

## Studies on quality of *Gulabjamun* prepared from cow milk blended with coconut milk

P.S. MAHALE, R.R.SHELKE, V.M. THAKRE AND S.P.NAGE

### ABSTRACT

The present investigation was undertaken to utilize valuable, nutritious biological coconut milk with cow milk for preparation of *Gulabjamun* and to obtain value added product. The blending of cow milk with coconut milk was taken in the proportion of 100:00 (T<sub>1</sub>), 90:10 (T<sub>2</sub>), 80:20 (T<sub>3</sub>), 70:30 (T<sub>4</sub>), 60:40 (T<sub>5</sub>) for *Gulabjamun* preparation. Total solid content in all the treatment was non significant, fat content increased significantly as increased the level of coconut milk blending from 10 to 40 per cent while protein content decreased significantly. The overall acceptability of *Gulabjamun* prepared from cow milk blended with coconut milk in proportion 80:20 was good quality *Gulabjamun* and for 90:10, 70:30 and 60:40 were fair quality. The cost of ingredients only was taken to indicate the cost of *Gulabjamun* production. Blending of 20 per cent coconut milk with 80 per cent cow milk was useful for manufacture of *Gulabjamun* having most acceptable quality.

**KEY WORDS** : Khoa, Coconut milk, *Gulabjamun*, Sensory

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### INTRODUCTION

*Gulabjamun* is a nationally popular khoa based sweet, originally, it was made with khoa and maida (flour). As it looked like the monsoon fruit, Jamun, and was flavoured with rose water, it got its name as *Gulabjamun*. The gourmet version of *Gulabjamun* has centre-cored honey with pistachio and cardamom seeds and is preserved in kesar (saffron) syrup. *Gulabjamun* is characterized by brown colour, smooth and spherical shape, soft and slightly spongy body free from both lumps and hard central core, uniform granular texture, mildly cooked and oily flavour, free from doughy feel and fully succulent with sugar syrup (Sharma, 2006).

The importance of milk and milk products in India is realized since vedic period. It supplies various nutrients like animal protein, vitamin A and lactose. It contains milk fat which generates nearly 2.5 times more energy than other food products. It supplies milk sugar, minerals and carotene, whose deficiency may lead to night blindness.

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Milk has been described as most ideal food which referred as Bank of nutrients.

Coconut milk has developed considerable interest in nutrition as it could be one of the possible substitute for milk at reasonable cost. It is considered very healthy in Ayurveda. Some people believe that coconut milk can be used as a laxative. Coconut milk has a medicinal and therapeutic value. It stimulates growth. It is highly digestible and found quite effective in curing gastric troubles. It is useful for feeding infants and children. It is highly energetic food and a tonic for persons suffering from diabetes, blood pressure, kidney troubles, general weakness and diseases related to malnutrition in children and pregnant women it also acts as a effective brain tonic.

#### Objectives:

– To find out the optimum level of coconut milk blended with cow milk in *Gulabjamun* preparation, to standardize the method of *Gulabjamun* preparation using coconut milk, to study sensory quality of *Gulabjamun* prepared with different levels of coconut milk and to work out the cost of *Gulabjamun* blended with coconut milk.

### MATERIALS AND METHODS

The procedure adopted for experimentation in the present study are given below :

**Materials :**

**Milk:**

Fresh, clean, whole cow milk was used for *Gulabjamun* preparation. For each trial, cow milk was obtained from Livestock Instructional Farm of Department of Animal Husbandry and Dairying, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola.

**Ingredients:**

Ingredients like sugar, maida, coconut, vegetable ghee and baking powder were purchased from the local market.

**Preparation of khoa:**

Khoa was prepared as per the standard procedure given by Rangi *et al.*(1985).

**Preparation of coconut milk:**

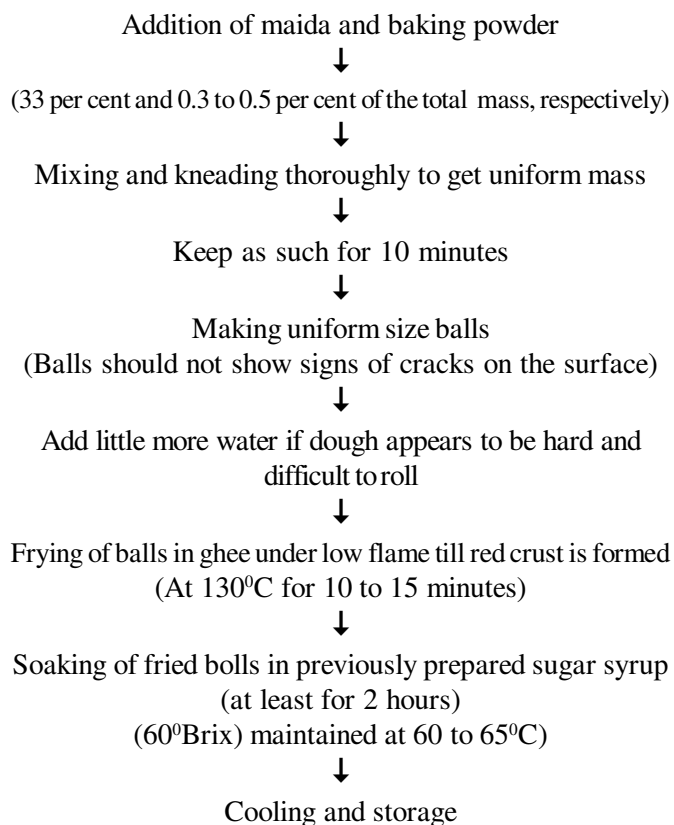
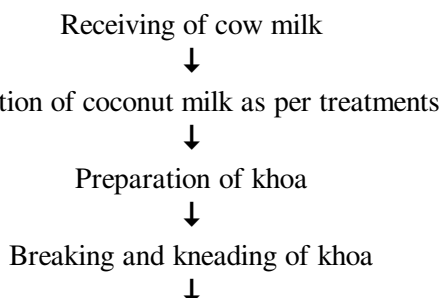
First black skin of wet coconut fruit was taken out, followed by grating of coconut. A small quantity of water was added in grated coconut and it was allowed to soak for 20 minutes. Water soaked grated coconut was blended with the help of mixer for one minute. Afterwards one cup of water was added and again it was blended into mixer for one minute. Finally the entire mixture was squeezed and was strained through the muslin cloths. The coconut milk so prepared was used in different combinations with cow milk for *Gulabjamun* preparation. For obtaining 250-300 ml coconut milk one wet coconut (480 ± 4g) was required.

**Preparation of sugar syrup:**

The syrup was prepared by dissolving sugar in water in the proportion of 1:1 and kept for boiling for 10 to 15 minutes. Any dirt or impurity that gather on the surface of the syrup during boiling were removed with ladle. The syrup was ready when sugar concentration reached 60°Brix.

**Preparation of Gulabjamun:**

*Gulabjamun* were prepared as per the procedure given by Srinivasan and Anantkrishnan (1964) with slight modifications as per flow diagram given below:



**Details of experiment:**

During the course of investigation, five treatments were studied and each treatment was observed six times. As per treatments, khoa was prepared as follows and utilized for preparation of *Gulabjamun* for further studies:

- T<sub>1</sub> – 100 per cent cow milk (control)
- T<sub>2</sub> – 90 per cent cow milk and 10 per cent coconut milk
- T<sub>3</sub> – 80 per cent cow milk and 20 per cent coconut milk
- T<sub>4</sub> – 70 per cent cow milk and 30 per cent coconut milk
- T<sub>5</sub> – 60 per cent cow milk and 40 per cent coconut milk

**Chemical analysis of Gulabjamun:**

**Total solids:**

The total solids content was determined by gravimetric method as per IS:1479 (Part II), 1961.

**Fat :**

The fat content was determined by standard Gerber method described by Chaudhari (1959) for Channa.

**Protein :**

The protein was determined by estimating the per cent nitrogen by micro Kjeldhal method as recommend in IS:1479 (Part II), 1961. The per cent nitrogen was multiplied by 6.38 to find out the protein percentage in *gulabjamun*.

**Ash :**

Ash content was determined by the method described in A.O.A.C., 1975.

**Determination of sugar syrup absorption in *Gulabjamun*:**

Sugar syrup absorption was determined by taking the difference between initial weight *i.e.* before soaking and weight after soaking at different time intervals.

**Sensory evaluation:**

Ready to eat *Gulabjamun* from different treatments was served to a panel of judges for organoleptic evaluation and scores were recorded by with nine point hedonic score cards.

**Economics:**

The cost of *Gulabjamun* production under different treatment was worked out by using prevailing market rates of ingredients.

**Statistical analysis:**

Data were statistically analyzed under completely randomized design by adopting standard method of analysis of variance (Amble, 1975).

## RESULTS AND DISCUSSION

The results obtained from the present investigation are presented below:

**Sensory evaluation of *Gulabjamun*:**

Sensory evaluation of any consumable product is the best method of judging the acceptability of the product by the consumers. The assessment was done by studying the characteristics like flavour, body and texture, colour and appearance of the product by the panel of judges by

using “ Nine Point Hedonic Scale” score card. Each sample was bearing a code number so as to avoid its identify and have impartial results. The data pertaining to sensory score for flavour, body and texture, colour and appearance at different treatments are depicted in Table 1.

**Flavour:**

The good quality *Gulabjamun* has characteristics oily and slightly cooked flavour and optimum sweetness and succulent taste. It was observed from Table 1 that, the *Gulabjamun* prepared from T<sub>3</sub> level recorded highest score for flavour (7.39) followed by T<sub>2</sub> (7.14). The sensory score increased upto T<sub>3</sub> *i.e.* 20 per cent level of coconut milk and decreased simultaneously for T<sub>4</sub> and T<sub>5</sub>. Lowest score was noticed for *Gulabjamun* prepared from 60 per cent cow milk blended with 40 per cent coconut milk (T<sub>5</sub>). Prajapati *et al.* (1994) stated that addition of trisodium citrate improves flavour of *Gulabjamun* over control sample.

**Body and texture:**

*Gulabjamun* prepared from 80 per cent cow milk with 20 per cent coconut milk possessed soft body with spongy and porous texture, which obtained highest score (7.62). The addition of coconut milk more than 20 per cent affected the body and texture as well as porousness and sugar syrup absorption rate of the product. Agarkar *et al.* (2004) reported that the replacement of khoa by 15 per cent cassava flour prepared from fresh and soaked tubers in the *Gulabjamun* preparation showed significant improvement in texture of *Gulabjamun*.

**Colour and appearance:**

Highest colour and appearance score was obtained in treatment T<sub>3</sub> while lowest in treatment T<sub>5</sub>. *Gulabjamun* prepared from 80 per cent cow milk blended with 20 per

**Table 1 : Score for sensory evaluation of *Gulabjamun* (out of nine)**

Treatment	Proportion (CM:CCM)	Flavour	Body and texture	Colour and appearance	Overall acceptability
T <sub>1</sub>	100:00	6.89	7.10	7.08	7.02
T <sub>2</sub>	90:10	7.14*	7.25	7.30	7.23*
T <sub>3</sub>	80:20	7.39*	7.62*	7.43*	7.47*
T <sub>4</sub>	70:30	6.47	6.78	7.03	6.75
T <sub>5</sub>	60:40	6.10	6.56	6.42	6.36
'F' test	--	Sig.	Sig.	Sig.	Sig.
SE (m) ±	--	0.289	0.230	0.202	0.208
CD at 5%	--	0.860	0.685	0.599	0.619

\* indicates significance of value at p= 0.05.

cent coconut milk (T<sub>3</sub>) was significantly superior over T<sub>1</sub>, T<sub>2</sub>, T<sub>4</sub> and T<sub>5</sub>. Similarly, treatments. T<sub>2</sub> and T<sub>3</sub>, T<sub>3</sub> and T<sub>1</sub>, T<sub>1</sub> and T<sub>5</sub>, and T<sub>5</sub> and T<sub>4</sub> were at par with each other. Agarkar *et al.* (2004) reported that replacement of khoa by 15 per cent cassava flour prepared from fresh and soaked tubers in *Gulabjamun* preparation showed significant improvement in appearance of *Gulabjamun*.

#### Overall acceptability:

From the results of overall acceptability scores, thus, indicated that *Gulabjamun* prepared from 80 per cent cow milk blended with 20 per cent coconut milk was superior. However, coconut milk @ 10 per cent can produce good quality *Gulabjamun*. Higher proportion of coconut milk (30 and 40 per cent) showed reduction in sensory quality score for *Gulabjamun*.

#### Chemical analysis, sugar syrup absorption and cost of production of *Gulabjamun* :

##### Fat:

Table 2 indicates that the mean value of fat increased significantly from T<sub>1</sub> to T<sub>5</sub>. The highest fat content (15.16 per cent) was observed in *Gulabjamun* prepared from 60 per cent cow milk with 40 per cent coconut milk (T<sub>5</sub>), whereas the lowest fat content (9.16 per cent) was observed in *Gulabjamun* prepared from cow milk without coconut milk (T<sub>1</sub>). The perusal of data from Table 2 revealed that blending with coconut milk had significantly affected the fat content of *Gulabjamun*. It was observed that blending of coconut milk increased the fat content of *Gulabjamun*. The declining trend of fat content of *Gulabjamun* can be attributed to the fact that the fat content of coconut milk is higher than

cow milk (40.00 per cent). The results of the present investigation are in accordance with the findings of Gulhati *et al.* (1992) who reported that fat content varied from 8.66 to 16.04 per cent in *Gulabjamun* prepared with different base materials.

##### Protein:

The perusal of data from Table 2 revealed that addition of coconut milk had significantly affected the protein content of *Gulabjamun*. Blending of coconut milk showed gradual decrease in protein content of *Gulabjamun*. The average protein content of *Gulabjamun* were 8.21 (T<sub>1</sub>), 6.99 (T<sub>2</sub>), 6.48 (T<sub>3</sub>), 5.97 (T<sub>4</sub>), and 5.46 (T<sub>5</sub>). The highest protein content in *Gulabjamun* (8.21 per cent) was observed in treatment (T<sub>1</sub>) *i.e.* *Gulabjamun* prepared from cow milk without coconut milk and the lowest (5.46 per cent) at 40 per cent level of coconut milk (T<sub>5</sub>). The results of the present investigation are more or less comparable with the values of protein reported by Prajapati *et al.* (1991) and Gulhati *et al.* (1992) who mentioned that protein content of *Gulabjamun* varied from 8.38 to 10.17 per cent and 9.25 to 17.81 per cent, respectively.

##### Ash :

The increase in the level of coconut milk resulted in significant decrease in ash content of *Gulabjamun*. The highest ash content (1.00 per cent) was observed in *Gulabjamun* prepared from cow milk without coconut milk (T<sub>1</sub>), whereas the lowest percentage (0.84 per cent) was observed in *Gulabjamun* prepared from 60 per cent cow milk blended with 40 per cent coconut milk (T<sub>5</sub>). The results of the present investigation can be compared very well with the findings of Prajapati *et al.* (1991), Prajapati *et al.* (1994) and Sharma (2006) who recorded the average ash content of *Gulabjamun* as 1.03-1.32 per cent 0.94-1.32 per cent and 0.9-1.0 per cent, respectively.

**Table 2 : Effect of different levels of coconut milk on chemical analysis sugar syrup absorption and cost of production of *Gulabjamun* (per cent and Rs. /kg., respectively)**

Treatments	Proportion (CM:CCM)	Chemical analysis in per cent and cost in Rs./kg.					
		Fat	Protein	Ash	Total solids	Sugar syrup absorption rate	Cost of production (Rs.perkg)
T <sub>1</sub>	100:00	9.16	8.21*	1.00*	68.31	88.94*	126.65/-
T <sub>2</sub>	90:10	10.44	6.99	0.97	68.61	84.66	144.37/-
T <sub>3</sub>	80:20	11.66	6.48	0.92	69.03	80.18	162.37/-
T <sub>4</sub>	70:30	13.38	5.97	0.88	69.41	76.18	181.93/-
T <sub>5</sub>	60:40	15.16*	5.46	0.84	69.81	73.94	202.76
'F' test	--	Sig.	Sig.	Sig.	NS	Sig.	--
SE (m) ±	--	0.292	0.192	0.022	0.377	3.504	--
CD at 5%	--	0.869	0.571	0.067	--	10.406	--

CM-cow milk, CCM-coconut milk \* indicates significance of value at p= 0.05.

**Total solids:**

Total solids content of *Gulabjamun* increased with the increase in the level of coconut milk. The maximum total solids content (69.81 per cent) was noticed in *Gulabjamun* prepared from 60 per cent cow milk and 40 per cent coconut milk *i.e.* T<sub>5</sub> where as the lowest (68.31 per cent) was recorded in *Gulabjamun* prepared from cow milk without coconut milk (T<sub>1</sub>). Bandopadhyay *et al.* (2006) reported the total solids content of *Gulabjamun* as 67.89 to 76.23 per cent.

**Sugar syrup absorption rate:**

There was significant decrease in sugar syrup absorption rate of *Gulabjamun* with the increase in the level of coconut milk. The highest sugar syrup absorption rate was observed in *Gulabjamun* prepared from cow milk without coconut milk (T<sub>1</sub>) *i.e.* control (88.94 per cent), whereas the lowest sugar syrup absorption rate was observed in *Gulabjamun* prepared from 60 per cent cow milk with 40 per cent coconut milk (T<sub>5</sub>) scoring 73.94 per cent. Spongier product holds greater amount of sugar than a less spongy one.

**Cost of production of *Gulabjamun*:**

The cost of ingredients only was taken to indicate the cost of *Gulabjamun* production. Increase in the level of coconut milk was observed to be increased in the production cost of *Gulabjamun*. The cost of *Gulabjamun* production at T<sub>1</sub>, T<sub>2</sub>, T<sub>3</sub>, T<sub>4</sub> and T<sub>5</sub> levels was Rs. 126.65, 144.37, 162.37, 181.93, and 202.76 per kg, respectively. The production cost of *Gulabjamun* of most acceptable level (T<sub>3</sub>) was Rs. 162.37 per kg.

**Conclusion:**

The most acceptable quality of *Gulabjamun* can be prepared by using 20 per cent coconut milk. Total solid content in all treatment was non significant, fat content increased significantly as increased the level of coconut milk blending from 10 to 40 per cent while protein content decreased significantly. There was significant decrease in sugar syrup absorption rate of *Gulabjamun* with the increase in the level of coconut milk. Increase in the level of coconut milk was observed to be increased in the production cost of *Gulabjamun*.

**LITERATURE CITED**

- A.O.A.C. (1975). *Official methods of analysis*, 12<sup>th</sup> Edition, Association of Official Analytical Chemists, Washington, D.C., U.S.A.
- Agarkar, B.S., Satwadhar, P.N., Pawar, V. D. and Kshirsagar, R.B.(2004). Effect of soaking on physico-chemical characteristics of cassava flour and its utilization in *Gulabjamun*. *Indian J. Nutrition & Dietetics*, **41** (11): 490—493.
- Amblae, V. N. (1975). Statistical method in Animal sciences.: 191-195.
- Bandopadhyay, Mahuva, Mukharjee, R.S., Chakraborty, Runu and Raychaudhari,U.(2006). A survey on formulations and process techniques of some special Indian traditional sweets and herbal sweets. *Indian Dairyman*, **58** (5): 23-35.
- Chaudhari, A.C. (1959). *Practical dairy science and laboratory methods*. Scientific Book Agency, CALCUTTA (India).
- Gulhati, H.B., Rathi, H.M. and Bache, C.S.(1992). Studies on qualities of *Gulabjamun*. *Indian Food Packer*, **46** (3):43.
- IS: 1479 Part-II (1961). *Method of test for dairy industry: Chemical analysis of milk*. Indian Standard Institution, MANAK BHAVAN, NEW DELHI (India).
- Prajapati, P.S., Thakar, P.N., Miyani, R. V. and Upadhyay, K.G. (1991). Influence of use of khoa prepared from concentrated milk on quality of *Gulabjamun*. *Indian J. Dairy Sci*, **44** (6): 395.
- Prajapati, P.S., Thakar, P.N. and Upadhyay, K.G. (1994). Preparation of *Gulabjamun* from buffalo milk khoa/dough incorporated with gtrisodium citrate. *Indian J. Animal Sci.* **64** (4): 411.
- Rangi, A.S., Minhas, K.S. and Sidhu, J.S.(1985). Indigenous milk product-I. Standardization of recipe for *Gulabjamun*. *J.Fd. Sci. Technol.* **22** (3): 191.
- Sharma, R. (2006). *Production, processing and quality of milk products*. International Book Distribution Company, LUCKNOW, U.P.(India).
- Srinivasan, M.R. and Anantkrishnan, C.P. (1964). Milk products of India. I.C.A.R. Publicaton, NEW DELHI (India).

