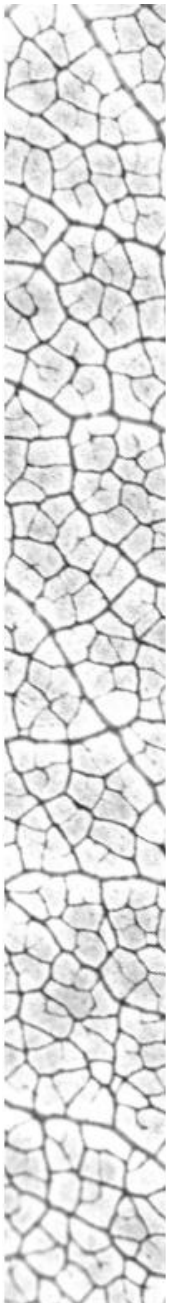

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Studying the nutrition value and validity period of the processed product milk –like from chickpeas

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Abstract
The aim of this study is to use powder chickpeas seed in similar processed milk and study its microbial, physical, chemical and sensory properties. The results showed that the product (similar to processed milk) made from chickpeas and without adding soda (bicarbonate sodium) to the soaked water (sample 1) was better than the second sample of chickpea with the addition of soda.the result of bacterial count were 0.33 and 4.00 (cfu / ml), respectively, during the storage in the refrigerator for 9 days. The result showed bacterial count were 20.00 and 27.33 (cfu / ml), respectively. and mold count 0.00 and 1.33 (cfu / ml), respectively, after 4 days storage. As well as the product volume its amount 600.00 and 565 ml, respectively. and density of the product before pasteurization, amount 0.934 and 0.921 g / cm (Naeem, 2010)., respectively and after pasteurization directly, amount, 0.932 and 0.925 g / cm (Naeem, 2010)., respectively. also in terms of PH value were 6.62 and 6. 54, respectively and acidity amount 0.40 and 0.32%, respectively. As for the chemical components, the moisture, fat, protein, calcium and iron ratios were lower than in the sample 2. Also, it is free of phosphates compared to sample 2. Sample 1 exceeds sample 2 by fiber, ash, dry matter, carbohydrate and calorie. Sample 1received a higher acceptance general than Sample 2. Sample 1 gave weight to the cake after roasting less than the weight of the cake made using Almudhish milk. But Standing Highet and accepted more than the cake made using Almudhish milk. When adding the nutella to sample 1 gave the product density and accepted in general more. We recommend that the product be manufactured without soda and introduced into the pastry industry, and used as alternative food for bovine milk for lactose-sensitive people. It has a good nutrition value, with 100 g of dry weight (fat 1.26, moisture 18.12, ash 3.91, fiber 4.22, protein 12.09, salt concentration 1.73, dry matter 81.88, carbohydrate 60.35, calorie 286.48, calcium 0.092, iron 0.0068 percentage and PH 6.23). The shelf life of product was 9 days at 4°C and 3 days after use it

Keywords: chickpea, milk, bicarbonate sodium, lactose-sensitive

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INTRODUCTION

Many mothers and children, especially in developing countries, especially in the Asian diet suffer from malnutrition due to lack of calories and protein in their daily diet. Such cases can be prevented and the daily food shortage is prevented by eating legumes (Iqbal, et al. 2006& Yust, et al. 2003.) In addition, some people suffer from eczema allergy. The factory milk is taken from chickpeas instead of fresh milk powder and milk because it is free of actose (Naeem, 2010). Hummus is one of the most important legume crops used in our daily diet as an alternative to red meat (FAO 2016). As it is a food rich in carbohydrates, protein, vitamin and minerals (de Almeida Costa, et al. 2006& Wang, & Daun, 2004). And that the original habitat for chickpea seeds is the Mediterranean region (Jenkins, et al. 2012). His scientific name is L Cicer arietinum The chemical components of chickpeas vary according to the environment conditions of the soil and climate and the country where chickpeas are grown, where 100 g of chickpeas meet the needs of children under 3 Years It is a good source of iron (Salwa, et al. 2015). It contains the most important minerals, namely potassium, calcium, phosphorus, magnesium and potassium Hummus also contains large amounts of essential amino acids, methonine and systeine (Wang, & Daun, 2004). It contains unsaturated fatty acids such as linoleic and oleic acid as well as contains vitamins, riboflavin, niacin, thiamine, folic acid, vitamin A and B carotene (Salwa, et al. 2015). It also contains sugars namely glucose, galactose, fructose, sucrose and maltose. It contains fiber, which is soluble and insoluble in water and helps

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to move the intestines (Tosh, & Yada, 2010). Hummus seeds have medical benefits, lowering blood sugar levels and reducing blood pressure. It reduces the proportion of cholesterol in the blood (Murty, Pittaway, & Ball, 2010), protects against cancer and protects against heart disease. Different from cooked, toasted and grated to obtain chickpea flour for the purpose of improving the nutritional value of bread and pastries as a good source of proteins, fibers and minerals (Simona, Adriana, & Sevastița, 2006). Due to its importance, the current research objective is to use chickpeas seeds in the manufacture of a milk-like product and to study its microbial, physical, chemical and sensory properties. It provides food for people who are allergic to lactose.

MATERIALS AND METHODS

The used materials

American, fine chickpeas, Iraqi sugar, Iraqi salt, Jordanian vanilla, Iraqi sodium bicarbonate (soda), coffee mate (the Iraqi original type, Nestle, Thailand), Iraqi cacao and Polish nutella were used.

Procedure of manufacturing of mess milk product from chickpeas:

1- Hundred grams of grinded chickpeas was used and, then one liter of cold and sterilized water was added. The mixture was immersed in water bath at 63 C^o for 30 minutes with continuous shaking. The mixture was pulled out and cooked for 1.5 on high temperature flame for 15 minutes and the rest time was on medium temperature flame with continuous shaking (to be unstick or burned) and then, the product was pulled out and left to be cooled and it was put inside an electrical mixer for 5 minutes (2 minutes on low speed, 2 minutes of on medium speed and 1 minute on high speed). The product was manufactured into two separated kinds, the first was without soda addition and the second was with addition of 0.05 soda to 100 gram seeds. The two separated kinds were isolated using two layers of cloth for each one.

2- The following flavors were added to the two product using the following amounts, 3 grams sugar, 0.2 gram salt, 0.2gram vanilla and 0.5 coffee mates for each 100 ml of the above solution.

3- The volume was completed to one liter by adding boiled, sterilized and cold water.

4- The mixture was mixed by an electrical mixer for one minute to each product.

5- Sterilized containers were used for packing and they were pasteurized at 63^o C for 30 minutes. (Sajede, 2000).

6- Container cooling and storage in freezer (-18^o C) were done till test time.

The microbial tests

The prepared samples were tested microbiologically in a laboratory and the frozen samples were melted at the first, sixth and ninth days, and at the fourth day after product opening for 3 days in a refrigerator at 4 C^o for 3 hours. The total account of bacteria, yeasts and molds was done after carrying the 10^1, 10^2 and 10^3 dilutions and, they were poured in dishes and incubated at 37 C^o for bacteria growth and at 35 C^o for yeasts and molds growth using the method which is mentioned by (AOAC. 2000). and the results were recorded.

Table 1. Product pH values during refrigerator storage for five days

Days	Sample 1 without soda	Sample 2 with soda	The value of Test T-
1 day	0.32 ± 6.62	0.19 ± 6.54	0.428 NS
2 day	0.03 ±7.01	0.02 ±7.10	0.309NS
3day	0.05 ± 6.47	0.03 ±6.52	0.372NS
4 day	0.05 ± 6.47	0.03 ±6.59	0.368NS
5 day	0.04 ± 6.47	0.04 0 ±6.6	0.352NS

P <0.05 (* significant)

The chemical tests

Moisture, dry materials and protein were determined using the method mentioned by (AOAC. 2000).Fat were determined using the method mentioned by (Wite, 2003). Fibers, ash and carbohydrates were determined using the method mentioned by(Al-Dilale, & Al-hakim, 1987). The mineral calcium, Iron and phosphorus were determined according to (AOAC. 2000).

The sensory evaluation of the product and the products:

The evaluation was done on the samples by evaluators from the same center to evaluate appearance, texture, freshness, color, flavor and general acceptance properties by using the adopted questionnaire by food and nutrition department, Texas stat (USA) (1975). The produced products were evaluated as showing in the following table.

The statistical analysis

The statistical analysis system (SAS), 2012 was used to explain the significant differences between the mediums using least significant difference (LSD).

RESULTS AND DISCUSSION

The microbial test was done on the product (the mess enriched milk) and melting at room temperature (25 C^o) in the first day for 3 hours. The test carried out also after melting at refrigerator temperature for 3 hours in the first, third and sixth days in testing bacteria molds and yeasts presence. It was found that the two products above were free of bacteria molds, yeast and fungi and this was due to tools, place and the analyzer cleanness (Al-Ane, 2007). and to nutrient contents safety.

Table 1 shows pH values of the two products during refrigerator storage time for five days.

During the first day, pH value of sample (1) (without soda) was 6.62 (near neutral value (7)) and 6.54 in sample (2) (with soda), thus pH value in sample (2) was more than pH value in sample (1).

Table 2. The chemical composition according to dry weight basis

Ingredients	Sample 1 without soda	Sample 2 with soda	The value of test T-
Humidity	0.85 ±18.12	20.42 ± 0.53	4.067 NS
Ash	0.19 ±3.91	0.03± 3.32	0.677 NS
Fat	0.47 ±1.26	0.06±1.86	0.619 NS
Fiber	0.11 ±4.22	3.67 ± 0.07	0.521*
Protein	0.79±12.09	13.14 ± 1.02	1.365 NS
PH	0.09 ±6.23	6.63 ± 0.13	0.437 NS
Concentration of salts	0.12 ±1.73	0.09 ±2.42	0.642Ns

P <0.05 (* NS: Not significant)

Table 3. Dry materials, carbohydrates and heat calories according to dry weight basis %

Ingredients	Sample 1 without soda	Sample 2 with soda	The value of test T-
Dry matter	0.85± 81.88	79.58 ± 0.53	5.836 NS
Carbohydrates	0.17± 60.35	57.58 ± 1.59	5.092 NS
Calories / kcal	286.48 ± 0.04	285.28 ± 2.48	27.663 NS

NS: Not significant

In the second day, pH value was 7.01 (neutral) in sample (1) and 7.10 (more alkaline) in sample (2). In third day, pH of sample (1) directed to acidity and it reached (6.47) and stayed stabilized during fourth and fifth days, while sample (2) directed to acidity but in less trend than sample (1) and it was 6.53 and in the fourth day it raised to 6.59 and to 6.60 in the fifth day (directed to alkalinity) and this may be due to presence of soda in product preparation and this in turn caused pH rise(Abid Al-All, et al. 2012). Furthermore, storage of the two products in the refrigerator may cause chemical and physical changes in the two products and this in turn affects pH value in pH rise or decline. From statistical point of view, there were no significant differences between the two products.

Table 2 shows the chemical composition of the two products according to dry weight basis. The results showed that sample (1) (without soda got fibers and ash content higher than sample (2) (with soda), and sample (1) got less values compare with sample (2) in moisture, fat, protein, salt concentration and pH value Fat ratio was 1.26% in sample (1) and it was less than its value (1.50%) in banana enriched KDD milk, and more than the fat ratio in KDD nutella milk which was (1%). Fibers and protein ratios in sample (1) were higher than their contents in nutella KDD and there were 1.58 and 3.3% respectively. From statistical point of view, there were significant differences between the two samples in fibers property only.

Table 3 shows contents of dry materials, carbohydrates and calories of sample 1 and 2. Sample (1) (without soda) got higher values than sample (2) (with soda) in dry materials, carbohydrates and calories (kilo calorie).The value of the dry material in sample (1) was 81.88% and it was close to value of the dry material of the dried milk (87%), the calories and carbohydrates ratios in sample (1) were higher than their ratios in KDD milk tins in which were 82 and 12.6 respectively. From statistical point, there were not significant differences between sample 1 and 2.

Table 4. The mineral elements (calcium, iron and phosphorus) (%)

Elements	Sample 1 without soda	Sample 2 with soda	The value of test T-
Calcium	0.006±0.092	0.096 ± 0.002	0.0302 NS
Iron	0.0068 ± 0.00	0.0077 ± 0.00	0.0019 NS
Phosphate	0.00 ± 0.00	0.017 ± 0.009	0.012*

P <0.05 (* NS: Not significant)

Table 5. Acidity related to the two products

% / Day	Sample 1 without soda	Sample 2 with soda	The value of test T-
1day	0.02 ±0.40	0.32 ± 0.04	0.16 NS
2day	0.05 0.40 ±	02.0± 0.47	0.11NS
3day	0.03 ±0.33	0.02 ±0.12	0.11*
4day	0.03 ±0.22	0.02 ± 0.19	0.07 NS
5day	03.0 ± 0.20	0.03± 0.02	0.04 NS

P <0.05 (* NS: Not significant)

Table 4 shows the mineral elements (iron, phosphorus and calcium) contents in sample 1 and 2. The results showed that sample (1) (without soda) got less values compare with sample (2) values (with soda addition). While from statistical point of view, there were significant differences between sample 1 and 2 in phosphorus values only and, these differences above in tables 5, 6 and 7 may be due to presence of soda in product and absence of it in another product and this may have an effect on the chemical components (Al-Hmodat, 1986).

The results in **Table 5** refers to acidity amount of the two products It was found that the acidity values in sample (1) (without soda addition after melting at refrigerator temperature in the first, second, third, fourth and fifth days) were 0.40, 0.40, 0.33, 0.22 and 0.20 respectively. While values in sample 2 with soda were 0.32, 0.47, 0.12, 0.19, 0.21 respectively. The acidity in the first and second days was unstable and they declined in the third, fourth and fifth day respectively. Acidity value in sample (1) was higher than sample (2) in the first day due to soda presence in this sample in which it may decrease acidity value (Abid Al-All, et al. 2012).Acidity value of sample (2) raised in the second day and declined in the third day and then it raised in the fourth and fifth days respectively according to the chemical and physical changes that were occurred during period of refrigerator storage, addition to effect of soda presence or absence in the product (Abid Al-All, et al. 2012).From statistical point of view, there were significant differences between sample 1 and 2 in acidity values in the third day only.

Table 6 shows the sensory evaluation of the two products. The results showed that the sample (1) exceeded significantly on the sample (2) in consistency and flavor (test and smell) absence of flavor and the general acceptance. From statistical point, there were significant differences between the two samples in absence of undesired flavor only. So it may be

Table 6. The sensory evaluation of the product which is mess the enriched milk

Sample	arithmetic mean ± standard error.				
	Color	Texture	flavor	Lack of flavor	acceptance general
Sample 1 without soda	4.02 ± 0.03	5.00 0.06 ±	± 4.47 0.03	0.04 4.12±	4.58 0.07 ±
Sample 2 with soda	4.75 ± 0.12	4.98 ± 0.06	± 4.32 0.11	± 3.62 0.05	4.29 ± 0.06
The value of test-T	* 0.298	0.472NS	0.428NS	0.663NS	0.683 NS

P <0.05 (* NS: Not significant)

Table 7. Weight of cake before and after grilling and fluffy the two samples

Adjective	Sample 1 without soda	Sample 2 with soda	The value of T-test
Weight before grilling	0.00 ±100	0.00 ±100	0.00 NS
Weight after grilling	94.00 ± 0.26	0.37 ±89. 33	7.02 NS
The papyrus	4.42 ± 0.03	4.58 ± 0.46	1.07 NS

NS: Not significant

Table 8. The sensory evaluation of cake

Sample	arithmetic mean ± standard error.				
	The appearance	Texture	The coolness	flavor	acceptance general
Sample 1 Using Almudhish milk with sode	5.42 ±0.15	± 5.06 0.04	± 5.63 0.08	5.78 ± 0.06	5.48 ± 0.10
Sample 2 Using Almudhish milk without sode	6.59± 0.07	5.97± 0.11	5.52 ± 0.07	5.81 ± 0.12	± 5.88 0.07
The value of test-T	0.602 *	0.554 *	0.519 NS	0.376 NS	0.503 NS

P <0.05 (* NS: Not significant)

recommended to produce the product without soda addition.

Table 7 shows cake weight before and after grill and the fluffy in the sample (1) by using Al-Modhish milk and in the sample (2) by using the mess milk that enriched produced without soda as it is considered as the best in the studied quality properties above. The results showed that weight of cake of sample (2) which was produced from product without soda was after grilling with value less than cake weight of sample (1) which was produced from adding Al-Mudhish milk. In fluffy property, it was found that cake fluffy of sample 2 was more than sample (1) and this indicates that the produced cake without soda contributed in giving fluffy to the cake. From statistical point there were no significant differences between sample 1 and 2 neither in weight nor in fluffy properties.

Table 8 shows the sensory evaluation of the produced cake by using Al-Mudhish milk in sample (1) and by using the mess milk which was produced from chickpeas without soda of the sample (2). The results showed that sample (2) exceeded significantly in appearance, texture, flavor and general acceptance properties. From statistical point, there were significant differences between the two samples in appearance and texture properties, so, it may be recommended to use it in pastries production.

Table 9. Density average of many of different products produced from chickpeas without soda addition

Treatments	Total
A Without Coffee matt	1.130±0.042
B with Coffee matt	1.145±0.061
Added Coffee matt and added 5 gm from nutella C	174.1± 0.069
D without Added Coffee matt and added 5 gm from nutella	1.145±0.061
E Added Coffee matt and added 0.25 gm from powder cacao	1.168±56.00
F without Added Coffee matt and added 0.25 gm from powder cacao	1.154±0.048
The value of T – test	NS0.0941
NS: Not significant	

Table 10. The sensory evaluation of the different products produced from chickpeas without soda addition

Treatments	Color	Texture	Flavor	Lack of flavor	acceptance general
A Without Coffee matt	± 3.75 0.07	3.71 ± 0.04	3.14 ± 0.05	± 4.17 0.09	± 3.26 0.11
B with Coffee matt	3.69 ± 0.11	4.00 ± 0.10	4.36 ± 0.14	± 4.26 0.08	± 3.87 0.06
C Added Coffee matt and added 5 gm from nutella	3.82 ± 0.8	4.28 ± 0.06	± 4.07 0.10	± 3.91 0.08	± 4.32 0.15
D without Added Coffee matt and added 5 gm from nutella	4.00 ± 0.11	4.33 ± 0.15	4.22 ± 0.04	± 4.19 0.06	± 4.25 0.09
E Added Coffee matt and added 0.25 gm from powder cacao	3.92± 0.08	3.92 ± 0.10	± 4.07 0.09	± 4.35 0.11	± 4.18 0.04
F without added coffee matt and added 0.25 gm from powder cacao	± 3.87 0.07	± 3.93 0.05	3.98 ± 0.12	4.17 ± 0.09	± 4.27 0.11
The value of T – test	0.893 NS	0.913 NS	* 0.802	0.794NS	* 0.503

P <0.05 (* NS: Not significant)

Table 9 shows the density average of many of different products produced from chickpeas without soda addition. The density with coffee mate and Nutella was 1.174 g cm^{-3} and it was higher than density of KDD milk (1.146 g cm^{-3}). The less density (1.130 g cm^{-3}) was in the treatment (A) in the produced product without adding coffee mate and it was higher than density of the KDD milk enriched by banana (1.09 g cm^{-3}). From statistical point, there were no significant differences between all the treatments.

Table 10 shows the sensory evaluation of the different products produced from chickpeas without soda addition. The results showed that the treatment (D) (without coffee mate and Nutella) exceeded significantly over the rest treatments which are (A) (without coffee mate), (B)(with coffee mate), (c) (with coffee mate and Nutella),(E) (with coffee mate and cacao) and (F) (without coffee mate and cacao) in color and consistency properties meanwhile, the (B) treatment was superior over the rest treatments in flavor property. The (E) treatment exceeded significantly over the rest treatments in unwanted flavor absence properties. The (C) treatment in the general acceptance property and the product had good flavor and when Nutella was added to the product, it became more acceptance by the consumer, so, it may be recommended to use it as drink or use it in cake production or adding five grams of Nutella to each 100 ml of the product according to

consumer wish. From statistical point of view, there were no significant differences between the different products in flavor and general acceptance properties only.

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