Physico-Chemical Analysis of Drinking water from various water resources in Pampore town, (Kashmir) India

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Abstract

Water is a free gift of nature to human being and its availability in terms of its quality has now become a problem as the fresh water sources are depleting due to increasing demand of population and different pollution sources. The physicochemical parameters of water were analyzed by standard methods. The samples were collected from 5 different water sources of Pampore and have been analyzed for total solids (TS), total alkalinity, Ca hardness, Mg hardness, Chloride (Cl^-), dissolved oxygen (D.O) and the result showed that these parameters were ranged from TS (664±7.21 to 1163.33±8.82 mg/L), T. alkalinity (125.33±4.33 to 263±4.36), Ca. hardness (220.67±2.36 to 592.67±2.78), Mg hardness (96.67±5.7 to 187.33±5.21), DO (6.06±0.5 to 8.33±0.10) and Chlorides (2.57±0.14 to 11.27±0.36). Among all these water samples, the water sample taken from bored well from the Karewa fields showed the best results and permissible limit for drinking purposes prescribed by USEPA and WHO and the the present investigation found that the maximum parameters were within range and could be suitable for irrigation purposes. The samples collected from river Jehlum suggested that the rate of pollution is increasing day to day when compared with previous papers.

Keywords: Pysicochemical, Water sources, Parameters, Pampore

Introduction

Water is very important for the survival of living world and it plays an important role in every aspect of life (Krimsky, & Wrubel, 1996). Water quality is considered as environmental concern as availability of fresh water resources for human consumption is declining day to day (Foley, et al., 2011). Clean drinking water is now recognized as a fundamental right of human beings (Thakur, 1997). A variety of health risks are blamed due to direct exposure of untreated water and the indirect exposure imparted by consuming contaminated foods

irrigated by untreated water (WHO, 2011). The healthy aquatic ecosystem depends on the biological diversity and physico-chemical characteristics (Venkatesharaju et al., 2010). Without adequate quantity and quality of fresh water, sustainable development will not be possible (Qadir, et al. 2003). The appraisal alteration in water resources by predominant pollution would become an interesting concern within the framework of aquatic ecology (Wilson, & Carpenter, 1999). The depletion of fresh water resources could create the resource crisis of the 21st Century bringing up agriculture, industrial, domestic as well as international conflicts (Gleick, 1993). Industrial growth, urbanization and the increased use of synthetic organic substances have serious and adverse impacts on freshwater bodies. It is generally accepted fact that the developed countries suffer from problems of chemical discharge into the water sources mainly groundwater while developing countries face problems of agricultural run-off in water sources (Wu, et.al. 1999). The resource which makes availability of water in Kashmir possible is rainfall and snow. The major portion of that water was flow down in rivers and streams and the small proportion seeps into ground water (Khan, 2008). Mostly in Kashmir the surface water sources are reliant water resources of drinking water supply. But at present time river surface water is facing remarkable pressure due to encroachment, discharge of untreated domestic and industrial waste, dumping of solid waste, tourism and illegal diversion of water (Ahmed & Ahmed, 2013). Ecologically the Kashmir witnessed degradation of land, water, and biodiversity as it is fragile Himalayan region (Rameez & Srivastava, 2017). One of the major objectives of water quality estimation is to determine the best sources within the locality and the impacts of human activities over these resources. In this study we have examined the physicochemical parameters of various water resources of Pampore town

Materials and Methodology

Study area

Pampore is known as saffron town of Kashmir is situated on eastern side of river Jhelum. It almost 11 km away from Srinagar city located 1600-2100 masl. The water samples were collected at 5 different sites i.e. Jehlum River water (S1), 250 mts dwelled tube well at Karewa fields (S2), Stream flowing from Ladhoo to Kranchoo (S3), A well at Apple garden, (S4), water from Satisar wetland (S5). The samples were collected in the month of April 2018.

Collection of samples

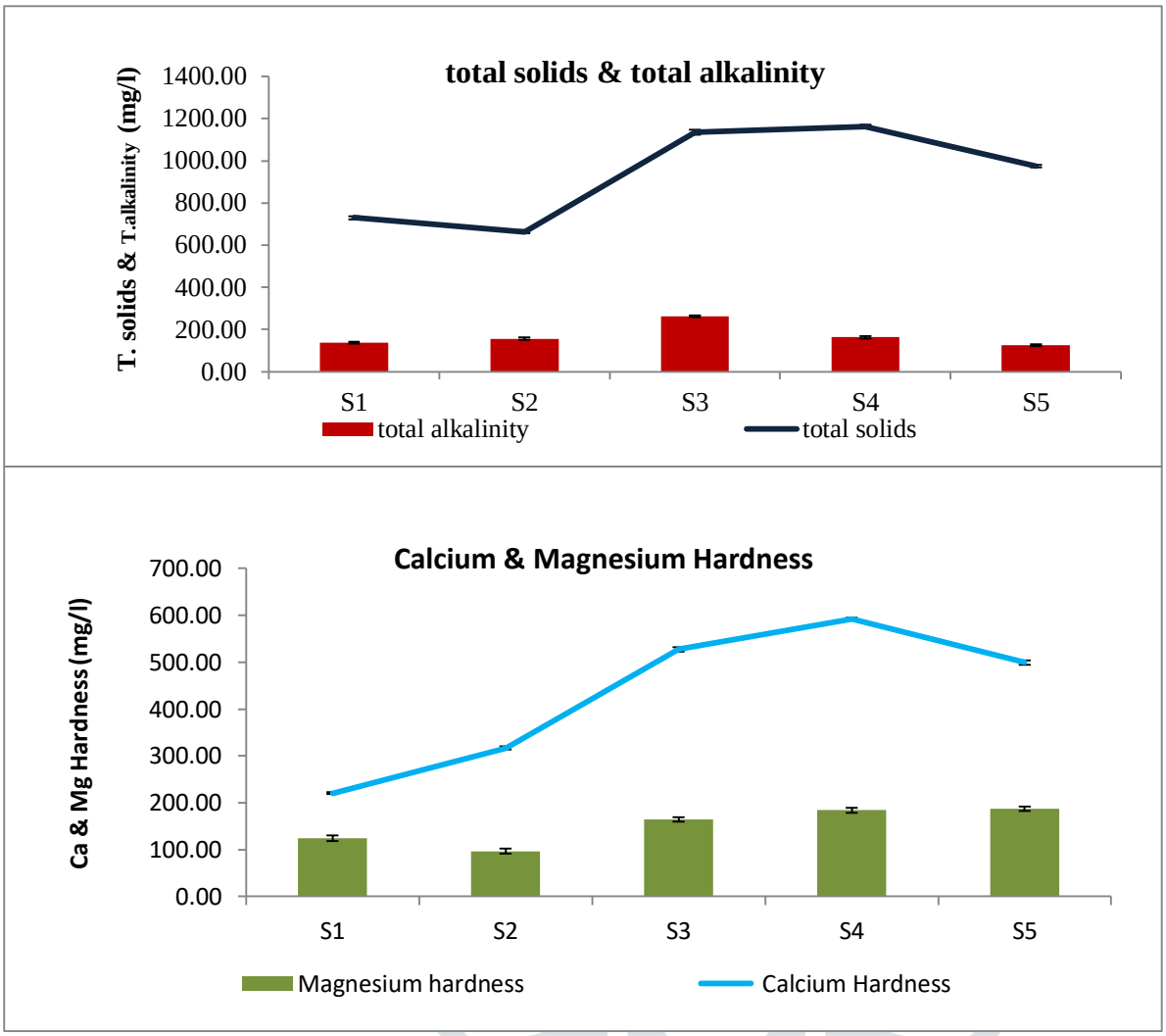
The water samples were collected in PVC bottles of 1.2 L capacity. Before the collection of samples, the bottles were properly cleaned and rinsed thoroughly several times with distilled water and then samples were collected in triplicates from each sampling site.

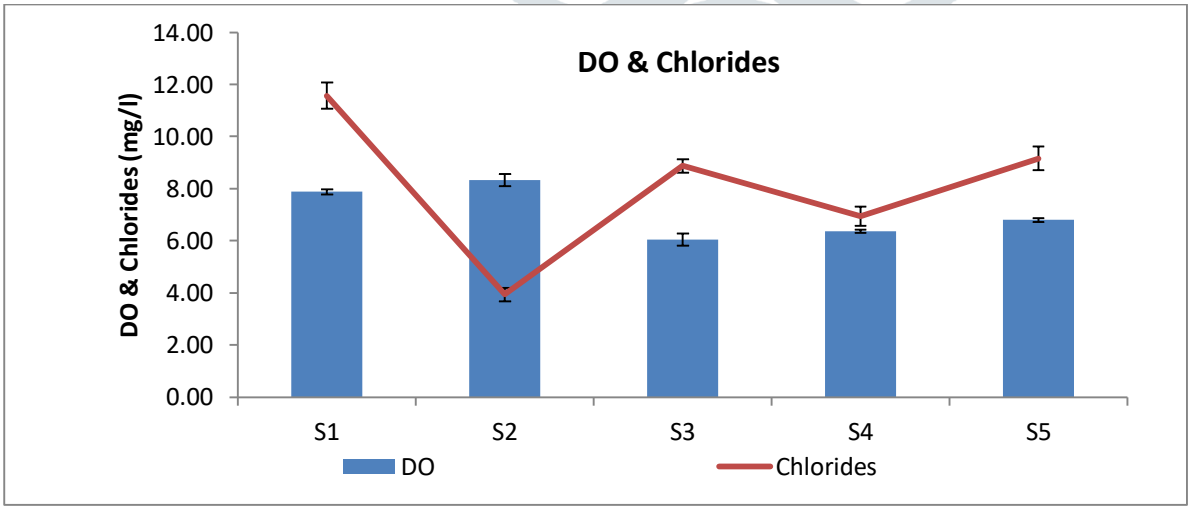
Physicochemical analysis

Physico-chemical parameters i.e. pH, EC and temperature were analysed by Digital analytical meter (Jackson 1967); Total Dissolved Solids, Total Suspended Solids, Total Solids were calculated by filtration, evaporation method (APHA 2005); Total Hardness, Ca hardness and Mg Hardness, calculated by EDTA titrimetric method (APHA 2005); Total Alkalinity were calculated by Titration method (APHA 2005); Nitrates were calculated by Phenol Disulfonic method (APHA 2005); Chlorides were calculated by Argentometric method (APHA 2005); DO and BOD were calculated by Modified Wrinklers method (S.M.APHA 1976). Sodium and potassium were calculated by calculated by Flame Photometri c method (APHA 1976).

Results and discussion

The results of physiochemical parameters of water samples were presented in below given table.





The TS of S1, S2 is within normal range i.e. 730±7.64, 664±7.21 whereas the concentration of TS in S3, S4, and S5 lie above the WHO and NSDWQ limits. The alkalinity of water is due to carbonates, bicarbonates, borates,

silicates and phosphates and also by the free hydroxyl ions which posses the acid neutralizing capacity (Sherlock, et.al. 1995).. Total alkalinity was ranged from 125.33±4.33 to 263±4.36 mg/l with maximum alkalinity in S3 and minimum in S5. Most probably the concentration of Calcium and Magnesium depicts the total hardness of water (Vaidya & Gadhia 2012). The maximum calcium i.e. 592.67±2.78 and was found in S4 and minimum concentration i.e. 220.67±2.36 mg/L were observed in S1. At the same time the maximum concentration of Magnesium hardness was found in S5 and minimum hardness were analysed from S2. According to standards of drinking water the calcium hardness and even magnesium hardness were beyond the limit of standards from S1 to S5 water samples. The DO is very important parameter for physical and biological processes occurring within water and as the temperature increases the solubility of gas in water decreases and at the same time the microbial activity within the water increases which reduces the concentration of DO from the water (Delpla, et.al. 2009). The D.O. concentration varies from 8.32 to 5.2 mg/L and the observed results showed that the concentration of DO in S1 and S2 are 7.87±0.10 & 8.33±0.24 which is normal according to standards of WHO and water is suitable for drinking purposes where as the remaining water is suitable for irrigation purpose on the basis of DO. Spatial variability in Chlorides showed that S5 was rich in Chloride content (9.16±0.45) whereas minimum content of Chlorides were observed from S2 (3.94±0.25). The chlorine application is essential as it ensures the safety of drinking water. The values of Chlorine from all different sites are within the permissible limits and according to the standards of Indian specification and WHO for drinking water. Chlorine is the basic reason for high salinity of water as high concentration of chlorides from industrial effluents might cause dissolution of organic waste (Lefebvre & Moletta, 2006).

Conclusion

In this present study the water samples were collected from Pampore town Kashmir for analysis of different physicochemical parameters. The result revealed that the sample from site 2 (S2) showed the parameters within the standard limits for drinking water quality given by WHO, BIS and US-EPA, and water from rest remaining 4 sites were not hygienic for drinking purposes. It is necessary to make public aware of drinking water quality and it is the responsibility of every citizen of the town to manage this precious natural liquid resource. For the welfare of the human being, water quality should be assessed on the regular basis.

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