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Apricot Addition for Enrichment Yogurt with Amygdalin

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Keywords: Yogurt, Apricot, Apricot kernel, Amygdalin, nutritive value.

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Abstract:

The objective of the present research was to enrich yogurt with amygdalin (vitamin B17) and increase the nutritional value of yogurt using apricot and a by-product of apricot fruit kernels. Amygdalin was considered an antibacterial, hepatic protecting, anti-tumor, antifungal, anti-inflammatory, anti-coagulant, anticancer, antiaging, antidiabetic, anti-atherosclerotic, anti-angina, and antioxidant. Apricots that were mixed in a blinder for 3 min and filtered were used as a source of dietary fiber, lipids, proteins, minerals, and vitamins. Apricot kernels that were heated for 2 minutes at 120 ˚C. Then cold and grind in a blender were used as a source of amygdalin (B17). Obtained results showed that the incorporation of apricot and apricot kernel is considerably impacted by the addition of apricot and apricot kernel 5% Apricot pulp + 1% Apricot kernel and 10% Apricot pulp + 2% Apricot kernel 1.42, 2,92 mg/100gm respectively.

Keywords: Yogurt, Apricot, Apricot kernel, Amygdalin, nutritive value.

إضافة المشمش لتدعيم الزبادي بالاميغدالين

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الخلاصة:

تهدف الدراسة الحالية الى تدعيم الزبادي بالاميجدالين (فيتامين ب ١٧) وزيادة القيمة الغذائية للزيادة عن طريق إضافة المشمش ونواة المشش كمنتج ثانوي. يعتبر الاميغدالين مضاد للبكتريا وحماية الكبد و ،مضاد للأورام والفطريات والالتهابات والتخثر والسرطان، والذبحة الصدرية ،وتصلب الشرايين والشيخوخة. تم عصر المشمش فالخلاط لمدة ٣ دقائق وتصفيته حيث يستخدم كمصدر للألياف الغذائية والدهون والبروتين والفيتامينات والأملاح المعدنية. تم تسخين نواة المشمش ١٢٠ درجة مئوية لمدة دقيقتين ثم تركه ليبرد وطحنه فالمطحنة حيث يستخدم كمصدر للاميغدالين (فيتامين ب ١٧). تم استخدام المشمش الذي تم خلطه في الخلاط لمدة ٣ دقائق وتصفيته وذلك كمصدر للألياف الغذائية والدهون والبروتينات والمعادن والفيتامينات. تم تسخين حبات المشمش لمدة دقيقتين عند ١٢٠ درجة مئوية. ثم تركها لتبرد و تخلط في الخلاط. أظهرت النتائج الى أن محتوى الأميغدالين فالزبادي الطازج المعد من ٥٪ مشمش + ١٪ نواة المشمش كان ١,٤ ملجم/١٠٠ جرام والمعد من ١٠٪ مشمش + ٢٪ نواة المشمش ٢,٩ ملجم/ ١٠٠ جرام على التوالي.

الكلمات المفتاحية: الزبادي، المشمش، نواة المشمش، الأميغدالين، القيمة الغذائية.

1. Introduction:

Each person's eating habits determine how they should be fed, although all humans eat to maintain their health by consuming the nutrients found in food, particularly in fruits and vegetables [1, 2]. One of the most well-known fruits is apricot, which holds significant value due to its composition, which allows it to have a significant role in human nutrition and be utilized in a variety of non-food products. In terms of proteins (8%), sugars (more than 60%), crude fat (2%), crude fibers (11.50%), total minerals (4%), vitamins (vitamins A, C, K, and B), and reasonable levels of organic acids (malic and citric acids) [3]. Apricots are a fruit with a high nutritional richness [4, 5]. The apricot kernel contains exceptional nutritional value, much like the fruit. Particularly high in fat, protein, and dietary fiber overall, apricot kernels may be beneficial for human nutrition. Numerous research organizations have extensively examined the chemical and nutritional properties of apricot kernels [6].

Rosaceae nuclei are the source of the naturally occurring chemical amygdalin (D-mandelonitrile-b-D-glucoside-6 b-glucoside) [7]. It's a cyanogenic glycoside present in several

fruits, including apricots. Amygdalin views it as a natural cancer treatment [8], antibacterial, hepatic protecting, anti-tumor, antifungal, anti-inflammatory, anti-coagulant, anticancer, antiaging, anti-diabetic, anti-atherosclerotic, anti-angina, and antioxidant are only a few of the pharmacological properties of apricot kernels that have been documented [9, 12]. Additionally, apricot kernels have a significant role in both the management and prevention of chronic illnesses [5, 13].

These advantageous health effects are brought about by the presence of bioactive ingredients such as cyanogenic glycosides, Carotenoids, fatty acids, volatile substances, and polyphenols [5- 14]. Algeria is one of the world's top producers of apricots [15]. The majority of the country's apricot crop is used for fresh or dried fruit, as well as for making jam and juice. Apricot kernels have long been regarded as trash in all these applications. Because agricultural wastes are readily available, biodegradable, and most importantly, less expensive, there has been an increased focus on their utilization in recent times [16, 17]. Because of this, researchers have invested in the value-adding of apricot fruits by recovering and using their seeds [18, 19]. Nevertheless, because apricot kernels contain amygdalin (cyanogenic glycoside, commonly referred to as laetrile or vitamin B17), which is hazardous when ingested in quantities higher than recommended, their usage in food is restricted. Despite this, considering their advantageous health effects, researchers have suggested that apricot kernels can be added to specific meal preparations [10-20].

This study focuses on increasing Amygdalin and the nutritional value of yogurt by using apricots and apricot kernel supplements, as they represent some of the waste resulting from the manufacture of juice, jam, etc. The Purpose of apricot juices is also to mask apricot kernel taste.

2. Materials:

The Ministry of Agriculture's Animal Production Research Institute herd provided fresh cow's milk. Apricots and sucrose sugar were acquired from a local marketplace. The laboratories of Chr. Hansen in Copenhagen, Denmark. CMC. Provided a yogurt culture including Streptococcus thermophiles and Lactobacillus delbrueckii subsp. bulgaricus. Sigma-Aldrich was the source of amygdalin (98% purity), diethyl ether (98%), methanol, and HPLC-grade ethanol (98%).

3. Methods:

3.1 Preparation of apricot yogurt:

To make apricot pulp, mix in a blinder for three minutes, then filter. The apricot kernel was heated for 2 minutes at 120 ˚C., then let it cool after that grind it in a blinder. For 20 minutes, fresh cow milk and 5% sugar were heated to 80°C. This milk was split into three identical

portions. The 1st considered as control, 5 % Apricot juice + 1 % apricot kernel and 10 % Apricot juice + 2 % apricot kernel were added to the 2nd and the 3rd portions respectively. The three portions were inoculated with 3% yogurt culture. The chemical properties of the made apricot yogurt and its control were evaluated both during its fresh state and after a week of refrigeration at 6± 1˚C**.**

3.2 Chemical analysis:

Total protein, fiber Total lipids, Cyanide content, and acidity were determined **[21]**. Total flavonoids were determined **[22]**. Total phenolics were determined **[23]**. Mg, K, and Ca: An innovative microwave digestion system was used to determine the values of Mg, K, and Ca. Thermo Scientific's Icap6000 series inductively coupled plasma (ICP-AES) is used to determine calcium, magnesium, and potassium. Argon gas excites an elemental atom. For every element, the sample values assumed the blank values. Potassium is calculated using the formula **[24]**. Amygdalin calibration curve: A stock 1, solution of 100 µg ml -1 was created by dissolving the amygdalin standard in water, and it was kept at 20 C until analysis. Six standard solutions containing 1, 5, 10, 20, 40, and 50 µg ml -1 of amygdalin were used to create a calibration curve **[25]**. Amygdalin extraction: Five grams of apricot kernels were blended, and two grams were weighed into a 200-milliliter conical flask. After adding 50 ml of water, the flask was put in a water bath with shaking at 37 °C. The extraction of amygdalin used 40,80,100,120, and 180 minutes. After filtering via Whatman No. 1 filter paper, the extracts were put into 50 ml plastic polypropylene tubes. Three times fat extractions were made by vortexing (20 ml) of n-hexane for one minute. The tubes were spun for 10 minutes at 3250 g using a benchtop Eppendorf 5810R centrifuge. Supernatants were combined and thrown away. The remaining hexane was removed from the sample using a rotary evaporator operating at low pressure, 35 degrees Celsius, and 7 millibars **[25].**

Sensory evaluation: All samples were evaluated as the organoleptic properties included flavor (20 points); body & texture (10 points) and Color and appearance (10 points) **[7]**.

4. Statistical analysis:

Differences between samples were tested using a one-way analysis of variance using the COSTAT program and Standard deviation (SD) was calculated by Excel program**.**

4.1 The functional properties and chemical composition of apricot and apricot kernel:

Table 1 illustrates the chemical composition of apricot pulp and kernel while the Total protein was 6.4, 14.04 g/100 gm. These results are in accordance with the findings of **[26]**. Chemical composition results are in accordance with the findings of **[5]**. Amygdalin is not

detected in Apricot pulp. Apricot pulp contains 0.001 ± 0.10 HCN mg/gm on the other wise Apricot kernel contains 0.005 ± 0.001 gm/100 gm. Given that the lethal dose of HCN for an adult is 0.54 mg/kg of body weight, this is safe [27].

Table 1. Chemical composition of Apricot pulp and Apricot kernel

	Apricot pul (g/100gm)	Apricot kernel (g/100gm)
Total phenols	0.072 ± 0.001	0.18 ± 0.001
Total flavonoids	0.012 ± 0.001	0.05 ± 0.000
Total protein	06.41 ± 0.02	14.04 ± 0.02
Total lipid	01.40 ± 0.01	08.34 ± 0.01
Total fiber	14.04 ± 0.02	30.54 ± 0.01
Ca	0.17 ± 0.001	0.20 ± 0.001
K	2.94 ± 0.001	0.65 ± 0.001
Fe	0.0031 ± 0.002	0.0004 ± 0.000
Amygdalin	Not Detected	0.16 ± 0.01
HCN	0.001 ± 0.001	0.005 ± 0.001

4.2 Chemical composition of apricot yogurt:

The chemical composition of the control and yogurt supplemented with different treatments of Apricot and apricot kernel is presented in **Table 2** for fresh and stored yogurt. The data show that Amygdalin that is not detected in control and treatment 10% Apricot pulp + 2% Apricot kernel yogurt had a higher total protein, Total lipid, and Amygdalin contents being 4.32, 4.73, and 2.92 respectively .

The mean average of total protein, total lipid, and amygdalin contents of 5% Apricot pulp + 1% Apricot kernel yogurt and 10% Apricot pulp + 2% Apricot kernel yogurt samples increased with the advancing storage period at 6 ± 1 ˚C for 7 days which may be due to the evaporation of water and loss of moisture during the storage period.

Table 2. Chemical composition of apricot yogurt

Treatments	Control	5% Apricot pulp + 1% Apricot kernel yogurt	10% Apricot pulp + 2% Apricot kernel yogurt
Fresh Yogurt			
Total protein	3.41 ± 0.01c**	3.86 ± 0.01b**	4.32 ± 0.01a*
Total lipid	3.9 ± 0.01c*	4.36 ± 0.01b*	4.73 ± 0.01a*
Amygdalin	Not Detected	1.42 ± 0.01b*	2.92 ± 0.01a*
Stored yogurt (After 7 days			
Total protein	3.44 ± 0.01c*	3.95 ± b*	4.34 ± 0.01a*
Total lipid	3.93 ± 0.01c*	4.36 ± 0.01b*	4.9 ± 0.01a**
Amygdalin	Not Detected	1.44 ± 0.02b*	2.93 ± 0.01a*

Each value represents the mean ± S.E (Standard Error) and the meaning of three replicates. Values in the same column with the same letter are not significant at p≤0.05.

4.3 The acidity of apricot yogurt:

Table 3 indicated that significant increase in acidity with added 5 and 10 % apricot pulp and 1 + 2 % apricot kernel in fresh. The acidity percentage of 5% Apricot pulp + 1% Apricot kernel yogurt and 10% Apricot pulp + 2% Apricot kernel yogurt samples increased with the advancing storage period at 6 ± 1 ˚C for 7 days which may be due to the Production of lactic acid by yogurt culture during the storage period for 7 days at 6 ± 1 ˚C.

Table 3. The acidity of apricot yogurt

Treatments	Control	5% Apricot pulp + 1% Apricot kernel yogurt	10% Apricot pulp + 2% Apricot kernel yogurt
Fresh Yogurt			
Acidity %	0.6 ± 0.1a**	0.8 ± 0.1b**	0.9 ± 0.1a**
Stored yogurt (After 7 days)			
Acidity %	0.7 ± 0.1a*	0.9 ± 0.1b*	1.0 ± 0.1a*

Each value represents the mean ± S.E (Standard Error) and mean of three replicates. Values in the same column with the same letter are not significant at p≤0.05.

4.4 Sensory evaluation of apricot yogurt:

Scores of sensory properties of yogurt are given in **Table 4**. Sensory properties were evaluated in fresh and after 7 days of storage period. Higher values were given by the panelists for the flavor, texture, and appearance of fresh control yogurt than stored yogurt. At fresh yogurt, 5% Apricot pulp + 1% Apricot kernel recorded the highest total scores (37 and 37) followed by treatment 10% Apricot pulp + 2% Apricot kernel. The same trend was also recorded after the storage period (7 days). Fresh control yogurt and fresh 5% Apricot pulp + 1% Apricot kernel are the best values than other treatments after storage.

Table 4. Sensory evaluation of adding apricot kernels and pulp to yogurt

Treatments	Flavor (20)	Body and texture (10)	Color and appearance (10)	Total scores (40)
Fresh yogurt				
Control	19 ± 1	8 ± 1	9 ± 1	37
5% Apricot pulp + 1% Apricot kernel	19 ± 1	9 ± 1	9 ± 1	37
10% Apricot pulp + 2% Apricot kernel	17± 1	8 ± 1	8 ± 1	33
Stored yogurt (After 7 days)				
Control	19 ± 1	8 ± 1	9 ± 1	36
5% Apricot pulp + 1% Apricot kernel	17 ± 1	8 ± 1	8 ± 1	33
10% Apricot pulp + 2% Apricot kernel	16 ± 1	7 ± 1	7 ± 1	30

5. Conclusion

It could be concluded through this study, that it is possible to produce yogurt supplemented with apricot and apricot kernel rich in many important nutritional components such as vitamins such as amygdalin, minerals, protein, fat, and fibers.

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