Brief

Effect of sucrose substitution by date syrup on the physicochemical and sensory properties of malt beverage

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Introduction: Non-alcoholic beverages are consumed in many countries. There are many people who avoid alcohol because of their health concerns, and in Muslim countries alcoholic beverages are religiously banned. Malt beverages are classified based on the alcohol content as alcoholic (more than 1.2%), low alcoholic (0.5-1.2%) and with no alcohol (less than 0.5%). Malt beverages are generally produced by dissolving wort granulates in water, filtration, and adding pure hop aroma. The malt beverage has some health benefits such as protection against coronary heart diseases, cancers and ulcers. Malt beverages are usually produced using barley malt and in some cases from other sources such as wheat, oats, rye and sorghum. In Iran, malt beverage is prepared without fermentation and is generally produced using barley malt. Malt beverages usually sweetened with sucrose. Sucrose is often preferably replaced with other sweeteners since it is the main cause of obesity, as well as diabetes and dental cavities. There are several known intense sweeteners which provide little or no energy intake. Since intense sweeteners are amongst the most controversial food additives due to suspicions of adverse health effects only few of them are allowed to be used in food industries. On the other hand, there is a wide range of natural sweeteners, which besides providing sweetness to the product, they contain various bioactive compounds, such as vitamins, minerals or polyphenols that are known to exhibit positive health effects and contribute to the concept of functional foods. Though not widely used, several natural alternatives to sugar are available.

Date fruit from date palm (*Phoenix dactylifera*) is one of the important cultivations in Iran. The importance of the date in human nutrition comes from its rich composition of carbohydrates (70–80%), salts and minerals, dietary fiber, vitamins, fatty acids and amino acids. Date juice concentrates, are condensed products made out of date extract. They differ in appearance, taste and consistency depending on the type of the raw juice and the degree of concentration. Three main products can be distinguished as date spread, date syrup and date liquid sugar. Date syrup is the most generally derived date product. It is a high energy food rich in carbohydrate, a good source of minerals but it also contains a very complex mixture of other saccharides, amino and organic acids, carotenoids and polyphenols. Besides its nutritional compounds, it is rich in antioxidants. The components responsible for antioxidative effect are flavonoids, phenolic acid, ascorbic acid and carotenoids. Date syrup as an innovative and main by-product in date processing was used as a substitution of sucrose in non-alcoholic malt beverage. In this study, the effect of sucrose replacement with date syrup on physicochemical and organoleptic properties of malt beverage was studied within 1, 7, 14, 21, 28, 60, 90,120, 150 and 180 days during 6 months of storage.

Materials and methods: The materials including barley malt and hops pellets, sucrose and date syrup were supplied from local market. Barley malt and hops pellets were obtained from Sard Sahra Company (Tabriz, Iran). Sucrose was purchased from Khoy sugar factory (Khoy, Iran) and date syrup from Shahd Bab Pars factory (Tabriz, Iran).

For preparing malt beverages barley malts were milled using a roller mill, then steeped with hot water in a
mash tank. Malt extract was filtered to produce thick, sweet liquid called wort. The wort was then boiled for an hour and date syrup and sugar were added together to the boiling wort at the ratios of 0:100, 25:75, 50:50, 75:25 and 100:0. Hops pellets were also added to the extract. The wort was then chilled using heat exchanger plate to avoid fermentation and filtered. The pH and brix of extracts were adjusted to 3.8 and 6 and they were transferred into 300 ml green Polyethylene Terephthalate (PET) bottles, then were pasteurized at 70°C for 30 minutes and stored in refrigerator at 4°C for further analysis.

Malt beverages which were sweetened with ratios of 0:100, 25:75, 50:50, 75:25 and 100:0 of date syrup to sucrose, physicochemical and sensory properties were evaluated during six months of storage. The data reported are the means of triplicate observations. Analysis of the data was done by Duncan’s test.

**Results and discussion:** According to results pH and Brix were not changed during 6 months. There was a significant difference (p<0.05) in reducing sugar and color between samples and control. Based on results increasing the proportion of date syrup in beverages could elevate reducing sugar. The amount of total sugar in samples with 75%, 50% and 25% date syrup showed significant difference to the sucrose containing samples (p<0.05). However, there was no significant difference between the sample with 100% date syrup and sucrose containing sample (p>0.05). According to sensory results, malt beverage with 75% date sugar exhibited the highest overall acceptability. Beverages formulated with date syrup had a desirable characteristic. So, from both the technological and sensory points of view, the malt beverage with 75% date syrup was found to be the best formula.

**Keywords:** Date Syrup, Malt Beverage, Organoleptic Properties, Sucrose Replacement.