

## STUDIES ON PREPARATION OF POPPY SEED (*Papaver somniferum*) KHEER FROM COW MILK

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### ABSTRACT

The present investigation entitled “Studies on preparation of poppy seed (*Papaver somniferum*) kheer from cow milk” was undertaken during the year 2015-2016 at Animal Husbandry and Dairy science section, College of Agriculture, Nagpur. Milk was standardized to 4 per cent fat and used for preparing kheer. Then kheer was prepared with addition of rice at 2.5 per cent (T<sub>1</sub>) and poppy seeds @ 2 (T<sub>2</sub>), 4 (T<sub>3</sub>), and 6(T<sub>4</sub>) per cent by weight of milk. 6 per cent sugar was uniformly added to all the treatments. The product was analyzed for chemical composition like fat, total solids, protein, ash and moisture content as well as for sensory attributes like colour and appearance, body and texture, flavour and overall acceptability. The cost of production was also calculated by considering the retail market prices for various items i.e. poppy seeds, sugar, rice, cardamom etc. and milk as per university rate. The data revealed that fat, total solids, protein, and ash of kheer were increased with the increase in level of poppy seeds. While moisture content was decreased with the increase in level of poppy seeds. A significantly increase in fat (7.59 to 11.04 per cent), total solids (35.02 to 41.42 per cent), protein (5.28 to 8.11 per cent) and ash (1.37 to 1.65) of kheer were recorded with the increase in levels of poppy seeds. While moisture (64.98 to 58.40 per cent) was decreased with the increase in levels of poppy seeds. The significantly highest score for colour and appearance (19.00 out of 20), body and texture (30.43 out of 35), flavour (40.84 out of 45) and overall acceptability (8.32 out of 9) were obtained in kheer containing 2 per cent of poppy seeds (T<sub>2</sub>). The cost of production of 1 kg kheer was increased with the increase in the level of poppy seeds. The lowest cost of production (Rs. 85.30) was recorded in case of kheer prepared with the addition of rice at 2.5 per cent (T<sub>1</sub>). However, the cost of production (Rs.95.99) of kheer with 2 per cent poppy seeds (T<sub>2</sub>) was found to be the best treatment selected by panel of judges for sensory evaluation. Therefore, although kheer with 2 per cent poppy seeds with slightly costly, its acceptability over rice kheer had added advantage like nutritional value and overall acceptability hence, needs to be promoted.

(Key words: Kheer, poppy seeds, physicochemical parameters, sensory attributes, cost structure)

### INTRODUCTION

Kheer is popular all over the country. As a pre-eminent milk delicacy, it has been associated with festivities and celebrations from time immemorial. A sweetened dish of rice cooked in milk first finds mention as ‘Payasa’ in Buddhist-Jain literature in 400 BC. It in seems unchanged to this day, being called payasam in South India and payes in Bengal. Payasam and payesh both are milk products. Similar to payasa is the kheer of North India and the prathamam of Kerala. Its extension is the paramanna, a ritual kheer- like confection, given to a six month old infant as his first solid food (Aneja *et al.*, 2002).

Hindu methodology refers to the kheer as the celestial nectar, amrit or elixir and gives it a place of prominence among foods as the secrete of immortality, the life giving food. It is used as sweet dish at various festivals and different types of celebration like wedding, child birth and marriage anniversaries etc. (Patel and Singh, 2002).

Poppy seeds are an oilseed obtained from the *Opium poppy*. The seeds are used whole or ground as an ingredients in many foods. Poppy seeds have long been used as folk remedy to aid sleeping, promote fertility and wealth and even to provide suppressed magical power of invisibility and sedative effect. Poppy seeds are also a good source of Dietary fiber (23 g 100<sup>-1</sup> g seed), Vitamin B<sub>9</sub> ( 82 mg 100<sup>-1</sup> g), Vitamin E (1.8 mg 100<sup>-1</sup> g), minerals like Calcium 1438 mg and Phosphorus 432 mg 100<sup>-1</sup> g (Duke, 1983).

#### The nutritional facts 100<sup>-1</sup> g are as follows (Allergen,2001)

Energy	477 kcal	Sodium	20 mg
Carbohydrate	4.2 g	Potassium	750 mg
lipids	42.2 g	Calcium	1460 mg
Protein	20.2 g	Iron	9.5 mg
Fiber	20.5 g	Phosphorus	855 mg

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Poppy seeds have health benefits due to presence of oleic acid, which reduces the risk of breast cancer, while the linoleic acid prevents risk of heart disease, heart attack and stroke. Poppy seeds help to prevent formation of kidney stones. Poppy seeds contain abundant amount of calcium and phosphorus and help to maintain bone health and prevent osteoporosis and minerals in poppy seeds like zinc and iron help in boosting the immune system as well as performing neurological functions well and maintain the cell and neurological development. A paste made of poppy seeds provides relief in joint pains. In Ayurvedic medicine poppy seeds are used to prepare a moisturizer for the skin. Poppy seeds relieve colic, abdominal pain and sciatica (Jolly, 2012).

Therefore, it was planned to study on preparation of poppy seed (*Papaver somniferum*) kheer from cow milk with the objectives to find out the suitable level of poppy seed along with physicochemical quality and its cost structure.

## MATERIALS AND METHODS

The present investigation entitled “studies on preparation of poppy seed (*Papaver somniferum*) kheer from cow milk” was undertaken during the year 2015-2016 at section of Animal Husbandry and Dairy Science, College of Agriculture Nagpur. During the entire study fresh, clean, whole cow milk was obtained from section of Animal Husbandry and Dairy Science, College of Agriculture, Nagpur. For standardization milk was sterilized by boiling and cooling to room temperature. Initially Poppy seeds, were dried and then roasted. These roasted seeds were soaked in water for 2 hrs. Then these seeds were put in mixer to make paste.

The cow milk was standardized to 4 per cent fat and 8.5 per cent SNF and then it was taken in an iron karahi and heated on gentle fire. At the time of boiling, milk was stirred with the help of stainless steel ladle in a circular manner. Cardamom powder 2 per cent were added commonly in all treatments. For adequately cooking and concentrating the initial kheer mixture, it was boiled and reduced to 40 per cent volume. Thus, table servable kheer contained 6.25 per cent rice in plain kheer and 5, 10 and 15 per cent poppy seeds paste in poppy seeds based kheer.

### Treatment details

T<sub>1</sub> = 91.5 Parts of cow milk + 2.5 parts of rice+ 6 parts sugar (Control sample)

T<sub>2</sub> = 92.0 Parts of cow milk + 2.0 parts of poppy seeds paste + 6 parts sugar

T<sub>3</sub> = 90.0 Parts of cow milk + 4.0 parts of poppy seeds paste + 6 parts sugar

T<sub>4</sub> = 88.0 Parts of cow milk + 6.0 parts of poppy seeds paste + 6 parts sugar

## Chemical analysis of kheer

### Determination of fat

Fat content in kheer was determined by Mojonnier fat extraction apparatus method as prescribed in B.I.S. Handbook of food analysis. SP: 18 (Part XI) (Anonymous, 1981).

### Determination of total solids

The percentage of total solids in kheer was determined by using gravimetric method as per the procedure of IS: 1479 (Part II) (Anonymous, 1961).

### Determination of protein

The protein content in kheer was determined as per the procedure recommended in IS: 1479 (Part II), (Anonymous, 1961).

### Determination of ash

The ash content in kheer was determined as per the method recommended in B.I.S. Handbook of food analysis. SP: 18 (Part I) (Anonymous, 1980).

### Sensory evaluation

The quality of kheer was judged by offering the sample to the panel of 5 judges in each trial separately. Score card method for sensory evaluation of kheer as suggested by Pal and Gupta (1985) was adopted details below

Characters	Prefect score
Colour and appearance	20
Body and texture	35
Flavour	45
Total	100

Overall acceptability was determined by a trained sensory panel (minimum of 6 members) on a 9-point hedonic scale as prescribed by Nelson and Trout (1964).

### Hedonic rating

Sr. No.	Remarks	Score
1	Like extremely	9
2	Like very much	8
3	Like moderately	7
4	Like slightly	6
5	Neither like nor dislike	5
6	Dislike slightly	4
7	Dislike moderately	3
8	Dislike very much	2
9	Dislike extremely	1

Note:- Score of 5.5 and above indicates acceptability within the score of 1 to 9.

### Statistical analysis:

The experiment was laid out in RBD with 4 treatments and 5 replications. The data obtained was analyzed statistically according to method described by Snedecor and Cochran (1967).

## RESULTS AND DISCUSSION

Chemical quality of kheer was evaluated with respect to fat, total solids, protein, ash and moisture content and data are presented in table 1.

### Fat content

The fat content of kheer sample was significantly affected due to the kheer with addition of poppy seeds at different levels. In limits of kheer mixture the fat content in kheer under the treatments 2.5 per cent rice, and 2, 4 and 6 per cent poppy seeds were 7.59, 8.80, 9.96, and 11.04 per cent, respectively. The lowest (7.59) percentage was recorded in kheer prepared without addition of poppy seeds i.e. kheer with 2.5 per cent of rice. While fat content was the highest (11.04 per cent) in kheer prepared with the addition of poppy seeds 6 per cent. The results indicated that with the increase in the addition of poppy seeds, there was significant increase in fat percentage of kheer. This might be due to high amount of fat content in poppy seeds as compared to the fat content in milk. Shrinivasan and Anaantkrishnan (1964) reported 15 per cent fat content in plain kheer and 25 per cent fat in sweetened kheer. Jha (2000) observed the fat content in kheer mix powder as 18.20 per cent.

### Total solids content

The average total solids contents of kheer in treatments 2.5 per cent rice and 2, 4 and 6 per cent poppy seeds were 35.02, 37.00, 38.89, and 41.42 per cent, respectively. The total solids percentage was significantly highest (41.42 per cent) in kheer prepared with the addition of 6 per cent poppy seeds, while total solids content was the lowest (35.02 per cent) in kheer prepared without addition of poppy seeds i.e. kheer with 2.5 per cent rice.

It was noticed that total solids content of kheer was significantly increased with the addition of poppy seeds. It was seen that as the level of poppy seeds increased, there was increase in content of total solids in kheer. This might be due to higher total solids content of poppy seeds. These results are in agreement with the result obtained by Aneja *et al.* (2002), who reported 40.00 per cent total solids content of khuskhus payasam and 40.10 per cent total solids content in kadduki kheer. De *et al.* (1976) observed the total solids as 32.98 per cent in kheer made from milk of 4 per cent fat, 2.4 per cent rice and 5 per cent sugar.

### Protein content

The protein content in kheer under treatments 2.5 per cent rice, and 2, 4 and 6 per cent poppy seeds were 5.28, 7.95, 8.04 and 8.11 per cent respectively. The highest (8.11 per cent) protein percentage was recorded in kheer prepared with the addition of poppy seeds 6 per cent while protein content was the lowest (5.28 per cent) in kheer prepared without addition of poppy seeds i.e. kheer with 2.5% rice.

It was noticed that protein content of kheer was significantly increased with the addition of poppy seeds. It was seen that as the level of poppy seeds increased, there

was increase in content of protein in kheer. Aneja *et al.* (2002) reported 6.40 per cent protein content in Bengal gram dal (kadalebele) payasam. Unnikrishnan *et al.* (2000) reported 7.7 per cent protein content in gil-e-firdaus payasam. Thus, the present results showed the improvement in protein content and servable kheer.

### Ash content

The ash content in kheer under treatments 2.5 per cent rice, and 2, 4 and 6 per cent poppy seeds were 1.37, 1.46, 1.52 and 1.65 per cent, respectively. The ash percentage was recorded significantly the highest (1.65 per cent) in kheer prepared with the addition of 6 per cent poppy seeds, while ash content was the lowest (1.37 Per cent) in kheer prepared without addition of poppy seeds i.e. kheer with 2.5 per cent rice. The significant increase in ash content of kheer due to increase in the level of poppy seeds, which helped in increasing the total solids.

The above results are more or less in agreement with the results of Ramasamy *et al.* (1999), who reported 1.40 per cent ash content in rice kheer.

### Moisture content

The moisture content in kheer under treatments 2.5 per cent rice, and 2, 4 and 6 per cent poppy seeds were 64.98, 62.96, 60.92 and 58.40 per cent, respectively. The moisture percentage was recorded significantly the highest (64.98 per cent) in kheer prepared without addition of poppy seeds i.e. kheer with 2.5 per cent rice, while moisture content was the lowest (58.40 Per cent) in kheer prepared with the addition of 6 per cent poppy seeds. It was observed that increase in the level of poppy seeds in kheer resulted in decrease in the moisture content.

The above results are comparable with the figure reported by Ramasamy *et al.* (1999), (67 per cent moisture content in rice kheer). Narwade *et al.* (2003) reported 67 per cent moisture content in kheer prepared from buffalo milk and 71 per cent moisture content in kheer prepared from 50:50 blends of buffalo milk and safflower milk.

### Sensory evaluation of kheer

The data with respect to sensory evaluation of kheer are presented in table 2.

### Colour and appearance

The colour and appearance score of kheer prepared with the addition of 2 per cent poppy seeds (19.00 out of 20) was superior over rest of the treatments. From the data obtained, it is revealed that as the levels of poppy seeds increased, the score for colour and appearance of kheer decreased proportionately.

### Body and texture

The score of body and texture was the highest in kheer with 2 per cent poppy seeds (30.43 out of 35). From the data obtained, it is revealed that as the levels of poppy seeds increased, the score for body and texture of kheer decreased proportionately. The poppy seed kheer was thick and have compact body.

**Table 1. Chemical composition of poppy seeds kheer**

<b>Treatments</b>	<b>Fat</b>	<b>Total solids</b>	<b>Protein</b>	<b>Ash</b>	<b>moisture</b>
T <sub>1</sub> = 91.5 Parts of cow milk + 2.5 parts of rice + 6 parts sugar	7.59 <sup>d</sup>	35.02 <sup>d</sup>	5.28 <sup>d</sup>	1.37 <sup>d</sup>	64.98 <sup>a</sup>
T <sub>2</sub> = 92.0 Parts of cow milk + 2.0 parts of poppy seeds paste + 6 parts sugar	8.80 <sup>c</sup>	37.00 <sup>c</sup>	7.95 <sup>c</sup>	1.46 <sup>c</sup>	62.96 <sup>b</sup>
T <sub>3</sub> = 90.0 Parts of cow milk + 2.0 parts of poppy seeds paste + 6 parts sugar	9.96 <sup>b</sup>	38.89 <sup>b</sup>	8.04 <sup>b</sup>	1.52 <sup>b</sup>	60.92 <sup>c</sup>
T <sub>4</sub> = 90.0 Parts of cow milk + 2.0 parts of poppy seeds paste + 6 parts sugar	11.04 <sup>a</sup>	41.42 <sup>a</sup>	8.11 <sup>a</sup>	1.65 <sup>a</sup>	58.40 <sup>d</sup>
SE ±	0.14	0.17	0.10	0.16	0.20
CD @ 5 %	0.45	0.53	0.32	0.51	0.62

**Table 2. Table for sensory evaluation of kheer as affected by different levels of poppy seeds**

<b>Treatments</b>	<b>Colour and appearance(20)</b>	<b>Body and texture(35)</b>	<b>Flavour(45)</b>	<b>Overall acceptability hedonic scale (out of 9)</b>
T <sub>1</sub> =91.5 Parts of cow milk + 2.5 parts of rice + 6 parts sugar	16.16 <sup>c</sup>	26.58 <sup>b</sup>	35.99 <sup>c</sup>	7.58 <sup>b</sup>
T <sub>2</sub> =92.0 Parts of cow milk + 2.0 parts of poppy seeds paste + 6 parts sugar	19.00 <sup>a</sup>	30.43 <sup>a</sup>	40.84 <sup>a</sup>	8.32 <sup>a</sup>
T <sub>3</sub> =90.0 Parts of cow milk + 2.0 parts of poppy seeds paste + 6 parts sugar	17.22 <sup>b</sup>	25.43 <sup>c</sup>	37.88 <sup>b</sup>	6.27 <sup>c</sup>
T <sub>4</sub> =90.0 Parts of cow milk + 2.0 parts of poppy seeds paste + 6 parts sugar	15.82 <sup>d</sup>	20.38 <sup>d</sup>	25.48 <sup>d</sup>	5.11 <sup>d</sup>
SE ±	0.17	0.13	0.19	0.12
CD @ 5%	0.52	0.41	0.60	0.37



## Flavour

Significantly highest score (40.84 out of 45) was obtained by kheer prepared with 2 per cent poppy seeds as compared to other treatments. Hence, it indicated that 2 per cent level of poppy seeds resulted in better flavour of kheer and thereafter, it decreased proportionately.

## Overall acceptability

The score for overall acceptability of kheer were 7.58, 8.32, 6.27, and 5.11 under the treatments 2.5 per cent rice, and 2, 4 and 6 per cent poppy seeds respectively. The score of overall acceptability was significantly affected due to addition of poppy seeds. The significantly highest score (8.32 out of 9) was obtained by kheer prepared from 2 per cent poppy seeds. Thus, overall acceptability score of kheer with 2 per cent poppy seeds, was most superior over rest of the treatments.

## Cost of production

Cost of production of 1 kg kheer prepared under various treatments i.e 2.5 per cent rice, and 2, 4 and 6 per cent poppy seeds was Rs.85.30, Rs.95.99, Rs.105.50 and Rs.114.88 respectively. The cost of production increased with the increase in levels of poppy seeds. The lowest cost of production (Rs. 85.30) was recorded in case of kheer prepared with the addition of rice at 2.5 per cent. However, the cost of production (Rs.95.99) of kheer with 2 per cent poppy seeds was found to be slightly more but it was the best treatment selected by panel of judges for sensory evaluation. The increase in the level of added poppy seeds showed the increase in cost of production kheer. Considering the more acceptability of kheer with 2.0 per cent poppy seeds than 2.5 per cent rice based kheer slight increase in the cost may be overlooked and kheer with 2 per cent poppy seeds can be promoted due to its increased nutritional value.

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