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Microbiota of fresh herbs and whole spices used in home food preservation and effectiveness of microbial intervention methods

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Fresh herbs and whole spices may carry a significant microbial load acquired via cultivation and post-harvest processing practices. Their use in minimally processed foods could cause accelerated spoilage or illness, if pathogens are present. Reduction of the microbiota by simple intervention techniques would enhance shelf life and safety of herbs and spices.

The microbial profile of selected fresh herbs and whole spices used in home preparation of sauces, flavored oils and vinegars was studied. Effectiveness of a wash treatment, and of washing followed by chlorine dipping (175 ppm solution) were investigated as techniques for decreasing the microbial load.

Fresh herbs (basil, cilantro, dill, oregano, parsley, rosemary, tarragon, thyme) and whole spices (allspice, black pepper, mustard) were obtained from two grocery stores and one international farmer's market location. Aerobic mesophiles, fungi, presumptive *Clostridium perfringens*, *Bacillus cereus*, *Salmonella* spp. and coliform populations from unwashed, washed, and chlorine-dipped herb and whole spice samples were enumerated.

The microflora of herbs and spices varied with source, with an aerobic mesophilic count (APC) of 2.9×10^2 to 3.2×10^7 CFU/g, a coliform count of 7.9×10^2 to 1.9×10^7 CFU/g and *Salmonella* levels of 7.9×10^2 to 2.7×10^5 CFU/g. Fungal, *Bacillus cereus* and *Clostridium perfringens* populations ranged from undetectable to 1.7×10^7 CFU/g, 1.4×10^6 CFU/g and 8×10^3 CFU/g, respectively. Washing and chlorine dipping reduced APC numbers by 0.25 -1.0 \log_{10} and by an additional 0.2 - 1.0 \log_{10} respectively, the efficiency of the intervention methods being dependent upon the initial microbial load.

This study determined that fresh herbs and whole spices have significant levels of spoilage and potentially pathogenic microorganisms. Consumer intervention steps like washing and chlorine dipping decrease microbial populations and improve the quality of herbs and spices.