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Biological Science

SCREENING OF BACTERIOLOGICAL CONTAMINATION OF DRINKING WATER: ASSESSMENT OF TBC AND *E. Coli* PREVALENCE

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ABSTRACT Contaminating drinking water with microbial pathogens remains a significant public health threat, particularly in underserved regions. The major objective of the current study was to screen for bacterial contamination and *Escherichia coli (E. coli)* in drinking water samples by employing the Bactaslyde BS102 *Test Kit*. *Bacterial* contamination of drinking water is a serious public health concern. Throughout the current work, drinking water samples were obtained and examined from various sites in slum settlements. The test kit was a quick, easy, and efficient method for detection. The test showed that all the samples collected from different sources were found to be positive for bacterial contamination; some of the samples were positive for *E. coli*, indicating a general problem of microbial contamination. These results underscore the need for better water treatment processes to ensure public health safety.

KEYWORDS : Drinking water, slum, contamination, health

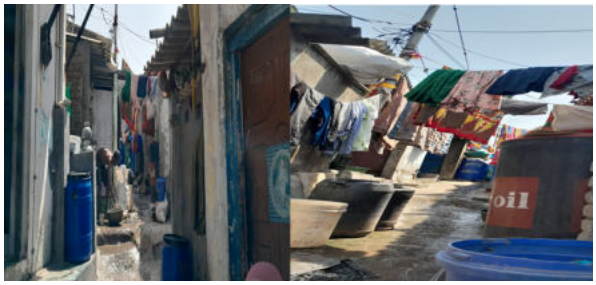
INTRODUCTION

Safe drinking water access is important to human health and well-being. Throughout the world, contaminated drinking water causes more than 485,000 diarrheal deaths every year, the majority of which take place in developing nations [1]. Microbial pathogens like *Escherichia coli* and faecal coliforms are generally known as indicator microorganisms of faecal contamination that can be utilised to predict the occurrence of disease-causing microorganisms like Salmonella, *Vibrio cholerae, and Giardia lamblia* [2]. In India, slums and informal settlements typically depend on groundwater or uncontrolled surface water sources. The sources become contaminated through seeping sewer pipes, open defecation, and uncovered wells. Microbial indicator analysis plays an important role in examining water safety as well as public health risks potential estimation. In the study Wang et al. introduced a biochip-based Loop-Mediated Isothermal Amplification (LAMP) assay capable of detecting low concentrations of *E. coli* in water within 15 minutes, offering a rapid and cost-effective alternative to traditional methods[3]. Different researchers have worked on evaluating the presence of *E. coli* in drinking water [4,5,6,7]. This study aimed to screen for the presence of *E. coli* in collected drinking water samples to determine its potability.

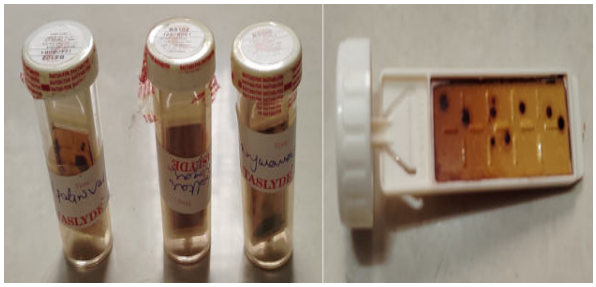
METHODOLOGY

Sample Collection:

Twenty drinking water samples were collected from various sources, such as municipal tap water and bore water, from different selected slum areas (Govalak, Morarji Vasahat, Banjaravas, Halpativas, and Ambedkarnagar) of Surat city. The samples were taken in sterile tubes and treated right away on the spot, and kits were securely packed and brought to the laboratory to incubate for 24 hours.



Sampling area



Colony formation on slides

Test Procedure:

The Bactaslyde BS102 kit uses a dip slide test method to simultaneously assess total bacterial count (TBC) and *E. coli* levels in a sample. The test kit provided a dual media slide, allowing for the growth of both TBC and E. coli

Observations:

Following incubation, the presence of *E. coli* colonies (which are yellow) and the overall TBC (red colonies) were compared to a density chart to determine the bacterial count.

RESULTS AND DISCUSSION:

Colonies were observed in all the samples within a 24-hour incubation period. All the samples collected from different sources were found to be positive for bacterial contamination, and four of the samples showed positive for *Escherichia coli*. The number of colonies per sample varied, but all the slides showed at least 10^2 CFU/ml, whereas some of the samples showed up to 10^9 CFU/ml and were irregular.

Different studies have reported bacterial and, particularly, *Escherichia coli* contamination in drinking water and its significance for public health in India. Shekhar et al. isolated multidrug-resistant *E. coli* from drinking water in Ayodhya, Uttar Pradesh, and raised microbial safety concerns regarding local water sources [8]. In one of the studies that examined roadside vendors' drinking water in Delhi, a high microbial load and *E. coli* contamination were recorded, which reflected poor treatment and handling practices [6]. Some researchers reported that groundwater sources in the Brij area were highly contaminated with multidrug-resistant *E. coli*, reflecting more rural public health hazards [9]. Similarly, other researchers examined water sources in Punjab's Bist Doab region and documented high *E. coli* contamination, indicating direct linkage to waterborne diseases [10]. In Assam, Choudhury et al. documented bacterial pollution of Goalpara District's water sources, necessitating early intervention to find drinking water [11].

The global prevalence of bacterial colonies in all water samples examined within a 24-hour incubation time is a sign of the widespread microbial contamination of drinking water sources. The detection of *Escherichia coli* in four samples is noteworthy since it is a conclusive marker of faecal contamination and possible presence of disease-causing microorganisms [12].

The results concur with research studies carried out in different parts of India. Kumar and Kansagara [13] in Rajkot district of Gujarat have recorded Total Coliform (TC) levels of 10-1300 CFU/100 ml, exceeding permissible limits, with the presence of *Salmonella* and *E. coli* in several samples. A similar study in the Amritsar district revealed that 42.9% of the 1,317 water samples were unsuitable for human consumption due to bacteria, and this was highest with submersible pumps and tanks[14].

Surat, Gujarat, had WASMO carry out a Multi-District Assessment of Water Safety (M-DAWS) survey, which confirmed bacteriological contamination in rural drinking water samples. The survey established the lack of residual chlorine in nearly all samples analysed, a key factor responsible for the inhibition of microbiological contamination [15].

These results highlight the critical necessity for ongoing monitoring and rigorous water treatment protocols to ensure microbial safety. The application of integrated water quality analysis, including TBC analysis, can be used to detect contamination early and avoid such instances of waterborne disease outbreaks. The findings of this study indicated contamination levels with *E. coli* in some of the drinking water samples analysed. This is alarming since *E. coli* contamination of drinking water is a reliable indicator of faecal contamination, which may result in waterborne disease outbreaks. The results indicate that the water sources analysed are unsafe for drinking according to WHO [16]. The World Health Organisation underscores that *E. coli* must not be found in any 100 ml drinking water sample, underlining the critical necessity to enforce rigorous water quality standards.

Improper handling and treatment of drinking water might be the cause of bacterial presence. Water can become contaminated by unsuitable storage procedures. Lack of sanitation near water sources also leads to bacterial contamination. The results indicated that increased water treatment and sanitation procedures were needed to protect public health.

Some of the possible reasons for the contamination include Inadequate water treatment, storage or distribution contamination, and cross-contamination due to poor sanitation around water sources.

The results call for enhanced treatment of water and sanitation to help ensure public health. Further investigation should investigate how concentrations of contamination of *E. coli* relate to some water treatments in determining effective intervention of effective interference with contamination prevention and provision of safe drinking water.

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