Microbial Pollution Status of Selected Rock Pools in Ponmudi Hills with Special Reference to Drinking Quality, Thiruvanathapuram, Kerala

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Abstract: The present study area is Ponmudi Hills, is an idyllic hill resort with a narrow winding pathway and consists of cool green wodded environment. In Ponmudi, there are a number of small springs originate from the mountain and these springs are united at lower part and joint to Kallar River which is in turn formed Vamanapuram River of Thiruvananthapuram district. For the present investigation three major rock pools in and around Ponmudi Hills were selected .The present investigation includes the seasonal variations of microbial parameters. The parameters studied in microbial analysis were total coliforms and E.Coliform The present study reveals that the microbiological parameters are beyond the permissible limit of water quality standards.

Introduction

Natural water supplies such rivers, lakes and streams contain sufficient nutrients to support growth of various microorganisms. Microorganisms enter the water supplies in several ways. In congested centers domestic and industrial water pollutes water supplies. As a potential carrier of pathogenic microorganisms, water can endanger health and life, from the standpoint of transmitting human disease, polluting water with soil, rubbish, industrial wastes and even animal manure is comparatively harmless. These sources rarely contain pathogens capable of producing human diseases when swallowed with drinking water. Sewage containing human excreta however is most dangerous material that pollutes water. People with communicable disease of many kinds eliminate the causative organisms in their excreta. The most important microbial disease transmitted through water is typhoid fever, paratyphoid fever, amoebic dysentery, cholera, poliomyelitis and infectious hepatitis. Abani and Nipanney (1995) conducted an assessment of drinking water quality of open wells in Malappuram coast Kerala, Water quality of 42 randomly selected open dug wells was studied during post monsoon and recorded to be safe for human consumption. The study revealed that water in none of the open wells investigated was safe for drinking; this was startling observation because more than 50% of population in Kerala used dug well water for drinking. There is no attempt to make a study in the microbial contamination of rock ponds in Ponmudi hills.

Materials and method

The present study area is Ponmudi hills (Fig.1) is situated between north latitudes 8° 17' and 8° 54' and east longitudes 76° 41' and 77° 17', is an idyllic hill resort with a narrow winding pathway and consist of cool green wooded environment. Ponmudi abounds number of rock pools, which are formed by erosional forces of nature. For the present investigation selected three major rock pools in and around Ponmudi hills.

For the microbiological studies water samples are collected from three selected Rock pools in Ponmudi Hills. Station-I (Rock pool –I, Photo-I) is located in forest area, Station –II (Rock pool- II, Photo-II) is located on the border of forest area and Station- III (Rock pool-III, Photo-III) is located in the open area i.e. tourist center. Clean and sterilized bottle was used for the water collection. It was at its base by hand dip in to the water with its neck downward up to 6" below the water surface and then its mouth was opened by removing its stopper against the current. The bottle was not filled completely. The mouth of the bottle was closed under water by replacing stopper to avoid contamination of the sample. A brown paper with the help

of rubber bands wrapped the neck of the stopper. For microbiological analysis water samples were collected once in a month from August 2016 to January 2017. The Total and E.Coliform was measured by Most Probable Number Method (APHA, 1995).

Results

The observations of microbiological parameters of water samples taken from selected rock pools of Ponmudi hills are presented in the Table 1 and figure 2. The Total coliform of water samples observed maximum at station III (34 MPN/100ML) in October 2016 and minimum number (5MPN / 100ML) is noticed in station I in August 2016.

At Station I, a Total coliform of maximum number was noted in October 2016(25.8MPN/100ML) and minimum number was noted in August 2016 (5MPN / 100ML). The average value of Total coliform in station I was 13.3 MPN/100ML. The maximum total coli forms number in Station II was noted in October 2016 (28 MPN/100ML) and minimum value was noted in January 2017 (11 MPN/100ML), the average value of total coliform in station II was 17.6 MPN/100ML At station III, maximum values of total coliforms was noticed in October 2016 (34 MPN/100ML) and minimum values was observed in September 2016 (12 MPN/100ML). The average value of total coliforms in Station III was 21 MPN/100ML.

The E.coli of water samples varied maximum in station III (14MPN/100ML) in October 2016 and minimum value is noticed in station I (2.5MPN/100ML) in August 2016. At Station I, E. coli varies maximum number was noted in October 2016 (12 MPN/100ML) and minimum number was noted in August 2016 (2.5 MPN / 100ML). The average value of E. coli in station I was 7.1 MPN/100ML.The maximum E. coli number in Station II was noted in October 2016 (18 MPN/100ML) and minimum value was noted in January 2017(7 MPN/ML), the average value of E coli in station II was 10.3MPN/100ML. At station III, maximum values of E. coli was noticed in October 2016 (14 MPN/100ML) and minimum values was observed in August 2016 (3.5 MPN/100ML). The average value of E. coli in Station III was 8.5 MPN/100ML.

Discussion

Microbiological analysis has an important role in the drinking water quality assessment of a particular water body; in the present study water samples were collected from three selected rock pools in Ponmudi Hills in Thiruvananthapuram district. The bacteriological analysis of water determines the potability of water .The desirable limit of coli forms in water is 10 mpn/100ml (BIS, 1996). According to Ghosh *et al.*(1991) at relatively higher temperature, microbial activity increases and these results in increasing microbial population.

The pollution of water harmfully affects the life activities of the people. The pathogenic microorganisms which may enter the water along with sewage and other wastes may cause tremendous damage to public health. These pathogens comprising mainly of viruses and bacteria can cause dangerous water borne diseases, such as cholera, typhoid, dysentery and infectious hepatitis in humans (Dara, 2004). Coli forms are indicators of fecal pollution of water system and enter in to the water body mainly by runoff from wooded areas, pastures, feedlots, septic tanks and sewage plants (Bhosle and Rao, 2001). The number of coli forms varies according to climatic and hygienic conditions. Presence of coli forms in water indicates fecal pollution (Chakravorty, 2002). The present investigation reveals that the Total coli form number is maximum at station III (34 MPN/100ML) in October 2016 (monsoon season). The station III was located in tourist area. The maximum value of total coli forms observed in station III may due to surface runoff water from surrounding area during rainy season. The present study showed that comparatively high values of total coliform were also noted in station II.

The contamination of pond water by microbial pathogens are mainly due to defecating activities of animals and peoples who enter in to the water, also when it rains contaminants on the catchments area are

Table 1. Showing Microbiological variations of water samples taken from selected Stations in Ponmudi Hills

	Stations	August	September	October	November	December	January
Total coli form (MPN/100ml)	I	5 MPN	8.9 MPN	25.8 MPN	20 MPN	11.5 MPN	9 MPN
	II	12 MPN	15 MPN	28 MPN	26 MPN	14 MPN	11 MPN
	III	15 MPN	12 MPN	34 MPN	29.5MPN	18 MPN	18 MPN
E. Coli (MPN/100ml)	I	2.5 MPN	4.6 MPN	12 MPN	10 MPN	8 MPN	5.5 MPN
	II	6 MPN	7.8 MPN	18 MPN	15 MPN	8.5 MPN	7 MPN
	III	3.5 MPN	7.5 MPN	14 MPN	10 MPN	9.5 MPN	6.5 MPN

during August 2016 to January 2017

Fig 1: Graphs showing Microbiological Parameters of water samples taken from Rock pools in Ponmudi Hills during August 2016 to January 2017.
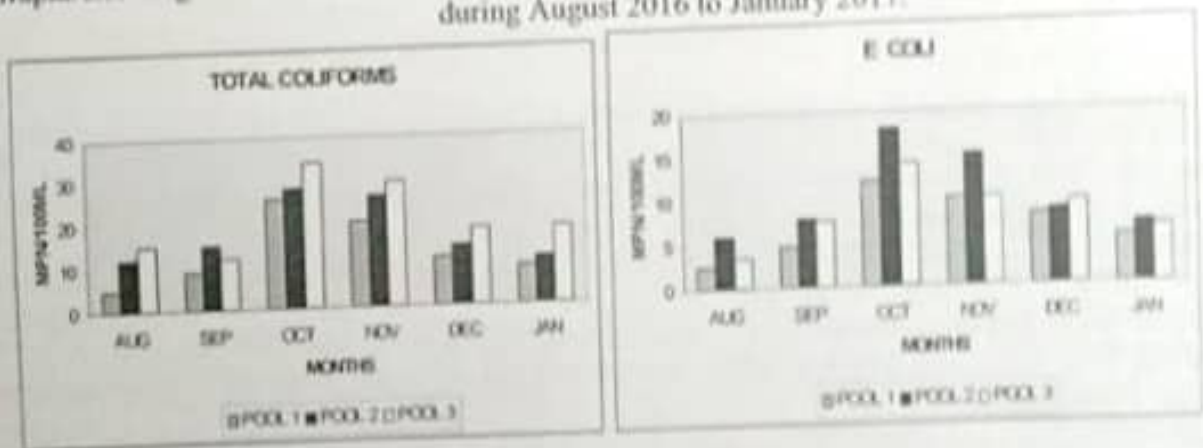
washed into the pond by surface water (Pickford, 1991).   The E coli values in the present study, the maximum value was noted in station II (18 mpn/100ML) in October 2016 and comparatively high value at station III (14 MPN/100ML) in October 2016. The increasing anthropogenic activity to the tourist point in and around the Ponmudi Hills has deteriorated the quality and paucity of rock pools. The high number of E. coli may be due to defecating activities of animals and peoples and also due to surface runoff. The same findings and conclusion are also reported by Aji (2004) at Pamba River.

The present study reveals that the microbiological parameters are beyond the permissible limit of water quality standards. At station III the microbiological parameters are very high; this may due to encroachment of human beings and deposition of wastes in the forest area. The anthropogenic activities contaminate the Rock Pools resources are clearly manifested in these results. The deterioration and water pollution is directly related with human intervention and other effluent, which are as a direct result of improper management of ecosystem.

Acknowledgements

References

Abani, S.A and Nipanney, R .1995. An assessment study of drinking water quality of open wells in Malappuram coast Kerala, Indian J. Environ. Proct. 15(7): 504- 509.

Aji. A.T.2004. Studies on Environmental Pollution of Pamba Riverine System ,PhD Thesis, Dept. of Environmental sciences,Kerala university,Trivandrum.2004

APHA, 1995. Standard methods for the examination of water and waste water. 20th Edn., American Public Health Association, Washington D.C

Bhosle, A.B. and B.Rao., 2001. Comparative study of treated and untreated given water for potability. Poll. Res., 20 (3): 475-479.

Chakravorty, K.L., 2002. In A treatise on food laws and food science (2.nd edn). Capital Business Enterprise, Guwahati.

Dara. S.S., 2004. Water pollution. In Environmental chemistry and pollution control (7th edn). Ed S.S. Dara. S. Chand and Co. Ltd., New Delhi.pp 65-93.

Ghosh, S. K.; T. K De; A. Choudhary and T. K Jana, 1991. Oxygen deficiency in Hoogly estuary, East Coast of India. *J. Mar. Sci.* 20 pp. 216 – 217.

BIS [Bureau of Indian Standards]. 1996. Ind. Stand. Drinking Water Specification.

Pickford, J.A., 1991. The worth of water. Technical briefs on health water and sanitation. IT Publication, London .pp 56-59.