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Pathogenic Bacteria Prevailing in the Tea Stall Water from Different Areas of Dhaka City

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Abstract

An experiment was conducted in the microbiology department of Primeasia University. *Salmonella* spp., *E. coli*, *Klebsiella* spp., *Vibrio* spp. cause potentially epidemic and life-threatening, severely dehydrating disease. Cholera infections are most common through drinking contaminated water containing *Vibrio cholerae*, found naturally or introduced from the feces of cholera patients. In this study, the drinking water from the tea stall was tested to identify possible source of infection. A total of 9 areas in Dhaka city, including tea stalls, were selected for collecting and culturing drinking water in the lab. *E. coli*, *Salmonella* spp., and *Vibrio* spp. etc., microorganisms were detected, and among those, *E. coli* was the most predominant.

Keywords: Too numerous to count, Water borne disease, Fresh water, and Fecal contamination.

1. Introduction

Water is a transparent fluid which forms the world's streams, lakes, oceans and rain and is the major constituent of the fluids of living things. Water is a liquid but often co-exist gaseous, ice and solid state. It also exists as snow, fog, dew and cloud. Water covers 71% of earth's surface which is vital for all forms of life (Lanrewaju *et al.*, 2022). Safe drinking water is essential to human and other life forms even though it provides no calories or organic nutrients. Access to safe drinking water has improved over the last decades in almost every part of the world, but approximately one billion people still lack access to safe water and over 2.5 billion lack accesses to sanitation. There is a

clear correlation between access to safe water and gross domestic product per capita (Happy *et al.*, 2018; Kristanti *et al.*, 2022).

Waterborne diseases are caused by pathogenic microorganisms that most commonly are transmitted in contaminated fresh water. Water pollution is a serious problem which is caused by caused by fecal contamination due to the potential for contracting the diseases from pathogens (Sarker *et al.*, 2021; Wen *et al.*, 2020). Though water is essential for our day to day life, many people do not have access to clean and safe drinking water and many die of waterborne bacterial infections. Drinking water in tea stall is also very risky as proper treatment is not done normally. So the aim

of this study is to assess the microbiological quality of drinking water in different teal stalls in Dhaka city.

2. Methodology

Study Area

This research was conducted to research and cultivation laboratory, Primeasia University, Dhaka, Bangladesh.

Study Duration

The project was conducted to 12th October, 2015 to 20th February, 2017.

Samples Collection

Nine water samples were collected from different areas in Dhaka city. The areas are:

- Mouchak
- Farmgate
- Jatrabari
- Nikunja
- Kallyanpur
- Banani
- Airport
- Sayadabad
- Shahajadpur

Media Used

Total of 4 media were used in this study. The media were:

- Mac-Conkey Agar
- TCBS Agar
- SS Agar
- Nutrient Agar

Lab Procedure

All the water samples were inoculated to nutrient agar first and incubated for 24-48 hours at 37C. The positive samples with growth then sub cultured to selective media for 24-48 hours at 37C. The results were confirmed by physical monitoring of the colonies supported with Gram staining results.

Statistical Analysis

IBM SPSS software version 22 was used for statistical data analysis.

3. Results and Discussion

Contamination of drinking water is one of the greatest health problems worldwide, particularly in developing countries. This study aimed to analyze the bacterial contamination in drinking water of various tea stall sources of Dhaka city and analyzed in Primeasia University, microbiology department.

Table 1 reveals that growth was found in all the selected tea stall areas of Dhaka city. *E.coli* was the most predominant organism found in maximum location tea stall drinking water. Mouchak, Farmgate, Nikunja, Banani, Airport, Shahajadpur are the area where *E.coli* was found. *E. coli* is recognized as key indicator organism in worldwide for fecal pollution in water (Ashbolt *et al.*, 2001). Its presence strongly suggests that the supply of water has greatly been exposed to animal or human waste, harboring potentially other pathogenic microorganisms, like *Shigella*, *Salmonella*, and *Vibrio* species. As per guidelines of World Health Organization (WHO), zero *E.coli* or detectable fecal coliforms should be contained in drinking water in any 100 ml sample (WHO, 2017).

Table 1: Isolates from Different Area Tea Stall Drinking Water.

Samples	Media	Organism	Colony Count for 100ml (Filtration)	Colony Count for 100microL (Spread)
	Mac		TNTC	TFTC, 250
Mouchak	SS	<i>E.coli</i>	TFTC, 200	No Growth
	TCBS		TFTC, 37	No Growth
	Mac		TNTC	TFTC, 20
Farmgate	SS	<i>E.coli</i>	TNTC	TFTC, 1
	TCBS		TNTC	No Growth
	Mac		TNTC	TFTC, 20
Jatrabari	SS	<i>Vibrio spp.</i>	TNTC	TFTC, 1
	TCBS		TNTC	TFTC, 1
	Mac		TNTC	TFTC, 100
Nikunja	SS	<i>E.coli</i>	TNTC	No Growth

	TCBS		TNTC	No Growth
	Mac		TNTC	TFTC, 60
Kallyanpur	SS	<i>Salmonella</i> spp.	TNTC	TFTC, 5
	TCBS		TNTC	TFTC, 10
	Mac		TNTC	TFTC, 80
Banani	SS	<i>E.coli</i>	TFTC, 18	No Growth
	TSBS		TNTC	TFTC, 3
	Mac		TNTC	TFTC, 20
Airport	SS	<i>E.coli</i>	TNTC	TFTC, 1
	TCBS		TNTC	No Growth
	Mac		TNTC	TFTC, 280
Saydabad	SS	<i>Vibrio</i> spp.	TNTC	TFTC, 31
	TCBS		TNTC	TFTC, 150
	Mac		TNTC	TFTC, 50
Shahajadpur	SS	<i>E.coli</i>	TNTC	TFTC, 20
	TCBS		TNTC	TFTC, 20

Jatrabari and Saydabad are the areas where vibrio spp. was found and only in Kallyanpur, *salmonella* spp. was found. Most of the areas, the results were TNTC which means too numerous to count in 100ml filtration method and the results were TFTC which means too few to count in 100 micro litre spread plate technique method. *V. cholerae*, are the causative agents of cholera (Albert *et al.*, 2024) and in aquatic environments, especially with poor water hygiene under warm conditions (Colwell, 1996; Rahman *et al.*, 2019).

4. Conclusion

Due to time and resource limitations, the *E. coli* spp. and *Vibrio* spp. were commonly found in water samples, and *Escherichia coli* was the most prominent, indicating the presence of fecal coliform contamination, which was so alarming. A similar type of finding can occur in the other areas of Dhaka city as well as all over Bangladesh. Regular microbiological testing should be performed in the tea stalls of different areas of Dhaka city, and people should be aware of drinking this water. All people should be aware of drinking this type of tea. Research was conducted as a cross-sectional study, and the study revealed that the drinking water collected from 9 different areas was contaminated with various disease-causing bacterial species.

5. Ethical Clearance

This research was performed maintaining all ethical aspects. Institutional approval was taken from department of microbiology, Primeasia University.

6. Author Contributions

S.G.: performed all the laboratory works, A.U.Z.: prepared the manuscript, S.G.; and A.U.Z.: prepared the figure and tables, S.U.Z.: advised and supervised in whole laboratory works and manuscript writing.

7. Acknowledgement

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8. Conflicts of Interest

The authors announce that there is no conflict of interest with respect to the publication of this article.

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