**Original Research Article**

**Studies on Effect of Fat Levels on Quality of Peda**

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**ABSTRACT**

Dietary fat is a topic of intense discussion, mostly from the point of view of energy reduction. In a recent study, fat content was the most important motivator in the choice of calorie-reduced dairy products. In the present investigation an attempt has been made to study the chemical and sensory evaluation of peda at different treatment combinations. Results related to proximate composition, mean chemical composition, sensory attributes of peda control (T1) and peda with different level of milk fat viz. 4.5, 3, and 1.5 per cent (T2, T3, and T4) are as, from the results it was observed that, use of different level of milk fat viz. 6, 4.5, 3, and 1.5 per cent decrease in moisture from 19.76 to 18.54% and fat 18.36 to 12.53%, increase in protein from 14.38 to 17.70%, total sugar 44.68 to 47.95%, total solid 80.25 to 81.46 and ash 2.83 to 3.29% in finished product. Control peda rated highest score for colour and appearance (8.63), body and texture (8.75), sweetness (8.75), flavour (8.63) and overall acceptability (8.75) than peda prepared from different milk fat. The score was significantly higher than the peda with different level of milk fat that is 4.5, 3, and 1.5 per cent. However, control peda and peda with 4.5 per cent level of milk fat was rated good and acceptable. The cost of production (per kg) of control peda (T1) and peda prepared different fat level of milk that is 4.5, 3, 1.5 per cent, T2, T3 and T4, were Rs. 180.63, Rs.183.55, Rs. 192.97, and Rs. 194.68, respectively.

**Keywords** Effect of fat levels on chemical composition, Sensory evaluation and cost of peda

**Introduction**

India rank first in the world with record production of 146.31 million tons of milk per annum with per capita availability 302 gm/day (2015-16).

Out of the total milk produced in India, 46 per cent is consumed as liquid milk, 4 per cent converted into western milk products such as milk powders, processed butter and processed cheese and remaining 50 per cent is converted into traditional dairy products such as Ghee/ Makhani (clarified butter), Dahi (Yoghurt-like), Khoa (Partially desiccated milk product) and Chhana and Paneer (unprocessed cottage cheese). Out of these 7 per cent of milk is used for the manufacture of khoa based sweets as peda, burfi, kalakand, milkcake etc. (Handbook on Technology of Indian Milk Products).

Buffalo milk is preferred over cow and goat for preparation of milk products such as paneer, basundi, khoa and khoa based sweets (Peda, burfi, kalakand, gulabjamun etc.) because it gives soft and uniform body with smooth, compact and homogenous texture to finished products.
Khoa occupies a prominent place in traditional dairy products sector. Khoa is the product obtained from cow, buffalo, goat or sheep milk/milk solids or a combination thereof by rapid drying of milk having fat content should not be less than 20 per cent of the finished product (PFA, 2002).

Varieties of khoa are produced in the market such as pindi, dhap and danedar and used for preparation of peda, burfi, gulabjamun and kalakand respectively (De, 1980).

Materials and Methods

Buffalo milk required for the study was procured from the Dairy of Natural Milk Pvt, Ltd, Latur and standardized as per treatment.

Treatment details

T1 - Buffalo milk of 6 per cent fat + 30 per cent sugar.

T2 - milk of 4.5 per cent fat + 30 per cent sugar.

T3 - milk of 3 per cent fat + 30 per cent sugar.

T4 - milk of 1.5 per cent fat + 30 per cent sugar.

The different levels were tried and compared with control (T1).

Milk was standardized by using pearson’s square method.

Flow diagram for preparation of peda

The Peda was prepared with standardized method separately for each treatment as shown in following flow chart

Sensory evaluation

Sensory evaluation of ginger pedha was carried out by a panel of judges comprising“9 point Hedonic scale”.

Analysis

The samples of finished product from various treatment combinations were chemically analyzed for moisture (ISI: 2785, 1964), fat (ISI: 1224, Part II, 1977), Protein by Micro Kjeldhl’s method (1940), the protein content was obtained by multiplying per cent nitrogen of sample by factor of 6.38 and ash (A.O.A.C 1975), total solid (IS: 1479 part II 1961), Total sugars by the volumetric (lane-Eynon) method as a described in ISI (1981).

Results and Discussion

Chemical composition

The mean chemical composition of peda (T1) and peda prepared from different fat level of milk viz. 4.5, 3, 1.5 per cent (T2, T3 and T4) varied treatment wise. It is due to the use of different fat milk for preparation of peda. Moisture content in peda was observed in range of 19.76 to 18.54%. The highest moisture was observed for T1 and lowest for T4, fat content of peda was observed 18.36 to 12.53%. The highest fat was observed for T1 and lowest for T4, protein content in peda was observed 14.38 to 17.70%. The highest protein was observed for T4 and lowest for T1, total sugar content was observed 44.68 to 47.95%. The highest was observed for T4 and lowest for T1, total solids content in peda was observed 80.25 to 81.46 %. The highest was observed for T4 and lowest for T1, ash content of peda was observed 2.83 to 3.29%. The highest was observed for T4 and lowest for T1 mean
chemical composition of peda is given in table 1.

The similar findings were observed by Sivakumar et al., (2010), Kandeepan et al., (2010), Krupa Hirpara et al., (2016)

**Sensory Properties**

Mean overall acceptability score decreased from treatment T₁ to T₄. Mean overall acceptability score was observed 8.75, 8.13, 7.73 and 7.25, respectively.

The treatments T₁, T₂, T₃ and T₄, found significant different. This might be due to the level of fat in milk used for preparation of peda.

The results indicated that the overall acceptability score had decreasing trend with decrease in fat per cent of milk used. Mean overall acceptability score given in table 2.

**Cost of production**

The cost of the ingredients used in the preparation of peda was rated as per the rates (2015-2016) in the prevailing market given in table 3.

The cost of production (per kg) of control peda (T₁) and peda prepared different fat level of milk that is 4.5, 3, 1.5 per cent, T₂ T₃ and T₄, were Rs. 180.63, Rs. 183.55, Rs. 192.97, and Rs. 194.68, respectively. The cost of production of 1 kg peda of different fat level of milk for T₂ treatment was Rs. 183.55 which increased to Rs. 192.97 (T₃) and Rs. 194.68 (T₄).

Control peda scored highest score for all sensory attributes as compared to peda prepared with different fat levels of milk that is 4.5, 3, and 1.5 per cent.

Among the peda prepared with different fat level of milk viz. 4.5, 3, 1.5 per cent peda prepared with 4.5 percent fat milk had highest score than 3 and 1.5 per cent fat milk peda.

Decrease in fat per cent of milk decreased fat and moisture.

Protein, total solid, total sugar and ash Per cent increased with decrease in fat level of milk in treated product as compared to control.

Decreased in level of fat the cost of peda increased this is due to the decrease in recovery of khoa obtained. Hence the treatment T₂ is superior as compare to control.

The similar findings were observed by Varma et al., (2005) who found that, as the fat level in milk increase the body and texture score of milk cake prepared from cow milk increases significantly.

Sivakumar et al., (2010), during preparation of low fat sweetened dahi by addition of soya protein Isolate and carrot juice. They observed decrease in moisture content of low fat sweetened dahi as the level of carrot juice increases.

Amir Hosein et al., (2013), observed that, as the fat content of yogurt decreased by using sesamum oil as fat replacer, the sensory score for colour and appearance was decreased.

Anil Kumar et al., (2014), prepared milk cake by using different fat milk viz.4%, 5% and 6% and reported that, as the level of fat in milk increases it also significantly increases body and texture score for milk cake.
**Table 1** Mean chemical composition of *peda*

<table>
<thead>
<tr>
<th>Chemical constituents (%)</th>
<th>Moisture</th>
<th>Fat</th>
<th>Protein</th>
<th>Total solid</th>
<th>Total sugar</th>
<th>Ash</th>
</tr>
</thead>
<tbody>
<tr>
<td>T1</td>
<td>19.76</td>
<td>18.36</td>
<td>14.38</td>
<td>80.25</td>
<td>44.68</td>
<td>2.83</td>
</tr>
<tr>
<td>T2</td>
<td>19.36</td>
<td>16.24</td>
<td>15.85</td>
<td>80.64</td>
<td>45.58</td>
<td>2.98</td>
</tr>
<tr>
<td>T3</td>
<td>19.13</td>
<td>14.31</td>
<td>16.60</td>
<td>80.88</td>
<td>46.78</td>
<td>3.19</td>
</tr>
<tr>
<td>T4</td>
<td>18.54</td>
<td>12.53</td>
<td>17.70</td>
<td>81.46</td>
<td>47.95</td>
<td>3.29</td>
</tr>
</tbody>
</table>

**Table 2** Overall acceptability score of *peda* prepared using different fat level

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Replication</th>
<th>Overall Acceptability</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Colour &amp; Appearance</td>
<td>Body and Texture</td>
</tr>
<tr>
<td>T1</td>
<td>8.50</td>
<td>9.00</td>
</tr>
<tr>
<td>T2</td>
<td>8.00</td>
<td>8.25</td>
</tr>
<tr>
<td>T3</td>
<td>7.90</td>
<td>7.50</td>
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<tr>
<td>T4</td>
<td>7.50</td>
<td>7.50</td>
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</tbody>
</table>

SE ±0.126, CD at 5 % =0.390

Values with different superscripts are significantly different at P < 0.05

**Table 3** Cost structure of *peda*

<table>
<thead>
<tr>
<th>Sr. No</th>
<th>Particulars</th>
<th>fat</th>
<th>Rate Rs</th>
<th>T&lt;sub&gt;1&lt;/sub&gt; Qty. Kg</th>
<th>T&lt;sub&gt;1&lt;/sub&gt; Amt. Rs</th>
<th>T&lt;sub&gt;2&lt;/sub&gt; Qty. Kg</th>
<th>T&lt;sub&gt;2&lt;/sub&gt; Amt. Rs</th>
<th>T&lt;sub&gt;3&lt;/sub&gt; Qty. Kg</th>
<th>T&lt;sub&gt;3&lt;/sub&gt; Amt. Rs</th>
<th>T&lt;sub&gt;4&lt;/sub&gt; Qty. Kg</th>
<th>T&lt;sub&gt;4&lt;/sub&gt; Amt. Rs</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Milk (lit)</td>
<td>6.0</td>
<td>4.5</td>
<td>40</td>
<td>36</td>
<td>34</td>
<td>30</td>
<td></td>
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<td></td>
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<td>4.5</td>
<td>3.0</td>
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<td>1.5</td>
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<tr>
<td>2</td>
<td>Khoa obtained (kg)</td>
<td>-</td>
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<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
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<tr>
<td>3</td>
<td>Sugar (kg)</td>
<td>30</td>
<td>0.300</td>
<td>9.60</td>
<td>0.270</td>
<td>8.64</td>
<td>0.240</td>
<td>7.68</td>
<td>0.210</td>
<td>6.72</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Miscellaneous Charges</td>
<td>-</td>
<td>10</td>
<td>-</td>
<td>10</td>
<td>-</td>
<td>10</td>
<td>-</td>
<td>10</td>
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<td></td>
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<tr>
<td>6</td>
<td>Fuel charges</td>
<td>-</td>
<td>5</td>
<td>-</td>
<td>5</td>
<td>-</td>
<td>5</td>
<td>-</td>
<td>5</td>
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<tr>
<td>7</td>
<td>Labour charges</td>
<td>-</td>
<td>15</td>
<td>15</td>
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<td>15</td>
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<td>8</td>
<td>Product obtained (kg)</td>
<td>-</td>
<td>1.105</td>
<td>995</td>
<td>900</td>
<td>805</td>
<td></td>
<td></td>
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<tr>
<td>9</td>
<td>Total cost for obtained product</td>
<td>-</td>
<td>199.60</td>
<td>182.64</td>
<td>173.68</td>
<td>156.72</td>
<td></td>
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<td></td>
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<tr>
<td>10</td>
<td>Total cost per kg</td>
<td>-</td>
<td>180.63</td>
<td>183.55</td>
<td>192.97</td>
<td>194.68</td>
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Flow diagram for preparation of peda

Buffalo milk

↓

Pre-heating (38-40°C)

↓

Filtration

↓

Standardized (as per treatment)

↓

Boiling of milk in karahi (stirring- cum- scrapping)

↓

Khoa leaving sides of pan

↓

Pat formation stage (stop heating)

↓

Addition of sugar (30% by wt. of khoa)

↓

Stirring and scrapping for mixing

↓

Spreading the mass to the sides of pan

↓

Making of Peda

↓

Storage
Fig. 1 Mean chemical composition of peda

<table>
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<td>T1</td>
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<td>T2</td>
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<td>T3</td>
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<td>T4</td>
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References


