COMPARISON OF PHYSICOCHEMICAL PROPERTIES AND GENERAL ACCEPTANCE OF FLAVORED DRINKING YOGURT CONTAINING DATE AND FIG SYRUPS

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Abstract: Milk and dairy products have a rich nutritional value and they are the main constituents of a human diet. In recent years, the consumption of dairy drinks containing water, sugar syrups and flavorings has been common. So it is important to find a natural alternative sweetener to remove sugar. Therefore, the purpose of this study is to produce flavored drinking yogurt with natural sweeteners like date syrup and fig syrup as a sugar substitute. The study was made of the comparing physicochemical properties and also of opinions about the general acceptance of flavored drinking yogurt with date and fig syrups. The physicochemical properties such as pH, titratable acidity, viscosity, total solid, syneresis and the sensory evaluation of samples were determined weekly at 4°C for 28 days. The results showed that the samples that contained fig syrup had a lower acidity and syneresis percentage while their viscosity was higher compared to the samples that contained date syrup. It can be concluded that flavored drinking yogurt with 10% fig syrup and 1% pectin was chosen as the best treatment since it was rated the highest in general acceptance compared to other samples.

Keywords: Yogurt drink, date syrup, fig syrup

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INTRODUCTION

Milk and dairy products play a key role in healthy human nutrition and development throughout life. In recent decades, technological advances have supported the development of new dairy-based products. The dairy sector has developed techniques to produce a diverse range of milk-based products and dairy ingredients. Processes such as fermentation are used to produce a variety of dairy products. Between all milk fermented products, yogurt is more popular than others and has a higher acceptability in the world due to its nutritional value [1]. Yogurt, typical fermented milk, is perhaps the most complex and biologically active of all foods consumed all around the world [2]. In the world, the vast majority of the human population suffers from lactose intolerance disease. Lactose intolerance is a condition in which people don't have the ability to digest lactose, the sugar found in milk products, and have the symptoms like abdominal pain, bloating, diarrhea, gas and nausea [3]. Yogurt containing live bacteria may be better tolerated by lactose malabsorbers because of the presence of the bacteria in yogurt that produce β-galactosidase in the small intestine. Furthermore, it takes yogurt longer to pass through the digestive system than milk does, thus allowing for a more effective lactose breakdown [4]. So yogurt should be included in the diet. The Ministry of Health and Medical Education show that people need 2 to 3 servings of dairy products a day but unfortunately people in some countries, such as Iranian, use only 0.7 serving of milk and dairy products [1]. Undoubtedly, one reason for the low rate of dairy products consumption is lack of sufficient diversity. Today, in order to deal with the problem of high soda and low dairy consumption, some dairy-based drinks with high diversity including whole dairy drinks such as fermented milk, drinking yogurt and dairy-based beverages have been placed in the dairy production program. Recently, the consumption of dairy drinks containing water, sugar syrup and flavorings has been common.

Table sugar which is referred to sucrose is a disaccharide consisting of glucose and fructose. Fruit syrups contain some simple sugars like fructose and glucose, however they also contain longer chain and complex carbohydrates that are longer to digest and absorb. Fruit syrups are fantastic health-promoters due to the presence of beneficial plant compounds compared to refined sugars (sucrose). The carbohydrates in fruit are accompanied by vitamins, minerals, protein, fibers, plant pigments and anthocyanins that confer a host of beneficial effects. So if a person doesn't suffer from a health problem such as diabetes, it is better to use syrups instead of sugar [5].

Fig fruit (Scientific name: Ficus carica) is an Asian species of flowering plants in the mulberry family. It is native to the Middle East and western Asia and one of the popular fruits enjoyed since ancient times. Fig is now widely grown throughout the world, both for its

fruit and as an ornamental plant [6]. Fig is rich in tocopherols, carotenoids, phenolics and vitamins such as vitamin C that can alter the metabolic activation and detoxification/ disposition of carcinogens. These antioxidant compounds affect the processes that modify the development of tumor cells [7], and avoid the neurochemical and behavioral changes related to aging [8]. The studies show that fruits and vegetables are rich in phenolics decrease cardio- and cerebrovascular diseases and cancer death rates [9]. Fig varieties with dark skin have higher amounts of polyphenols, flavonoids and anthocyanins accompanied by a higher antioxidant activity compared with fig varieties with lighter skin [10]. Figs are free of sodium, fat, and, like other fruits, are free of cholesterol. Fig fruit is low in calories since 100 g of fresh fig fruit contain only 74 calories. Fig fruits contain health benefiting dietary fiber and lignin. Fibers and lignin are non-digestible portions of a lot of plants that absorb water, and increase in bulk. They play a major role in preventing constipation by accelerating the passage of material through the large intestine [11]. The chemical composition of fig fruit varies with the type. The average composition of the edible part of a fresh fig with a moisture content of 80.8% is (per 100 gm): 1.3% protein, 0.6% mineral matter, 17.1% carbohydrates, 0.06 mg of calcium, 0.03 mg of phosphorus, 1.2 mg of iron, 270 I.U. of β-carotene, 0.6 mg of nicotinic acid, 50 micro gm of riboflavin (B_2) and 2 mg of ascorbic acid. The total sugar content of fresh figs is 13–20% and that of dried figs is 42–62% which is present mostly in the form of invert sugar. The analysis of fresh and dried figs showed the presence of 15.2% and 45–95% of reducing sugars [12]. Fig syrup is an artisan derivative of fig fruit and is a typical food product made by boiling and concentrating fresh figs in water, without adding any other ingredients. The obtained syrup is a dense product defined by its brown color, sweet taste and smell [13]. Therefore, fig syrup can be replaced by sugar to provide sweet healthy food.

Phoenix dactylifera, commonly known as date or date palm, is a flowering plant species in the palm family, *Arecaceae*. Due to its long cultivation, the place of origin is unknown but it probably originated from the lands around Iraq. The date species is widely cultivated and is naturalized in a lot of tropical and subtropical regions worldwide [14]. It is probably one of the oldest cultivated fruits and has been a part of a staple diet in the Middle Eastern countries. Date is energetic food, and when the body needs more energy, it is considered as the best food. 100 g of dates contain 277 calories [14]. Date production and consumption is increasing continuously because of its therapeutic virtues besides its high nutritive value [15]. The researches show that in a balanced nutrition regime date fruit is an important source of minerals and vitamins [16], so it can be useful in strengthening bones and curing painful diseases like osteoporosis [14, 17]. Numerous studies prove that when dates are eaten alone or in mixed food with plain yogurt, they have low glycaemic indexes [18, 19]. In addition, Miller *et al.* [20] reported that the consumption of dates may benefit in glycaemic and lipid control of diabetic patients. There are the following health benefits of date fruits: curing anemia, constipation; diarrhea; intestinal disorder; allergies and intoxication treatment. Various studies have revealed that dates have an anti-tumor activity [21], antioxidant and anti-mutagenic properties [22, 23]. Date fruit has been recommended in folk curing for the treatment of various infectious diseases and cancer [24]. Furthermore, dry date fruits are consumed in Indian traditional medicine after a child's birth as immunostimulants [25]. Date syrup (date honey or date molasses) is thick dark brown, very sweet fruit syrup extracted from dates and has the same properties of date. It is widely used in the North African and Middle Eastern cuisine. The average chemical characteristics of date syrup with 82 brix degrees are: 16.5% moisture, 1.45% protein, 38.2 glucose, 39.4% fructose and 1.6% ash [26]. Date syrup is rich in such monosaccharides as glucose and fructose. It is therefore highly suitable for people suffering from hypoglycaemia, or for those with sucrose intolerance or those with pancreatic problems who have difficulty absorbing disaccharides. Date syrup is used by women after childbirth to stimulate their immune system [25]. Aqueous date extract also significantly inhibited lipid peroxidation and protein oxidation in a dose-dependent manner [27].

Several studies have been carried out to indicate the potential of dairy- based drinks production. Habibi et al. [28] examined the use of a yogurt starter to produce dairy-based drinks. They tested two species of bacteria (*Streptococcus thermophilus* and *Lactobacillus delb-rueckii* subsp. *bulgaricus*), sucrose syrup, pectin and strawberry flavor to produce a flavored dairy drink. They concluded that they can produce the dairy-based drinks which can be accepted by the customers. The impact of date syrup on kefir physical and chemical properties was examined by Taherian et al. [29]. They found that date syrup has the highest general acceptance according to taste panel opinions. Kazemizadeh and Fadaei [30] used pomegranate peel extract and date nectar to make flavored milk and they got very good results in the general acceptance of the obtained product.

The taste of yogurt is most often enhanced with fruit preserves or other ingredients [31]. Flavored yogurts are produced by adding fruit concentrates or flavored syrups to the cultured milk before or after incubation [32]. Therefore, the purpose of the present study is to optimize the formulation of flavored drinking yogurt with two different sugar substitutes such as date and fig syrups in order to remove sugar and improve the health of the products. In addition, some physicochemical properties of the produced drinks and the general acceptance of two produced drinks was examined and compared.

STUDY OBJECTS AND METHODS

To study the physicochemical properties and the general acceptance of flavored drinking yogurt with date and fig syrups, the materials and the experiments were prepared as described below.

Materials. The commercial yogurt starters YO-MIX 465 and YF-L711 were obtained from the Pardis Roshd Mehregan Company, Shiraz, Iran. The whole cow raw milk was purchased from a supermarket (Fasa, Fars, Iran). Fig syrup and date syrup were taken from a local supermarket (Estahban, Fars, Iran). All the chemicals used in this paper were of an analytical grade.

Preparing flavored drinking yogurt. Raw fresh milk was analyzed by MilkoScan FT1 (Denmark) and consisted of 3.10% protein, 3.1% fat, lactose 4.88 % and 11.79% total solids. Then, milk was preheated to 65°C and homogenized. The homogenized milk was pasteurized at 73°C for 15 seconds and cooled to 42°C. The pasteurized milk was inoculated with a 4% starter and the incubation continued until the pH reached 4.2. Yogurt drink formulation was done by adding Syrups (dates and figs) separately as sweeteners at 5 and 10 percent and 0.5 and 1 percent pectin as a stabilizer. And finally the product was pasteurized at 72°C in a hot water bath for 2 minutes. To prevent evaporation, the dishes were covered with foil, and then they were cooled to a temperature less than 10°C. Finally, they were packed in suitable sterile dishes and they were kept at 4°C for 28 days for further analysis [33].

pH measurement. The pH of each sample was measured at room temperature (20°C) by using a digital pH meter (WTW pH 525 model, Germany) during the storage period. At first, the pH meter was calibrated according to the manufacturer's instructions, using buffer standards of pH 7 and pH 4 and then placed directly into each sample and recorded the number.

Acidity measurement. Titratable acidity was measured for all samples according to the method adopted by the Association of Official Analytical Chemists with 0.1 N NaOH, and phenolphthalein as an indicator to see a pale pink color. The results were calculated in dornic degree.

Dry matter measurement. Total solids of samples were measured using a forced-air drying oven (500UNB model, Germany) at 105°C according to the Iranian National Standard No. 637 during the storage period. Moisture is evaporated from the sample by oven drying. Total dry matter is determined gravimetrically as a residue remaining after drying.

Viscosity measurement. The viscosity measurement was carried out at room temperature of 25°C using a Brookfield Programmable DVE Viscometer (Brookfield viscometer DVII, USA) equipped with a spindle No. 3 and a rotation speed of 30 rpm. The results were recorded in centipoises (cP) after 10 s of shearing.

Syneresis measurement. The syneresis index of different samples was determined according to the methodology proposed by Koksoy and Kilic [34]. Dinking yogurt (40 g) was weighed in sterile scaled plastic containers and the samples were stored at 4°C. After 28 days of storage at 4°C, a clear layer of serum, in case of having serum, was separated by Pasteur pipettes and it was weighed and the percentage of serum separation was calculated [34].

General acceptance. The analysis was performed under normal light, in the sensory laboratory at the Azad University of Fasa by fifteen trained students (eight women and seven men aged 22–28). The test samples, identified by a 3-digit code, were presented to the descriptors in a randomised order, immediately after being removed from the fridge (4°C). Since the samples were unusable on Day 28, so the duplicate samples on days of storage 0, 7, 14 and 21 were tested and the ratings were presented on a 4-point hedonic scale ranging from 4 ("like extremely") to 1 ("dislike extremely") according to the Iranian National Standards [35].

Statistical analysis. The data were analyzed using SPSS 24 software (SPSS Inc., Chicago, IL, USA). One-way ANOVA, Kruskal-Wallis, Mann-Whitney, Repeated Measures and Paired sample t tests were used. The results are expressed as mean ± SD with a significance level of $p < 0.05$. All the experiments were repeated three times.

RESULTS AND DISCUSSION

pH and acidity. The pH and acidity values of flavored drinking yogurt with fig and date syrups during storage at 4 °C are shown in Tables 1 and 2. The data showed that by increasing the percentage of fig and date syrups in the samples, pH increased and the titratable acidity decreased, respectively ($p > 0.05$). This phenomenon is due to the high pH of fig syrup (5.02) and date syrup (4.83) which significantly affects the final pH of flavored drinking yogurt. However, the samples containing date syrup had a significantly higher acidity in comparison with the samples containing fig syrup ($p > 0.05$). The pH and titratable acidity of all the samples decreased and increased, respectively during this period ($p > 0.05$). It seems that bacteria use such monosaccharides as fructose and glucose in fig and date syrups and produce acidic metabolites. These findings are in keeping with those of Milani *et al*. [36], who also reported that the use of date honey along with a stabilizer guar significantly decline the pH of the orange low-fat yogurt dessert during this period.

The different small letters indicate statistically significant differences in columns ($p < 0.05$). The different capital letters indicate statistically significant differences between days in each sample ($p < 0.05$).

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Percentage of dry matter. The percentages of dry matter of samples are shown in Table 3. The results indicated that dry matter of flavored drinking yogurt samples containing fig and date syrups significantly decreased when the percentage of syrup increased ($p > 0.05$). In the sugars, when the molecular weight lowered, the total solid decreased. The monosaccharides like glucose and fructose (make the major part of carbohydrate compounds in fig and date syrups) have a lower molecular weight than sucrose does [37]. Thus, when the percentage of syrups increased, the dry matter of flavored drinking yogurt decreased. We also observed that by increasing the pectin content in samples, the percentage of dry matter significantly increased

($p > 0.05$). The samples containing fig syrup had a higher dry matter compared to the date syrup samples. This is because of a high fiber content in fig syrup that leads to a high dry matter content. During storage, no significant difference was found in the dry matter content of the samples ($p > 0.05$). Similar results were obtained by Gad et al. [19] that a change in the moisture content of the product can significantly change according to the moisture content of the fruit. There were no significant differences between fig and date syrup in all samples and also during storage ($p > 0.05$).

Viscosity properties. Table 4 illustrates the changes of viscosity in the flavored drinking yogurt samples during storage at 4°C. When the percentage of fig and date syrups increased, the viscosity of the samples significantly increased. The presence of hydroxyl group in sugars can lead to hydrogen bonding between sugar and water. By increasing date and fig syrup (glucose and fructose) compared to sucrose, the hydrogen bonds increased and when the mobility of free water decreased, the viscosity increased. The lower molecular weight of saccharides is, they tend to absorb water and so the viscosity increased [36, 37]. Glucose and fructose (the main carbohydrate content in the fig and date syrups) have a lower molecular weight and absorb more water [38]. In addition, pectin had a significant effect at various levels of addition on the apparent viscosity. The data indicate that by increasing the amount of pectin as a thickening agent and stabilizer, the viscosity of the samples significantly increased ($p > 0.05$). We observed that the samples containing fig syrup showed a higher viscosity than the date syrup samples. This may be due to the high levels of fiber along with the high levels of dry matter in the samples containing fig syrup which hold more water and increase the gel strength. On the other hand, the viscosity of all samples declined with time ($p > 0.05$). That can be attributed to an increase in the acidity of samples. The results of this study are consistent with the findings of Milani *et al.* [36]. They found that frozen yogurt containing 50% date honey and 0.3% guar had a higher viscosity compared to the samples without date honey. Also, Gohari Ardabil et al. [37] found that the higher viscosity in frozen yogurt containing date syrup was due to the absorption of water by reducing sugars.

Table 1. Mean ± SEM pH of various flavored drinking yogurt samples during storage up to 28 days

Samples[1]	Time				
	Day 0	Day 7	Day 14	Day 21	Day 28
F1P1	5.81 ± 0.01^{bE}	5.26 ± 0.01^{cD}	4.88 ± 0.01^{cC}	4.59 ± 0.01^{bB}	4.36 ± 0.04^{bA}
F1P2	5.81 ± 0.02^{bE}	5.23 ± 0.04^{cD}	4.91 ± 0.01^{dC}	4.62 ± 0.01^{cB}	4.44 ± 0.01^{cA}
F2P1	6.09 ± 0.01^{eE}	5.56 ± 0.01^{fD}	5.37 ± 0.01^{fC}	5.07 ± 0.02^{fB}	4.83 ± 0.00^{eA}
F2P2	6.11 ± 0.01^{fE}	5.61 ± 0.01^{gD}	5.38 ± 0.01^{fC}	5.11 ± 0.01^{gB}	4.87 ± 0.01^{fA}
D1P1	5.73 ± 0.01^{Ae}	5.17 ± 0.02^{bD}	4.80 ± 0.01^{aC}	4.51 ± 0.01^{aB}	4.29 ± 0.02^{aA}
D1P2	5.72 ± 0.02^{aE}	5.13 ± 0.03^{aD}	4.83 ± 0.01^{bC}	4.50 ± 0.01^{aB}	4.34 ± 0.01^{bA}
D2P1	5.99 ± 0.01^{cE}	5.46 ± 0.01^{dD}	5.27 ± 0.01^{eC}	4.97 ± 0.02^{dB}	4.71 ± 0.02^{dA}
D2P2	6.02 ± 0.01^{dE}	5.49 ± 0.01^{eD}	5.26 ± 0.01^{eC}	5.01 ± 0.01^{eB}	4.74 ± 0.01^{dA}

[1]*Abbreviations:* F1P1 = 5% Fig syrup + 0.5% Pectin, F1P2 = 5% Fig syrup + 1% Pectin, F2P1 = 10% Fig syrup + 0.5% Pectin, F2P2 = 10% Fig syrup + 1% Pectin, D1P1 = 5% Date syrup + 0.5% Pectin, D1P2 = 5% Date syrup + 1% Pectin, D2P1 = 10% Date syrup + 0.5% Pectin, D2P2 = 10% Date syrup + 1% Pectin.

Table 2. Mean ± SEM titratable acidity (dornic degree) of various flavored drinking yogurt samples during storage up to 28 days

Samples[1]	Time				
	Day 0	Day 7	Day 14	Day 21	Day 28
F1P1	53.17 ± 0.47^{dA}	64.78 ± 0.87^{dB}	66.88 ± 0.54^{cC}	72.59 ± 0.65^{bc}	76.66 ± 0.68^{cdE}
F1P2	55.20 ± 0.96^{eA}	65.86 ± 0.72^{dB}	69.80 ± 0.31^{dC}	73.72 ± 1.00^{cD}	78.56 ± 0.56^{eE}
F2P1	44.07 ± 0.43^{aA}	55.00 ± 0.69^{aB}	61.05 ± 0.84^{aC}	65.84 ± 0.36^{aD}	69.30 ± 0.15^{aE}
F2P2	46.17 ± 0.98^{bA}	58.22 ± 0.98^{bB}	62.68 ± 0.46^{bC}	66.98 ± 0.72^{aD}	70.90 ± 0.40^{bE}
D1P1	62.23 ± 0.96^{gA}	72.89 ± 0.72^{eB}	76.83 ± 0.31^{fC}	80.75 ± 1.00^{dD}	85.05 ± 0.47^{Ge}
D1P2	60.29 ± 0.47^{fA}	71.90 ± 0.87^{eB}	74.00 ± 0.54^{eC}	79.71 ± 0.65^{dD}	83.78 ± 0.68^{fE}
D2P1	49.85 ± 0.43^{cA}	61.68 ± 1.76^{dB}	67.29 ± 1.52^{cC}	71.82 ± 0.64^{bD}	76.05 ± 0.91^{cE}
D2P2	52.43 ± 0.98^{eA}	64.48 ± 0.98^{dB}	68.94 ± 0.46^{dC}	73.24 ± 0.72^{cD}	77.16 ± 0.40^{dE}

[1]*Abbreviations:* F1P1 = 5% Fig syrup + 0.5% Pectin, F1P2 = 5% Fig syrup + 1% Pectin, F2P1 = 10% Fig syrup + 0.5% Pectin, F2P2 = 10% Fig syrup + 1% Pectin, D1P1 = 5% Date syrup + 0.5% Pectin, D1P2 = 5% Date syrup + 1% Pectin, D2P1 = 10% Date syrup + 0.5% Pectin, D2P2 = 10% Date syrup + 1% Pectin.

Table 3. Mean ± SEM dry matter (weight percent) of various flavored drinking yogurt samples during storage up to 28 days

Samples[1]	Time				
	Day 0	Day 7	Day 14	Day 21	Day 28
F1P1	23.16 ± 0.22^{cA}	23.22 ± 0.36^{cA}	23.04 ± 0.64^{cA}	23.23 ± 0.48^{bA}	23.19 ± 0.20^{cA}
F1P2	27.04 ± 0.07^{dA}	26.45 ± 1.44^{dA}	26.75 ± 0.56^{dA}	27.17 ± 1.47^{cA}	27.05 ± 0.24^{dA}
F2P1	16.15 ± 0.26^{aA}	15.70 ± 0.39^{aA}	16.17 ± 0.05^{aA}	16.15 ± 0.32^{aA}	16.06 ± 0.15^{aA}
F2P2	18.08 ± 0.14^{bA}	18.01 ± 0.09^{bA}	18.02 ± 1.06^{bA}	17.60 ± 0.62^{aA}	17.71 ± 0.45^{bA}
D1P1	23.11 ± 0.24^{cA}	23.18 ± 0.37^{cA}	23.06 ± 0.54^{cA}	23.27 ± 0.52^{bA}	23.16 ± 0.16^{cA}
D1P2	27.04 ± 0.06^{dA}	26.83 ± 1.71^{dA}	26.78 ± 0.55^{dA}	27.10 ± 1.45^{cA}	27.04 ± 0.28^{dA}
D2P1	16.04 ± 0.18^{aA}	15.70 ± 0.32^{aA}	16.01 ± 0.12^{aA}	16.05 ± 0.33^{aA}	16.07 ± 0.26^{aA}
D2P2	18.04 ± 0.07^{bA}	17.96 ± 0.09^{bA}	18.09 ± 1.02^{bA}	17.56 ± 0.71^{aA}	17.77 ± 0.41^{bA}

[1]*Abbreviations:* F1P1 = 5% Fig syrup + 0.5% Pectin, F1P2 = 5% Fig syrup + 1% Pectin, F2P1 = 10% Fig syrup + 0.5% Pectin, F2P2 = 10% Fig syrup + 1% Pectin, D1P1 = 5% Date syrup + 0.5% Pectin, D1P2 = 5% Date syrup + 1% Pectin, D2P1 = 10% Date syrup + 0.5% Pectin, D2P2 = 10% Date syrup + 1% Pectin. The different small letters indicate statistically significant differences in columns ($p < 0.05$). The different capital letters indicate statistically significant differences between days in each sample ($p < 0.05$).

Syneresis of the flavored drinking yogurt. The results of the syneresis of all the flavored drinking yogurt samples are presented in Fig. 1. The results of syneresis percentage of the samples revealed that by increasing the amount of pectin and syrup, the syneresis of the flavored drinking yogurt samples significantly decreased ($p > 0.05$). The similar results reported by Amerinasab et al. [38] show that low syneresis at an optimum date liquid syrup (DLS) content (6%) in DLS-fortified yogurt can be attributed to a high water binding capacity of fructose monosaccharide in DLS composition. In addition, Kumar and Mishra [39] reported that the use of pectin in mango soy fortified set yogurt significantly reduced the syneresis. It seems that stabilizers like pectin form a hydrocolloid network which entraps casein and water in the network and prevents syneresis. The data showed that fig syrup significantly decreased the syneresis of samples compared to date syrup ($p > 0.05$). This might be due to high fiber in syrups especially in fig syrup that have a higher water-binding capacity and absorb the water.

Table 4. Mean ± SEM viscosity (cP) of various flavored drinking yogurt samples during storage up to 28 days

Samples[1]	Time				
	Day 0	Day 7	Day 14	Day 21	Day 28
F1P1	123.00 ± 1.00^{cE}	112.67 ± 0.58^{cD}	96.67 ± 0.58^{bC}	73.33 ± 0.58^{bB}	42.67 ± 0.58^{bA}
F1P2	166.67 ± 0.58^{fE}	156.00 ± 2.00^{fD}	133.67 ± 0.58^{eC}	112.33 ± 0.58^{eB}	81.00 ± 1.00^{eA}
F2P1	144.67 ± 0.58^{eE}	136.00 ± 1.00^{eD}	121.00 ± 1.00^{dC}	98.33 ± 0.58^{dB}	66.33 ± 1.53^{dA}
F2P2	203.00 ± 1.00^{hE}	186.00 ± 3.61^{hD}	167.67 ± 1.15^{gC}	137.00 ± 1.00^{gB}	96.67 ± 0.58^{fA}
D1P1	101.67 ± 1.15^{aE}	90.67 ± 1.15^{aD}	73.00 ± 0.00^{aC}	50.67 ± 0.58^{aB}	22.67 ± 1.53^{aA}
D1P2	141.33 ± 1.15^{dE}	132.33 ± 0.58^{dD}	117.67 ± 0.58^{cC}	82.67 ± 1.53^{cB}	59.67 ± 1.53^{cA}
D2P1	119.00 ± 1.00^{bE}	109.67 ± 0.58^{bD}	96.00 ± 1.00^{bC}	75.00 ± 0.00^{bB}	44.00 ± 1.00^{bA}
D2P2	181.00 ± 1.00^{gE}	171.00 ± 1.00^{gD}	153.33 ± 1.15^{fC}	121.67 ± 2.08^{fB}	82.67 ± 1.53^{eA}

[1]*Abbreviations:* F1P1 = 5% Fig syrup + 0.5% Pectin, F1P2 = 5% Fig syrup + 1% Pectin, F2P1 = 10% Fig syrup + 0.5% Pectin, F2P2 = 10% Fig syrup + 1% Pectin, D1P1 = 5% Date syrup + 0.5% Pectin, D1P2 = 5% Date syrup + 1% Pectin, D2P1 = 10% Date syrup + 0.5% Pectin, D2P2 = 10% Date syrup + 1% Pectin. The different small letters indicate statistically significant differences in columns ($p < 0.05$). The different capital letters indicate statistically significant differences between days in each sample ($p < 0.05$).

Table 5. Mean ± SEM general acceptance scores of various flavored drinking yogurt samples during storage up to 28 days, n=15

Samples[1]	Time			
	Day 0	Day 7	Day 14	Day 21
F1P1	3.40 ± 0.51^{abC}	3.20 ± 0.68^{aC}	2.60 ± 0.51^{bB}	2.13 ± 0.74^{abA}
F1P2	3.67 ± 0.49^{abC}	3.40 ± 0.63^{aBC}	3.13 ± 0.35^{dfAB}	2.80 ± 0.86^{cdA}
F2P1	3.60 ± 0.51^{abC}	3.33 ± 0.72^{aBC}	3.07 ± 0.70^{cdfAB}	2.67 ± 0.62^{bcdA}
F2P2	3.80 ± 0.41^{bC}	3.53 ± 0.64^{aBC}	3.20 ± 0.68^{fAB}	2.93 ± 0.59^{dA}
D1P1	3.27 ± 0.46^{aB}	3.07 ± 0.59^{aB}	2.13 ± 0.64^{aA}	1.93 ± 0.59^{aA}
D1P2	3.53 ± 0.52^{abB}	3.20 ± 0.56^{aB}	2.73 ± 0.46^{bcdA}	2.40 ± 0.74^{abcdA}
D2P1	3.40 ± 0.51^{abB}	3.13 ± 0.52^{aB}	2.67 ± 0.49^{bcA}	2.27 ± 0.70^{abcA}
D2P2	3.60 ± 0.51^{abC}	3.27 ± 0.70^{aBC}	2.87 ± 0.35^{bcdeAB}	2.53 ± 0.64^{bcdA}

[1]*Abbreviations:* F1P1 = 5% Fig syrup + 0.5% Pectin, F1P2 = 5% Fig syrup + 1% Pectin, F2P1 = 10% Fig syrup + 0.5% Pectin, F2P2 = 10% Fig syrup + 1% Pectin, D1P1 = 5% Date syrup + 0.5% Pectin, D1P2 = 5% Date syrup + 1% Pectin, D2P1 = 10% Date syrup + 0.5% Pectin, D2P2 = 10% Date syrup + 1% Pectin. The different small letters indicate statistically significant differences in columns ($p < 0.05$). The different capital letters indicate statistically significant differences between days in each sample ($p < 0.05$).

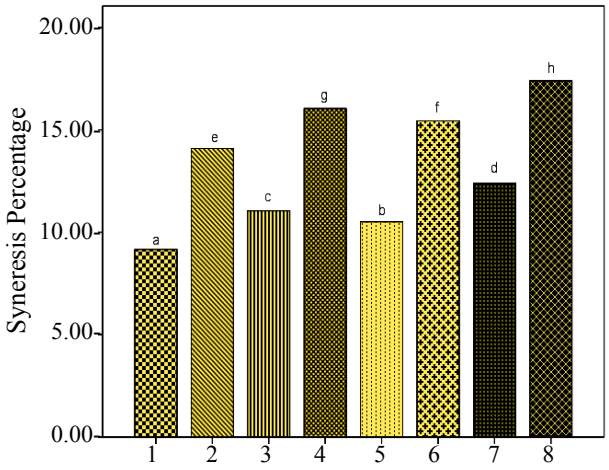

Fig. 1. Syneresis percentage of various flavored drinking yogurt samples at day 28 of storage. (1) 10% Fig syrup + 1% Pectin, (2) 5% Fig syrup + 1% Pectin, (3) 10% Fig syrup + 0.5% Pectin, (4) 5% Fig syrup + 0.5% Pectin, (5) 10% Date syrup + 1% Pectin,(6) 5% Date syrup + 1% Pectin, (7) 10% Date syrup + 0.5% Pectin, (8) 5% Date syrup + 0.5% Pectin. The different letters indicate statistically significant differences ($p < 0.05$).

General acceptance evaluation. However the samples with high syrup and pectin presented higher preference scores, no significant differences were found between them ($p > 0.05$) (Table 5). But there was a gradual decrease in the general acceptance score of samples over 21 days ($p > 0.05$). This phenomenon may be due to an increase in acidity followed by a decrease in viscosity. It seems that panelists prefer samples with a higher viscosity and a better texture. The lowest scores for the overall acceptability of samples could probably be due to their high syneresis in the results of low firmness and viscosity [38]. Keshtkaran et al. [26] reported that any increase in viscosity had a positive effect on the rate of the general acceptance of date milk drink. In addition, Dalim et al. [2] confirmed that the general acceptance of a banana milk drink was higher than a Chico drink because of its higher viscosity.

Today, a variety of additives such as chocolate, honey, strawberries and etc. are used to improve the taste of milk and different types of dairy based healthy drinks. Therefore, the present study used different percentage of fig and date syrups as natural sweeteners to make flavored drinking yogurt in order to remove the sugar. The study was made of the comparing physicochemical properties and general acceptance of flavored drinking yogurt with date and fig syrups.

In general, this study showed that samples contained fig syrup had a lower acidity and syneresis percentage while their viscosity was higher compared to the samples that contained date syrup. Hence, it can be concluded that flavored drinking yogurt with 10% fig syrup and 1% pectin (F2P2) was chosen as the best treatment since it was rated the highest in general acceptance and it had a longer shelf-life compared to other samples.

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