



MICROBIOLOGICAL QUALITY IMPROVEMENT OF CONVENIENCE FOOD, CHICKEN AND SPICES BY IRRADIATION.

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Extended Synopsis

A series of studies were carried out with the objective of improvement of microbiological quality of convenience food, spices and chicken meat.

a) convenience food :

A ready to-eat- fish Kebab (convenience food) was prepared using fish paste , spices , salt and deep oil frying. The aseptically packaged kebab had a shelf-life of about 3 days at room temperature. This convenience food item had initially a total bacterial count of 1.2×10^2 /g. (Table-1). Fungi and coliform were absent. After irradiation at 5 kGy no microorganisms were detected in kebab samples. These greatly improved the microbial stability of the kebabs. Inoculated pack studies of *Clostridium botulinum* spores in the kebabs showed that oil frying in combination with 5 kGy irradiation dose reduced the number of spores by 4-5 log factors.

Table 1. Total Bacterial Counts (TBC), Total Fungal Counts (TFC) and Total Coliform Counts (TCC) of non-irradiated and irradiated fish kebabs during storage at room temperature.

Storage (d)	Fried kebabs (moisture content 39.63 %)					
	Non-irradiated (0 kGy)			Irradiated (5 kGy)		
	TBC/g	TFC/g	TCC/g	TBC/g	TFC/g	TCC/g
0	1.2×10^2	0	0	0	0	0
7	2.1×10^6	0	0	0	0	0
21	6.7×10^8	0	0	0	0	0
75	3.9×10^9	0	0	0	0	0
120	Spoiled	0	0	0	0	0
180	Spoiled	0	0	0	0	0

Some local bakery products were collected from markets and investigated for microbiological qualities and hygienization by irradiation treatment. The results showed that all products tested had high microbial counts, a few had coliform contamination and a radiation at 2.5-5.0 kGy significantly reduced the number of bacteria and eliminated coliforms.

b) Spices :

Whole and prepackaged ground local varieties of spices which included Coriander , Cumin , Chilli and Turmeric were found to be heavily contaminated with bacteria and moulds. The total bacterial counts ranged between 10^4 - 10^7 per gram. Fungal count ranged between 10^3 - 10^5 per gram. Coliform counts ranged from 10^2 - 10^4 per gram. The bacterial contamination mainly consisted of *Bacillus* sp, *Pseudomonas* sp, *Streptomyces* sp, *Serratia* sp with *Bacillus* sp as the predominant bacteria. The fungal contamination consisted mainly of *Aspergillus* sp. and *Fusarium* sp. Other fungal contaminants were *Penicillium* sp, *Rhizopus* sp, *Rhizoctonia* sp, *Trichoderma* sp., *Cercospora* sp and *Alternaria* sp. The whole spices were found to be more contaminated than their ground varieties.

A dose of 10 kGy was required to reduce the total bacterial count below detectable levels, while a dose of only 5 kGy was required to eliminate the fungal contamination. Coliforms were totally eliminated at a radiation dose of 5 kGy. During a 6 months storage at ambient temperatures of irradiated and unirradiated spices , the irradiated spices were found to retain good microbiological quality.

c) Frozen chicken :

The distribution of total bacteria, total coliform and psychrophilic bacteria, in frozen chicken and irradiation effect on them were investigated. The total bacteria, total psychrophiles and total coliform counts were found to be 1.2×10^5 CFU/g, 1.1×10^5 CFU/g and 2.0×10^4 CFU/g respectively. The bacteria isolated and identified from frozen chicken included *Escherichia coli*, *Enterobacter aerogenes*, *Citrobacter freundii*, *Aeromonas hydrophila*, *Klebsiella* spp., *Pseudomonas* spp., *Staphylococcus* spp., and *Sarcina* spp. The necessary dose for 2 log reduction of the total bacterial and total psychrophiles was 4 kGy. A dose of 3 kGy was found effective for complete elimination of total coliforms from the sample. The D_{10} values of *E. coli* isolated from frozen chicken in phosphate buffer, nutrient broth and in frozen chicken were 0.1 kGy, 0.13 kGy and 0.4 kGy respectively.

The results of this studies showed that irradiation can contribute to improve the hygienic qualities of food by eliminating /reducing pathogenic/spoilage microorganisms.

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