## Short Communication

# Bacteriological Status of Street Foods in Different University Premises of Dhaka City, Bangladesh

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**Street food contamination is common and has a potential health hazards throughout the world. These categories of foods are very popular among the students of Academic Institutions (Universities) of Dhaka city, Bangladesh for their appealing look and reasonable cost. This study was conducted to determine the presence of *E. coli*, *Shigella* sp. and *Vibrio* sp. in the street foods. Two hundred and forty-two food samples were collected from 20 University premises of Dhaka city. Biochemical tests were performed on suspected colonies for the identification of the relevant bacteria obtained from the samples. *E. coli*, *Vibrio* sp., and *Shigella* sp. were identified in 18% samples, where *E. coli* was found in 12%, *Vibrio* sp. was identified in 5%, and *Shigella* sp. in <1.0% food sample studied. The samples from which *E. coli* and food borne pathogens were obtained were considered unsatisfactory for human consumption. Presence of enteric bacteria in street foods indicates that the students of different Universities in Dhaka city might be at high risk of food borne disease.**

**Keywords: Street-vended food; Microbiological hazards; Food contamination; *E. coli*; *Shigella* sp.; *Salmonella* sp.; *Vibrio* sp.**

This present study is a continuation of our previous findings where we identified pathogenic organisms in street foods sold around the University premises [1]. Street foods are usually vended in stalls, roadside stands, different types of push-carts, hawker with loads. A large number of people prefer these foods because of the accessibility, reasonable cost, good taste and to some extent for its nutritional value [2, 3]. However, these foods can be contaminated from the raw materials to the storage and distribution[4]. Different studies highlighted the potential role of food borne illnesses due to consumption of street foods [5-9]. Also the organisms present in different types of street food samples were identified as Multidrug resistant [10]. Food spoilage is another reason of contamination because of its long exposure on roadsides while vending [2, 3].

In our previous study, it was observed that the street vended foods, collected from East West

University premises were contaminated with different types of enteric bacteria such as; *E. coli*, *Salmonella* sp., *Shigella* sp. and *vibrio* sp. [1]. At that time, we selected only one University premises where street foods are sold enormously. However, due to our shortage of resource we could not carry out microbiological evaluation of street foods in other University premises. It is also important to assess the food quality in other University areas. Therefore, the objective of this study was to identify the food contamination in street vended foods, obtained from twenty different University premises. In addition, this study also evaluated seasonal distribution of different organisms in contaminated street food samples.

The total number of different street vended food samples was 242 (Table 1). About 200 g of each sample was taken in sterile sealed poly bags from 20 University premises in Dhaka city. Samples were carried to the laboratory within 2-3 hours of collection then these were processed.

**Table 1:** *Food category of collected street food samples from different University premises (n = 242)*

| Food category | No. of samples |
| --- | --- |
| Deep Fried and fried Items | 109 |
| Spicy and sour items | 44 |
| Sweet and baked items | 82 |
| Rice and noodles items | 7 |

For *E. coli* isolation, 5 g (for solid and semi-solid) or, 5 ml (for liquid) were blended with 45 ml of Trypticase Soy Broth (TSB) and 0.3% yeast extract (YE) and were incubated at 37 ºC for 18-24 hours for enrichment. These broths were then inoculated onto TBX (Tryptone Bile X-glucuronide**)** and MacConkey agar plates and were incubated at 37ºC for 18-24 hours**.**

For isolation of *Shigella* sp.*,* and *Salmonella* sp., food samples were homogenized with 45 ml of BPW (Buffered Peptone Water) broth and were incubated at 37 ºC for 18-24 hours. Enriched broths were then used to inoculate onto two agar plates, namely BGA (Brilliant Green Agar) and XLD (Xylose Lysine Deoxycholate) and were incubated at 37 º C for 18-24 hours.

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For the *Vibrio* sp., 45 ml of APW (Alkaline Peptone Water) was mixed with homogenized samples and incubated at 37 ºC for 18-24 hours for the purpose of enrichment. Enriched broths were then inoculated in TCBS (Thiosulfate Citrate Bile salts Sucrose) and incubated at 37 ºC for 18-24 hours**.**

Different types of biochemical tests such as KIA (Kligler's Iron Agar), MIO (Motility, Indole, Ornithine), Catalase, Oxidase, Urease test etc. were performed by standard laboratory methods (World Health Organization, 1987).

Table 1 shows different types of food categories which were collected from different University premises. The food categories were deep fried and fried (n = 109); spicy and sour (n = 44); sweet and baked (n = 84) and rice and noodles (n = 7).

Street food samples from twenty different Universities showed the presence of three types of microorganisms (*E. coli, Shigella* sp. and *Vibrio* sp.). *E. coli* was identified in majority contaminated samples (29 samples), *Vibrio* sp. was observed in twelve samples and only two samples were identified with *Shigella* sp. (<1.0%). Among 43 food samples, 13% (deep fried and fried items) and 12% (sweet and baked items) were contaminated with *E. coli.* Contamination with *E. coli* (20%) was found in spicy and sour items of collected samples (Figure 1). Our results (Figure 2) showed seasonal distribution of different organisms in food
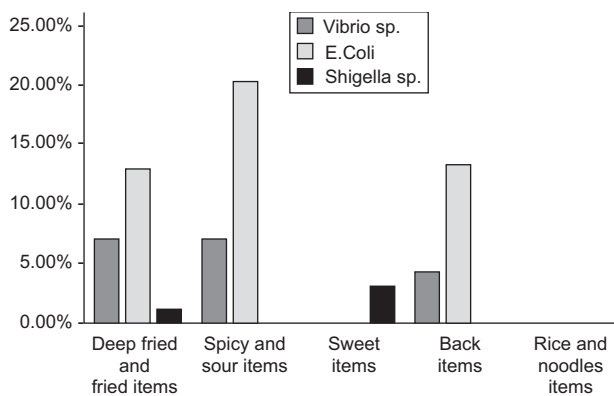


**Figure 1.** *Food samples (%) contaminated with microorganisms (n=242)*
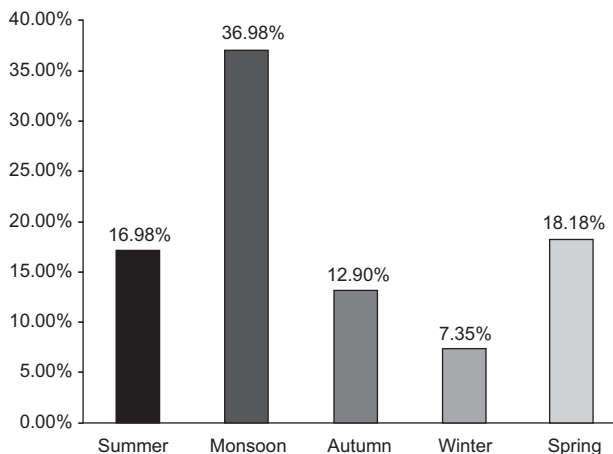


**Figure 2.** *Seasonal distribution of different organisms in all categories of street food samples (n=242)*

samples. Food samples collected in Monsoon (n = 46) and Spring (n = 44) showed 37% and 18% contamination respectively. Only 7.35% showed contamination in winter season (n = 68).

We found contamination in 43 (18 %) from 242 food samples with *E. coli, Shigella* sp*,* and *Vibrio* sp*.* In the total 43 samples, 29 (12%) were contaminated with *E. coli*, 12 (5%) with *Vibrio* sp and 2 (<1.0%) with *Shigella* sp. No *Salmonella* sp. was observed in street food samples. This is the second report of our findings regarding the food contamination in street vended items in different 20 University premises in Dhaka city. In our first report we observed contamination with *Salmonella* sp. (50% samples), *E. coli* (46%), *Shigella* sp. (20%), and *Vibrio* sp. (2%) in one University premises [1].

In one study with food samples revealed that the highest frequencies of occurrence of pathogenic bacteria were *P. aeruginosa* (25%), *E. coli* (32%), *S. aureus* (27%), *Proteus* sp. (45%) and 36% *Salmonella* sp. [3] Study performed in Dhaka city, Bangladesh on the street vended ready-to-eat foods showed only 4.2 % items were safe. A significant number of samples were coliforms and *E. coli* positive [2]. Our results corroborate with the findings of different reports regarding the presence of *E. coli, Vibrio and Shigella* sp. We also found highest contamination of food with *E. coli* (12%) from 242 samples. Study conducted in Iran on 580 hospital food samples (both raw and cooked) were identified with highest prevalence of bacteria (64.10%) in Summer [11]. We found majority of contamination of street foods (37%) during Monsoon season. We also observed that 17 and 18% of food contamination occurred in Summer and Spring respectively. The results of our study suggest that due to excessive humidity, microorganisms grow enormously in Monsoon season of Bangladesh.

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