

Assessment of the microbiological safety of some spices and raw vegetables in Tehran caterings

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ABSTRACT

Nowadays, foodborne illnesses in public places like fast foods and caterings are one of the majority issues in development and retarded countries. Presence of some microorganism in this food segment is undesirable and upset for human health and increasing some pathogenic risks like salmonellosis, hemorrhagic colitis and things like that. The aim of this study was to evaluate the Assessment of the microbiological safety of some spices and raw vegetables in Tehran caterings. In this cross-sectional survey, some microbial experiments of 5 types of spices and 6 kinds of raw vegetables randomly collected from different caterings in Tehran, Iran. After that, all of the samples were analyzed for determination of total microbial, mold and fungi, salmonella, *E. coli* and parasite eggs count for spices and *Shigella*, *E. coli*, *Salmonella*, *S. aureus* and *Enterococcus* for raw vegetable, respectively. Parasitic pollution was detected in all of the spice samples. Result obtained pointed that salmonella and *E. coli* contamination were negative in all spice samples. The presence of *S. aureus*, *Shigella*, *Salmonella*, *Enterococcus* and *E. coli* is observed on samples of vegetables. The present paper indicated that high potential hazard of microbial contamination in caterings industry, therefore this segment needs more attention about implementation of some food standard to avoid foodborne illnesses.

Keywords: Catering, Microbial contamination, Fresh vegetable, Spices.

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Introduction

Always, vegetables are important part of our diet and help to digestibility with high content of soluble in insoluble fiber and mineral components with vast range of vitamins, especially group C, K (1,2). Nowadays, people around the world according to life style didn't have enough time to preparing meals in their

places under to sanitary methods such as washing vegetable with enough and clean water, use some antimicrobial liquid for vegetables, etc. Some of the raw materials that always used in preparation and provide food and salads are spices, condiments and widely range of vegetables. These materials daily used in fast

foods and catering. Spices are original source of taste, good smell and antioxidant activity for food manufacture. Reports showed that spices essential oils have inhibiting activity toward poison microorganisms, but gram-positive bacteria were more sensitive to the antimicrobial compounds in spices than gram-negative (3). There was a lot of report about bacterial and fungal contamination at salad vegetables by *salmonella* and vibrio cholera that were cause of vomit and diarrhea in hot seasons. Salmonella and other microorganism are responsible for frequent foodborne illness outbreaks and also salmonellosis infection is an increasing problem and recent salmonellosis outbreaks have been associated with a widely variety of vegetables, spices and even those that were not previously considered to imply a risk (4). The main objective of this study was performed to evaluate possible of bacterial pollution in some raw materials likes vegetable and spices in caterings.

Materials and Methods

Spices and vegetables collection

A total of 5 popular and most consume spices samples (n=60), black and red pepper, garlic powder, curry powder and turmeric that always used in Iranian catering were collected. Meanwhile, all the samples (almost 100g) were collected in sterile plastic bags (25X25cm). Moreover, 6 kinds of popular and different vegetables (n=60) that always addition to preparing salad and meals such as carrot, bell pepper, corn, tomato, lettuce and cucumber were collected from specific catering in Tehran, Iran. Vegetables samples transferred to sterile package and analyzed after 2 hours of collected.

Isolation and identification of pathogenic bacteria by pour plate method

A 25g of samples were weighted, after rinsing and washing put into the 250mL beaker containing 100 mL of sterile distilled water and rinsed water samples were dilute to 10^{-2} and 10^{-4} . In addition, 0.1mL of all samples diluted was incubation on "Mac Conkey Agar Media" (MCA) and plates were incubation at 37C° during 24h for isolation of bacterial pathogens. All of the samples were examined for colony properties in some nutrition agar. Meanwhile, from this 60 vegetables sample, 76 bacterial pathogens were isolated and identification under biochemical test like Indole and Iron agar tests (5). And general by specific bacteriological tests have been performed based on advised method by Iranian national standards on all of the samples.

Results

Distribution of microbial experiment vegetable and spice samples in the study is presented in Tables 1- 3. The average number of all bacterial total count and mold and fungi were upper than standard except garlic powder and turmeric. Among vegetable samples presence of bacterial pollution were *E.coli* (18.3%), *Shigella* (13.3%), *Salmonella* (11.5%), *S.aureus* (46.5%) and finally *Enterococcus* (18.3%), respectively. The highest "total bacterial count" was detected in the black pepper sample and lowest in garlic powder sample.

Discussion

In the present study, it was found that all of spice samples contaminated with parasitic eggs. The results of this study showed that between spices all of samples except garlic powder are

Table 1. Result of salmonella, parasite eggs and E.coli contamination in spice samples

Samples	<i>Salmonella</i> spp		Parasite eggs		<i>E.coli</i>	
	Result	Standard	Result	Standard	Result	Standard
Turmeric						
Red pepper						
Black pepper	Negative	Negative	Positive	Negative	Negative	Negative
Curry powder						
Garlic powder						

Table 2. The comparison of the average total bacterial count, Mold and Fungi in spices

Samples	Bacterial Total Count (CFU/g)				Mold and Fungi (CFU/g)			
	Min	Max	Ave	Standard	Min	Max	Ave	Standard
Turmeric	5.5×10^5	7×10^5	6.5×10^5 *		2.4×10^2	2.9×10^2	2.65×10^2	
Red pepper	1.5×10^5	1.7×10^5	1.6×10^5 *		1.7×10^5	1.9×10^5	1.8×10^5	
Black pepper	6.5×10^5	8×1^5	7.25×10^5 *		1.7×10^5	2.3×10^5	2×10^2	
Curry powder	1.2×10^5	1.3×10^5	1.25×10^5 *		1×10^5	1.2×10^5	1.1×10^5	
Garlic powder	1×10^5	1.1×10^5	1.05×10^5	5×10^5	1.6×10^2	1.8×10^2	1.7×10^2	5×10^2

*Contamination more than standard

Table 3. Presence of pathogenic bacteria flora in difference vegetables samples tested

Samples	<i>Shigella</i>	<i>E.coli</i>	<i>Salmonella</i>	<i>S.aureus</i>	<i>Enterococcus</i>
Carrot	1	3	1	4	1
Lettuce	2	2	3	4	1
Cucumber	2	1	0	5	2
Tomato	3	2	1	6	4
Bell pepper	1	1	2	6	5
Corn	1	2	1	3	2
%	13.3	18.31	11.5	46.5	18.3

highest bacterial total count infection comparing to standard total count that showed in Table1, it could be pointed that all of the spices were higher than standard level at bacterial total count experience. In addition, Ankri & Mirelman (6) stated that allicin is an organosulfur compound obtained crushed garlic and the main antimicrobial effect of allicin is due to its chemical reaction with Thiol groups of various enzymes, e.g. alcohol dehydrogenase, thioredoxin reductase, and RNA polymerase, which can affect essential metabolism of cysteine proteinase activity. On the other hand, scientific reported that among tested spice samples, chili powder showed the highest presence of fungal and garlic with curry

samples did not present any fungal contamination (7). Another study pointed that black pepper, caraway, garlic and red chili did not contain any *B.cereus*, and coliforms were found in 33 and 15%, respectively of the kinds (8). Moreover, researchers obtained aerobic bacteria count was greater than 5.39 log CFU/g in turmeric, curry powder and paprika (9). According to previous study, there is different reason for outbreak and contamination in vegetables like lack of sanitary education in public places resemble caterings and fast foods and Deny washing hands by workers, suitable and proper washing could be reduce the microbial and parasitic contaminations in vegetables (10). Thus, Sunil *et al.* (11) reported

that 3 of 112 samples were positive for helminthic ova. Also, 2 samples of cabbage and 1 sample of onion were positive for *Ascaris spp.* While, Tambekar & Mundhada, (12) reported that present of *E.coli*, *salmonella* and *shigella* observed in 50 samples of vegetables such as radish, spinach and beet in India that is potential hazard of street vended salad vegetables.

Conclusion

In many cases and countries, some vegetables provide for salad and meals without any washing and in some industrial zone there isn't any potable and clean water for irrigation to vegetables and fruits growing and harvest. Most of spices and condiment preparing and provided in south and south east of Asia, unfortunately bad climateric condition in public health figure due warm with highest humidity range is one of the causes at bacterial contamination, completely. Implementation of some international food standard like HACCP and GMP/GHP in catering, fast foods and spice processing factories under standard range of bacterial contamination it could be most safe methods for deterioration of microbial contamination in raw food materials.

Conflict of Interest

The authors declare no conflict of interest.

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