

# Development of nutritious ice-creams from soymilk and pumpkin seed milk and evaluation of their acceptability

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Soybean is rich source of protein and energy instead of these nutritional qualities it is not consumed by a large number of populations. Similarly pumpkin seeds are rich source of protein as well as minerals mainly iron yet they are discarded generally by the population. Pineapple is a rich source of ascorbic acid. The objective of the present study was to prepare nutritionally dense ice-cream by the incorporation of soy milk, pumpkin seeds milk and pineapple pulp and evaluation of their acceptability and nourishing potential. Different types of ice-creams were prepared by soymilk, pumpkin seeds milk as whole and their blends with or without addition of pineapple pulp. At 9 point hedonic scale ice-creams were evaluated in which most of the ice-creams were liked moderately to very much and two ice-creams which were most acceptable *i.e.* whole pumpkin seed milk ice-cream and blended milk ice-cream with pineapple pulp were liked very much to extremely. The nutritional analysis of two most acceptable ice-creams indicated that protein and fat value was found to be excellent and calcium, Iron as well as vitamin C content were also found in good amount in comparison to standard cow's milk ice-cream. Thus these ice-creams would be highly nutritious and acceptable by the population.

**Key Words :** Ascorbic acid, Nourishing potential, Hedonic scale

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## INTRODUCTION

Ice-cream is delicious and nutritional frozen dessert with high caloric food value. Ice-cream with minimum amount of fat contains approximately 40mg cholesterol/100g (Khillari *et al.*, 2007). One serving of ice-cream contains about 200cal and reduced calories ice-cream contains 120cal, protein 5g, of carbohydrate 32g and fat 10g of which half is saturated food ([www.caloric-](http://www.caloric-counter.net/nutrition-calories-in-icecream-in-icecream.htm)

[counter.net/nutrition-calories-in-icecream-in-icecream.htm](http://www.caloric-counter.net/nutrition-calories-in-icecream-in-icecream.htm), July 2010.).

Ice-cream has a fat content of 14 per cent (Pinto *et al.*, 2007). It is typically contains vitamin A, vitamin B2, vitamin B12 and minerals such as calcium, phosphorus and potassium ([www.calorie-counter.net/nutrition-calories-in-icecream.htm](http://www.calorie-counter.net/nutrition-calories-in-icecream.htm) July 2010).

Ice-cream can be made nutritious by adding soybean seed milk, pumpkin seed milk and vitamin C rich pineapple.

Soybean (*Glycine max* L. Merril.) belongs to family *Leguminous* and sub family *Papilionidae*. There are about ten species of genus *glycine* and several thousand varieties (Chauhan and Chauhan, 2007). Soybean being rich in proteins and energy has a great potential to solve the problem of protein energy malnutrition in India and many other developing countries. However, the processed

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foods from soybean in India are low. The supplementation of cereal based diet with soybean can play an important role in combating the protein energy malnutrition (Dogra *et al.*, 2001).

The pumpkin seeds are a balanced source of good proteins with 29g per 100g. In addition to protein to they are excellent source of iron which is 11.2mg/100g. The other nutrients are vitamin A, B, E, magnesium, phosphorus, iron, zinc and copper. Also contain pantothenic acid, unsaturated oils and antioxidants (*www.whffood.com, August 2010*).

Pineapple [*Ananas comosus* (L) Merr.] is one of the commercially important fruit crops of tropical world. Pineapple fruits have characteristic pleasant flavour distinct aroma, requisite taste and absence of seeds, which qualifies it as one of the choicest fruits throughout the world. It is a good source of carotene and ascorbic acid and is fairly rich in vitamin B and B2 (Rashmi *et al.*, 2005). Thus the challenge is to develop a delicious and highly nutritious acceptable ice-cream from soy bean seed milk, pumpkin seed milk and also with the addition of pineapple pulp. Keeping in views present study was planned and carried out with the following objectives :

- To prepare different types of nutritious ice-creams by incorporation of soybean seed milk, pumpkin seed milk and pineapple pulp.
- To evaluate the acceptability of the prepared ice-creams through sensory evaluation methods.
- To conduct nutritional evaluation of the prepared ice-creams by using standardized methods.

## METHODOLOGY

Soybean seeds and pumpkin seeds used in this study were procured from Sultanpur city. While other materials were procured from campus of Kamala Nehru Institute of Physical and Social Science, Sultanpur.

### Development and standardization of milk :

#### Preparation of ice-creams :

Ice-creams were prepared by modifying the recipe of standardized ice-cream.

Ice creams were prepared from soy milk and pumpkin seeds milk with and blended milk with and without addition of pineapple pulp. Different types of prepared ice creams are as follows:

- Soy milk (100%) ice cream (A) without addition of pineapple pulp.

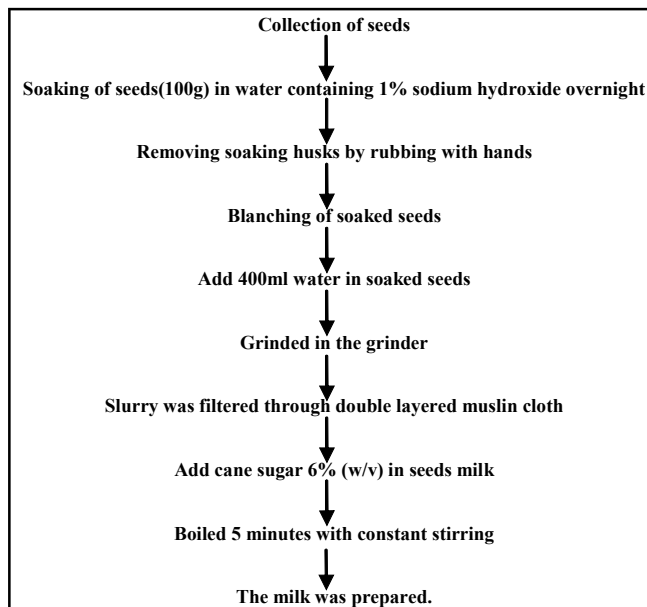


Fig. A : Flow Chart of Milk Formation from seeds

- Pumpkin seed milk (100%) ice cream (B) without addition of pineapple pulp.
- Soy milk and pumpkin seed milk (50-50%) ice cream (C) without addition of pulp.
- Soy milk and pumpkin seed milk (50-50%) ice cream (D) with addition of pineapple pulp.
- Pumpkin seed milk (100%) ice cream (E) with addition of pineapple.
- Soy milk (100%) ice cream (F) with addition of pineapple pulp.

Ice cream prepared from 100 per cent (cow milk) was taken as a standard ice cream for comparison.

### Analysis of sensory characteristics :

The sensory attributes including colour, flavour, body and texture, crunchiness, mouth feel and overall acceptability were evaluated by a group of 5- 10 panellists. The evaluation was held either 11 am for the morning session and at 3 pm for the afternoon session. The nine – point hedonic scale was used to evaluate the degree of liking and disliking for preference of the biscuits in following sequence: like extremely-9, like very much-8, like moderately-7, like slightly-6, neither like nor dislike-5, dislike slightly-4, dislike moderately-3, dislike very much-2 and dislike extremely-1 (Indian Standard, 1971).

Statistical methods used for analysis of data in the

present investigation were:

- Mean
- Standard deviation

### Mean :

Mean are, the central part of the distribution. It is extensively used in practical work. The most popular and widely used measure of representing the entire data by one value is mean.

$$\bar{X} = \frac{\sum X}{N}$$

### Standard deviation :

Standard deviation is the most important and commonly used measure of dispersion. Standard deviation is the positive square root of the average of square deviation taken from the arithmetic mean. It is also known as root mean square deviation.

Formula :

$$SD = \sqrt{\frac{\sum (x - \bar{x})^2}{N}}$$

### Student's t test:

Theoretical work on t- distribution was done by W.S. gusset (1876-1937) in early 1299-gusset was employed by the guiness and son, a dubin bravery Ireland, who did not permit employees to publish research finding under their own names. So gusset adopted the name "student" and published his findings under his own name.

Thereafter, the t- distribution is commonly called students t- distribution or simply student's distribution. Student's distribution is generally used to test significance of various results obtained from small samples.

$$t = \frac{(\bar{x}_1 - \bar{x}_2)}{S} \times \sqrt{\frac{n_1 \times n_2}{n_1 + n_2}}$$

## OBSERVATIONS AND ASSESSMENT

In present study the effort was done to increase the nutritive value of traditional ice-creams by incorporating phytochemical rich soymilk, pumpkin seed milk and nutrient rich pineapple. Ice-creams were prepared by mixing soymilk and pumpkin seed milk in different proportion along with pineapple pulp and without pulp. Six types of ice-creams were prepared which are as

follows: A-soya milk ice-cream, B- pumpkin seed milk ice-cream, C— 50 per cent soy milk and 50 per cent pumpkin seed milk ice-cream, D-50 per cent soya milk and 50 per cent pumpkin seed milk ice-cream with pineapple pulp, E- pumpkin seed milk ice-cream with pineapple pulp and F- soya milk ice-cream with pineapple pulp (Table 1).

### Moisture content :

The moisture content of soymilk and pumpkin seed milk were as follows 85.23 per cent and 84.63 per cent which was slightly lower in comparison to standard cow's milk contain 87.23 per cent moisture content. Studies reported that total solids of seed milk increased significantly when extraction ratio of seed to water were increased (Chang and Martha, 1990).

### Protein content :

The results reveals that the protein content of soymilk and pumpkin seed milk was found 6.06g/100g and 5.10g/100g, respectively which was higher than the standard cow's milk that contain 3.46g/100g protein content. There was a significant difference in protein content of soymilk and pumpkin seed milk in comparison to standard cow's milk.

### Fat content :

The results show that fat content of soymilk was 3.79g/100g which was slightly lower than the standard cow's milk that contain 4.40g/100g and pumpkin seed milk contain 5.32g/100g which was slightly higher than the standard cow's milk fat content. Studies reported that soybean seed contain 13-25 per cent oil. The fatty acids are linoleic acid (55%) followed by oleic acid (21%), palmitic acid (9%), stearic acid (6%) and other fatty acid (9%). The ratio of PUFA to SFA (P/S) is 82:18 which is highly conducive below the blood cholesterol (Fenselav and Schrezemeir, 2000). Pumpkin seeds contains fatty acids among palmitic, stearic, oleic, linoleic together constituted more than 80 per cent of the fatty acid content of oil (Bhatia *et al.*, 1997).

### Ash content :

Ash content of soymilk and pumpkin seed milk 2.09g/100g and 1.07g/100g, respectively found to be higher in comparison to standard cow's milk which contain 0.90g/100g.

The studies revealed that soybean is a good source of iron, potassium, calcium, magnesium and phosphorus with several water soluble and B complex (Gupta, 1982).

**Total solids :**

The result reported that total solids found in soy milk and pumpkin seed milk were 14.18g/100g and 16.34g/100g which were higher in comparison to standard cow’s milk that contain 12.86 g/100g.

The studies indicated that the total solids in milk include protein, carbohydrate and ash. Total solids of milk increased significantly when the extraction ratio of seeds to water was increased (Chang and Martha, 1990).

**Carbohydrate content :**

The carbohydrate content of soymilk was found to be 2.24g/100g which was lower than the standard milk that contain 4.10g/100g. While pumpkin seeds milk contain 5.02g/100g carbohydrate content which was found to be slightly higher than the standard cow’s milk fat content. The studies reported that the carbohydrate content was increased when seeds to water ratio were increased (Chang and Martha, 1990).

**Sensory evaluation of scores of icecreams :**

The results reveal that ice-creams made from whole soymilk-A (100% Soymilk) were liked moderately while which are made from whole pumpkin seed milk-B (100% pumpkin seeds milk) and from blended milk-C (50% soymilk and 50% pumpkin seed milk) were liked very much. These ice-creams were prepared without addition of pineapple pulp. Whereas all the ice-cream which were prepared with the addition of pineapple pulp were liked very much to extremely. The standard milk ice-cream got highest scores among the all samples and liked extremely by the semi trained panel members on 9 point hedonic scale.

The appearance, flavour and mouth feel were found

similar point in all test samples of ice-cream which were prepared without addition of pineapple pulp except whole soymilk ice-cream and liked moderately to very much by the semi trained panel members. While the ice-creams which were prepared with the addition of pineapple pulp were found highest scores and liked very much too extremely by the semi trained panel members. Two ice-creams were found to be highest scores for overall acceptability *i.e.* Sample-B (whole pumpkin seed milk) and Sample-D (50% soymilk and 50% pumpkin seed milk with pineapple pulp).

**Summary and conclusions:**

The conclusion drawn from the present study was as follows:-

The result of mean scores of overall acceptability reveals that among all samples of ice-creams pumpkin seed milk ice-cream-B (100% pumpkin seed milk) and blended milk ice-cream ( 50% soymilk and 50% pumpkin seed milk) with pineapple pulp-D were most acceptable at 9 point hedonic scale.

Results of present study goes to emphasise that the soybean is a rich source of good quality protein as well as fat and important vitamin and minerals and pumpkin seeds milk was not only rich in protein and fat but also rich in iron and calcium.

These ice-creams would be highly beneficial for all age groups because protein quality is fairly high encompassing all essential amino acids and also be proving to be cost effective due to less availability of cow’s milk. An added feature of these ice-creams are that they are more accompanied by health promoting qualities such as cholesterol free thus helping in preventing cardiovascular diseases. It is fondly hoped that these developed ice-creams would contributes towards militating nutritional requirements of the all age group individual.

**Table 1 : Mean scores of sensory attributes of ice-creams**

Attributes	S	A	B	C	D	E	F
Appearance	8.65±0.79	7.65±0.74	7.95±0.82	7.95±0.68	8.35±0.58	8.35±0.67	8.60±0.50
Flavour	8.90±0.05	7.75±0.63	7.95±1.14	7.90±0.91	8.45±0.68	8.10±0.71	8.35±0.58
Mouthfeel	8.96±0.20	7.65±0.67	7.91±0.02	8.05±0.82	8.35±0.58	8.45±0.60	8.35±0.74
Overall acceptability	9.10±0.10	7.70±0.57	8.55±0.6	8.20±0.69	8.65±0.48	8.45±0.68	8.40±0.60

S- standard milk ice-cream

B-pumpkin seed milk ice-cream

D- 50 per cent soya milk and 50 per cent pumpkin milk ice-cream with pineapple pulp

F- soya milk ice-cream with pineapple pulp

A- soya milk ice-cream

C- 50 per cent soya milk and 50% pumpkin milk ice-cream

E- pumpkin seed milk ice-cream with pineapple pulp

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