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## Studies on preparation, sensory evaluation, chemical analysis and cost configuration of finger millet (*Eleusine coracana*) flour buffalo milk burfi

PS Mohod, RM Zinjarde and PN Khadse

**Abstract**

The research work on effect of different combinations of finger millet flour on sensory quality, proximate composition of buffalo milk burfi was conducted during the year 2019-20. Milk was standardized to 6 per cent fat and the burfi was prepared by addition of finger millet flour in the proportion of 100:0 (T<sub>1</sub>), 90:10 (T<sub>2</sub>), 85:15 (T<sub>3</sub>), 80:20 (T<sub>4</sub>) and 75:25 (T<sub>5</sub>) with 30 per cent sugar by weight of khoa was added. The data were statistically analyzed for five treatments and four replications in completely randomized design (CRD). Sensory evaluation like flavour, body and texture, colour and appearance, and overall acceptability by 9 point hedonic scale with five treatments and four replications of finger millet burfi. Burfi prepared by blending with 15 parts of finger millet flour (T<sub>3</sub>) had secured the highest scored for flavour, body and texture, colour and appearance, and overall acceptability were 8.85, 8.76, 8.95, and 8.89 respectively. The chemical composition of burfi i.e. fat, protein, moisture and acidity was significantly decreased while total solids, solids not fat and ash significantly increased with increased levels of finger millet flour. Burfi prepared with addition of 15 parts of finger millet flour (T<sub>3</sub>) has fat, protein, total solid, S.N.F, moisture, ash, and acidity were 22.98, 15.95, 81.03, 56.23, 18.97, 3.7, and 0.21 per cent respectively. The cost of burfi was decreased simultaneously with increase in the level of finger millet flour. The cost of burfi production at 100:0 (T<sub>1</sub>), 90:10, (T<sub>2</sub>), 85:15 (T<sub>3</sub>), 80:20 (T<sub>4</sub>) and 75:25 (T<sub>5</sub>) khoa to finger millet flour were Rs 243.95, 229.95, 224.2, 215.95, 207.7 per kg, respectively. The production cost of burfi at most acceptable level i.e burfi with 15 part of finger millet flour (T<sub>3</sub>) was Rs.224.2 per kg. Hence, it is concluded that superior quality burfi can be produced by addition of 15 parts of finger millet flour with 85 parts of khoa and 30% sugar.

**Keywords:** Burfi, finger millet burfi, finger millet flour, sensory attributes, cost structure

**Introduction**

Burfi is one of the most popular khoa based milk product appreciated all over India. It is prepared by evaporating milk in an open pan to obtain a semi-solid product called khoa. There are many types of burfi present in market *viz.* simple, mawa, fruit, cashewnut, almond, besan, khajoor etc. Due to its intractiveness and wide acceptance throughout India, many forms of burfi with numerous ingredients and flavours have been developed. (Sonika Pandey and Amrita Poonia. 2020) [16].

In recent years, finger millet has gained importance, because of its nutritional strength in terms of dietary and functional fibre, starch pattern, as well as high calcium and iron contents. India is the major producer of finger millet contributing nearly 60% of the global production (Shukla and Srivastava 2014).

Finger millet is extensively grown in states of Karnataka, Tamil Nadu, Andhra Pradesh and part of north India. The percentage share of ragi production in total production, it is recorded the highest i.e. 63.23 per cent (5112 thousand tonnes) in Karnataka, followed by Tamil Nadu (800.4 thousand tonnes with 8.91 per cent), Uttarakhand (694 thousand tonnes with 7.73 per cent), Maharashtra (622.6 thousand tonnes with 6.93 per cent), and Andhra Pradesh (368.8 thousand tonnes with 4.11 per cent). The lowest share is recorded by Madhya Pradesh (0.5 thousand tonnes at 0.006 per cent). (Sankaran.,2017) [13].

Ragi provides highest level of calcium, antioxidants properties, phytochemicals, which makes it easily and slowly digestible. Hence it helps to control blood glucose levels in diabetic patients very efficiently. (Patel *et al.*, 2016) [11]. finger millet in combination with khoa will help in increasing the level of calcium, iron, B vitamins and fiber. When milk is supplemented with such beneficial cereals it will provide more nutrition and marketing opportunities.

**Materials and Methods**

The present study on "Studies on preparation, sensory evaluation, chemical analysis and cost

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configuration of finger millet (*Eleusine coracana*) flour buffalo milk burfi", was carried out at the section of Animal Husbandry and Dairy Science, College of Agriculture, Nagpur during the year 2019-2020.

### Materials

The whole, fresh, clean buffalo milk was obtained from Market, The milk sample was analyzed for different milk constituent's viz., fat, protein, total solids, moisture, acidity and ash. Milk was standardized to 6 per cent by Pearson's formula. Finger millet flour, 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

The burfi with different combination was prepared by addition of finger millet flour in the proportion of 100:0 (T<sub>1</sub>), 90:10 (T<sub>2</sub>), 85:15 (T<sub>3</sub>), 80:20 (T<sub>4</sub>) and 75:25 (T<sub>5</sub>) with 30 per cent sugar by weight of khoa was added.

### Procedure for preparation of burfi

The observations were recorded for flavour, body and texture, colour and appearance and overall acceptability by using 9 point hedonic scale (Nelson and Trout, 1964) [9]. The observations were recorded for fat, protein, total solids, snf, moisture, ash, acidity.

The Statistical analysis was done as per method suggested by Snedecor and Cochran (1994) [5].

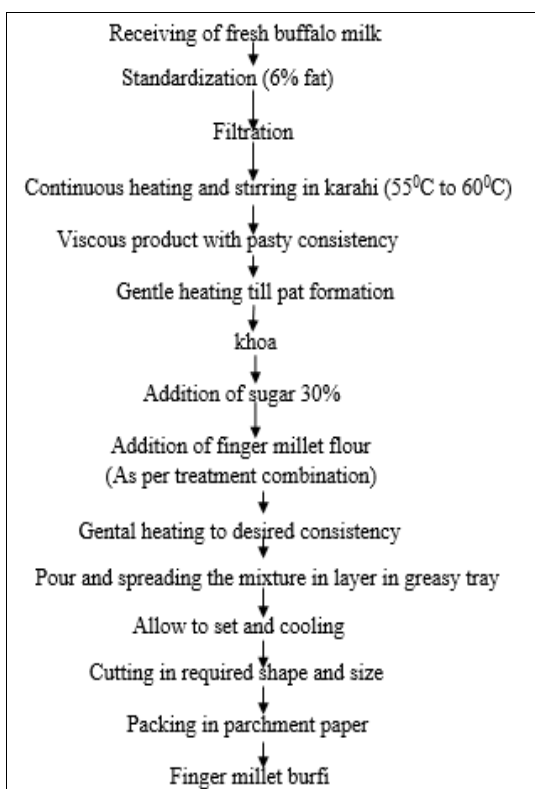


Fig 1: Flow chart for preparation of burfi

Table 2: Overall average chemical composition of burfi prepared with different levels of finger millet flour (per cent).

Treatments	Parameters						
	Fat	Protein	Total solids	Solids not fat	Moisture	Ash	Acidity
T <sub>1</sub>	29.05 <sup>a</sup>	17.77 <sup>a</sup>	79.92 <sup>e</sup>	50.87 <sup>e</sup>	20.08 <sup>a</sup>	3.59 <sup>a</sup>	0.24 <sup>a</sup>
T <sub>2</sub>	26.19 <sup>b</sup>	16.59 <sup>b</sup>	80.71 <sup>d</sup>	54.52 <sup>d</sup>	19.29 <sup>b</sup>	3.67 <sup>b</sup>	0.22 <sup>b</sup>
T <sub>3</sub>	24.80 <sup>c</sup>	15.95 <sup>c</sup>	81.03 <sup>c</sup>	56.23 <sup>c</sup>	18.97 <sup>c</sup>	3.70 <sup>c</sup>	0.21 <sup>c</sup>

Table 1: Effect of finger millet flour on sensory evaluation and overall acceptability of burfi

Treatments	Parameters			
	Flavour	Body & Texture	Colour & Appearance	Overall acceptability
T <sub>1</sub>	8.43 <sup>c</sup>	8.18 <sup>c</sup>	8.43 <sup>c</sup>	8.03 <sup>c</sup>
T <sub>2</sub>	8.60 <sup>b</sup>	8.50 <sup>b</sup>	8.66 <sup>b</sup>	8.38 <sup>b</sup>
T <sub>3</sub>	8.85 <sup>a</sup>	8.76 <sup>a</sup>	8.95 <sup>a</sup>	8.89 <sup>a</sup>
T <sub>4</sub>	8.13 <sup>d</sup>	7.78 <sup>d</sup>	8.00 <sup>d</sup>	7.33 <sup>d</sup>
T <sub>5</sub>	7.70 <sup>e</sup>	7.50 <sup>e</sup>	7.33 <sup>e</sup>	6.44 <sup>e</sup>
S.E. (m) ±	0.049	0.041	0.046	0.082
C.D.	0.148	0.124	0.141	0.25
Result	Sig.	Sig.	Sig.	Sig.

### Sensory evaluation of finger millet flour burfi Flavour

The data from Table 1 showed that, the flavour of burfi was significantly affected due to addition of finger millet flour. Significantly highest score (8.85 out of 9) was received by burfi prepared with 15 parts of finger millet flour (T<sub>3</sub>). It showed that increase in level of finger millet flour, increase the flavour score of burfi up to certain limit and thereafter it decrease proportionately. Similar result was obtained by Ramteke (2018) [12], who reported that 10 per cent potato flour (T<sub>3</sub>) in burfi scored highest point 44 while 20 per cent potato flour was scored lowest point 40.25 for burfi.

### Body and texture

Data from Table 1 showed that, the significantly highest score (8.79 out of 9) was obtained by burfi prepared with 15 parts of finger millet flour.

The body and texture score of burfi in treatment T<sub>3</sub> (8.79) was superior over rest of the treatments which had soft body and smooth grained texture burfi. Likewise similar result was reported by Meshram (2014) [8] that increase in the level of air potato flour, the score for body and texture of burfi also increased (28.60 to 33.80) up to certain limit and thereafter it decreased gradually.

### Colour and appearance

The data from Table 1 showed that, the colour and appearance of the burfi was significantly affected due to addition of finger millet flour. The significantly highest score (8.95 out of 9) was obtained by burfi prepared with 15 parts of finger millet flour (T<sub>3</sub>) as compared to other treatments. Similar results were obtained by Suchita Bhosale *et al.* (2017) [17] who observed that the highest score for colour and appearance was obtained (19.30 out of 20) by the burfi prepared with 15% of bottle gourd pulp (T<sub>4</sub>) while, the lowest score was secured (15.87 out of 20) by the burfi prepared without addition of bottle gourd pulp.

### Overall acceptability

The data from Table 1 showed that, that, the burfi prepared with 15 parts of finger millet flour (T<sub>3</sub>) was highest i.e. 8.89 amongst all the treatments followed by T<sub>4</sub> (20 parts), T<sub>2</sub> (10 parts), T<sub>1</sub> (0 parts), T<sub>5</sub> (25 parts), respectively.

T <sub>4</sub>	22.98 <sup>d</sup>	15.36 <sup>d</sup>	81.58 <sup>b</sup>	58.60 <sup>b</sup>	18.43 <sup>d</sup>	3.75 <sup>d</sup>	0.20 <sup>d</sup>
T <sub>5</sub>	21.73 <sup>e</sup>	14.75 <sup>e</sup>	82.02 <sup>a</sup>	60.29 <sup>a</sup>	17.98 <sup>e</sup>	3.78 <sup>e</sup>	0.19 <sup>e</sup>
S.E. (m) ±	0.10	0.026	0.025	0.111	0.0249	0.0099	0.0016
C.D.	0.32	0.079	0.075	0.336	0.075	0.0299	0.0048
Result	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.

### Chemical composition of burfi

The finished product were subjected for the proximate analysis *viz.*, fat, protein, total solids, SNF, moisture, ash, acidity. The results obtained on account of these parameter are present in Table 2.

### Fat content

The data from Table 2 showed that, the fat content in treatment (T<sub>1</sub>) was highest (29.05%) among all the treatments. The lowest fat content (21.73%) was observed in burfi prepared with addition of 25 parts of finger millet flour (T<sub>5</sub>). Fat content in burfi was decreased as the proportion of finger millet flour in the burfi increased. Meshram (2014) [8], reported that with increase in air potato flour levels, there was proportionately decrease (18.92 to 16.22%) in the fat content of burfi, this might be due to low fat content in air potato.

### Protein content

The data from Table 2 showed that, the plain burfi (T<sub>1</sub>) prepared without addition of finger millet had lowest (14.75%) protein content in (T<sub>5</sub>) treatment. it was observed that that as the addition of finger millet flour increased, there was decreased in the protein content in the burfi. similar results were reported by Karuna Datarkar (2012) [7], she reported that with the increase in the levels of singhara flour, there was proportionately decreased (16.20 to 14.17%) in the level of protein.

### Total solids content

The data from Table 2 showed that, the significantly highest total solids were noticed in T<sub>5</sub> (82.02%). It is indicated that as the finger millet flour level increased, total solids content in burfi also increased. Karuna Datarkar (2012) [7], who reported that with the increase in singhara flour level, there was proportionately increased (85.49 to 86.09%) in the total solids content of burfi.

### Solids not fat content

The data from Table 2 showed that, the significantly highest solids not fat were noticed in T<sub>5</sub> (60.29). It is indicated that as the finger millet flour level increased, solids not fat content in burfi also increased. This was due to the higher content of solids not fat in to finger millet flour. Meshram (2014) [8], who observed that with the increase in the level of air potato flour, there was proportionately increased (66.08 to 73.58%) in the level of solids not fat content in burfi.

### Moisture content

The data from Table 2 showed that, the moisture content (20.08%) of burfi prepared without addition of finger millet flour (T<sub>1</sub>) was significantly highest than rest of the treatments. As finger millet flour level increased, moisture content in burfi decreased. This might be due to lowest moisture content of finger millet flour. More or less similar results were reported by Kapare (2017) [6] observed that with the increase in the levels of finger millet flour, there was proportionately decrease (16.84 to 15.87%) in the level of moisture content in burfi.

### Ash content

The data from Table 2 showed that, the minimum ash (3.59%) was noticed in burfi prepared without addition of finger millet flour (T<sub>1</sub>) while maximum ash (3.78%) was noticed in burfi prepared with addition of 25 parts of finger millet flour. Swati Wankhade (2005) [18] analysed the ash content of mango pulp burfi as 1.90 to 3.04 per cent.

### Acidity content

The data from Table 2 showed that, The acidity of burfi prepared without addition of finger millet flour (T<sub>1</sub>) was significantly highest than rest of the treatments. As finger millet flour level increased, acidity of burfi decreased. Swati Wankhade (2005) [18] analysed the acidity content of mango pulp burfi as 0.27 to 0.98 per cent.

### Cost configuration of burfi

The cost of burfi prepared without addition of finger millet flour (T<sub>1</sub> control) was Rs. 243.95 per kg. The average total cost of burfi prepared in the proportion of 90:10 (T<sub>2</sub>), 85:15 (T<sub>3</sub>), 80:20 (T<sub>4</sub>), and 75:25 (T<sub>5</sub>) khoa to finger millet flour were Rs. 229.95, 224.2, 215.95 and 207.7 per kg, respectively. Hence, it was noticed that addition of 15 per cent finger millet flour (T<sub>3</sub>) can produce superior quality burfi and would receive more price in market.

It may be inferred that the superior, nutritional and medicinal quality finger millet flour burfi can be prepared by addition of 15 parts of finger millet flour and 85 parts of buffalo milk khoa with 30 per cent sugar. (Costing 224.2 Rs/Kg)

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