



## Bacteriological analysis of drinking water samples

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### Abstract

The world health organisation has estimated that up to 80% of all sickness and disease in the world is caused by inadequate sanitation, polluted water or unavailability of water. So the study was conducted to isolate and identify the micro-organism responsible for the contamination of drinking water. Material and methods; a total of 30 drinking water samples were collected. Presumptive test by multiple tube method and confirmative test by identification of bacterial isolates was carried out. Out of 30 samples collected 10(33.33%) were contaminated with either one or more than one type of organisms, results of most probable no test(MPN) showed 4(13.33%) were unsatisfactory. *Pseudomonas* was the common cause of contamination about 6(20%) while *Escherichia coli* and *Klebsiella pneumoniae* were 3(10%), *Proteus vulgaris* 1(3.33%). Conclusions; *Pseudomonas* was the major source of contamination. A regular monitoring of the water quality for improvement not only prevents disease and hazards but also checks the water resources from going further polluted.

**Keywords:** bacteria, drinking water

### Introduction

Urban living is the keystone of modern human ecology. Large cities in the less developed countries typically combine the traditional environmental health problems of poverty and infections, particularly respiratory and enteric, with those of poor quality of living conditions. Such populations have long been incubators and gateways for infectious diseases, associated with poor sanitation and unsafe drinking water [1]. Many of the organisms that cause serious disease, such as Typhoid fever, Cholera and Dysentery can be traced directly to polluted drinking water. These disease causing organisms called pathogens are discharged along with faecal wastes and are difficult to detect in water supplies. Fortunately, less harmful, easily isolated bacteria called indicator organisms can be used indirectly to detect pathogens. Among these indicators are Coliform bacteria. They live in the intestine of man and other animals and are almost always present, even in healthy persons. The presence of Coliforms in water is a warning signal that more dangerous bacteria may be present. Diseases resulting from ingestion of pathogens in contaminated water have the greatest public health impact worldwide. Diarrhoeal diseases are among the leading causes of morbidity and mortality among children under five years of age [2].

Overcrowding and inadequate facilities for human excreta and waste water disposal makes the water distribution system prone to microbial contamination. Presence of faecal coliforms or *Escherichia coli* is used as an indicator for the presence of any of the waterborne pathogens [3, 4, 5]. WHO recommends that no faecal coliform be present in 100ml of drinking water. Good quality water is odourless, colourless, tasteless and free of faecal contamination and chemicals in harmful amounts. The common feature of all routine screening procedures is that the primary analysis is for indicator organisms rather than the pathogens that might cause concern. Indicator organisms are bacteria such as non-specific coliforms, *Escherichia coli* and *Pseudomonas aeruginosa* that are very commonly found in the human or animal gut and which, if detected, may suggest the

presence of sewage. Indicator organisms are used because even when a person is infected with more pathogenic bacteria, they will still be excreting many millions times more indicator organisms than pathogens. It is therefore reasonable to surmise that if indicator organism levels will be very much lower or absent. The micro-organisms of concern in contaminated water include the following bacterial agents of Diarrhoea and Gastroenteritis namely *Salmonella* sp, *Shigella* sp, *Escherichia coli* and *Vibrio cholerae*, Protozoal agents of diarrhoea include *Entamoeba histolytica*, *Giardia lamblia*, *Balantidium coli* and *Cryptococcus parvum*, Enteroviruses causing various clinical ailments, not necessarily diarrhoea but are transmitted by water include Poliovirus, Rotavirus, Hepatitis A virus and Hepatitis E virus [6]. This study was therefore carried out to determine the Bacteriological quality of Drinking water.

### Material and methods

All the water samples which were received in the Dept of microbiology, Shri.Vyankatesh Arts, Commerce and Science College, Deulgaonraja for a period of 2 months, about 30 samples were included in the study. The samples were tested for Bacteriological contamination by Coliform organisms using Presumptive Coliform count employing the method described in Mackie and Mc Cartney. The most probable number of these bacteria was determined from Mc cradys probability tables. Samples with MPN more than three were considered unfit for drinking purposes. Most probable number method(MPN); In this technique a 100ml water sample is distributed in culture broth containing lactose and an indicator(after incubation the number of tubes which shows lactose fermentation with acid and gas production are counted) the lactose fermented by coli form is reported. By reference to probability tables, the most probable number of coli form in 100ml water sample can be estimated. Most probable number is done in following steps

1. Presumptive test done by multiple tube method
2. Confirmative test and identification of organisms up to species level according to Mackie and Mc Cartney

## Results

Out of 30 samples collected, 10(33.33%) were contaminated with one or more than one types of organisms. *Pseudomonas aeruginosa* was the common cause of contamination about 6(20%), *Escherichia coli* and *Klebsiella pneumoniae* 3(10%) and *Proteus vulgaris* 1(3.33%)

## Discussion

Safe guarding drinking water supplies is a major health responsibility. The WHO guidelines place the greatest emphasis on the microbiological quality of drinking water. The concept of safe water eludes the common man. Consequently an outbreak of water borne diseases remains a great burden on the society. The bacteriological examination of drinking water is a sensitive method to assess its quality though it does not detect contamination with protozoa, virus and fungi. Enumeration of coli forms has been recommended by the Indian council of medical research and has been the main method adopted by many workers.<sup>9</sup> According to the WHO, The lack of safe water supply and of adequate means of sanitation is blamed for as much as 80% of all diseases in developing countries. Sewage containing human excreta is the most dangerous material that pollutes water. The most important microbial diseases transmitted through water are Typhoid fever, Amoebic dysentery, bacillary dysentery, Cholera, Poliomyelitis and Infectious hepatitis<sup>[10]</sup>. The samples received from hostel overhead tank showed mixed contamination of *Pseudomonas aeruginosa* and *Escherichia coli*. However when the sample was again received from the same site after treatment showed contamination with *Pseudomonas aeruginosa* only. This showed prevalence of *Pseudomonas* even after cleaning and treatment of water. This could be due to mixing of sewage water with drinking water as a result of leakage in the pipeline. A regular monitoring of the water quality for improvement not only prevents disease and hazards but also checks the water resources from going further polluted. The conservation of water sources is very important to provide safe water as far as possible, water sources must be protected from contamination by human and animal waste which can contain a variety of Bacterial, Viral, Protozoan and Helminthic Parasites. The control of drinking water quality in distribution networks remain a major challenge. The protection of sources, treatment and distribution management are all critical strategies in maintaining and improving water supply.

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