Effect of different cooking methods on bioactive compounds in vegetarian, broccoli-based bars

Hassan Barakat \textsuperscript{a,b}, Sascha Rohn \textsuperscript{a,*}

\textsuperscript{a} Institute of Food Chemistry, Hamburg School of Food Science, University of Hamburg, Grindelallee 117, D-20146 Hamburg, Germany
\textsuperscript{b} Department of Food Science, Faculty of Agriculture, Benha University, 13736 Moshtohor, Kaliuobia, Egypt

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ABSTRACT

Recently, trend toward vegetarianism and veganism has globally increased. Effect of domestic cooking methods including microwaving, frying, frying/microwaving, steaming and baking on bioactive compounds of broccoli-based bars (BBBs) was investigated. Total phenolic content (TPC), antioxidant activity and phytochemicals were investigated. Subsequently, identification and quantification of dominant phenolics and glucosinolates were carried out. A sensory evaluation of cooked BBBs was performed, as well. Results indicate that health-promoting compounds in BBBs were significantly affected by cooking methods. Negligible change was found in TPC, whereas antioxidant activity was significantly affected. Cooking treatments except steaming and baking caused significant losses of chlorophylls, carotenoids, and flavonoids in the range of 20–51, 15–58, and 25–33%. Frying and frying/microwaving caused a loss of single phenolic compounds. Total glucosinolates content decreased significantly during frying, frying/microwaving, steaming, and baking, while microwaving did not. The presented data might be helpful for selecting the optimum processing conditions for innovative BBBs.

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1. Introduction

Vegetables of the \textit{Brassica} family such as cabbage, broccoli, cauliflower, and Brussels sprouts have been studied extensively in particular for their health beneficial properties. As one of the most important representatives of \textit{Brassica} vegetables, broccoli (\textit{Brassica oleracea} var. \textit{italica}) contains high levels of phytochemicals, and has been described as a vegetable with high nutritional value (Borowski, Szajdek, Borowska, Ciska, & Zieleński, 2008; Manchali, Chidambara Murthy, & Patil, 2012; Vallejo, Tomás-Barberán, & García-Viguera, 2002; Verkerk et al., 2009) and considerable bactericidal effect against specific infection in type 2 diabetic patients (Bahadoran et al., 2014).

However, \textit{Brassica} vegetables are consumed mostly after some types of processing, e.g. blanching, boiling, steaming, microwaving, frying, roasting, or fermentation which are expected to give beneficial effects on the vegetable properties, such as improving palatability and bioavailability of nutrients or shelf-life extension. However, processing can also result in changes of the phytochemicals content (Martínez-Hernández, Artés-Hernández, Gómez, & Artés, 2013; Nugrahedi, Verkerk, Widianarko, & Dekker, 2013). Various reviews have discussed the effect of conventional cooking methods on health-promoting compounds of broccoli (Cieslik, Leszczyńska, Filipiak-Florkiewicz, Sikora, & Pisulewski, 2007; Lin & Chang, 2005; Lippi, Salvagno, Montagnana, & Guidi, 2008; Nugrahedi et al., 2013; Sikora, Ciesliś, Leszczyńska, Filipiak-Florkiewicz,