desirable limit of MPN of coliform is 0 MPN/100ml in drinking water recommended by WHO.

IV. Conclusion

After the study of different physiochemical parameters of drinking water, many variations have been found which is due to the environmental condition and geographical area of the region and soil texture of the area.

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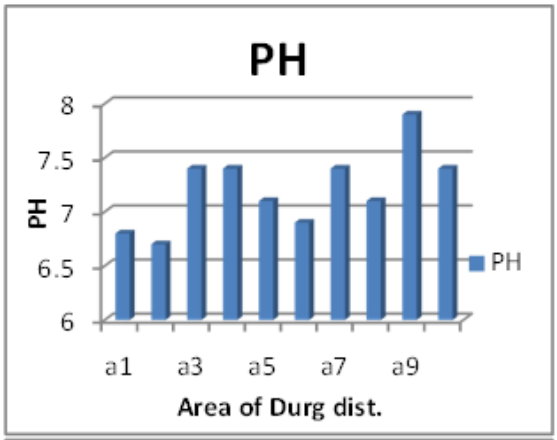
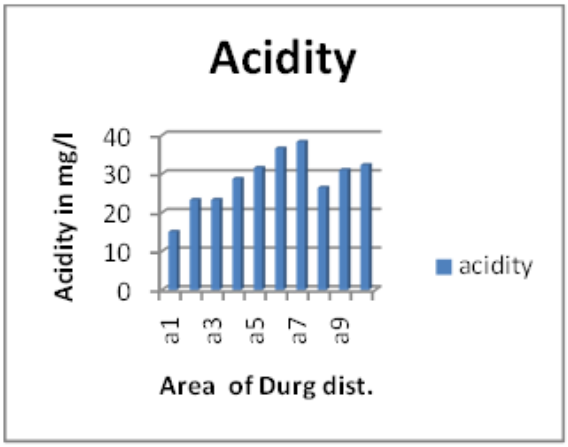
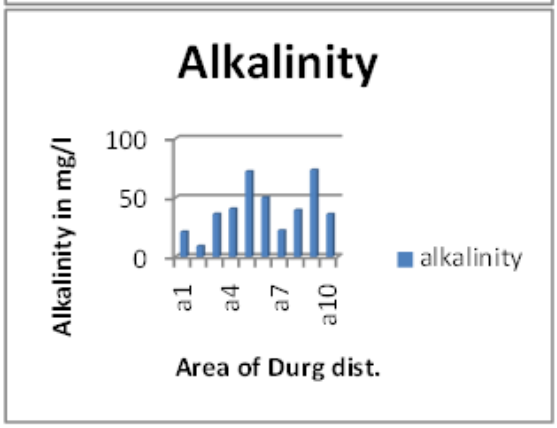
TABLE 1.1: Physiochemical characteristics of sampled site of Durg Dist.

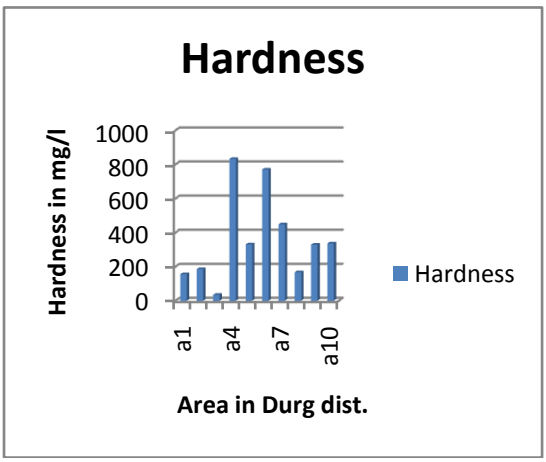
S. NO	PARAMETERS	Subhash nagar (A1)	Sindhiya nagar (A2)	Shankar nagar (A3)	Mohan nagar (A4)	Shikshak nagar (A5)	Katul board (A6)	Ganj para (A7)	Borsi (A8)	Civil line (A9)	Malviya nagar (A10)
1	Temperature	31ºC	32ºC	31ºC	31C	33ºC	28ºC	33ºC	32ºC	31ºC	28ºC
2	PH	6.8	6.7	7.4	7.4	7.1	6.9	7.4	7.1	7.9	7.4
3	Acidity	14.99	23.26	23.27	28.69	31.54	36.56	38.25	26.39	30.98	32.26
4	Alkalinity	21.11	8.98	36.23	40.55	72.18	50.15	22.2	39.47	73.46	36.03
5	Hardness	156	185.2	34.4	832	330.8	769.2	448	166.8	329.2	336.03
6	Ca	244	161.2	834.4	552	330.4	725.2	324	140	316	269.19
7	Mg	-88	24	-800	280	0.4	44	124	26.8	13.2	66.84

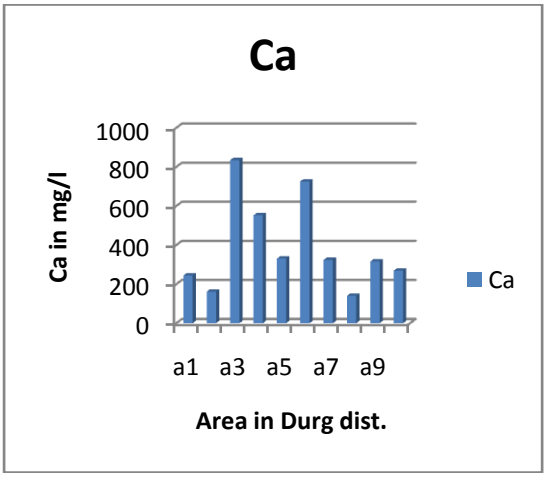
8	Phenol	0.3	0.4	0.8	0.2	O.6	0.3	5	0.9	0.3	1
9	DO	0.44	3.6	5.2	3.2	4.8	5.2	3.6	5.6	2.8	2.34
10	COD	206.4	161.6	100.8	113.6	105.6	41.6	126.4	137.6	188.8	124.8
11	BOD	0.04	0.04	0.1	0.4	0.13	0.23	0.23	0.4	0.24	0.1
12	MPN	2	4	13	9	16	13	16	4	11	14

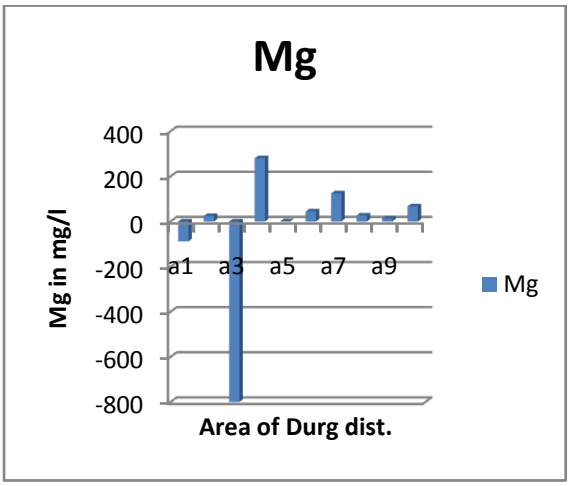


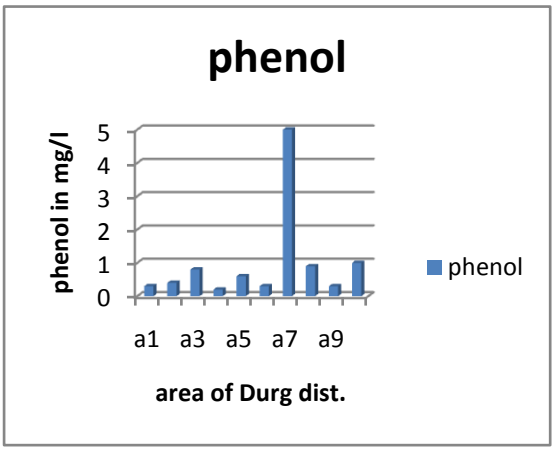









Mg
400
200
0
-200
-400
-600
-800
Mg in mg/l
a1
a3
a5
a7
a9
Area of Durg dist.
Mg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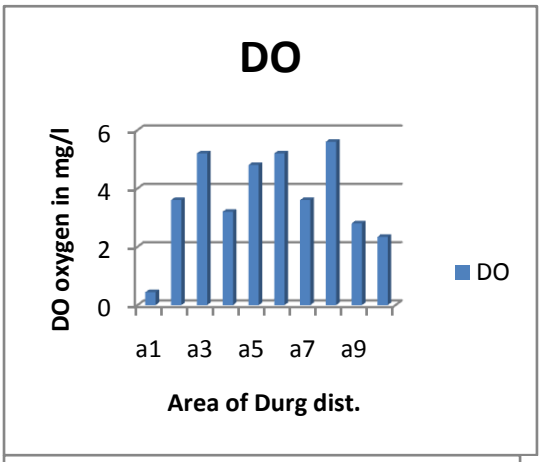
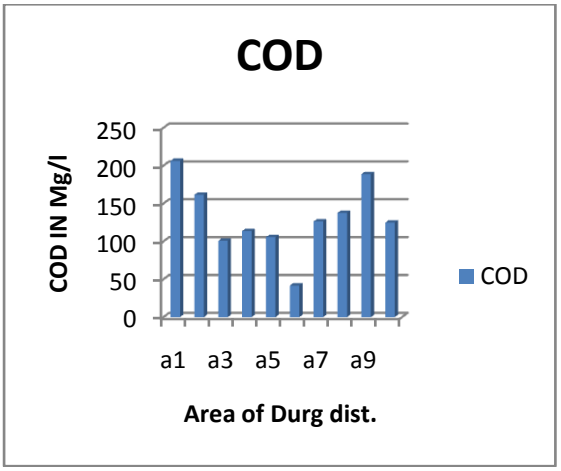
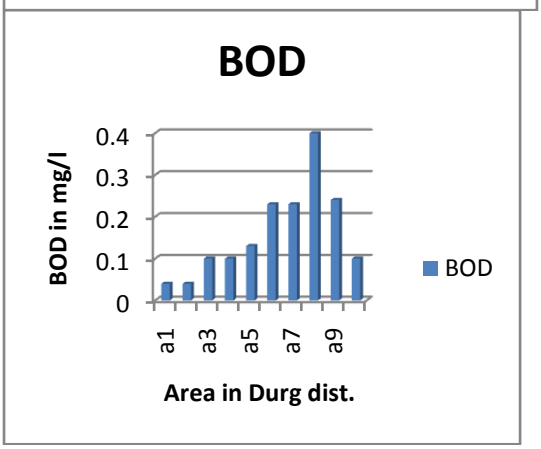
4
3
2
1
0
phenol in mg/l
a1
a3
a5
a7
a9
area of Durg dist.
phenol


DO
6
4
2
0
DO oxygen in mg/l
a1
a3
a5
a7
a9
Area of Durg dist.
DO


COD
250
200
150
100
50
0
COD IN Mg/l
a1
a3
a5
a7
a9
Area of Durg dist.
COD


BOD
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0.3
0.2
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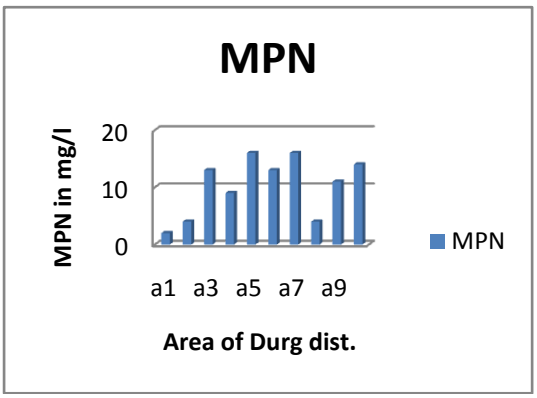
BOD in mg/l
a1
a3
a5
a7
a9
Area in Durg dist.
BOD


MPN
20
10
0
MPN in mg/l
a1
a3
a5
a7
a9
Area of Durg dist.
MPN