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PHYSICO-CHEMICAL AND BIOLOGICAL MEASUREMENT OF DRINKING WATER ADOPTED FROM SHIVNA RIVER MANDSAUR (M.P.)

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ABSTRACT
The four water samples were collected from different areas at Mandsaur and analysed on different aspects. The physico-chemical and biological analysis was done and found various dangerous results. The pH was respectively 9.67 of the nearest starch factory, 6.58 of Ramghat, 7.59 of Ramghat filter plant and 9.27 of Department of Zoology. The chloride quantity of nearest to starch factory was 243.92436 mg/liter, Ramghat 210 mg/ltr., Ramghat filter plant 140 mg/ltr. and Department of Zoology, Govt. P.G. College, Mandsaur (M.P.) 200mg/ltr. The microbial count nearest the starch factory was 1088 cfu/ml, Ramghat 412 cfu/ml, Ramghat filter plant 376 cfu/ml and Department of Zoology 103 cfu/ml. The tests' results indicated the dangerous polluted condition of Shivna river water.

KEYWORDS: Physical Parameters, Pollutant, Microorganisms.

INTRODUCTION
About 75% part of the earth is covered by water while approx 97% water is salty water in which salt & different minerals are present. Less than 1% water is useful in drinking, industries & many other purposes (Agrawal, 2008). The pure drinking water is safe for all the survivals that depend on it (Anderson *et al.*, 2002; Fewtrell *et al.*, 2005; Ross *et al.*, 1988; Vidyasagar, 2007). Today, different types of pollutants effect the environment & the related biological parts.

Water is a very essential necessity of life. The various types of chemicals such as acids, detergents, colours and solutions etc. are drained into the rivers by the factory owners. Today, more than 10 thousand dyes are available for commercial uses while seven lakh tons of dyes are produced per annum (Zolinger, 1987). At the time of dying process, 10 to 15% dyes are released in the rivers. These dyes are toxic and carcinogenic at the time of releasing into water.

Various animals are also affected by these chemical compounds. According to the previous researches, different heat shock proteins generate into the body by these chemical components. These types of proteins generate various types of diseases in the animals' body. People have connecting with these animals directly or indirectly. Many big rivers as Ganga, Yamuna, Chambal and Kaveri etc. are highly polluted by toxic chemicals, drained by leather and various other industries.

The Shivna is one of the most important and popular river in Mandsaur, Madhya Pradesh. People were bath into the river in various festivals and give the importance as the Ganga River.

Various drainages of municipal sewage water and starch industrial wastes (figure 2 and 3) are directly drained without any treatment. These wastes have a very toxic content that causes different skin diseases. The river water is use for drinking water.

MATERIAL AND METHOD
Collection of samples
The four samples were collected from four different places at Mandsaur district Mandsaur (M.P.) (figure 1). The places were near to starch factory, Ramghat, Filtration Plant at Ramghat and water cooler (Department of Zoology, Rajiv Gandhi Govt. P.G. College, Mandsaur, M.P.).

Figure 1- Map of Madhya Pradesh.

Figure 2- Starch factory waste water

Figure 3- Starch Factroy Waste Water Drained into Shivna River.

Analysis of water samples

Chlorine Test

50ml sample was taken into a conical flask and adjusted to pH 7.0- 8.0 then 1.0ml $K_2Cr_2O_7$. This solution was titrated with standard $AgNO_3$ solution till $AgCrO_4$ started precipitating as pale red precipitate. The silver nitrate was standardized against standard NaCl. For better accuracy, 50 ml distilled water was titrated in the same way to establish reagent blank.

Calculation

Chloride mg/L as Cl = (A-B) 45x1000/ml sample

Were,

A=mL $AgNO_3$ required for sample

B=mL $AgNO_3$ required for Blank and

N=Normality of $AgNO_3$ used.

Chloride Test

50ml sample was taken into a test tube and 1 to 2 drops of chloride reagent-A was added. 5 to 10 minutes later the colour changed and converted into the yellow color now reagent-B was added drop by drop until the brown colour appeared and the quantity was calculated.

Drops of chloride reagent B x10 =……mg/liter.

Hardness Test

5ml sample was taken into a test tube and added 5 drops of reagent-A and reagent-B and then was mixed properly. If the colour changes into blue, the water is not hard and the colour is wine red, the water is hard.

The reagent C was added until blue color appeared.

Drop of hardness reagent C x 50=……mg/liter.

Nitrate Test

5ml sample was taken into a test tube and added 2 drops of HCl. After it 50 ml nitrate reagent-A was added and mixed well. After 10 minutes, four drops of nitrate reagent B were added into it. The water colour converted into light red after 15 minutes.

Fluoride Test

4ml water sample was taken into a test tube and 10 ml fluoride reagent was mixed well. The brown red or yellow colour started disappearing.

Microbial Count Test

First of all the sample of water was collected from the different places at Mandsaur District Mandsaur and 1ml sample was taken into petri-disc and added 15 to 20 ml nutrient media. Then it was swirled slowly and kept in incubator for 18-24 hrs. in invert position. After 24 hrs., count the colonies by colony counter.

RESULT AND DISCUSSION

Water is the main part of the human life. Most of the food products are prepared with its help. Mostly the rivers are also polluted by mixing the drain water into them. Such polluted water contains various types of chemicals and heavy metals that has deteriorated the soil fertility. The collected sewage water showed toxic effect on onion crop and block the growth rate of onions' root (Bhatt S., 2013). The water samples were collected from different places at Mandsaur District Mandsaur (M.P.) and they were analyzed on physical, chemical and biological basis (table-1). The result came out which proved that it will be dangerous in the next future. In the physical status, three water samples of Shivna river showed turbidity while one water sample of tubewell did not show it. The pH was respectively 9.67 of the nearest starch factory, 6.58 of Ramghat, 7.59 of Ramghat filter

plant and 9.27 of Department of Zoology, Govt. P.G. College, Mandsaur (M.P.) (table-1). Nearest starch factory water had highest pH compared to Ramghat 6.59 (figure-4). The pH status showed contamination of various toxic pollutants in the river. In the chemical status, nearest starch factory had alkaline, Ramghat acidic, Ramghat filter plant mild alkaline and Department of Zoology, Govt. P.G. College, Mandsaur (M.P.) alkaline. Nearest starch factory water had 200 mg/ltr. iron while absent in other samples. The chloride quantity of nearest to starch factory was 243.92436 mg/liter, Ramghat 210 mg/ltr., Ramghat filter plant 140 mg/ltr. and Department of Zoology Govt. P.G. College, Mandsaur (M.P.) 200mg/ltr (figure-5). The hardness of Shivna river water had under limit at the collection time.

The biological status of water has also more importance as compared to physical and chemical status. The bacterial colonies generate various types of diseases. The nearest the starch factory 1088 cfu/ml, Ramghat 412 cfu/ml, Ramghat filter plant 376 cfu/ml and Department of Zoology, Govt. P.G. College, Mandsaur (M.P.) 103 cfu/ml (figure-6). The microbial count of nearest to starch factory is higher and lower count in the department of zoology. It can create a dangerous situation in near future.

Table-1: Comparative Study of Water Sample collected from Different Places

Test	Nearest Starch Factory	Ramghat	Ramghat Filter Plant	R.G. Govt. P.G. College, Mandsaur M.P. (Department of Zoology)
pH	9.67	6.58	7.59	9.27
Turbidity	High Turbidity	High Turbidity	Low Turbid	Nil
Chloride	243.92436 mg/ltr.	210 mg/ltr.	140 mg/ltr.	200 mg/ltr.
Alkalinity	Alkaline	Acidic	Mild Alkaline	Alkaline
Hardness of water	450mg/liter	550mg/liter	400 mg/liter	400mg/liter
Iron	200mg/liter	Absent	Absent	Absent
Microbial Count cfu/ ml	1088 cfu/ml	412 cfu/ml	376 cfu/ml	103 cfu/ml

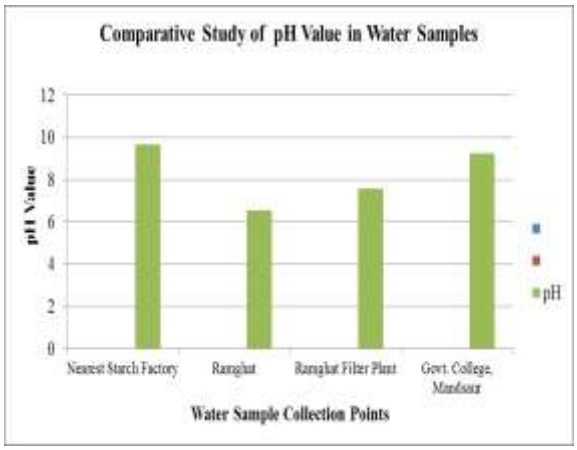

Figure 4- Comparative Study of pH Value in Water Samples.

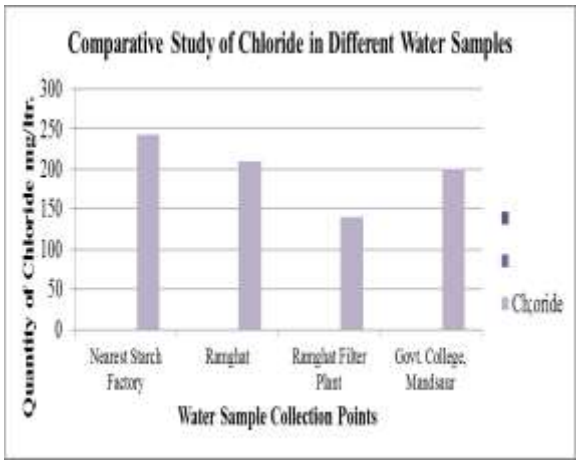

Figure 5- Comparative Study of Chloride in Different Water Samples

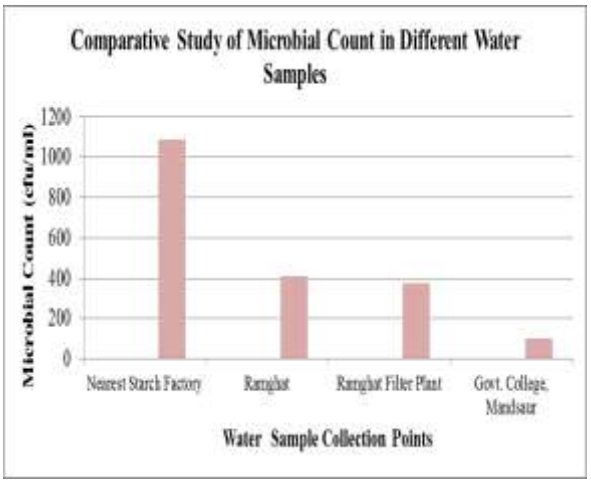

Figure 6- Comparative Study of Microbial Count in Different Water Samples

CONCLUSION

These physicochemical results showed the dangerous situation in near future and the Shivna river water will be toxic and generate skin diseases. The biological data of samples indicated the highest microbial count in each sample but in ICMR standard, the count should be nil. The water sample collected from the nearest place to the starch factory indicated highest microbial count, Ramghat, Ramghat filter plant had less count compared to the previous samples. The sample collected from the Department of Zoology, had less count compared to other three samples. Thus, these results provided the information about the pollution prevailing in Shivna river.

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REFERENCES

1. Agrawal KC. Environmental biology. Nidhi Publishers, Bikaner, India. Second edition, 2008.
2. Anderson, B. A., Romani, J. H., Phillips, H. E., & van Zyl, J. A. (2002). Environment, access to health care, and other factors affecting infant and child survival among the African and Coloured populations of South Africa, 1989-94. Population and Environment, 23: 349-364.
3. Bhatt S, Dhyani S. Toxicity effects of municipal sewage effluent on onion roots. *J. Environ. Res. Develop.*, 2013; 7(4A): 1547-1551.
4. Fewtrell, Lorna, Kaufmann, Rachel B., Kay, David, Enanoria, Wayne, Haller, Laurence, & Colford, John M., Jr."Water, sanitation, and hygiene interventions to reduce diarrhoea in less developed countries: a systematic review and meta-analysis," The Lancet Infectious Diseases., 2005; 5: 42-52.
5. Ross, J. A., Rich, M., Molzen, J., and Pensak, M. Family planning and child survival in one hundred developing countries. New York: Center for Population and Family Health, Columbia University., 1988.
6. Vidyasagar, D. Global minute: water and health - walking for water and water wars Journal of Perinatology., 2007; 27: 56–58.
7. Zolinger, H., Colour chemistry- Synthesis, Properties of organic dyes and pigments, VCH publishers, New York., 1987; 92.