Original Research Article

MICROBIOLOGICAL STUDY OF CONVENTIONAL DRINKS IN MIRPUR AREA, NORTH DHAKA CITY OF BANGLADESH

ABSTRACT

Fruit juices are incredibly popular because of how tasty and fresh they are. These juices contain all the nutritional benefits that were found in whole fruits. Juices are a nutritious beverage for people of all ages. People enjoys these drinks to meet their thirst almost every day during their work break or way to work. However, the situation is very different if they are exposed to pathogenic microorganisms when the juice is being processed. Juice might provide the bacteria with adequate chances to survive and grow because of its nutritional qualities. To examine the microbiological quality, we included two different types of fresh juices in this investigation. There was contamination in every sample. Growth in MacConkey agar media showed pink mucoid colony. And also metallic sheen in EMB media is been noticed which determines the samples contain fecal coliform. The result is in between 1- 100 MPN which indicates these drinks can cause intermediate risk. These beverages' water has both a physicochemical and a microbiological component. For many individuals, buying traditional drinks from street vendors is a crucial way to quench their thirst. However, it might not always be safe to drink and might include potentially dangerous germs. The goal of the current study was to evaluate the microbiological quality of ordinary drinks sold on the street, specifically the presence of fecal coliform bacteria. This study demonstrates that juice samples from street vendors in Dhaka North city are not complying with microbiological specifications of WHO. It also indicates that conventional drinks Mirpur area of Dhaka North City may not be safe for human consumption.

Keywords: Sugarcane Juice, Lemon Juice, E.coli, Bacillus, Staphylococcus.

1. INTRODUCTION

Fresh fruits drinks have good health benefits also. In developing country like Bangladesh mostly people from low and middle income enjoy the benefits of nutrients and refreshments from these street drinks as they are easily accessible and also cost effective for general people. Bangladesh is a country with variety of traditional drinks. Street drinks are famous and easily accessible for the citizens. It feeds millions of people daily as they are relatively cheap in all over the country. People enjoys these drinks as they give refreshment to the body. However, the proper quality of these drinks is not maintained. It displayed in open place. The ingredient keeps in unhygienic dish and water they use mostly from poor water supply source. It could cause serious problem to human body and health. Children's, adults have a great affection for it so it is necessary important to focus on the assessment. Conventional drinks are drinks which are sold in streets of different parts of Bangladesh to fulfil the thirst of passersby. It is also used as the source of refreshments for the citizens. Sugarcane juice is a kind of juice which is made of fresh sugarcane. This juice is sold in the popular streets of big cities of Bangladesh. In Mirpur area of North Dhaka city this juice is very popular conventional drink which fulfil the thirst of passersby. Lemon juice is another convention juice for the Bangladeshi community. Fresh raw lemon is used to make this drink with sugar and a pinch of salt and water. Lemon juice is another convention juice for the Bangladeshi community. Fresh raw lemon is used to make this drink with sugar and a pinch of salt and water. This study was conducted using the multiple tube method, which is typically employed to assess the water's hygienic condition and suitability for widespread use. By this method identification of microorganism and distribution of coliform bacteria in the juices and water samples will be done.

Bangladesh is well known for its famous and most common street drinks. People from all walks of life enjoys the drinks from street. These drinks are made of water mostly from unhygienic source and condition. Which can cause serious illness to human health. Unsafe water and poor hygiene can be crucial to human life. Fruit juice is a "non-fermented and no sparkling fruit or vegetable beverage, obtained by the dilution in potable water of the juice, pulp, or vegetable extract of the fruit of origin, with or without sugar," according to the definition.[1]".

All year long, especially during the hotter months, fruit juices are quite popular with people of all ages. These juices are typically sold in crowded places like malls, offices, hospitals, universities, schools, and so forth. Juice made from fruits that have skin surface damage run the risk of becoming infected with dangerous bacteria from the environment. In addition, the ingredients used to make juice, ice, water, equipment used during the preparation, the hygienic state of the juice maker, the surface where the fruits are processed, etc. can affect the quality of juice and, if not properly maintained, can transfer pathogenic microorganisms to the final juice, causing consumers to experience food-borne gastrointestinal disorders and, in rare cases, even death[2]. This study aimed to determine and identify the distribution of fecal coliform to help street vendors to improve the quality of their drinks.

2. MATERIALS AND METHODS

The study is a cross sectional type of study design. The selected juice sample sources in Mirpur, North Dhaka City area. Sampling technique was random. In order to begin the microbiological assays as soon as possible, samples were collected aseptically in sterile plastic bottles stored at 25°C to maintain homeostasis and transported as soon as possible to the lab[3].

2.1 Sample Collection

Street vended conventional juices were used as materials for the study. The samples were collected from different streets of Mirpur area of North Dhaka City. A total of 10 samples of juices were purchased from street vendors. Based on the consumer demand, total 2 types of fresh Sugarcane (*Saccharum officinarum*) and Lemon (*Citrus limon*) juices were selected for microbial analysis. Samples were collected randomly from the vending places. From the vendors freshly extracted juice samples (125 ml each) were collected in sterile conical flasks using aseptic technique. All samples were transported to the laboratory and analyzed immediately.

2.2 Samples

The selected samples were from the street vendors of ten different spots in Mirpur area Dhaka North City. They are enlisted here:

Table 1: The selected sample name and their collection areas.

Sample no.	Sample name	Collection point (105 ml/sample)
1	Sugarcane juice	Mirpur 1
2	Sugarcane juice	Darussalam
3	Lemon juice	Lal Kuthi
4	Lemon juice	Ansar Camp
5	Lemon juice	Mirpur 12
6	Sugarcane juice	Kallyanpur
7	Sugarcane juice	Monipur
8	Lemon juice	Shewrapara
9	Lemon juice	Mirpur 10
10	Sugarcane juice	Mirpur 2

2.3 MPN method performed in 3 steps

Presumptive test

The first step in the MPN test procedure is the presumptive test. The main purpose of this is to identify Gram negative coliform bacteria in water samples. Each sample required 15 series of test tubes, each holding 10 mL of lactose fermentation broth. Sequential additions of 10 mL, 1 mL, and 0.1 mL samples were made to five test tubes each containing 10 mL of lactose fermentation broth (2X), 10 mL of lactose fermentation broth (1X), and 10 mL of lactose fermentation broth (2X). Each tube included a Derhum tube to demonstrate the generation of gas following coliform bacteria's lactose fermentation[4].

Confirmed test

Prepare the required number of tubes of confirmation culture medium (Macconkey agar for total coliforms and EMB agar for faecal coliforms). Using a sterile wire loop, transfer inocula from positive tubes into the confirmation medium. Sterilize the loop between successive transfers by heating in a flame until it is red hot. Allow it to cool before use. If confirmation of both total and faecal coliforms is required, Macconkey and EMB agar plate should be inoculated from each presumptive positive. Label these plates carefully with the same code used in the presumptive test and incubate them for 48 hours at 35 ± 0.5 °C or 37 ± 0.5 °C for total coliforms (Macconkey agar and EMB agar) and for 24 hours at 44 ± 0.5 °C for faecal coliforms (EMB agar medium)[4].

Completed test

This completes the MPN test method that was started when the indicator bacteria Escherichia coli was confirmed to be present in the EMB agar medium. For the assurance of the gas production after lactose fermentation, the suspected E. coli from a single colony with green metallic sheen was added to a lactose fermentation broth 1X more. Gram staining was additionally done to validate E. coli isolates[4].

Table 2 : Reactions over different media

Medium	Reactions	
	Total coliforms at 35°C or 37 °C	Thermotolerant coliforms at 44°C or 44.5 °C
1.Macconkey broth	1. Gas visible in the inverted fermentation (Durham) tubeplus turbidity of the medium.	1. Same as total coliforms 35°C or 37 °C
2.Macconkey agar	**2.**Lactose fermenting pink colony.	2. Not applicable.
3.EMB agar	3. Greenish Metalic sheen colony will appear.	3. Same as total coliform at 35°C or 37 °C
4.MIU agar	4. Indole positive and motile in nature.	4. Same as 35°C or 37 °C
5. TSI	5. GLU neative, LAC poitive, H2S negative, Gas positive	5. Same as 35°C or 37 °C
6.Citrate3	6. Citrate negative green colour	6. Same as 35°C or 37 °C
7.Oxidase	7. The streaked bacteria on the filter paper were treated with a few drops of oxidase reagent. Within one to thirty seconds, favorable reactions changed the bacteria's color from violet to purple. Neglecting delayed responses is advised.	

3. RESULTS AND DISCUSSION

Table 3: Compare the combination of positive result, from the most probable number index that is values/100ml of sample for a tests of one 50ml, five 10ml, and five 1 ml volumes[5].

	No of tubes giving a positive reaction			
Number of sample	1×50 ml	5×10 ml	5×1 ml	MPN/100ml
Sample 1	0	0	0	<1
Sample 2	1	0	1	3
Sample 3	0	0	0	<1
Sample 4	0	0	0	<1
Sample 5	1	3	2	14
Sample 6	0	1	2	3
Sample 7	0	2	0	2
Sample 8	0	4	0	5
Sample 9	1	0	0	1
Sample 10	1	1	2	7

Example of classification and color-code scheme for thermotolerant (fecal) coliforms or E. coli in water supplies[6].

Table 4: Example of classification and color-code scheme for thermotolerant (fecal) coliforms or E. coli in water supplies with remarks.

Count per 100ml	Category and colour code	Remarks
0	A (blue)	In conformity with WHO guidelines
1–10	B (green)	Low risk
10–100	C (yellow)	Intermediate risk
100–1000	D (orange)	High risk
>.1000	E (red)	Very high risk

- Sample 1, sample 3 and sample 4 respectively collected from Mirpur 1, Lal Kuthi, and Ansar Camp are safe to drink.
- Sample 2, sample 6, sample 7, sample 8, sample 9, and sample 10 respectively collected from Darussalam, Kallyanpur, Monipur, Shewrapara, Mirpur-10, and Mirpur-2 are at low risk.
- Sample 5 (lemon juice) collected from Mirpur 12 is at intermediate risk.

Fresh fruits juices are very common in small and big cities of Bangladesh. They are renowned for the nutrients, minerals, and vitamins they contain. Fruit juices are typically offered in public spaces and roadside stands. These shops are mostly unhygienic and occurs diseases. This study focusses on the assessment of microbial status of popular street drinks in Bangladesh.

Bangladesh is a country with variety of good drinks. Street drinks are famous and easily accessible for the citizens. It feeds millions of people daily as they are relatively cheap in all over the country. To name some famous one, sugarcane, pineapple, lemon juice is common. Lemon Juice fulfils

the thirst of people in summer days. However, these street drinks are prepared in unhygienic condition and displays in an open place. The most concern issue is the water used to prepare these drink is not from a good source of water. Seller's mostly use unhygienic water in this purpose. They frequently pose a concern to public health due to their ready ingestion, quick methods of cleaning utensils, handling, and extraction[7]. Therefore, it cancreate crucial issue to human health. In this condition there is a chance the juice can be easily contaminated which can lead to foodborne illness and foodborne outbreak. According to a study Microbiological Analysis of Street Vended Fruit Juices from Mumbai City, India According to a claim, customers prefer unpasteurized juices because of their "fresh flavor" qualities, and as a result, their demand has grown recently[2].

According to a study titled "Microbial status of street vended fresh-cut fruits, salad vegetables and juices in Dhaka city of Bangladesh" by Atomic energy research they found infectious microorganism including Escherichia coli (36%), Bacillus (25%), Staphylococcus (24%), Klebsiella (9%) and Proteus (6%). Therefore, it is necessary to assess the quality of these conventional street drinks[8]. Therefore, this study aims to find out the status of juice and water used in street drinks to know whether the drinks thousands of people having is good or can create detrimental effect to their health. By doing this research we find out that is fecal coliform bacteria is preset in juices of Mirpur area.

Water used in preparing this drinks are mostly from poor, unhygienic sources. Safe drinking water, also known as potable water, is water that poses no major harm to health during the course of intake, taking into account any potential differences in sensitivity between life phases(WHO)[9]. On the contrary, Water that is not fit for drinking but yet useful for other tasks like irrigation and flushing toilets is referred to as non-potable[10].

4. CONCLUSION

Since traditional street beverages are closely related to human life, their quality is of utmost importance to humanity. The microbial contamination of these juices and its control pose a serious problem globally because it continues to be a significant source of illness, can result in mortality, especially in children, and concerns the population's health in both developed and developing regions. Our present study suggests that, juices from street vendors in Mirpur area North Dhaka City are contaminated with a large group of bacteria and are not safe for human consumption. These sample sources also harbor pathogens which are 370 Microbiological Quality causative agents of fatal diseases. APC and E. coli numbers must be controlled for street vendors in Mirpur to meet BDS and WHO requirements, and a good and hygienic lifestyle must be developed in light of this research.

5. REFERENCES

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