Studies on chemical composition of *Kheer* prepared from soy milk blended with buffalo milk


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**ABSTRACT**

*Kheer* was prepared from buffalo milk with constant level of sugar (8 per cent by volume of the milk) and different levels of soy milk as T1 (100:00), T2 (90:10), T3 (80:20) and T4 (80:30). It was observed that proximate analysis of the product indicated the increase trend of moisture and protein and titrable acidity contents as the proportion of soy milk increased in the blend. Fat, total sugar, total solids and ash contents of the *kheer* decreased with addition of soy milk in the blend. The cost of production of soy *kheer* for treatments T1, T2, T3 and T4 were Rs. 81.04, 76.54, 73.16 and 69.27, respectively. The production cost of treatment T4 (69.27) was comparatively less than treatment T1 (81.04), T2 (76.54) and T3 (73.16).

**Key words:** Buffalo milk, Cost of production, *Kheer*, Sensory evaluation, Soy milk.

**INTRODUCTION**

Traditional Indian products include several innovative blends used in the preparation of variety of milk-based delicacies. *Kheer*, a sweet milk-rice confection, finds mention as payasa in Buddhist- Jain literature in 400 BC. *Kheer* is a very delicious cereal based indigenous milk product. It is popular throughout the country, and enjoyed by all sections of the society, because of its good taste, higher nutritional value and relatively lowers cost. Conventionally, it is prepared by partial dehydration of whole milk in a *karahi* over a fire together with sugar and usually rice or semolina (De et al, 1982.). *Kheer* is known by different names, in different parts of the country, such as ‘kheer’ in North Western region, ‘payasam’ in Southern region, ‘payas’ in Eastern region, ‘phirni’ in Northern region, ‘kheech’ in Mewar region and ‘payesh’ in Bengal, (Aneja et al., 2002). It is used as sweet dish at all ceremonial occasions and festivals and relished by all the age groups. In spite of remarkable increase in milk production, the milk and milk products are out of reach of vulnerable group, due to the high cost of milk and milk products. These situations demanded to development of the low cost substitute for milk and milk products in country and scientists have standardized the procedure for manufacture of milk and milk products from groundnut, safflower, coconut soybean and peanut.

Soy milk is free of milk sugar (lactose) and is good choice for people who are lactose intolerant. A variety of acceptable foods can be developed from soybean to fit in the Indian diet. In soybean seeds protein content (40.00 %) and appreciable quantity of oil (20 %). The preparation of soy milk seems to be an alternative to milk. Efforts have been made to prepare low cost milk using soybean seeds. Soy milk is an excellent source of good quality protein. Hence, looking to the nutritional and therapeutic importance of soy milk, it is proposed to utilize soy milk in the preparation of *kheer*.

**MATERIALS AND METHODS**

**Preparation of soy milk:** The soy milk was prepared as per method given by Kapoor et al. (1977) and Grover et al. (1983). 250 g of soybean seeds were weighed and washed with water. After washing soak the seeds over night in water with addition of (NaHCO@ 0.03 %) for removal of beany flavor. Dehulling of seeds was done followed by addition of lukewarm water at ratio of 1:4 proportions and then blended in mixer. The milk was then filtered through double layered muslin cloth. Boiled the milk for 2 minutes to detect its heat stability.

**Blending of buffalo milk and soy milk:** For preparation of *kheer* following blends of buffalo milk and soy milk were studied.

\[T_1\] 100 parts of buffalo milk
\[T_2\] 90 parts of buffalo milk with 10 parts of soy milk
\[T_3\] 80 parts of buffalo milk with 20 parts of soy milk
\[T_4\] 70 parts of buffalo milk with 30 parts of soy milk

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Buffalo milk was purchased from local market of Latur city (Natural Amrut Private Limited), which was standardized at 6.0 per cent fat level and was used for preparation of kheer after pasteurization. The pure soybean seeds of variety JS- 335 required for preparation of kheer was obtained from local market of Latur city.

Method of preparation of soy milk:

**Flow diagram for preparation of soy milk**

- Soybean seeds (250 g)
- Seed washed with hot water
- Soaked over night (60°C water)
- (NaH CO₃ @ 0.3 %)
- Dehulling
- Addition of lukewarm water (1:4)
- Grinding
- Boiled for 2 minutes
- Filtrate through double layer muslin cloth

Soy milk

**Flow chart for preparation of kheer from buffalo milk blended with soy milk**

- Receiving fresh buffalo milk
- Standardization of buffalo milk (at 6.00 per cent fat and 9 per cent SNF)
- Buffalo milk blended with soy milk (as per treatment)
- Heating of milk at 90°C
- Addition of rice Basmati Sadhu rice @ 2.5% of milk
- Condensing (1.8:1)
- Addition of sugar (8%)
- kheer(2: 1 conc.)
- Cooling to room temperature
- Storage (at 4°C)


**Cost analysis:** The ingredients, material required for preparation of kheer was calculated as per prevailing market rate during 2012-2013 and cost of production of kheer is worked out.

**Statistical analysis:** The data was analyzed by using C.R.D. as described by Panse and Sukhatme(1967).

**RESULTS AND DISCUSSION**

**Chemical composition of kheer:** The chemical composition of soy kheer is presented in Table 1. It is observed that moisture content of soy kheer increased from 66.7 to 69.07. As the proportion of soy milk in the blends increased there was increased in the moisture content of kheer. This was due to higher content of moisture in soy milk than buffalo milk. Narwade *et al.* (2003) observed same trend for kheer prepared from safflower milk blended with buffalo milk.

As the proportion of soy milk in the blend increased there was decreased in the fat content of kheer. This might be due to lower fat percentage in soy milk as compare to buffalo milk. All the treatments significantly differed from each other at 5% level. The findings are in agreement with Chaudhary, (2006) who found that the similar results in the preparation of kheer from cow milk blend with soy milk. Increased in the soy milk proportion decreased the fat content of the kheer.

As the proportion of soy milk in the blend increased there was increased in the protein content of kheer. This might be due to the prominent protein content in soy milk as compare to buffalo milk. Chaudhary, (2006) also noted same result, who prepared the kheer from the cow milk blended with soy milk. It was found that the increased the protein content in kheer due to the soy milk contain more protein than cow milk.

Ash content of the kheer decreased from 0.92 to 0.81. This may be due to lower ash content in soy milk was observed.

The total sugar content in kheer varied from 14.74 to 14.10 per cent. As the proportion of soy milk in the blend increased there was significantly decreased in the total sugar content was observed. This may be due to difference in lactose content of buffalo milk and soy milk.

This result is in agreement with Katra and Bhargava (1990). They prepared rasogolla from soy milk blended with cow milk. He observed that increasing proportion of soy milk
in cow milk blend there was decreasing in total sugar content in rasogolla.

There was decrease in total solids content in kheer with increased level of soy milk. There were significant differences in total solids content of kheer. The results recorded are comparable with Chaudhary, (1989) who reported an average total solids content of kheer i.e. 38.23 per cent.

**Cost of production of kheer:** The production cost for one kg of kheer of treatment $T_1, T_2, T_3$ and $T_4$ was Rs. 87.50, 82.71, 77.91 and 73.12 respectively. The production cost for kheer from treatment $T_1$ (i.e. control) was comparatively high in comparison with treatment $T_2, T_3$ and $T_4$. Lowest cost was observed for treatment $T_4$. The lower cost may be due to the less cost of production of soyamilk used for kheer production.

**CONCLUSION**

In the present investigation, the kheer prepared by taking 80 parts of buffalo milk and 20 parts of soy milk with 8 % sugar and 2.5 % basmati rice was found more suitable and acceptable due to its low cost of production (16.43 per cent lower than conventional kheer); 13.84 % more protein i.e.7.73 % and 19.01 per cent less fat i.e. 8.86 as compared to conventional kheer(10.94). The developed kheer might be fruitful for health conscious people due to its low fat and high protein.

**REFERENCES**


