Abstract  Physico-chemical, sensorial, microbial and textural quality attributes of Kheer Mohan have been characterized. It is a chhana based, traditional sweetmeat, highly popular in eastern region of Rajasthan. Five cities (Gangapur city, Kurgao, ChhotiUdai, Sapotra and Karoli) from the vicinity of the traditional manufacture region were randomly selected for this study. Initially, four samples from reputed manufacturers of each city were procured followed by popularity identification and screening of these samples through consumer's preference survey. Wide variations in the composition of the market samples were observed. Fat, protein, lactose, sucrose, ash and total solids contents of the market samples were in the range of 3.07-10.95, 5.12-10.50, 1.14-1.90, 53.75-64.53, 0.63-1.06 and 70.79-78.93%, respectively. Proximate composition of the most preferred Kheer Mohan, sold at Gangapur city, was 77.78% total solids, 10.70% fat, 10.32% protein, 1.20% lactose, 1.03% ash and 54.52% sucrose content. The observed weight and average diameter of it's single ball were 4.93 cm and 105.68 g, respectively. Average values of water activity, L*, a* and b* were 0.79, 46.77, 13.64, and 30.60, respectively. Variations in hardness, springiness, cohesiveness, gumminess, chewiness, weight and diameter of the market Kheer Mohan balls were in the range of 46.85-123.03N, 0.35-2.54mm, 13.97-32.86N, 10.04-14.12 N.mm, 59.61-108.34g and 2.34-5.02cm, respectively. Microbial analysis showed presence of total plate counts (TPC), coliform, yeast and mold counts in market sample of Kheer Mohan. Sensory attributes of highly preferred Kheer Mohan sample includes moderate to light brown colour, cooked and moderate caramelized flavour, pleasant taste with heated note. It had fairly tough, close knit, dense and chewy, non-elastic, granular body and texture with moderate sweetness and juiciness.

Keywords : Chhana, KheerMohan, Textural analysis, Descriptive Sensory Evaluation, Market survey

Introduction

Kheer Mohan is a chhana based, traditional sweetmeat highly popular in eastern region of Rajasthan. It is preferred over Rasogolla and other traditional sweetmeats among the consumers due to its distinct flavour, colour and appearance. Owing to its popularity, some sweet makers exclusively manufacture and sell it at their shops. Both production and popularity of this indigenous product is region specific. Till date, not a single scientific study has been conducted or reported particularly on characterization of this product. To, make its presence all over the country, more efforts are needed. Pre-requisite for such efforts is product characterization through suitable techniques like survey works, earlier reported by several workers to characterize traditional products such as Dodaburfi (Chawla et al., 2011), Thabdi (Patel et al., 2012), Halvasan (Patel et al., 2010) and KhoaJalebi (Jayaraj and Pagote, 2012). Such studies are mainly conducted to understand, define and differentiate between unique or typical attributes of identical indigenous dairy products. Outcomes of such studies perform two important functions viz., acts as a base platform for the future research and development activities required for the improvement in technology of such products and also adds a new item to the products portfolio of organised dairy sector. Documentation of various traditional Indian dairy products is a mandate of Indian Council of Agricultural Research (ICAR). This has been done to bring forth Indian culture including cuisine culture to the world scene. The daunting task of data and information collection on such products is long-continued and recurrent.
products has been assigned to its research institutes like National Dairy Research Institute (NDRI) and State Agriculture Universities (SAUs) (Jayaraj and Pagote, 2012). As part of this mandate, the present study was conducted.

**Materials and Methods**

**Collection of Kheer Mohan Samples**

Samples of Kheer Mohan were procured from randomly selected cities namely Gangapur City (C1), Kurgaon (C2), Chhotiudai (C3), Sapotra (C4) and Karoli (C5). These cities were in the vicinity of eastern Rajasthan where traditional manufacturing of Kheer Mohan being practiced. As good number of product manufacturing units were present in these cities so they were able to meet local market demand as well as supply this product to nearby regions too. Information pertaining to product’s typical attributes were collected using pre-designed questionnaires and face to face interaction with several halwais, shopkeepers and consumers. Available facilities and use of ingredients at the manufacturer’s door were seen and recorded. To get preferable market samples of Kheer Mohan, a consumer preference survey was performed. Initially four samples from reputed manufacturers from each city were procured and evaluated for sensory characteristics by local consumers. Based on the degree of liking compiled from the local consumers of the individual cities, half of the total samples were rejected and remaining half were again provided to the local consumers of each city. Based on consumer’s response, four most preferable samples were brought to the laboratory of NDRI, Karnal in insulated ice-boxes in triplicate and evaluated for sensory, textural, microbial and physico-chemical parameters.

**Proximate Composition**

Market samples were thoroughly mixed using pestle and mortar and this homogeneous mass was used for further analysis. Estimation of total solids content as per (IS:4079, 1967; IS: SP: Part XI, 1981b), fat by Mojonnier method, protein using micro Kjeldahl method, lactose and sucrose using volumetric (Lane-eynon) method; ash by standard gravimetric method were estimated. Colour values (L*, a*, b*) and water activity (a_w) were determined using a Colour Flex colourimeter (Hunter Associated Laboratory, Inc., VA, USA) and Aqua lab (make U.S.A.), respectively.

**Texture Profile Analysis**

Textural profile of Kheer Mohan was determined using Texture Analyser, TA-XT2i (M/s Stable Micro Systems, UK) fitted with a 25 kg load cell and calibrated with 5 kg standard dead weight prior to use. Compression plate (P-75) was used to compress the Kheer Mohan samples up to 50% of it’s original height using a typical two bite test. Force-distance compression curve was obtained to estimate hardness, fracturability, springiness, cohesiveness, gumminess and chewiness of the product. Pre-test, test and post-test speed during texture analysis were kept as 2.0, 1.0 and 2.0 mm/s, respectively. Temperature of test sample was maintained at 25°C.

**Morphological Features**

Five Kheer Mohan balls were randomly picked from each lot of most preferred samples and weights of the individual balls were recorded. Diameter of the Kheer Mohan balls were measured using vernier caliper.

**Sensory Evaluation**

Sensory evaluation of the screened Kheer Mohan samples was carried out by trained faculty of the Dairy Technology Division, NDRI, Karnal using 9-point hedonic scale and Descriptive Sensory Evaluation (DSE) technique in a well-equipped sensory laboratory. The judges were asked to evaluate and describe different product attributes viz., colour and appearance, flavour, body and texture, sweetness, juiciness and overall acceptability.

**Microbiological Analysis**

All screened samples of market Kheer Mohan were analysed for TPC, coliform count and yeast and mold count by IS: 5402 (2002), IS: 5401, Part I (2002) and IS: 5403 (1999) methods, respectively.

**Statistical Analysis**

Data obtained for Kheer Mohan samples were statistically analysed employing one way ANOVA using SAS Enterprise guide (5.1, 2012, USA).

**Results and Discussion**

**Physico-chemical Attributes of Kheer Mohan**

Variations in all constituents of market Kheer Mohan (i.e. fat, protein, lactose, sucrose, ash and total solids) were statistically significant (p<0.05) as presented in Table 1.

**Total Solids**

Total solids content of Kheer Mohan samples ranged from 70.79% (C4)-78.93% (C1). It was observed that in eastern Rajasthan, almost all manufacturers utilize their vast experience to manufacture product with definite final total solids by cleverly observing the product colour development during its cooking in boiling sugar syrup. However, some manufactures prefer to have varied total solids in their product based on market preference. Higher or lower total solids in a particular sample defines its hardness and storage life. It was observed
that range of total solids content in Kheer Mohan was almost similar to Chhana Balshai (69.03%), Kheer Mohan (76.85%) from local Kolkata market (Meena et al., 2012), soft grade Sandesh (75.90%), lower than Chhana-Murkhi (84.23%) (Arora, 2011) but higher than Kachagolla (66.1%) and Rasogolla (50%) (Aneja et al., 2002), Cham-cham (55.44%) (Meena et al., 2012), Rasomalai (54%) (Sayedatunnesha et al., 2008) and Chhanajhili (57.93%) (Dyuthy, 2009). The differences observed in total solids content may greatly affect quality attributes and result in distinct identity of the product.

### Fat

The fat contents of Kheer Mohan samples ranged from 3.22% (C4)-10.70% (C1) and were significantly varying (p<0.05) as shown in Table 1. The range of fat content obtained in Kheer Mohan was comparable to the fat content of other products like (7.63%) Chhana Balshai, (5.44%) Kheer Mohan from local Kolkata market, (10.18%) Cham-cham (Meena et al., 2012), (5%) Rasogolla (Aneja et al., 2002), (9.41%) Chhanajhili (Dyuthy, 2009) but lower than (12.5%) Rasomalai (Sayedatunnesha et al., 2008), (18.7%) soft grade Sandesh, (15.5%) Kachagolla (Aneja et al., 2002) and (15.10%) Chhana-Murkhi (Arora, 2011).

### Protein

Average protein content of Kheer Mohan ranged from 5.12% (C4)-10.50% (C1). The range of protein content obtained in Kheer Mohan was comparable to the protein content of other products like ChhanaBalshai (11.16%), Kheer Mohan (8.98%) from local Kolkata market, Cham-cham (14.89%) (Meena et al., 2012, Rasogolla (5%) (Aneja et al., 2002), Chhanajhili (8.94%) (Dyuthy, 2009), Rasomalai (8.40%) (Sayedatunnesha et al., 2008) but lower than soft grade Sandesh (16.1%), Kachagolla (12.8%) (Aneja et al., 2002) and Chhana-Murkhi (14.12%) (Arora, 2011). This difference in protein content of Kheer Mohan may be attributed to the types of milk and binding agent used by the manufactures of different cities.

### Lactose

The lactose content of Kheer Mohan ranged from 1.14% (C1)-1.90% (C3). This variation in lactose content of Kheer Mohan may be the result of difference in the composition of milks used for the manufacture in different cities.

### Ash

The ash content of Kheer Mohan ranged from 0.63% (C1)-1.06% (C4) which is lower than the ash content of Chhana-Murkhi (1.10%) (Arora, 2011), Cham-cham (1.04%) (Meena et al., 2012), soft grade Sandesh (1.70%), Kachagolla (1.4%) (Aneja et al., 2002), Rasomalai (1.20%) (Sayedatunnesha et al., 2008), but higher than ChhanaBalshai (0.39%), KheerMohan (0.60%) from local Kolkata market (Meena et al., 2012) and Chhanajhili (0.56%) (Dyuthy, 2009). The variation in ash content of Kheer Mohan may be due to the difference in the composition of milks as well as other additives used for the manufacturing.

### Sucrose

The sucrose content of Kheer Mohan ranged from 53.75% (C1)-64.23% (C2). The variations in sucrose content may be the result of difference in the amount of dry sugar added to chhana during its kneading, concentration of sugar syrup and time duration for which Kheer Mohan was soaked in this sugar syrup as per the consumer's preference.

### Colour Values

$L^*$, $a^*$ and $b^*$ values of Kheer Mohan samples ranged from 35.40 (C2)-48.77 (C1), 11.15 (C4)-16.43 (C2) and 28.17(C2)-41.45 (C3), respectively. The variation in colour values may be the result of extent of product cooking in sugar syrup, the quality of sugar and number of cycles for which that sugar syrup was used for cooking and soaking of the product.

### Water Activity ($a_w$)

Knowledge of aw (measure of water available in food for microbial growth) of a particular food item is crucial for the manipulation of water content of that food to arrest microbial growth and also to retard the chemical changes. Water activity

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**Table 1 Physicochemical characteristics of Kheer Mohan**

<table>
<thead>
<tr>
<th>Cities</th>
<th>Total Solids (%)</th>
<th>Fat (%)</th>
<th>Protein (%)</th>
<th>Lactose (%)</th>
<th>Ash (%)</th>
<th>Sucrose (%)</th>
<th>$L^*$</th>
<th>$a^*$</th>
<th>$b^*$</th>
<th>$a_w$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Range</td>
<td>70.79-78.93</td>
<td>3.07-10.95</td>
<td>5.12-10.50</td>
<td>1.14-1.90</td>
<td>0.63-1.06</td>
<td>53.75-64.23</td>
<td>35.40-48.77</td>
<td>11.15-16.43</td>
<td>28.17-41.45</td>
<td>0.773-0.823</td>
</tr>
<tr>
<td>C1</td>
<td>77.8±1.15</td>
<td>10.70±0.25</td>
<td>10.32±0.18</td>
<td>1.20±0.06</td>
<td>1.03±0.03</td>
<td>54.52±0.77</td>
<td>46.77±2.13</td>
<td>13.64±0.94</td>
<td>30.6±0.55</td>
<td>0.79±0.008</td>
</tr>
<tr>
<td>C2</td>
<td>75.73±1.30</td>
<td>4.12±0.05</td>
<td>5.7±0.16</td>
<td>1.70±0.06</td>
<td>0.79±0.01</td>
<td>63.41±0.83</td>
<td>37.01±1.61</td>
<td>15.84±0.59</td>
<td>29.01±0.84</td>
<td>0.78±0.006</td>
</tr>
<tr>
<td>C3</td>
<td>73.73±0.73</td>
<td>4.45±0.28</td>
<td>5.76±0.09</td>
<td>1.81±0.09</td>
<td>0.97±0.04</td>
<td>61±0.71</td>
<td>43.61±2.14</td>
<td>14.14±1.17</td>
<td>40.29±1.16</td>
<td>0.77±0.004</td>
</tr>
<tr>
<td>C4</td>
<td>71.34±0.55</td>
<td>3.22±0.15</td>
<td>5.22±0.10</td>
<td>1.70±0.07</td>
<td>0.65±0.02</td>
<td>60.55±0.65</td>
<td>47.05±0.72</td>
<td>11.39±0.24</td>
<td>35.35±0.58</td>
<td>0.82±0.003</td>
</tr>
</tbody>
</table>

*Means within a column with different superscripts are significantly different (p<0.05), n=3*
of Kheer Mohan ranged from 0.773 (C3)-0.823 (C4). It is evident from the results that Kheer Mohan, due to its high sugar content, falls under the category of intermediate moisture content foods (moisture content: 15-50% with a\textsubscript{w}: 0.85-0.60). At a\textsubscript{w} value of 0.85 growth inhibition of most bacteria, yeasts and molds occurs. Growth of all bacteria, yeasts and molds can be checked at a\textsubscript{w} values of 0.75 and 0.65, respectively (Aneja et al., 2002). Although water activity of Kheer Mohan samples is far below the required level for the growth of spoilage bacteria, which indicates better storage life of the product; it is prone to spoilage by yeast (osmophilic yeasts) and molds (xerophilic molds). Moreover, water can also migrate from the areas of high a\textsubscript{w} to low a\textsubscript{w} by absorbing it from surroundings. It was observed that a\textsubscript{w} values of Kheer Mohan samples were lower than other chhana based sweets like Cham-cham (0.94), ChhanaBalshai (0.875) (Meena et al., 2012), Rasogolla (0.911) (Aneja et al., 2002) and ChhanaMurkhi (0.845) (Arora, 2011).

Texture and Morphological Parameters of Kheer Mohan

The Texture profile of the market Kheer Mohan was measured in terms of hardness, fracturability, springiness, cohesiveness, gumminess and chewiness. Average values of textural parameters of the Kheer Mohan from different cities are presented in Table 2. Wide variations within and among the manufactures as well as cities were observed for the textural parameters of market Kheer Mohan. The average ranges for hardness, springiness, cohesiveness, gumminess and chewiness of the Kheer Mohan samples were 46.85-123.03 N, 0.35-2.54 mm, 0.14-0.38, 13.97-32.86 N and 10.04-14.12 N. mm, respectively. Maximum hardness (123.03 N) was observed in samples from C3 while least (46.85 N) in samples collected from C4. Statistical analysis showed that the hardness values of C3 samples were significantly higher (P<0.05). Fracturability (13.12 N) was only observed in the samples collected from C2. The least springiness (0.35 mm) was observed in samples of C2 and the highest (2.54 mm) in samples of C1 which was also significantly (P<0.05) different from other samples. Remaining samples were statistically at par with each other. Similar results were also observed for cohesiveness but all the samples were significantly (P<0.05) different from each other. The highest gumminess was observed in samples from C3 and the least in samples of C4. Statistical analysis revealed that the gumminess values of C3 samples were significantly higher (P<0.05) than other samples. Samples from C1 and C4 had maximum and minimum chewiness, respectively; although the difference among all the samples was non-significant. Wide variation in the diameter and weight of Kheer Mohan balls was noticed (Table 2). The samples collected from C1 were observed to have highest weight (108.34 g), whereas C3 samples had least (59.61 g). Weight and diameter of Kheer Mohan were significantly different (P<0.05) from each other.

Sensory Evaluation

Mean value of different sensory attributes scores on 9-point hedonic scale for the market samples of Kheer Mohan are presented in Table 3. Sensorial parameters of the samples were critically observed using DSE and the results are presented in Table 4. Kheer Mohan was observed to have irregular, round to oval shape, cooked and highly caramelized flavour, pleasant taste with heated note. It had fairly tough, close knit, dense, chewy, non-elastic and granular texture. Samples were moderately sweet and juicy. The juiciness was such that upon chewing, sugar syrup tends to ooze out but to an extent lesser than Rasogolla and ChhanaBalsahi (Prakash et al., 2013). Colour of the market Kheer Mohan samples was varying even within its structure i.e. product balls were moderately brown at surface while light brown with reducing intensity towards the core.

In general, there were only slight variations in sensory attributes of the product from different places but those from city C3 were distinctly browner and harder with excessive sweetness and intense cooked flavour. This may be attributed due to cooking of the product in highly concentrated sugar syrup for longer time.

Microbial Analysis

Microbial count of a particular food product usually affects its textural and sensorial attributes which ultimately decide its acceptability/rejection and shelf life. Results of microbial analysis of the Kheer Mohan samples have been presented in Table 4. Highest TPC but nil coliform counts were observed in the sample collected from city C1. Yeast and mold counts were only observed in the sample of city C4. Coliform counts were present in samples of Kheer Mohan of cities C2, C3 and C4. Microbial counts observed in the present investigation in Kheer Mohan samples underlines the lack of hygienic practices employed during product manufacturing and handling with chances of post processing contamination. Several workers also have reported similar observations for different indigenous dairy products.

Ingredients used and Manufacture Aspects of Kheer Mohan

Traditionally, the method being used to manufacture Kheer Mohan by different manufacturers is similar to that of Rasogolla and ChhanaBalshai, but mainly differ in type and amount of ingredients used and duration of cooking. During manufacturing of Kheer Mohan, one of the crucial step which needs lot of experience is kneading of chhana to right consistency otherwise chhana balls usually break and spread over sugar syrup during cooking. Other common ingredients used for Kheer Mohan making are mixture of semolina and arrow root powder, dry sugar and reetha. As per the
information shared by halwais, the function of the ingredients are as: chhana forms the base material for the preparation of Kheer Mohan, mixture of semolina and arrowroot powder acts as binding agent, dry sugar promote desired degree of browning required for proper colour development and reetha (pericarp is soaked in water for thirty minutes and then the formed solution sprayed over sugar syrup) acts as a foam forming agent which helps in cooking of chhana balls on the surface of the sugar syrup. Arrowroot means the separated and purified starch from the rhizomes of the plants known as Maranta arundinacea or from Curcuma augustifolia (FSSR, 2011). It is a valuable food stuff for infants and invalids as it lack gluten; earlier used in biscuits, cakes and puddings (Pradeep Kumar et al., 2008). It is an under exploited tuber crop having tremendous potential in food and pharmaceutical industries (Jyothi et al., 2009) and popular for its high digestibility and medicinal properties (The Wealth of India 1962). The Scientifically reetha is the nuts obtained from the soapnut trees of genus Sapindus which includes two major species viz., S. mukorossi, S. marginatus abundantly found not only in north and south India but also in tropical and sub-tropical region of the world (Kothiyal, et al., 2011). Sapindus mukorossi is well known for its folk medicinal values and commonly known by several names such as soapnut, soapberry, washnut, reetha, aritha, dodan and dodani.

Recently, several pharmacological actions of this plant have been reported like antimicrobial, cytotoxic, insecticidal, pesticidal and fungicidal activities (Tanaka et al., 1996; Upadhyay and Singh, 2012). The ratio of the ingredients for Kheer Mohan manufacture varied from halwai to halwai, but there was common agreement among the halwais that buffalo milk chhana was suitable for the manufacture of Kheer Mohan. This may be scientifically convincing observation because the Kheer Mohan needs to have firm texture and granular

Table 2: Textural and morphological attributes of Kheer Mohan.

<table>
<thead>
<tr>
<th>Cities</th>
<th>Hardness (N)</th>
<th>Fracturability (N)</th>
<th>Springiness (mm)</th>
<th>Cohesiveness (N)</th>
<th>Gumminess (N.mm)</th>
<th>Chewiness (N.mm)</th>
<th>Weight (g)</th>
<th>Diameter (cm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Range</td>
<td>46.85-123.03</td>
<td>-</td>
<td>0.35-2.54</td>
<td>0.14-0.38</td>
<td>13.97-32.86</td>
<td>10.04-14.12</td>
<td>59.61-108.34</td>
<td>2.34-5.02</td>
</tr>
<tr>
<td>C1</td>
<td>59.27±7.01</td>
<td>-</td>
<td>2.19±0.35</td>
<td>0.14±0.13</td>
<td>15.67±0.91</td>
<td>11.79±1.64</td>
<td>105.68±2.66</td>
<td>4.93±0.09</td>
</tr>
<tr>
<td>C2</td>
<td>56.45±4.48</td>
<td>-</td>
<td>0.37±0.02</td>
<td>0.18±0.15</td>
<td>19.67±0.46</td>
<td>13.41±0.46</td>
<td>89.90±3.20</td>
<td>4.60±0.058</td>
</tr>
<tr>
<td>C3</td>
<td>113.89±9.14</td>
<td>-</td>
<td>0.45±0.02</td>
<td>0.25±0.10</td>
<td>31.44±1.42</td>
<td>13.90±0.22</td>
<td>60.73±1.12</td>
<td>2.40±0.057</td>
</tr>
<tr>
<td>C4</td>
<td>48.63±1.78</td>
<td>-</td>
<td>0.77±0.01</td>
<td>0.38±0.18</td>
<td>14.37±0.40</td>
<td>10.47±0.43</td>
<td>80.18±2.51</td>
<td>3.60±0.056</td>
</tr>
</tbody>
</table>

abc mean values within a column with different superscripts are significantly different (P<0.05) NS: Non significant, n=5

Table 3: Mean sensory scores of market samples of Kheer Mohan

<table>
<thead>
<tr>
<th>Cities</th>
<th>Flavour</th>
<th>Body and Texture</th>
<th>Colour and appearance</th>
<th>Sweetness and Juiciness</th>
<th>Overall acceptability</th>
</tr>
</thead>
<tbody>
<tr>
<td>C1</td>
<td>8.21±0.14</td>
<td>8.43±0.11</td>
<td>8.28±0.21</td>
<td>7.95±0.34</td>
<td>8.19±0.20</td>
</tr>
<tr>
<td>C2</td>
<td>8.29±0.31</td>
<td>7.77±0.07</td>
<td>7.99±0.10</td>
<td>6.34±0.25</td>
<td>7.74±0.12</td>
</tr>
<tr>
<td>C3</td>
<td>7.44±0.10</td>
<td>6.76±0.11</td>
<td>6.47±0.26</td>
<td>5.68±0.36</td>
<td>6.85±0.22</td>
</tr>
<tr>
<td>C4</td>
<td>6.99±0.15</td>
<td>6.71±0.09</td>
<td>7.57±0.06</td>
<td>7.57±0.14</td>
<td>7.52±0.06</td>
</tr>
</tbody>
</table>

abc mean values within a column with different superscripts are significantly different (P<0.01), n=3

Table 4: Descriptive sensory attributes of the Kheer Mohan

<table>
<thead>
<tr>
<th>Sensorial attributes</th>
<th>C1</th>
<th>C2</th>
<th>C3</th>
<th>C4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flavour</td>
<td>Cooked and moderately caramelized, pleasant taste with heated note</td>
<td>Cooked and caramelized, pleasant taste</td>
<td>Over cooked and extremely caramelized</td>
<td>Moderately cooked and caramelized, pleasant taste</td>
</tr>
<tr>
<td>Body and texture</td>
<td>Fairly tough, close knit, dense and chewy, non-elastic and granular</td>
<td>Tough, dense, chewy, non-elastic and granular</td>
<td>Very hard, chewy, non-elastic and non-granular</td>
<td>Comparatively soft than others</td>
</tr>
<tr>
<td>Colour and appearance</td>
<td>Medium brown crust with light brown core</td>
<td>Medium brown crust with light brown core</td>
<td>Dark brown crust with browner core than other samples</td>
<td>Medium brown crust with lighter brown core</td>
</tr>
<tr>
<td>Sweetness and Juiciness</td>
<td>Moderately sweet and juicy</td>
<td>Extremely sweet and juicy</td>
<td>Highly sweet and juicy</td>
<td>Moderate to more sweet and juicy</td>
</tr>
<tr>
<td>Degree of liking</td>
<td>Very much</td>
<td>Moderate</td>
<td>Slight</td>
<td>Slight to Moderate</td>
</tr>
</tbody>
</table>
body that can only be imparted by buffalo milk proteins (particularly caseins) which also have high calcium content (Ganguli, 1974). The general method of preparation of Kheer Mohan compiled during the survey work by face to face interactions and visiting various manufacturing facilities of Kheer Mohan manufacturers is depicted in Figure 1.

Conclusions

Kheer Mohan samples procured from market of eastern Rajasthan showed wide variations in their physico-chemical and textural attributes. Occurrence of higher TPC, yeast and mold counts and coliform counts in market Kheer Mohan samples indicate the lack of hygienic practices adopted for manufacture and handling of the product. Most preferred Kheer Mohan procured from the market of Gangapur city (C1) had cooked and moderately caramelized flavour, pleasant taste with heated note. It had fairly tough, close knit, dense and chewy, non-elastic and granular body and texture. It had moderate to light brown colour from surface to core, highly caramelized flavour and pleasant taste with heated note. Degree of sweetness and juiciness was moderate. Results obtained during the present investigation are of vital importance in determination of product quality. To add a new item in the food basket of the global consumers with uniform quality and improved safety, large scale production and marketing of this product by organized sector is mandatory. Consequently, optimization of process parameters will act as a pre-requisite to showcase this product as a typical Indian traditional product in culinary exhibitions.

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References


Table 5: Microbial quality of the market samples of Kheer Mohan

<table>
<thead>
<tr>
<th>Microbial count, CFU/g</th>
<th>C1</th>
<th>C2</th>
<th>C3</th>
<th>C4</th>
</tr>
</thead>
<tbody>
<tr>
<td>TPC</td>
<td>1404.68±2.40</td>
<td>220.66±2.90</td>
<td>1846±2.30</td>
<td>441.33±2.40</td>
</tr>
<tr>
<td>Yeast and Mold</td>
<td>Nil</td>
<td>Nil</td>
<td>Nil</td>
<td>25±1.40</td>
</tr>
<tr>
<td>Coliform</td>
<td>Nil</td>
<td>23±1.53</td>
<td>30.67±1.76</td>
<td>25.33±1.45</td>
</tr>
</tbody>
</table>

abc mean values within a row with different superscripts are significantly different (P<0.01), n=3

Figure 1: Traditional method of Kheer Mohan manufacture


