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EFFECT OF TOXICANT IN DOMESTIC WATER SUPPLY IN GULBARGA DISTRICT, KARNATAKA.

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ABSRACT:

Water-related diseases continue to be one of the major health problems globally. An estimated 4 billion cases of diarrhea annually represented 5.7% of the global disease burden in the year 2000 (WHO 2002). One of the major strategies for tackling this problem is the installation of protected sources such as boreholes, standpipes or wells to provide water of better quality. Water Quality Index is one of the most effective tools to communicate information on the quality of ground water to the concerned citizens and policy makers. The objective of the present work is to assess the suitability of ground water for human consumption based on the computed water quality values, ground water characteristics and quality assessment. Ten areas of Gulbarga are selected and at each area water samples were collected using standard procedural methods and analyzed for pH, TH, Ca, Mg, Cl, TDS, fluoride, Na , SO4.

KEYWORDS: ***Drinking Water, Bacterial count, Physco-Chemical Parameters, Water Quality, Gulbarga.***

INTRODUCTION

The biological contamination in drinking water is a major problem of public health in developing world. WHO estimates that about 1.1 billion people globally drink unsafe water and the vast majority of diarrheal disease in the world (88%) is attributable to unsafe water, sanitation and hygiene (WHO 2003). The most common and widespread health risks associated in drinking water in developing countries are of biological origin. Looking at the 20 leading risks factors for health burden in developing regions, unsafe water, sanitation and poor hygiene are third, behind underweight or practicing unsafe sex (WHO 2003). Ten major water-borne diseases are responsible for over 28 billion disease episodes annually in developing countries (Walsh 1990). Of these diarrheal diseases are the big killers especially infants. According to the WHO estimations more than 3 million children below age 5 die annually form diarrheal disease contracted through drinking water in developing world. Nonetheless, the inadequate availability of water, poor quality of water at source, ill-maintained water pipelines and sewer lines, unsafe disposing of human, animal and household wastes, unawareness about good sanitation and personal hygienic practices etc. are some key factors responsible for poor drinking water quality in rural areas of India. Also, the infectious disease caused by pathogenic bacteria, viruses and parasites (e.g. protozoa and helminthes) are the most common and widespread health risks associated with drinking water in rural habitations.

World Health Organization (WHO) provides extensive guidance for countries to develop local drinking water guidelines and standards. The Second Edition of the WHO *Guidelines for Drinking-water Quality* (WHO, 1993) includes recommendations for assessment of microbial water quality based on the detection of *E. coli* and total coli forms. Volume 2 of the Second Edition (WHO, 1996) however, discusses in detail the inadequacies of total coli forms as an indicator of faecal pollution and debates the merits of alternative indicators such as enterococci and sulfite-reducing clostridia. Are currently being updated to emphasis total system risk management with less focus on parametric values for acceptable water quality. The WHO is considering removing total coli forms as a primary compliance parameter in the revision for the Third Edition of the *Guidelines for Drinking water Quality*.

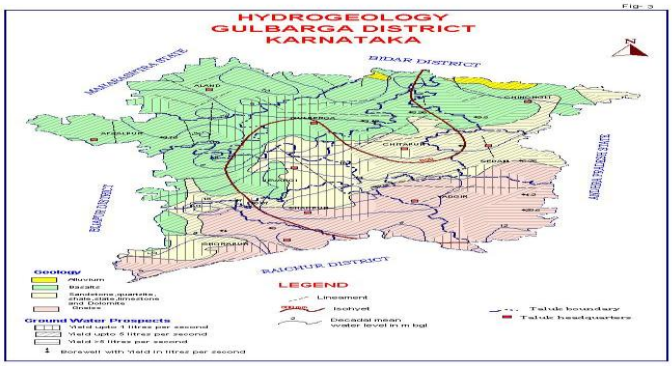
These enter pathogenic bacteria in water are for a variety of diseases like cholera, typhoid, dysenteries, bacillary dysentery, etc. in human and livestock (Ash bolt 2004). The faecal indicator bacterium (*E. coli*) has been considered as a bioindicator of fecal contamination of drinking water. It is excreted in the faeces of all warm-blooded animals and some reptiles (Enriquez et al. 2001). The major pathogenic bacteria responsible for water-borne disease spread by the faecal–oral route, in which water may play an intermediate role. The public health burden is determined by the severity of the illnesses associated with pathogens, their infectivity and the population exposed. There has therefore been an increasing interest in the application of quantitative risk assessment for microbial load in drinking water sources. The aim of this study was to analyze the drinking water quality in respect to microbial contamination in urban habitations. The data of this study may provide some important information about public health risks associated with drinking water quality in this region.

The other bacteria like coliforms are of gratee risk to humans in Gulbarga district. As comparision , Total coliforms have been shown not to be a sensitive indicator of the risk of waterborne disease. In some reported waterborne disease outbreaks, coliforms and *E. coli* have been detected in drinking water, while in others they are not present. The presence of *E. coli* is more representative of faecal pollution than other coliforms, because it occurs in higher numbers in faecal material, and generally does not occur elsewhere in the environment.

MATERIALS AND METHOD.

STUDY AREA

Gulbarga district lies in the northern part of Karnataka between 16o11’ –17o45’ N. latitudes and 76o03' - 77o30' E longitudes, with a geographical area of 16,174 sq km. The district is bounded by Bidar district in the north, Bijapur district in west, Raichur district in south and Andhra Pradesh in the east..Asofthe2014Indiacensus Gulbarga had a population of 11, 01,989. Males constitute 55% of the population and females 45%. Gulbarga has an average literacy rate of 67%, higher than the national average of59.5%: male literacy is 70%, and female literacy is 30%. In Gulbarga,15% of the population is under 6 years of age. Kannada and Tamil are the main languages spoken in this city. A sizeable population also speaks all mix fruit juice of language like Kannada, Hindi, and Urdu. The weather in Gulbarga consists of three main seasons. The summer spans from late February to mid-June. It is followed by the southwest monsoon, which spans from late June to late September. It is then followed by dry winter weather until mid-January. Temperatures during the different seasons are: Summer: 26 ^{0}C to 39 °C, Monsoon: 23 to 32 °C, Winter: 12 to 31 °C.



SAMPLE COLLECTION:

Major Elements were analyzed from 10 ground water samples collected during monsoon, winter, summer from bore wells of areas. The samples were collected after 10 min of pumping and stored in Poly Ethylene bottles of 2 liter capacity at 10°C. Immediately after sampling, pH and electrical conductivity (physic parameter) were measured in the field, The samples were collected to examine the water quality in the month of February and the Year 2014 of different areas in Gulbarga, and brought to the laboratory for analysing chemical parameters selected are , Turbidity, Total Alkalinity, Total Hardness, Total Dissolved Solids, Dissolved Oxygen, carbon dioxide, Chloride, BOD, COD, Chlorides, sodium and floride ,nitrate, potassium, sulphate, biological contamination, chemical contamination, analyzed by following standard method.

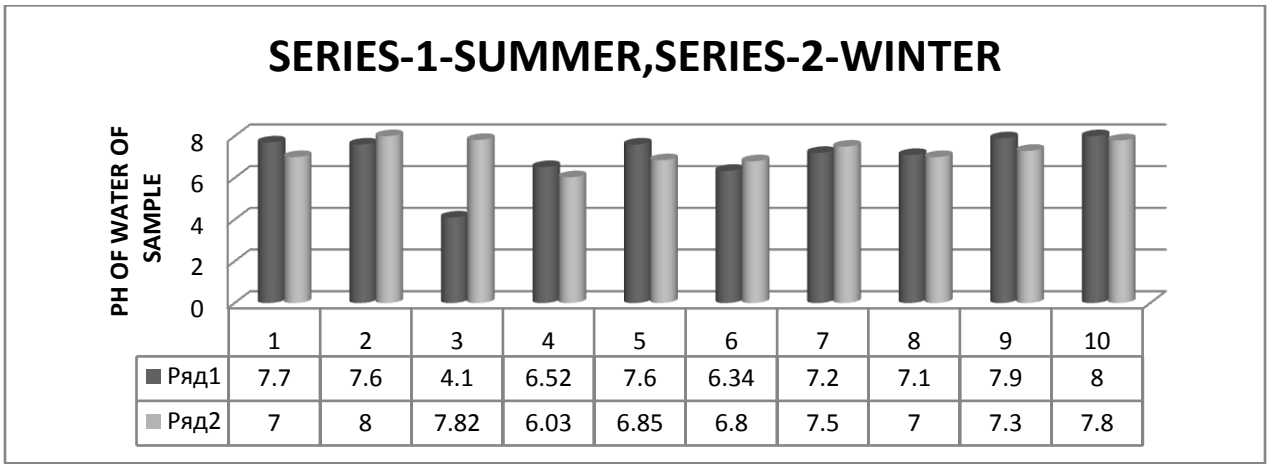
RESULTS AND DISCUSSION

The physico-chemical tests and biological examination were conducted employing Standard scientific methods so as to minimize the determinate errors. The test have been conducted for every month and the below data had been listed with respected to winter &summer season

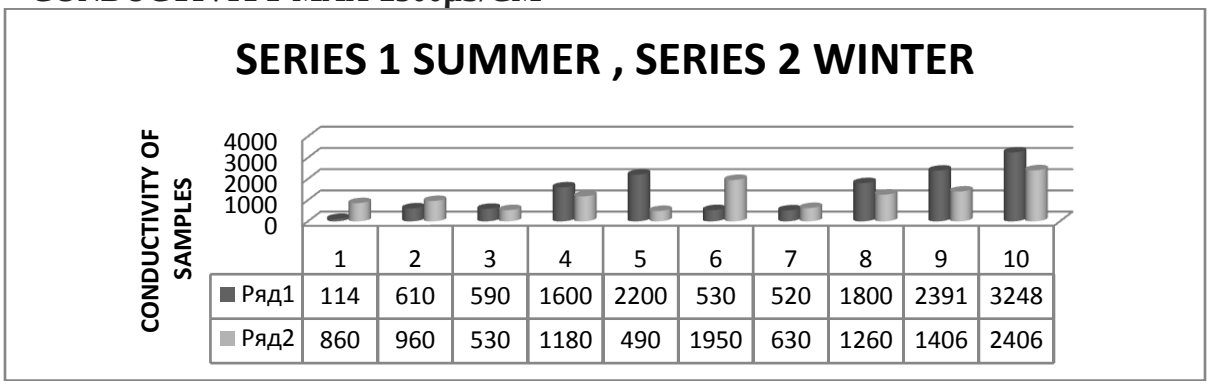
Sl.no	Sample	Source of collection
1.	S1	Bore well at tippu chok colony, Gulbarga
2.	S2	Bore well at bare hills college ,Gulbarga.
3.	S3	Bore well at Science center ,Gulbarga.
4.	S4	Bore well at GDA, Gulbarga.
5.	S4	Bore well at SBR college, Gulbarga.
6.	S6	Bore well at Gazipura, (market) Gulbarga.
7.	S7	From water cooler at railway station, Gulbarga.
8.	S8	From water cooler at bustand,Gulbarga.
9.	S9	Bore well at basveshwar,Gulbarga,
10.	S10	Bore well at shabazar,Gulbarga.

Sl No	PARAMETERS	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10
1	**PH**	**7.7**	**7.6**	**8.1**	**6.52**	**7.6**	**6.34**	**7.2**	**7.1**	**7.9**	**8**
2	**CONDUCTIVITY**	**1140µs/cm**	**610µs/cm**	**590µs/cm**	**1600µs/cm**	**2200µs/cm**	**530µs/cm**	**520µs/cm**	**1800mg/l**	**2391µs/cm**	**3248µs/cm**
3	**TDS**	**816mg/l**	**462mg/l**	**326mg/l**	**800mg/l**	**1660mg/l**	**346mg/l**	**348mg/l**	**1234mg/l**	**2428mg/l**	**786mg/l**
4	**HARDNESS**	**508mg/l**	**360mg/l**	**184mg/l**	**808mg/l**	**800mg/l 211.2mg/l**	**176mg/l**	**170mg/l**	**600mg/l**	**719mg/l**	**785mg/l**
5	**CALCIUM**	**105mg/l**	**56mg/l**	**24mg/l**	**120mg/l**	**308mg/l**	**49.6mg/l**	**41.6/mg/l**	**100mg/l**	**157mg/l**	**132mg/l**
6	**CHLORIDE**	**180mg/l**	**62mg/l**	**60mg/l**	**330mg/l**	**143.1mg/l**	**94mg/l**	**94mg/l**	**232mg/l**	**255mg.l**	**300mg/l**
7	**MAGNESIUM**	**59.29mg/l**	**53.4mg/l**	**30.1mg/l**	**123.4MG/L**	**376mg/l**	**12.6mg/l**	**16.03 mg/l**	**121mg/l**	**39mg/l**	**39mg/l**
8	**ALKALINITY**	**302mg/l**	**282mg/l**	**192mg/l**	**168MG/L**	**47mg/l**	**84mg/l**	**72mg/l**	**360mg/l**	**386mg/l**	**347mg/l**
9	**NITRATE**	**1.24mg/l**	**0.73mg/l**	**0.43mg/l**	**4.46MG/L**	**350mg/l**	**33mg/l**	**47mg/l**	**42mg/l**	**200mg/l**	**151mg/l**
10	**SULPHATE**	**124mg/l**	**49mg/l**	**31mg/l**	**194MG/L**	**0.19mg/l**	**29mg/l**	**14mg/l**	**205mg/l**	**61mg/l**	**82mg/l**
11	**FLORIDE**	**0.44mg/l**	**0.57mg/l**	**0.21mg.l**	**0.79MG/L**	**160mg/l**	**0.04mg/l**	**0.03mg/l**	**0.23mg/l**	**0.12mg/l**	**15mg/l**
12	**SODIUM**	**46mg/l**	**29mg/l**	**46mg/l**	**48MG/L**	**01**	**26mg/l**	**29mg/l**	**110mg/l**	**95mg/l**	**50mg/l**
13	**POTASSIUM**	**01**	**02**	**03**	**01**	**Nill**	**Nill**	**Nill**	**27mg/l**	**4.4mg/l**	**0.62mg/l**
14	**COLIFORM(MPN/100ML)**	**nill**	**nill**	**nill**	**nill**		**Nill**	**nill**	**4**	**Nill**	**2**

ISSFDW – PH 6.5 TO 8.5

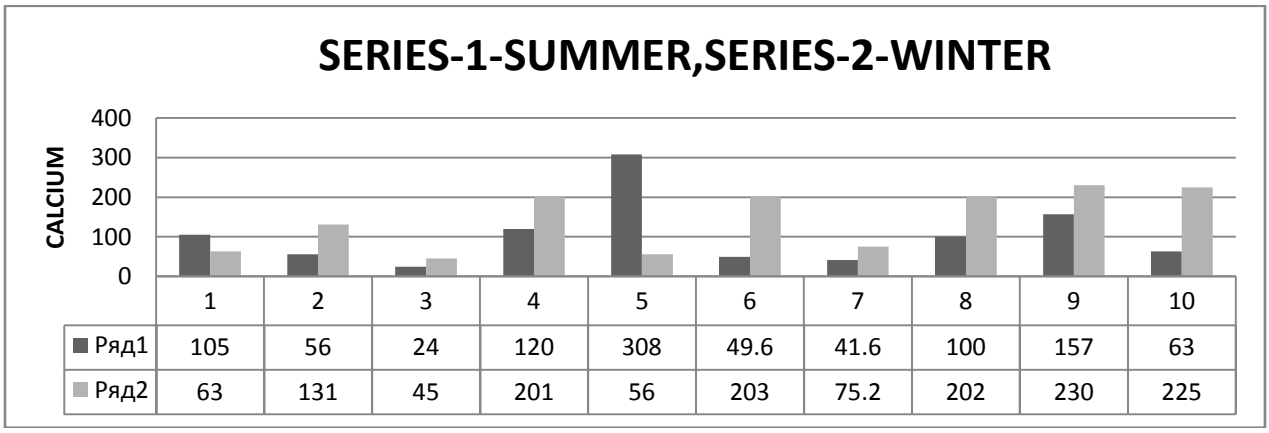


ISSFDW - CONDUCTIVITY MAX-2500µS/CM



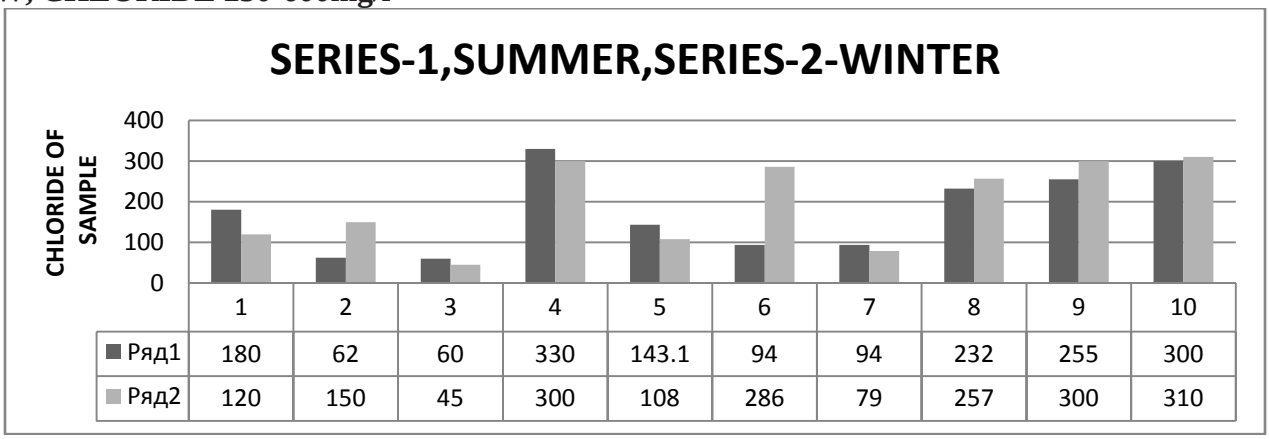
	1	2	3	4	5	6	7	8	9	10
Ряд1	114	610	590	1600	2200	530	520	1800	2391	3248
Ряд2	860	960	530	1180	490	1950	630	1260	1406	2406

ISSFDW CALCIUM .75-200 MG/L



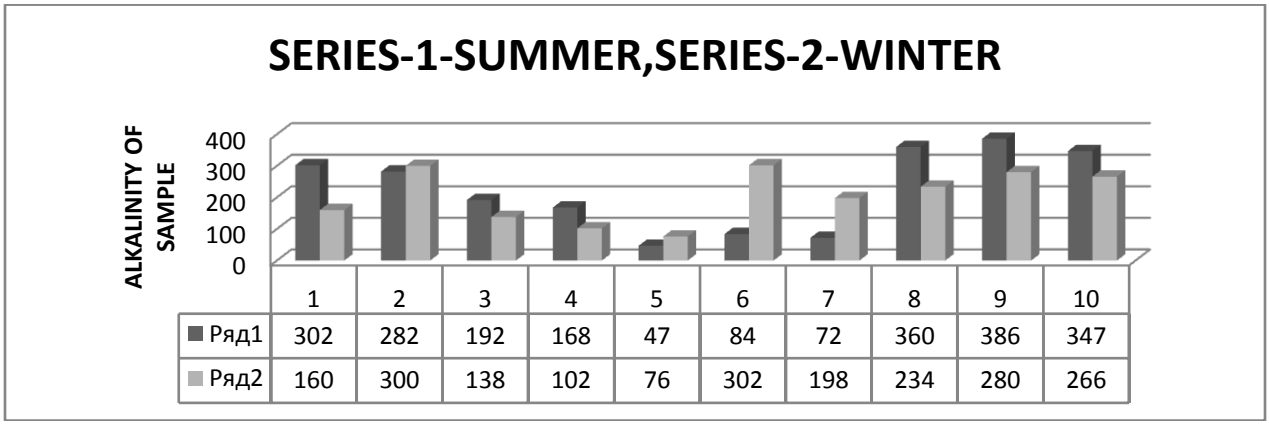
	1	2	3	4	5	6	7	8	9	10
Ряд1	105	56	24	120	308	49.6	41.6	100	157	63
Ряд2	63	131	45	201	56	203	75.2	202	230	225

ISSFDW, CHLORIDE 250-600mg/l



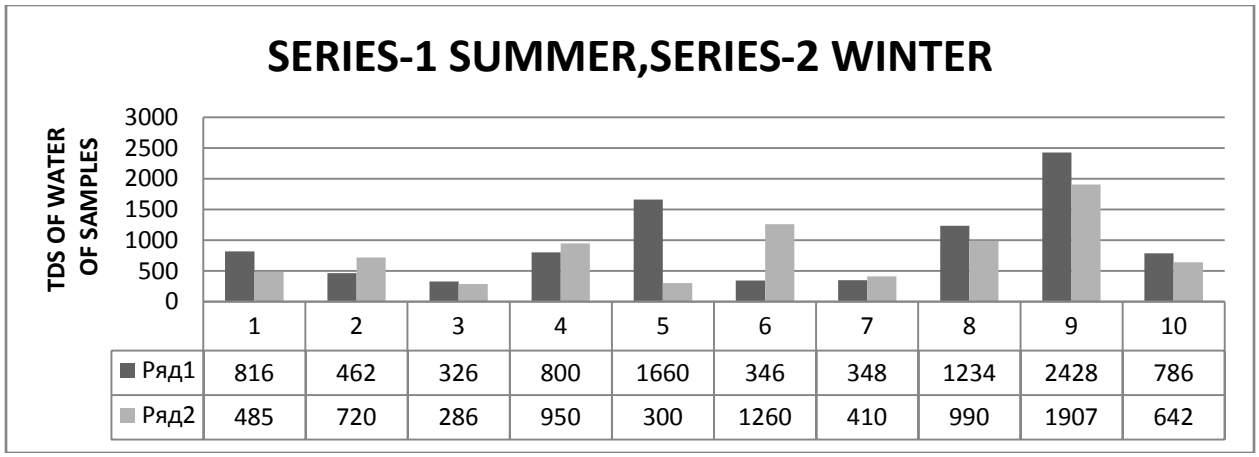
	1	2	3	4	5	6	7	8	9	10
Ряд1	180	62	60	330	143.1	94	94	232	255	300
Ряд2	120	150	45	300	108	286	79	257	300	310

ISSFDW, TOTAL ALKALINITY 200-600mg/l



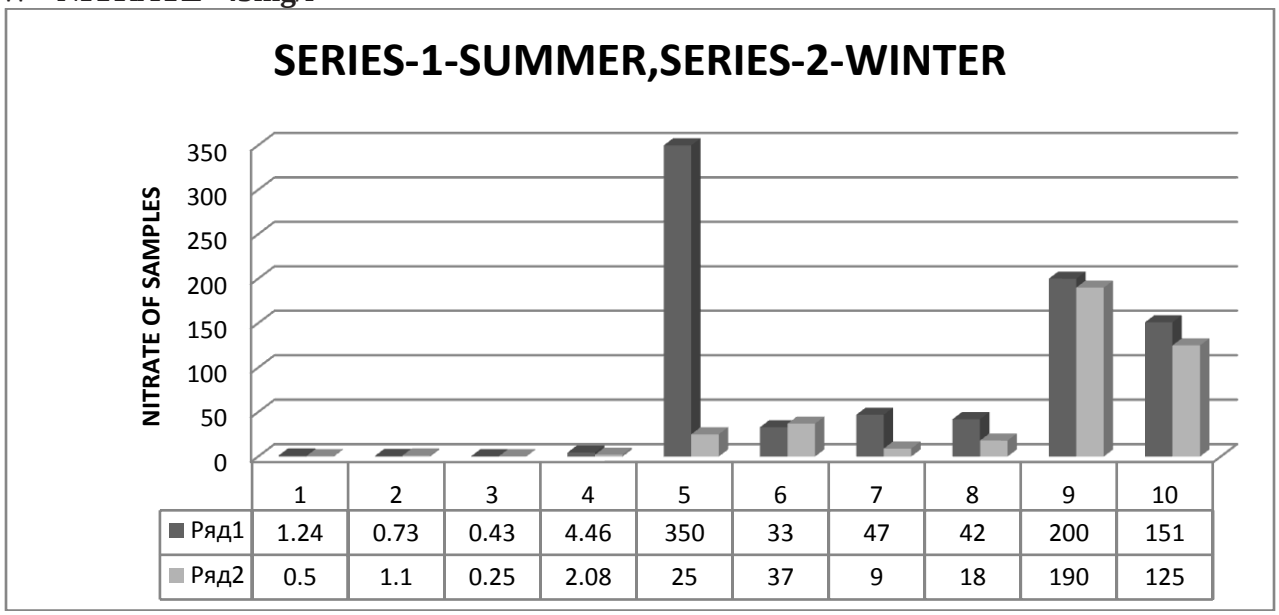
	1	2	3	4	5	6	7	8	9	10
Ряд1	302	282	192	168	47	84	72	360	386	347
Ряд2	160	300	138	102	76	302	198	234	280	266

ISSFDW- TOTAL HARDNESS -500-1500mg/l



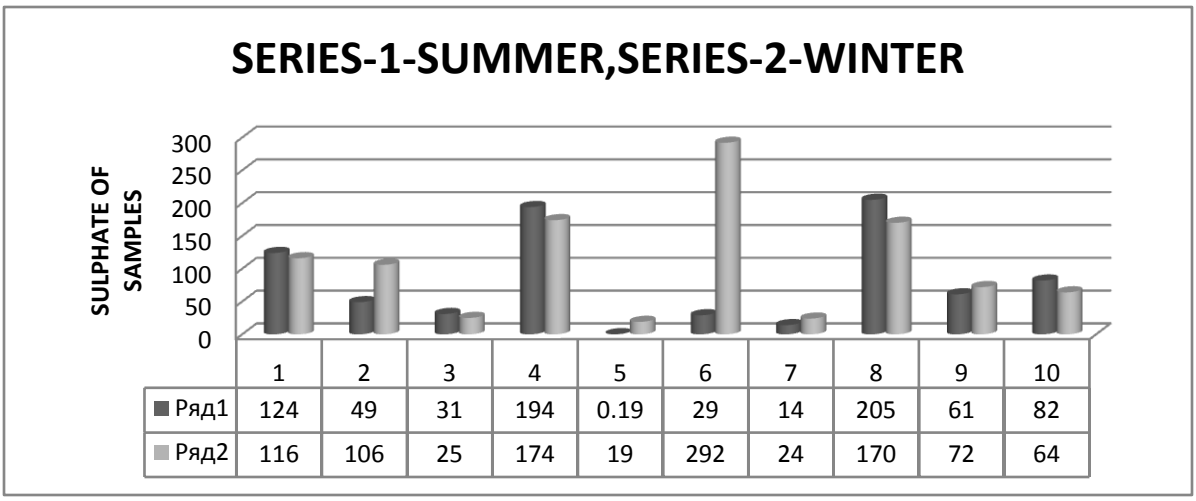
	1	2	3	4	5	6	7	8	9	10
Ряд1	816	462	326	800	1660	346	348	1234	2428	786
Ряд2	485	720	286	950	300	1260	410	990	1907	642

ISSFDW - NITRATE -45mg/l



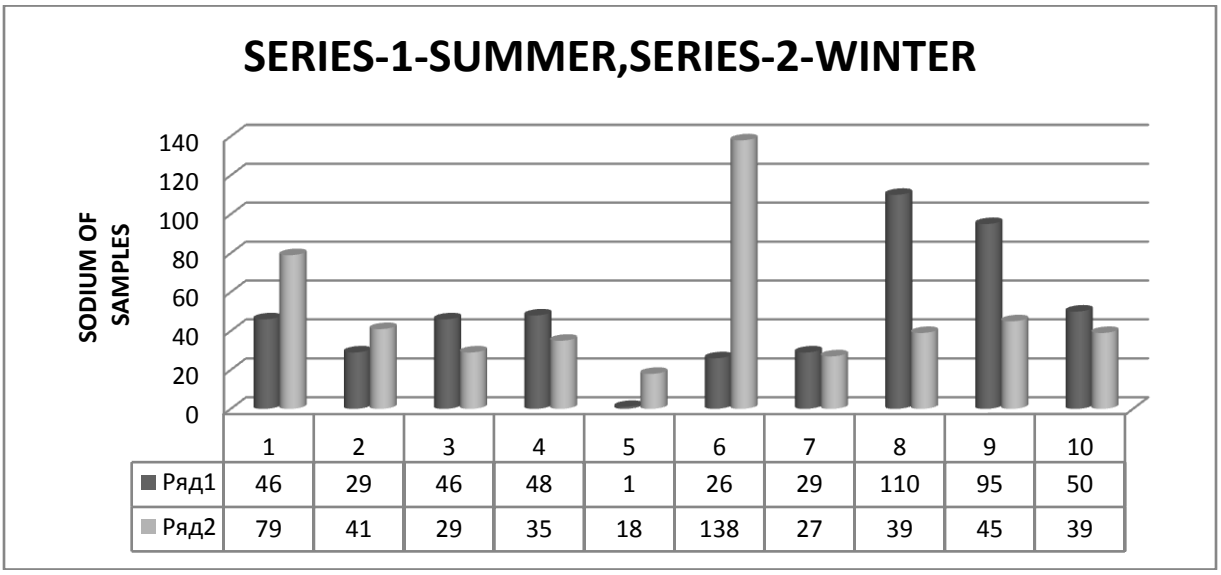
	1	2	3	4	5	6	7	8	9	10
Ряд1	1.24	0.73	0.43	4.46	350	33	47	42	200	151
Ряд2	0.5	1.1	0.25	2.08	25	37	9	18	190	125

ISSFDW – SULPHATE -200-400mg/l



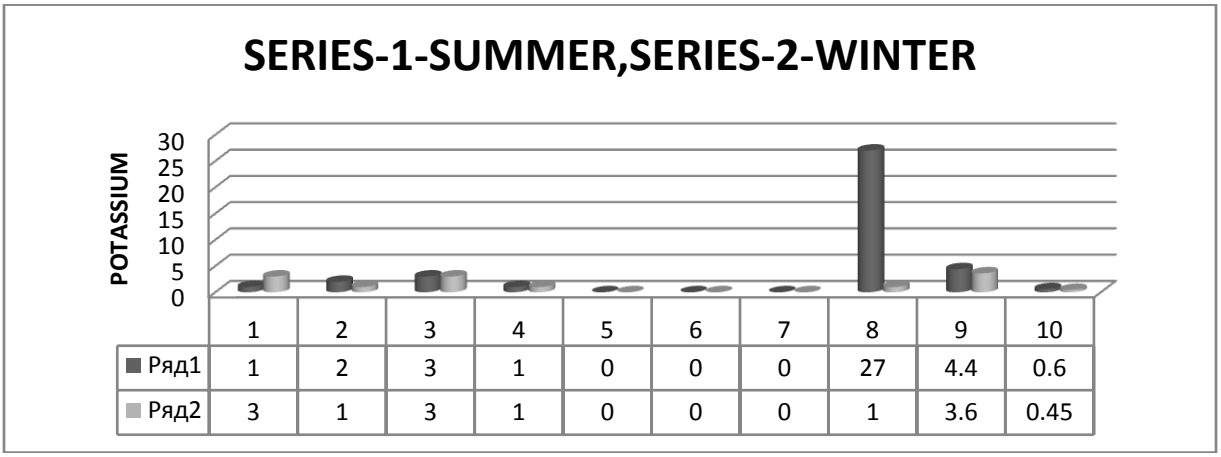
	1	2	3	4	5	6	7	8	9	10
Ряд1	124	49	31	194	0.19	29	14	205	61	82
Ряд2	116	106	25	174	19	292	24	170	72	64

ISSFDW – SODIUM, 10-70 MG/L



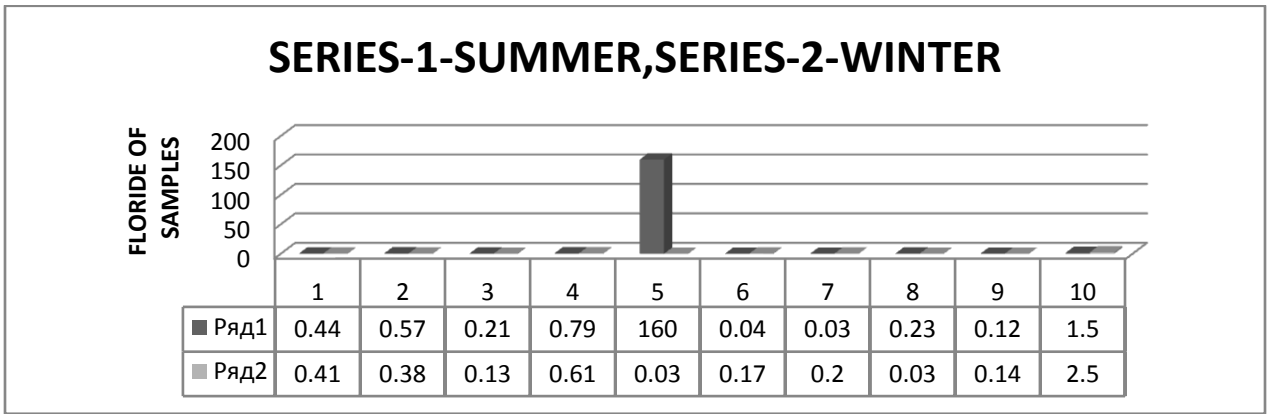
	1	2	3	4	5	6	7	8	9	10
Ряд1	46	29	46	48	1	26	29	110	95	50
Ряд2	79	41	29	35	18	138	27	39	45	39

ISSFDW- POTASSIUM 0.5-10mg/l.



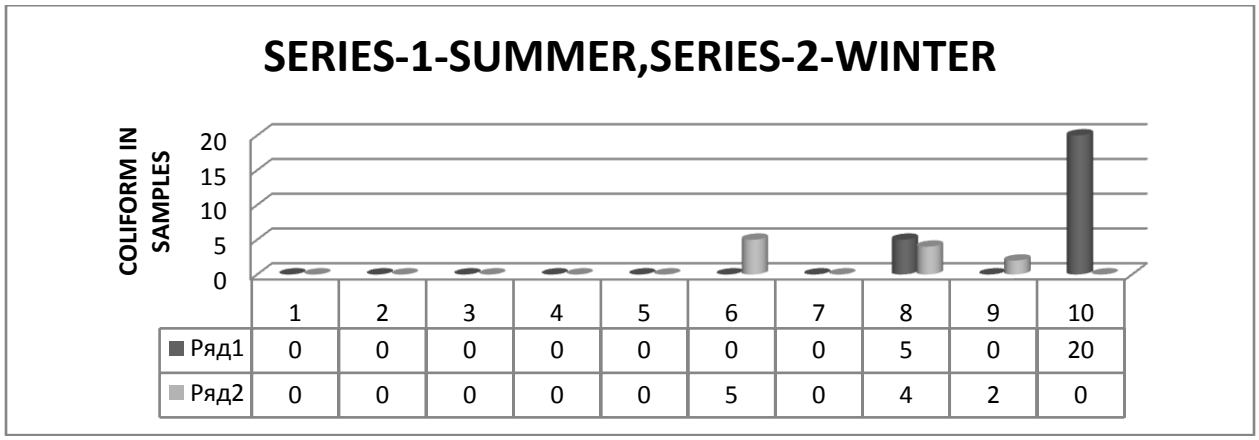
	1	2	3	4	5	6	7	8	9	10
Ряд1	1	2	3	1	0	0	0	27	4.4	0.6
Ряд2	3	1	3	1	0	0	0	1	3.6	0.45

ISSFDW, FLORIDE, 1.0-1.5mg/l



	1	2	3	4	5	6	7	8	9	10
Ряд1	0.44	0.57	0.21	0.79	160	0.04	0.03	0.23	0.12	1.5
Ряд2	0.41	0.38	0.13	0.61	0.03	0.17	0.2	0.03	0.14	2.5

ISSFDW- COLIFORM- 0 /100ml.



	1	2	3	4	5	6	7	8	9	10
Ряд1	0	0	0	0	0	0	0	5	0	20
Ряд2	0	0	0	0	0	5	0	4	2	0

Water quality evaluation for drinking purpose, the result obtained from analysis of water samples from different places of Gulbarga region in summer and winter season are given in the table above .a comparison of physico-chemical characteristics of water samples has been made with drinking water standards .It has been confirmed that the different chemical parameters in higher amount of floride ,nitrates are more in railway station, GDA, basveswar, is more than permissible and most importantly the count of bacteria should be zero but in some of the samples it is seen. Hence other parameter like magnesium, are conformed to be more the expectation with respected to Indian standard for drinking water

CONCLUSION:

It is an evidenced by higher values and presence of coli form alarming situation from the public health point of view. Hence there is a necessity to extend such studies to the bore wells of individual's area and to investigate in detail microbial, biochemical quality of drinking water supplies of Gulbarga. Based on these studies recommendations can be made to the local authorities to take suitable control measures for drinking water source.

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