

REVIEW ARTICLE

Producing Drink like Grafted Milk from Chickpeas and Evaluation of its Qualitative Properties

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ABSTRACT

The present study aimed to study the possibility of producing a drink that looks like grafted milk by using chickpeas and evaluate its physical, chemical, microbial, and sensory properties.

The result showed the superiority of F treatment (soaking 100 grams of chickpeas at the refrigerator temperature 4°C for 12 hours) over the rest seven treatments in extraction efficiency, which was 70%, while, it was 50.5% in H treatment (soaking 100 grams of chickpeas in the heated water at 60°C for 30 minutes). The highest value of the product density was after water and flavorings addition in the D treatment (soaking 100 grams chickpeas in 0.05 soda solution at 60°C for 30 minutes), and it was 0.97 g cm⁻³, compared with the lowest density 0.57 g cm⁻³ in A treatment (soaking 100 grams chickpeas in 0.05 soda solution at room temperature 25°C for 12 hours).

pH values were highest in A treatment compared with the other treatments, and its value was 7.66 in the 1st and 2nd day, after dissolving in a refrigerator at 4°C, and then, for 5 minutes at room temperature 30°C. The lowest value in the D treatment was 6.45 on the 1st day, and 6.87 on the 2nd day in the G treatment. On the 3rd day, the highest pH value was 7.13 in the D treatment, and the lowest value 6.79 was in the E treatment. pH highest value was 6.2 on the 4th day in A treatment.

From the last results, it may be concluded that F treatment was the best in extraction efficiency, the final product density, and less total bacterial number, after dissolving for 5 days at refrigerator temperature 4°C, and then, at room temperature 30°C for 3 and 48 hours incubation. The best extraction volume and pH were in A treatment.

Keywords: Chickpeas, Chickpeas soap, Grafted milk, Milk.

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INTRODUCTION

Chickpeas are considered an important and popular legume crop,¹ and it has many English names.² The chickpeas are grown around the world, and among them, Mediterranean countries, especially Italy and the Arabian region.³ It has many species, such as, white, red, black, Al-krsne, Al-bostane, and the wild. It is used warmed and boiled with rice, fries, and cool, especially, with roast chickpeas, and it may be eaten roasted. After chickpeas cooking ends, salt, spices, and fats may be added and onion, parsley, and tomato may be added to improve the flavor (test, and smell),³ and also, improve food color and appearance and improving food consumer acceptance.⁴ It is recommended to eat chickpeas as soap, especially, for 4 to 5 years' kids' age,⁵ due to its high nutrition value (protein and carbohydrate content), minerals and vitamins,⁶ fibers, and alkali materials equalize the eaten acidic foods. It has, thereby, properties, and the most

important properties are blood purification, kidney, liver, and skin diseases' treatment.⁷ It is described as an antioxidant and protects from heart and cancer diseases. It decreases high blood pressure.

MATERIALS AND METHODS

Materials

The materials used were fine Indian and coarse Mexican chickpeas.

- Primary experiments were done on two kinds of chickpeas to test the extraction efficiency of solid materials, flavor (test + smell) for the extractions, and soaking period. Soaking for 12 hours was best in the last-mentioned properties from soaking chickpeas for 24 hours, and the Mexican chickpeas, which were soaking for 24 hours were best from the rest treatments, and it had desired qualitative properties.

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- Table sugar (sucrose), Iraqi sugar.
- Salt (Al-Mansour type), Iraqi salt.
- Coffee-mate (original), Nestle trademark, Thailand.
- Sodium bicarbonate (soda), Iraq.
- Dried vanilla, Noon trademark, Jordan.
- Sterilized and cool tap water.

Procedure

Mexican Chickpeas

The soaking operation was done on the whole chickpeas seeds samples (not grinded) for 12, 24, 36, and 48 hours, and by using 1:5 chickpeas:water ratio at room temperature, then cooking of the samples were done for each sample individually, for 1 to 2 hours, and in 1:6 chickpeas:water ratio.

The soaking chickpeas were extracted using the mixer, in which the used water ratio in the mixer was 1:5 chickpeas:water. The mixture was filtered directly after mixing when it was hot, and by using a piece of raw chenille.

Indian Chickpeas

Due to the preferred Indian chickpeas over the Mexican chickpeas in the last-mentioned properties, so it was used as the main material in preparing of the drink, which is close to grafted milk, by using eight different treatments, which included using only the grinded chickpeas (powder) because it is also better in the mentioned properties.

The treatments are shown as follows:

A treatment: 100 grams of chickpeas were soaked in 0.05% soda at room temperature 25°C for 12 hours.

B treatment: 100 grams of chickpeas were soaked in 0.05% soda at refrigerator temperature 4°C for 12 hours.

C treatment: 100 grams of chickpeas were soaked in 0.05% soda in boiling water at 100°C for 10 minutes.

D treatment: 100 grams of chickpeas were soaked in 0.05% soda at 60°C water for 30 minutes.

The added water ratio in cooking for 1.5 hours was 10:1; it means 100 grams of chickpeas were added to 1,000 mL of sterilized cool tap water. The volume was completed to 1,000 mL by sterilized, cool water to each treatment individually, then tins were pasteurized in a water bath at 63°C for 30 minutes,⁸ chemical and microbial tests, and tins were put in a refrigerator (4°C) for doing the sensory evaluation in the 2nd day of product manufacturing.

Physical and Chemical Tests

Measurements were done on extraction volume, extraction efficiency, and product density properties, before and after water, flavors addition (salt, vanilla, sugar, and coffee-mate), and also, measuring the final product density (after soda addition to some treatments) in the average of 10 replicates per treatment individually at 30°C, and also measuring pH value of the final product of each treatment individually in the average

Table 1: Extraction efficiency, size, and density, after and before adding water and flavors, for product drink like grafted milk from chickpeas

<i>Treatment</i>	<i>Product density after add water (g/cm³)</i>	<i>Product density before add water (g/cm³)</i>	<i>Product density after add flavors (g/cm³)</i>	<i>Extraction efficiency</i>	<i>Product size (mL)</i>
A (100 grams soaking chickpeas + 0.05 soda) and at 25°C for 12 hours	0.41	0.64	0.57	68	916
B (100 grams soaking chickpeas + 0.05 soda) and at 4°C for 12 hours	0.46	0.87	0.95	68.5	757.5
C (100 grams soaking chickpeas + 0.05 soda) and in boiling water at 100°C for 10 minutes	0.64	0.91	0.92	63	700
D (100 grams soaking chickpeas + 0.05 soda) and in boiling water at 60°C for 60 minutes	0.54	0.89	0.79	60	850
E (100 grams soaking chickpeas) and at 25°C for 12 hours	0.53	0.82	0.71	60	825
F (100 grams soaking chickpeas) and at 4°C for 12 hours	0.5	0.88	0.9	70	757.5
G (100 grams soaking chickpeas) and in boiling water at 100°C for 10 minutes	0.5	0.93	0.93	61	720
H (100 grams soaking chickpeas) and in boiling water at 60°C for 60 minutes	0.6	0.87	0.84	50.5	800
LSD	0.115*	0.207*	29.861 0.239*	6.224*	29.861*

*p < 0.05; *There is a significant difference between the mean treatment; *Each number in the table represents the arithmetic mean for the rate 3 replicates

Table 2: Number of bacteria after 3 days from dilution at 4 and 30°C for 3 hours

Treatment	Number of bacteria from all dilution (cfu)		
	10 ¹	10 ²	10 ³
A (100 grams soaking chickpeas + 0.05 soda) and at 25°C for 12 hours	0	0	123
B (100 grams soaking chickpeas + 0.05 soda) and at 4°C for 12 hours	50.33	59.33	19
C (100 grams soaking chickpeas + 0.05 soda) and in poling water 100°C for 10 minutes	20	66.67	39.33
D (100 grams soaking chickpeas + 0.05 soda) and in poling water at 60°C for 60 minutes	221.67	0	248
E (100 grams soaking chickpeas) and at 25°C for 12 hours	0	31.67	175.33
F (100 grams soaking chickpeas) and at 4°C for 12 hours	47.33	10.67	76.67
G (100 grams soaking chickpeas) and in poling water at 100°C for 10 minutes	189	0	86.67
H (100 grams soaking chickpeas) and in poling water at 60°C for 60 minutes	55.67	3.33	0
LSD	91.92*	44.448*	66.005*

*p < 0.05; *There is a significant difference between the mean treatment; *Each number in the table represents the arithmetic mean for the rate 3 replicates

of 3 replicates at room temperature (30°C), and after putting product in a refrigerator (4°C) on the 1st, 2nd, 3rd, and 4th day.⁹

Microbial Tests

The treatments were kept in a freezer (-18°C) till the time of microbial tests, then they were melted in a refrigerator (4°C) for one day and dissolved at room temperature 30°C for 3 hours. The tests were repeated to all treatments individually after melting in a refrigerator (4°C) for 3 and 5 days, and then, they were dissolved at room temperature 30°C for 3 hours (The Central Institution of Standardization and Quality Control, 2006).

RESULT AND DISCUSSION

In Table 1, it may be noticed that the F treatment (soaking 100 grams chickpeas in the water at refrigerator temperature 4°C for 12 hours) exceeded on the other treatments, which were A treatment (soaking 100 grams chickpeas in 0.05 soda at room temperature 25°C for 12 hours), B treatment (soaking 100 grams chickpeas in 0.05% soda at a refrigerator temperature 4°C for 12 hours), C treatment (soaking 100 grams chickpeas in 0.05% soda solution at 100°C for 10 minutes), D treatment (soaking 100 grams chickpeas in 0.05% soda solution at 60°C for 30 minutes), and E treatment (soaking 100 grams chickpeas in the water at room temperature 25°C for 12 hours). It was also noticed that the product density before adding water and flavors, reached its highest value 0.93 g cm⁻³ in G treatment and its lowest value was 0.64 g cm⁻³ in A treatment.

Table 2 shows that the aerobic bacteria did not appear in the A and E, and the place which discourages bacterial growth,¹⁰ besides boiling operation, moisture content, and pH, which were not suitable for bacterial growth. The nutrient content did not encourage bacteria growth. From Table 3, it may be noticed that the bacteria appeared at their highest number in D treatment (221.67 cfu mL⁻¹), and their lowest number in C treatment (20 cfu mL⁻¹) at the first dilution.¹¹

In Table 3, it was noticed that C, D, and F treatments got higher density value 1.15 g cm⁻³, than the other treatments (A, B, E, G, and H), while H treatment got the lowest density

Table 3: Total efficiency in the eight treatments at 30°C

Treatments	Efficiency (g cm ³)
A (100 grams soaking chickpeas + 0.05 soda) and at 25°C for 12 hours	1.14
B (100 grams soaking chickpeas + 0.05 soda) and at 4°C for 12 hours	1.12
C (100 grams soaking chickpeas + 0.05 soda) and in poling water 100°C for 10 minutes	1.15
D (100 grams soaking chickpeas + 0.05 soda) and in poling water at 60°C for 60 minutes	1.15
E (100 grams soaking chickpeas) and at 25°C for 12 hours	1.1
F (100 grams soaking chickpeas) and at 4°C for 12 hours	1.15
G (100 grams soaking chickpeas) and in poling water at 100°C for 10 minutes	1.14
H (100 grams soaking chickpeas) and in poling water at 60°C for 60 minutes	1.09
LSD	0.075 NS

*p < 0.05; NS: Non-significant; *Each number in the table represents the arithmetic mean for all treatment rate 10 replicates

value 1.09 g cm⁻³, compared with the other treatments, and the density values represents an average of ten replicates to each treatment,¹² and all the pH values in the table were within density values limits (not more than 2 g cm⁻³). These differences between the treatments may be due to product weight to the constant volume of each product individually, as the weight differs between each treatment, and soda presence or absence. From the statistical point, there were no significant differences between all the treatments.¹³

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