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Antioxidant Activity, Rheological, and Sensory Properties of Functional Goat Milk Yoghurt Drink Using Some Plant Extracts

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Abstract - The present study was designed to investigate the effect of using different ratios (5, 10, and 15%) of date fruit, karkade, and oregano extracts in the manufacture of goat milk yoghurt drinks. Antioxidant activity, rheological, and sensory properties of flavored yoghurt drinks were evaluated. All goat milk yoghurt drink samples were analyzed for phenolic compounds, antioxidant activity, and sensory properties when fresh and during storage (21 days) at 4±1°C. Our results indicated that there was an increase in antioxidant activity and phenolic compounds in all treatments by increasing the levels of plant extracts added. Generally, the data concluded that using 10% date fruit, 10% karkade, and 5% oregano extracts yielded higher scores for rheological and sensory properties than other treatments. The overall results showed that it is possible to produce good-quality goat milk yoghurt drinks with good appearance, flavor, body & texture by adding date, karkade, and oregano extracts as functional foods.

Keywords: Goat milk; Yoghurt drink; Antioxidant activity; Rheological properties; Sensory properties.

INTRODUCTION

Yoghurt is a fermented dairy product that is widely manufactured and consumed in Egypt and around the world, owing to its various health claims and therapeutic benefits, in addition to its nutritional value. Goat milk is a crucial food for humans, especially those who have lactose

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intolerance and are sensitive to the milk of other animals. Goat milk contains a variety of nutrients that are essential for both goats and humans. Goat milk contains vital nutrients such as fat, protein, lactose, vitamins, enzymes, and minerals. However, regardless of its highly valuable nutritive composition, goat milk is less preferred by consumers due to its specific sensory characteristics, which are very often regarded as undesirable, such as goaty or mutton flavor, which may exist in some areas **[**1].

The date palm (*Phoenix dactylifera* L.) is one of the major fruit trees in Egypt **[2]**. Its production and consumption are increasing continuously due to its high nutritional value, and therapeutic properties. Date fruit is an important source of minerals and vitamins. Date fruits were found to contain carbohydrates (44- 88%), fats (0.2 - 0.4%), proteins (2.3-5.6%), fibers (6.4-11.5%), minerals, and vitamins **[3]**. Carbohydrates in dates are mostly in the form of fructose and glucose, which are easily absorbed by the human body **[4-5]**.

Hibiscus sabdariffa L. (Hs, roselle; Malvaceae) or karkade has been used traditionally as a food, in herbal drinks, in hot and cold beverages, as a flavoring agent in the food industry, and as an herbal medicine. Some evidence is provided by in vitro and in vivo studies, as well as some clinical trials. Extracts demonstrated antibacterial, anti-oxidant, nephro- and hepatoprotective, renal/diuretic effects, lipid metabolism (anti-cholesterol), anti-diabetic, and anti-hypertensive effects, among other properties. This might be linked to strong antioxidant activities, inhibition of a-glucosidase and a-amylase, inhibition of angiotensin-converting enzymes (ACE), a direct vaso-relaxant effect, or calcium channel modulation. Phenolic acids (especially protocatechuic acid), organic acids (hydroxycitric acid and hibiscus acid), and anthocyanins (delphinidin-3-sambubioside and cyanidin-3-sambubioside) are likely to contribute to the reported effects **[6]**.

Origanum vulgaris, popularly known as oregano, is a very versatile plant, and although it has been used in folk medicine as a diaphoretic, carminative, anti-inflammatory, and immunostimulant, only recently has it been recognized for its exhibited antifungal and antibacterial activities, as well as its absolute anti-aflatoxigenic efficacy. **[7-8-9-10]**.

During the last decade, increasing consumer awareness and a better understanding of how food contributes directly to their health have considerably changed consumer demands in the field of food production. These differences, resulting from a better knowledge of nutrition-health relations,

led to the development of the functional food concept. Today, it is well established that functional food products can be obtained by adding other functional ingredients to food or by using processing and production methods that enable the preservation of native active compounds in a specific product. In terms of employing the enrichment with or addition of other functional ingredients to a food product, most often medicinal plant extracts serve as the functional constituents, primarily due to their therapeutic effects, which are mostly attributed to the presence of polyphenolic compounds **[11-12-13]**.

As a result, the goal of this study is to prepare and use extracts of three traditional medicinal plants from date, Karkade, and oregano to develop a functional goat yoghurt drink with enhanced bioactive properties and improved sensory characteristics.

MATERIAL AND METHODS

MATERIALS

Fresh goat milk (12.60% total solids, 4.25% fat, 3.34% protein, 0.88% ash, 4.13% total carbohydrates, 0.16% acidity as lactic acid, and 6.65 pH value), was collected randomly from Baladi goats with small holding herds grazing in Aswan Governorate. Milk samples were immediately stored under refrigerated conditions until they were transferred to the laboratory. The date fruit (*Phoenix dactylifera* L.), karkade (*Hibiscus sabdariffa L.),* and oregano (*Origanum vulgare)* were obtained from the local market in Aswan City. Milk samples were immediately stored under refrigerated conditions until they were transferred to the laboratory. Commercial-grade sugar (sucrose) was obtained from a local market. CMC (used as a stabilizer) is produced by Danisco Ingredients (Juelsminde, Denmark) for Misr Food Additives Company (MIFAD), Egypt. Skim milk powder (97% TS) is produced in Poland by Varimex Company. Yoghurt culture, which consists of *Streptococcus thermophilus* and *Lactobacillus delbreuckii* subsp. *bulgaricus* (freeze-dried red-set), was obtained from Chr. Hansen Laboratories, Copenhagen, Denmark.

METHODS

Preparation of plant extracts

The date fruit (*Phoenix dactylifera* L.), karkade (*Hibiscus sabdariffa* L.) and oregano (*Origanum vulgaris)* powder were mixed each alone with sterile H_2O at the ratio of 1: 10 in a 250 ml bottle. The final volume of both plant extracts was 0.1 g/ml. The mixture was left for 12 hrs

[14] in water bath (70 °C) followed by centrifugation (6000 rpm, 15 min.). The supernatant was collected and concentrated in a rotary evaporator, then used as an herbal concentrated extract in making herbal-fermented drinks. The date extract consisted of 26.35, 1.01, 0.48, 1.66, and 23.20 % for total soluble solids, protein, lipids, ash, and total carbohydrate, respectively, and 0.07% acidity as malic acid - 5.50 pH). Also, karkade extract contained 9.89, 0.7, 0.84, 1.26, and 7.09 % for total soluble solids, protein, lipids, ash, and total carbohydrate, respectively, and 1.90 % acidity as mallic acid - 3.80 pH). On the other hand, oregano extract recorded 8.20, 0.92, 0.51, 1.88, and 6.77 % for total soluble solids, protein, lipids, ash, and total carbohydrate, respectively and 0.35% acidity as malic acid- 4.74 pH).

Chemical analysis

The chemical composition of goat milk and the plant water extracts were determined according to the methods described by **[15]**. Total phenolic compounds were determined by the Folin-Ciocalteau method following a published procedure **[16]. Antioxidant activity:** The antioxidant activity (radical scavenging activity %) was measured using DPPH (1,1-diphenyl-2-picrylhydrazyl) **[15].**

Rheological properties

Rheological parameters (texture factor, flow behavior index, viscosity) of yoghurt drink blends were measured using Brookfield Engineering labs DV-III Rheometer. The blend was placed in a small sample adapter and a constant temperature water bath was used to maintain the desired temperature. The viscometer was operated between 10 and 50 rpm and shear stress, shear rate, and viscosity data were obtained directly from the instrument. The SC4-21 spindle was selected for the measurement **[17].**

Sensory evaluation

The organoleptic properties included flavor 45 points; body & texture 35 points, acidity, and appearance (both 10 points) **[17].** The organoleptic evaluations were done by staff members and others.

Statistical analysis

Tests and analyses including each sample and each test parameter mentioned above, were conducted in triplicate. The results are reported as the mean ± SD. The collected data were statistically analyzed using the general linear model in IBM SPSS Statistics 25 software, and the

Duncan's multiple range test was applied to determine significance at a *p*-value of ≤0.05.

Preparing of yoghurt drink

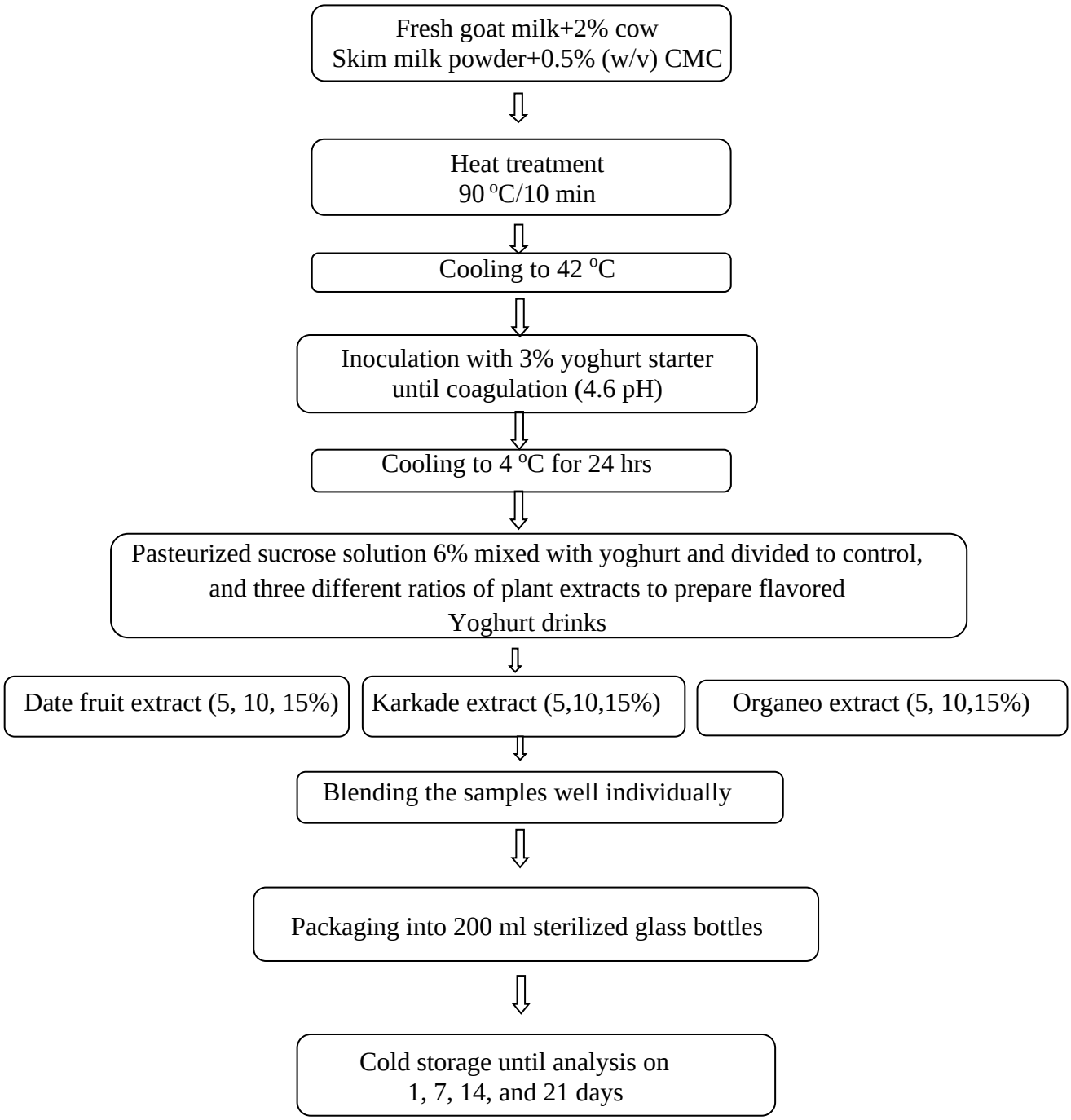

Figure 1: Technology method for preparing of yoghurt drink treatments.

RESULTS AND DISCUSSION

Phenolic compounds and total antioxidant activity of yoghurt drinks

The phenolic compounds and total antioxidant activity contents of yoghurt drinks were determined when fresh and at the end of the storage period (21 days). The phenolic compounds and total antioxidant activity contents of yoghurt drinks were significantly influenced ($p \leq 0.05$) by different additives flavors flavored with date, karkade, and oregano extracts. The antioxidant and phenolic compound contents increased ($p \leq 0.05$) with rising date, karkade, and oregano extract levels added, due to the high levels of phenolic compounds and antioxidant activity of date, karkade, and oregano extract concentrations (Table 1).The amount of phenols and antioxidants present increases with the proportion of increased concentration **[18-19]**.

The total phenolic compound contents of fresh yoghurt drinks increased with the addition of date fruit extract, being 5.75, 6.22, and 6.70 mg/100g for yoghurt drinks containing 5, 10, and 15 % of karkade extract, respectively. The same trend was observed through storage. Also, the total phenolic compound contents of fresh yoghurt drinks increased with the addition of karkade extract, being 6.70, 7.15, and 7.40 mg/100g for yoghurt drinks containing 5, 10, and 15 % of karkade extract, respectively. The same trend was observed through storage.

From the same previous Table 1, the total phenolic compound contents of fresh yoghurt drinks increased with the addition of oregano extract and were 9.22, 9.50, and 9.75 mg/100g for yoghurt drinks containing 5, 10, and 15 % of oregano extract, respectively. The same trend was observed through storage.

Moreover, the highest antioxidant activities (AOA%) were observed in yoghurt drinks containing 15% of all plant extracts (D_3, K_3, O3), followed by those containing 10% (D_2, K_2, O_2) or (D_1, K_1, O_1). Meanwhile, the control yoghurt drinks were characterized by the lowest values of AOA% as compared with those containing different plant extracts. The same trend was found throughout the storage period. The AOA% of fresh yoghurt drinks increased with the addition of date extract and was 87, 89.1, and 90.5% for yoghurt drinks containing 5, 10, and 15 % of date extract, respectively. Similar finding were reported by **[20]**.

Also, the AOA% of fresh yoghurt drinks increased with the addition of more karkade extract: 86.1, 87.3, and 89 % for yoghurt drinks containing 5, 10, and 15 percent of Karkade extract, respectively. The same trend was observed through storage. From the same previous Table 1, the AOA% of fresh yoghurt drinks increased with the addition of oregano extract, being 88.9, 90.6,

and 92% for yoghurt drinks containing 5, 10, and 15 % of oregano extract, respectively. The same trend was observed through storage.

The results are in agreement with earlier findings by **[17-21]**. Moreover, these fruits show the highest antioxidant content in the different plant extracts.

Table 1: Changes in total phenolic compounds (mg gallic acid equivalents (GAE) /100 g sample) and antioxidant activity (AOA) % of goat milk yoghurt drinks during storage at (4±1° C for 21 days).

Parameters										
Treatments	**Con.**	**D_1**	**D_2**	**D_3**	**K_1**	**K_2**	**K_3**	**O_1**	**O_2**	**O_3**
Phenolic compounds (mg/100g)										
Fresh	1.82 ±0.00^{a}	5.75 ±0.01^{a}	6.22 ±0.00^{a}	6.70 ±0.00a	6.70 ±0.01^{a}	7.15 ±0.01^{a}	7.40 ±0.01^{a}	9.22 ±0.00^{a}	9.50 ±0.00^{a}	9.75 ±0.00^{a}
21 days	1.54 ±0.00$_{b}$	4.02 ±0.00^{b}	4.50 ±0.02^{b}	5.04 ±0.00^{b}	5.45 ±0.00^{b}	5.60 ±0.00^{b}	5.90 ±0.00^{b}	6.12 ±0.03^{b}	6.50 ±0.00^{b}	7.10 ±0.02^{b}
Total antioxidant activity (%)										
Fresh	82.00 ±1.2^{a}	87.00 ±1.3^{a}	89.10 ±1.5^{a}	90.50 ±0.6^{a}	86.10 ±1.3^{a}	87.30 ±0.45^{a}	89.00 ±0.23^{a}	88.90 ±1.2^{a}	90.60 ±1.0^{a}	92.00 ±0.6^{a}
21 days	74.00 ±1.7^{b}	79.30 ±1.2^{b}	81.30 ±1.2^{b}	81.90 ±0.9^{b}	77.70 ±1.2^{b}	80.00 ±0.90^{b}	80.50 ±0.56^{b}	81.50 ±0.65^{b}	82.00 ±1.2^{b}	83.80 ±0.9^{b}

***** a & b: means with the same letter among treatments are significantly different ($p \leq 0.05$).
**Con. Control ; D_1, D_2, and D_3 goat milk yoghurt drink with 5, 10, and 15% date fruit extract respectively.
K_1, K_2, and K_3 goat milk yoghurt drink with 5, 10, and 15% Karkade extract respectively.
O_1, O_2, and O_3 goat milk yoghurt drink with 5, 10, and 15% Oregano extract respectively.

Rheological properties of yoghurt drinks

Many factors affect the consistency, such as the rheological properties of fermented milk products. Among these factors are pH value, dry matter, and protein contents **[22]**. Table 2 shows the rheological parameters of the tested flavored yoghurt drink samples. The treatments with higher ratios of date fruit extract tended to have lower rheological parameters (texture factor, flow behavior, and viscosity) between treatments and during storage. Using higher levels of Karkade extract increased all the rheological characteristics except the viscosity values. Also, the storage period contributes to decreased viscosity values.

Similar results were reported by **[17]**, who found that the viscosity of fermented yoghurt drinks significantly decreased with a decrease in fat content. Khalil (2013) **[23],** reported that using a higher ratio of pomegranate juice significantly decreased all the rheological characteristics except the flow behavior index of the resultant yoghurt drink. The texture of yoghurt drinks is influenced by various factors, such as the quality and composition of milk and its protein and fat contents,

heat treatment, the combination of lactic acid bacteria used the acidification rate and storage time. Ibrahim and Khalifa **(2015) [24]**, found that camel milk yoghurt containing stabilizer had a higher viscosity than the control samples. On the other hand, hardness and viscosity increased along with the acidity increase in all samples during storage, as reported by **[25]**.

Table 2: Changes in the rheological characteristics of goat milk yoghurt drink as affected by adding different levels of concentrated date fruit, karkade, and oregano extracts during the storage period.

Parameters										
Treatments	**Con.**	**D_1**	**D_2**	**D_3**	**K_1**	**K_2**	**K_3**	**O_1**	**O_2**	**O_3**
Texture factor										
Fresh	0.31^{cB}	0.52^{aB}	0.52^{aB}	0.45^{bB}	0.33^{bB}	0.36^{aB}	0.36^{aB}	0.35^{aB}	0.33^{bB}	0.33^{bB}
21 days	4.92^{cA}	5.17^{bA}	5.30^{aA}	4.70^{cA}	4.98^{bA}	5.30^{aA}	5.28^{aA}	5.10^{bA}	4.70^{cA}	5.22^{aA}
Flow behavior index										
Fresh	0.61^{cA}	0.81^{bA}	0.89^{aA}	0.88^{aA}	0.95^{bA}	1.05^{aA}	1.08^{aA}	1.00^{bA}	1.09^{aA}	1.11^{aA}
21 days	0.40^{cB}	0.46^{bB}	0.51^{aB}	0.49^{aB}	0.60^{bB}	0.71^{aB}	0.74^{aB}	0.60^{bB}	0.77^{aB}	0.78^{aB}
Viscosity(40 speed) m pas										
Fresh	17.90^{cB}	18.35^{aB}	18.37^{aB}	18.12^{bB}	18.05^{aB}	18.00^{bB}	18.00^{bB}	18.31^{aB}	18.02^{bB}	18.00^{bB}
21 days	43.45^{cA}	43.90^{aA}	43.88^{aA}	43.60^{bA}	43.60^{aA}	43.53^{bA}	43.49^{bA}	43.60^{aA}	43.50^{bA}	43.50^{bA}

***** a, b & d- A, B: means with the same letter among treatments are significantly different ($p \leq 0.05$).
**Con. Control ; D_1, D_2, and D_3 goat milk yoghurt drink with 5, 10, and 15% date fruit extract respectively.
K_1, K_2, and K_3 goat milk yoghurt drink with 5, 10, and 15% Karkade extract respectively.
O_1, O_2, and O_3 goat milk yoghurt drink with 5, 10, and 15% Oregano extract respectively.

Sensory properties of yoghurt drinks

Consumer acceptance of healthy food products is strongly dependent on the sensory characteristics of these products **[17-26]**. The sensory quality of yoghurt is an important criterion for consumers when making a purchasing decision, whereas the yoghurt type influences consumers' preferences to a low extent **[27]**.

The total scores of organoleptic results, including flavor, body & texture, appearance, and acidity for yoghurt drink samples, as shown in Tables 3, 4, and 5, are affected by adding concentrated date fruit, Karkade, and oregano extracts, respectively.

Significant differences were noticed in the overall acceptability and appearance of all the treatments in fresh and stored yoghurt drink samples. These are in agreement with those obtained

by **[19-28]**, who revealed that flavor, had a significant influence ($p \leq 0.05$) on the overall acceptability of stirred yoghurt.

Also, the results obtained indicated that the samples treated with date fruit extract (D_2) had the highest scores in fresh yoghurt drink, followed by D_1 and D_3. Later, the total scores decreased, but the products were still acceptable. In fresh and stored yoghurt drink samples; there were significant differences in flavor, body, and texture for all treatments.

Data from Table 4 indicated that the yoghurt drink samples flavored with Karkade extract (K_1) had the highest scores in fresh yoghurt drink, followed by K_2, but K_3 had the lowest scores. Later, the total scores decreased, but the products were still acceptable. In fresh and stored yoghurt drink samples; there were significant differences in flavor, body, and texture across all treatments.

The sensory scores of all the samples in the present study decreased during the storage period. This may be due to the acidity development or the production of microbial metabolites and the low pH value, which slightly affected the rheological and sensory properties of the product. Saitmuratova and Sulaimanova (2000) **[29]**, found that the carbohydrate content of fermented camel milk was 3–5 times lower than that of unfermented camel milk. These results are in accordance with those reported by **[30]**, who found a decrease in the lactose content from 6.53 to 4.22% and an increase in glucose and galactose in yoghurt prepared by *L. bulgaricus* and *S. thermophilus*. Desouky *et al*. (2018) and Shori and Baba (2011b) **[21-31]** who observed that the maximum attainable sensory scores of some properties of goat milk yoghurt drink were given for the appearance of all fresh samples, whereas after 21 days of storage, the samples flavored with the highest amount of date, karkade, and oregano extracts ranked the lowest for appearance. The most acceptable treatments were that yoghurt drink flavored with date extract (D_3) followed by oregano (O_3) and lastly karkade (K_3).

Also, the results obtained in Table 5 indicated that the samples treated with oregano extract (O_1) had the highest scores in the fresh yoghurt drink, followed by O_2 and O_3. Later, the total scores decreased, but the products were still acceptable. In fresh and stored yoghurt drink samples; there were significant differences in flavor, body, and texture across all treatments.

Table 3: Organoleptic properties of goat milk yoghurt drink as affected by adding different levels of concentrated date fruit extract during the storage period at 4 ± ^{o} C.

Parameters					
Treatments					
	Flavor (45)	**Body & texture (35)**	**Appearance (10)**	**Acidity (10)**	**Overall acceptability* (100)**
Fresh					
Con.	44	34	10	1	89±0.50^{c}
D_1	43	34	10	4	91±0.22^{b}
D_2	45	35	10	6	96±0.21^{a}
D_3	41	33	10	7	91±0.09^{b}
7 days					
Con.	40	35	10	2	87±0.03^{b}
D_1	44	33	9	2	88±0.09^{a}
D_2	45	32	8	3	88±0.11^{a}
D_3	41	31	9	3	83±0.06^{c}
14 days					
Con.	47	35	10	2	94±0.07^{a}
D_1	44	33	9	2	88±0.04^{b}
D_2	45	32	9	3	89±0.06^{b}
D_3	40	31	8	3	82±0.00^{c}
21 days					
Con.	43	30	10	2	85±0.04^{a}
D_1	30	20	7	1	58±0.03^{c}
D_2	39	33	10	3	85±0.13^{a}
D_3	35	25	8	2	70±0.51^{b}

***** a, b & c: means with the same letter among treatments are significantly different ($p \leq 0.05$).
**Con. Control ; D_1, D_2, and D_3 goat milk yoghurt drink with 5, 10, and 15% date fruit extract respectively.
K_1, K_2, and K_3 goat milk yoghurt drink with 5, 10, and 15% Karkade extract respectively.
O_1, O_2, and O_3 goat milk yoghurt drink with 5, 10, and 15% Oregano extract respectively.

Table 4: Organoleptic properties of goat milk yoghurt drink as affected by adding different levels of concentrated karkade extract during the storage period at 4 ± °C.

Parameters					
Treatments					
	Flavor (45)	**Body & texture (35)**	**Appearance (10)**	**Acidity (10)**	**Overall acceptability* (100)**
Fresh					
Con.	44	34	10	1	89±0.14^{b}
K_1	44	32	10	4	90±0.06^{a}
K_2	44	33	10	2	89±0.08^{bc}
K_3	41	32	10	3	86±0.03^{c}
7 days					
Con.	40	35	10	2	87±0.00^{a}
K_1	44	33	9	2	88±0.03^{c}
K_2	41	34	9	3	87±0.04^{b}
K_3	40	33	8	4	85±0.03^{b}
14 days					
Con.	40	32	10	2	84±0.05^{a}
K_1	42	32	8	3	85±0.02^{c}
K_2	41	32	9	3	85±0.04^{b}
K_3	38	30	9	4	81±0.03^{b}
21 days					
Con.	40	30	10	2	82±0.33^{a}
K_1	40	32	8	3	83±0.13^{c}
K_2	36	33	9	4	82±0.09^{a}
K_3	30	30	7	4	71±0.09^{b}

***** a, b& c: means with the same letter among treatments are significantly different ($p \leq 0.05$).
**Con. Control ; D_1, D_2, and D_3 goat milk yoghurt drink with 5, 10, and 15% date fruit extract respectively.
K_1, K_2, and K_3 goat milk yoghurt drink with 5, 10, and 15% Karkade extract respectively.
O_1, O_2, and O_3 goat milk yoghurt drink with 5, 10, and 15% Oregano extract respectively.

Table 5: Organoleptic properties of goat milk yoghurt drink as affected by adding different levels of concentrated oregano extract during the storage period at 4 ±1 ^{o}C.

Parameters					
Treatments					
	Flavor (45)	**Body & texture (35)**	**Appearance (10)**	**Acidity (10)**	**Overall acceptability* (100)**
Fresh					
Con.	44	34	10	1	89±0.14^{c}
O_1	43	35	10	5	93±0.06^{a}
O_2	44	32	10	5	91±0.08^{b}
O_3	43	30	10	4	87±0.03^{d}
7 days					
Con.	40	35	10	2	87±0.16^{a}
O_1	41	34	9	5	89±0.15^{c}
O_2	43	33	9	4	89±0.05^{a}
O_3	41	34	7	2	84±0.05^{b}
14 days					
Con.	37	35	10	2	84±0.08^{a}
O_1	37	35	9	4	85±0.00^{d}
O_2	40	33	8	3	84±0.11^{b}
O_3	41	34	7	2	84±0.08^{c}
21 days					
Con.	41	30	10	2	83±0.04^{b}
O_1	40	30	9	5	84±0.09^{b}
O_2	37	30	10	4	81±0.08^{a}
O_3	34	31	9	4	78±0.10^{c}

***** a, b & c: means with the same letter among treatments are significantly different ($p \leq 0.05$).
**Con. Control ; D_1, D_2, and D_3 goat milk yoghurt drink with 5, 10, and 15% date fruit extract respectively.
K_1, K_2, and K_3 goat milk yoghurt drink with 5, 10, and 15% Karkade extract respectively.
O_1, O_2, and O_3 goat milk yoghurt drink with 5, 10, and 15% Oregano extract respectively.

CONCLUSION

Because goat milk contains the majority of the important nutrients, it might cover a large portion of human daily nutritional demands. Furthermore, goat milk yoghurt drinks containing date,

karkade, or oregano extracts offered total phenolic components, antioxidants, excellent characteristics, and greater acceptable sensory values.

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النشاط المضاد للأكسدة والخواص الريولوجية والحسية لمشروب اليوجورت الوظيفي من لبن الماعز بإستخدام بعض المستخلصات النباتية

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الملخص العربي

تهدف الدراسة الحالية إلى دراسة تأثير إستخدام تركيزات مختلفة (٥- ١٠- ١٥٪) من مستخلصات مركزة من ثمار البلح ونبات الكركديه والأورجانيوم في تصنيع مشروب يوجورت من لبن الماعز. تم تقييم النشاط المضاد للأكسدة , الخواص الريولوجية والحسية لمشروبات اليوجورت المنكهة بالمستخلصات . تم تحليل كل العينات لمشروبات اليوجورت المصنع من لبن الماعز وتقدير المواد الفينولية , النشاط المضاد للأكسدة والخواص الحسية عند بداية التصنيع وأثناء التحزين (٢١ يوم) عند ٤±١°م . تشير النتائج إلي زيادة في النشاط المضاد للأكسدة والمركبات الفينولية في كل المعاملات بزيادة نسب الإضافة من المستخلصات (٥- ١٠- ١٥٪) ، وتخلص النتائج إلي أن استخدام التركيزات ٥٪ و١٠٪ و١٥٪ من مستخلصات البلح والكركديه والاورجانيوم سجل أعلي تقييم في الخواص الريولوجية والحسية بالمقارنة بالمعاملات الأخري . أشارت كل النتائج إلي إمكانية إنتاج مشروب يوجورت وظيفي جيد من لبن الماعز بنكهات متنوعة ذو مظهر وطعم وقوام مقبول عن طريق إضافة مستخلصات من البلح والكركديه والأورجانيوم كغذاء وظيفي.