Preparation of Ready to Mix Semolina Milk Pudding- Kashmiri Fireen

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Abstract: The present study was conducted to standardize the processing parameters for the preparation of ready to mix semolina-milk dessert (Kashmiri Fireen) using both skim and whole milk powders which are abundantly available throughout the year. Various proportions of semolina and dried milk powder viz., 1:5, 2:5, 3:5, 4:5 and 5:5 parts were used for the dessert manufacture. For dried milk powder different proportions of whole milk powder (WMP) and skim milk powder (SMP) were used. It was found that the increase in the level of skim milk powder beyond 1:1 proportion decreased the quality of semolina-milk dessert. The use of semolina and dried milk powder at the ratio of 4:5 and 5:5 produced better quality product especially when the proportion of WMP and SMP was kept at 1:1 level. So, the best formulation for ready to mix Fireen was achieved from 4-5 parts semolina, 2.5 parts SMP, 2.5 parts WMP and 6 parts ground sugar when reconstituted with 40 parts water.

Keywords: Fireen; semolina; reconstituted milk; whole milk powder; skim milk powder.
1. Introduction

Cereal based dairy desserts are traditional products having a very long history of existence and forming one of the important milk based delicacies relished by people of India. *Kheer, falooda, satori, kaju katli and Fireen* are some of the famous products manufactured in India. Most of these products bear a tremendous regional and cultural importance and their production is linked to a particular cultural setting (Jha, 2006). However their production has been restricted to households and unorganized sector leading to lower quality and shelf life due to lack of proper scientific processing technology for their manufacture and storage (Aneja, 1997). Semolina milk dessert, called *Fireen* in local parlance is a traditional Kashmiri cereal based dairy dessert and has wide spread consumer acceptability in this region (Aneja et al., 2002). In Kashmir this dessert is very famous for its health benefits and is a common food item given to invalids, elderly people and patients. It is also being served at many festive occasions like marriages and during Ramadan (Mathur et al., 1985). The dessert can be cooled and used as a variety of ice cream. The basic ingredients used for its manufacture include milk, semolina and sugar. Besides, flavoring agents, dry fruits and garnishing material are also added for the purpose of enrichment of its flavor (Singh and Kumar, 2006). However there is a lack of uniformity in the quality of this product as its manufacture involves a traditional process which lacks standardization. Thus there is a need to take up a scientific study with regard to the development of processing technology for standardizing the manufacturing method for semolina-milk dessert. This will enable product diversification and production of this dessert at industrial level, thereby helping in the development of cottage/small scale industry.

The powdered milk can be used in the manufacture of ready to mix formulation without much effort. The ready to mix formulations are currently getting lot of emphasis owing to increase in their demands in markets due to ease of preparation at homes. The use of skim milk powder, which is abundantly available at low cost, not only provides low cost but also low fat product thus serving to the ever growing section of society which are health conscious with regard to intake of fats (Khan and Pal, 2011; Prabha and Pal, 2006).

2. Material and Methods

2.1. Optimization of Mix Formulation

Various proportions of semolina and WMP viz., 1:5, 2:5, 3:5, 4:5 and 5:5 parts were used in the dessert manufacture in 40 parts of water. The semolina level was optimized on the basis of sensory evaluation. Then the best combination (i.e. 5:5 ratio) of earlier experimentation was used for preparing dessert using various admixtures of whole milk powder and skim milk powder viz., 1:0, 2:1, 1:1, 1:2
and 0:1 ratios, while keeping all other processing conditions unchanged. The product was manufactured in the same manner as in first phase and subjected to sensory and physicochemical evaluation.

2.2. Preparation of Semolina-Milk Desert Mix

Dried milk powder (WMP with 26% fat and SMP with 1.5% fat) of higher instantization capacity was used for its production. The powder in form of dust was sprayed on mixture of semolina and ground sugar in humidified atmosphere to get evenly distributed and coated on the semolina particles and the mix was then dried in fluidized bed and finally sifted.

Small amount of nuts and dried fruits could be added to commercial product to improve the sensory quality characteristics of the product.

2.3. Reconstitution of Semolina-Milk Dessert Mix

Water was heated to about 90°C and the mix was reconstituted properly in it. During addition of semolina mix, it was continuously stirred to avoid formation of lumps maintaining a moderate ebullition for 5 min. The product was then poured over the plates, cooled and subjected to physicochemical and sensory evaluation.

2.4. Proximate Composition

Various physicochemical parameters like pH, moisture, ash, protein (Micro-kjeldahl method) and fat (solvent extraction) and carbohydrates of Semolina-milk dessert were analyzed using the standard procedures of Association of Official Analytical Chemists (AOAC, 2003).

2.5. Sensory Analysis

The samples of semolina-milk dessert were presented to a panel of 10 semi-trained judges on the basis of a 9 point Hedonic scale for appearance, flavor, texture, consistency and overall acceptability and mean ranks were given on the basis of this data by Kruskal and Wallis testing (Wallis, 1952).

2.6. Statistical Analysis

The data obtained from duplicate samples were averaged and data so generated were analyzed statistically following the methods outlined in Gomez and Gomez (1984). The data was processed in a computer using SPSS software package.
3. Results and Discussion

3.1. Optimization of Semolina Level

With a view to develop semolina-milk dessert having all desirable characteristics varying levels of semolina and WMP were used in order to determine the most suitable level for the ready to make mix.

3.1.1. Physicochemical quality

In the current study the semolina-milk dessert was evaluated for average moisture, protein, fat, total carbohydrates and ash contents. The average moisture ranged from 72.43% in dessert prepared from 1:5 ratio to 58.34% in dessert prepared from 5:5 ratio. The significant decrease (p < 0.05) in moisture content was due to increase in total solid content by increasing the quantity of semolina level in the mix (Table 1). The decrease in moisture content with increase in total solids was also observed in Kashmiri saffron phirini and rice kheer (Bhat et al., 2010; Srinivasan and Anantakrishna, 1964).

Table 1. Chemical composition of semolina-milk dessert with varying levels of semolina

<table>
<thead>
<tr>
<th>Semolina: WMP ratio</th>
<th>Parameters</th>
<th>Moisture</th>
<th>CHO</th>
<th>Protein</th>
<th>Fat</th>
<th>Ash</th>
<th>pH</th>
</tr>
</thead>
<tbody>
<tr>
<td>1:5</td>
<td></td>
<td>72.43±0.25&lt;sup&gt;a&lt;/sup&gt;</td>
<td>20.32±0.23&lt;sup&gt;a&lt;/sup&gt;</td>
<td>3.42±0.00&lt;sup&gt;a&lt;/sup&gt;</td>
<td>3.51±0.01&lt;sup&gt;a&lt;/sup&gt;</td>
<td>0.32±0.00&lt;sup&gt;a&lt;/sup&gt;</td>
<td>7.00±0.00&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>2:5</td>
<td></td>
<td>69.34±0.05&lt;sup&gt;b&lt;/sup&gt;</td>
<td>23.11±0.05&lt;sup&gt;b&lt;/sup&gt;</td>
<td>3.66±0.01&lt;sup&gt;b&lt;/sup&gt;</td>
<td>3.54±0.00&lt;sup&gt;ab&lt;/sup&gt;</td>
<td>0.34±0.00&lt;sup&gt;b&lt;/sup&gt;</td>
<td>7.01±0.00&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>3:5</td>
<td></td>
<td>65.77±0.04&lt;sup&gt;c&lt;/sup&gt;</td>
<td>26.32±0.05&lt;sup&gt;c&lt;/sup&gt;</td>
<td>3.97±0.01&lt;sup&gt;c&lt;/sup&gt;</td>
<td>3.56±0.00&lt;sup&gt;ab&lt;/sup&gt;</td>
<td>0.37±0.00&lt;sup&gt;b&lt;/sup&gt;</td>
<td>7.01±0.00&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>4:5</td>
<td></td>
<td>62.50±0.22&lt;sup&gt;d&lt;/sup&gt;</td>
<td>29.28±0.08&lt;sup&gt;d&lt;/sup&gt;</td>
<td>4.21±0.01&lt;sup&gt;d&lt;/sup&gt;</td>
<td>3.59±0.00&lt;sup&gt;ab&lt;/sup&gt;</td>
<td>0.41±0.01&lt;sup&gt;d&lt;/sup&gt;</td>
<td>7.00±0.00&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>5:5</td>
<td></td>
<td>58.34±0.20&lt;sup&gt;e&lt;/sup&gt;</td>
<td>33.17±0.07&lt;sup&gt;e&lt;/sup&gt;</td>
<td>4.43±0.01&lt;sup&gt;e&lt;/sup&gt;</td>
<td>3.63±0.00&lt;sup&gt;b&lt;/sup&gt;</td>
<td>0.44±0.00&lt;sup&gt;e&lt;/sup&gt;</td>
<td>7.01±0.00&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

Note: Column wise values with different superscripts differ significantly (p ≤ 0.05), N = 5.

The mean value of total carbohydrates for semolina-milk desserts prepared from 1:5 to 5:5 parts are portrayed in Table 1. The mean values of total carbohydrates for semolina-milk desserts differed significantly (p < 0.05) with each other and mean value of dessert prepared from 5:5 ratio was significantly higher than all other dessert samples. The significantly different total carbohydrate contents of semolina-milk desserts can be attributed to varying levels of semolina in desserts which is rather the major variable contributor to total carbohydrate content, sugar being constant for all samples. Increasing trend in carbohydrate content was also observed in kheer with increase in the amount of cereals used in its manufacture (De et al., 1976).

The average fat content of experimental semolina-milk dessert samples did not show much
variation, in that, the mean values of dessert samples did not differ significantly with each other as the source of fat was milk powder which remained constant in the first phase of experiment (Table 1). However some difference in fat content in lower and higher ratios may be attributed to use of different levels of total solids in phirini making which resulted in some variation on percent basis in the end product from 3.51% to 3.63% in different ratio. In Kashmiri saffron phirini a fat content of 4.87% was reported (Bhat et al., 2010). The comparatively lower fat content in present case can be ascribed to the use of different composition of mix used in this case. Other constituents such as protein and ash were also found to increase with the increase in semolina level which contributed to their increase in the product.

The varying level of semolina was reported to have no significant influence on pH of semolina-milk dessert and average pH of dessert samples was found to range from 7 to 7.01. This was in line with the average values of pH for Kashmiri saffron phirini prepared from reconstituted whole milk (Bhat et al., 2010).

### 3.1.2. Sensory Quality

In the current study, the sensory evaluation by Hedonic scale was done and the data was evaluated by Kruskal-Wallis test for generating mean ranks. The test revealed that mean ranks for all sensory characteristics obtained by the semolina-milk dessert prepared by using 5:5 ratio of semolina and dried milk powder were significantly higher (p < 0.05) than those made from 3:5, 2:5 and 1:5 proportions. However, it did not show significant difference when compared with the dessert prepared using 4:5 ratio. All sensory attributes were seen to be affected by different semolina levels, however the consistency and texture of semolina-milk dessert was influenced more than other characteristics (Fig. 1). Semolina-milk dessert prepared by using 1:5 ratio was observed to exhibit a consistency more like a fluid milk and dessert prepared from 2:5 to 3:5 ratios were of weak consistency and flavor was less pronounced as compared to semolina-milk dessert prepared from 4:5 and 5:5 ratios.

From the above findings, it could be concluded that 4:5 to 5:5 levels are best for preparing semolina-milk dessert of good quality as it obtained the highest mean values and corresponding mean ranks for all the sensory traits chosen for the study (Fig. 1).

### 3.2. Optimization of Whole Milk Powder and Skim Milk Powder Ratio

Different admixtures of whole milk powder and skim milk powder were used in order to determine the most suitable admixture level and simultaneously to investigate the effect of incorporating skim milk powder on semolina-milk dessert. The objective of admixing was to allay the health concerns, meet demand for lower fat products, utilization of skim milk powder which is
abundantly available in market and economizing the production of milk products.

![Graph](image)

**Figure 1.** Mean ranks for sensory scores by Kruskal–Wallis test for desserts with varying levels of semolina.

### 3.2.1. Physicochemical analysis

With the increase in proportion of skim milk powder by replacing whole milk powder average moisture content of semolina milk dessert was found to decrease. The mean value of moisture content of semolina milk dessert based on skim milk powder alone was 57.22% which was significantly lower ($p < 0.05$) than 58.58% of dessert sample prepared from whole milk powder and other desserts prepared from admixtures of whole milk powder (WMP) and skim milk powder (SMP). Bhat *et al.* (2010) recorded no significant effect of the type of milk on Kashmiri saffron *phirini*. Other components such as total carbohydrates, protein and ash contents were found to increase with corresponding increase of skim milk powder (Table 2). This is due to the fact that these ingredients are higher in SMP than WMP on percent weight basis.

**Table 2.** Chemical composition of semolina-milk dessert with different admixtures of WMP and SMP

<table>
<thead>
<tr>
<th>WMP:SMP</th>
<th>Parameters</th>
<th>Moisture</th>
<th>CHO</th>
<th>Protein</th>
<th>Fat</th>
<th>Ash</th>
<th>pH</th>
</tr>
</thead>
<tbody>
<tr>
<td>1:0</td>
<td></td>
<td>58.58±.07</td>
<td>33.01±.07</td>
<td>4.42±.01</td>
<td>3.56±.01</td>
<td>0.41±.00</td>
<td>7.01±.00</td>
</tr>
<tr>
<td>2:1</td>
<td></td>
<td>58.35±.08</td>
<td>34.02±.07</td>
<td>4.81±.01</td>
<td>2.34±.01</td>
<td>0.46±.00</td>
<td>7.01±.00</td>
</tr>
<tr>
<td>1:1</td>
<td></td>
<td>57.95±.04</td>
<td>34.70±.03</td>
<td>5.04±.02</td>
<td>1.81±.01</td>
<td>0.48±.00</td>
<td>7.02±.00</td>
</tr>
<tr>
<td>1:2</td>
<td></td>
<td>57.91±.03</td>
<td>35.15±.02</td>
<td>5.23±.01</td>
<td>1.14±.02</td>
<td>0.55±.00</td>
<td>7.03±.00</td>
</tr>
<tr>
<td>0:1</td>
<td></td>
<td>57.22±.02</td>
<td>36.05±.02</td>
<td>5.60±.01</td>
<td>0.49±.02</td>
<td>0.62±.01</td>
<td>7.05±.00</td>
</tr>
</tbody>
</table>

Note: Column wise values with different superscripts differ significantly ($p \leq 0.05$), $N = 30$, data are expressed as mean ± S.E.
Admixture of whole milk powder and skim milk powder was found to have a pronounced effect on average fat content of semolina-milk dessert (Table 2). The mean fat value of semolina-milk dessert was found to decrease with the increase in the proportion of skim milk and relative decrease in the proportion of whole milk powder. The mean fat value of semolina milk dessert (0.49%) prepared by using skim milk powder was significantly lower than the mean fat value of dessert (3.56%) made from whole milk powder. These results were in consonance with the findings on Kashmiri saffron phirini (Bhat et al., 2010). The average pH value of semolina milk dessert prepared from skim milk powder was 7.04 which differed significantly ($p < 0.05$) with mean pH value of 7 in dessert made from whole milk powder. The varying chemical composition of whole milk powder and skim milk powder can be cited as a reason for this difference in pH as acidity and pH depends upon the protein content of milk (Walstra et al., 2006).

3.2.2. Sensory evaluation

The mean sensory scores of appearance, flavor, texture and overall acceptability for semolina-milk dessert prepared from 1:0, 2:1,1:1, 1:2 and 0:1 proportion of whole milk powder and skim milk powder are depicted in Fig. 2. The mean values revealed that semolina-milk dessert prepared from equal proportions of whole milk powder and skim milk powder was awarded the highest mean scores for all sensory attributes and further increase in skim milk powder resulted in lower mean scores awarded to dessert samples. Kruskal-Wallis test applied on hedonic rating revealed that mean ranks obtained by semolina-milk dessert prepared from skim milk powder alone were significantly lower ($p < 0.05$) than dessert samples prepared from whole milk powder or admixture of whole milk powder.

![Figure 2. Mean ranks of sensory scores as influenced by different ratios of WMP and SMP.](image-url)
and skim powder. The difference can be related to the influence of fat present in whole milk powder which imparts the desirable flavor characteristics in the product (Walstra et al., 2006). Thus, there seems to be reduced flavor potential in semolina-milk dessert prepared from higher ratios of skim milk powder.

4. Conclusions

A variety of cereal based indigenous dairy products are prepared in various parts of the country. Semolina-milk dessert, commonly called as Fireen in Kashmir, represents this group of cereal based dairy products and is the most common dessert prepared in almost every household of Kashmir valley. It was developed in ready to mix form by simply mixing various ingredient in different ratios. On the basis of results obtained it was found that semolina and dried milk powder mix at the ratio of 4 to 5 parts semolina with 5 parts dried powder produced better quality product particularly when the proportion of WMP and SMP was kept at 1:1 level.

References


