



Effect of storage on bioactivity of an Algerian spice “paprika”: optimization of phenolic extraction and study of antioxidant and antibacterial activities

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Abstract

The effect of different storage methods (ambient temperature (A), refrigeration at 4 °C (R) and freezing at – 18 °C (F)), on the phytochemistry of an Algerian spice (paprika powder), was assessed. The optimized extract was obtained under the optimum conditions of ultrasound-assisted extraction (UAE) using response surface methodology (RSM) coupled with a Box–Behnken Design (BBD). This extract was evaluated for its total phenolics content (TPC), total flavonoids content (TFC) and its antioxidant and antibacterial activities. Under the optimum conditions (5 min for the irradiation time, 40% for the amplitude, 80% for ethanol concentration and 50% for solid–liquid ratio) the TPC was 12.23 ± 1.01 mg Gallic Acid Equivalent/gram of Dried Powder (mg GAE/g DP) which is very close with experimental assay. The TPC are better preserved at A whereas TFC and the antioxidant activity at F, and the antibacterial activity depend on the storage methods and the strains tested.

Keywords Paprika · Storage · Phenolic compounds · Ultrasound-assisted extraction · Box–Behnken design · Biological activities

Introduction

A spice can be a dried seeds, fruits, roots, barks or flowers of a plant or herb used, in small quantities, not only as flavor, color or preservative agents, but also in traditional medicines (Embuscado, 2015; Mulay and Salve, 2018). From ancient times, spices played major role in the lifestyle of people and have been used to treat several diseases (Barbosa et al., 2019; Cetó et al., 2018; Hamed et al., 2019). The active

phytochemicals derived from these spices have provided the molecular basis for these actions (Hamed et al., 2019; Jessica Elizabeth et al., 2017; Škrovánková et al., 2017).

Dried powdered spices are also widely used in food products to improve their sensory properties (Molnár et al., 2018). Among condiments, paprika is the most important one consumed throughout the world and used for flavoring (Deng et al., 2018a).

Additionally, paprika is used as natural colorant in seasonings, sauces and confectionary (Monago-Maraña et al., 2019). It is used not only for its taste value but also for its nutritional quality (Oyun and Oyetayo, 2020).

Paprika displays potent biological activities such as antioxidant, anti cancers, stimulation of the immune system, and prevention of cardiovascular diseases and delays the aging process (Batiha et al., 2020; Salehi et al., 2018). Sometimes it referred as chilli pepper, a characteristic red seasoning powder obtained from the drying and grinding of certain varieties of red peppers such as *Capsicum annum* L. Its cultivars have been identified as potential solanaceous crop (Cetó et al., 2020) with important economically and nutritionally interests because of their richness in natural colors and antioxidants (Lee et al., 1995). In addition to their

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