Study on Physico-chemical properties of Kulfi prepared by using betel vine leaves extract

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Abstract
Kulfi is 500 years old popular frozen dessert of Indian origin and it occupies a privilege position among the traditional Indian dairy products. Due to its palatability and comparatively low cost, kulfi is popular in many parts of country. The present study was carried out with incorporation of betel vine leaves extract at 10, 15, 20 per cent levels represented as T1, T2, T3 respectively and T0 is control without incorporation of betel vine leaves extract. The prepared betel vine kulfi was subjected to physico-chemical analysis such as total solids, fat, protein, total sugar, ash, titratable acidity. Kulfi prepared with 15 per cent betel vine leaves extract was found superior over rest of the treatments.

Keywords: Betel vine leaves extract, milk, kulfi

Introduction
Milk is an ideal food for both infant and adults. It has been regarded as best alternative to build nourishing diet. It is a rich source of fat, protein, carbohydrates, vitamins, etc. It has been regarded as best alternative to build nourishing diet. Among indigenous frozen milk products, kulfi is widely accepted and has demand next to ice-cream. It is produced by concentrating whole milk to about two folds followed by addition of sugar and freezing it in aluminium or plastic moulds, usually of conical shape. It has distinctive taste due to caramelization of lactose and sugar during the lengthy heating process.

Betel (Piper betle L) is a leaf of a vine belonging to the piperaceae family and is a perennial climber cultivated for its leaf. It is valued as mild stimulant and for its medicinal properties. It also has immense social, religious and export value. In fact, no Hindu religious ceremony is complete without pan. Betel leaves are mostly consumed in Asia and other parts of world by some Asian emigrants. Betel leaves are beneficial to the throat and remove viscosity in human beings. The juice of betel leaves is used as an adjunct to pills administered in the Ayurvedic medicines. The fresh crushed leaves are used as antiseptic for cuts and wounds. It is also useful for treatment of mastitis, leucorrhoea, ringworm, swelling of gums. It is used as folk medicine for cut, injuries, headache, constipation, itching. It neutralizes the acidity and acts as blood purifier. Main constituents of betel leaves are vitamin B and C, carotene, and other elements.

Material and Methods
For preparation of kulfi incorporated with betel vine leaves extract, buffalo milk was received from Dairy farm, College of Agriculture, Dapoli, whereas as betel vine leaves were purchased from Horticulture farm, College of Agriculture, Dapoli. Amul fresh cream and sugar were purchased from the local market. The betel vine kulfi was prepared as per the procedure given by Sukumar De with minor modification.

The fresh good quality buffalo milk was pre-heated to 35-40 °C for 5 minutes and filtered through two fold muslin cloth. The milk was concentrated to 50% of original volume with continous stirring. Sugar was added @ 12% of volume of unsweetened condensed milk and cream added @ 14 % of volume of unsweetened condensed milk. Betel vine extract was added as per treatment i.e, @ 0, 10, 15 and 20% of kulfi mix. Ageing of mix was done at 6-7 °C for 2-3 hours. The mix was transfer to kulfi cones and hardened at -18 to -20 °C for overnight.
Receiving of milk
↓
Pre-heating
(35 to 40 °C/5 minutes)
↓
Filtration
(Two fold muslin cloth)
↓
Concentration
(50% of Original volume)
↓
Addition of sugar
(12% of volume of unsweetened condensed milk)
↓
Addition of cream
(14% of volume of unsweetened condensed milk)
↓
Addition of betel vine leaves extract as per treatment
↓
Ageing of mix (6-7 °C for 2-3 hours)
↓
Transfering of mix to kulfi cones and freezing (0-5 °C)
↓
Hardening
(-18 to -20°C overnight)
↓
Betel vine kulfi

Fig 1: Flow chart for betel vine kulfi preparation

The total solids and protein content of milk and betel vine kulfi were determined as per IS: 1479 (part-II), 1961 [6]. The fat content of milk and betel vine kulfi was determined by using standard Gerber method as per IS: 1224 (part-I), 1977 [7]. The acidity of milk and betel vine kulfi was estimated according to IS: 1479, (part-I), 1960 [8]. The ash content of milk and betel vine kulfi was determined by Lane Eyon method as per IS: 1479 (part-II), 1961 [6]. The lactose content of milk and betel vine kulfi was estimated as per the procedure given in A.O.A.C. (1975) [9]. The total solids content of milk and betel vine kulfi were 17.02, 5.80, 15.26 and 14.75 per cent respectively. The total solids content of milk and betel vine kulfi were 0.207, 0.208, 0.209, 0.210 per cent respectively. The titratable acidity content of betel vine kulfi increased, the fat content of betel vine kulfi decreased non-significantly with increase in the level of betel vine leaves extract. The average values for 0, 10, 15 and 20 per cent level of betel vine leaves extract were 12.30, 11.43, 11.06 and 10.67 per cent respectively. As the level of betel vine leaves extract increased, the fat content of kulfi decreased significantly. The highest fat content was observed at T₀ (12.30 per cent) i.e. betel vine kulfi without addition of betel vine leaves extract and lowest fat content was observed at T₃ (10.67 per cent).

**Fat content**
The average values of fat for 0, 10, 15 and 20 per cent level of betel vine leaves extract were 5.84, 5.54, 5.46 and 5.38 per cent respectively. However protein content lie within the legal permissible limits. The kulfi without addition of betel vine extract contained highest 5.84 per cent protein and lowest protein content was observed at T₃ (5.38 per cent).

The protein content of base material i.e. unsweetened condensed milk was 6.95, whereas protein content of cream is very negligible as it contains 2 per cent protein. When betel vine leaves extract was added in kulfi mix there was addition of protein content ranging from about 1.5g (T₁) to 3.1g (T₃) in kulfi mix. Simultaneously, there was increase in the weight (mass) of kulfi mix ranging from 50g. (T₁) to 100g. (T₃). Hence, with addition of betel vine leaves extract there was reduction in per cent protein of kulfi.

**Total sugars**
The total sugar content of betel vine kulfi decreased significantly with increase in the level of betel vine leaves extract. The average values for 0, 10, 15 and 20 per cent level of betel vine leaves extract were 17.02, 5.80, 15.26 and 14.75 per cent respectively. The kulfi without addition of betel vine extract contained highest 17.02 per cent protein and lowest protein content was observed at T₃ (14.75 per cent).

**Ash content**
The perusal of data revealed that the ash content of betel vine kulfi decreased non-significantly with increase in the level of betel vine leaves extract. The average ash content of betel vine kulfi for 0, 10, 15 and 20 per cent level of betel vine leaves extract were 1.36, 1.16, 1.12 and 1.08 per cent respectively.

**Titratable acidity**
The titratable acidity content of betel vine kulfi increased significantly with increase in the level of betel vine leaves extract. The average values for 0, 10, 15 and 20 per cent level of betel vine leaves extract were 0.207, 0.208, 0.209, 0.210 per cent respectively.

**Conclusion**
The results of present investigation concluded that betel vine leaves extract can be successfully utilized for manufacturing of kulfi. All the compositional values decreased and such decrease was significant for total solids, fat, total sugar and titratable acidity. As *Piper betle* has many medicinal importance it can used in preparation of kulfi and other dairy products.
Table 1: Average chemical quality of buffalo milk (%)

| Sr. No. | Constituents   | Buffalo Milk |
|---------|----------------|--------------|
| 1       | Total solid    | 15.72        |
| 2       | Fat            | 6.33         |
| 3       | Protein        | 3.65         |
| 4       | Total sugars   | 4.9          |
| 5       | Ash            | 0.78         |
| 6       | Titratable acidity | 0.13 |

Table 2: Average chemical quality of betel vine kulfi (%)

| Levels of Betel vine leaves extract (%) | Constituents                      |
|----------------------------------------|-----------------------------------|
|                                        | Total solid | Fat | Protein | Total sugars | Ash | Titratable acidity |
| 0                                     | 37.14       | 12.30 | 5.84 | 17.02 | 1.36 | 0.207 |
| 10                                    | 35.81       | 11.43 | 5.54 | 15.80 | 1.16 | 0.208 |
| 15                                    | 35.22       | 11.06 | 5.46 | 15.26 | 1.12 | 0.209 |
| 20                                    | 34.67       | 10.67 | 5.38 | 14.75 | 1.08 | 0.210 |
| SE±                                    | 0.134595    | 0.08832 | 0.097802 | 0.119206 | 0.068363 | 0.000096 |
| CD                                     | 0.405716    | 0.267768 | 0.294806 | 0.359325 | 0.206068 | 0.000290 |

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