

Bioaccessible Phenolics, Phenolic Bioaccessibility and Antioxidant Activity of Pumpkin Flour

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Abstract : Pumpkin flour (PF) has a long shelf life and can be used as a nutritive, functional (antioxidant properties, phenolic contents, etc.) and coloring agent in many food items, especially in bakery products, sausages, instant noodles, pasta and flour mixes. Pre-treatment before drying is one of the most important factors affecting the quality of a final powdered product. Pretreatment, such as soaking in a bisulfite solution, provides that total carotenoids in raw materials rich in carotenoids, especially pumpkins, are retained in the dried product. This is due to the beneficial effect of antioxidant additives in the protection of carotenoids in the dehydrated plant foods. The oxygen present in the medium is removed by the radical SO_2 , and thus the carotene degradation caused by the molecular oxygen is inhibited by the presence of SO_2 . In this study, pumpkin flours (PFs) produced by two different applications (with or without metabisulfite pre-treatment) and then dried in a freeze dryer. The phenolic contents and antioxidant activities of pumpkin flour were determined. In addition to this, the compound of bioavailable phenolic substances which is obtained by PF has also been investigated using in vitro methods. As a result of researches made in recent years, it has been determined that all nutrients taken with foodstuffs are not bioavailable. Bioavailability changes depending on physical properties, chemical compounds, and capacities of individual digestion of foods. Therefore in this study; bioaccessible phenolics and phenolic bioaccessibility were also determined. The phenolics of the samples with metabisulfite application were higher than those of the samples without metabisulfite pre-treatment. Soaking in metabisulfite solution might have a protective effect for phenolic compounds. Phenolics bioaccessibility of pumpkin flours was investigated in order to assess pumpkin flour as sources of accessible phenolics. The higher bioaccessible phenolics ($384.19 \text{ mg of GAE } 100\text{g}^{-1} \text{ DW}$) and phenolic bioaccessibility values ($33.65 \text{ mL } 100 \text{ mL}^{-1}$) were observed in the pumpkin flour with metabisulfite pre-treatment. Metabisulfite application caused an increase in bioaccessible phenolics of pumpkin flour. According to all assay (ABTS, CUPRAC, DPPH, and FRAP) results, both free and bound phenolics of pumpkin flour with metabisulfite pre-treatment had higher antioxidant activity than those of the sample without metabisulfite pre-treatment. The samples subjected to MS pre-treatment exhibited higher antioxidant activities than those of the samples without MS pre-treatment, this possibly due to higher phenolic contents of the samples with metabisulfite applications. As a result, metabisulfite application caused an increase in phenolic contents, bioaccessible phenolics, phenolic bioaccessibility and antioxidant activities of pumpkin flour. It can be said that pumpkin flour can be used as an alternative functional and nutritional ingredient in bakery products, dairy products (yoghurt, ice-cream), soups, sauces, infant formulae, confectionery, etc.

Keywords : pumpkin flour, bioaccessible phenolics, phenolic bioaccessibility, antioxidant activity

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