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Organoleptic and Nutritional Evaluation of Apricot Products Developed for Hypertensive Patients.

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ABSTRACT

Hypertension is an important public health problem worldwide. Dietary Approaches to Stop Hypertension (DASH) was a program by the National Institute of Health, USA, which included dietary modifications with less sodium and high potassium and fiber intake. Dried apricot was selected based on its nutritional quality and high potassium content, considering its nutritional efficacy as a component of DASH diet. Incorporation of apricot at different % levels in the formulation of two basic tea time snacks i.e. muffins and cookies. The products were studied for their organoleptic and nutritional parameters. Standard recipes of cookies and muffins were selected and they were incorporated with apricots using different percentage compositions. Nutritional analysis was done, and organoleptic evaluation was done using hedonic scale. Products incorporated with 15% of apricots were most acceptable by the panel members having potassium content of 0.49 ± 0.07 and 0.42 ± 0.05 %, in muffins and cookies respectively. Protein, fat and ash content of muffin was found to be 6.96 ± 1.17, 10.79 ± 0.11 and 0.84 ± 0.05% respectively. Protein, fat and ash content of cookies were found to be 5.86± 0.09, 10.02 ±0.12 and 1.41 ±0.07% respectively. Considering the potassium content and nutritional and organoleptic evaluation it was concluded that apricot incorporated products developed were acceptable by people and inclusion of such fortified common daily use snacks will help community to maintain a healthy life.

Keywords: Hypertension, DASH diet, Potassium, Apricot, Organoleptic evaluation, Nutritional composition

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INTRODUCTION

Hypertension is an important public health problem in India and leads annually to 1.1 million deaths (uncertainity index 0.9-1.3 million). It is estimated to account for 10.8 per cent of all deaths and 4.6 per cent of all Disability Adjusted Life Years (DALYs) in the country [1]. Globally also, hypertension is the most important risk factor for death and disease burden and is estimated to be responsible for 9.4 million deaths and 7.0 per cent DALYs [2].

Several guidelines published in 2013 have refocussed international attention on hypertension [3-6]. A crucial focus in all these guidelines is both the achievement of optimum blood pressure (BP) as well as overall reduction in cardiovascular (CV) risk. These can be achieved by combination of a range of interventions: *(i)* lifestyle changes (increased physical activity, increased consumption of fruits and vegetables, sodium restriction, weight management, alcohol abstinence and smoking/tobacco cessation); *(ii)* drugs to lower BP (calcium channel blockers-CCBs, diuretics, angiotensin converting enzyme inhibitors-ACEI, angiotensin receptor blockers-ARBs, beta-blockers, *etc.*) and to lower lipids using statins [3].

Important lifestyle or environmental factors are dietary excess of sodium and fat, dietary deficiency of potassium and fibre, alcohol intake, physical inactivity, and psychosocial stress [7].

Obesity, especially, truncal obesity are powerful proximate determinants of high BP, also in Indians [8], and lifestyle influences on their genesis are well known. Major lifestyle factors influencing hypertension management and amenable to control are shown in Table 1.

Lifestyle measures are a crucial step in hypertension management. Dietary Approaches to Stop Hypertension (DASH) study showed that a diet low in sodium and high in fruits, vegetables, and calcium is helpful in treating hypertension [9].

Table 1: Dietary and lifestyle changes that modify blood pressure

	Level of evidence	Recommendations
Dietary sodium intake	++	<100mmol (2.3g) of sodium per day.
Dietary potassium intake	++	>120mmol (4.7g) of potassium per day
Omega-3 polyunsaturated fat	++	Increase omega-3 fat intake from natural resources
Overall healthy dietary patterns	++	An overall healthy diet: DASH diet (USA), Mediterranean Diet (Europe), Omish diet (USA), Indian vegetarian diet
Dietary calcium magnesium	+/-	Increase dietary calcium and magnesium intake through natural resources
Saturated fat, omega-6 unsaturated Fat, monounsaturated fat	+/- to +	Low saturated fat diet for reducing the cardiovascular risk
Protein, total protein, animal protein, Vegetable protein	+/- to +	Increase vegetable protein in terms of carbohydrates
Carbohydrate	+	Amount and type of carbohydrate uncertain
Fibre	+	High fibre diet
Cholesterol	+/-	Low cholesterol diet to reduce cardiovascular risk
Exercise	+	At least 30 min of moderate activity most days of the week
Alcohol intake	++	Moderation of alcohol intake to <2 drinks/per day in men and <1drink/per day in women in those who take alcohol
Stress Management	+/-	Yoga, meditation, progressive relaxation techniques

Source: Strategies for initial management of hypertension. Indian J Med Res. Nov 2010: 132(5): 531 - 542

Increased potassium intake

High potassium intake is associated with reduced BP. Although data from individual trials have been inconsistent, three meta-analyses of these trials have documented a significant inverse relationship between potassium intake and BP in non-hypertensive and hypertensive individuals [10].

In the meta-analysis by Whelton *et al* [11] average systolic and diastolic BP reductions associated with increase in urinary potassium excretion of 2 g/d (50mmol/d) were 4.4 and 2.5 mm Hg in hypertensive and 1.8 and 1.0 mm Hg in non-hypertensive individuals. Available data suggest that increased potassium has beneficial effects on BP in the setting of salt intake that is low.

Potassium reduces BP to a greater extent in blacks than in whites. A study from India reports similar BP reduction with potassium supplementation as observed in the Caucasian whites [12].

Because a high potassium intake can be achieved through diet rather than pills and because potassium derived from foods is also accompanied by a variety of other nutrients, the preferred strategy to increase potassium intake is to consume foods such as fruits and vegetables rich in potassium, rather than supplements. In the DASH trial, the two groups that increased fruit and vegetable consumption both lowered BP [13].

Dietary Approaches to Stop Hypertension (DASH) was a program by the National Institutes of Health, USA [9,13,14]. This series of three large controlled trials tested the effects of dietary patterns on BP. The first trial was a randomized feeding study that compared 3 dietary patterns [9]. Of the 3 diets studied, the most effective diet, now called the DASH diet, emphasized fruits, vegetables, and low-fat dairy products; included whole grains, poultry, fish and nuts; and was low in fats, red meat, sweets, and sugar-containing beverages. Accordingly, it was rich in potassium, magnesium, calcium, and fiber and was low in total fat, saturated fat, and cholesterol; it also was slightly high in protein.

Apricot is one of the best sources of potassium and its intake is less as compared to other food products. So this study was conducted to develop potassium rich products made from apricot.

Incorporation of apricot in the commonly used food products will ensure greater intake of potassium by the hypertensive patients which ultimately will help in maintaining blood pressure and thus treating and preventing the condition of hypertension.

MATERIALS AND METHODS

The local market of Rajpura, Punjab was selected to purchase the apricot. It was then peeled and kept in oven for drying, at a temperature of 200 ± 10°C for ~ 5 min. The dried apricot was then powdered and used for the development of *cookies* and *muffins*.

Products with apricot powder

The potassium rich apricot powder was incorporated in two basic tea time snacks i.e. *cookies* and *muffins*, in different ratios.

Cookies

Standardized recipe of the *cookies* has the ingredients, refined flour 100gms, butter 50gms, sugar 50gms and baking bowder. *Cookies* incorporated with apricot were prepared using refined flour and apricot powder blends in the proportion of 100:0, 90:10, 85:15 80:20 and 75:25, remaining ingredients kept same.

All the ingredients were used in the above mentioned amounts and mixed properly to make dough. This was then shaped into balls and placed onto ungreased cookies sheets. 20 *cookies* were developed using 100gms of raw material. The *cookies* were then baked at a temperature of 220 degree Celsius for 8minutes and were packed in an air tight container.

Muffins

Standardized recipe of the *muffins* has the ingredients, refined flour 100gms, cholesterol free butter 50gms, sugar 50gms, milk 50gms, milkmaid 50gms and baking bowder. *Muffins* incorporated with apricot were prepared using refined flour and apricot powder blends in the proportion of 100:0, 90:10, 85:15 80:20 and 75:25, remaining ingredients kept same.

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Refined flour, apricot powder and all the ingredients were used in the above mentioned amounts and mixed properly. The batter was then transferred to muffin moulds and baked at 220 degree Celsius for 12 minutes. 5 muffins were developed using 100gms of raw material.

Organolaptic evaluation of the apricot products

The different apricot products were evaluated sensorily to find the maximum acceptable level of incorporation by a panel of 20 semi-trained judges using 9- point Hedonic scale following the method of Peryam and Pilgrim [15]. The products were evaluated for their appearance, color, texture, taste, flavour and overall acceptability.

Nutritional analysis

After completing the organoleptic evaluation of products, the best acceptable products of the *cookies and muffins* were nutritionally analysed. The products were analysed for the ash, moisture, fiber, carbohydrate and potassium content. (AOAC, 2010) Protein was estimated by Lowry's method. Soxhlet was used for fat estimation.

Statistical analysis

The data pertaining to organoleptic evaluation and nutritional composition of the products was analyzed using the analysis of variance (ANOVA) technique while paired *t*-test was used to compare different parameters between the control and apricot incorporated products [16].

RESULTS AND DISCUSSION

Cookies and Muffins incorporated with 15% of apricots (Sample 2) were most acceptable by the panel members. (Table 2 and 3) Biochemical estimations were done of the most acceptable products. Potassium content was found to be 4.9 ± 0.07 and 4.2 ± 0.05 %, in muffins and cookies respectively. Protein, fat and ash content of muffin was found to be 6.96 ± 1.17, 10.79 ± 0.11 and 0.84 ± 0.05% respectively. Protein, fat and ash content of cookies were found to be 5.86± 0.09, 10.02 ±0.12 and 1.41 ±0.07% respectively. Moisture and fiber content in *cookies* were 6.38 ± 0.11 and 1.18 ± 0.06% respectively. Moisture and fiber content in *muffins* were 14.69 ± 0.04 and 0.58 ±0.08% respectively. (Table – 4)

Table 2: Sensory scores of Apricot *Cookies*

Sample	Apricot incorporation %	Appearance	Colour	Texture	Taste	Flavor	Overall acceptability
Control	0	8.2 ± 1.15	8.16 ± 1.21	8.12 ± 1.45	7.85 ± 1.23	7.56 ± 1.29	7.03 ± 1.71
Sample 1	10	7.16 ± 1.02	7.24 ± 0.85	8.76 ± 1.03	7.27 ± 1.43	7.26 ± 1.32	7.53 ± 1.26
Sample 2	15	8.72 ± 1.02	7.9 ± 1	8.9 ± 1.2	7.82 ± 1.54	7.78 ± 0.82	8.86 ± 1.31
Sample 3	20	7.25 ± 1.05	6.58 ± 0.07	7.24 ± 0.08	7.24 ± 1.32	7.5 ± 1.11	7.26 ± 1.98
Sample 4	25	6.56 ± 1.02	7.1 ± 1.12	7.26 ± 1.35	7.38 ± 1.68	7.28 ± 1.05	6.8 ± 1.28

Mean values ± standard deviation (n = 20)

Table 3: Sensory scores of Apricot M*uffins*

Sample	Apricot incorporation %	Appearance	Colour	Texture	Taste	Flavor	Overall acceptability
Control	0	7.63 ± 1.34	8.24 ± 1.42	7.46 ± 0.06	8.53 ± 1.48	8.64 ± 1.84	8.06 ± 1.68
Sample 1	10	7.24 ± 0.03	7.26 ± 1.43	7.41 ± 1.26	7 ± 1.32	7.54 ± 0.84	7.38 ± 1.32
Sample 2	15	7.84 ± 0.86	7.74 ± 1.46	7.66 ± 1.12	7.74 ± 1.89	7.44 ± 1.28	7.8 ± 1.28
Sample 3	20	7.2 ± 0.64	7.16 ± 0.39	7 ± 1.26	7.46 ± 1.24	7.12 ± 0.48	7.58 ± 1.68
Sample 4	25	5.03 ± 1.24	6.2 ± 1.81	7 ± 0.41	6.54 ± 1.28	6.7 ± 1.68	6.6 ± 1.26

Mean values ± standard deviation (n = 20)

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Table 4: Nutritional composition of apricot products

Sample	Moisture%	Fat%	Ash%	Protein%	Dietary fibre%	Carbohydrate%	Potassium %
Cookies	6.38 ± 0.11	10.02 ±0.12	1.41±0.07	5.86± 0.09	1.18 ± 0.06	71.88 ± 2.43	0.42 ± 0.05
Muffins	12.69± 0.04	10.79 ± 0.11	0.84 ± 0.05	6.96 ± 1.17	0.58 ±0.08	67.82 ± 1.12	0.49 ± 0.07

Mean values ± standard deviation (n=3)

CONCLUSION

Apricot incorporated products developed in this study were acceptable and inclusion of such fortified common daily use snacks will help community to maintain a healthy life. Also considering the nutritional importance of apricot in terms of potassium content, its suitability of incorporation into traditional and convenience products and value addition will be helpful for hypertension patients for maintaining the blood pressure level. Work in pursuit of this strategy includes continuing efforts to ensure food fortification, supplementation, and healthy lifestyle measures to prevent and treatment the global condition for hypertension.

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