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Effect of incorporation of guar gum in combination with Arabic gum on quality of peanut *Chikki*

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Abstract
In this present study the attempt was made to prepare peanut *Chikki* by adding blend of guar gum with Arabic gum at various levels 0.1, 0.2, 0.3 and 0.4 percent. The peanut *Chikki* was prepared and evaluated for sensory, textural and microbial quality. The moisture content 7.52%, fat 42.85%, protein 25.72%, carbohydrate 19.44%, fiber 2.98% and ash 1.49% for raw peanut and in case of roasted peanut moisture content 3.28%, fat 42.46%, protein 24.10%, carbohydrate 25.78%, fiber 2.96% and ash 1.42% respectively. As peanuts are roasted moisture is released and facilitated moisture loss. Raw peanut showed a good source of calcium and iron (136.4 and 177.4 mg/100 gm); the roasted peanut is good source of phosphorus (0.72 mg/100 gm). The moisture content of the product was in the range of 3.30 to 3.37%. Sensory scores for colour and appearance, flavor, taste of the product does not show any notable change. In case of texture maximum score was obtained and acceptable quality of peanut *Chikki* can be prepared up to 0.3% of each of blend gum concentration. Force required to break the peanut *Chikki* was ranged in between 12.98 kg to 14.60 kg. As per the sensory evaluation 13.48 kg force found to be suitable i.e. satisfactory texture (bite). The Total plate counts ranged from 45-6452 cfu/g. In case of Yeast and mold count was obtained in between 0-11 cfu/g. The production cost for 50 g of peanut *Chikki* is Rs 3.53.

Introduction

Consumers are increasingly conscious about health and have begun to look at the nutritional benefits of food, disease prevention and health promoting compounds in many foods.

Chikki is a sweet product prepared by mixing various types of nuts and other ingredients either with jaggery or sugar. *Chikki* is popular all over the country amongst all age groups but school going children and rural areas are the main targets. Guar gum is used as a thickener and stabilizer in the food industry as a result of its hydration and water-binding properties. It improves the body, texture, chewiness, and heat-shock resistance by binding free water. Gum arabic is widely used in the food industry mainly to impart desirable qualities because of its influence over body and texture. Thus this study was developed with the intention of incorporating hydrocolloids to enhance rheological property of peanut *Chikki*.

Materials and methods

Guar gum and arabic gum was collected from College of Food Technology, VNMKV, Parbhani. Sugar, peanut and liquid glucose were purchased from local market of Parbhani.

Chemical composition

Chemical constituents like Total carbohydrate, fat, protein content, ash and fiber content were determined by AOAC.

Minerals

Minerals were determined by using Atomic Absorption Spectroscopy (Perkin Elmer-200)

Formulation of peanut *Chikki*

In given formulation of peanut *Chikki* other ingredients are kept constant only the concentration each of guar and arabic gum is changed accordingly.

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Table 1: Formulation of peanut *Chikki*.

Ingredients	Weight (g)
Sugar	500
Peanut	500
Liquid glucose	05

Control sample T0 (Control) = 0.0% guar and arabic gum, T1= 0.1% each of guar gum and arabic gum, T2= 0.2% gum each of guar and arabic, T3 = 0.3% each of guar gum and arabic gum, T4 = 0.4% each of guar gum and arabic gum.

Preparation of *Chikki*
The peanuts were roasted individually in a pan and allowed to cool to room temperature. Sugar was added with minimum quantity of water and heated to make a thick solution. The heating of solution was continued till 115°C for 20 min. Roasted peanuts, blend of gum and liquid glucose were mixed with hot sugar syrup and poured into an aluminium plate which was smeared with oil. The product was then spread uniformly by rolling it with the help of a roller. Vertical and horizontal lines were marked with a cutter to make individual slabs then cooled to room temperature (27 ± 2 °C) and were packed in polythene pouches, Dombe *et al.* (2014) [2].
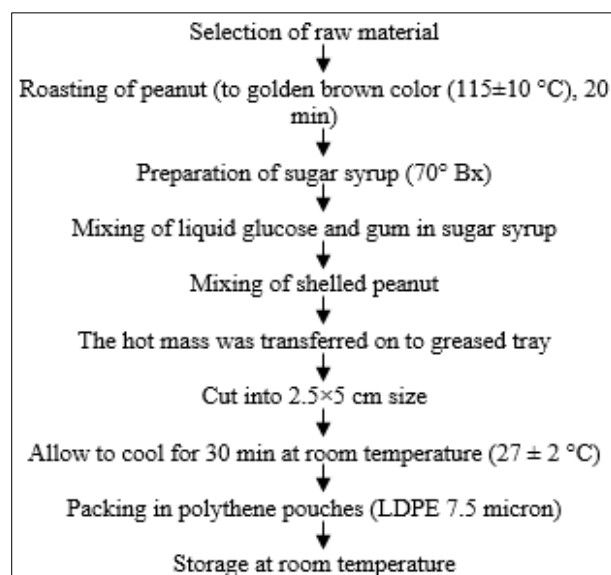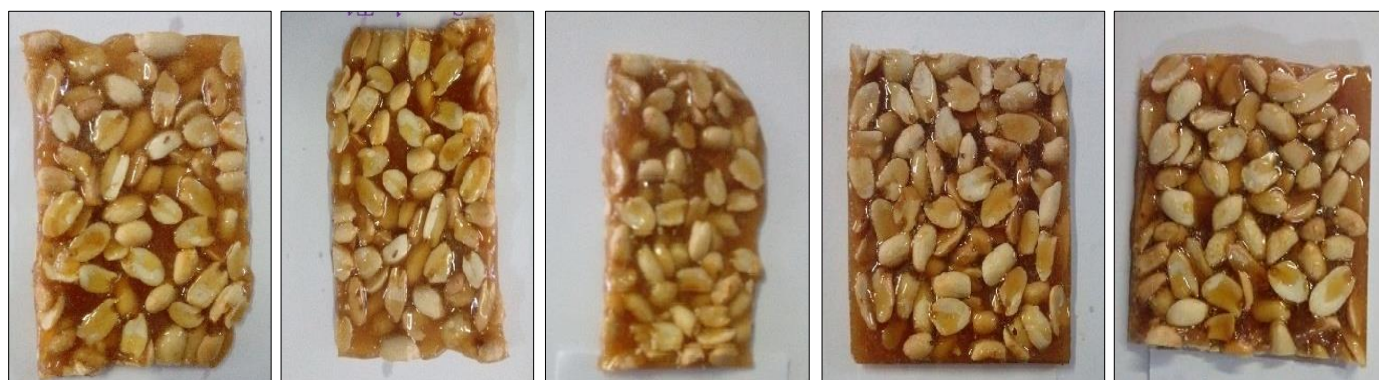

Fig 1: Preparation of peanut *Chikki* with incorporation of guar gum and Arabic gum blend.

Peanut chikki incorporated with guar and Arabic gum blend

Control	**Sample T1**	**Sample T2**	**Sample T3**	**Sample T4**

Sensorial Analysis
Sensory analysis of prepared product was performed by using 9 point hedonic scale method.

Texture
Textural analysis with respect to the breaking strength of peanut *Chikki* was measured by Stable Micro System *TAXT2 plus* Texture Analyzer using following parameters Mode-Compression, Pre test speed -2.0 mm/s, Test speed-1.0 mm/s, Post test speed - 10.0 mm/s, Target mode- Distance, Triger type-Auto and Probe-Blade set (HDP/BS) (Warner Bratzler).

Microbial quality
The microbial analysis with respect to TPC, Yeast and Mold count and Coliform count of *Chikki* was carried out according to Ranganna (1986) [4].

Results and Discussion
The data pertaining to proximate composition of raw and roasted peanut is tabulated in table 2. The results revealed that raw peanut showed moisture content 7.52%, fat 42.85%, protein 25.72%, carbohydrate 19.44%, fiber 2.98% and ash 1.49% respectively. In case of roasted peanut moisture content 3.28%, fat 42.46%, protein 24.10%, carbohydrate 25.78%, fiber 2.96% and ash 1.42% respectively. As peanuts are roasted moisture is released and facilitated moisture loss. Raw peanut showed a good source of calcium and iron (136.4 and 177.4); the roasted peanut is good source of phosphorus (0.72). The availability of calcium, phosphorus andiron is good indication.

Table 2: Effect of roasting on proximate composition of peanut

S. No.	Composition	Raw peanut (%)	Roasted peanut (%)
1.	Moisture content	7.52	3.28
2.	Fat	42.85	42.46
3.	Protein	25.72	24.10
4.	Carbohydrate	19.44	25.78
5.	Fiber	2.98	2.96
6.	Ash	1.49	1.42
7.	Ca (mg /100gm)	136.4	99.2
8.	P (mg /100gm)	0.60	0.72
9.	Fe (mg /100gm)	177.4	156.8

Moisture

Moisture of peanut *Chikki* is very critical as it determines the quality and stability of the product. Moisture content of peanut *Chikki* is presented in table 3. The results reveal that all the samples had moisture content in between 3.30 to 3.37%. This might could be due to hydrocolloids used in small quantities (<1%) increase water retention, There is marginal difference between control and gum incorporated samples. The results are in agreement with Hirdyani *et al.* (2015) [3].

Table 3: Effect of guar gum and arabic gum blend on moisture content of peanut *Chikki*.

S. No.	Samples	Moisture (%)
1.	T0	3.30
2.	T1	3.32
3.	T2	3.33
4.	T3	3.35
5.	T4	3.37
S.E.		0.0088
C.D. at 5%		0.0266

Sensory evaluation of peanut *Chikki*

The sensory evaluation of peanut *Chikki* in respect of color and appearance, flavor, taste and texture, was evaluated by panel of judges using nine point hedonic scale. The results obtained are tabulated in table 4.

The data reveals that the up to 0.4% concentration of gum not seen any significant difference with respect to colour and appearance, flavor, taste and texture of peanut *Chikki* but in case of 0.6% concentration of gum observed highest score for flavor, taste and texture of peanut *Chikki*. In case of texture maximum score was seen i.e. incorporation of gum improved the texture of peanut *Chikki*, this may due to the water binding and emulsifying effect of blend of gum.

Table 4: Effect of guar gum and arabic gum blend on sensory evaluation of peanut *Chikki*

Sample	Colour and appearance	Flavor	Taste	Texture	Overall acceptability
T0(Control)	8.0	8.0	8.0	8.0	8.0
T1	8.0	8.0	8.0	8.0	8.0
T2	8.0	8.0	8.0	8.4	8.0
T3	8.0	8.5	8.5	9.0	8.5
T4	7.0	7.0	7.0	7.0	7.0
S.E.	0.0089	0.0098	0.0094	0.0053	0.0098
C.D. at 5%	0.0268	0.0294	0.0282	0.0161	0.0294

Texture

The force required to break the *Chikki* in to 2 pieces was recorded as the breaking strength. The breaking strength of the peanut *Chikki* which was measured in kg is shown in table 5. The data reveals that the force required to break the peanut *Chikki* was ranged in between 12.98 kg to 14.60 kg. As the level (0.1, 0.2, 0.3 and 0.4%) of gum increases the force required found to be decreased. This could be due to the absorption of moisture by the *Chikki*. As per the sensory evaluation 13.48 kg force found to be suitable i.e. satisfactory texture (bite).

Table 5: Effect of guar gum and Arabic gum blend on breaking strength of peanut *Chikki*.

S. No.	Samples	Force required (kg)
1.	T0 (Control)	14.60
2.	T1	14.10
3.	T2	13.80
4.	T3	13.48
5.	T4	12.98
S.E.		0.0062
C.D. at 5%		0.0186

Microbial quality of peanut *Chikki*
Microbiological examination of peanut *Chikki* was carried out after 15 days of interval with respect to TPC, Yeast, Mold, and Coliform count. The data pertaining to microbial examination is presented in Table 6.

Microbiological examination of the peanut *Chikki* revealed that Total plate count was found to be in the range of 45-6452 cfu/ ml. Total plate count was found to be 6452 on 105th days of storage. In case of Yeast and mold count was obtained in between 0-11cfu/ ml but it was appeared to be 11 on 105th days of storage. While coliform colonies were not detected throughout the period of investigation. The moisture content of peanut *Chikki* samples gradually increased during storage due to its hygroscopic nature and after 90 days the TPC and Yeast and mold count was not found under feasible limit.

Table 6: Microbial quality of peanut *Chikki* stored at ambient temperature

S. No.	Days	TPC (cfu/ml)	Yeast and Mould count	Coliform count
1.	0	45	00	ND
2.	15	156	00	ND
3.	30	639	01	ND
4.	45	1352	03	ND
5.	60	2641	04	ND
6.	75	3568	06	ND
7.	90	4256	09	ND
8.	105	6452	11	ND

Table 7: Production cost of guar and arabic gum blend incorporated peanut *Chikki*

S. No.	Ingredient	Quantity(g)	Rate (Rs/kg.)	Amount(Rs.)
1.	Sugar	500	32	16.0
2.	Peanut	500	80	400.0
3.	Liquid glucose	05	120	0.60
7.	Guar gum	1.5	400.00	0.60
8.	Arabic gum	1.5	72.00	1.08
9.	Total weight of ingredients	1008	--	-
10.	Processing and packaging cost @ (10%) of RM cost	--	--	5.82
11.	Production cost of 907gm of peanut *Chikki*	--	--	64.10
12.	Production cost of 1kg of peanut *Chikki*	--	--	70.67

Production cost of peanut *Chikki* was worked out on the basis of cost of raw material including processing cost. The total production cost for 1 kg peanut *Chikki* is Rs 70.67. Hence cost for 50 g of peanut *Chikki* is Rs. 3.53 (Table 7).

Conclusion
It was concluded that the incorporation of 0.6 percent of blend of combination of gum peanut *Chikki* was found to be overall acceptable and enhanced texture. Shelf life of the product was found to be 60 days under normal conditions.

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