

Bacteriological Analysis of Drinking Water from Various Fast Food Corners of Police Bazar, Shillong, Meghalaya

**Antymary Rani, Batlariti Kurbah, Daroilin Nongkynrih, Dohu Simi, Fabyleen L.
Nongpiur, Lawanri Daiamai, Lupon Yeaton, Pem Yangchin, Sonam Tsomu, Tejaswini
Vashishtha**

(6th Semester Students 2020-2023 Batch)

Introduction

Contaminated water, poor sanitation and improper hygiene practice leads to water borne diseases. As a consequence, 34 million deaths a year occur throughout the world, which are mostly children (UNICEF, 2008). According to a systematic review on microbial drinking water quality, even the improved sources including piped water were observed to be contaminated with *E. coli* or Thermotolerant Coliform TTC (Bain *et al.*, 2014b). Thus, microbial contamination is widespread and affects all water sources (Bain *et al.*, 2014a). Several researchers in different countries around the world observed that various disease-causing agents or pathogens viz. faecal coliform bacteria or toxic chemicals result in water contamination. As a consequence, consumption of contaminated water leads to several health problems (Lahlou, 2002; Howard, 2002; Obiri-Danso *et al.*, 2003; Dodoo *et al.*, 2006). Guidelines for Drinking-Water Quality recommend that faecal indicator bacteria (FIB), preferably *E. coli* or alternatively thermotolerant coliform (TTC), should not be detectable in any 100 ml drinking water sample (WHO, 2011).

Police Bazar is the main shopping hub in Shillong, the capital city of Meghalaya. With the growing population and huge inflow of tourists, a number of restaurants, fast food corners and street vendors have come up in the city. For many middle class people, fast food corners are preferred because of cheaper price of food items. However, the hygienic status of these eateries is not monitored and the drinking water provided is directly collected from the tap or a water storing container. The water supply in the city is either by the Shillong Municipal Board or by the Public Health Engineering Department. Due to shortage water supply many of the eateries buy water from an individual who brings water in cans or from a tanker. Unclean and unsafe water, poor sanitary and hygienic facilities in restaurants of the city possess a potential source of diseases and risk to human health.

Objective: The objective of this study is to determine the bacterial contamination of drinking water provided in fast food corners of Police Bazar, Shillong by biochemical tests (culture characteristics).

Methods:

Sample Collection

Samples from five fast food corners from different locations of Police Bazar (samples 1-5) were collected in sterilised sampling bottles and brought to the laboratory for culturing. One sample was collected from a bore well (sample 6) from within the College campus for comparison. Sampling was done in the month of May 2023.

Biochemical Tests

Biochemical tests were done in accordance to standard procedure (Aneja, 2003). Three steps were followed:

1. Presumptive test

For analysis 1 mL of the sample was inoculated in 10 mL MacConkey broth. The microbial growth is observed as turbidity in the broth.

2. Confirmed Test

In the confirmed test, the samples from the presumptive MacConkey broth tubes were streaked on Eosin-Methylene Blue (EMB) Agar medium that is selective in nature because of the presence of the dye methylene blue which inhibits the growth of gram positive bacteria, allowing the growth of gram negative bacteria.

3. Complete Test

Complete test is used as a confirmatory test for the presence of *E.coli* in the water sample. In this test, lactose positive colonies from EMB agar were inoculated into a lactose broth tube. If there is production of acid and gas in the inoculation lactose broth, this confirms the presence of *E.coli* in the water sample and is considered a positive complete test.



Figure 1. Students performing the project

Results:

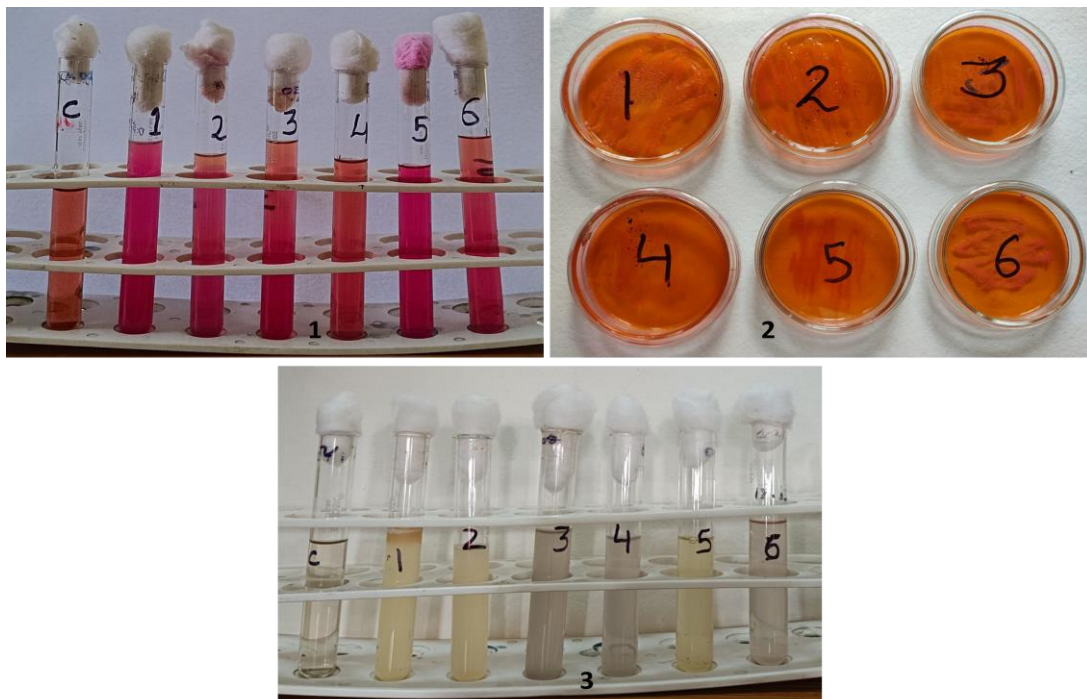


Figure 2. Culture Characteristics; 1. McConkey broth; 2. Eosin-Methylene Blue (EMB) Agar; 3. Lactose broth

Table 1. Culture characteristics of water samples in different culture media

Steps	Media	Sample Number	Results
1	MacConkey broth	1	Positive
		2	Positive
		3	Positive
		4	Positive
		5	Positive
		6	Positive
2	EMB agar	1	Positive
		2	Positive
		3	Positive
		4	Positive
		5	Positive
		6	Positive
3	Lactose broth	1	Positive
		2	Positive
		3	Positive
		4	Positive
		5	Positive
		6	Positive

From our experiments, we observed that all the samples collected showed positive results. This indicates the presence of bacteria i.e., *E.Coli*. However, the McConkey and Lactose broth showed different intensity of turbidity. Samples 1, 2 and 5 showed higher turbidity and gas production compared to samples 3, 4 and 6. Sample 6, which is the water sample collected from a bore well from the college campus showed the least turbidity, which indicates that it is cleaner than the water samples collected from different fast food corners of Police Bazar.

Conclusion:

From our experiments it can be concluded that the water samples collected from different fast food corners of Police Bazar are untreated and contaminated with *E.Coli*. It is therefore, suggested to avoid drinking water from these food centres.

References:

Aneja, K.R. 2003. Staining and biochemical techniques. In: Experiments in microbiology, plant pathology and biotechnology, 4th edn. New Age International (p). Ltd., Publishers, New Delhi.

- Bain, R., R. Cronk, J. Wright, H. Yang and J. Bartram. 2014b. Fecal contamination of drinking water in developing countries: a systematic review and meta-analysis. *PLoS Medicine* 11(5): 1-23.
- Bain, R., R. Cronk., R. Hossain, S. Bonjour, K. Onda, J. Wright, H. Yang, T. Slaymaker, P. Hunter, A. Prüss-Ustün and J. Bartram. 2014a. Global assessment of exposure to faecal contamination through drinking water based on a systematic review. *Trop Med Int Health*. 19(8):917-27.
- Dodoo, D. K., E. K. Quagraine, F. Okai-Sam, J. Kambo Dorsa and J. V. Headley. 2006. Quality analysis of sachet waters in the Cape Coast municipality of Ghana. *J. Environ. Sci. Health*. 41(3): 392-342.
- Howard, K. 2002. Comparison study on river quality. *Sci. Total Environ*. 207: 141-148.
- Lahlou, Z. M. 2002. Water quality in distribution systems. In *National Drinking Water Clearing house fact sheet*. West Virginia University. Pp.1-4.
- Obiri-Danso, K., A. Okore-Hanson and K. Jones. 2003. The microbiological quality of drinking water sold on the streets Kumasi, Ghan. *Letters Appl. Microbiol*. 37: 334- 339.
- UNICEF. 2008. *UNICEF Handbook on Water Quality*. Pp. 20-21, 41, 53-55.
- WHO. 2011. *Guidelines for Drinking-Water Quality*. 4th edition. WHO, Geneva. Pp.564. Available at http://whqlibdoc.who.int/publications/2011/9789241548151_eng.pdf