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Shelf Life and Storage Studies on the Sensory Attributes of Dietetic Herbal *Rasmalai*

Ambili M.V., Dinker Singh, Rajakumar S.N., Beena R,L., Rejeesh R., Ligimol James, Rashmi K.G., Divya K.B.

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ABSTRACT

Rasmalai is a tradional *chhana* based dairy dessert. The present investigation was carried out to study the changes occur during storage of dietetic herbal *Rasmalai.* Sensorial quality of dietary fiber enriched dietetic herbal *Rasmalai* was analyzed at ambient (32 ± 1^0C) and refrigerated storage (5 ± 1^0C). The sensory quality of the product was expressed for flavor, color and appearance, body and texture, sweetness and overall acceptability scores. Sensory studies at ambient temperature revealed that there was significant ($p<0.05$) difference between control and herbal *Rasmalai* with regard to the sensory parameters flavour, body and texture and overall acceptability while other parameters showed non-significant ($p>0.05$) difference. Sensory score was reduced during the progression of storage period and the deterioration was rapid for the samples stored at ambient temperature. Herbal *Rasmalai* had a shelf life of 1 days at room temperature and 7 days at refrigerated storage

Keywords Dietary fiber, Dietetic, Shelf life, Reduced calorie, Herbal *Rasmalai.*

Ambili M.V.[1], Dinker Singh[2]*, Rajakumar S.N.[3], Divya K.B.[8]
[2,8]Assistant Professor, [3]Dean and Head,
Dept of Dairy Technology, Verghese Kurien Institute of Dairy and Food Technology, Mannuthy, Thrissur680651, India

Beena R.L.[4],
[4]Assistant Professor,
Dept of Dept of Dairy Technology, College of Dairy Science and Technology,Trivandrum 695551, India

Rejeesh R[5], Ligimol James[6]
[5,6]Assistant Professor, Dept of Dairy Microbiology,
[5]College of Dairy Science and Technology, Trivandrum 695551
[6]Verghese Kurien Institute of Dairy and Food Technology, Mannuthy, Thrissur 680651, India

Rashmi KG[7]
[7]Dairy Extension Officer (on Deputation to KVASU), Dept of Dept of Dairy Technology, Verghese Kurien Institute of Dairy and Food Technology, Mannuthy, Thrissur 680651, India

Email : dinkersingh@kvasu.ac.in
*Corresponding author

INTRODUCTION

According to National Dairy Development Board (NDDB), India stands first in world milk production with 198.44 Million Tonnes for the year 2019-20. At present around 150 varieties of milk based sweet meats are available in the country and have become an inevitable part of socio-cultural life of India (Bandyopadhyay and Khamrui 2007). The importance of traditional dairy sweets are underlined by the fact that about 50% of India's milk production is utilized for making these products such as *Khoa* based sweets, concentrated dairy products, *Paneer*, ghee, *Malai, Dahi, Chhana* and *Chhana* based sweets like *Rasagolla, Rasmalai, Sandesh, Chhana podo.* (Aneja *et al.* 1990, Bandyopadhyay and Khamrui 2007, Singh *et al.* 2009).

Rasmalai is a *chhana* based dairy dessert served by dipping in the sweetened concentrated milk and in chilled condition. It is a very delicate, spongy and chewy sweet that has a delectable taste (Aneja *et al.* 1990, Sharma 2004). Sharma *et al*. (2011) described *Rasmalai* as sugary white, cream or yellow colored balls of cheese soaked in *Malai* (clotted cream) flavoured with cardamom. Food Safety and Standards Regulation (2020) made guidance note on the shelf life of the product that to be kept in refrigerator and consumed within 2 days from the date of manufacturing.

Now, health conscious consumers in India prefers the functional foods and one of the major trends in India's food market is the addition of herbs/herbal extract and novel functional ingredients into traditional dairy products through up-gradation of technology (Gawande *et al*. 2012).

In view of the above, an attempt was made to study the changes taken place during storage at ambient (32±1^{0}C) and refrigerated storage (5±1^{0}C) on the sensory quality of the fiber enriched herbal *Rasmalai* for flavor, color and appearance, body and texture, sweetness and overall acceptability scores. The change in sensory quality of experimental *Rasmalai* was due to fortification of *Tulasi* extract, *Ashwagandha* root powder, isabgol and sucralose in experimental *Rasmalai*.

MATERIALS AND METHODS

Cow milk and buffalo milk as the base material for *Rasmalai* was procured from Kerala Veterinary and Animal Sciences University Dairy plant, Thrissur. *Tulasi* leaves, *Ashwagandha* root powder and isabgol were purchased from Earth Expo Company, Bhavnagar, Gujarat. Cane sugar in the sweetened concentrated milk was completely replaced with sucralose which was procured from Sha Narendra & Sons,Vyasarpadi, Chennai. Sugar, citric acid, nuts and baking powder used for the preparation were procured from the local market Thrissur, Kerala.

Manufacturing of fiber incorporated herbal *Rasmalai*

Fiber incorporated herbal *Rasmalai* was prepared according to the methods given by Sharma *et al.* (2014) with minor modifications.

Sensory studies of fiber incorporated dietetic herbal *Rasmalai*

Sensory evaluation was performed by a panel of 5 trained judges from the Department of Dairy Technology, VKIDFT, Thrissur (India). Samples were placed in closed containers, coded with three-digit random numbers. Each panellist assessed three samples for each treatment;necessary training was imparted to avoid any biasing during the evaluation of the sample. Sensory evaluation was done at 25^{o}C and 60 % relative humidity. Hedonic rating (9-point scale; 1 = dislike extremely, 9 = like extremely) was used for color and appearance, flavor, body and texture, sweetness and overall acceptability.

Statistical analysis

For storage studies, repeated measures ANOVA and independent t-test was done for comparing between the samples in each period. Data obtained from the sensory analysis was statistically analyzed using Friedman's test for followed by Wilcoxon Signed Rank test (SPSS vs 22.0). Each experiment was conducted in three replications.

RESULTS AND DISCUSSION

Tables 1-2 indicates the changes in sensorial quality of herbal *Rasmalai* during storage at ambient (32±1^{0}C) and refrigerated storage (5±1^{0}C), respectively. The sensory quality of the product is expressed as the scores obtained for the sensory parameters viz., flavor, color and appearance, body and texture, sweetness and overall acceptability. Sensory studies at ambient temperature revealed that there was significant difference between control and herbal *Rasmalai* with regard to the sensory parameters flavor ($p<0.05$) and body and texture ($p<0.05$). This observation followed the similar pattern of the sensorial analysis of the control and herbal *Rasmalai.*

The refrigerated storage (Table 2) (5±1^{0}C) was found to have sifgnificant difference ($p<0.05$) on the flavor scores of control as well as herbal *Rasmalai*

Table 1. Effect of storage on sensory quality of fiber incorporated reduced calorie herbal *Rasmalai* at ambient temperature (32 ± 1°C).

Sample	Days of storage	
	0th day	1st day
Flavor		
Control	8.43±0.21	Spoiled
Herbal *Rasmalai*	7.71±0.11	Spoiled
Mann Whitney U	0.50*	
Color and Appearance		
Control	8.28±0.11	Spoiled
Herbal *Rasmalai*	8.26±0.10	Spoiled
Mann Whitney U	7.5ns	
Body and Texture		
Control	8.31±0.07	Spoiled
Herbal *Rasmalai*	7.38±0.07	Spoiled
Mann Whitney U	0.00*	
Sweetness		
Control	8.56±0.12	Spoiled
Herbal *Rasmalai*	8.07±0.13	Spoiled
Mann Whitney U	5.00ns	
Overall Acceptability		
Control	8.18±0.12	Spoiled
Herbal *Rasmalai*	8.07±0.13	Spoiled
Mann Whitney U	6.5ns	

Figures are the Mean ± Standard error of six replications, *significant at five per cent level($p<0.05$), **significant at one per cent level ($p<0.01$), ns- non significant ($p\geq0.05$).

The mean flavor score of control varied from 8.31 to 7.37 and that of herbal *Rasmalai* from 7.31 to 6.35. The decrease in flavor score may be due to the increased acidity and rancidity of the product. Rai and Rai (2018) reported that *Shrikhand* added with *Tulasi* extract exhibited an increase in flavor score up to 15 days during the refrigerated storage and the declined gradually. David (2015) prepared Shrikhand by the addition of *Tulasi* extract and reported that flavor scores are increased on extract addition. Positive effect on flavor by the addition of *Ashwagandha* root powder in the development of flavored milk was reported by Dhole *et al.* (2022). In a study conducted for the Development of *Rasogolla* by incorporating Isabgol powder flavor scores are found to be decreasing on the addition of isabgol (Suryawanshi 2020) which was contradictory to our observations.

The change in the color and appearance score of control was non significant during the storage (5±1^{0}C) where as significant in the case of herbal *Rasmalai* ($p<0.01$). The mean sensory sore for colour and appearance varied from 8.18 to 6.15 with chi square value 13.74. It was also found to be significantly different from the control from 4th day of storage. The decreased score of the color and appearance may be imparted by the weak body of the herbal *Rasmalai,* which starts disintegration on increased storage. Rai and Rai (2018) reported that color and appearance scores of *Tulasi* extract incorporated *Shrikhand* on refrigerated stoage increased till 15th day and reduced thereafter which is in contradiction to our findings. Kumar *et al.* (2013) in the development of herbal ice-cream by addition of *Tulasi* extract reported a similar trend that addition of *Tulasi* extract increased the color and appearance score of the product.

Body and texture score of control in refrigerated storage (5±1^{0}C) was found to be gradually decreased from 8.37 to 7.58 and that of herbal *Rasmalai* indicated a rapid decline in the sore from 7.32 to 5.87. Significant difference ($p<0.01$) was observed between the control and herbal *Rasmalai* on every day. The decreased body and texture score in the product may be due to the presence of *Tulasi* extract and isabgol, which increased the moisture content of the product and resulted in a weak body on storage. Our observations are in agreement with report given by Rai and Rai (2018) who explained that he significant reduction in body and texture score was observed with advancement of storage period of *Tulasi* extract added *Shrikhand.* Trivedi *et al.* (2014) prepared herbal ice cream by the addition of 6% *Tulasi* juice and found that addition of *Tulasi* had a negative impact on body and texture of ice cream which was contradictory to our observations. Indu and Awasthi (2018) reported that addition of *Ashwagandha* root powder in the cereal legume based *Ladoo* decreased the body and texture scores of the product, which was in conflict with our observation.

During the refrigerated storage the sweetness score of the control declined from 8.31 to 8.16 and that of herbal *Rasmalai* from 8.31 to 8.26. The change in sweetness during the storage was found to be non significant. The decrease in score of sweetness was reported by Kumar *et al.* (2013) in the development of herbal ice-cream by addition of *Tulasi* extract, this result was also in contradiction with our observations.

Table 2. Effect of storage on sensory quality of fiber incorporated reduced calorie herbal *Rasmalai* at refrigerated temperature (5 ± 1°C).

Sample	Days of storage					
	0th day	2nd day	4th day	6th day	8th day	Chi square
Flavor						
Control	8.31±0.12[a]	8.25±0.10[ab]	8.12±0.08[ab]	7.37±0.16[b]	Spoiled	9.541*
Herbal *Rasmalai*	7.31±0.12[a]	7.02±0.18[ab]	6.72±0.11[ab]	6.35±0.12[b]	Spoiled	10.680*
Mann Whitney U	0.00*	0.00*	0.00*	0.00*		
Colur and Appearance						
Control	8.31±0.12	8.18±0.12	8±0.10	7.8±0.12	Spoiled	7.030[ns]
Herbal *Rasmalai*	8.18±0.12[a]	7.87±0.07[ab]	7.07±0.18[ab]	6.15±0.06[b]	Spoiled	13.74**
Mann Whitney U	5.50[ns]	2.00[ns]	0.00*	0.00*		
Body and Texture						
Control	8.37±0.07[a]	8.18±0.12[ab]	7.93±0.06[ab]	7.58±0.06[b]	Spoiled	1.174**
Herbal *Rasmalai*	7.32±0.06[a]	6.76±0.10[ab]	6.33±0.10[ab]	5.87±0.07[b]	Spoiled	13.930**
Mann Whitney U	0.00*	0.00*	0.00*	0.00*		
Sweetness						
Control	8.31±0.12	8.18±0.12	8.2±0.12	8.16±0.06	Spoiled	1.174[ns]
Herbal *Rasmalai*	8.31±0.12	8.18±0.12	8.07±0.13	8.26±0.10	Spoiled	1.954[ns]
Mann Whitney U	8.00[ns]	8.00[ns]	5.5[ns]	5.5[ns]		
Overall Acceptability						
Control	8.43±0.06[a]	8.32±0.06[a]	8.08±0.06[ab]	7.58±0.06[b]	Spoiled	12.669**
Herbal *Rasmalai*	8.18±0.12[a]	7.68±0.12[ab]	7.15±0.06[ab]	6.5±0.10[a]	Spoiled	13.930**
Mann Whitney U	3.00[ns]	0.00*	0.00*	0.00*		

Figures are the Mean ± Standard error of six replications, *significant at five per cent level ($p<0.05$), **significant at one per cent level ($p<0.01$), ns- non significant ($p\geq0.05$).

Overall acceptability score of the sensory parameter for the control *Rasmalai* varied significantly ($p<0.01$) from 8.43 to 7.58 and that of herbal *Rasmalai* from 8.18 to 6.5. From the second day of storage the control and herbal *Rasmalai* indicated a significant difference. The difference in overall acceptability may be due to the significant decline in the body and texture score of herbal *Rasmalai.* Husain and David (2018) prepared herbal *Sandesh* by the incorporation of 2% *Tulasi* extract and 2% *Ashwagandha* root powder and reported that interaction of these two factors had a positive effect on the overall acceptability score of the product, which was contradictory to our observations. The study conducted by Suryawanshi *et al.* (2020) described that addition of Isabgol to *Rasogolla* reduced the overall acceptability score of the product this observation was also contradictory to our findings.

CONCLUSION

It was concluded from present investigation that there was significant ($p<0.05$) difference between control and herbal *Rasmalai* with regard to the sensory parameters flavor, body and texture and overall acceptability while other parameters showed non-significant ($p>0.05$) difference. Sensory score was reduced during the progression of storage period and the deterioration was rapid for the samples stored at ambient temperature as compared with refrigeration temperature. Herbal *Rasmalai* had a shelf life of 1 days at room temperature and 7 days at refrigerated storage.

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REFERENCES

Aneja RP, Mathur BN, Chandan RC, Banerjee AK, Gupta PR (1990) Technology of Indian Milk Products (Dairy India Publication, New Delhi, India). Section 3.4 Fat Rich Dairy Products, pp 187.

Bandyopadhyay P, Khamrui K (2007) Technological advancement on traditional Indian desiccated and heat-acid coagulated dairy products. *Bulletin-Intl Dairy Federation,* pp 415.

David J (2015) Preparation of herbal shrikhand prepared with basil (*Ocimum basilicum*) extract. *The Pharma Innov J* 4 (8, Part B): 81-84.

Dhole RR, Undratwad DT, Khadse PN, Meshram TA (2022) Studies on sensory evaluation and cost structure of low fat flavored milk incorporated with ashwagandha (*Withania somnifera)* root powder. *The Pharma Innov J* 11 (8): 950-954.

FSSAI (Food Safety and Standards Authority of India (2020).The Food Safety and Standards Act, pp 32.

Gawande H, Shendurse A, Dhotre A (2012) Low calorie traditional milk sweets in India A review. *Ind Food Industry* 31(2): 43-51.

Husain SA, David J (2018) Studies on sensory attributes of Herbal Sandesh by incorporation of Ashwagandha (*Withania somnifera*) and *Tulsi* (*Ocimum sanctum*) at room temperature. *J Pharmacog Phytochem* 7(3):2567-2571.

Indu PC, Awasthi P (2018) Development and evaluation of cereal-legume based ladoo supplemented with Ashwagandha (*Withania somnifera*). *The Pharma Innov J* 7(7): 358-362.

Kumar S, Rai DC, Singh D (2013) The functional, rheological and sensory attributes of *Tulsi* (holy basil, *Ocimum sanctum)* extract based herbal ice-cream. *The Bioscan* 8(1): 77-80.

Rai HK, Rai DC (2018) To study the shelf life of *Tulsi (Ocimum tenuiflorum)* enriched herbal Shrikhand. *The Pharma Innov* 7 (5, Part I): 611.

Sharma S (2004) Technological aspect of *Rasmalai*, an indigenous Chhana based sweet. PhD thesis. College of animal science CCS Haryana Agricultural University, pp 136.

Singh HL, Kalra KK, Singh B (2009) A study on cost and returns of indigenous dairy products in Meerut city of western Uttar Pradesh. *Prog Agric* 9 (1): 26-30.

Suryawanshi DB, Padghan P, Patil Y, Patil RA (2020) Development of Rasogolla prepared by incorporating Isabgol (Plantago Ovata) powder. *J Pharma Innov J* 9(2): 05-12.

Trivedi VB, Prajapati JP, Pinto SV, Darj IV (2014) Use of Basil (*Tulasi*) as flavoring Ingredient In the manufacture of Ice-cream. *Am Int J Scientific Res* 1(3): 47-62.