

EFFECT OF BOTTLE GOURD PULP ON SENSORY QUALITY AND PROXIMATE COMPOSITION OF COW MILK BURFI

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ABSTRACT

The research work on effect of different combinations of bottle gourd pulp on sensory quality, proximate composition of cow milk burfi was conducted during 2016-2017 in the department of Animal Husbandry and Dairying at College of Agriculture, Nagpur. The different concentrations of bottle gourd pulp were T₁ (0%), T₂ (05%), T₃ (10%) and T₄ (15%). 30 per cent constant rate sugar was mixed in a khoa for preparation of burfi. The different levels of bottle gourd pulp had a definite effect on improving the sensory quality like flavour, body and texture, colour and appearance also on overall acceptability of bottle gourd burfi. The score regarding the quality of cow milk burfi showed that the burfi prepared by utilizing cow milk khoa with 15 per cent bottle gourd pulp had secured highest score (8.86) and ranked as most acceptable product. Similarly chemical properties viz., moisture, solids not fat significantly increased by treatment (85% khoa+15% bottle gourd pulp) when compared with control and other remaining treatments but fat, protein, total solids, ash significantly decreased by the addition of increasing concentration (0-15%) of bottle gourd pulp. Thus, it is inferred that a good quality cow milk burfi with utilizing bottle gourd pulp can be prepared by 85% khoa +15% bottle gourd pulp and 30 per cent sugar.

(Key words : Cow milk, bottle gourd pulp, sensory evaluation, proximate composition)

INTRODUCTION

Milk is an almost ideal food. Milk has long been recognized as the most complete single food available in nature for the maintenance of health and promotion of growth of the mammal. Milk is regarded as rich source of nutrients as it contain high quality proteins, lactose, flavour enriching fat. A single glass of milk is loaded with 15 essential vitamins and nutrients. It contain as much as protein as an egg, as many as many carbohydrate as a quarter cup of rice and the same calcium as 16 cups of spinach. India ranks first in milk production, accounting for 18.5% of world production, achieving annual output about 155.5 million tonnes during 2015-16 (Anonymous, 2016). The per capita availability of milk in India has increased from 176 grams per day in 1990-91 to 337 grams per day by 2015-16.

Burfi is a one of the most popular khoa based sweets all over India. Burfi is prepared by heating a mixture of concentrated milk solids (khoa) and sugar to a near homogenous consistency followed by cooling and cutting into small cuboids. Khoa burfi contains muscle and bone building proteins and minerals but is deficient in fiber and vitamin C.

Several varieties of burfi are being sold in the market depending on additives viz; besan burfi, plain burfi, groundnut burfi, cashewnut burfi, mango burfi, wood apple burfi, herbal burfi, fig powder burfi etc.

Bottle gourd is commonly cultivated vegetable plant all over in India. Chemical composition of bottle gourd per 100 g edible portion was analyzed and reported by Manay and Shadaksharaswamy (1995) as moisture 96.1 g, protein 0.2 g, fat 0.1 g, minerals 0.5 g, fibre 0.6 g, carbohydrates 2.5 g, energy 12 k.cal, calcium 20 mg, phosphorus 10 mg, iron 0.7 mg, thiamine 0.3 mg, riboflavin 0.01 mg and niacin 0.2 mg. It is rich in calcium, potassium and other minerals and also contains vitamins, lipids and some amino acids also reported that bottle gourd (its fruit, juice, seeds, powder) possess anti-hyperlipidemic, analgesic, anti-inflammatory, diuretic, anti-oxidant, immunomodulatory, cardio protective, anthelmintic properties. Approximately 96 per cent of bottle gourd is water and is therefore, a great thirst quencher excellent vegetable for hypertensive patients and low calorie diet. Keeping in view the nutritive value of both, the above research had done.

MATERIALS AND METHODS

The present study was conducted on the studies on preparation of burfi blended with bottle gourd pulp at Department of Animal Husbandry and Dairy Science section, College of Agriculture, Nagpur during the year 2016-17. The material used and methods employed for conducting the experiments are as follows.

Materials

The whole, fresh, clean cow milk was obtained from the Section of Animal Husbandry and Dairy Science,

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College of Agriculture, Nagpur. Bulk milk sample was obtained in stainless steel container from the morning milking and the milk was filtered through the muslin cloth to avoid dirt and extraneous matter. The milk sample was analyzed for different milk constituent's viz., fat, protein, total solids, moisture and ash. Milk was standardized to 4 per cent by Pearson's formula. Bottle gourd, Sugar obtained from the local market of Nagpur. Different equipments viz., Karahi, khunti, wooden Khunti, stainless steel trays, mixer grinder, etc were available in the department. Analytical reagent grade chemicals were used for the chemical analysis.

Methods

Treatments included different combinations like;

T₁ = 100 parts of cow milk khoa + 0 parts of bottle gourd pulp i.e. (Control)

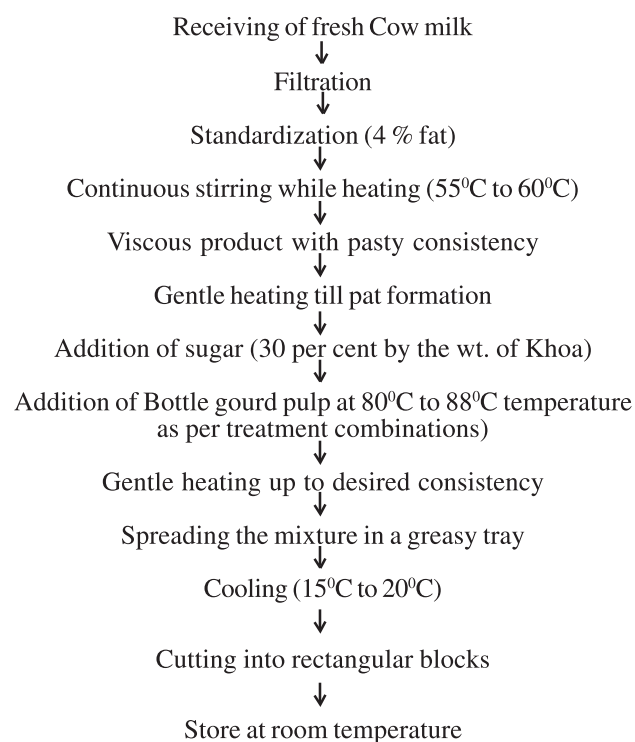
T₂ = 95 parts of cow milk khoa + 5 parts of bottle gourd pulp

T₃ = 90 parts of cow milk khoa + 10 parts of bottle gourd pulp

T₄ = 85 parts of cow milk khoa + 15 parts of bottle gourd pulp

Procedure for preparation of Burfi - The cow milk was concentrated to a pasty consistency by evaporating in open pan on gentle fire. The sugar at the rate of 30 per cent was added and heated gently till pat formation. When the product started to leave the sides of karahi (within 5 to 8 min) the bottle gourd pulp was added and further heated on low flame till the product again started to leave the sides of karahi. The product was taken off the flame and transferred in to a greasy tray and was allowed to cool and cut into desirable size as per flow diagram given ;

Flow chart for preparation of Burfi



The observations were recorded for flavour, body and texture, colour and appearance and overall acceptability by using 100-point scale (Pal and Gupta, 1985) and on the basis of 9 point hedonic scale (Nelson and Trout, 1964). Fat content was determined by Mojonnier fat extraction method and recorded (Anonymous, 1977). Protein content was estimated by Micro-kjeldahl's method (Anonymous, 1961). Total solids was determined by gravimetric method (Anonymous, 1961). Solids not fat content was estimated by subtraction method i.e. Solids not fat = T.S. Percentage – fat percentage. Moisture content of burfi was determined by subtraction method i.e. Moisture (%) = 100 - Total solids (%). Ash content estimated (Anonymous, 1967). Statistical analysis was done as per method suggested by Snedecor and Cochran (1994).

RESULTS AND DISCUSSION

A) Sensory evaluation of bottle gourd burfi

a) Flavour

The data from table 1 showed that the score obtained for flavour were 39.50, 40.33, 41.68 and 43.58 for treatments T₁ (100:00), T₂ (95:05), T₃ (90:10) and T₄ (85:15) khoa to bottle gourd pulp, respectively. The highest score of 43.58 for flavour was obtained by treatment with 85 parts of khoa + 15 parts of bottle gourd pulp which was at par with treatment 90 parts of khoa + 10 parts of bottle gourd pulp (41.68). The lowest score of 39.50 was obtained by treatment 100 parts of khoa + 0 parts of bottle gourd pulp. Similar result was obtained by Girase (2016), who reported that 6 per cent gulkand (T₄) in burfi scored highest point 42.54 while 0 per cent gulkand was scored lowest point 39.36 for burfi.

b) Body and texture

The data from table 1 showed that the score obtained for body and texture were 29.88, 31.07, 32.65 and 33.82 for treatments T₁ (100:00), T₂ (95:05), T₃ (90:10) and T₄ (85:15) khoa to bottle gourd pulp, respectively. The highest score of 33.82 for body and texture was obtained by treatment with 85 parts of khoa + 15 parts of bottle gourd pulp which was at par with treatment 90 parts of khoa + 10 parts of bottle gourd pulp (32.65). The lowest score of 29.88 was obtained by treatment 100 parts of khoa + 0 parts of bottle gourd pulp i.e. control. Likewise similar result was reported by Patil (2012), who reported that, burfi blended with 15 per cent dried date recorded the highest score in respect of body and texture, and lowest score for 10 per cent date paste burfi.

c) Colour and appearance

The data from table 1 showed that the mean score for colour and appearance of burfi during various treatments T₁ (100:00), T₂ (95:05), T₃ (90:10) and T₄ (85:15) khoa to bottle gourd pulp were 15.87, 16.65, 17.57 and 19.30 respectively. The highest score of 19.30 for body and texture was obtained by treatment with 85 parts of khoa + 15 parts

of bottle gourd pulp which was at par with treatment 90 parts of khoa +10 parts of bottle gourd pulp (17.57). The lowest score of 15.87 was obtained by treatment 100 parts of khoa +0 parts of bottle gourd pulp i.e. control. Similar results were obtained by Kamble *et al.* (2010), who reported that pineapple burfi prepared from 15 per cent was superior for colour and appearance.

A) Overall acceptability

The overall acceptability of burfi was significantly affected by addition of bottle gourd pulp. Burfi with treatment T₄ (8.86) was significantly superior over the rest of the treatments. The lowest score obtained by burfi prepared without addition of bottle gourd pulp i.e. control T₁ (6.41). The present results are in agreement with the results of Anurag and Chawla (2016), who reported that, increase in the levels of bottle gourd pulp, there was proportionate increase in the overall acceptability of burfi prepared in proportions of 10% (T₁), 20% (T₂), 50% (T₃), 100% (T₄) and 200% (T₅) bottle gourd shreds (BGS) with khoa (150 g) and scores were 6.96, 7.31, 8.02, 8.33 and 8.15, respectively. Treatment T₄ (100%) having maximum score of 8.33. It might be due to increase in the proportion of BGS.

Proximate composition

The data regarding proximate composition of bottle gourd burfi revealed that it had significantly (Pd^{0.05}) increase moisture (%), solids not fat (%) than the control. Comparison between the treatment groups indicated that fat (%), protein (%), total solids (%) and ash (%) significantly (Pd^{0.05}) declined with increase in the concentration of bottle gourd pulp in the burfi.

Fat

The data pertaining to fat content of burfi with different levels of bottle gourd pulp are presented in table 2. The mean fat content percentage were 17.55, 16.65, 15.83 and 14.87 per cent with treatments T₁ (100:0), T₂ (95:05), T₃ (90:10) and T₄ (85:15) (khoa to bottle gourd pulp), respectively. Fat content in burfi was decreased as the proportion of bottle gourd pulp in the burfi was increased. This might be due to very low fat content in bottle gourd pulp i.e. 0.1 per cent (Manay and Shadaksharaswamy, 1995). This investigation agrees with the results obtained by Pathak *et al.* (2017), who reported decrease in fat content (24.65 to 17.42 per cent) from treatment T₁ to T₄ (0% to 15%). Waghmare (2012) also reported decrease in fat content (21.10 to 17.46 per cent) from treatment T₁ to T₄ (0% to 15%).

Protein

Protein content in burfi by the different levels of bottle gourd pulp burfi ranged from 13.28, 12.46, 11.98 and 11.19 per cent with treatments T₁ (100:0), T₂ (95:05), T₃ (90:10) and T₄ (85:15) khoa to bottle gourd pulp, respectively. The findings are in agreement with Waghmare (2012), who reported decrease in protein content (14.80 to 12.72 per cent) with the increase in concentration of bottle gourd pulp to khoa from treatment T₁ to T₄ (0% to 15%). The results were

also confirmed with the findings of Dhande (2014) and Bhutkar *et al.* (2015), who noted that, with the increase in the levels of fruit pulp there was proportionate decrease in the levels of protein content in burfi.

Total Solids

Total solids content in burfi was affected by addition of different levels of bottle gourd pulp. Total solids content in burfi by the different levels of bottle gourd pulp burfi ranged from 83.50, 83.05, 82.78 and 82.23 per cent with treatments T₁ (100:0), T₂ (95:05), T₃ (90:10) and T₄ (85:15) khoa to bottle gourd pulp, respectively. Bankar *et al.* (2013) observed that, average value of total solids in the burfi under treatments of 100:0 (T₀), 95:5 (T₁), 90:10 (T₂) and 85:15 (T₃) khoa to pineapple pulp were 83.74, 82.57, 82.17 and 81.58 per cent, respectively.

Solids not fat

The data presented in table 2 indicated that the average solids not fat content of burfi with addition of bottle gourd pulp increased proportionately. Solids not fat content in burfi by the different levels of bottle gourd pulp burfi ranged from 65.95, 66.40, 66.86 and 67.35 per cent with treatments T₁ (100:0), T₂ (95:05), T₃ (90:10) and T₄ (85:15) khoa to bottle gourd pulp, respectively. Dhande (2014) who observed that, average value of solids not fat in the burfi under treatments of 100:0 (T₁), 95:10 (T₂), 85:15 (T₃), 80:20 (T₄) and 75:25 (T₅) khoa to ash gourd pulp were 64.34, 66.04, 66.77, 67.45 and 67.83 per cent, respectively.

Moisture

The moisture content in burfi with different levels of treatments ranged from 16.50, 16.94, 17.22 and 17.77 per cent with treatments T₁ (100:0), T₂ (95:05), T₃ (90:10) and T₄ (85:15) khoa to bottle gourd pulp, respectively. The moisture content in burfi significantly increased with increase in the different levels of bottle gourd pulp. This might be due to bottle gourd pulp content more moisture i.e. 96.1 per cent. Kamble *et al.* (2010) noticed increase in moisture content (16.85 to 19.26 per cent) with the increase in concentration of pineapple pulp to khoa from treatment T₁ to T₆ (0% to 25%).

Ash

The data pertaining to ash content of burfi with different levels of bottle gourd pulp are presented in table 2. The mean ash content percentage were 2.80, 2.69, 2.54 and 2.39 per cent with treatments T₁ (100:0), T₂ (95:05), T₃ (90:10) and T₄ (85:15) khoa to bottle gourd pulp, respectively. Similar results were reported by Waghmare (2012), who reported that, average value of ash in the burfi under treatments of 100:0 (T₀), 95:5 (T₁), 90:10 (T₂) and 85:15 (T₃) khoa to bottle gourd pulp were 2.78, 2.70, 2.53 and 2.42 per cent, respectively. The results of present study are in line with the findings Pathak *et al.* (2017) and Bhutkar *et al.* (2015), who noted that, with the increase in the levels of fruit pulp there was proportionate decrease in the levels of ash content in burfi.

Table 1. Effect of bottle gourd pulp on sensory evaluation and overall acceptability of burfi

Treatments Proportion (CMK:BGP)	Parameters			
	Flavour (45)	Body & Texture (35)	Colour & Apperance (20)	Overall acceptability
T ₁ (100:00)	39.50 ^d	29.88 ^d	15.87 ^d	6.41 ^d
T ₂ (95:05)	40.33 ^c	31.07 ^c	16.65 ^c	7.09 ^c
T ₃ (90:10)	41.68 ^b	32.65 ^b	17.57 ^b	7.68 ^b
T ₄ (85:15)	43.58 ^a	33.82 ^a	19.30 ^a	8.86 ^a
SE (m) ±	0.202	0.213	0.125	0.088
CD at 5%	0.605	0.640	0.375	0.263

(CMK-Cow Milk Khoa, BGP-Bottle Gourd Pulp, * P < 0.05)

Table 2. Proximate composition of bottle gourd burfi

Constituents	Control T ₁ (100:00)	T ₂ (95:05)	T ₃ (90:10)	T ₄ (85:15)	SE	CD at 5%
Fat	17.55 ^a	16.65 ^b	15.83 ^c	14.87 ^d	0.067	0.200
Protein	13.28 ^a	12.46 ^b	11.98 ^c	11.19 ^d	0.061	0.182
Total Solids	83.50 ^a	83.05 ^b	82.78 ^c	82.23 ^d	0.168	0.504
Solids not fat	65.95 ^d	66.40 ^c	66.86 ^b	67.35 ^a	0.214	0.641
Moisture	16.50 ^d	16.94 ^c	17.22 ^b	17.77 ^a	0.168	0.502
Ash	2.80 ^a	2.69 ^b	2.54 ^c	2.39 ^d	0.038	0.115

Values with different superscripts differ significantly (P<0.05)

It may be inferred that the superior, nutritional and medicinal quality bottle gourd burfi can be prepared by addition of 15 parts of bottle gourd pulp and 85 parts of cow milk khoa with 30 per cent sugar. Bottle gourd burfi contains 14.87 per cent fat, 11.19 per cent protein, 82.23 per cent, total solids, 67.35 per cent solids not fat, 17.77 per cent moisture and 2.39 per cent ash, respectively.

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