Indian Journal of Environmental Sciences 17(1) 2013, pp. 25-27
Green Earth Foundation

MICROBIOLOGICAL QUALITY OF WATER FROM BISALPUR RESERVOIR

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ABSTRACT

This study investigated the microbiological quality of water at four sites along the catchment area of Bisalpur reservoir having a variation of distance of approximate 20-25 Km. from each other. For coliform counting, the water samples were collected from all sites namely Thadoli, Negdiya, Bisalpur and Bonada Gangi (Nasirada) in separate sterilized containers and brought to laboratory for further processing. The viable coliform counts during winter were 40 cfu/ml in Bisalpur, 92cfu/ml in Nasirda, 115cfu/ml in Thadoli and 114 cfu/ml in Negdiya area.The microbiological quality of water was found to be poor.

INTRODUCTION

The potential of water to harbour microbial pathogens and causing subsequent illness is well documented for both developed and developing countries (Younes and Bartram 2001, Wright et al. 2004). Water-related diseases continue to be one of the major health problems globally (UNESCO 2003). It is estimated that 80% of all illnesses are linked to use of water of poor microbiological quality (WHO 2006). One of the strategies for tackling this problem is the provision of protected sources such as boreholes, stand pipes, protected wells and springs (Ahmed et al. 1998). However, such facilities are located some distances requiring transportation to homes. During transportation, water gets contaminated with bacteria which grow and proliferate during storage in the homes (Houge et al. 2006). This contamination may decrease the water source improvements in relation to microbiological quality (Wright et al. 2004).

Present study was conducted on Bisalpur reservoir made on river Banas near village Bisalpur in Deoli, District Tonk. This dam lies between 26° 28' to 26° 29' north latitudes and 74° 37' 30" to 74° 38' east longitudes. It covers about 500 km perimeter area and its maximum depth is about 30.0 m when full of water. In this dam, the water is run off from the surrounding of Banas River during the monsoon season. Bisalpur Dam supplies the water in seven cities i.e. Kekri, Sarvar, Nasirabad, Kishangarh, Ajmer, Beawar and Jaipur, and therefore, study of microbial quality of water was made.

MATERIALS AND METHODS

Study area

Four sites were selected along the catchment area of Bisalpur reservoir having a variation of distance of approximate 20-25 km from each other. The selected sites were having spatial variation and had different kind of exposure and level of water quality, stress etc.

These four sites were Bisalpur, Nasirda, Thadoli and Negadiya from where water samples were collected in separate sterilized containers and brought to laboratory for further processing.

Viable *E. coli* counts

For viable count of coliforms (*E.coli*) in the water samples, spread plate method as described by Quinn et al. (1994) was followed. A range of serial ten-fold dilution of each water sample was made with distilled water from 1:10 (10^{-1}) to 1:10000 (10^{-4}). An inoculum of 100µl from each dilution of each sample was placed on the surface of MacConkey agar medium and then spread over whole of the surface of the medium evenly with sterilized glass rod bent in an L-shape. Two plates of each dilution was inoculated in this manner and incubated at 37°C for 48 hours.

After incubation the colonies were counted in colony counter and the dilutions yielding 30 to 300 colonies were read. The average of two plates with the selected dilution was taken as final colony counts.

Identification of *E. coli* on MacConkey and EMB agar media

A colony from medium used for viable colony counts was taken and streaked on above two culture media for confirmation of *E. coli*. After streaking, the plates were incubated for 48 hours at 37°C in the incubator (Dubey and Maheshwari 2010).

RESULTS AND DISCUSSION

Viable coliform counts are presented according to the four sites during extreme cold ambience.

1. Water sample from Bisalpur :

Mean counts of colony at 10^{-2} dilution: 40

The number of bacteria/100µl of original (undiluted) sample = $40x10^2$

The number of bacteria/ ml of original (undiluted) sample = $40x10^2x10 = 4.0x10^4$

2. Water sample from Nasirda:

Mean counts of colony at 10^{-2} dilution: 92

The number of bacteria/100µl of original (undiluted) sample = $92x10^2$

The number of bacteria/ ml of original (undiluted) sample = $92x10^2x10 = 9.2x10^4$

3. Water sample from Thadoli:

Mean counts of colony at 10^{-2} dilution: 115

The number of bacteria/100µl of original (undiluted) sample = $115x10^2$

The number of bacteria/ ml of original (undiluted) sample = $115x10^2x10 = 1.15x10^5$

4. Water sample from Negdiya:

Mean counts of colony at 10^{-2} dilution: 114

The number of bacteria/100µl of original (undiluted) sample = $114x10^2$

The number of bacteria/ ml of original (undiluted) sample = $114x10^2x10 = 1.14x10^4$

Identification of *E. coli* :

A. Growth on MacConkey agar:

The colonies developed on MacConkey agar were bright pink indicating acid production as a result of fermentation of lactose in the presence of neutral red indicator.

B. Growth on EMB agar:

The colonies on EMB agar gave a distinctive metallic sheen confirming it to be colonies of *E. coli*.

CONCLUSION

The presence of fecal coliform bacteria, the most common being *Escherichia coli*, in aquatic environments indicated that the water has been contaminated with the fecal material of man or other animals. The presence of fecal contamination is an indicator that a potential health risk exists for individuals exposed to this water. Fecal coliform bacteria may occur in ambient water as a result of the overflow of domestic sewage or nonpoint sources of human and animal waste. The presence of *E. coli* in water samples is taken as evidence of faecal pollution (Quinn et al. 1994). These variations in bacterial counts among the different reservoirs may be attributed to the general management practices for maintenance of service reservoirs and the possibility of enroute contamination. The faecal contamination associated with failures in cleaning and technical management stress the importance of instructions for waterworks personnel to perform maintenance work properly (Pitkanen et al. 2008).

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