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Extended Abstract

Survey on the Effect of Sucrose Replacement with Stevia (*Stevia rebaudiana*) Powder and Tragacanth Gum on Physico-chemical, Rheological and Sensorial Properties of Apricot Nectar

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Abstract

Awareness of people about the suitable nutrition, can influence human nutrition and lead manufacturers to produce food products with low fat, sugar and salt, but with high fiber. One of the special diets is production of low-calorie foods with less sugar. In this study the effect of replacing sucrose with stevioside (0, 50 and 100%) and tragacanth gum (0.5%) in low-calorie apricot nectar was investigated. In the present study the tests included acidity, pH, total solids, total sugar, density, antioxidant activity (DPPH), total phenol, viscosity, lightness and sensory evaluation. The results showed that the Stevia addition had no significant effect on acidity and pH; however, it caused significant changes in the total solids and density of treatments. Total sugar and viscosity reduced with increasing Stevia addition. Antioxidant activity of samples increased with Stevia addition and, in all samples these factors improved through the addition of tragacanth gum. Additionally, rheological behaviors of samples were Power law with correlation coefficient of higher than 99 percent, and consistency coefficient increased by gum addition. The sensory evaluation results showed that sensory score reduced with 100% Stevia replacement that may be related to the bitter after-taste of Stevia and can be covered with tragacanth gum application. The above mentioned results showed that by replacing sugar with Stevia and tragacanth gum low-calorie products can be produced for the consumers.

Keywords: Apricot Nectar, Sensory Evaluation, Stevia, Tragacanth, Viscosity

Introductıon

Non-nutritional and artificial sweeteners, such as stevia, are a good choice for diabetic patients to receive their sugar in excess of the amount allowed (Badawi *et al*., 2005). Polyphenols such as flavonoids, catechins and anthocyanins are the most important compounds with anti-oxidant properties of stevia. 2.5% of the dry weight of the stevia leaves is phenolic compounds, especially flavonoids (with free radical inhibitory effect) (Iacopini *et al*., 2008). A lot of research has been done on the use of stevia sweeteners in various food products as a substitute for sugar. Considering that no specific research on the use of stevia sweetener has been performed as a substitute for sugar in apricot nectar, so far, in this study

attempt to Using stevia, for reducing the amount of sugar in the formulation of apricot nectar, as well as, tragacanth gum as a modifier of the rheological properties of apricot nectar. Finally, the effect of this replacement on physicochemical, rheological and sensory properties of the final product was investigated.

Material and methods

First, all the formulations were mixed together in a stirred tank and mixed up for a few minutes. Then filled and sealed in a metal cans by a filling machine. It should be noted that the nectar was packed cold in the can. After this step, the cans were immediately pasteurized in autoclave at 95 °C for 15 min. After this stage, they were immediately stored in cold water at a temperature of 35 °C and kept in a controlled room. Subsequently, acidity, pH, total soluble solids, density, total sugar, antioxidant activity, total phenol, rheological behavior, color, sensory evaluation of treatments was assessed according to standard methods. This research was based on the statistical model of factorial experiment in a completely randomized design. Factor A contains three levels of sweetener (100% sugar, 50% and 100% sugar replacement with its stevia equivalents), and factor B containing two levels of tragacanth gum in apricot nectar (0% and 0.5%).

Results and discussion

The acidity of each sample in different days did not show significant difference (P>0.05). Also, there was no significant difference (P>0.05) between the different samples in the same time period. The partial and complete replacement of sugar with stevia in apricot nectar has not caused any changes in its pH. The results of pH measurements were consistent with the results of the nectar acidity. The difference in dry matter in samples with 0, 50 and 100% stevia was significant (P<0.05). By increasing the percentage of stevia in the formulation of nectars as well as decreasing sugar, the density of samples was very low, which is not significant (P>0.05). By increasing the amount of stevia in samples and reducing sugar, the amount of total sugars decreased, which was a significant difference between the samples (P<0.05). With the increase in stevia, the amount of phenolic compounds increased, so that the highest phenol content is for the 100% stevia treatment and 100% stevia and tragacanth gum. Along with the results of antioxidant activity, total phenol values also increased with increasing the percentage of stevia and gum in the formulation of samples. In fact, increasing concentrations of phenolic compounds directly increase the ability of the samples to inhibit free radicals (Shahidi & Naczk, 2004). Researchers reported that inhibiting of DPPH free radicals by plant extracts depended on the concentration of phenolic compounds. The compounds in stevia seem to be capable of releasing electrons to active free radicals, thus stopping the free radical chain reaction. These researchers relate the strong antioxidant activity of plant extracts with high levels of phenols and flavonoids in the extracts (Lemus-Mondaca *et al*., 2012; Shivanna *et al*., 2013; Koda *et al*., 2008). By increasing the percentage of sugar substitution with stevia, the transparency factor (L*) of apricot nectar significantly decreased (P<0.05). Because during the pasteurization thermal process, in more stevioside samples with more polyphenols the chemical reaction between polyphenols and proteins results in the production of brown products and reduces the transparency of the final product. By increasing the amount of stevia and reducing sugar, the consistency coefficient decreased and the flow behavior index increased. All samples have non-Newtonian and dilatant behavior with cutting (n<1), and by increasing stevia in formulation, the rheological behavior of nectars has changed due to reduced sugar content in the formulation. The sample with 100% replacement has a lower acceptance than other samples, probably due to the bitter after taste of stevia. However, the addition of tragacanth gum has increased their acceptance, which can be due to a better oral sense caused by the gum (Saniah & Samsiah, 2012).

Conclusion

The addition of stevia with various percentages (0, 50 and 100%) with tragacanth gum (0.5%) in apricot nectar did not cause significant changes in acidity and pH, but the total solids, density and total sugar decreased. With increasing the percentage of stevia and reducing in sugar in the presence of tragacanth gum, because of polyphenols, such as flavonoids, catechins and anthocyanins and other antioxidant compounds, IC_{50} decreased. The results showed that with increasing the amount of stevia and reducing sugar, the viscosity of nectar samples decreased, but the addition of tragacanth gum to the samples improved the rheological properties. The sensory evaluation results showed that by replacing more sugar with stevia due to the bitter after taste, the samples had a lower acceptance than the control sample, which can be partially covered by the addition of tragacanth gum. In general, replacing sugar with stevia (with benefits such as low blood pressure, no calorie and low blood sugar) and the use of gum (covering some of the disadvantages of stevia) can be a lower-risk product for the health of consumers, Along with physico-chemical, rheological, and sensory desirable properties.

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