JETIR.ORG ISSN: 2349-5162 | ESTD Year : 2014 | Monthly Issue
JOURNAL OF EMERGING TECHNOLOGIES AND INNOVATIVE RESEARCH (JETIR)
An International Scholarly Open Access, Peer-reviewed, Refereed Journal

"Bacteriological analysis of water: A Case study of Beed city (MH) India."

Zagare Manjushri Sitaram ,

Mrs. Kesharbai Sonajirao Kshirsagar Arts, Science & Commerce College, Beed

Abstract

Bacteriological analysis of water is a critical procedure to assess its safety and sutability for human consumption This study of bacterial quantity of general water sample at Beed collected from source including (tap water, lake water, borewell water, filter water,and panipuri) the standard microbiological technique was employed the most probable numbers (MPN) the detect and quantity the presence of coliform bacteria the preliminary estimate of coliform contamination 10MPN/50ml to 5MPN/50ml up to 4 water sample were found to be contaminated. due to contaminated water diseases such as diarrhrea, cholera wind disorder and water borne disease like colds and coughs are caused the result revealed that the drinking water of public place in Beed was found to be not microbiologically clean and safe for drinking. The bacteriological analysis of water sample revealed that presence of coliform bacteria in several source indicating potential fecal contamination and posing a risk in public health.

Introduction

Water is essential resource for life and accests to clean and safe drinking water is a fundamental to human health and well being, the water source can be easily contaminated by various biological chemical and physical agent among these bacteriogical contamination is one of the most significant corcerns as it can lead to the spread of numerous waterborne disease such as cholera Thyphoid dysentery and hepatitis. Bacteriogical analysis of water focuses on detecting indicator organism primarily coliform bacteria which serve as signals of fecal contamination and the possible presence of pathogenic microorganism the presence of fecal coliform particularly significant as it indicate recent contamination and the potential for harmful pathogens.

This study aims to evaluate the bacteriological quality of various water source using standards microbiological techniques the research seeks to determine the safety of there water source for human consumption and hilighting the importance of regular monitoring and proper water treatment practices.

Water process such as boiling chlorinated and filtration are widely used in both household and municipal levels to ensume water safety advance techniques including UV, disinfection ozonation and membreane based filtration system the effectiveness of those remedies however depends on proper implementation consistent monitoring and public awareness.

Objectives

MICROBIOLOGICAL ANALYSIS OF WATER

Need of Water Analysis

A major quantity of earth's water is salty and a major quantity of remaining water is not potable due to presence of toxic chemicals and microorganisms. It is estimated that only about 0.007% of the earth's water is available for direct human consumption.

The drinking water is obtained from rivers, streams, lakes, wells and bore wells. Such natural water supplies, particularly the surface sources are polluted with domestic and industrial wastes. The water is a potential carrier of pathogenic microorganisms, which may hazard the health of living beings. According to rough estimates, more than 15 million deaths worldwide result annually from waterborne infections. Diarrheal diseases of small children alone result in more than two million deaths annually in developing countries. The outbreak of cholera in South America in 1991-1995 resulted in more than 1 million cases and over 10,000 deaths (Atlas and Bartha, 2007). Hence, the drinking water must be free from microorganisms particularly the pathogens. The number of saprophytic bacteria also should not exceed 100 ml of water. Many diseases are transmitted through drinking water especially the infections of intestinal tract. Some of the common examples of enteric diseases with respective pathogens are typhoid (Salmonella typhi), dysentery (Shigella dysenteriae), amoebic dysentery (Entamoeba histolytica), cholera (Vibrio cholerae), etc. The causative organisms of these diseases are released through fecal matter of patient and may enter into drinking water sources. Hence, microbiological analysis of water is very essential to determine potability of water.

Objective Of Study

1) The water brone disease is commonly occurred in Beed city.

2) The primary objective of this study is to asses the bacteriogical quality of various water sources by detecting and quantifying the presence of indicator organism or total coliform in Beed city.

3) To evaluate the safety of water for human consumption.

4) Determine the presence of coliform bacteria in water sample from various sources including borewell, tap water, lake water filter water and panipuri water.

This is what we really aim to see

Material and methodology

Media composition (Hi-media) Glasswares: Beakers, Flasks, Petri Dishe, Pipettes, Test Tube, Along With Specialized items like durham tubes. These items are used for collecting, Storing, and preparing samples, as well as for culturing and observing bacteria.

MacConkey broth

Ingredients	Grams/Litre
Peptic digest of animal tissue	20.00 gm
Lactose	10.00 gm
Bile salts	5.00 gm
Sodium chloride	5.00 gm
Neutral red	0.075 gm
Final PH at 25° c	7.4 +0.2

Methodology

1) Sample collection

Water testing was conducted in Beed city.

Water samples were collected from Five different locations in Beed city.

The water sample were collected separately in different pre-sterilized conical flask (100 ml) and analysed within 1 hour of collection.

2) Sample inoculation

5 sample were added to maccokeys broth in 100 ml MPN method tube. tube were incubated at 37°Cfor 24 and 48 hour.

letter positive and negative result were observed on different tube after incubation period.

Sr.No	Location		Sample Type	Collection Date Result Date
1	Ashoke Nagar Beed	Tap Water	23/08/2024	31/08/2024
2	Bindusara Dam Beed	Lake Water	29/08/2024	03/09/2024
3	Zam Zam Colony Beed	Bore Well	01/10/2024	05/10/2024
4	Shivaji Nagar Beed	Filter Water	14/10/2024	21/10/2024
5	Shubhas Road Beed	Panipuri	04/12/2024	09/12/2024

Test media and MPN test

1) The test was performed as three sets, each with five tubes containing 10 ml. MacConkey's broth, Set-l and Set-Il contain single strength and Set-III contain double strength.

2) These three sets of nutrient medium tubes are inoculated respectively with- 0.1, 1.0 and 10 ml. water sample.

3) Addition of 10 ml inoculum in Set-III causes much dilution of nutrient medium which decreases the amount of nutrients per unit volume of medium.

4) Hence, double amount of ingredients are initially added to keep the balance.

5) The complete set of 15 tubes of MacConkey's broth was incubated at 37°C, for 24 hrs.

6) Gas formation in Durham's tubes and change in colour of the medium from red to pink indicates positive test.

7) The number of positive tubes from each set is noted.

8) Scientists McCartney and Mackle have prepared a standard table correlating number of positive tubes in each set and number of coliform bacteria present in the sample.

9) Using this MPN table of coliform bacteria/100 ml of water sample is determined.

10) The water sample showing total absence of coliforms is considered as good and potable.

Set Number	Number of Tubes used	Strength Of Medium	Amount of Nutrients Medium In Each Tube (ml)	Quantity Of Water Sample (ml)
Set-1	5	Single Strength	5 (ml)	0.1 (ml)

Set-2	5	Single Strength	5 (ml)	1.0 (ml)
Set-3	5	Single Strength	10 (ml)	10.0 (ml)

Sample 1 Tap Water

Sr.no	Strength of Media	Number of Water Sample Added	No. of Tube showing +ve result(A&G)
1	Double Strenght Tap Water	0.1 ml	0 +ve
2	Single Strenght Tap Water	1 ml	0 +ve
3	Single Strenght	10 ml	2+ve

Result :- MPN = 13 Coliform/100 ml of H2O

MPN= No.of +ve tubes ×100 / Vol.of sample ×total vol of sample used

Sample 2

Sr.no	Strength of Media	Number of Water Sample Added	No. of Tube showing +ve result(A&G)
1	Double Strenght Lake Water	0.1 ml	5 +ve
2	Single Strenght Lake Water	1 ml	5 +ve
3	Single Strenght Lake Water	10 ml	5+ve

Result :- MPN = 2400 Coliform /100 ml of H2O

The water is nonpotable because it contain coliforms that means it must be treated through clisinfectin.

Sample 3

Sr.no	Strength of Media	Number of Water Sample Added	No. of Tube showing +ve result(A&G)
1	Double Strenght Borewell Water	0.1 ml	5 +ve
2	Single Strenght Borewell Water	1 ml	5 +ve
3	Single Strenght Borewell Water	10 ml	5+ve

Result :- MPN = 2400 Coliform /100 ml of H2O

The water is nonpotable because it contain coliforms like E.coli and Klebsiella that means it must be treated through clisinfectin.

Sample 4

Sr.no	Strength of Media	Number of Water Sample Added	No. of Tube showing +ve result(A&G)
1	Double Strenght Filter Water (10ml)	0.1 ml	5 +ve
2	Single Strenght Filter Water (1ml)	1 ml	5 +ve
3	Single Strenght Filter Water0.1 ml	10 ml	5+ve

Result :- MPN = 2400 Coliform /100 ml of H2O

The water is nonpotable because it contain coliforms like E.coli and Klebsiella that means it must be treated through clisinfectin.

Sample 5

Sr.no	Strength of Media	Number of Water Sample Added	No. of Tube showing +ve result(A&G)
1	Double Strenght Pani puri (10ml)	0.1 ml	5 +ve
2	Single Strenght Pani puri (1ml)	1 ml	5 +ve
3	Single Strenght Pani puri (0.1 ml)	10 ml	5+ve

Result :- MPN = 2400 Coliform /100 ml of H2O

The water is nonpotable because it contain coliforms that means it must be treated through clisinfectin.

Conclusion

The study can provide information about the bacterial quality of public drinking water in beed city by MPN method.

The bacteriological analysis of water. Sample in present study showed a high level of bacterial load. The coliform count exceeded the acceptable limit which make the water unsuitable for drinking and cleaning. Out of 5 samples 4 samples are nonpotable because it contain high level of bacterial coliform, potential pathogen for public health corner.

Hence there is need for well water maintenance. Environmental sanitation around the well a sea and hygienic practices by households and individuals to help reduced the risk of disease outbreak that could result due to organisms encountered in this study.

Reference

State General Administration of the people. Republic of china for Quality supervision and Inspection and Quarantine (AQSIQ) Examination method for public place part-5 Central Air Conditioning ventilations systems GB/T 18204.5-2013. AQSIQ, China.2013

Water Quality-Enumerations of legionella ISO; Geneva, switzerland 2017.

Bacteriological Analysis of drinking water by MPN methods. "Rakesh Dhakal public. Helth microbiology tribhuvan University Nepal.

Jayana, B.L.., prasai, T Singh A& Yami, K.D. (2009). Assessment of

drinking water quality of madhyapur-thimi and study of Andibiotic Sensitivity against bacterial Isolates. Nepal Journal of science and Te Chnology, 10, 167- 172

Guidelines for Drinking-water Quality (2008) 3d vol world Health organizations. Geneva, Switzerland: Recommendations

Sharon, O., Buce. I.d, Wayne, W..,and sherry W. (2013). Drinking Water Bacteria Available from: http://extension unl.edu/publications. accessed.

Department of health and social Security (1982). The Bacteriological Examinations of drinking water supplies. Her majestry's stationary office (HMSO). London.

Saudi Journal of biological science August (2019). DOI 10. 21276) Hay 9-

2019 4.7.2.

Dr. Balkrishina .m. sandikar Himalaya published House (2013) Applied microbiology. (page NO. 140).

Packiyam. R.. S. Kananan, s. pachaiyappani and U. Narayanan (2016) Effect of Storage Containeres.on Coliform Drinking Water Int. J. Curr. microbiol App. sci. (2016) S (1): 461-477

I down AO, Oluremi BB, Odubawo km (2011). Bacteriological Analysis of Well Water samples in sagamu. African Journal of clinical and Experimental microbiology 12(2): 86-91.

Hughes JM, Koplan JP (2005). Saving Lives through Global Safe Water, Journal of EmergingInfectious Diseases, 11(10): 1636-1637.

Atlas and Bartha, 2007.