MATERIAL AND METHODS

The experiment “Process Standardization for Preparation of Gulabjamun Mix by using Spray and Drum Dried Skim Milk” was carried out in the research Lab of Warner School of Food and Dairy Technology, Sam Higginbottom Institute of Agriculture, Technology and Sciences (Formerly Allahabad Agricultural Institute) (Deemed -to-be- University) Allahabad. Materials used in the experiment, the techniques employed in preparation of Gulabjamun mix, different test and evaluation of the product involved are described in this chapter.

The experimental Gulabjamun Mix samples were tested and statistically analyzed. The details of experimental techniques employed during the course of present investigation are described under the following heads:

2. Procurement and collection of ingredients.
3. Preparation of the treatments.
5. Testing of formulated Gulabjamun Mix.
6. Chemical analysis :
   a. Moisture.
   b. Fat.
   c. Protein.
   d. Acidity.
   e. Ash.
7. Microbial Analysis:
   a. Yeast & Mould count.
   b. SPC
8. Organoleptic Test:

The Gulabjamun samples were evaluated for flavour, body & texture, colour & appearance and overall acceptability on a 9-point Hedonic scale by a sensory panel consisting of 5 judges.


The data obtained were statistically analysed by factorial design and critical difference (CD) techniques (Imran and Coover, 1983).

**Materials Required:**

Spray and Drum dried Skim milk powder

Wheat flour (maida)

Semolina (Suji)

Vanaspati

Baking powder

Sugar

Petroleum ether

Conc. sulphuric acid

Copper sulphate

Potassium sulphate

Sodium hydroxide solution

Standard sodium hydroxide solution

Standard sulphuric acid solution

Conc. hydrochloric acid

Phenolphthalein indicator
Methods:

3.1 Procurement and collection of ingredient:

3.1.1 Spray and Drum dried Skim milk powder:

Spray and Drum dried Skim milk powder were procured from local market at Allahabad and NDRI, Karnal respectively.

3.1.2. Refined wheat flour:

Refined wheat flour was procured from local market of Allahabad.

3.1.3. Semolina (Suji):

Refined semolina was procured from local market of Allahabad.

3.1.4 Vanaspati:

Refined Vanaspati was procured from local market of Allahabad.

3.1.5. Baking powder:

Refined baking powder was procured from local market of Allahabad.

3.1.6. Sugar:

Refined cane Sugar was procured from local market of Allahabad.

3.1.7 Chemicals:

All the chemicals used in the investigation were of ‘AR’ grade.
3.2 Treatment combination:

Four different ratios of skim milk powder (spray and drum dried) and two different levels of Maida, Suji and Vanaspati were used for making Gulabjamun mix. Gulabjamun mix prepared from different treatment combinations were compared with each other.

The different treatment combinations used in the experiment are represented as follows:

3.2.1 Formulation of Gulabjamun mix: The mix was formulated from different ingredients in the following proportion:

<table>
<thead>
<tr>
<th>Ingredients</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>T&lt;sub&gt;1&lt;/sub&gt;</td>
</tr>
<tr>
<td>Skim milk powder*</td>
<td>50</td>
</tr>
<tr>
<td>Maida</td>
<td>20</td>
</tr>
<tr>
<td>Suji</td>
<td>10</td>
</tr>
<tr>
<td>Vanaspati</td>
<td>18</td>
</tr>
<tr>
<td>Baking powder</td>
<td>2</td>
</tr>
</tbody>
</table>

*Skim milk powder (Spray dried & Drum dried) were separately used during the study.
Details of treatment combination:

**ST**₁– Represent experimental Gulabjamun mix prepared from skim milk powder (spray dried), Maida, Suji, Vanaspati and Baking powder in the ratio (50:20:10:18:2).

**ST**₂– Represent experimental Gulabjamun mix prepared from skim milk powder (spray dried), Maida, Suji, Vanaspati and Baking powder in the ratio (50:22:8:18:2).

**ST**₃– Represent experimental Gulabjamun mix prepared from skim milk powder (spray dried), Maida, Suji, Vanaspati and Baking powder in the ratio (48:20:10:20:2).

**ST**₄– Represent experimental Gulabjamun mix prepared from skim milk powder (spray dried), Maida, Suji, Vanaspati and Baking powder in the ratio (48:22:8:20:2).

**ST**₅– Represent experimental Gulabjamun mix prepared from skim milk powder (spray dried), Maida, Suji, Vanaspati and Baking powder in the ratio (46:20:10:22:2).


**ST**₇– Represent experimental Gulabjamun mix prepared from skim milk powder (spray dried), Maida, Suji, Vanaspati and Baking powder in the ratio (44:20:10:24:2).

**ST**₈– Represent experimental Gulabjamun mix prepared from skim milk powder (spray dried), Maida, Suji, Vanaspati and Baking powder in the ratio (44:22:8:24:2).

**DT**₁– Represent experimental Gulabjamun mix prepared from skim milk powder (Drum dried), Maida, Suji, Vanaspati and Baking powder in the ratio (50:20:10:18:2).

**DT**₂– Represent experimental Gulabjamun mix prepared from skim milk powder (Drum dried), Maida, Suji, Vanaspati and Baking powder in the ratio (50:22:8:18:2).
DT₃– Represent experimental Gulabjamun mix prepared from skim milk powder (Drum dried), Maida, Suji, Vanaspati and Baking powder in the ratio (48:20:10:20:2).

DT₄–Represent experimental Gulabjamun mix prepared from skim milk powder (Drum dried), Maida, Suji, Vanaspati and Baking powder in the ratio (48:22:8:20:2).

DT₅–Represent experimental Gulabjamun mix prepared from skim milk powder (Drum dried), Maida, Suji, Vanaspati and Baking powder in the ratio (46:20:10:22:2).


DT₇–Represent experimental Gulabjamun mix prepared from skim milk powder (Drum dried), Maida, Suji, Vanaspati and Baking powder in the ratio (44:20:10:24:2).

DT₈–Represent experimental Gulabjamun mix prepared from skim milk powder (Drum dried), Maida, Suji, Vanaspati and Baking powder in the ratio (44:22:8:24:2).

Number of treatment : 16

Number of replication : 5

3.3 Testing of Gulabjamun mix (Spray and Drum Dried Skim Milk):

3.3.1 Determination of moisture:

The moisture content of Gulabjamun mix was determined by the method described in Manual in Dairy Chemistry (1972), ICAR.

3.3.2 Determination of fat:

The fat content of Gulabjamun mix was determined by Soxhlet Extraction method described in AOAC (1980).
3.3.3 Determination of protein:

The protein content of Gulabjamun mix was determined by Kjeldahl method described in AOAC (1980).

3.3.4 Determination of acidity:

Acidity percentage of Gulabjamun mix was determined according to the method described in ISI (1980).

3.3.5 Determination of ash:

Ash content in Gulabjamun mix was determined according to the method described in AOAC (1980).

3.4. Method of microbial analysis of Gulabjamun mix:

The microbial analysis, i.e. Yeast and mould count and SPC of Gulabjamun mix were estimated prepared from standard procedure laid down in Manual of Dairy Bacteriology, I C A R (1972).

3.5. Organoleptic evaluation of Gulabjamun prepared from Gulabjamun mix:

The products developed were subjected to sensory evaluation by a panel of five judges. The evaluation of the product was carried out prepared from the “9 point Hedonic scale” (Srilakshmi, 2008).

3.6. Determination of cost of the product:

The cost of the prepared product was calculated at the prevailing prices of raw materials purchased from the local market of Allahabad.
3.7. Statistical analysis:

The data obtained were statistically analyzed for its validity by factorial design and critical difference (C.D.) technique (Imran and Coover, 1983).
Skim milk powder
(Spray dried)

↓

Heat treatment (95 ± 50°C/45 min)

was given to denature the whey proteins thereby making the balls soft

↓

Mixing
(Maida, Suji, Vanaspati & Baking powder)

↓

Gulabjamun mix.

**Fig. 3.1 Preparation of Gulabjamun mix from spray dried skim milk**

Skim milk powder
( Drum dried)

↓

Mixing
(Maida, Suji, Vanaspati & Baking powder)

↓

Gulabjamun mix.

**Fig. 3.2 Preparation of Gulabjamun mix from Drum dried skim milk**
Gulabjamun mix

Addition of water (50 ml/100 gm of Gulabjamun mix)

Dough making

Making of balls (each of 12gm weight)

Frying of balls in rice bran oil (at 125°C/ 10 min)

Soaking of balls in sugar syrup (60% concentration at 60-70°C/ 30- 60 min)

Gulabjamun

Fig. 3.3 Production of Gulabjamun from Formulated Gulabjamun mix