Cooking with microwave bags affects the quality of broccoli: easy-to-cook is a friend or foe?

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Abstract

Cooking vegetables in microwave-bags has become a popular cooking method. However, information about the effect of this cooking method on phytochemicals content and microbiological safety of vegetables is limited. The aim of this work was to study the effect of microwave-bag cooking vs. conventional microwaving on phytochemical content and microbiological quality of broccoli florets. The influence of cooking time on these quality parameters was also evaluated.

Broccoli florets were placed into microwaveable bags and cooked in a microwave oven for 3 and 5 min. Product cooked under the same conditions, without using bag, was used as a control. Samples were taken before and after cooking. Glucosinolates (GSL) content and hydroxycinnamic acids (HCAs) content were analyzer by HPLC-DAD-ESI-MSn. To evaluate microbiological quality, aerobic mesophilic bacteria, aerobic psychrotrophic bacteria and moulds and yeasts were analyzed.

Microwaved broccoli for 3 min showed no significant losses of total GSL content, regardless of cooking method. For 5 min cooking, microwave bag cooked broccoli showed higher total GSL content (32.3 ± 2.6 μmol g^{-1}) than conventional microwaved

broccoli (26.4 ± 1.3 μmol g^{-1}). HACs content declined by 40% compared to fresh broccoli, in all conditions (from 2.52 ± 0.08 μmol g^{-1} to 1.52 ± 0.31 μmol g^{-1}).

Microwave-bag cooking showed higher reduction of mesophilic and psychrotrophic bacteria than conventional microwaving. The counts of moulds and yeasts were < 10^2 cfu/g, independently of cooking method and time applied.

Microwave-bag cooking is a novel method that showed to be microbiologically safe and preserved GSL content, main bioactive compound of broccoli. Furthermore, this option is fast, easy and clean cooking option to fulfill modern consumers' needs.

Keywords: microwave cooking; microwaveable bag; microbiological quality; bioactive compounds; broccoli florets