INTERNATIONAL RESEARCH JOURNAL OF PHARMACY

www.irjponline.com ISSN 2230 – 8407

Research Article

PHYSICOCHEMICAL ANALYSIS OF WATER OF BAGALKOT DISTRICT, KARNATAKA IN INDIA

Kugali. N. M[1]* and Yadawe. M. S[2]

[1]Basaveshwar Science College, Bagalkot, India

[2]S. B. Arts and K. C. P. Science College, Bijapur, India

*Corresponding Author Email: nmkugali@yahoo.com

Article Received on: 10/06/13 Revised on: 08/07/13 Approved for publication: 12/08/13

DOI: 10.7897/2230-8407.04839

IRJP is an official publication of Moksha Publishing House. Website: www.mokshaph.com

ABSTRACT

Physicochemical analysis such as temperature, pH, Total hardness, Chloride, fluoride, iron, Total Alkalinity, Nitrate, Nitrite and sulfate of bore wells, drinking water has been carried out from twenty sampling stations of Bagalkot territory area, India during March 2013 and August 2013 in order to assess water quality index.

Keywords: Physic-chemical analysis, Bagalkot, chloride, sulfate etc.

INTRODUCTION

Water is the most important in shaping the land and regulating the climate. It is one of the most important compounds that profoundly influence life. The quality of water usually described according to its physical, chemical and biological characteristics. Rapid industrialization and indiscriminate use of chemical fertilizers and pesticides in agriculture are causing heavy and varied pollution in aquatic environment leading to deterioration of water quality and depletion of aquatic biota. Due to use of contaminated water, human population suffers from water born diseases. It is therefore to check the water quality at regular interval of time. Water is one of the most important compounds to the ecosystem. Better quality of water described by its physical, chemical and biological characteristics. But some correlation was possible among these parameters and the significant one would be useful to indicate quality of water. Due to increased human population, industrialization, use of fertilizers in agriculture and man-made activity. The natural aquatic resources are causing heavy and varied pollution in aquatic environment leading to water quality and depletion of aquatic biota. It is therefore necessary that the quality of drinking water should be checked at regular time interval because due to use of contaminated drinking water, human population suffers from a variety of water borne diseases. It is difficult to understand the biological phenomena fully because the chemistry of water reveals much about the metabolism of the ecosystem and explain the general hydro biological relationship. The physicochemical parameters of water and the dependence of all life process of these factors make it desirable to take as an environment. Physicochemical analysis of drinking water of Bagalkot district of Karnataka state, India has been investigated intensively[1-3]. Bore well water is generally used for drinking and other domestic purposes in this area. The uses of fertilizers and pesticides, manure, lime, septic tank, refuse dump, etc. Are the main sources of bore wells water pollution[4]. In the absence of fresh water supply people residing in this area use bore wells water for their domestic and drinking consumption. In order to assess water quality index, we have reported the physicochemical analysis of bore wells drinking water. Fluoride is found in all natural water at some concentration. In ground water however low and high concentration of fluoride can occur depending upon the nature of the rocks and the occurrence of the fluoride – bearing minerals. Fluorosis has been described as an endemic of tropical climate[5]. The main source of fluoride intake is water[6]. Much of the current concern with regards to environmental quality is focused on water because of its importance in maintaining the human health and health of the ecosystem. Fresh water is finite resource, essential for agriculture, industry and even human existence, without fresh water of adequate quantity and quality, sustainable development will not be possible[7].

MATERIALS AND METHODS

The Water Samples from Bagalkot, India were collected from four different stations in the morning hours between 9 to 11 am, in polythene bottle regularly for every month. The water samples were immediately brought in to laboratory for the estimation of various physicochemical parameters like water temperature and pH were recorded at the time of sample collection, by using thermometer and pocket digital pH meter. Transparency was measured with the help of secchi disc. While other parameters such as, TDS, hardness, chlorides, alkalinity, nitrite and nitrate were estimated in the laboratory by using Standard Methods as prescribed by APHA, AWWA[8], Trivedy and Goel[9], Kodarkar[10].

Study Area

According to the 2011 census Bagalkot district, India has a population of 1,890,826, roughly equal to the nation of Lesoth or the US state of West Virginia. This gives it a ranking of 249th in India (out of a total of 640). The district has a population density of 288 inhabitants per square kilometre (750 / sq mi). Its population growth rate over the decade 2001-2011 was 14.46 %. Bagalkot, India has a sex ratio of 984 females for every 1000 males and a literacy rate of 69.39 %. Bagalkot is the second largest district in the Belgaum Division and the 15th most populous district in Karnataka, India. With over 1,651,892 inhabitants of which 28.97 % were urban, Bagalkot accounts for over 18 % of the total population of the Belgaum Division. Bagalkot, India has 6 taluks, comprising a total of 18 hoblies and 627 villages. Of the 6 taluks, two are categorised as "More Backward Taluk" and one as "Most Backward Taluk". The district has 163 Gram Panchayats and 12 urban agglomerations.

Bagalkot, with a decadal growth rate of about 19 % is one of the ten fastest growing districts in Karnataka, India. Over 86 % of the population in the district is Hindu, while 11 % of the population is Muslim. Jains account for a little over 1 % of the population, while Christians account for 0.17 %. Scheduled Castes and Tribes constitute about 17 % of the total population. Communal tensions are fairly uncommon in Bagalkot, India.

Table 1: Overview Result Analysis of Hunagund and Bagalkot talukas of Bagalkot district

Villages	pH	Total hardness In mg / L	Chloride In mg / L	Fluoride In mg / L	Iron In mg / L	Total Alkalinity In mg / L	Nitrate In mg / L	Nitrite In mg / L	Arsenic In mg / L	Sulfate In mg / L
Navanagar Sector 40	7.5	600	200	0.5	Nil	220	5	1	Nil	375
Navanagar Sector 38	7.0	550	200	0.3	Nil	225	10	1	Nil	300
Muchakhandi	8.o	825	130	0.5	Nil	690	35	Nil	Nil	200
Bagalkot (KID)	7.5	420	130	Nil	Nil	800	6	1	Nil	180
Gaddankeri 1	8.0	450	150	Nil	Nil	850	50	1.8	Nil	80
Gaddankeri 2	5.o	225	45	Nil	Nil	90	10	Nil	Nil	200
Navanagar Sector 45	6.5	405	90	0.5	Nil	225	5	1	Nil	75
Ankalgi	9.o	765	475	0.5	Nil	450	45	Nil	Nil	100
Yadahalli	7.5	400	85	0.5	Nil	75	25	0.5	Nil	150
Kaladagi	8.5	750	475	0.5	Nil	400	50	0.2	Nil	150
Kudalasangama	8.4	504	348	4.4	0.4	448	20	Nil	Nil	40
Bisaldinni	8.4	732	984	4.4	Nil	520	25	0.01	Nil	60
Chaudakamalddini	8.3	280	176	2.2	0.1	124	5	Nil	Nil	10
Katagur	8.6	512	240	1.5	0.2	516	25	0.1	Nil	40
Sangam Cross	8.0	448	172	0.6	0.2	364	20	Nil	Nil	35
Kirsur	8.1	400	290	0.2	0.1	304	18	Nil	Nil	30
Havanur	8.2	408	288	Nil	0.2	344	20	0.1	Nil	25
Chittargi	9.0	304	126	1.5	0.1	604	15	Nil	Nil	30
Gangur	8.6	640	612	2.0	0.2	472	20	Nil	Nil	50
Hadagali	8.9	168	176	1.5	0.1	608	5	Nil	Nil	5

RESULTS AND DISCUSSION

The physicochemical parameters of the Bagalkot have been given in the Table 1. The physicochemical features of Bagalkot water were influenced due to the discharge of domestic waste and agriculture at discharges. pH of water Bagalkot water ranged from 5.0 to 9. The factors like air temperature bring about changes the pH of water. Most of bio-chemical and chemical reactions are influenced by the pH. The reduced rate of photosynthetic activities reduces the assimilation of carbon dioxide and bicarbonates which are ultimately responsible for increase in pH, the low oxygen values coincided with high temperature during the summer month[11]. Higher values of the pH at this station as consequence of acid-forming substances such as sulfate, phosphate, nitrates release into the river basin. These substances as abundance in fertilizer usage might have altered the acid-base equilibria, resulted in the reduced acid-neutralizing capacity and hence raising the value of pH[12]. The value of hardness fluctuates from 168 to 825 mg / l. High value of hardness (825 mg / l) can be attributed to decrease in water volume and increase of rate of evaporation of water. Total hardness in water is the sum of concentration of alkaline earth metal cat ion such as Ca^{++}, Mg^{++}. The total hardness is the total soluble magnesium and calcium salts present in the water expressed as its $CaCo_3$ equivalent. Total hardness are also includes the sulfates, chlorides of calcium and magnesium. In most natural water the predominant ions are those of bicarbonates associated mainly with calcium to lesser degree with magnesium and still less with sodium potassium. Mishra and Saxsena[13], reported high values of 295 mg / lit in Ganga River. The values of chlorides range from 45 to 984 mg / l. The maximum chloride content was found to be 984 mg / lit and the minimum chloride content was found to be 45 mg / l in Bagalkot. The higher content of chloride in ponds may be due to animal origin like human faces and sewage inflow. Chloride increases with the increasing degree of eutrophication. Similar results were reported by Swarnalatha and Narsing rao[14]. The variation in fluoride of water ranged from a minimum of 0.2 mg / lit to a maximum of 4.4 mg / l respectively. Fluoride at a lower concentration at an average of 1 mg / lit is regarded as an important constituent of drinking water[15,16] . But as its high concentration cause serious health problem in that concern it is well below. Surface water generally contains less than 0.5 mg / lit fluoride. However, when present in much greater concentration, it becomes a pollutant. Iron content ranges from 0.1 to 0.4 mg / l. Total alkalinity of the lake was varied from 75 to 850 mg / l. Das and Chand[17] recorded low alkalinity during monsoon, which might be due to dilution effect of rainfall. Katariya *et al*[18] have measured maximum value of alkalinity due to confluence of industrial and domestic waste. Our results are in well agreement with the findings of above authors. The values of nitrate ranged from 5 to 50 mg / l. This indicates that continuously applied the common N-P-K fertilizer or chicken dung[19] into agriculture scheme practice during early stage of cultivations will lead much more potential of being nitrate leached or surface run off into the river. Nitrite content ranged from 0.01 to 1.8 mg / l. There was no arsenic in the study area. The Sulfate ranged from 5 to 375 mg / l. Sulfate is a substance that occurs naturally in drinking water. Health concerns regarding sulfate in drinking water have been raised because of reports that diarrhea may be associated with the ingestion of water containing high levels of sulfate. Of particular concern are groups within the general population that may be at greater risk from the laxative effects of sulfate when they experience an abrupt change from drinking water with low sulfate concentrations to drinking water with high sulfate concentrations. Sulfate is one of the least toxic anions. The lethal dose for humans as potassium or zinc sulfate is 45 g. The reported minimum lethal dose of magnesium sulfate in mammals is 200 mg / kg[20]. Sulfate doses of 1000 to 2000 mg (14 to 29 mg / kg bw) have a cathartic effect on humans, resulting in purgation of the alimentary canal[21]. Sulfate in drinking water currently has a secondary maximum contaminant level (SMCL) of 250 milligrams per liter (mg /

L), based on aesthetic effects (i.e. taste and odor). This regulation is not a federally enforceable standard, but is provided as a guideline for States and public water systems. EPA estimates that about 3 % of the public drinking water systems in the country may have sulfate levels of 250 mg / L or greater. Dehydration has also been reported as a common side effect following the ingestion of large amounts of magnesium or sodium sulfate[22].

CONCLUSION

Physicochemical analysis yields information about the possible physicochemical causes that may influence the quality status of the natural resource "water".

ACKNOWLEDGEMENTS

Authors are also thankful to management and staff of chemistry dept for valuable assistance during sampling activities.

REFERENCES

1. Rana AK, Kharodawala MJ, Patel JM, Rai RK, Patel BS and Dabhi HR. Asian Journal of Chemistry 2002; 14: 1209.
2. PA Hamilton and DK Helsel. Ground Water 1995; 33: 2. http://dx. doi.org/10.1111/j.1745-6584.1995.tb00255.x
3. E Brown, MW Skovgstd and MJ Fishman. Methods for Collection and Analysis of Water Samples for Dissolved Minerals and Gases 1974; Vol. 5. PMCid:PMC428937
4. AI Vogel. Text Book of Inorganic Quantitative Analysis, 4thed, ELBS, London; 1978.
5. Guidelines for drinking water quality, World Health organization, Geneva 1993; Vol.1.
6. Guidelines for drinking water quality, World Health organization, Geneva 1999; Vol.2.
7. N Kumar. A View on Freshwater environment, Ecol. Env and Cons 1997; 3: 3-4.
8. APHA: Standard Methods For Examination of Water and Wastewater, 20th Edition, American Public Health Association, Washington D. C; 1985.
9. Trivedy RK and Goel PK. Chemical and biological methods for water pollution studies, Environmental Publication, Karad, Maharashtra; 1986.
10. Kodarkar MS. Methodology for water analysis, physico-chemical, Biological and Microbiological Indian Association of Aquatic Biologists Hyderabad Pub.2; 1992. p. 50.
11. Kamble SM, Kamble AH and Narke SY. Study of physico-chemical parameters of Ruti dam, Tq. Ashti, dist. Beed, Maharashtra. J. Aqua. Biol 2009; 24(2): 86-89.
12. Razak AA, Asiedu AB, Entsua Mensah REM, De Graft Johnson KAA, West African Journal of Applied Ecology 2009; 15.
13. Mishra SR and Saxena DN. Aquatic Ecology ashish publishing house, New Delhi; 1992.
14. Swaranlatha S and A Narsingrao. Ecological studies of Banjara lake with reference to water pollution. J. Envi. Biol 1998; 19(2): 179-186.
15. WHO, World Health Organisation; 1972.
16. NM Kugali and MS Yadawe. IJABPT 2010; I(2).
17. Das SK and BK Chand. Limnology and biodiversity of Ichthyofauna in a pond of Southern Orrissa. India. J. Ecotoxical Environ. Monit 2003; 13(2): 97-102.
18. Kataria HC, SA Iqbal and AK Shandilya. Limno- chemical. Studies of Tawa Reservoir. IJEP 1996; 16(11): 841-846.
19. Wan Abdullah WY, Aminuddin BY, Zulkifli M. Water, Air and Soil Pollut 2005; 5: 115. http://dx.doi.org/10.1007/s11267-005-7407-9
20. Arthur D Little. Inc. Water quality criteria data book. Vol. 2. Inorganic chemical pollution of freshwater. Water Pollut. Control Res. Ser. No. DPV 18010, U.S. Environmental Protection Agency, Washington, DC; 1971.
21. McKee JE and Wolf HW. Water quality criteria. 2nd edition. California State Water Quality Control Board, Sacramento, CA; 1963.
22. Fingl E. Laxatives and cathartics. In: Pharmacological basis of therapeutics. AG Gilman, LS Goodman and L Gilman (eds.). McMillan Publishing Co., New York, NY; 1980.

Cite this article as:

Kugali. N. M and Yadawe. M. S. Physicochemical analysis of water of Bagalkot district, Karnataka in India. Int. Res. J. Pharm. 2013; 4(8):202-204 http://dx.doi.org/10.7897/2230-8407.04839

Source of support: Nil, Conflict of interest: None Declared