PJN
ISSN 1680-5194

PAKISTAN JOURNAL OF NUTRITION

ANSInet
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Pakistan Journal of Nutrition 2 (5): 296-299, 2003

Comparison of Rasogolla Made from Fresh Cow Milk, Fresh Buffalo Milk and Mixture of Cow and Buffalo Milk

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Abstracts: Three types of rasogolla were prepared from cow milk chhana and buffalo milk chhana named as A (100% cow milk chhana). B (100% buffalo milk chhana) and C (50% cow + 50% buffalo milk chhana). Quality of those was evaluated by physical and chemical tests. Rasogolla made from cow milk chhana gained the highest organoleptic score. In addition the addition of 50% buffalo milk chhana with 50% Cow milk chhana Produced rasogolla nearly similar to A type rasogolla.

Key words: Rasogolla, chhana, cow milk and buffalo milk

Introduction

Rasogolla is the most important pleasant and charming foods to most of the people of the country. In Eid, Puja, birthday, marriage ceremony and in any party or any kind of entertainment either in domestic or national level, rasogolla are used as one of the famed and demandable items. It is very nutritious for accounts of its fairly high protein, fat, minerals specially calcium and phosphorus and also fat-soluble vitamins particularity vitamin A and D. Despite and Datto (1993) defined rasogolla as the most popular Indian sweetmeats that are valued for its characteristics texture. It is also a common milk products in India (Varadaraj and Ranganathan, 1984)

In most cases Rasogolla is made from cow milk. But the production of cow milk is not satisfactory, especially in the month from July to November due to seasonal effect and the production goes to minimum level. The scarcity of milk hampers the production of sweet meat as well as rasogolla production, which contribute in the rise of prices. So if buffalo milk, which is available in some local market could be used in the preparation of sweet meat specially rasogolla. The pressure or supply of fresh cow milk for the consumption of children of the country would be reduced.

In India nearly half of the milk processed by the organized dairies come from buffaloes (Aneja, 1990). In Bangladesh Buffalo milk is one of the most important sources of milk. Total milk Production of the country from cattle and Buffalo were 78,230 and 24,000 MT respectively (FAO, 1997).

Although buffalo milk is an excellent source of protein and fat, but no effort has been made to utilize buffalo milk for preparation of rasogolla. Hence the present study was undertaken to monitor the quality of Rosogolla made from Buffalo milk to evaluate the feasibility of replacing cow milk with buffalo milk for manufacturing rasogolla.

Materials and Methods

The Experiment was conducted at the Bangladesh Agricultural University, Mymensingh, Bangladesh. Rasogolla was prepared from different proportional mixture of cow milk chhana and Buffalo milk chhana by using traditional method.

Preparation of Rasogolla: During each trial 1200 g cow milk 1200g buffalo milk and 1200g of mixed milk (50% cow and 50% Buffalo milk) was used to prepare chhana for rasogolla separately. The diagram of rasogolla manufacture is given below:

Flow Diagram for the preparation of Rasogolla

Milk
↓
Heated to boiling temperature
↓
Cooling to 70 °C
↓
Coagulating with sour whey at 70 °C
↓
Stay for few minutes for complete coagulation of Chhana
↓
Draining whey through muslin cloth
↓
Channa (Coagulum)
↓
Grinding, Kneading and cutting in to small pieces
↓
Kneading of Chhana with flour of subsequent preparation into ball
↓
Preparing and boiling of sugar syrup
↓

Clarification of sugar syrup
↓
Dropping of Chhana balls (13-15) in the boiling syrup
↓
Cooking for 10-15 minutes (during cooking sprinkling of cold water)
↓
Swelling of Chhana balls after 10-15 minutes
↓
The color was changed after 10-15 minutes
↓
After 30 minutes ready for consumption

Three kinds of rasogolla were prepared from three types of chhana such as A (from cow milk), B (From Buffalo milk), and C (From a mixture of cow and Buffalo milk). The following ingredients were used for preparation of rasogolla. For A type rasogolla: cow milk chhana-240g, sugar-1000g, flour-17g and water-1500g. For B type rasogolla: buffalo milk chhana-280g, sugar-1166.7g, flour-20g and water-1800g. For C type rasogolla: chhana-260g, sugar-1083g, flour-18.5g and water-1600g.

Organoleptic examination: a panel of experiment Judges from the prepared rasogolla sample using a scorecard judged the organoleptic properties such as flavor, body and texture, color and appearance and taste.

Chemical Analysis: All rasogolla samples were chemically analyzed in the Laboratory. The parameters measured in the laboratory were pH and percentage of moisture, total solids, protein, fat, carbohydrate, ash and acidity.

Design of experiment: The data of this experiment were analyzed using completely randomized design (CRD) as per MSTAT statistical program. The difference among sample means was compared by calculating LSD value (Gomez and Gomez, 1984).

Results and Discussions

Results on various parameters of different types of rasogolla are discussed below:

Physical parameters: It was shown in Table 1.

Flavor score: No significant difference was found in respect of flavor score of different rasogolla samples although the score was slightly higher for A type rasogolla followed by type B and C. Flavor score in type A and C are closely related but in type B was slightly decreased. The results indicate that addition of buffalo milk chhana slightly decrease the flavor score, on the other hand Bhattacharya and Des Raj (1980b) observed that flavor of rasogolla were highly affected with the increase of cooking time.

Body and texture: Highest body and texture score was found for A type rasogolla followed by type B and C, but no significant difference among those types were found. De and Ray (1954) observed that the chhana produced from cow milk had a soft body and smooth texture, more suitable for rasogolla preparation than buffalo milk chhana, which has coarse and granular body. It is evident that body and texture decrease in rasogolla with increased level of buffalo milk chhana. For this reason A type rasogolla was comparatively better than B type rasogolla and C type was closely related to type A.

Color and Appearance: It was not differed among 3 types of rasogolla statistically though it was little high in type A. The variation in color and appearance were probably due to using of some cooking syrup for each type of rasogolla. From Table 1, it was found that A type rasogolla had a slightly higher white color and round shape than B type rasogolla and C type rasogolla was very close to A type rasogolla.

Taste: There was no significant difference among the taste score of different types of rasogolla though A type shows slightly better score.

Overall score: Table 1 showed that A type rasogolla had the highest organoleptic score and the lowest was in B. But C is near about to type A. Although there was little difference among 3 types of samples, but all types of sample were accepted by the panelists and the statistical difference within overall score of different sample were not significant. Kanwall *et al.* (1980) reported that the overall organoleptic score of buffalo rasogolla were 80, 76, 86 and 84% respectively for color appearance texture, smell and tastes.

Chemical parameters: The different rasogolla samples were analyzed for their moisture, total solids, protein, fat, carbohydrate, ash, acidity and pH content. The results were presented in Table 2.

Moisture: Table 2 showed that the moisture content among 3 different types of rasogolla differ significantly ($P<0.01$). The maximum moisture contents was observed in sample A and minimum in B. Bhattacharya and Des Raj (1980a) agreed with it who reported that acceptable quality rasogolla contain 49.85 to 53.80% moisture. These differences might be due difference in level of fat in these 3 types of rasogolla.

Total solids: Significant difference ($P<0.01$) was found among the total solids contents of different types of rasogolla. Type B rasogolla had the highest total solids

Table 1: Comparison of organoleptic characteristics of different types of rasogolla

Source of variation	Types of rasogolla			Level of significance
	A	B	C	
Flavor score (45)	38.89± 0.92	37.22± 3.59	38.06±1.63	NS
Body and texture (30)	25.42±1.94	24.78±1.95	25.17±1.48	NS
Color and Appearance (15)	13.06±0.92	11.97±1.32	12.75±0.58	NS
Taste score (10)	8.11±1.02	7.72±1.51	7.78±0.63	NS
Overall Score (100)	85.48±4.8	81.69±8.37	83.76±4.32	

NS = Non significant; A = Rasogolla made from 100% cow milk chhana; B = Rasogolla made from 100% buffalo milk chhana; C = Rasogolla made from 50% cow milk chhana +50 buffalo milk chhana.

Table 2: Comparison of average chemical composition of different types of rasogolla samples

Chemical parameters	Types of rasogolla			Level of significance
	A	B	C	
Moisture (%)	54.86^{a}± 1.05	41.80^{c}± 0.30	48.55^{b}± 0.69	**
Total solids (%)	45.08^{c}± 0.96	58.20^{a}± 0.30	51.45^{b}± 0.69	**
Protein (%)	5.05^{b}± 0.12	5.58^{a}± 0.25	5.27^{ab}± 0.15	*
Fat (%)	4.90^{c}± 0.10	7.90^{a}± 0.10	6.38^{b}± 0.30	**
Carbohydrate (%)	34.35^{c}± 0.88	43.83^{a}± 0.26	38.94^{b}±0.61	**
Ash (%)	0.84± 0.04	0.91±0.01	0.86±0.03	NS
Acidity (%)	0.75±0.03	0.70±0.02	0.71±0.01	NS
pH	6.60^{ab}± 1.0	6.73^{a}± 0.06	6.50^{b}± 0.10	

*** = Significant at 1% level; * = Significant at 5% level; NS = Non significant; A= Rasogolla made from 100% cow milk chhana; B = Rasogolla made from 100% buffalo milk chhana; C = Rasogolla made from 50% cow milk chhana.

content and A had the lowest. It was occurred due the variation in moisture content of rasogolla, which gradually increases with the increase of buffalo chhana in rasogolla.

Protein: Protein content of different rasogolla samples varied significantly ($P<0.05$). From Table 2 it was found that increase level of buffalo milk chhana enhanced the protein percentage of rasogolla. As per BSTI standard (1993) minimum protein content of rasogolla should be 5%. Desi *et al.* (1993) also observed that 6.7% protein remain in a better quality sponge rasogolla. So it can be said that this A, B and C types of rasogolla was suitable for consumption in respect of protein content.

Fat: There was significant difference ($p<0.01$) among the fat content of different types of rasogolla samples (Table 2) it was observed that B samples had the highest fat and A the lowest among 3. The variation of fat content in different rasogolla samples was due to addition of buffalo milk chhana because it content more fat than that of cow milk chhana. It supports the report of Bhattacharya and Raj (1980) who reported that lesser fat in chhana resulted in lesser fat in rasogolla. Desi *et al.* (9993) also reported that 5.41% fat content results a better quality rasogolla.

Carbohydrate: There was a significant difference ($P<0.01$) among the carbohydrate content of different rasogolla samples. Carbohydrate content of sample B was the highest and in sample A it was lowest (Table 2). It can be said that A type rasogolla was better that other two. Desi *et al.* (1993) reported that 35.16% carbohydrates remain in better quality sponge rasogolla that supports the current result.

Ash, Acidity and pH: Among 3 samples of rasogolla, it was found that ash and acidity did not differed significantly ($p>0.05$) except pH which differed significantly ($p<0.01$) among those 3 types of rasogolla (Table 2). So it may be said that addition of buffalo milk chhana had not effect on ash content in manufacturing rasogolla. But, in that case acidity decreased and thus pH increased. In this connection Rao *et al.* (1989) observed that chhana obtained from cow milk showed higher acidity than that of buffalo that support the current result. Kanwall *et al.* (1980) also agreed with the current result who reported that the fat content of chhana increased with increasing of pH.

From the above discussion it may be mentioned that nutritive value of buffalo milk rasogolla was better than that of cow milk.

Conclusion: Judging from the results of 3 parameters studied, it was found that rasogolla prepared from cow milk obtained highest (but not significant) organoleptic score. But in nutritional point of view, rasogolla prepared from Buffalo milk was significantly better than that from

cow milk. So it may be concluded that additional of buffalo milk with cow milk chhana may produce better quality rasogolla.

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