Phisco-Chemical analysis and sensory evaluation of Iraqi cake incorporated with grape and date (Zahidi) syrup

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Abstract. In this research, The effect of substituting sucrose with different level of DS and DG (0, 25, 30,50,70 and 100%) on the physiochemical, microbial and sensory properties of cake were studied. Cake models were as well construed for microbial content and organic structure during, before then next 35 days storing at experimental temperature. Results showed no significant variances (p < 0.01) in the chemo physical structure of the date and grape test cake for protein values while there were significant differences for Asch, fiber and fat content values, Sensory assessment results showed high significant variance (p < 0.01) among the cake trials with the exemption of texture (6.04-6.07) for both treatment and general acceptability (7.05 and 7.08) for date and grape cakes, respectively. The microbial content (fungal and bacterial) of the grape cake were lesser than the date cake all over the period of the 35 days storing at experimental temperature. The maximum microbial content was documented next the 25th days (148.0 × 10⁵ cfu/g) in addition to (194.30 × 10⁵ cfu/g) for grape and date trial cakes respectively. The fungus content was additionally supreme at 25th day of storing (14.33 × 10³ cfu/g) and (12.67 × 10³ cfu/g) for grape and date cakes respectively. The total viable counts remained in suitable parameters for human utilization. So, grape and date syrup can easily replace sucrose in sweetened cake making in Iraq. The aim of research study the effect of the accepted neutral sweetener (grape and date syrup) acting as replacement of sugar in production of local cake sensory and chemical characteristic have been examined.
1. Introduction

Several varieties of sweeteners such as normal and synthetic have subsisted sourced to prepare a fortified cake by the decreased quantity of natural sugar. Influence of aspartame and Polyols as the substitutes for sucrose on a spongy cake’s assets exhibited that exchanging supply with a sugar can lessening the, porosity, bulk density and size of a product cake [1]. Substituting natural sucrose by aspartame and sorbitol has reduced the cake’s calorie to 24.5[2]. Additionally, the application of sorbitol as an unconventional sweetener to sucrose in the mode of cookies was explored in addition to the product with smooth material was prepared [2]. Lowered-calorie cake were formed because of substituting natural sucrose with sorbitol, mannitol and fructose Furthermore, substituting sucrose by mannitol, fructose and sorbitol were addition to exploring the substitute effect on the manufactured cake assets showed a reduction in calorie, and the extent of calorie was reduced by growing the ratio of natural sucrose as a substitute for these natural sugars[3]. Manufacture of fortified iron-encouraged biscuits and its effect on the physico-chemical assets of biscuit was evaluated by substituting juice concentrate of grape with sugar [1]. Results shown that substituting concentrate by the sugar had a noteworthy effect on the physico-chemical assets, as it reduced pH and improved the content of moisture and ash and to improving the shelf life of product. More, the probability of substituting sugar by concentrate in a conventional sweet named “Halvay-e Shire” was explored [4]. The results showed that the concentrate be able to used for example an suitable substitute for sugar in “Halvay-e Shire[4]. Generous amounts of date syrup in the desert countries of Asia, south Africa, , worldwide and USA are manufactured by date (Phoenix dactylifera L) as extern-rate yields. Date pulp is prolific in sugars, mostly glucose and fructose, but is found to be little in protein and fat [5].

Greatest of natural sugar is in the formula of regular sugars that the person system can simply absorb. Date is a beneficial supplier of lots minerals like magnesium, potassium, phosphorous, iron, sodium, and calcium [6]. Date syrup additionally include rich quantities of natural antioxidants, which are satisfactory acknowledged to be affected as important function in the avoidance of cardiovascular illness and cancer [7]. In the modern years original date by products manufacturing are create grown aiming at making rate supplementary yields of better value and quality. In this framework, manufacture of natural date foodstuffs as sweeteners (as replacement of sucrose) by great dietary value of date palm is a superior object. Various section procedures are remaining expended for managing of minimal cost dates addicted to original yields and a amount of last inventions have been grown and advertised. Currently, manufacture links are effective to produce a extensive amounts of natural date products of marketable price involving date concentrate, date liquid and date syrup, sugar. Natural Date syrup has the subsequent standard descriptions:, pH score 4.2-6, minimum Brix of 70°, a minimum reducing sugars of58% and maximum ash content of 2%, [7]. These three date yields may be utilized exactly through the customers or the diet making industrial units the same as partial-completed yields in making several foods for example biscuit, canned foods and cake, as sweeteners. Chemo-physical and dietetic assets of these developing foods are of excessive reputation to the customers and food manufacture. The focal object of this work to explore the influences of treating steps on Chemo-physical assets of some by-products date and grape extract on Sensory Textural and Physico-chemical volatile profiles of Iraqi cake.

2. Materials & Methods

Current study was managed at animal of production, University of Karbala, Iraq. Raw materials like, sugar, grapefruit, date fruit, eggs, ghee, flour and commercial baking products were acquired from the national market of Karbala. compounds for evaluation were bought from Sigma (Germany) obtainable in the regional shop.

2.1. Cake preparing Method

The formula, based on wheat flour weight, was: 120% sugar, 60% milk, 30% oil, 50% eggs and 3% baking powder. The ingredients studied were added according to the experimental design (Table 2) to formulate a soft cake, the collected grape and date syrup their component presented at Table (1,2) at
the six concentration (0%, 20%, 30%, 50, 70% and 100) % were substitute with the natural sugar rate in the preparation of cake. Ratio 72% natural sugars, 0.5% vanilla, 72% eggs, 57% oils in addition to 25% water and 1.34% baking powders (agreeing to the weight % of water) were utilized as the components of this mode. Next, the batter was decanted to a mold and cooked in a warm oven to 180°C for 30 m. In the following step, the testers were chilled at the 35c for 3 or 4 m, insured by the cellophanes and lastly saved at the value of room temperature.

Table 1. chemical composition of grape syrup

| Brix% at 20C | Ash % | PH | Acidity (tartaric acid) |
|-------------|-------|----|------------------------|
| 75          | 1.88  | 5.1| 0.79                   |

Table 2. chemical composition of date syrup

| Brix% at 20C | Ash % | Protein | Moisture | Fat | PH |
|--------------|-------|---------|----------|-----|----|
| 72           | 2.18  | 5.1     | 0.79     | 0.004 | 4.34 |

2.2. Methodology
The tests of current study for the organic assessments were studied founded on three duplicates on the initial time of manufacture, and sensual estimation, they were established on the initial and fifth Recuperative day of manufacture established on 3 duplicates for both of the Recuperative days.

2.3. Formulation of Solutions
At three various steps of industrial manufacture procedure [8], date and grape syrup, were tested, stored in PT bags and locked. The tests were removed to a cooling area regulated at 4°C and kept for additional trials. The tastes were then watery to 12, 35, 65 and 72º Br. Sucrose liquids of (12, 35, 65 and 72º) Br were addition made and checked [8]. Black grape fresh fruit from local market (Vitis vinifera) were obtained from local market. The grapes were wash away under purified water next dried. Triplicate grapes were accurately (100) g, Grapes crust was segregate from the new fruit. Collected pulp minced into minor parts and crushed with 25 ml ration of purified water double stages boiled to 85°C under stirring and sonicated for 30 m. The delay mix were delivered over a sterilized mesh filters before sifting by Whitman No 1 utilizing Buchner pipe. The testes created up to last size of solution example 75 ml. Filtered and kept in freezer. An amount of the example was watery with distilled water to cause the concentrated of the tastes in the scope of the standard curves. Each standards and suspensions all set to assay were pass into 0.45 um filter and radiation for 15 m in ultrasonic soak[9].

2.4. Chemical analysis
Proximate compositions of all cake samples were studied using [10] methods.

2.5 Sugar determination
Sugar content were studied using [11] methods.
2.6 Protein determination
Total nitrogen ratio was determinate using the Micro-Kaldal method using the [12].

2.7 Microbiological assessment:
Total plate count was performed agreeing to method [10].

2.8 Sensory assessment
Sensory characteristic of the bread was evaluated by 9 evaluators The ingredients of experiments as treatments, The sensory evaluation form used was followed by [11].

2.9 Microbial content determination:
Total plate count was performed agreeing to method to method [10]

2.10 Statistical Analysis
SAS program was used to analyze the effect of the different factors in the studied traits, mean differences between the averages were compared with the least significant difference at significance level of p<0.05.

3. Results and Discussions
3.1 Moisture ratio
The percentages of moisture content of samples on the 1st and 5th days were characterized in results in Figure (1, 2) shown the first group involved testes with 100% grape and date syrup and further however the next group consist treatments with 70% grape and syrup and fewer. Hence, Results recorded no statistically meaningful variance between the blank treatment and the group with 20% grape and date syrup, containing the smallest total of moisture, individually. Furthermore, Result showed non significant variance between the samples with 100%, 70% grape and date syrup, consisting the greatest equal of moisture. Finally, there was non statistical variance between the samples with 70% and the sample with 50% grape and date syrup. Comparable trend has been registered by (14) they experimented the influence of Grape Syrup as a substitutions for natural Sugar on physical characteristics of sponge cake.

![Figure 1](image-url)  
Figure 1. The cake moisture forficate with date syrup on the storage period at Different characters show significant difference at (p < 0.01).
Figure 2. The effect of cake moisture content sweetened with grape syrup on the storage period at Different characters show significant difference at (p < 0.01)

3.2. Sugar ratio
Results in Figure (3,4) demonstrates a significant variance at the quantity 20% in the factor of natural sugar. In same expressions, the raise in the amount of grape or date syrup produce to a reduce in the quantity of simple sugar, specified that the sugar rang in the locally manufactured cake was assessed to be at smallest (15), this quantity in the control example was similar to the basic quantity and considerably reduced in other trials then there was a high significant variance among the sugar equal of the control compared with all treatments.

Figure 3. The cake sugar content frogsicate date syrup with on the storage period at Different characters show significant difference at (p < 0.01)
Figure 4. The cake sugar content sweetened with grape syrup on the storage period at Different characters show significant difference at (p < 0.01).

3.3. crude fiber ratio:
Results directed fiber ratio varied considerably among samples (Table 3). As well as the fiber ratio for treatments varied from 0.53±0.02 to 2.89±0.04% recorded highest score for T4 and lowest score for T0. Results showed regular improve in fiber ratio by supplementing grape syrup in locally cake. As grape syrup is a sweet source supplement to increases the level of fiber ratio in trials.

3.4. fat content ratio
The fat content as well varied considerably with several samples (Table 3). Maximum contents of fat recorded in D0% (35.80±0.05a %) and lowest in G100% (20.17±0.81c %). that apparent scores that was a continuing reduction in fat ratio by adding of grape and date natural fiber as it substitutes the natural fat. Recorded results of this search are in interest with discoveries of (16) who recorded reduction in fat ratio (28.57±0.04e %) in cake prepared Grape Fruit Albedo Powder with different quantities.

3.5. protein ratio:
Protein ratio varied highly considerably between changed samples (Table 3). Extreme protein ratio were recorded in G0% (13.87±0.02a %) charted by G20% ( T1 ) while the smallest ratio of protein recorded in G0% ( T6) (10.77±0.04f %). The amount of protein ratio reduced as evaluated to other samples because grape and date syrup is a poor in protein. Our research results are in recognisable treaty with the discovering of (17) who registered that protein content in the control was significantly upper than all different samples. Similar decreasing style of protein contents in cake was additionally registered by (18).

3.6. Effect on ash contents:
The ash contents extended from 0.35±0.03 to 0.95±0.04 % arranging highest mark for D20% (T2)and lowest mark for G100% (T6) (Table 3). This could be owed to improved ash ratio of date and grape syrup natural fiber. Grades of this research are in approach with ash ratio of nationally cake enhanced with banana (19).
Table 3. proximate composition of cake blends sweetened with date and grape syrup.

| Treatment | Crude protein % | Crude fiber % | Ash content % | Crude fat % |
|-----------|-----------------|---------------|---------------|-------------|
| Ds0 (T1)  | 12.66±0.05a     | 0.43±0.16a    | 0.81±0.02a    | 35.80±0.05a |
| Ds20% (T2)| 12.89±0.03b     | 0.65±0.20c    | 0.95±0.04b    | 33.71±0.12b |
| Ds30% (T3)| 11.87±0.02c     | 0.69±0.34b    | 0.13±0.03c    | 33.00±0.18c |
| Ds50% (T4)| 11.22±0.07d     | 0.78±0.15a    | 0.17±0.04b    | 29.33±0.03b |
| Ds70% (T5)| 11.02±0.01e     | 0.98±0.45d    | 0.21±0.05d    | 28.54±0.06d |
| Ds100% (T6)| 10.77±0.04f    | 1.23±0.61f    | 0.26±0.02a    | 21.77±0.23a |
| Gs0% (T1) | 13.87±0.02a     | 0.56±0.12a    | 0.92±0.03a    | 31.98±0.04b |
| Gs20% (T2)| 13.65±0.02a     | 0.78±0.22c    | 0.16±0.05b    | 30.44±0.06c |
| Gs30% (T3)| 13.12±0.02a     | 0.97±0.13a    | 0.27±0.04c    | 28.12±0.23f |
| Gs50% (T4)| 12.76±0.02a     | 1.76±0.34d    | 0.29±0.05b    | 25.87±0.03a |
| Gs70% (T5)| 12.32±0.02a     | 1.98±0.25d    | 0.31±0.06c    | 22.45±0.51c |
Table 4. Mean bacterial content for date and grape syrup cake

| Treatment | 0         | 14        | 28        | 35        |
|-----------|-----------|-----------|-----------|-----------|
| Date cake | 9.67±0.68a| 12.64±0.3 | 22.08±0.0 | 31.32±0.3 |
| Grap e cake | 11.98±0.5 | 16.98±0.5 | 27.87±0.0 | 36.33±0.6 |
| LSD       | 2.09      | 3.65      | 2.98      | 1.87      |

The microbial presented in both samples were a express consideration of the healthy value of the supply of resources, handling and storing of the products (23). The retes acquired for both products samples remained inside the appropriate (ICMSF) parameters and guidelines for yields of this flora (105 cfu/g) in suitable industrial preparation (13). The fungal content of the prepared cakes within 35 days of storing temperature Asignificant variance (p < 0.01) in bacterial load of the prepared samples were noticed excluding in day 0 (9.67x 105 cfu / g) for the date cake and (11.98x 105 cfu / g) for the grape cake. Th ere have also been important variances also, bacterial load of the prepared cake treatments was found to be increasing from first day to 35 (10.67 x 105 cfu / g – 33.32 x 105 cfu / g) respectively for the date cake and (9.76 x 105 cf u / g – 36.11 x 105 cfu / g) respectively for the grape cake. There have also been important variance (p<0.01) among the microbial content of (33.32 x 105 cf u / g) date and grape product (36.11 x105 cfu / g). (p<0.01) between the bacterial content of (33.32 x 105 cfu / g) date cake and grape cake (36.11 x105 cfu / g). Usually, the bacterial load of date product was better than that of the grape cake which could be presented to the extent of storing time before it was stored or the treatment while trading. (20, 21) The (TVC) for microbial which were detected to increase from first to 14 days, extended their peaks on days 28 and crashed in days 35 for both product were in accord with the type or growth phase of bacteria (22). The flora existing in both product were a direct consideration of the healthy value of the materials, treating and storing condition.
storing under study temperature were presented in Table 5. Conclusion showed that were no important variance \((p > 0.01)\) between the flora content of equally products. On first day, the flora content was 10.67x 10^3 cfu/g for date product and 9.76 x 10^5 cfu/g for grape cake. The rates regularly enlarged to the 28th period. The fungal content values obtained for date and grape samples were within suitable ranges for foods of this quality as guidelines by ICMSF (103 cfu/g) (13 ).The bacterial infection in baked product is induced by flora infection, which primarily occurs place on the surface (24,25).

**Table 5. Mean fungal content for grape and date baked samples**

| Treatment | 0  | 14       | 28       | 35       |
|-----------|----|----------|----------|----------|
| Date cake | 10.67±0.5 | 15.64±0.1 | 20.08±0.1 | 33.32±0.2 |
| Grape cake| 9.76±0.44 | 11.08±0.4 | 27.87±0.0 | 36.11±0.5 |

| LSD       | 1.11 | 2.04    | 3.08     | 2.09     |

3.7. Sensory limitation of fortified product:
Experimented samples achieved suitable results except D50\%  (T4) was desired by the reviewer’s in characterize of color (8.02±0.50), flavor (9.04±0.34), taste (7.13±0.57), mouth feel (9.07±0.33) and total acceptability (7.09±0.76) enjoyed by G30\%  (T3) stable after storing stage of five weeks (Table 6).
Table 6. Effect of various treatments on sensory properties of fortified cake.

| Treatment | Color | texture | Taste | flavor | general acceptability |
|-----------|-------|---------|-------|--------|-----------------------|
| D0 (T1)   | 6.06±0 0.32 | 6.12±0 0.83 | 6.35±0 0.98 | 8.08±0 0.98 | 7.12±0 1.12 |
| D20% (T2) | 6.03±0 0.44 | 6.71±0 0.76 | 6.18±0 0.20 | 8.12±0 0.54 | 7.40±0 0.23 |
| D30% (T3) | 6.32±0 0.66 | 6.04±0 0.44 | 6.03±0 0.54 | 8.43±0 0.40 | 7.05±0 0.43 |
| D50% (T4) | 6.02±0 0.50 | 6.04±0 0.34 | 6.13±0 0.57 | 8.07±0 0.33 | 7.09±0 0.76 |
| D70% (T5) | 6.32±0 0.67 | 6.06±0 0.70 | 6.17±0 0.55 | 8.02±0 0.65 | 7.02±0 0.80 |
| D100% (T6) | 6.32±0 0.59 | 6.09±0 0.32 | 6.06±0 0.65 | 8.32±0 0.54 | 7.23±0 0.70 |
| G0% (T1) | 6.11±0 0.60 | 8.05±0 0.33 | 6.13±0 0.55 | 8.32±0 0.34 | 8.32±0 0.60 |
| G20% (T2) | 6.34±0 0.63 | 8.03±0 0.61 | 6.16±0 0.90 | 8.31±0 0.30 | 8.52±0 0.10 |
| G30% (T3) | 6.22±0 0.11 | 8.00±0 0.30 | 6.06±0 0.78 | 8.51±0 0.76 | 8.02±0 0.50 |
| G50% (T4) | 6.18±0 0.65 | 8.02±0 0.13 | 6.76±0 0.80 | 8.98±0 0.80 | 8.98±0 0.60 |
| G70% (T5) | 6.41±0 0.29 | 8.07±0 0.87 | 6.33±0 0.56 | 8.54±0 0.30 | 8.04±0 0.40 |
| G100% (T6) | 6.19±0 0.87 | 8.07±0 0.80 | 6.65±0 0.77 | 8.54±0 0.54 | 8.13±0 0.60 |
| LSD       | 0.06   | 0.05    | 0.05   | 0.07   | 0.08      |
4. Conclusions
The present assessment obviously showed that all grape and date syrup be able to substituted with sugar without some significant changes in physical and sensual assessments. Consequently, they could be used as alternative sources profit for cake industry.

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