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Studies on utilization of pomegranate juice in the preparation of peanut *chikki*

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Abstract

Pomegranate juice mixed peanut *chikki* prepared by incorporation of different level of juice into *chikki* for sensory evaluation. 20 per cent juice mixed peanut *chikki* was selected for further study. The selected *chikki* were evaluated for sensory quality, chemical parameter etc. The protein content of pomegranate juice mixed peanut *chikki* was 14.19 per cent, fat content juice mixed *chikki* was 23.75 per cent. The crude fibers, carbohydrates, ash content of juice mixed *chikki* were 3.10, 51.01, 1 per cent respectively. The calcium, iron and total polyphenol content in juice mixed *chikki* were obtained 86.49, 1.69, 31.28 mg/100g respectively. The value addition of pomegranate juice to *chikki* also increases the colour of *chikki*. The selected treatment of *chikki* was stored for 3 months in different packaging material such as PP and LDPE to study nutritional and storage stability of selected treatment of juice mixed peanut *chikki*. During storage study the chemical parameter such as moisture content of juice mixed peanut *chikki* was increased in both the packaging material, so that the texture of *chikki* became slightly soggy. The chemical parameter such as fat, protein, crude fibre, ash, calcium, iron, total polyphenol etc. were decreased in both the packaging material and this might be due to increase in moisture content.

Keywords: Utilization, pomegranate, juice, preparation, *chikki*

Introduction

India with divergent food habits is having a number of traditional foods, including sweet products. Indian's has more traditional foods with more nutrition and all the foods comes under the snacks, sweetmeats which are producing by local raw materials with more nutrition. In Indian traditional sweet snacks, *chikki* is one of the popular sweet. *Chikki* is mainly prepared by using jaggery as sweetener and roasted peanuts (*Arachis hypogaea*). *Chikki* is popular in rural population with attractive price compared with other confectionery products. Peanuts, which are rich source of protein and amino acids, can help in preventing malnutrition. Another important vitamin which is supplemented in the body by the intake of groundnuts is vitamin B3 (Brown *et al.*, 2001) [4] to an extent of 13.525mg. Consumption of nuts has a positive effect on coronary heart diseases (Kelly and Sabate, 2006) [6]. Jaggery is obtained by concentrating sugarcane juice to solid or semi solid state. It is a natural sweetener having a sweet winy flavor (Shahi, 1999) [10] and contains protein, minerals and vitamins and is a potent source of iron and copper (Manay and Swamy, 2001) [8]. Though jaggery is the usual sweetener material, sugar is used as base in certain type of *chikki*. Jaggery is also useful in combating problems like cough and stomach ailments like indigestion, acidity and constipation. Consumption of jaggery is useful for those who are exposed to pollution on a regular basis like industrial workers. It has been lauded for its ability to help human body to fight off the ill effects of pollution.

In addition to the most common peanut *chikki*, several different variety of *chikki* is available in market. Variety of *chikki* is named depending upon the name of ingredient used, which includes the puffed or roasted bengal gram, sesame, puffed rice, beaten rice or khobra (desiccated coconut). These ingredients are used for preparation of different variety of *chikki* with different combination. Special *chikki* are made of cashews, almond and pistachios alone or in combination. It is very popular sweet item in both the rural and urban South Asia. Some also add glucose to *chikki* which are usual there. From a single flavour of jaggery and peanut, it just started. However, today there are different exotic flavours available in market (Kundu and Sarkar, 2017) [7]. Food bar, nut brittle etc are alternative name of *chikki*.

Pomegranate (*Punica granatum* L.) is the most historic fruit tree, belonging to family Punicaceae and is locally known as Anar. It is cultivated in the middle-east from several years and is found in Iran, Afghanistan, India and in other mediterranean countries (Narzary *et al.*, 2010). Pomegranate is known for its edible fruit also consumed in many processed forms such as beverages (wines and juices), as food products (jam, jellies, oil) and as extract in dietary supplements (Elfalleh *et al.*, 2012) [5]. Many phytochemical constituents present in different parts of pomegranate plant makes it pharmacologically precious. Pomegranate fruit is berry like with a leathery rind (husk or peel) enclosing many seeds surrounded by juicy arils. The husk is composed of two parts: pericarp and mesocarp (albedo). The edible part of the pomegranate fruit (50%) consists of 40 per cent arils and 10 per cent seeds. Arils contain 85 per cent water, 10 per cent total sugars and bioactive compounds such as phenolics and flavonoids, principally anthocyanins (Rafrat *et al.*, 2017). Pomegranate peel comprises about 50 per cent of the total fruit weight and is an important source of minerals especially potassium, calcium, phosphorus, magnesium, and sodium; complex polysaccharides and high levels of diverse range of bioactive compounds such as phenolics, flavonoids, proanthocyanidin compounds and ellagitannin (ETs), such as punicalagins and its isomers, as well as lesser amounts of punicalin, gallic acid, ellagic acid, and ellagic acid glycosides.

Materials and Methods

The experiment was conducted in the laboratory Department of Food Science and Technology, Post Graduate Institute at Mahatma Phule Krishi Vidyapeeth, Rahuri during the year 2019-2020.

Packaging material

The packaging materials like polypropylene (PP) and low density polyethylene (LDPE) were purchased from the local market.

Ingredients

The major ingredients for the preparation of productssuch as pomegranate fruits, peanuts, jaggery were purchased from local market and other chemicals were used from the laboratory store.

Method

Procedure for preparation of pomegranate juice mixed peanut *chikki*

Pomegranate juice mixed *chikki* were prepared by the procedure given by Sharaynyarani and Chaturvedi (2014) [11] with slight modification. The procedure of *chikki* were given in Fig.1.

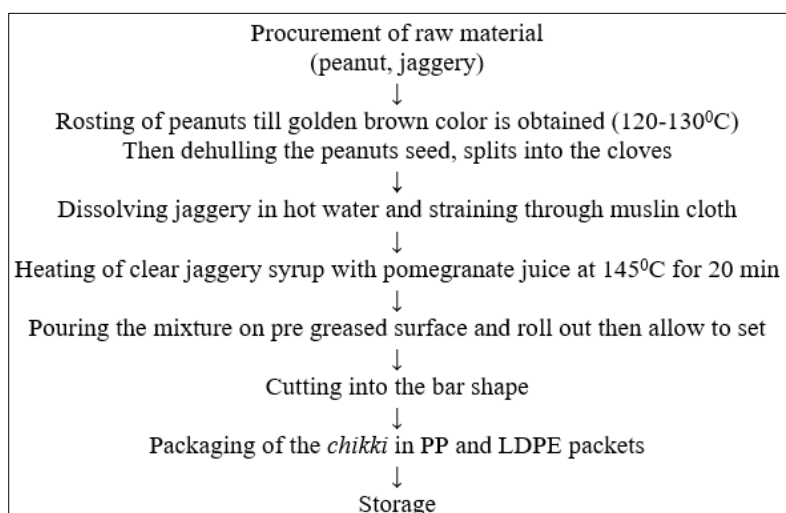


Fig 1: Flow chart for preparation of pomegranate juice mixed peanut *chikki*

Table 1: Treatment details

Treatments	Pomegranate juice (%)	Peanut (%)	Jaggery (%)	Liquid glucose (%)
T ₀	00	100	90	10
T ₁	10	90	80	10
T ₂	20	80	70	10
T ₃	30	70	60	10
T ₄	40	60	50	10
T ₅	50	50	40	10

Physico-chemical analysis of raw material and *chikki*

The method described in A.A.C.C. (2000) [1] for determining moisture was used. The protein content of *chikki* was estimated by determining total nitrogen content using standard Micro-Kjeldhal method and fat content of the *chikki* estimated by the soxhlet method A.A.C.C (2000) [1]. The crude fiber content in the product was estimated by A.A.A.C. (2000) [1]. The carbohydrate content in the selected *chikki*

were obtained by subtracting from 100, the sum of values of moisture, protein, fat, ash and crude fiber content per 100 g of the sample (Raghuramulu, *et al.*, 1993) [12]. Calcium and iron were analyzed using atomic absorption spectrometry (AAS). The total polyphenols content of *chikki* was estimated by method given by (Bray and Thorpe 1954) [3].

Packaging and storage of *chikki*

The selected treatment (T₂) of pomegranate juice mixed peanut *chikki* was packed in polypropylene (PP) and low density polyethylene (LDPE) and stored for 90 days. The samples were drawn at an interval of 30 days and evaluated for chemical and sensory quality.

Sensory evaluation of pomegranate juice mixed peanut *chikki*

Sensory evaluation of pomegranate juice mixed peanut *chikki* was carried on by 9 point hedonic scale. The average scores

of the ten judges for different quality characteristics viz. Colour and appearance, flavour, texture, taste and overall acceptability were recorded.

Statistical analysis

All experiments were carried out by using Factorial Completely Randomized Design (FCRD). The data obtained in the present investigation were analyzed for the statistical significance according to the procedure given by Rangaswamy (2010) [13].

3. Results and Discussion

Table 2: Physico-chemical properties of peanut

Sr. No.	Physico-chemical constituent	Peanut
1.	Colour	Light brown
2.	Shape	Oblong
3.	1000 kernel weight (g)	365.45
4.	Moisture (%)	6.24
5.	Protein (%)	24.17
6.	Fat (%)	46.10
7.	Crude fiber (%)	3.07
8.	Ash (%)	2.27
9.	Carbohydrates (%)	18.15
10.	Calcium (mg/100 g)	128.52
11.	Iron (mg/100 g)	3.02

*Each value represents the average of three determinations

Table 3: Physico-chemical properties of pomegranate juice

Sr. No.	Physical and Chemical constituents	Mean value (pomegranate juice)
1.	Total soluble solid (Brix)	15.10
2.	Acidity (%)	0.41
3.	pH	3.57
4.	Reducing sugars (%)	16.46
5.	Total sugars (%)	15.71
6.	Total polyphenols (mg/L)	1551

Table 4: Sensory evaluations of fresh pomegranate juice mixed peanut *chikki*

Treatments	Colour and appearance	Texture	Flavour	Taste	Overall acceptability
T ₀	8.60	8.50	8.40	8.43	8.63
T ₁	8.07	8.10	8.00	8.03	8.13
T ₂	8.57	8.30	8.33	8.37	8.43
T ₃	8.00	7.73	7.70	7.63	7.57
T ₄	7.73	7.57	7.70	7.63	7.60
T ₅	7.63	7.63	7.67	7.63	7.53
Mean	8.10	7.97	7.97	7.96	7.98
S.E. +	0.12	0.12	0.11	0.10	0.13
CD at 5%	0.38	0.36	0.34	0.32	0.39

*Maximum score out of 9

Where, T₂ = 20% pomegranate juice mixed peanut *chikki*

The organoleptic evaluation of *chikki* prepared by different combination of pomegranate juice and peanuts were carried out. The *chikki* were prepared and presented to panel of ten judge for assessing the quality and acceptability of product. Organoleptic evaluation of *chikki* was carried out using a 9 point hedonic scale of sensory characteristics such as colour, texture, taste and overall acceptability. Treatment T₂ i.e. 20% pomegranate juice mixed *chikki* was selected and kept for 90 days storage study. Chemical analysis and sensory evaluation was done at interval of 30 days.

Table 5: Chemical analysis of pomegranate juice mixed peanut *chikki* during storage

Parameters	Initial				Final			
	TOP1	TOP2	TIP1	TIP2	TOP1	TOP2	TIP1	TIP2
Chemical constituent	TOP1	TOP2	TIP1	TIP2	TOP1	TOP2	TIP1	TIP2
Moisture (%)	3.96	3.96	3.95	3.95	3.97	4	3.96	3.99
Protein (%)	14.17	14.17	14.19	14.19	14.15	14.14	14.17	14.16
Fat (%)	23.78	23.78	23.75	23.75	23.76	23.75	23.733	23.72
Crude fiber (%)	2.10	2.10	3.10	3.10	2.07	2.05	3.04	3.01
Carbohydrate (%)	51.04	51.04	51.01	51.01	50.94	50.91	50.92	50.87
Ash (%)	1.03	1.03	1	1	0.99	0.97	0.97	0.95
Calcium (mg/100g)	86.60	86.60	86.49	86.49	86.50	86.49	86.45	86.42
Iron (mg/100g)	1.73	1.73	1.69	1.69	1.66	1.60	1.62	1.58
Total polyphenol (mg/100g)	8.53	8.53	31.28	31.28	8.45	8.42	31.20	31.19

Whereas: T₀-(control peanut *chikki*)

T₁-(20% pomegranate juice)

P₁ – Low density polyethylene (LDPE), P₂ - Polypropylene bag (PP)

The data in above table shows that moisture content increased for treatment T₀ from 3.97 to 4% in PP and 3.96 to 3.97 per cent in LDPE was observed for 90 days of the storage. Treatment T₁ showed increase in the moisture content 3.97 to 3.99 per cent in PP and 3.96 to 3.96 per cent in LDPE. It was observed that the protein decreased for control treatment T₀ from 14.17 to 14.14 per cent in PP and from 14.17 to 14.15 per cent in LDPE was observed for 90 days of storage. Treatment T₁ showed decrease in protein content from 14.17 to 14.16 per cent in PP and from 14.19 to 14.17 per cent in LDPE. The fat content decreased for treatment T₀ from 23.78 to 23.75 per cent in PP and from 23.78 to 23.76 per cent in LDPE was observed for 90 days of storage. Treatment T₁ showed 23.75 to 23.72 per cent decrease in PP and 23.75 to 23.73 per cent decrease in LDPE. The crude fiber content decreased for treatment T₀ from 2.08 to 2.05 per cent in PP and from 2.10 to 2.07 per cent in LDPE was observed for 90 days of storage. The sample T₁ showed crude fibre content 3.07 to 3.01 per cent in PP and from 3.08 to 3.04 per cent in LDPE. The carbohydrate content decreased for T₀ from 51.02 to 50.91 per cent in PP and from 51.03 to 50.94 per cent in LDPE observed for 90 days of storage. The sample T₁ showed carbohydrate content 50.99 to 50.87 per cent in PP and from 51.00 to 50.92 per cent in LDPE. The ash content decreased for treatment T₀ from 1.02 to 0.97 per cent in PP and from 1.03 to 0.99 per cent in LDPE was observed for 90 days. The sample T₁ showed decrease from 1 to 0.95 per cent in PP and from 1 to 0.97 per cent in LDPE. The calcium content decreased for treatment T₀ from 86.58 to 86.49 mg/100 g in PP and from 86.59 to 86.50 mg/100 g in LDPE was observed for 90 days. The sample T₂ showed decrease from 86.47 to 86.42 mg/100 g in PP and from 86.48 to 86.45 mg/100 g in LDPE. The iron content decreased for treatment T₀ from 1.71 to 1.60 mg/100 g in PP and 1.72 to 1.66 mg/100 g in LDPE was observed for 90 days. The sample T₁ showed decrease from 1.66 to 1.58 mg/100 g in PP and from 1.67 to 1.62 mg/100 g in LDPE. It was observed from that the total polyphenol decreased for treatment T₀ from 8.52 to 8.42 mg/100 g in PP and 8.52 to 8.45 mg/100 g in LDPE was observed for 90 days. The sample T₂ showed decrease from 31.27 to 31.19 mg/100 g in PP and from 31.28 to 31.20 mg/100 g in LDPE. The juice mixed peanut *chikki* (T₃) initial low microbial growth detected showed for 0×10^5 , 1×10^5 cfu/g, respectively and Final count was taken at 90 days of storage study.

The growth of microorganism detected more showed the count 2×10^5 and 3×10^5 cfu/g respectively. The total cost of production for 1 kg pomegranate juice mixed peanut *chikki* was Rs 158.16 Rs/kg.

Changes in sensory parameters of pomegranate juice mixed peanut *chikki* during Storage

Pomegranate juice mixed peanut *chikki* (20% pomegranate juice) remained in good condition at ambient temperature during the entire storage period of 3 months. The *chikki* stored in low density polyethylene bags (LDPE) showed good quality than polypropylene (PP) during 3 months of storage. The overall acceptability for T₁ treatment score decreases from 8.63 to 8.23 in PP and 8.70 to 8.47 in LDPE.

Conclusion

Pomegranate juice mixed peanut *chikki* prepared with 20% pomegranate juice, 80% peanut, 70% jaggery, 10% liquid glucose was the best over other combination of pomegranate juice mixed *chikki*. The selected treatment was best and it was fairly stable to storage period for chemical composition. The *chikki* remained in good condition during storage period of 3 month. The *chikki* stored in LDPE bags showed good quality than polypropylene (PP) during 3 month storage.

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