IAFP Latino 2024
Simpósio Latinoamericano em Segurança dos Alimentos
Santos - SP - Brasil
11 a 14 Nov, 2024

Assessing the relationship between processing practices and the microbiological quality and safety of dehydrated spices sold in Brazil

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Spices have been used for many centuries, whether for dietary or medicinal purposes. Regarding cooking, it is common to use these dehydrated products as condiments to add to the flavor, aroma and color of foods. However, they are subject to contamination during the processing, storage and retail stages, which may pose a risk to consumers' health. As part of a large project on microbiological risks associated with low water activity foods, the aim of this study is to report results on the processing practices, as well as the microbiological quality and safety of dehydrated spices retailed in Brazil. As a preliminary phase of the study, two establishments (A and B) located in the city of Piracicaba, SP - Brazil, were visited and a 45-question survey was applied, addressing the hygienic-sanitary conditions of the facilities, as well as the handling and storage practices. In addition, 19 samples of dehydrated spices were collected and analyzed for mesophilic bacteria, yeasts and molds, total coliforms and *Escherichia coli*. Samples were also tested for *Salmonella* spp. using the ISO 6579-1:2017 method. The temperature and relative humidity of the spice storage area were also measured using a portable digital thermo-hygrometer. Both establishments purchased spices from factories and repackaged them on-site. Some of the main differences observed were that establishment A packaged larger quantities (minimum 500 g) for resale, while establishment B packaged smaller quantities (50-100 g) for bulk sales. Moreover, establishment A repackaged spices upon arrival, storing them in cardboard boxes on pallets and using the same utensils for all spices. Establishment B kept spices in original packaging and weighed them per customer request, using different utensils for different spices. Regarding microbiological results, the mean counts in samples from establishments A and B were, respectively: mesophilic bacteria (6.3±1.3 and 5.9±1,1 log CFU/g), yeasts and molds (2.0±0.6 log CFU/g for both) and total coliforms (2.7±0.9 and 1.5±0.9 log MPN/g). *E. coli* was only detected in samples from establishment A (8; 88.9%) with a mean count of 0.6±0.3 MPN/g. None of the samples were positive for *Salmonella* spp. The recorded temperature and relative humidity values for the establishments were as follows: 23 ºC and 68% RH for establishment A and 29 ºC and 38% RH for establishment B. Overall, the results indicate better microbiological quality of samples from establishment B, which appears to be related to better environmental conditions and practices employed. Nevertheless, all samples met the legal limits established by the Brazilian Surveillance Agency for these products. These data provide insights into Brazilian food establishments regarding processing practices and microbiological aspects of dehydrated spices. Understanding the impact of these practices and environmental conditions is crucial, as this knowledge guides the implementation of measures, aiming to ensure the quality and safety of these products.

Agradecimentos: CAPES (#88887.916664/2023-00) and FAPESP (#2013/07914-8)