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A Comparative Study of Microbial Quality of Street Vended Foods in Chennai City Based on Degree of Processing

KEYWORDS: Street foods, Microbial analysis, Processed

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ABSTRACT *The present study was undertaken to examine and compare the microbial quality of street foods in Chennai. The presence of food borne pathogens like e-coli, salmonella, bacillus, coliform and aerobic microbial count was investigated. The street foods were classified on basis of degree of processing as unprocessed, semiprocessed and processed foods. From each category totally three solid and three liquid food items were aseptically collected from six areas for assay. The samples were analyzed by standard procedures within an hour of procurement. None of the samples screened in the present study were in the un-satisfactory grade. However the sugarcane-juice samples and coconut-chutney samples were within acceptable range. The results reveal high degree of contamination in the unprocessed foods followed by the semiprocessed foods. The processed foods that have undergone processing at high temperatures are less contaminated*

Introduction

Street foods are ready–to-eat foods and beverage prepared and/or sold by vendors, especially on streets and other public places (1). Street vended foods include foods as diverse as meat, fish, fruits, vegetable, grains, cereals and frozen produce (2). Street foods provide ready to eat and fairly inexpensive priced snacks and meals for a wide variety of people (3). Infact, it is gradually becoming popular with office goers, hospitals, railway stations, bus-terminals, shopping-centres etc. at reasonable prices (4). The street food industry offers a significant amount of employment often to persons with little education and training (5). Lack of awareness about food safety and hygiene among vendors is also resulting in food contamination (6). Food adulteration is major public hazard, which affects the quality of life of people. The nature of food adulteration and contamination may vary from place to place, because of changing environmental factors, like non-seasonal rains or improved production/cultivation practices (7). There are different sources of microbial invasion of street-vended foods. Pathogens may invade the interior surfaces of the food during peeling, slicing, handling, trimming and other processes like packaging, storing and marketing (8). Use of unhygienic water for dilution, dressing with ice, prolonged preservation without refrigeration, unhygienic surroundings often with houseflies and fruit flies and airborne dust can also act as sources of contamination (9). Pathogenic organisms can enter fruits and vegetables through damaged surfaces, such as punctures, wounds, cuts and splits that occur during growing or harvesting. Some of the bacteria that are important from public health point of view can multiply to dangerously high numbers in food without changing the appearance, odour or taste of the food (10). The total plate count analysis is a useful tool in monitoring food process and the results may reflect the hygienic level of food handling (11). A significant numbers of E coli in food may also suggest a general lack of cleanliness in food handling and improper storage of food (12). Bacteria like salmonella sp. and e-coli can contaminate the food through contact with sewage and contaminated water (13).

Objectives

- To obtain an insight into the availability of street foods in 6 randomly selected areas of Chennai city.
- To investigate the microbial profile of foods sold on streets of Chennai.

METHODOLOGY

Selection of sample

On the basis of processing, street foods are classified into two types such as liquid and solid street food. The food items selected were sugarcane-juice, coconut-chutney, mushroom-soup, raw-mango, bhelpuri and boiled-peanuts. Unprocessed food is the foods which have not undergone any heat treatment. The food items selected from this category were sugarcane-juice (liquid food) and raw-mango (solid food). Semiprocessed food includes ingredients which are processed as well as added raw to the final preparation. The food items selected from this category were coconut-chutney (liquid food) and bhelpuri (solid food). Processed foods are which that has been subjected to high temperature. The food items selected from this category were mushroom-soup (liquid food) and boiled-peanuts (solid food).

Collection of samples

The study was carried out during March to December 2013. Samples from each category were collected under aseptic conditions from street food outlets to assess their microbiological quality. Each sample was properly identified with a number code. Samples were sent to the laboratory within one hour after collection in a cold-box containing ice cube.

Samples processing for analysis

Add 25g of food sample in 225ml of sterile water / peptone water (10^1)

↓

Leave the mixture for 2-5mins

↓

Transfer 10ml from 10^1 to test tube containing 90ml of sterile water (10^2)

↓

Leave the mixture for 2-5mins

↓

Transfer 1ml from 10^2 to test tube containing 9ml of sterile water (10^3)

↓

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Mix the contents well

↓

Transfer 1ml from 10^3 to test tube containing 9ml of sterile water (10^4)

↓

Continue the process till 10 dilutions

↓

From each dilution 1ml is transferred using sterile pipette to sterile media

↓

Duplicated and control plates were maintained

↓

Plates were incubated at 36 ± 1 ℃ for 48hrs

RESULTS & DISCUSSION

TABLE 1: MEAN MICROBIAL PROFILE OF SOLID FOOD ITEMS

S.NO	Food items		Aerobic Microbial Count / gm	Total coliform / gm	E coli /gm	Salmonel-la / gm	Bacillus cereus / gm
1.	Boiled peanuts	Mean	35.83	6.83	1.50	.00	.00
		S.D	8.976	1.941	1.643	.000	.000
2.	Bhelpuri	Mean	174.83	41.00	14.17	.00	.00
		S.D	23.095	10.863	5.456	.000	.000
3.	Raw mango	Mean	203.17	42.67	14.83	.00	.00
		S.D	39.977	5.354	4.622	.000	.000

The results depicted in Table 1 showed that all solid street food items selected for study was contaminated with total Plate Count, coliforms and e-coli. Salmonella and bacillus were absent in all the samples analyzed. The growth of organisms was more in raw-mango compared with other solid food items.

TABLE 2: MEAN MICROBIAL PROFILE OF LIQUID FOOD ITEMS

S.NO	Food items		Aerobic Microbial Count / gm	Total coli-form / gm	E- coli /gm	Salmo-nella / gm	Bacil-lus ce-reus / gm
1.	Mush-room soup	Mean	24.17	2.33	1.00	.00	.00
		S.D	11.321	2.733	1.265	.000	.000
2.	Coconut chutney	Mean	225.50	65.00	20.50	.00	.00
		S.D	30.343	13.784	2.950	.000	.000
3.	Sugarcane juice	Mean	306.67	103.33	18.50	.00	.00
		S.D	19.107	49.261	6.124	.000	.000

The results depicted in Table 2 showed that all liquid street food items selected for study was contaminated with total Plate Count, coliforms and e-coli. The salmonella and bacillus were absent in all the samples analyzed. The growth of organisms was more in sugarcane-juice compared with other liquid food items.

TABLE 3: MEAN MICROBIAL PROFILE OF PROCESSED, SEMIPROCESSED & UNPROCESSED FOODS

TYPES OF FOOD		Aerobic Microbial Count / gm	Total coliform / gm	E coli /gm	Salmonel-la / gm	Bacillus cereus / gm
Processed	Mean	30.00	4.58	1.25	.00	.00
	S.D	11.489	3.260	1.422	.000	.000
Semi-pro-cessed	Mean	200.17	53.00	17.33	.00	.00
	S.D	36.893	17.236	5.331	.000	.000
Unprocessed	Mean	254.92	73.00	16.67	.00	.00
	S.D	61.757	46.041	5.516	.000	.000

Table 3 clearly shows that the levels of contamination were low in processed food stuffs since the food stuffs were subjected to high temperature. The results of this study demonstrate that the microbiological quality of unprocessed food is extremely poor, followed by semi processed foods which also shows a poor microbiological profile. Processed foods are microbiologically safe.

SUMMARY & CONCLUSION

Microbiological assay reveals that both pathogens Salmonella and Bacillus were absent in all the food items. But all the samples showed the presence of E-coli, coliform and total microbial count. The mean total microbial count of mushroom-soup and boiled-peanuts were found to be 24.17 and 35.83 respectively, mean total coliform count were found to be 2.33 and 6.83 respectively, mean E-coli count were found to be 1.00 and 1.50 respectively. The microbial analysis revealed that the levels of contamination were low in processed food stuffs, since both the food stuffs were subjected to high temperature. Mushroom-soup samples showed a superior microbial quality compared to the boiled-peanut sample. Bhelpuri and coconut-chutney were the food stuffs selected from the semi-processed food category. The mean total microbial counts of bhelpuri and coconut-chutney were found to be 174.83 and 225.50 respectively, mean total coliform counts were found to be 41 and 65 respectively, mean E-coli count of bhelpuri and coconut-chutney were found to be 14.17 and 20.50 respectively. The microbial analysis revealed that the levels of contamination were comparatively high in semi-processed food stuffs, since both the food stuffs preparation includes ingredients which are processed as well as added raw to the final preparation. The bhelpuri samples showed a superior microbial quality compared to the coconut-chutney sample. Raw-mango and sugarcane-juice were the food stuffs selected from the unprocessed food category. The mean total microbial count of raw-mango and sugarcane-juice were found to be 203.17 and 306.67 respectively, mean total coliform count were found to be 42.67 and 103.33 respectively, mean E-coli count of raw-mango and sugarcane-juice were found to be 14.83 and 18.50 respectively. The microbial analysis revealed that the levels of contamination were very high in unprocessed food stuffs, since both the food stuffs have not undergone any heat treatment. The raw-mango samples showed a superior microbial quality compared to the sugarcane-juice sample.

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