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The Effect of Ultrasound Pretreatment on Bioactive Compounds of Freeze-Dried Carrots

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Abstract : Although drying is one of the most prevalent techniques applied to enhance food stability, it is a complicated method covering simultaneous coupled heat and mass transfer phenomena and the theoretical application of these phenomena to food products becomes challenging because of the complex structure and to the physical and chemical changes that happen at drying. Pretreatment of materials before drying has been shown to be effective in solving drying problems such as long drying times and poor product quality. The study was conducted to examine the effect of ultrasound (US) pre-treatment on physical and chemical/nutritional attributes of freeze-dried carrot slices. The carrots were washed, hand-peeled, and cut with dimensions of 1 cm (L) x 0.2 (W) cm x 1 cm (H). The carrot samples were treated in an ultrasonic bath in two different times, which were 15 and 30 minutes. Untreated and ultrasound pre-treated carrot samples were dried in a freeze dryer. Freeze-dried samples were analyzed in terms of bioactive compounds, including total phenols, ascorbic acid, and antioxidant capacity. Significant differences were found among dried carrot samples with and without ultrasound. The freeze-dried carrot slices treated with a US (especially 30 minutes - treatment) showed higher preservation of bioactive compounds. In overall, US pretreatment is a promising process, as demonstrated in current research by its capability to better retain freeze-dried carrot quality.

Keywords : bioactive compounds, carrot, freeze drying, ultrasound-pretreatment
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