



Studies on preparation of *Gulabjamun* blended with wheat bran

M.R. NALAWADE, A.T. SHINDE, R.L. KORAKE AND N.T. LINGAYAT

ABSTRACT : The *Gulabjamun* were prepared from *Khoa* of buffalo milk blended with wheat bran in different proportion such as (T_1) 0.2 per cent wheat bran by weight of milk, (T_2) 0.4 per cent wheat bran by weight of milk, (T_3) 0.6 per cent wheat bran by weight of milk and compared with control T_0 (without wheat bran) for its acceptability. The average chemical composition of control *Gulabjamun* (T_0) and *Gulabjamun* blended with wheat bran 0.2 per cent (T_1), 0.4 per cent (T_2), 0.6 per cent (T_3) are as moisture 27.12, 27.42, 28.00 and 28.30 per cent, fat 14.89, 15.00, 15.17 and 15.37 per cent, protein 13.72, 14.00, 14.28 and 14.56 per cent, ash 2.95, 2.76, 2.55 and 2.32 per cent, fibre 0.55, 1.46, 2.32 and 3.25 per cent, carbohydrate 41.32, 40.82, 40.00 and 39.45 per cent and total solid 72.88, 72.58, 72.00 and 71.70 per cent, respectively. The sensory score for overall acceptability of control *Gulabjamun* (T_0) and *Gulabjamun* blended with wheat bran treatment T_1 , T_2 and T_3 are 8.62, 8.52, 8.43 and 8.30, respectively. *Gulabjamun* was evaluated for textural properties viz., hardness, cohesiveness, adhesiveness, springiness, gumminess and chewiness. Hardness, cohesiveness, adhesiveness, springiness, gumminess and chewiness in control T_0 was 2.157, 0.2673, 0.061, 18.391, 0.5765 and 10.602, for treatment T_1 was 2.097, 0.2767, 0.059, 16.621, 0.5802 and 9.643, for treatment T_2 was 1.968, 0.2717, 0.050, 15.037, 0.5347 and 8.040, for treatment T_3 was 1.843, 0.2553, 0.016, 16.546, 0.4705 and 7.784, respectively. Cost of production of 1 kg *Gulabjamun* (T_0) and *Gulabjamun* blended with wheat bran of treatment T_1 , T_2 and T_3 were Rs. 219.46, 218.00, 216.26 and 214.69, respectively.

KEY WORDS : *Gulabjamun*, Dietary fibre, Wheat bran, Sensory

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INTRODUCTION

India is the highest milk producing country in the world with an annual growth rate of over 5 per cent. The current milk production of India is 132.40 MT and per capita availability is 291 gm/day, whereas in Maharashtra it is 206 g/day (Anonymous, 2013).

Buffalo milk has its nutritional significance that it

contain lower cholesterol (0.65 mg/g), more protein efficiency ratio (2.74), rich source of calcium, phosphorus and iron and vit-A. Buffalo milk is preferred over cow and goat for preparation of milk products such as *Paneer*, *Basundi*, *Khoa* and *Khoa* based sweets (*Peda*, *Burfi*, *Kalakand*, *Gulabjamun* etc.) because it gives soft and uniform body with smooth, compact and homogenous texture to finished product (Sirsath *et al.*, 2013).

Gulabjamun is a popular sweet prepared in all parts of India. Like other sweets, the manufacture of *Gulabjamun* is also largely in the hands of *halwais* who adopt small-scale batch method. Thought, there is large variation in the sensory quality of *Gulabjamun*, the most liked product should be brown colour, smooth and spherical shape, soft and slightly spongy body free from both lumps

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and hard core, uniform granular texture, mildly cooked and oily flavoured free from doughy feel and fully succulent with sugar syrup (Anonymous, 2014).

Now-a-day, dietary fibre is gaining more importance in human diet due to its important role in human health. As per recommendations of US Agencies, minimum intake of 20-35 g/d of fibre is conducive for long-term good health. Most of dietary fibre consumed by people in the form of cereals, vegetables and fruits. Incorporation of plant origin material in milk or milk products, directly or indirectly adds dietary fibre in human food. So far the research on incorporation of plant and fruit origin materials in milk and milk products has been focused on value addition to improve acceptability, taste, flavour development and as thickening agent.

Wheat is most important staple food for more than 1/3rd of the world human population and it is considered as good source of protein, minerals, B-group vitamins and dietary fibre. Wheat bran is generally discarded product in the milling of the flour. The wheat bran is good source of B-complex vitamins (riboflavin, niacin and thiamine), trace minerals (Ca, K, P, Mg and Niacin) in small quantities and indigestible cellulose (Kumar *et al.*, 2011).

Wheat bran is more wholesome and nourishing than flour itself. It is an excellent laxative and its laxative effect is much more superior than those of fruits or vegetables because cellulose of later is more easily broken by bacteria in intestine. Wheat bran is used as supplement source of dietary fibre for prevention of colon diseases, gastric cancer, type 2 diabetes, constipation etc. It is also helps in easy execution of faeces due to increased peristalsis. Taking into account of nutritional values of wheat bran, the present research was conducted to prepared *Gulabjamun* with blends of different level of wheat bran.

MATERIAL AND METHODS

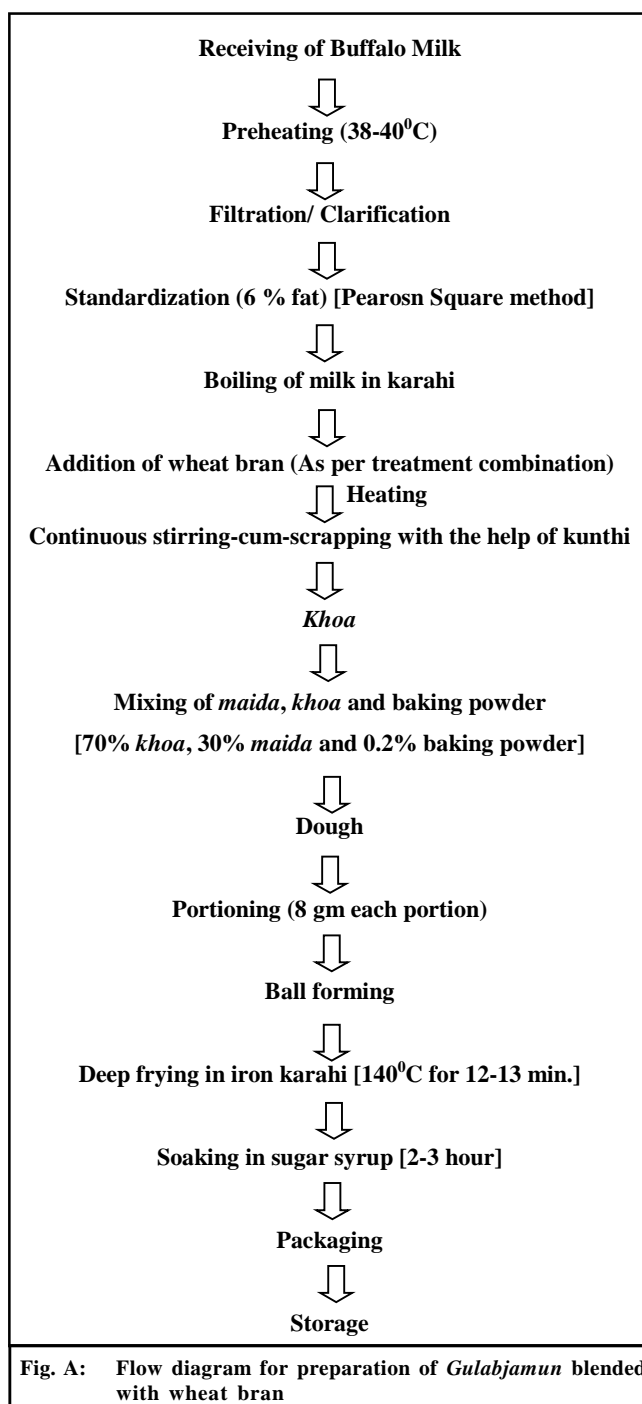
Preparation of *Gulabjamun* blended with wheat bran:

The (T₀) Control *Gulabjamun* and *Gulabjamun* blended with different level of wheat bran 0.2, 0.4, 0.6 per cent (T₁, T₂ and T₃) was prepared by adopting standard procedure described in Fig. A.

Treatment details :

- T₀ - Control - *Gulabjamun* (without wheat bran)
- T₁ - 0.2 per cent wheat bran by weight of milk

- T₂ - 0.4 per cent wheat bran by weight of milk
- T₃ - 0.6 per cent wheat bran by weight of milk



Sensory evaluation :

Sensory evaluation of control *Gulabjamun* and *Gulabjamun* with wheat bran was done by semi trained

panel five of judges using 9 point hedonic scale (Gupta, 1976). The sensory properties such as colour and appearance, flavour, body and texture, mouthfeel, sweetness and overall acceptability of control and finished product was studied.

Chemical analysis :

The *Gulabjamun* blended with wheat bran and without wheat bran (control) were chemically analysed for moisture as per procedure described by ISI: 2785 (Anonymous, 1964). Fat was estimated as per the procedure described by Aggarwal and Sharma (1961). Protein was estimated as per the procedure described in ISI: 1479 Part II (Anonymous, 1961). Ash was estimated as per the procedure described in ISI (Anonymous, 1981). Total solid was estimated as per the procedure described in ISI: 1479 Part- II (Anonymous, 1961). Carbohydrate was determined by subtraction method. The dietary fibre was estimated as per the method described in AOAC method (Anonymous, 1975).

Statistical analysis :

The experimental trials were replicated for four times and the observations obtained from all four replications were analyzed statistically by using Completely Randomized Design (CRD) as per Panse and Sukhatme (1985).

RESULTS AND DISCUSSION

The results of the present study as well as relevant discussions have been presented under following sub heads:

Proximate analysis of *Gulabjamun* blended with wheat bran :

The chemical composition of *Gulabjamun* blended with wheat bran is presented in Table 1. Moisture content

of control *Gulabjamun* T₀ (27.12 %) was significantly lower than *Gulabjamun* blended with Wheat bran T₁, T₂ and T₃ (27.42, 28.00 and 28.30 %), respectively. Moisture values in T₁, T₂ and T₃ increased significantly as the level of wheat bran increased from 0.2 to 0.6 per cent. Higher moisture content in *Gulabjamun* blended with wheat bran could be due to soaking of water by the wheat bran during *Khoa* preparation. The results are in agreement with those of Matkar (2006) and Sirsah *et al.* (2013). Fat content of control *Gulabjamun* T₀ (14.89 %) and *Gulabjamun* blended with wheat bran T₁, T₂ and T₃ were (15.00, 15.17, and 15.37 %), respectively. The treatment T₃ (15.37) had significantly higher fat per cent than T₀ (14.89) and T₁ (15.00); however, fat per cent of T₃ (15.37) and T₂ (15.17) are at par. The results showed that at higher level of fibre addition, fat content of *Gulabjamun* was increased significantly as compared to control. Significant increase in fat content of *Gulabjamun* blended with wheat bran as compared to control *Gulabjamun* was due to fat content in wheat bran (5.5 g/100g). The results are in agreement with those of Shikalgar (1996) and Mahale *et al.* (2011). Similarly, protein and fibre of finished product increased from 13.72 to 14.56 and 0.55 to 3.25, respectively. Also ash, carbohydrate and total solid of finished product decreased from 2.95 to 2.32, 41.32 to 39.45 and 72.88 to 71.70, respectively. The decrease in ash and total solid content in *Gulabjamun* blended with wheat bran is due to highest moisture values in treatment product.

Sensory evaluation :

The finished products from all the treatment combinations were served to semi trained panel of judges. The score given for various sensory parameters were statistically analysed and presented in Table 2. Overall acceptability score of control *Gulabjamun* (T₀) scored highest (8.62) followed by T₁, T₂ and T₃, (8.52, 8.43 and

Table 1 : Chemical composition of *Gulabjamun* blended with wheat bran (%)

Treatments	Constituents (%)						
	Moisture	Fat	Protein	Ash	Fibre	Carbohydrate	Total solid
T ₀	27.12 ^d	14.89 ^c	13.72 ^d	2.95 ^a	0.55 ^d	41.32 ^a	72.88 ^a
T ₁	27.42 ^c	15.00 ^{bc}	14.00 ^c	2.76 ^b	1.46 ^c	40.82 ^b	72.58 ^b
T ₂	28.00 ^b	15.17 ^{ab}	14.28 ^b	2.55 ^c	2.32 ^b	40.00 ^c	72.00 ^c
T ₃	28.30 ^a	15.37 ^a	14.56 ^a	2.32 ^d	3.25 ^a	39.45 ^d	71.70 ^d
S.E. _±	0.045	0.067	0.034	0.041	0.029	0.113	0.045
C.D. (P=0.05)	0.136	0.203	0.103	0.123	0.087	0.339	0.136

Values with different superscript are significantly differed at P< 0.05

8.30), respectively. However, overall acceptability score of control treatment T₀ (8.62) was significantly higher than T₃ (8.30) and at par with T₁ (8.52) and T₂ (8.43). The result were comparable to those of Patil (2002) who reported overall acceptability score ranged as 7.96 to 8.23 for formulation of *Gulabjamun* prepared from goat milk. Dewani and Jayprakash (2002) who reported overall acceptability score for *Gulabjamun* ranged as 6.50 to 8.16. Thaware (2011) reported the score for overall acceptability ranged as 7.58 to 8.24 for prepared *Gulabjamun* blended with potato powder as substitute of *Maida*.

Textural properties :

The textural profile of *Gulabjamun* (Table 3) revealed that there were wide range (1.843-2.157) in hardness values in *Gulabjamun* blended with 0.2, 0.4 and 0.6 per cent wheat bran. The highest value of hardness was observed in control *Gulabjamun*, whereas lowest hardness value in *Gulabjamun* prepared with 0.6 per cent wheat bran. This indicates that addition of wheat bran reduces the hardness of *Gulabjamun*. The highest hardness value in control *Gulabjamun* might be due to higher content of *Khoa*. The results are in accordance with those of Yawale and Rao (2012). The superior results

Table 2 : Sensory evaluation of *Gulabjamun* blended with wheat bran

Treatments	Replication					
	Flavour	Colour and appearance	Body and texture	Mouthfeel	Sweetness	Overall acceptability
T ₀	8.57 ^a	8.70 ^a	8.80 ^a	8.70 ^a	8.42 ^c	8.62 ^a
T ₁	8.56 ^{ab}	8.69 ^{ab}	8.60 ^a	8.40 ^{ab}	8.43 ^{bc}	8.52 ^a
T ₂	8.55 ^{bc}	8.68 ^{bc}	8.00 ^b	8.10 ^b	8.45 ^{ab}	8.43
T ₃	8.54 ^c	8.67 ^c	7.60 ^c	7.50 ^c	8.47 ^a	8.30
S.E. _±	0.005	0.005	0.077	0.103	0.007	0.105
C.D. (P=0.05)	0.015	0.015	0.231	0.309	0.021	0.316

Values with different superscript are significantly differed at P< 0.05

Table 3 : Textural properties of *Gulabjamun* blended with wheat bran

Treatments	Hardness (kg)	Cohesiveness	Adhesiveness	Springiness (mm)	Gumminess	Chewiness
	H	A2/A1	A3	D1	H x A2/A1	(H x A2/A1) x D1
T ₀	2.157	0.2673	0.061	18.391	0.5765	10.602
T ₁	2.097	0.2767	0.059	16.621	0.5802	9.643
T ₂	1.968	0.2717	0.050	15.037	0.5347	8.040
T ₃	1.843	0.2553	0.016	16.546	0.4705	7.784

Table 4 : Cost structure of *Gulabjamun* blended with wheat bran

Sr. No.	Particulars	Rate (Rs.)	T ₀		T ₁		T ₂		T ₃	
			Qty.	Amount (Rs.)	Qty.	Amount (Rs.)	Qty.	Amount (Rs.)	Qty.	Amount (Rs.)
1.	Buffalo milk (lit)	44/lit	4	176.00	4	176.00	4	176.00	4	176.00
2.	<i>Khoa</i> obtained (kg)	--	1	--	1.010	--	1.022	--	1.033	--
3.	Sugar (kg)	35/kg	1	35.00	1	35.00	1	35.00	1	35.00
4.	Wheat bran (g)	10/kg	--	--	8	0.08	16	0.16	24	0.24
5.	Maida (g)	28/kg	430	12.00	430	12.00	430	12.00	430	12.00
6.	Dalda (Vegetable oil) (kg)	90/kg	0.250	22.50	0.250	22.50	0.250	22.50	0.250	22.50
7.	Baking powder (g)	480/kg	3	1.50	3	1.50	3	1.50	3	1.50
8.	Miscellaneous- depreciation @ 10% of electricity, utensils etc. in Rs.	--	--	15.00	--	15.00	--	15.00	--	15.00
9.	Fuel charges	--	--	15.00	--	15.00	--	15.00	--	15.00
10.	Labour charges	150/8hr	--	37.50	--	37.50	--	37.50	--	37.50
11.	Total expenditure (Rs.)			314.50		314.58		314.66		314.74
12.	Total <i>Gulabjamun</i> prepared (kg)		1.433		1.443		1.455		1.466	
13.	Cost of production per kg			219.46		218.00		216.26		214.69

in terms of cohesiveness were observed in *Gulabjamun* blended with 0.2 per cent wheat bran than rest of the treatments. The results are comparable with those of Adhikari (1993) who reported cohesiveness values of laboratory and market *Gulabjamun* as 0.35 and 0.39, respectively. The adhesiveness values were highest for *Gulabjamun* without blend of wheat bran and lowest for *Gulabjamun* prepared with 0.6 per cent wheat bran. The springiness values were observed in wide range among treatments groups. However, *Gulabjamun* without blend of wheat bran showed highest score for springiness compared to *Gulabjamun* blended with 0.2, 0.4 and 0.6 per cent wheat bran. The addition of wheat bran significantly affected the chewiness of *Gulabjamun*. Among all treatments, *Gulabjamun* blended with 0.6 per cent wheat bran showed lowest chewiness while highest values of chewiness were observed in case of control *Gulabjamun*.

Cost of production :

The Table 4 revealed that cost of production of control *Gulabjamun* (T_0) and *Gulabjamun* blended with wheat bran (0.2, 0.4 and 0.6 %) in T_1 , T_2 and T_3 , were Rs. 219.46, 218.00, 216.26 and 214.69, respectively. The cost of production per kg of control *Gulabjamun* (T_0) is high (Rs. 219.46) and low cost per kg *Gulabjamun* blended with wheat bran observed in treatment T_3 (Rs. 214.69). There is significant decrease in the cost of production in T_1 , T_2 and T_3 is due to slightly higher yield and low price of wheat bran. It can be concluded that we can prepare good quality *Gulabjamun* by addition of wheat bran (0.2 to 0.6 %)

Conclusion :

Thus, it can be concluded that wheat bran could be successfully incorporated in *Gulabjamun* up to 0.6 per cent without adversely affecting the sensory as well as nutritional quality of finished product.

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