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ORIGINAL ARTICLE

Compositional characteristics of date syrup extracted by different methods in some fermented dairy products

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Methods and zabady

Abstract This study was conducted to select the best method of extraction. Different methods have been used to extract and concentrate the date syrup "Dibs". Minced date flesh of Saidy variety was extracted twice using minced flesh at a water rate of 1:2 at 70 °C for 30 min using microwave, rotary evaporator and water bath and concentrated in a rotary evaporator and microwave. Apparently, use of microwave method for extraction and concentration of date syrup had a significant ($p \geqslant 0.05$) difference higher in the content of moisture, protein, total sugars, dietary fiber, total phenolics, hydroxymethylfurfural and ash, but it had no significant ($p < 0.05$) difference in insoluble solids and fat content. The organoleptic evaluation of zabady and biogarde prepared with dibs are correlated with the chemical characteristics and microbiological tests. Results could be concluded that the caloric values of fermented milk products with 2% Dibs attained the highest values, actually 65.62 and 64.78 K Cal/100 g for zabady and biogarde respectively. Total solids, S.N., T.A. and ash contents were gradually increased during storage periods. Also, zabady and biogarde with 2% dibs were found to be rich in all essential amino acids excluding lysine, histidine, threonine, and leucine + isoleucine.

Introduction

Date palm (*Phoenix dactylifera* L.) is one of the major fruit trees in Egypt. It has been used as food for 6000 years. (Al-Shahib and Marshall, 2003). 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, amino acids and protein. (El-Beltagy et al., 2009; Al-Shahib and Marshall, 2003). Research proves that when dates are eaten alone or as mixed meals with yoghurts they have low glycemic indexes (Gad et al., 2010). Epidemiological studies have consistently shown that high date fruit consump-

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tion is associated with a reduced risk of several chronic diseases such as coronary heart disease, cardiovascular disease, cancer, aging, atherosclerosis, neurodegenerative disease, tumor, and mutagens (Al-Farsi et al 2007; El-Beltagy et al 2009; Gad et al 2010). Extracts of the dates provided to the women after childbirth stimulate their immune system (Gad et al., 2010). On the other hand, a polysaccharide isolated from dates presented an antitumor activity (Ishurd and Kennedy, 2005). Egypt lies among the first largest producers of Arab countries (1,151,000 tons) means 17% of world production (FAO, 2004). Industrially, it is utilized to produce several products such as syrup, jam, jelly, chutney, candy and date bars, Yousif and Alghamdi (1998) and Ramadan (1998). Date syrup (dibs) is the most commonly derived date product. In date syrup industry the fruits are mixed with water and heated, when the sugars are extracted. This method destroys some nutritive components and darkens the product's color. Zabady is pasteurized milk coagulated to a cluster-like consistency with a mixed lactic acid culture containing *Lactobacillus bulgaricus* and *Streptococcus thermophilus*. It is most often used with fruit preserves or date palm syrup (dibs), in a variety of food products, including their use as functional food and ingredients in nutraceuticals. This is attributed to the fact that these foods may provide an optimal mixture of phytochemicals such as dietary fiber, phenolics, natural antioxidants and other bioactive compounds (Al-Farsi et al., 2007; Mansouri et al., 2005). In Several studies attempts have been made to improve the health status by the incorporation of *Lactobacillus acidophilus* or/and *Bifidobacterium bifidum* in the manufacture of yoghurt. These bacteria may have several therapeutic functions, including antimicrobial activity, its ability to assimilate cholesterol and carcinogenic activity (Chou and Weimer, 1999). The objective of this study was to compare existing differences in compositional and functional characteristics of three different methods to prepare the date syrup (dibs) of the Saidy date variety and to investigate the influence of date syrup (dibs) on chemical characteristics, microbiological tests, sensory evaluation and acceptability of zabady and biogarde.

Materials and methods

Materials

Saidy variety of date *P. dactylifera* L was used to prepare the date syrup in this investigation. The former, Saidy, is one of the finest cultivars (Semi-dry) in Egypt. It was obtained from the Kharja Date Packing Factory during the sorting operations of the high quality fruits. The fruits were pitted and the flesh was minced just before chemical analysis, and kept refrigerated in sealed polyethylene bags for further analysis and processing.

Chemicals

All chemicals and solvents were obtained from Sigma Aldrich Co. Ltd. (Dorset, UK).

Date syrup production

Date flesh (Semi-dry) Saidy date variety was pitted, crushed and cut to small pieces with a sharp knife and dry – blended for 3 min. with a blender, and extracted twice using 1:2 of flesh powder water rate at 70 °C for 30 min. by using microwave and rotary evaporator. But in water bath method the date flesh powder sample was heated in 1: 2 of flesh powder water rate at 70 °C for 30 min. and blended. The raw syrups were collected separately from each method, centrifuged at 4000 rpm for 15 min and filtered through a whatman No. 41 filter paper divided in two flashes and concentrated in a rotary evaporator under vacuum at 70 °C and a microwave to about 72 Brix. The produced date syrup (dibs) was packed in sealed glass bottles and stored inside the freezer until use.

Milk

Fresh whole buffalo's milk was obtained from the herd of Assiut experimental farm, the Faculty of Agriculture, Al-Azhar University, Assiut Branch.

Starter cultures

B. bifidum ATCC 15696, *Lactobacillus delbruekii* subsp. *bulgaricus* EMCC 11102, *Lb. acidophilus* ATCC 4356 and *S.* thermophilus EMCC 11044 were secured from Cairo MIRCEN, the Ain Shams University.

Proximate analysis

Percentages of moisture by a vacuum oven at 70 °C to a constant weight, protein by Kjeldahl nitrogen and ash by direct analysis were determined according to the Association of Official Analytical Chemists methods (AOAC, 2003). The Bligh and Dyer method (Al-Farsi et al., 2007) was used to determine the fat content. Total sugars and reducing sugars were determined according to Lan and Eynon method. Non reducing sugars were calculated by difference. Dietary fibers were carried out according to (Al-Farsi et al., 2007). The sample was de-sugared by three extractions, each with 85% ethanol (10 m1/g), and then dried overnight at 40 °C. Otherwise the total dietary fiber content would have been overestimated. Contents of crude protein (percentage total nitrogen X 6.25) and ash determined by using the methods described above were used to correct the fiber content. Dietary fiber was expressed as grams per 100 g of fresh weight. Proximate analysis was expressed as grams per 100 g of fresh weight. Total phenolics were determined calorimetrically using Folin – Ciocaltaeu reagent as described by (Al-Farsi et al., 2005), using a UV – 1601 spectrophotometer (Japan), the concentrations are expressed as milligrams of gallic acid equivalents (GA) per 100 g of fresh weight. Minerals i.e. Na, Ca, Mg and K were estimated using emission flame photometer (England), the other minerals (Fe, and Zinc) were determined according to AOAC (2003) using absorption spectrophotometer (Perkin – Elmer Instrument Model 2380, USA). Amino acids of date syrup concentrations (dibs) and fermented milk products were determined using a Beckman Amino Acid Analyzer Model 7300. The results were expressed as gram per 100 g protein or mg/100 g dry date basis. Hydroxymethylfurfural (HMF), titratable acidity, pH and total soluble solids (TSS) were determined in dibs according to the method of Rangana (1986) and results of Browning – index of HMF was expressed as absorbance values (at 420 nm). Total soluble solids (TSS) were determined by an ''Abbe'' refractometer at 20 °C (Rangana, 1986). The pH value was determined using a research pH meter. Titratable acidity (T.A) was determined by direct titration with NaOH (0.1 N) to a pH value 8.1 using a pH meter. The