Effect of sodium metabisulphite and osmo dehydrated pretreatment on physicochemical and organoleptic characteristics of vacuum dried citrus lemon (shirazi) slice

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Introduction: Nutrition research on the health benefits of substances in plant foods (phytochemicals) has recently advanced to a new stage, as ascorbic acid, these phytonutrients is abundant in citrus fruit, and all show physiologic actions that may contribute to cancer prevention. Citrus lemon is an important source of this nutritional quality and it has low durability due to its high water content (87%). Therefore, some practical solutions such as drying could help to increase their sustainable necessary for improve production. Different drying methods have considerable impact on the quality of final product. Vacuum drying can preserved nutrients and increased the nutritional quality of the final product. This behavior could be related to drying process at low temperatures in the absence of oxygen. In vacuum drying, removal of moisture from food products takes place under low pressure. The lower pressure allow drying temperature to be reduced and higher quality to be obtained than with classical air conventional process at atmospheric pressure. Osmotic dehydraion can be used to remove water from heat-sensitive products with low energy consumption at a low temperature. Since osmotic dehydraion cannot remove whole moisture but it is good as a preliminary partial dehydration step. Higher osmotic concentration, long time and oxygen resulted in higher loss of antioxidant activity but fit osmotic concentration and time. The osmotic process has received considerable attention as a pre-treatment to reduce energy consumption and improve food quality, besides reducing the drying time in different studies. The osmotic dehydraion as a pre-treatment also inhibits enzymatic growing, retains natural color and retains volatile aromas during the subsequent drying. Sodium metabisulphite is an inorganic compound. It is used as antioxidant (through oxidation prevention) and preservative agent. The purpose of this study was to quantify the flow of soluble micronutrients, such as ascorbic acid, antioxidant agent during osmosis and its effects on the changes of organoleptic characteristics (flavor, taste, color and texture) in final product.

Materials and method: In this study, lemons (shirazi) of uniform quality were purchased from the local market Tabriz city (Iran) and stored at 4°C then the local temperature reached before use. The prepared slices of lemon with a thickness of 4 mm, were immersed in a solution of sodium metabisulphite (1500ppm) for 10 minutes at room temperature. Then, the influence of three different osmotic solution, (40 % sugar, 15 % salt and 20%-20 sugar/salt) on osmotic dehydraion (water loss and solid gain) prior to vacuum drying oven (Memmert, Schwabach, Germany) at temperature: 60°C and pressure: 70mbar, were investigated the (Shulka and Singh, 2007) method. Moisture content was determined by the oven drying method (AOAC, 1990). The effects of various drying parameters such as osmotic solution and metabisulphite treatment on the quality of dried lemon slices were evaluated. Drying kinetics were presented in terms of the temperature of the product during drying, drying curve and drying time and quality aspects were studied in terms EC50 by the 2, 2-diphenyl-1-picylhydrazyl absorption rate in spectrophotometer method (Cemeroglu, 2010), ascorbic acid by the 2, 6-dichlorophenol Indophenol titration method (Cemeroglu, 2010), shrinkage by the fluid movement (by ethanol) method (yasamehrirjerdì et al, 2012), and sensory evaluation by the ratings table method. Also the experiment was conducted according to a completely randomized design in triplicates. Data were evaluated by analysis of variance (ANOVA), using Design Expert software, and version dx7-trial.

Result & discussion: The result showed that the pretreatment with osmotic solution, has significant effect (level 1%) on physicochemical and organoleptic characteristics. In this study, shrinkage levels were reduced to an average of 20 percent because of the evolution of volume of dried lemon tissue throughout osmotic dehydraion in osmotic aqueous solution were closely supported by microstructural and ultrastructural changes.

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The observed behavior of structural parameters could be partially explained in terms of the multicomponent diffusion process occurring during osmosis as well as the relaxation of structural stresses of the compressed viscoelastic cell walls. Water loss in samples immersed in sodium metabisulphite was increased, while EC50 (reduced EC50 amount that’s mean increased antioxidant capacity) and that ascorbic acid content were decreased. Also combined osmotic solution (salt 20%- sugar 20%), considerable in water loss and solid gain due to the combined osmotic solution were increased. Mass transfer in samples was increased by increasing the osmotic pressure using salt. The sugar solution can be preserved fruit nutrients and increased the sensory quality of the final product through preserved antioxidant capacity and ascorbic acid content. model presented the best fit for the observed data and sample immersion in sodium metabisulphite with sucrose osmotic solution selected. Since, changing the original taste of fruit in osmotic dehydration considered to be a negative factor. Therefore, the selection of the best solution must be based on the sensory properties. Based on the obtained results, the best osmotic solution for dried lemon was found to be the sugar solution.

**Key Words:** Citrus lemon, Osmotic, Sodium metabisulphite, Vacuum drying