RESEARCH PAPER:

Seasonal changes in coliform contamination of potable ground water sources in Thiruvananthapuram, Kerala, India

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Asian Journal of Environmental Science (December, 2009 to May, 2010) Vol. 4 No. 2 : 181-185

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SUMMARY

In order to verify the level of microbial contamination in potable well water sources of Thiruvananthapuram city and their suitability for drinking purpose, the present study was conducted. The study area *i.e.* Thiruvananthapuram Corporation with 81 wards was classified into different zones by combining nearby wards. Samples were collected from dug wells from each zone during summer and monsoon seasons of two consecutive years *viz.*, 2006 and 2007. Samples were analysed for total coliforms and fecal coliforms. The samples which showed nil values for TC using MPN method were analysed by PCR . The number of coliforms, both total and fecal were much higher than the permissible limits in most cases. Most of the wells which had higher level of contamination were shallow, which could be the reason for ease of contamination. The hot spot of FC contamination was zone no. 4. The results throw light on the degree of microbial contamination in potable water sources, the seasonal changes as well as hot spots of contamination, which can be useful for further remedial and suitable precautionary measures to prevent outbreak of water borne diseases.

Key words : Coliform contamination; Total coliforms (TC), Fecal coliforms (FC), Most probable number (MPN), Polymerase chain reaction (PCR)

Accepted : ***October, 2009***

Drinking water safety is a worldwide concern. Drinking water may be contaminated by added discharges from human or animal intestines. Diseases caused through contaminated water and poor hygiene practices are leading cause of death among children worldwide (WHO, 2003). Biological hazard in the form of pathogenic bacteria, viruses etc. are responsible for a major portion of diarrhea, morbidity, gastro-intestinal disorder, cholera etc. in most developing countries.

Water contaminated with human feces are generally regarded as a greater risk to human health, as they are more likely to contain human-specific enteric pathogens, including *Salmonella enterica* serovar. *typhi*, *Shigella* spp., hepatitis A virus, and Norwalk-group viruses. Animals can also serve as reservoirs for a variety of enteric pathogens (e.g., various serotypes of *Salmonella, Escherichia coli*, and *Cryptosporidium* spp.) Ground water is generally less susceptible to contamination and pollution as compared to surface water bodies. But in India, where ground water is used extensively for irrigation and industrial purposes, a variety of land and water based human activities are causing pollution of this precious resource. Laluraj *et al.* (2005) reported a high incidence of open defecation in coastal parts of Kerala. Water has played a significant role in the transmission of human diseases and the indicator microorganisms have been used to suggest the presence of pathogens (Peeler *et al*., 2006). Out breaks of a series of water borne diseases were reported from thickly populated areas in recent years especially during the rainy seasons. A survey conducted by Royee (2004) showed that 56% of households in Kollam Municipality discarded child feces in open places. In this context, the present study was aimed to find the source of microbial contamination in well water sources of Thiruvananthapuram Corporation in order to create awareness among the public about the safety of their drinking water.

MATERIALS AND METHODS

The study was intended to analyse the possibility of presence of pathogens through the analysis of indicators in the drinking water sources of Thiruvananthapuram Corporation. For the collection of water samples, the Corporation area which consists of 81 wards were grouped into 15 zones (Table 1) and 3 samples were collected from each zone based on the availability of wells for two consecutive years *viz*., 2006 and 2007 during summer and monsoon seasons. Sampling was done