Haryana Vet. (Dec., 2014) **53 (2)**, 124-126

Research Article

TECHNOLOGICAL ASPECTS OF INDIGENOUS CHHANA BASED RASMALAI

S.P. SHARMA[1], C.M. KAPOOR[1], S. KHANNA[2], M. RANI[1], S. BISHNOI[1] and S.S. AHLAWAT[1]*

[1]Department of Livestock Products Technology;

[2]Department of Livestock Production and Management, College of Veterinary Sciences

Lala Lajpat Rai University of Veterinary and Animal Sciences, Hisar-125 004, India

Received: 18.09.2014; Accepted: 13.11.2014

ABSTRACT

The study was undertaken with an objective to standardize the technology of rasmalai on the basis of indigenous technology being followed locally. Semolina (at 2, 5 and 7% levels) in rasogolla part and sugar (at 1, 2 and 3% levels) in concentrated milk part were tried as additives. Nisin, potassium metabisulphite (100 ppm each) and microwave heat treatment were used as preservatives in concentrated milk part. The products were stored in a refrigerator (5±2ºC) and analyzed on 0, 5th, 10th and 15th day for their shelf life. The product made without semolina in rasogolla part and using 2% sugar in the concentrated milk part was significantly more acceptable than the control. However, preservation using all three methods. Per cent moisture content and free fatty acids increased significantly only in rasogolla part while increase in acidity of both rasogolla and concentrated milk part was insignificant. Changes in the pH during storage were not significant for rasogolla part but it significantly increased in concentrated milk part. Thiobarbituric acid values differed significantly for the treatments as well as for the storage period and the product remained highly acceptable during the storage period. It is concluded that the product was found to be chemically and microbiologically safe for consumption and the developed technology can be adopted for producing an improved rasmalai product with better shelf life.

Key words: Rasmalai, additives, preservatives, quality, shelf life

The term "Indigenous milk based sweets" refers exclusively to dairy products of a particular region or country. In India, milk based sweet meat industry is developing very fast and an estimated 50 to 55% of milk produced in India is converted into various traditional milk products (Aneja, 1997). Moreover, indigenous dairy products are a novelty segment for international dairy market, which can give Indian entrepreneurs an edge over their competitors. Producing these products hygienically and imparting them long shelf-life calls for thorough knowledge of their physico-chemical attributes (Parsad and Katre, 2002).

Rasmalai is a heat concentrated milk product containing about 60% total solids including sugar as the sweetening agent. Chhana and rabri are used as base materials for its preparation. Chhana is required for rasogolla (tikki) part and rabri (concentrated milk) is required for dipping these rasogollas before serving. It is popular in northern part of India particularly in Haryana state (Aneja, 1995).These products are still produced manually in small sector with variable quality depending upon the skill of the halwais. The current methods for manufacture of these products are primitive and based on techniques that have essentially remained unchanged over ages. Thus, it was felt desirable to standardize the technology of rasmalai preparation so that the possibilities for its large scale commercial manufacture may be explored.

*Corresponding author: ahlawatss9@gmail.com

MATERIALS AND METHODS

Fresh cow and buffalo milk was collected from the Department and processed for preparation of chhana and concentrated milk, respectively. Laboratory scale product was developed to standardize the technology of rasmalai with some modifications (using additives and preservatives) on the basis of indigenous technology being followed in Hisar city (control). Semolina (at 2, 5 and 7% levels) in rasogolla part and sugar (at 1, 2 and 3% levels) in concentrated milk part were tried as additives. Nisin (100 ppm; T_1), potassium metabisulphite (100 ppm; T_2) and microwave heat treatment at 800 watt for 2.5 min (T_3) were used as preservatives in concentrated milk part. The products (T_1, T_2 and T_3) along with market sample (control) of rasmalai were stored in a refrigerator (5±2ºC) and analyzed on 0, 5th, 10th and 15th day for their shelf life. For the preparation of chhana, cow milk was standardized to 4.0% fat and

8.5% solid non fat (SNF). The buffalo milk was standardized to 6.0% fat and 9.0% SNF for the preparation of rabri.

The samples of rasagolla and concentrated milk were analyzed separately for their moisture content (AOAC, 1995), acidity (BIS, 1989), pH, thiobarbituric acid (TBA) value (Witte *et al*., 1970) and free fatty acids (Koniecko, 1979). Sensory evaluation (9-point hedonic scale) of rasmalai was carried out by selected panel of six judges. The data generated was analyzed using simple Complete Randomized Block Design (CRD) and two factor factorial CRD (Sheoran and Pannu, 1999).

RESULTS AND DISCUSSION

Sensory scores of control samples were the highest followed by the addition of 2 and 5% semolina in chhana part (Table 1). Hence, incorporation of semolina was not recommended for preparation of chhana. Sensory panelists recorded excellent scores for sweetness on addition of 2% sugar in concentrated milk part followed by the addition of 1%, market samples (control) and 3% levels. These results are in accordance with the suggestions of Soni *et al*. (1980).

Moisture content of the rasogolla portion during storage did not differ significantly within the treatments and was significantly lower on 5th day of storage (Table 2). Moisture content of concentrated milk part was not affected by either treatment or storage period. Bhattachraya and Desraj (1980) also obtained better quality rasogolla when moisture content of chhana was between 50 to 60%. Rasogolla part in T_1 treatment had significantly higher pH than control at day 0 (Table 3). The storage period did not affect it. Concentrated milk part in T_1 treatment also had slightly higher pH as compared to control at 0 day. Non-significant increase in pH was observed at 5th day of storage in control and T_2 while T_1 and T_3 treatments showed a significant increase as compared to 0 day. Ghosh and Chakraborthy (1979) also reported the similar results.

Rasogolla part of T_2 treatment showed significantly higher TBA value as compared to control, T_1 and T_3 treatments on days 0 and 5 and it increased till 15th day of storage (Table 3) as compared to day 0. Mean TBA values of concentrated milk part revealed that T_1 treatment had the lowest TBA value till day 10. The TBA values significantly increased in all the treated and control samples with storage period. These findings are in line with the reports of Tiwari and Grewal (1999).

The acidity and free fatty acids of rasmalai ranged from 0.216 to 0.237 (% lactic acid) and 0.127 to 0.169 (% oleic acid), respectively. Neither treatments nor storage period showed any significant effect on acidity and free fatty acids of rasogolla as well as concentrated milk portion of rasmalai. These findings are in agreement with Suresh (1989) and Khokhar (1989). Colour and appearance sensory scores of the rasmalai samples in T_1 treatment were significantly lower as compared to the other treatments (Table 3). Judges liked it very much as well as it was not affected significantly by the storage period. Furthermore, body and textures sensory scores in T_2 treatment were the lowest as compared to other treatments. However, the control sample was rated as excellent. All the rasmalai samples were liked very

Table 1
Standardization of semolina and sugar level in rasmalai

Treatments (%)	Colour	Body and texture	Flavour	Overall acceptability
		Semolina in rasogolla part		
Control	8.75^c±0.33	8.80^c±0.08	8.75^c±0.33	8.83^c±0.03
2	7.50^b±0.10	7.80^b±0.10	7.80^b±0.10	7.70^b±0.10
5	6.75^a±0.03	6.50^a±0.03	6.50^a±0.03	6.53^a±0.03
7	ND	ND	ND	ND
		Sugar in concentrated milk part		
Control	8.50^b±0.33	8.25^b±0.08	8.00^b±0.33	8.25^b±0.25
1	8.70^c±0.10	8.50^c±0.10	8.50^b±0.23	8.60^c±0.33
2	8.75^c±0.30	8.75^c±0.03	9.00^c±0.03	8.85^d±0.10
3	7.75^a±0.03	7.70^a±0.20	7.50^a±0.10	7.70^a±0.03

Mean±SE with different superscripts column wise within the treatment differ significantly (P<0.05)

Table 2
Moisture content of the rasmalai during refrigeration (5±2°C) storage

Days	Treatment			
	Control	T_1	T_2	T_3
		Rasogolla part		
0	57.10^b±0.13	56.74^b±0.33	57.33^b±0.33	57.32^b±0.33
5	56.60^a±0.23	56.19^a±0.33	56.57^a±0.33	56.63^a±0.32
10	56.76^a±0.11	56.52^a±0.33	56.23^a±0.33	56.18^a±0.30
15	56.58^a±0.30	56.46^a±0.33	56.21^a±0.33	56.98^a±0.29
		Concentrated milk part		
0	62.01^a±0.23	61.36^a±0.30	62.08^a±0.29	61.61^a±0.17
5	61.55^a±0.30	61.66^a±0.32	62.20^a±0.31	60.71^a±0.20
10	61.58^a±0.32	61.37^a±0.24	61.82^a±0.28	62.05^a±0.34
15	62.01^a±0.21	61.66^a±0.18	61.76^a±0.27	61.79^a±0.19

Mean±SE with different superscripts column wise differ significantly (P<0.05). n=6; T_1=Nisin; T_2=Potassium metabisulphite; T_3=Microwave

Table 3
pH, TBA value and sensory evaluation scores of the rasmalai during refrigeration (5±2°C) storage

Parameter	Days	Treatment			
		Control	T_1	T_2	T_3
pH		Rasogolla part			
	0	6.48^{a}±0.13	6.56^{bc}±0.13	6.52^{ab}±0.13	6.60^{c}±0.13
	5	6.48^{a}±0.13	6.53^{ab}±0.13	6.46^{a}±0.13	6.56^{b}±0.13
	10	6.46^{a}±0.13	6.50^{ab}±0.13	6.46^{a}±0.13	6.56^{b}±0.13
	15	6.50^{a}±0.13	6.54^{ab}±0.13	6.50^{a}±0.13	6.57^{b}±0.13
		Concentrated milk part			
	0	6.50^{a}±0.13	6.53^{a}±0.13	6.50^{a}±0.13	6.60^{bB}±0.13
	5	6.53^{ab}±0.13	6.56^{b}±0.13	6.52^{ab}±0.13	6.72^{cC}±0.13
	10	6.47^{a}±0.13	6.50^{ab}±0.13	6.46^{a}±0.13	6.54^{bAB}±0.13
	15	6.46^{a}±0.13	6.50^{a}±0.13	6.46^{a}±0.13	6.52^{abA}±0.13
TBA value		Rasogolla part			
	0	2.85^{bA}±0.15	2.73^{aA}±0.13	3.08^{cA}±0.12	2.92^{bA}±0.15
	5	2.86^{aA}±0.11	$.89^{aAB}$±0.15	3.15^{bAB}±0.11	2.95^{aA}±0.14
	10	3.17^{bB}±0.12	3.00^{aB}±0.12	3.25^{bBC}±0.14	2.95^{aA}±0.11
	15	3.28^{aB}±0.14	3.31^{aC}±0.13	3.36^{aC}±0.13	3.40^{aB}±0.10
		Concentrated milk part			
	0	3.02^{bA}±0.08	2.89^{aA}±0.10	3.09^{bA}±0.07	3.02^{bA}±0.10
	5	3.08^{abA}±0.09	3.02^{aB}±0.04	3.21^{cB}±0.05	3.12^{bB}±0.06
	10	3.31^{bB}±0.11	3.16^{aC}±0.11	3.32^{bC}±0.09	3.31^{bC}±0.07
	15	3.45^{aC}±0.6	3.56^{bD}±0.06	3.48^{aD}±0.08	3.70^{bD}±0.05
Sensory score		Colour and appearance			
	0	8.66^{b}±0.32	8.23^{a}±0.22	8.58^{b}±0.11	8.72^{b}±0.22
	5	8.66^{b}±0.11	8.33^{a}±0.12	8.54^{b}±0.33	8.72^{b}±0.12
	10	8.80^{c}±0.12	8.26^{a}±0.22	8.50^{b}±0.32	8.75^{c}±0.15
	15	8.83^{c}±0.14	8.33^{a}±0.17	8.62^{b}±0.14	8.70^{bc}±0.17
		Body and texture			
	0	8.66^{c}±0.18	8.53^{bc}±0.14	8.25^{a}±0.08	8.35^{ab}±0.13
	5	8.90^{c}±0.09	8.40^{b}±0.17	8.00^{a}±0.07	8.46^{b}±0.20
	10	8.86^{c}±0.10	8.16^{a}±0.13	8.00^{a}±0.13	8.43^{b}±0.21
	15	8.96^{c}±0.08	8.43^{b}±0.23	8.25^{a}±0.09	8.46^{b}±0.12
		Flavour			
	0	8.80^{c}±0.21	8.33^{a}±0.23	8.43^{ab}±0.14	8.58^{b}±0.18
	5	8.80^{c}±0.16	8.31^{a}±0.15	8.33^{a}±0.27	8.55^{b}±0.16
	10	8.80^{b}±0.14	8.27^{a}±0.21	8.33^{a}±0.14	8.35^{a}±0.09
	15	8.90^{b}±0.16	8.26^{a}±0.11	8.44^{a}±0.19	8.45^{a}±0.08
		Overall acceptability			
	0	8.62^{b}±0.13	8.42^{a}±0.11	8.40^{a}±0.18	8.51^{ab}±0.10
	5	8.66^{c}±0.10	8.36^{b}±0.14	8.10^{a}±0.07	8.60^{c}±0.13
	10	8.90^{c}±0.12	8.32^{b}±0.19	7.97^{a}±0.06	8.49^{b}±0.14
	15	8.93^{b}±0.11	8.36^{a}±0.10	8.32^{a}±0.17	8.49^{a}±0.09

Mean±SE with different small letters superscripts row wise and capital letters column wise within the product differ significantly ($P<0.05$). T_1=Nisin; T_2=Potassium metabisulphite; T_3=Microwave

much by the judges for their body and texture with no difference in the body and texture of stored samples. Control samples showed significantly higher flavor scores followed by T_3, T_2 and T_1 treatments. It has been reported that the storage period did not show any significant effect on flavor of rasmalai samples (Ghosh and Chakraborthy, 1979). It was observed that control samples had significantly higher overall acceptability followed by T_3, T_1 and T_2 treatments and storage period did not affect overall acceptability upto 15 days of storage.

The rasogolla part made without semolina and using 2% sugar in the concentrated milk part of rasmalai product was highly acceptable than the market samples. Nisin, potassium metabisulphite and microwave heat treatments were found to be useful preservatives in concentrated milk part. The product was found to be chemically safe and organoleptically acceptable for consumption upto 15 days of storage and the developed technology can be adopted for producing an improved rasmalai product with better shelf life.

REFERENCES

AOAC. (1995). Official Methods of Analysis. (16th edn.). Association of Official Analytical Chemists. Washington, D.C.

Aneja, R.P. (1995). The Technology of Traditional Milk Products in India, Dairying in India. 26th Dairy Industry Conference, Vigyan Bhawan, New Delhi, India.

Aneja, R.P. (1997). Traditional Dairy Delicacies: A Compendium in Dairy India. (15th edn.).

Bhattacharya, D.C. and Desraj (1980). Studies on the production of rasogolla. Part I: Traditional method. *Indian J. Dairy Sci.* **33:** 237-243.

BIS. (1989). Hand book of Food Analysis, Part XI, Dairy Products. Bureau of Indian Standards. Manak Bhawan, New Delhi.

Ghosh, B. and Chakraborthy, S.C. (1979). Prevention of growing in canned rasogollas by added sulphur dioxide. *Indian Food Packer* **33:** 49.

Khokhar, S. (1989). Standardization of method of production of rabri. M.Sc. thesis, CCSHAU, Hisar.

Koniecko, E.S. (1979). Hand book of Meat Chemistry. Avery Publishing Group. Inc., Wayne, New Jersey.

Parsad, S.R. and Katre, S.C. (2002). House hold applications of dairy technology. *Indian Dairyman* **54(3):** 43-48.

Sheoran, O.P. and Pannu, R.S. (1999). Package for Agriculture Research Work. College of Agriculture, CCSHAU, Hisar.

Soni, K., Bandhopadyay, A.K. and Ganguly, N.C. (1980). Manufacture of *rasogolla* from buffalo milk. *Indian J. Dairy Sci.* **33:** 357-365.

Suresh, K. (1989). Standardization of method of production of rasgolla. M.Sc. thesis, CCSHAU, Hisar.

Tiwari, R.P. and Grewal, J.S. (1999). Studies on the effect of preservatives on the keeping quality of rasmalai. *J. Food Sci. Technol.* **36(1):** 84-87.

Witte, V.C., Krauce, G.F. and Bailey, M.E. (1970). A new extraction method for determining TBA values of pork and beef during storage. *J. Food Sci.* **35:** 582-585.