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Microbiological Analysis of Drinking Water Samples from Different Regions of Shirala Tahsil

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ABSTRACT: Water is one of the most essential needs of all living organisms for their continued existence. Water-borne diseases have been a potential threat in causing severe infections and diseases. Most of the diseases in the developing countries spread through contaminated water. The present study was carried out to determine microbiological quality of drinking water in five different villages of Shirala Tahsil. All the tested samples were found to have high coliforms count and each of them showed presence of *E. coli*, indicating that they are fecally polluted and are not suitable for drinking purpose. Several enteric pathogens such as *Salmonella* and *Shigella* species were also detected in water samples.

KEYWORDS: Coliform, *E.coli*, Most probable number, Water analysis.

I. INTRODUCTION

Water is one of the nature's most important gifts to mankind. According to the WHO, the lack of safe water supply and of adequate means of sanitation is the main reason for as much as 80% of all diseases in developing countries. Sewage containing human excreta is the most dangerous material that pollutes water. Different disease causing organisms are discharged along with fecal wastes. The use of such polluted water increases possibility of transmission of various microbial diseases including typhoid, cholera, dysentery, poliomyelitis and infectious hepatitis.

It is not possible to examine water for every possible pathogen that might be present. Detection of fecal indicator bacteria in drinking water provides a very sensitive method of quality assessment [1].

II. RELATED WORK

Coliforms are the most recommended indicator organisms for monitoring water quality. Coliform bacteria are commonly present in the intestinal tract of warm-blooded mammals including man and can be found in their wastes. Several authors had carried out microbial testing of drinking water and reported the presence of coliform bacteria from drinking water in different regions of India [2, 3, 4, 5]. The presence of coliforms in water is a warning signal that more dangerous bacteria may be present. As per WHO standards, drinking water should not contain any microorganisms known to be pathogenic or any bacteria indicative of fecal pollution. The present study is carried out to investigate microbiological quality of drinking water in various villages of Shirala Tahsil.

III. METHODOLOGY

Collection of samples:

Sampling was carried according to the procedure recommended by American Public Health Association [6]. Drinking water samples were collected for five different villages of Shirala Tahsil (Antri, Natoli, Kapari, Rile, Sagaon) in sterile containers, which are immediately covered tightly after collection of water samples and transported to the laboratory. Microbiological analysis of water samples was carried out immediately after collection.



Microbiological Analysis of Water Sample

1. Total coliform Count by Most Probable Number (MPN) Test

The total coliform count was determined by the most probable number (MPN) per 100 ml sample using multiple tube fermentation method including presumptive, confirmed and completed phases [7].

2. Biochemical analysis

For samples which gave positive results for coliforms test, further identification was done by IMViC (Indole, Methyl Red, Vogues Proskeur and Citrate utilization) tests [8].

3. Isolation and Detection of Enteric pathogens

Detection of *Salmonella* and *Shigella* species were done by the enrichment of water samples on Selenite F broth, followed by isolation of the typical organism on selective medium, Xylose Lysine Deoxycholate Agar (XLD) [9]. Detection of *Vibrio cholerae* was done by enriching the samples in 1% alkaline peptone water for 6 to 8 hours followed by isolation on Thiosulphate Citrate Bile salt sucrose (TCBS) agar medium [9]. For isolation of *E. coli*, Endo agar or MacConkey’s agar medium is used. All colonies with different characteristics were sub cultured onto Nutrient agar (NA) for purification. Enteric bacteria isolated on respective selective or differential media were identified on the basis of their colonial, morphological and Biochemical properties following Bergey’s Manual of Determinative Bacteriology, 1994 [10].

IV. EXPERIMENTAL RESULTS

The total coliform count of the water samples ranged from 31 to 1600. The MPN index of three samples were found to be very high (1,600/100 ml), indicating high level of fecal contamination compared with other samples. All water samples showed presence of *E. coli*. Other enteric pathogens like *Salmonella* sp. and *Shigella* sp. were also found in some water samples. *Vibrio cholera* was not detected in any of the water samples. The results are summarized in table 1.

Sr. No.	Name of village from which water sample is taken	Total coliform count	<i>E. coli</i>	<i>Salmonella</i> sp.	<i>Shigella</i> sp.	<i>Vibrio cholerae</i>
1	Antri	170	Present	Absent	Absent	Absent
2	Natoli	1600	Present	Present	Present	Absent
3	Kapari	1600	Present	Present	Present	Absent
4	Rile	31	Present	Absent	Absent	Absent
5	Sagaon	1600	Present	Present	Present	Absent

Table 1. Microbiological Analysis of Drinking Water samples

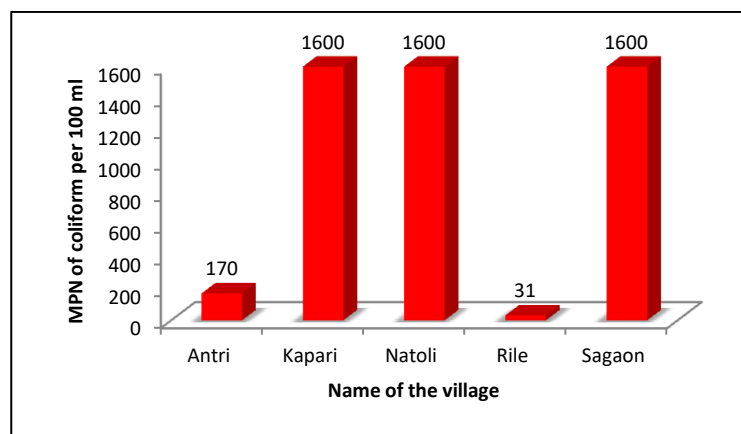


Fig. 1 Coliform Count in different water sample

Several authors had also reported same results of the high number of total coliforms in different water bodies in India during pre-monsoon and post monsoon seasons [4, 11]. The quality of the drinking water is critical in controlling infectious diseases and other health problems. The tremendous rise in pollution of water has adversely affected human health and environment. Bacteriological pollution of drinking water supplies may be either due to the failure of the disinfections of the raw water at the treatment plant or to the infiltration of contaminated water (sewage) through cross connection, leakage points and back siphonage [12]. The water quality must be regularly monitored to prevent spread of water borne diseases and to check the water resources from going further polluted [13].

V. CONCLUSION

According to WHO guidelines, coliform count in any drinking water sample of 100ml ideally should be zero. The results of the present study revealed that all water samples were found to have presence of *E. coli*, indicating that they are fecally polluted and are unfit for drinking purpose unless it is boiled. The water sample also showed presence of other enteric pathogens like *Salmonella* sp. and *Shigella* sp. Presence of these pathogens indicates that there is high risk of occurrence of disease epidemics like diarrhea, dysentery and other infections. It is necessary to take prompt action for periodic monitoring and disinfection of the said water resources. There is highest urge of proper treatment of the water provided by these sources. It is also necessary to incorporate more samples from the representative regions to get the actual status of drinking water quality. There is necessity to create awareness about the hazards of drinking contaminated water and ways of preventing contamination.

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