Development of Rasogolla prepared by incorporating Isabgol (Plantago Ovata) powder

DB Suryawanshi, Prabhakar Padghan, Yogesh Patil and RA Patil

Abstract
This study deals with the development of Rasogolla by incorporating the “Isabgol (Plantago ovata)” Powder. The Isabgol powder was incorporated at 0.5, 1.0 and 1.5 % level in the Channa (milk solid) prepared from cow milk. On the basis of results obtained through organoleptic evaluation, the mean overall score of acceptability of rasogolla for the treatments T1, T2, T3 and T4 were 8.47, 8.09, 7.56 and 6.90, respectively. Rasogolla prepared by incorporating 0.5 % isabgol powder treatment T2 was significantly superior over treatment T3 and T4 which had the highest mean score of isabgol powder added rasogolla using 0.5 per cent isabgol powder. The finished product was subjected for physico-chemical analysis. The acidity was 0.64, 0.49, 0.34 and 0.32 per cent; pH content was 6.05, 6.30, 6.37 and 6.52; fat 4.50, 4.42, 4.35 and 4.32 per cent; protein 4.80, 5.17, 5.27 and 5.39 per cent; total sugar content was 34.96, 34.90, 34.84 and 34.81 per cent; moisture 54.84, 54.54, 54.51 and 54.43 per cent; total solids content were found to be 45.16, 45.45, 45.48 and 45.56 per cent; ash per cent in isabgol rasogolla were 0.90, 0.97, 1.02 and 1.05 per cent and sugar syrup absorption was 78.73, 78.95, 79.92 and 81.00, for treatment T1, T2, T3 and T4 respectively. The textural properties of rasogolla were studied and recorded the score for hardness was found to be 2.627, 0.503, 0.358 and 0.958 g, cohesiveness was found to be 0.84, 1.51, 1.04 and 0.85, elasticity was found to be 69.74, 69.78, 69.793 and 69.79 mm, chewiness was found to be 153.89, 53.08, 26.06 and 57.17 kg per second (g/s) and gumminess of the finished product was found to be 2.20, 0.75, 0.36 and 0.81 (kg) for treatment T1, T2, T3 and T4 respectively.

Keywords: Nutraceutical Rasogolla, Isabgol (Plantago ovata)

Introduction
Dairy products have always played an important role in socio-economic life of Indians since time immemorial and among them indigenous dairy products account for over 90% of all dairy products consumed (Aneja et al. 2002) [9]. Rasogolla is a famous indigenous dairy based sweet of India and very popular particularly in West Bengal and Odisha. It is snow white in colour, possesses a spongy, chewy body and smooth texture having ping-pong ball size and shape. On all festive occasions it is widely accepted as most popular sweet and all ages of people like it. (Mohanata and Shrivastava 2016) [30]. Various types of rasogolla are available in the market viz., ordinary, sponge, canned and diabetic rasogolla, which may be further classified as small, normal and large categories depending on size of balls and ingredients used. As the time change the food habit of the people changed depend upon the present situation for examples early year the food had been developed for its nutritional and safety point of view.

Normally, cow milk is preferred for channa preparation due to it’s a soft body and smooth texture, both of which make channa suitable for preparation of high grade sweets such as rasogolla and Sandesh. In general rasogolla is prepared from soft, fresh cow milk chhana. Kneading of chhana to smooth paste is first step in rasogolla making. The smooth paste is portioned and rolled between palms to form balls of about 15mm diameter each weighing about 8–10 g in weight. Each ball should have smooth surface without visible cracks on surface. On an average, one kg chhana yields 90 – 100 rasogolla balls. These rasogolla balls are cooked in sugar syrup of approximately 50° brix. Heating is regulated to maintain stability of the balls. Balls are cooked for 14–15 min. During cooking small amount of water is continuously added to maintain syrup concentration. This makes up for the loss of water due to evaporation. After cooking rasogolla balls are transferred to dilute sugar syrup at 60 °C for texture and colour improvement. After 30 min stabilized balls are transferred to 60°brix syrup for 1-2 hours, followed by final dipping in 50° brix syrup. Sugar free rasogolla developed by using three types of coagulants viz., lactic acid, sour whey and sour defatted & deproteinized whey and four type of cooking medium such as sugar syrup 50° brix, whey syrup 50°brix,
defatted & deproteinized whey syrup 50° brix and fresh whey without sugar. The three different type of dipping medium observed i.e. sugar syrup, fresh whey having non-nutritive sweetener and defatted & deproteinized whey syrup. They utilized the sour whey as coagulant, fresh whey (without sugar) as cooking medium and fresh whey having nonnutritive sweetener as dipping medium were found suitable for sugar free rasogolla preparation (Dabur and Prakash 2005) [11].

Many innovations are developed in rasogolla and till research on it is being throughout the world. The major emphasis behind that is to develop nutritionality as well as functionality of the products. Tarafdar et al. (2002) [46] reported that the rasogolla is one of the most important pleasant and charming foods. Conducted the research work carried out to study the quality of rasogolla available in markets as M1, M2, M3, M4 and to compare them with rasogolla prepared in the laboratory as L. Overall acceptability of rasogolla was 92.80 and different market rasogolla was M1 81.56, M2 84.18, M3 83.97, M4 82.22. Then the rasogolla were judged by a panel of expert judges for organoleptic test and also analyzed for chemical qualities. Haque et al. (2003) [21] studied the three types of rasogolla which were prepared from cow milk channa and buffalo milk channa named as A (100 per cent cow milk channa), B (100 per cent buffalo milk channa) and C (50 per cent cow + 50 per cent buffalo milk channa). Qualities of those were evaluated b physical and chemical tests. Rasogolla made from cow milk channa gained the highest organoleptic score. In addition the addition of 50 per cent buffalo milk channa with 50 per cent cow milk channa produced rasogolla nearly similar to A type rasogolla. Kumar et al. (2015) [30] studied the effect of different coagulant (lactic acid, citric acid and calcium lactate) on sensory characteristics of channa and rasogolla. They observed that there was no significant difference found with respect to flavour and colour and appearances scores, as well as sweetness of rasogolla prepared with channa obtained from varying coagulants. Among different coagulants, citric acid was found best suitable for channa as well as rasogolla making.

The average composition of dietetic and diabetic rasogolla was, moisture 49.83 and 52.20 per cent, fat 4.66 and 4.46 per cent, protein 11.85 and 12.78 per cent, sucrose/sorbitol 32.41 and 29.66 per cent and ash 0.90 and 0.89 per cent, respectively (Chavan et al. 2009) [9]. The compositional analysis which showed that total solid, moisture, fat, protein, carbohydrate and ash content of market rasogolla were 75.87-83.17 per cent, 16.87-24.13 per cent, 2.56-4.13 per cent, 5.20-7.98 per cent, 63-73 per cent, 0.30-0.61 per cent respectively, whereas those in laboratory made were 73.57-79.17 per cent, 20.87-26.23 per cent, 3.15-6.13 per cent, 6.2-7.98 per cent, 61.50-65.60 per cent, 0.30-0.61 per cent respectively (Das et al. 2010) [12]. Rasogolla prepared by using different proportion of cow milk with substituting safflower milk with different combination 100:0 (T0), 70:30 (T1), 60:40 (T2) and 50:50 (T3). They recorded sensory score for rasogolla with different treatment combination viz., T15, T1, T2 and T3 were 8.84, 8.55, 8.16 and 7.46, respectively. It was revealed that rasogolla prepared from 50 parts of cow milk and 50 parts of safflower milk was acceptable and economical. On an average the rasogolla of treatment T3 contained 6.92 per cent fat, 6.70 per cent protein, 39.89 per cent sucrose, 0.96 per cent ash and 54.22 per cent total solid (Lokhande et al. 2010) [32].

Psyllium (Isabgol) is the name that is often used to describe a plant called Plantago. It is an annual species that has originated from arid and semi-arid zone and is used in traditional and industrial pharmacology. Isabgol has been used as a laxative for centuries, especially in India to treat constipation. In India the use of isabgol is as old as the Ayurveda System of Medicine. It is a high source of fiber and it acts as a bulk-forming laxative. In other words, it helps in increasing the volume of fecal matter, which stimulates a reflex contraction of the bowel walls that helps the stool to pass smoothly. Since Psyllium is known to help soften stool, it is an effective way to reduce the pain and discomfort associated with hemorrhoids. Psyllium causes a feeling of fullness, which can reduce our sensation of hunger. Short term placebo controlled studies showed that consumption of 7-10 g Psyllium /day lowers serum total cholesterol concentrations 4-11 per cent and serum LDL cholesterol concentrations 6-18 per cent below placebo control concentrations. Psyllium was shown to stimulate bile acid synthesis (7 alpha hydroxylase activity) in animal models and in humans, which leads to reduction of serum cholesterol. In a study by (Marlett et al. 2000) [34], they proposed that the unfermented gel isolated from Psyllium containing stools functions as an emollient and lubricant. Other studies suggested that the various constituents of Psyllium (such as soluble fibers, linoleic acid, and alkaloids) can help lower blood sugar levels. The bakery products are prepared from different dosage of Psyllium husk and literature suggested that replacement of Psyllium husk up to 50 per cent might be possible without detrimental change in quality and also explained the hypo-cholesterolemic worth of Psyllium considering gender and hormonal status in men and pre and postmenopausal women. In postmenopausal women, administrated Psyllium (15 g/day) for six weeks significantly lowered the total cholesterol concentration (5.2 per cent) whereas, in premenopausal women (1.3 per cent) whilst, no significant differences observed in triglycerides, apolipoprotein A1 and apolipo protein B concentration in pre and postmenopausal women. They concluded that postmenopausal woman can be benefitted from addition of Psyllium husk in their diet for reducing coronary risk (Ganjii and Kuo 2008) [16]. The high levels of soluble fiber and linoleic acid in Psyllium stimulate the production of cholesterol-lowering bile acids and reduce the amount of cholesterol absorption by the body (Garg et al. 2014) [17]. The rheological characterization of Isabgol husk, gum katira hydrocolloids and their blends. The miscibility of isabgol husk and gum katira blends in equal proportions as well as in higher concentrations of one another was found at studied thermal conditions. The blends and their components such as Isabgol husk and gum katira were found to be pseudo plastic in viscosity behavior as, on increasing the shear stress, the viscosity was decreased down (Sharma et al. 2014) [44].

Material and Methods

The present investigation was carried out at the Department of Animal Husbandry and Dairy Science, College of Agriculture, Latur, (MS). For this investigation, the material used and methods employed were as below.

Treatment Combinations

For preparation of rasogolla from cow milk channa kneading with isabgol powder following treatment combinations were finalized on weight basis as follows:
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Preparation of isabgol added chhana for rasogolla

The chhana was prepared in combination with isabgol as per method describe by De (2004) [14] with slight modification. For this purpose the isabgol was added in two stage i.e. before addition of coagulant (First condition) and after addition of coagulant and before draining of whey (Second condition), whereas the control was carryout without isabgol.

Procedure

In the investigation chhana was prepared by the traditional method from the standardized cow milk having 4% fat and 8.5% SNF as per method describe by De (2004) [14] with slight modification. During the preparation of chhana milk was boiled for two minutes on (liquid petroleum gas) stove and subsequently cooled to 70-72 °C. After that, the isabgol was added as per the treatment combination in two stage i.e. before addition of coagulant (First condition) and after addition of coagulant and before draining of whey (Second condition) through muslin cloth, every time only one condition was followed, the citric acid was added @ 1% citric acid and the mixture was stirred slowly till the appearance of clear greenish whey. Then whey was drained out through a double layer muslin cloth and left in the straining cloth for one hour for dripping out the whey. It was then manually squeezed so as to keep the moisture content between 55-65% and was weighed to get the yield value.

Preparation of rasogolla

The rasogolla was prepared by using chhana prepared in combination with isabgol as per method describe by Aneja and Mathur (2002) [5] as shown in flow diagram 2.

Chhana

Manual kneading and ball preparation of 8gm

Cooked in 55% sugar solution until the balls dipped down at the bottom of the pan

Cooled and stored under refrigeration in PET jars

Rasogolla

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Fig 1: Flow chart preparation of chhana

Fig 2: Flow chart of preparation of rasogolla
Procedure
After the preparation of soft chhana by using isabgol @ 0.5, 1.0, and 1.5 gm as per the treatments then proper kneading of chhana was done to mix isabgol powder and then prepare ball equal size of 8-10 gm approximately ball form it. The ball were cooked in 55% sugar syrup until to dipped down at the bottom of the pan with slow steaming and stored under refrigerated in pet jar having sugar syrup of 40% sugar. After soaking ball in sugar syrup for 1 hrs and then physico-chemical studied was conducted of products.

Rasogolla Samples in Sugar Syrup

Sensory Evaluation of the Product
The rasogolla was subjected to sensory evaluation by the semi expert panel of judges. It was evaluated for colour and appearance, flavour, test and mouth feel and overall acceptability. 9 point hedonic scale, developed by Quarter Master Food and Container Institute, U.S.A. (Gupta, 1976) [20] was used. The score of various treatments in respect of colour and appearance, flavour, taste and mouth feel and overall acceptability was worked out. The data were analyzed using Completely Randomized Block Design (CRBD) as per Panse and Sukhatme (1985) [38] and software developed by Sheoran et al., 1998 as Statistical Software Package for Agricultural Research Workers.

Evaluation of physico-chemical of rasogolla
Rasogolla samples of different treatments were subjected for physic-chemical analysis viz., titratable acidity, pH, fat, protein, total sugar, moisture, total solid and ash.

Titratable acidity
Titratable acidity (%) of rasogolla was determined in IS: 1479 (1960) Part-I.

\[ \text{Titratable acidity} \times \% \text{by volume} = \frac{9 \times V_1 \times N}{V_2} \]

Where,
- \( V_1 \) = Volume in ml of the standard sodium hydroxide solution required for titration.
- \( V_2 \) = Volume in ml of rasogolla taken for the test.
- \( N \) = Normality of the standard sodium hydroxide solution.

Determination of pH
The pH of rasogolla was measured by using digital pH meter at a temperature of 25 °C. Firstly the pH meter was standardized by using standard buffer solution of pH 4, 7.2 and 9. The electrode of pH meter was directly dipped into the diluted sample of rasogolla, dilution was done by using double distill water and records the reading show on the screen of pH meter.

Determination of fat
Fat content of rasogolla was determined Gerber’s method described in IS: 1224 (part II) (1977) [22].

Determination of protein
The protein content of rasogolla was determined by method described in A.O.A.C. (1965) [1].

\[
\frac{\text{Sample burette reading (ml)} - \text{Blank reading (ml)}}{\text{Weight of sample (g)}} \times 100
\]

Protein (%) = Percent nitrogen in sample x 6.38

Determination of total sugar
Total sugar content of rasogolla was determined by the volumetric (lane-Eynon) method as a described in IS: SP: 18 (Part XI) 1981 [25].

\[
\text{Sucrose} \% = \frac{20 \times W_1}{W_2} \left[ \frac{2f_2}{f_1} - \frac{f_1}{V_2} \right]
\]

Where,
- \( W_1 \) = Weight in mg of sucrose corresponding to 10 ml of Fehling’s solution
- \( W_2 \) = Weight in gm of the material taken for the determination
- \( f_1 \) = Dilution factor for solution A2 from A1
- \( f_2 \) = Dilution factor for solution B2 from B1
- \( V_1 \) = Vol. in ml of solution B2 corresponding to 10 ml of Fehling’s solution
- \( V_2 \) = Vol. in ml of solution A1 corresponding to 10 ml of Fehling’s solution

Determination of moisture
Moisture content of rasogolla was determined by the method described in IS: SP (Part XI) 1981 [25].

\[
\text{Moisture} \% \text{ (by weight)} = \frac{\text{Loss in weight of rasogolla}}{\text{Weight of rasogolla sample taken}} \times 100
\]

Determination of total solid
Total solids of rasogolla was determined by the method described in IS: SP (Part XI) 1981 [25].

\[
\text{Total solids} \% = \frac{\text{Weight of residue}}{\text{Weight of sample}} \times 100
\]

Determination of ash
The ash content of rasogolla was determined by the method described in IS: SP (Part XI) 1981 [25].

\[
\text{Total Ash} \% \text{ (by weight)} = \frac{W_1 - W}{W_2 - W} \times 100
\]

Where,
- \( W \) = weight of the empty crucible
- \( W_1 \) = weight of the crucible with ash
- \( W_2 \) = weight of the crucible with in gm

Statistical Analysis
In all four replications were carried out. The data obtained
were analyzed statistically by using completely randomized design (CRD) as per Panse and Sukhatme (1985) [38] and software developed by D.S. Hooda & R.C. Hasjja as Statistical Software Package for Agricultural Research Workers.

**Result and Discussion**

**Sensory Evaluation of Rasogolla**

The mean overall score of acceptability of rasogolla for the treatments T1, T2, T3, and T4 were 8.47, 8.09, 7.56 and 6.90, respectively. The highest overall acceptability score was observed in treatment T1 rasogolla sample i.e. T1 (8.47). The lowest overall acceptability score was found in treatment T4 (6.90). It was observed that all treatments significantly differ from each other and T2 was significantly superior over treatment T3 and T4 which had the highest mean score of isabgol powder added rasogolla using 0.5 per cent isabgol powder.

Chakraborty and Bandyopadhyay (2017) [8] studied overall acceptability score of the entire laboratory made rasogolla and market rasogolla samples were compared and revealed that the market rasogolla sample (8.2) as well as rasogolla (jyoti) (7.86) and control sample (7.86) were liked moderately by the judges, whereas rasogolla (chandramukhi) were liked very much by the judges (8.71) are agreed to this findings.

### Table 1: Sensory evaluation of Rasogolla prepared by using isabgol powder score recorded mention blow table

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Parameters</th>
<th>T1 Control</th>
<th>T2 0.5%</th>
<th>T3 1%</th>
<th>T4 1.5%</th>
<th>S.E. ±</th>
<th>C.D. at 5%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Colour and Appearance</td>
<td>8.50a</td>
<td>8.25b</td>
<td>7.75bc</td>
<td>7.00d</td>
<td>0.323</td>
<td>1.006</td>
</tr>
<tr>
<td>2</td>
<td>Flavour</td>
<td>8.62a</td>
<td>8.37bc</td>
<td>7.62c</td>
<td>7.00b</td>
<td>0.231</td>
<td>0.727</td>
</tr>
<tr>
<td>3</td>
<td>Body and Texture</td>
<td>8.50a</td>
<td>8.12bc</td>
<td>7.50c</td>
<td>6.75d</td>
<td>0.304</td>
<td>0.947</td>
</tr>
<tr>
<td>4</td>
<td>Sweetness /Mouth feel</td>
<td>8.25a</td>
<td>7.80bc</td>
<td>7.37b</td>
<td>7.00bc</td>
<td>0.255</td>
<td>0.795</td>
</tr>
<tr>
<td>5</td>
<td>Overall Acceptability</td>
<td>8.47a</td>
<td>8.09bc</td>
<td>7.56b</td>
<td>6.90d</td>
<td>0.075</td>
<td>0.233</td>
</tr>
</tbody>
</table>

The observations are the average of four replications

**Physico-chemical properties of isabgol rasogola**

In present investigation on an average acidity was recorded 0.64, 0.49, 0.34 and 0.32 per cent for treatment T1, T2, T3 and T4 respectively. The treatments T1 was found significantly differed from others. It was further observed that the highest acidity was observed in treatment T1 (0.64) which was significantly superior over the treatment T2, T3 and T4 and then decreased continuously in experimental treatment indicate that due to isabgol acidity is lower down might be due the destructions and absorption of ionic molecules by the addition of isabgol.

Recorded result similar finding with Haque et al. (2003) [21] studied comparison of rasogolla made from cow milk, buffalo milk and mixture of cow and buffalo milk and noticed that acidity of rasogolla of cow milk was 0.75%, buffalo milk rasogolla acidity 0.70% and mixture of cow and buffalo milk acidity was 0.71% and David (2015) [11] studied effect of different level of whey protein concentrate on yield and physico-chemical properties of rasogolla and observed that as Whey Protein Concentrate increased from 1.0 % to 1.5% acidity of rasogolla was decreased from 0.18 % to 0.16%. The fluctuation in acidity with other scientist, which was found than the present findings might be due to the different ingredients that the present study.

The average pH was examined 6.05, 6.30, 6.37 and 6.52 for treatment T1, T2, T3 and T4, respectively. It was further observed that the highest pH was observed in treatment T1 (6.52) and lower in treatment T4.

Similar findings were observed with Haque et al. (2003) [21]. He reported from the comparison of rasogolla made from cow milk, buffalo milk and mixture of cow and buffalo milk that pH of rasogolla of cow milk was 6.60, buffalo milk was 6.7 and mixture of cow and buffalo milk was 6.50.

The average fat content in rasogolla was found to be 4.50, 4.42, 4.35 and 4.32 per cent for treatment T1, T2, T3 and T4 respectively. The average range of fat content in rasogolla was 4.32 to 4.50 per cent. The highest fat content was recorded for treatment T1 i.e. 4.50 and the lowest fat content was recorded for treatment T4 i.e. 4.32 per cent. The control treatment recorded highest fat per cent as compared to other treatments, which reduced subsequently in isabgol added treatments. Above observations clearly indicate that, as the adding of isabgol in to the cow milk was increased, the fat content in the finished product was decreased might be due to the lower content of fat in isabgol than the milk.

The scientist worked on different aspects of rasogolla were found somewhat similar values for ash content in rasogolla studied Lokhande et al. (2010) [32] and Islam et al. (2015) [26]. The average protein content of the finished product was found to be 4.80, 5.17, 5.27 and 5.39 per cent for treatment T1, T2, T3 and T4 respectively. All four treatments were significant among each other indicate that the isabgol contributed protein contents of rasogolla in increasing order. The highest protein content was recorded for treatment T1 i.e. 5.39 per cent which decreased sequin-sly in treatment T3, T2 and T1. The lowest protein content was recorded for treatment T1 i.e. 4.80 per cent. Similar findings were observed with Garg et al. (2014) [17]. They studied development of mucilaginous sponge desert — A herbal rasogolla prepared from cow milk and noticed that protein percentage was more (13.8%) with addition of isabgol powder than control i.e. without isabgol powder (6%). The average total sugar content rasogolla were 34.96, 34.90, 34.84 and 34.81 per cent. The total sugar content was found to be highest in treatment T1 (34.96) which were significantly higher than T2, T3 and T4 respectively. The values recorded for total sugar content in the present investigation were comparable with Lokhande et al. (2010) [32] revealed the formulation of rasogolla from cow milk blended with safflower milk and noticed that as percentage of safflower milk increased from control (100% cow milk + 0% safflower milk) to 50% cow milk + 50% safflower milk, the total sugar content was decreased from 43.12 to 39.89%.

The moisture content of the product isabgol rasogolla was found to be 54.84, 54.54, 54.51 and 54.43 per cent for treatments T1, T2, T3 and T4 respectively. All treatments were not significantly differed from each other except T1. It was also observed that the moisture content was in decreasing order from treatment T1 to T4. This might be due to the increase in the proportion of isabgol. The values recorded in moisture content in the present investigation were comparable.
with Kumar and Chandra (2016) studied standardized the technology for preparation of channapodo and noticed that as the ratio buffalo milk was increased from 1:1 with cow milk to 1:3 the moisture percent was decreased from 29.030% to 27.003%.

The average total solids content of the finished product were found to be 45.16, 45.45, 45.48 and 45.56 per cent for treatment T₁, T₂, T₃ and T₄, respectively. The highest total solids content was recorded for treatment T₄ i.e. 45.56. The lowest total solids contents was recorded for treatment T₁ i.e. 45.16. It was observed from above findings that as the adding of isabgol increased the total solids content of the finished product from treatment T₂ to T₄. Control was significantly differed with the other treatments. The values recorded in total solid content in the present investigation were comparable with Haque et al. (2003). He reported from the comparison of rasogolla made from cow milk, buffalo milk and mixture of cow and buffalo milk that total solid content in rasogolla of cow milk was 45.08, buffalo milk was 58.20 and mixture of cow and buffalo milk was 51.45.

The average ash per cent in isabgol rasogolla were 0.90, 0.97, 1.02 and 1.05 per cent, respectively. All the treatments were found to be significantly differed from each other. The values recorded were found to be increasing order from treatment T₁ to T₄. This might be due to adding of isabgol in increasing level. The ash per cent was highest in T₄ samples i.e. 1.05 and lowest in control sample 0.90 percent in isabgol rasogolla.

The scientist worked on different aspects of rasogolla were found somewhat similar values for ash content in rasogolla studied by Haque et al., Chavan et al. (2009), Das et al. (2010), Lokhande et al. (2010) and Chavan et al. (2011).

Table 2: Physico-chemical properties of rasogolla prepared by using isabgol powder score recorded mention blow table

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Parameters</th>
<th>Treatments</th>
<th>T₁ Control</th>
<th>T₂ 0.5%</th>
<th>T₃ 1%</th>
<th>T₄ 1.5%</th>
<th>S.E.</th>
<th>C.D. at 5%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Acidity</td>
<td></td>
<td>0.64</td>
<td>0.49</td>
<td>0.34</td>
<td>0.32</td>
<td>0.010</td>
<td>0.030</td>
</tr>
<tr>
<td>2</td>
<td>pH</td>
<td></td>
<td>6.05</td>
<td>6.30</td>
<td>6.37</td>
<td>6.52</td>
<td>0.031</td>
<td>0.095</td>
</tr>
<tr>
<td>3</td>
<td>Fat</td>
<td></td>
<td>4.50</td>
<td>4.42</td>
<td>4.35</td>
<td>4.32</td>
<td>0.038</td>
<td>0.117</td>
</tr>
<tr>
<td>4</td>
<td>Protein</td>
<td></td>
<td>4.80</td>
<td>5.17</td>
<td>5.27</td>
<td>5.39</td>
<td>0.021</td>
<td>0.065</td>
</tr>
<tr>
<td>5</td>
<td>Total sugar</td>
<td></td>
<td>34.96</td>
<td>34.90</td>
<td>34.84</td>
<td>34.81</td>
<td>0.009</td>
<td>0.029</td>
</tr>
<tr>
<td>6</td>
<td>Moisture</td>
<td></td>
<td>54.84</td>
<td>54.54</td>
<td>54.51</td>
<td>54.43</td>
<td>0.057</td>
<td>0.177</td>
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<tr>
<td>7</td>
<td>Total solids</td>
<td></td>
<td>45.16</td>
<td>45.45</td>
<td>45.48</td>
<td>45.56</td>
<td>0.056</td>
<td>0.175</td>
</tr>
<tr>
<td>8</td>
<td>Ash</td>
<td></td>
<td>0.90</td>
<td>0.97</td>
<td>1.02</td>
<td>1.05</td>
<td>0.004</td>
<td>0.013</td>
</tr>
</tbody>
</table>

The observations are the average of four replications.

Fig 1: Sensory Evaluation of Rasogolla Prepared by Using Isabgol

Fig 1: Graph on physico-chemical analysis of rassogalla prepared by using isabgol powder.
Conclusion

In present investigation concluded that the cow milk is preferred to prepared rasogolla due to the soft structure of cow milk cassein. The rasogolla prepared by using isabgol has thirty per cent more yield as compared to the cow milk rasogolla without depleting the sensory and physico-chemical properties of original rasogolla and supplemented the health benefit effect of isabgol. This study also give hint for further study on suitability of buffalo milk for the preparation of rasogolla or other chhana based milk products by using isabgol, which might be help for softening the structure of chhana.

References


