

Title:

Quality and stability of frozen carrots fortified with green tea polyphenols

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Abstract:

Green tea (GT) is a high source of polyphenols such as epigallocatechin gallate, epigallocatechin, epicatechin gallate, and epicatechin. Beside their antioxidant properties, these polyphenols show pharmacological activities and their consumption has been correlated with low incidence of chronic pathologies related to oxidative stress. The GT amount that must be consumed daily to obtain the aforementioned health benefits is quite high and difficult to achieve. In this context, the production of food products fortified with GT extracts can help to reach the intake of GT polyphenols capable of exerting beneficial effects on human health.

In this study the use of green tea extract (GTE) for the production of frozen carrots fortified with GT polyphenols was investigated. To this purpose, sliced carrots (0.5 cm) were pre-treated by blanching (90 °C; 180 sec) and vacuum impregnated (50 mbar; 10 minutes) in water or GT extract solution (0.25% w/w), and thereafter frozen (-40 °C) and stored at -18 °C for 60 days. In order to evaluate the effect of processing on the functional properties, the overall quality and stability of carrots, fresh and pre-treated samples were evaluated before and after frozen storage for their colour, firmness, total carotenoids and polyphenols content (TPC), and antioxidant activity (AOA).

After pre-treatments, carrots evidenced a colour and firmness variation due to blanching while no effect was observed on carotenoids. VI with GTE allowed to significantly increase the carrots' polyphenol content and the antioxidant activity. After freezing and frozen storage all the samples evidenced a further softening and colour change with the not-pretreated sample being the most affected. All the samples showed a similar carotenoids loss whilst TPC decreased only on carrots fortified with GT polyphenols. Despite these losses, sample impregnated with GTE showed TPC and AOA values respectively 3 and 2 times higher than those of fresh carrots.