



ISSN (E): 2277-7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2023; 12(10): 1434-1438
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www.thepharmajournal.com

Received: 07-07-2023
Accepted: 16-08-2023

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Sensory quality of the Rasogolla preparing from Moringa chhana

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Abstract

The present investigation was carried out in the Department of A.H. & Dairying (Dairy Technology), C.S.A. University of Agri. & Tech. Kanpur. In this experiment cow milk and Moringa leaves extract in the ratio 500 ml milk not containing moringa leaves extract, 470 ml milk and 30 ml moringa leaves extract, 440 ml milk and 60 ml moringa leaves extract, 410 ml milk and 90 ml moringa leaves extract and 380 ml milk and 120 ml moringa leaves extract were taken for preparation of Rasogolla. Five physical attributes like - flavor, body, texture, sweetness and overall acceptability.

The study revealed that the physical quality of Rasogolla from cow milk coagulated by lactic acid with 1.5 percent and 90 ml moringa leaves extract with 25 percent sugar syrup at 0 days storage period was found better as compared to other. It was also concluded from the present investigation that the rasogolla preparing from moringa chhana can be stored successfully for 35 days without any significant deterioration at 5 °C.

Keywords: Sensory, Rasogolla, Moringa chhana, physical

Introduction

India produced 221 million tonnes of milk in 2021-22, recording an increase of percent over the previous year and Rajasthan topped the states by recording slightly more milk output than the earlier biggest producer Uttar Pradesh shows the 'Basic Animal Husbandry Statistics 2022'.

The report, released by the Animal Husbandry Ministry, shows that Rajasthan, Uttar Pradesh, Madhya Pradesh, Gujarat and Andhra Pradesh were the top five major milk producing states in the country while Maharashtra, Uttar Pradesh, West Bengal, Andhra Pradesh and Telangana emerged as the top five meat producing states in 2021-22.

The report is the primary source of data on production estimates of four major livestock products like milk, egg, meat and wool for the year 2021-22. In terms of meat, the country produced 9.29 million tonnes with an annual growth rate of 5.6%. Poultry meat contributed to more than half (51%) of the total meat output in the country followed by buffalo (17%) and goat (14%).

Chhana is a product obtained from cow or buffalo milk or a combination there of by precipitation with sour milk, lactic acid or citric acid. It should contain not more than 70% moisture, and its milk fat content should not be less than 50% on the dry matter basis [total solids]. According to Prevention of food Adulteration rules, (1976).

“Skim milk chhana or skim milk paneer is the product obtained from cow or buffalo skim milk by precipitation with sour milk, lactic acid or citric acid. It should not contain more than 70% moisture. The milk fat content of the product should not exceed 13.0% of dry matter basis”. (ISI specification, 1962) [4].

Rasogolla known as king of Bengal sweets. Product was developed by Nobin Chandra Das in 1868. Production is largely confined to cottage and small scale industry. K.C. Das used to be a brand name for rasogolla in past.

Rasogolla resembles ping- pong ball in shape, snow white color and possesses a slightly chew body and juicy and smooth texture. Rasogolla balls are stored and served in sugar syrup. The latest from the house of K.C. Das is the Nolen gur-flavoured rasogolla with a faint tint of pink, popular during month when Khajur Gur is available.

All parts of the Moringa tree can be used in a variety of ways. Moringa is full of nutrients and vitamins. It helps to clean dirty water. Leaves are low in fats & carbohydrates and rich in minerals, iron & Vitamin B. The seed powder can be used as a quick and sample method for

cleaning dirty river water, because powdered Moringa seeds, when added to murk water, acts as coagulant, binding to the bacteria and silt at bottom of the vessel (Makkar and Becker, 2005) [3].

The dry leaves of Moringa oleifera have 4 times more Calcium than milk, triple times the Potassium of bananas and 7 times the Vitamin C of oranges. The leaves contain 17% protein which is just double that of milk and it is a good source of vitamin B and contain two to four times more beta carotene found in carrots. The content of iron is very good (Khalsa, 2005) [2].

The Moringa oleifera is a widespread multipurpose tree to have nutritional, therapeutic and prophylactic properties with several industrial application. Moringa oleifera leaf (MOL) is a good source of protein, antioxidant and minerals, making it a suitable functional ingredient for improving nutritional and organoleptic properties of food products. Moringa oleifera dried leaves were used in manufacture of soft white chesses with different ratios (1, 2 & 3%). (Hassan, 2017) [5] Moringa oleifera Lam (Moringaceae) is a plant with high nutritional and medicinal value. The leaves are rich in minerals like calcium, potassium, iron etc and vitamins like β -carotene, Ascorbic acid, proteins, flavonoids, phenolic components and other essential phytochemicals (Reddy *et al.* 2020) [6]

The traditional method of chhana production is batch wise, manual, labor intensive, unhygienic and time consuming. Several studies were conducted for mechanization of various steps in chhana and chhana based sweets production. The first to conduct a systematic investigation standardized method of manufacturing of Chhana suitable for preparation of quality sweet. They reported that to obtain a quality product, optimum conditions were (i) Acid strength of the coagulant between 1-2 percent citric acid and lactic acid, (ii) pH of coagulation 5.4. (De and Ray 1954) [1].

Materials and Methods

Cow milk was obtained from dairy of the Department of Animal Husbandry and Dairying situated at Kanpur Campus for entire experimentation. Rasogolla preparing technique was standardized on the basis of various parameters under study and final product was subjected for the evaluation by sensory qualities.

Preparation of Chhana

Procedure for Chhana preparation

The method of Chhana preparation was followed by Kundu and De (1992), with the following modifications. Received 2.5-liter cow milk and divided into five different quantity (500 g, 470 g, 440 g, 410 g and 380 g) after preheating (40 °C) and filtration. cow milk was heated in the coagulation vessel (Stainless steel) using gas stove during heating, slow stirring was maintained to avoid burning and prevent skin formation. On boiling, the vessel with boiled milk was removed. Chhana was prepared under laboratory conditions by adding different amount of Moringa oleifera leaves extract 30 ml, 60 ml, 90 ml and 120 ml in 470 ml, 440 ml, 410- and 380-ml cow milk respectively at 60 °C temperature. The milk was then heated at 70 °C and then 1.5 percent lactic acid coagulant solution was added on top of milk with ladle which was stirring till coagulation look place and Chhana was collected in lumps. Acid coagulation was affected within one minute. The method of stirring of Chhana adopted was that mixture Chhana whey was transferred over a piece of muslin

cloth, held over an empty vessel and then four corners of the cloth were gathered and tied together and immersed in running water to cool for 1 minute, after this Chhana was hanged for 20 to 25 minutes to drain out Chhana whey from Chhana solids.

Procedure for Rasogolla Preparation

Preparation of cooking medium

The cooking medium of 10% of sucrose was prepared for cooking of Rasogolla and classified by boiling with a few ml. of milk (skim) for 2-3 times and three levels of sugar syrup (20, 25, 30 percent) in water was also prepared separately for final soaking of Rasogolla.

Preparation of Chhana balls

Chhana was ground in a mixer and then kneaded by hand to make soft and smooth dough. Chhana dough was then cut into small pieces of about revolving between the palms.

Preparation of Rasogolla

About 2 liters of freshly classified sugar syrup was brought to boil in a karahi heated by gas stove. Chhana balls were gently dropped into the boiling syrup after a few seconds. Foam was formed which covered the floating balls. Every 5 minutes about 50-60 ml. hot water was added to the karahi to compensate for the evaporated water and the balls were gently stirred with a perforated ladle. After a required time (20 min) heated was stopped and the Rasogolla were transferred into the classified hot preservative sugar syrup. After cooling the room temperature, entire product was stored in refrigerator at 5 °C.

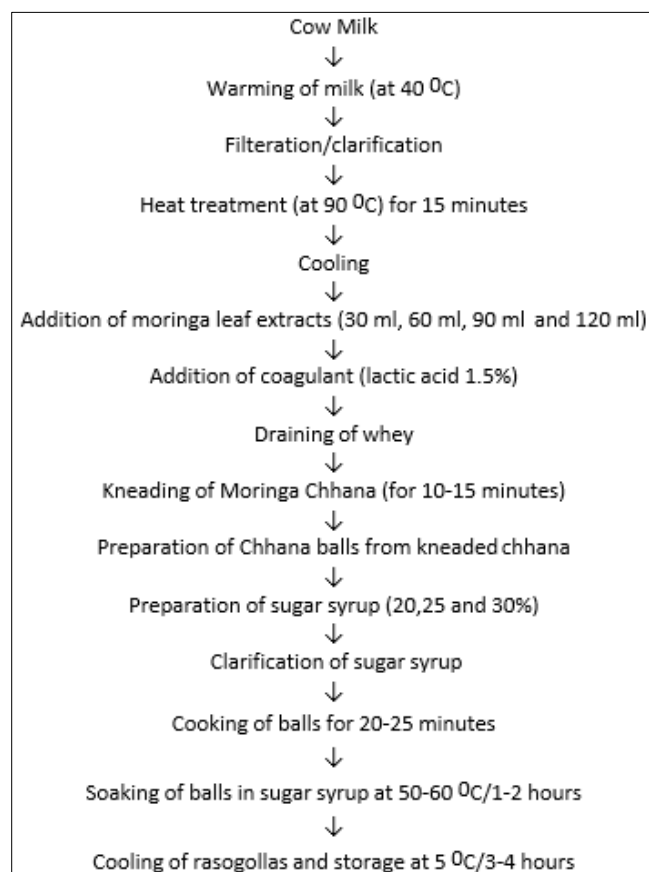


Fig 1: Flow diagram for preparation of Rasogolla from Moringa Chhana

Results and Discussion

Sensory evaluation of Rasogolla preparing from Moringa Chhana was done on the basis of organoleptic tests by a panel of Five judges of Department of Animal Husbandry and Dairying, Chanadra Shekhar Azad University of Agriculture and Technology Kanpur.

The judges evaluated the sample taking in the consideration of flavour, body and texture, color and appearance, sweetness, over all acceptability of rasogolla preparing from moringa chhana. The point hedonic scale was used for sensory evolution of product. The result and discussion of the present investigation have been summarized in the following appropriate heads.

Flavour

- The main effect of different levels of all the factors for flavour score of rasogolla from moringa chhana, the following facts were observed. The maximum significant flavor score (7.88) was found to be in A1 samples and minimum flavour score (7.60) was noticed in A2 samples both temperature shows significant difference at 5%.
- As the main effect of moringa leaves extract level on flavour score, it was observed that maximum (7.75) flavour score was noticed in B2 samples, while minimum (6.85) flavor score was recorded in B5 samples. It shows significant difference at 5% in leaves extract.
- In case of storage periods (D), the maximum significant flavour score (7.97) in rasogolla from moringa chhana was observed in D1 samples and minimum flavour score (7.08) in D6 samples. It shows significant difference at 5% in storage periods.
- From the interaction effect of A×B, the maximum flavour score (7.98) was found to be in A1B2 combination while minimum flavour score (6.86) was noticed in A2B5 samples at 5% significant level.
- From the interaction effect, In case of A×C, the maximum flavour score (7.90) was observed in A1C3 samples and minimum flavour score (7.07) was noticed in A2C1 samples at 5% significant level.
- From the interaction effect of B×C, the maximum flavour score (8.00) was noticed in B1C3 samples, and minimum flavour score (6.85) was noticed in B5C1 samples it was significant at 5% level.
- From the interaction effect of C×D, the maximum flavor score (8.01) was recorded in C3D1 samples, while minimum in (7.07) flavour score was noticed in C1D6 samples non - significant.
- The interaction effect of different storage period of A x B x C x D of all the factors for flavor score of rasogolla from moringa chhana, the following facts was observed. The maximum flavor score (8.30) was found to be in A1B1 C3D1 followed by (8.10) flavor score was found to be in A1B3C3D1 samples. While minimum flavor score (6.30) was found to be in A2B5C1D6samples followed by (6.40) was found to be in A2B5C2D6 result shows non - significant.

Body and Texture

The main effect of different levels of all the factors for body and texture score rasogolla from moringa chhana, the following facts were observed. The maximum significant

body and texture score (7.78) was found to be in A1samples and minimum body and texture score (7.54) was noticed in A2 samples both temperature shows significant difference at 5%.

As the main effect of moringa leaves extract level on body and texture score, it was observed that maximum (7.92) body and texture score was noticed in B2 samples, while minimum (6.94) body and texture score was recorded in B5 samples. It shows significant difference at 5 percent level.

In case of storage periods (D), the maximum significant body and texture score (7.69) in rasogolla from moringa chhana was observed in D1 samples and minimum body and texture score (7.11) in D6 samples. It shows significant difference at 5% in storage periods.

From the interaction effect of A×B, the maximum body and texture score (7.92) was found to be in A1B2 combination while minimum body and texture score (6.92) was noticed in A1B5 samples at 5% significant level.

From the interaction effect, In case of A×C, the maximum body and texture score (7.62) was observed in A1C3 samples and minimum body and texture score (7.13) was noticed in A2C1 samples at 5% significant level.

From the interaction effect of B×C, the maximum body and texture score (7.95) was noticed in B2C3 samples, and minimum body and texture score (6.71) was noticed in B5C2 samples it was significant at 5% level. From the interaction effect of C×D, the maximum body and texture score (7.87) was recorded in C3D1 samples, while minimum in (7.05) body and texture score was noticed in C2D6 samples non-significant.

The interaction effect of different storage period of A x B x C x D of all the factors for body and texture score of rasogolla from moringa chhana, the following facts was observed. The maximum body and texture score (8.30) was found to be in A1B2 C3 D1 followed by (8.20) body and texture score was found to be in A1B1C3D1 samples. While minimum body and texture score (6.20) was found to be in A1B5C3D6 samples followed by (6.40) was found to be in A1B4C2D6 it shows non-significant.

Color and appearance

The main effect of different levels of all the factors for color and appearance of Rasogolla from Moringa chhana, the following facts were observed. The maximum significant color and appearance score (7.57) was found to be in A1 samples and minimum color and appearance score (6.53) was noticed in A2 samples both temperature shows significant difference at 5%.

As the main effect of moringa leaves extract level on color and appearance, it was observed that maximum (7.57) color and appearance score was noticed in B2 samples, while minimum (6.53) color and appearance score was recorded in B5 samples. It shows significant difference at 5% of Moringa leaf extract.

In case of storage periods (D), the maximum significant color and appearance score (7.39) in Rasogolla from Moringa chhana was observed in D1 samples and minimum color and appearance score (6.69) in D6 samples. It shows significant difference at 5% in storage periods.

From the interaction effect of A×B, the maximum color and appearance score (7.57) was found to be in A1B2 Combination while minimum color and appearance score

(6.53) was noticed in A2B5 samples at 5% significant level. From the interaction effect, In case of A×C, the maximum color and appearance score (7.38) was observed in A1C3 samples and minimum color and appearance score (6.75) was noticed in A2C3 samples at 5% significant level.

From the interaction effect of B×C, the maximum color and appearance score (7.70) was noticed in B2C1 samples, and minimum color and appearance score (6.45) was noticed in B5C3 samples it was significant at 5% level. From the interaction effect of C×D, the maximum color and appearance score (7.46) was recorded in C1D1 samples, while minimum in (6.84) color and appearance score was noticed in C3D6 samples it was significant at 5% level.

The interaction effect of different storage period of A x B x C x D of all the factors for color and appearance score of rasogolla from moringa chhana, the following facts were observed. The maximum color and appearance score (8.00) was found to be in A1B1 C3 D1 & A1B2C1D1 followed by (7.90) color and appearance score was found to be in A2B1C2D1 samples. While minimum color and appearance score (6.00) was found to be in A2B5C3D6 samples followed by (6.10) was found to be in A2B5C3D5 it shows non - significant.

Sweetness

The main effect of different levels of all the factors for sweetness of Rasogolla from Moringa chhana, the following facts were observed. The maximum significant sweetness (7.53) was found to be in A1 samples and minimum sweetness (7.37) was noticed in A2 samples both temperature shows significant difference at 5%.

As the main effect of moringa leaves extract sweetness, it was observed that maximum (7.53) sweetness was noticed in B2 samples, while minimum (7.09) sweetness was recorded in B5 samples. It shows significant difference at 5% of Moringa leaf extract.

In case of storage periods (D), the maximum sweetness (7.48) in Rasogolla from Moringa chhana was observed in D1 samples and minimum sweetness (7.14) in D6 samples. It shows significant difference at 5% in storage periods.

From the interaction effect of A×B, the maximum sweetness (7.53) was found to be in A1B2 combination while minimum sweetness (7.09) was noticed in A2B5 samples at 5% significant level.

From the interaction effect, In case of A×C, the maximum sweetness (7.80) was observed in A2C3 samples and minimum sweetness (6.90) was noticed in A2C1 samples at 5% significant level.

From the interaction effect of B×C, the maximum sweetness (7.90) was noticed in B1C3 samples, and minimum sweetness (6.70) was noticed in B5C1 samples it was significant at 5% level.

From the interaction effect of C×D, the maximum sweetness (7.92) was recorded in C3D1 samples, while minimum in (6.76) sweetness was noticed in C1D6 samples it was non-significant at 5% level.

The interaction effect of different storage period of A x B x C x D of all the factors for sweetness of rasogolla from moringa chhana, the following facts were observed. The maximum sweetness (8.10) was found to be in A1B2 C3 D1 followed by (8.05) sweetness was found to be in A1B1C3D1 samples. While minimum sweetness (6.60) was found to be in A2B5C1D6 samples followed by (6.70) was found to be in

A2B4C1D6 it shows non - significant.

Over all Acceptability

- The main effect of different levels of all the factors for over all acceptability of Rasogolla from Moringa chhana, the following facts were observed. The maximum significant over all acceptability (7.78) was found to be in A1 samples and minimum over all acceptability (7.54) was noticed in A2 samples both temperature shows significant difference at 5%.
- As the main effect of moringa leaves extract over all acceptability, it was observed that maximum (7.92) over all acceptability was noticed in B2 samples, while minimum (6.94) over all acceptability was recorded in B5 samples. It shows significant difference at 5% of Moringa leaf extract.
- In case of storage periods (D), the maximum over all acceptability (7.63) in Rasogolla from Moringa chhana was observed in D1 samples and minimum over all acceptability (7.11) in D6 samples. It shows significant difference at 5% in storage periods.
- From the interaction effect of A×B, the maximum over all acceptability (7.92) was found to be in A1B2 combination while minimum over all acceptability (6.94) was noticed in A2B5 samples at 5% significant level.

From the interaction effect, In case of A×C, the maximum over all acceptability (7.62) was observed in A1C3 samples and minimum over all acceptability (7.13) was noticed in A2C1 samples at 5% significant level.

- From the interaction effect of B×C, the maximum over all acceptability (7.95) was noticed in B1C3 samples, and minimum over all acceptability (6.71) was noticed in B5C2 samples it was significant at 5% level.
- Among the interaction effect of C×D, the maximum over all acceptability (7.87) was recorded in C3D1 samples, while minimum over all acceptability in (7.05) was noticed in C2D6 samples result was non significant at 5% level.
- The interaction effect of different storage period of A x B x C x D of all the factors for over all acceptability of rasogolla from moringa chhana, the following facts were observed. The maximum over all acceptability (8.30) was found to be in A1B2 C3 D1 followed by (8.20) over all acceptability was found to be in A1B1C3D1 samples. While minimum over all acceptability (6.20) was found to be in A1B5C2D6 samples followed by (6.70) was found to be in A1B5C2D5 result shows non - significant.

Conclusion

On the basis of sensory evaluation of Rasogolla prepared from moringa chhana samples prepared from cow milk by using different Moringa leaf extract levels, different levels of sugar syrup and stored at different period of storage it is concluded that an excellent quality moringa rasogolla could be prepared from cow milk using 1.5% Lactic acid and 30 ml moringa leaf extract in 470 ml of milk.

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