# Quality evaluation of selected *Kulfi* samples sold in the market of Bikaner city (Rajasthan)

## Roopam Gupta and Madhu Goyal

Dairy products are universally known for their nutritional and therapeutic values. *Kulfi* is the popular Indian frozen concentrated milk product, which is an ice cream like product, has been quoted in literature in different ways like *Kulfi, Kulffi, Kulafi, Kulfy, Kulphy. Kulfi* which is one of the most popular and nutritious dairy product can sometimes become a potential source of health hazard, by causing food poisoning outbreaks or by acting as a carrier of pathogens or by adulteration. The present study was attempted to evaluate the quality of *Kulfi*. For this, samples were collected in triplicates in previously sterilized containers, from five prominent shops of Bikaner city. The average moisture, crude protein, fat, total ash, carbohydrate, energy, calcium and phosphorus content was ranged from 42.36-57.20 g %, 6.56-9.28 g %, 10.13-18.56 g %, 3.35-4.35 g %, 15.01-35.16 g %, 233-273 Kcal, 683-718 mg %, and 736-901 mg %, respectively. Forty per cent and 20 per cent samples were noted to be of satisfactory quality with respect to SPC and faecal streptococcal count, respectively. Presence or absence of adulterants like starch and metanil yellow were also detected, but all the samples were found to be devoid of starch but in 20 per cent samples the inedible color that is metanil yellow was present . With respect to the possibility of adulteration and microbial contamination, quality of *Kulfi* remains in question.

**Key Words :** Quality, Bacteriological examination, Adulteration, Health hazard, Microbial count

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## INTRODUCTION

*Kulfi* is popular Indian frozen dessert; 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. *Kulfi* is also known as qulfi, kulfa, kulphy etc (Pandit, 2004), is one of the most popular and nutritious dairy product can sometimes become a potential source of health hazard, by causing food poisoning outbreaks or by acting as a carrier of

pathogens or by adulteration. There are many causes for microbial contamination and adulteration of ice cream being mainly the poor quality of ingredients, improper processing or pasteurization, prolong aging of mix at low temperature, improper cleaning and sanitizing the equipments, improper handling and storage of the finished product (Yadav *et al.*, 1993 and Pooran *et al.,* 2012). With respect to the possibility of adulteration and microbial contamination, quality of *Kulfi* remains in question. An attempt was therefore made in the present investigation to study the quality of *Kulfi* with respect to nutritional, adulteration and bacteriological aspects.

## METHODOLOGY

Samples of *Kulfi* (kesar) were procured in triplicates and in previously sterilized containers from five different

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prominent shops of Bikaner city (Rajasthan). All the samples were immediately brought to laboratory under cold conditions and stored in refrigerator till used for analysis

Analysis of the *Kulfi* samples was carried out using standard methods for moisture, crude protein, total ash, fat, carbohydrate, energy (AOAC, 1995), calcium (Talptra *et al*., 1940), and phosphorus (Gupta *et al*., 1988). Bacteriological qualities were assessed on the basis of standard plate count (APHA, 1960), staphylococcal count (Chapman, 1946), psychrophilic count (APHA, 1978), coli form count (APHA, 1960) and E. coli count (APHA, l960) and faecal streptococcal count (NCFA, 1968). The presence of adulterants, if any, like inedible colour (metanil yellow) and exogenous starch were analyzed by using the methods prescribed by AOAC (1995) and Plummer (1971), respectively.

## OBSERVATIONS AND ASSESSMENT
The results obtained from the present investigation

as well as relevant discussion have been summarized under following heads :

### Nutritional analysis :
The average moisture, crude protein, fat, total ash, carbohydrate, energy, calcium and phosphorus content of *Kulfi* samples ranged from 42.36-57.20 g per cent, 6.56-9.28 g per cent, 10.13-18.56 g per cent, 3.35-4.35 g per cent, 15.01-35.16 g per cent, 233-273 Kcal, 683-718 mg per cent and 736-901 mg per cent, respectively (Table 1). Statistically significant difference (1 % level) was found between the *Kulfi* samples for all the above nutrient contents. Values of these nutrient content were noted to be comparable with the standards, prescribed by PFA (2000).

### Bacteriological examination :
On the basis of ISI (1964) standard, only 40 per cent and 20 per cent of *Kulfi* samples were found to be satisfactory with respect to SPC and faecal streptococcal

**Table 1 : Nutrient composition of *Kulfi* samples**

| Sample number | Moisture g % | Protein g % | Fat g % | Ash g % | Carbohydrate g % | Energy KCal | Calcium mg% | Phosphorus mg% |
|---|---|---|---|---|---|---|---|---|
| Sample I | 57.20 | 6.56 | 16.88 | 4.35 | 15.01 | 238 | 690 | 901 |
| Sample II | 42.36 | 8.75 | 10.13 | 3.60 | 35.16 | 267 | 718 | 773 |
| Sample III | 51.20 | 9.28 | 11.25 | 3.35 | 24.92 | 238 | 683 | 736 |
| Sample IV | 50.96 | 7.44 | 18.56 | 3.92 | 19.12 | 273 | 708 | 798 |
| Sample V | 55.84 | 8.31 | 14.06 | 3.49 | 18.30 | 233 | 698 | 737 |
| Standard error of mean (SEM) | 0.105 | 0.096 | 0.069 | 0.182 | 0.241 | 0.973 | 4.66 | 23.77 |
| CD value | 0.332 | 0.302 | 0.22 | 0.57 | 0.76 | 3.07 | 14.69 | 74.91 |

CD : Critical difference

**Table 2 : Bacteriological examination of *Kulfi* samples**

| Sample | SPC/g or ml | Quality | Stephy-lococcal Count / g or ml | Quality | Psychrophlic count/g or ml | Quality | Coliform Count/g or ml | Quality | E.Coli count/g or ml | Quality | Faecal Strepto-coccus Count/g or ml | Quality | Overall bacterial quality |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Standard | $<2.5 \times 10^5$ (ISI,1964) | S | Zero | S | $<5 \times 10^4$ (Mergyl,1984) | S | $<100$ (ISI,1964) | S | Zero | S | Zero | S | S |
| Sample I | $4 \times 10^4$ | S | $2 \times 10^3$ | US | $8.5 \times 10^4$ | US | $1.8 \times 10^3$ | US | $1.5 \times 10^4$ | US | $9 \times 10^2$ | US | US |
| Sample II | $2.5 \times 10^6$ | US | $8 \times 10^3$ | US | $1.2 \times 10^4$ | US | $1.8 \times 10^3$ | US | $4 \times 10^4$ | US | $1.6 \times 10^2$ | US | US |
| Sample III | $8.2 \times 10^5$ | US | $4.5 \times 10^3$ | US | $1 \times 10^5$ | US | $0.09 \times 10^3$ | S | $3.1 \times 10^4$ | US | 0 | S | US |
| Sample IV | $1.2 \times 10^5$ | S | $2 \times 10^3$ | US | $1 \times 10^6$ | US | $3.5 \times 10^2$ | US | $5 \times 10^2$ | US | $1.8 \times 10^2$ | US | US |
| Sample V | $3 \times 10^7$ | US | $3.7 \times 10^3$ | US | $9 \times 10^4$ | US | $1.6 \times 10^3$ | US | $3.4 \times 10^2$ | US | $2.8 \times 10^2$ | US | US |
| Percentage of S/US samples | 60%US 40%S | | 100%US | | 100%US | | 80%US 20%S | | 100%US | | 80% US 20%S | | 100%US |

S : Satisfactory
US : Unsatisfactory

**Table 3 : Detection of presence/absence of adulterants in *Kulfi* samples**

| Sample number | Adulterants | |
|---|---|---|
| | Starch | Color (Metanil Yellow) |
| Sample I | Absent | Absent |
| Sample II | Absent | Absent |
| Sample III | Absent | Slight pink color present |
| Sample IV | Absent | Absent |
| Sample V | Absent | Absent |

count. Hundred per cent of *Kulfi* samples were noted to be of unsatisfactory grade with respect to presence or absence of staphylococcal count, psychrophlic count and E.coli count. On the basis of ISI (1964) standard, 80 per cent of *Kulfi* samples were found to be of unsatisfactory quality with respect to coliform count (Table 2).

**Adulteration analysis :**

Results of the adulterant analysis showed that all the *Kulfi* samples analyzed were found to be free from adulterants with respect to inedible color ( metanil yellow) and exogenous starch as per suggestions of the established standards (PFA, 2000), except one sample which was adulterated with metanil yellow (Table 3).

**Summary :**

Overall quality of *Kulfi* samples when adjudged on the basis of their nutritional, bacteriological and adulteration analysis, the ice cream was found to be nutritious as well as free from exogenous starch but metanil yellow was present in very small amount in only one sample of *Kulfi*. But on the basis of bacteriological examination all the *Kulfi* samples under study, had high percentage of microbial count, indicating significance of sanitary methods used during processing, handling, storage and distribution of milk and milk products.

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