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By

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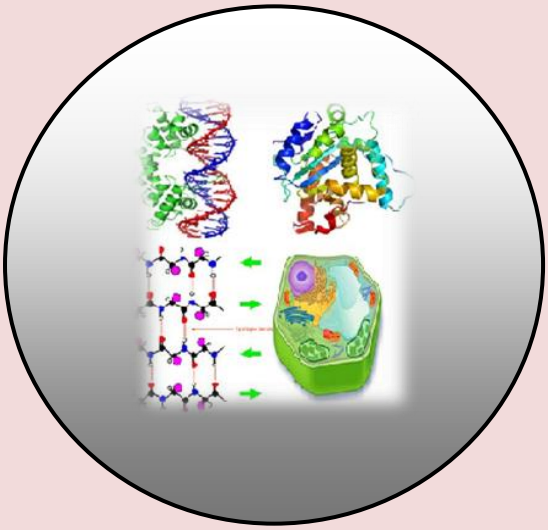

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Semi Quantitative Studies of Underground Drinking Water Contamination at Kadipur Block in Sultanpur after Monsoon Estimated As Per IS: 10500-2012

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ABSTRACT

Water is a elixir of life. It is very necessary for survival of life. If water is contaminated then it result into different types of disease, so to check quality of water after monsoon in Kadipur block of Sultanpur district U.P., we collected ten sample of underground drinking water after monsoon from ten India Mark hand pump in the year 2018.

After monsoon it is observed turbidity, TDS, Fluoride Conc., Total alkalinity, Conc. of sulphate of different sites in Kadipur increases except few sites, but except site I and IV, conductivity of all sites are less. Total hardness of site IV, V, VII, VIII and X are more than pre-monsoon. Amount of calcium at sites V and IX is more than pre-monsoon but other site it is less and all drinking water sites were deficient of micronutrient zinc.

Keywords: Underground water, Kadipur, Water Quality Monsoon and Water Quality Parameters.

INTRODUCTION

All plant and animals need water to survive. There can be no life on earth without water. Human activities are the major factor determining the quality of water (Niemi et al. 1990, Kar, 2010). Our bodies use water in all the cells, organs & tissues to help regulate body temperature and maintain other bodily functions. Because our bodies lose water through breathing, sweating and digestion it's crucial to rehydrate and replace water by drinking fluid and eating food that contain water. Ground water quality has multi-dimensional facets that are very important elements of water resources (Srivastava et al. 2008, 2012b: Singh et al.2012).

Therefore drinking water must be potable otherwise it is dangerous for human health and responsible for various types of disease. By checking various parameters of water, we know the water is potable or not and how much it is contaminated. Oxygen demand increases on the introduction of metal ions in the sample solution (Mittak et al. 2000).The high WQI values were due to high value of sub-indices of DO, EC, Nitrite and COD. (Hameed, A. et al.2000-2009). Therefore we check quality of water at Kadipur in Sultanpur district (U.P.).
Kadipur is a block in Sultanpur district of U.P. state, India. It is located 43 Km. towards East from district head quarter Sultanpur, 194 km. from state capital Lucknow towards west. Kadipur is located at 26.17^0N, 82.38^0E. It has on average elevation of 90 meter (295 feet).
In Kadipur, after monsoon underground drinking water contamination is increase in different sites. This result into different types of digestive problems and diseases.

EXPERIMENT

The ecosystem services of water from rivers and lakes are directly or indirectly contribute to both human welfare and aquatic ecosystem (Costanza et al. 1997; Kar 2007, 2013).A particular problem with water quality monitoring is a complex issue associated with analyzing a large number of associate measures of variables (Boyacioglu et al. 2007) and the high variability among the variables is due to increase in anthropogenic activities including natural influences (Simeonov et al. 2002). Kadipur is a fast growing block in Sultanpur due to human activities, underground water quality of Kadipur decrease day by day. To compare water quality of underground drinking water after monsoon, we had taken ten water samples from ten same India Mark-II Hand pump from ten same different public places as takenin pre-monsoon following standard methods of sampling (Sinha, et al. 2010).
The estimated physico-chemical parameter are PH value, turbidity, total dissolved solids, fluorides, iron, magnesium, sulphate, total hardness, total alkalinity, calcium, conductivity, zinc, dissolve oxygen, chemical oxygen demand, Bio Chemical oxygen demand. Thee physico-chemical parameters are estimated by using test method IS: 3025.

A brief description of sampling sites is presented in Table-1.

Table 1. Description of sampling sites.

Sl. No.	Site No.	Location	Type of Source India Mark-II Handpump	Depth of Boring (Feet)	Apparent water quality	Use of water
1.	Bus Stop	At the centre of Kadipur	India Mark- II Hand Pump	120	Colour less	Drinking
2.	Ohm Shanti Automobiles	400M East from Bus Stop	"	120	"	"
3.	KashiramAawas	240M South from Bus Stop	"	"	"	"
4.	Tribhuvan Devi Academy	1.8 Km South from Bus Stop	"	"	"	"
5.	TehsilKadipur	300m North from Bus stop	"	"	"	"
6.	Block Pramukh Office	750m North from Bus stop	"	"	"	"

7.	Primary School Andaraypur	3.5 km North from Bus stop	"	"	"	"
8.	Primary School Hingungaura	4 Km North-East from Bus stop	"	"	"	"
9.	Central Bank Kadipur	550m Km North-West from Bus stop	"	"	"	"
10.	SantTulsi Das PG College	2 Km West from Bus stop	"	"	Colour less but turns yellowing on standing	"

RESULT AND DISCUSSION

Site-wise estimation amount of different Physico-chemical parameter in pre-monsoon and after onset of monsoon period with their IS standard are present in table-2.

Table 2 A. For Pre-monsoon.

S. No.	Parameters	I	II	III	IV	V	VI	VII	VIII	IX	X	Acceptable limit	Permissible Limit
1.	pH Value	6.56	6.81	6.77	6.90	6.70	6.89	6.95	7.18	6.87	6.93	6.5-8.5	No Relaxation
2.	Turbidity NTU	1.0	1.5	0.5	2.6	2.8	1.2	8.6	0.9	0.6	0.8	1 Max	5 Max
3.	TDS (PPm)	1070	524	444	356	628	378	384	376	450	360	500 Max	2000 Max
4.	Fluoride (PPm)	0.27	0.23	0.13	0.43	0.24	0.19	0.03	0.46	0.47	0.10	1 Max	1.5 Max
5.	Iron (PPm)	0.85	0.52	0.25	0.87	0.28	0.79	0.70	0.45	0.22	0.14	0.3 Max	No Relaxation
6.	Sulphate (PPm)	79.4	36	20.8	23.9	57.5	29.3	32.5	30.2	15.8	26.7	200 Max	400 Max
7.	Total Hardness (PPm)	978	642	542	424	590	484	386	366	484	388	200 Max	600 Max
8.	Total Alkalinity (PPm)	62.0	58	46.0	38.0	50.0	36.0	40.0	34.0	40.0	36.0	200 Max	600 Max
9.	Calcium (PPm)	184	123	106	99.0	125	107	77.0	69.0	96.0	83.0	75 Max	200 Max
10.	Conductivity (us/cm)	1336	778	645	513	853	624	526	437	598	486	-	-
11.	Zinc (PPm)	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	5.0 MAX	15.0 MAX
12.	Magnesium (PPm)	25	8.4	6.9	5.1	7.1	6.0	4.8	4.6	6.1	5.5	30 Max	100 Max
13.	DO (PPm)	ND	ND	ND	ND	ND	ND	3.2	ND	ND	ND	-	-
14.	COD (PPm)	ND	ND	ND	ND	ND	ND	14.2	ND	ND	ND	-	-
15.	BOD (PPm)	ND	ND	ND	ND	ND	ND	2.1	ND	ND	ND	-	-

Table 2 B. For After-monsoon.

S. No.	Parameters	I	II	III	IV	V	VI	VII	VIII	IX	X	Accepta be Limit	Permis-sible Limit
1.	P^H Value	7.48	6.95	7.01	7.08	6.90	7.16	7.17	7.42	7.13	7.27	6.5 to 8.5	No relaxation
2.	Turbidity, NTU	1.4	1.8	0.6	1.2	3.6	0.9	12.5	0.5	0.9	0.9	1 max	5 max
3.	TDS (PPM)	1110	567.0	489.0	412.0	696.0	450.0	420.0	318.0	452.0	408.0	500 max	2000 max
4.	Fluoride (PPM)	0.34	0.21	0.32	0.49	0.12	0.24	0.08	0.43	0.67	0.23	1 max	1.5 max
5.	Iron (PPM)	0.61	0.48	0.13	0.24	0.16	0.59	0.57	0.27	0.19	0.48	0.3 max	No relaxation
6.	Magnesium (PPM)	12.32	7.9	7.5	7.5	8.38	5.6	5.95	6.4	3.4	8.6	30 max	100 max
7.	Sulphate (PPM)	166.1	61.97	28.9	30.6	99.56	32.9	48.9	37.8	18.6	21.4	200 max	400 max
8.	Total hardness as ($CaCO_3$) (PPM)	830.0	534.0	500.0	448.0	690.0	444.0	420.0	400.0	350.0	518.0	200 max	600 max
9.	Total alkalinity	78.0	71.0	86.0	41.0	62.0	44.0	48.0	39.0	55.0	44.0	200 max	600 max
10.	Calcium, (PPM)	129.0	83.2	73.0	55.2	138.4	84.8	72.0	54.4	84.0	65.6	75 max	200 max
11.	Conductivity (us/cm)	1495	696.0	612.0	511.0	913.0	472.0	506.0	397.0	552.0	425.0	-	-
12.	Zinc (PPM)	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	5.0 max	15.0 max
13.	DO (PPM)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	-	-
14.	COD (PPM)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	-	-
15.	BOD (PPM)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	-	-

From above data we conclude that

- Turbidity of handpump I, II, IV, V is more than acceptable limit but site VII has turbidity more than permissible limit & turbidity of all site are more than before monsoon except sites VI & VIII.
- TDS of sites I, II, V is more than acceptable limit & TDS of all site also more than pre-monsoon except at site VIII.
- Iron at site I, II, VI, VIII and X is more than acceptable limit after monsoon but conc. of iron decreases after monsoon in all sites except at site X.
- Total hardness of all sites are more than acceptable limit but at site I, V are more than permissible limit. At all sites total hardness is less than before monsoon except sites IV, V, VII, VIII and X.
- Calcium conc. at sites I, II, V, VI & IX is more than acceptable limit and conc. of calcium is less than before monsoon of all sites.
- Fluoride conc. of all sites after mansoon increases except sites II, V and VIII where conc. of fluoride is less than before monsoon.

- Sulphate conc. on all sites are more than pre-monsoon except sites VI, VII and X.
- Total alkalinity of water is more than before monsoon at all sites.
- Conductivity of all sites are less than before monsoon except at sites I, V.
- Conc. of magnesium on sites III, IV, V, VII, VIII, X are more than before monsoon but less at sites I, II, VI.

High turbidity in drinking water can cause symptom such as nausea, cramps and headaches high TDS in drinking water affects the taste of the water and make its taste bitter, salty or brackish. High conc. of iron content leads to an overload which can cause diabetes, hemochromatosis, stomach problems, nausea and vomiting, high conc. of calcium and magnesium in drinking water on the risk of cerebrovascular disease. High level of sulphate (more than 250 mg/liter) gives a bitter or medicinal taste to water and it cause dehydration and diarrhea, high sulphate level may also be corrosive for plumbing, particularly copper piping. High level of total alkalinity in body may gastrointestinal issues and skin irritations. Too much alkalinity may also agitate the body's normal PH, leading to metabolic alkalosis (a condition that may produce the following symptom nausea vomiting).
This result show that in Kadipur block underground drinking water quality decrease day by day and after few year it become unfit for drinking so some necessary steps are needed to increase water quality of underground drinking water and to protect people from harmful effect of water.

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