# Effect of Addition of Strawberry Pulp on Sensory Attributes of Kulfi

## M. M. Sontakke [a], S. G. Narwade [a] and P. L. Zine [a*]

[a] *Department of Animal Husbandry and Dairy Science, College of Agriculture, Vasantrao Naik Marathwada Krushi Vidyapeeth, Parbhani-431 402, Maharashtra, India.*

***Authors' contributions***

*This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.*

*Original Research Article*

## ABSTRACT

It is decided to undertake research work on "Effect of addition of strawberry pulp on sensory attributes of kulfi" because strawberry pulp is an excellent source of vitamin C and manganese. They also qualified as a very good source of dietary fiber and iodine as well as a good source of potassium, folate, riboflavin, vitamin B5, omega-3 fatty acids, vitamin B6, vitamin K, magnesium, and copper. The different levels of Strawberry Pulp 10, 15, 20 and 25 per cent were tried in buffalo milk Kulfi. The product obtained was subjected for organoleptic evaluation by panel of judges. It was discovered that the flavour score for treatment T0, T1, T2, T3 and T4 was 8.16, 8.25, 8.48, 8.18 and 7.90 respectively. Colour and Appearance was 8.51, 8.44, 8.57, 8.23 and 7.69, respectively. Body and texture was 8.24, 8.42, 8.58, 8.22 and 7.90, respectively. T0, T1, T2, T3, and T4 had overall acceptance scores of 8.30, 8.37, 8.53, and 8.18 and 7.82, respectively. The level of 15 Strawberry Pulp had the highest overall acceptance.

*Keywords: Sensory analysis; kulfi; strawberry pulp and CRD.*

_____

*Corresponding author: E-mail: pravinzine146@gmail.com;*

# 1. INTRODUCTION

*Kulfi* is traditional frozen dessert in South Asia, sometimes referred to as "Indian ice cream". "It is popular in India, Myanmar, Pakistan and Bangladesh, as well as the Middle East. It can be found in Indian restaurants around the world. Kulfi is an indigenous frozen dairy product popular in India and which resembles ice-cream. Kulfi is originating in the Indian subcontinent during the mughal era in the 16th century. It is often described as traditional Indian ice-cream. It is famous in Bangladesh, Myanmar, Nepal, Srilanka" [1]. The present investigation on "Utilization of strawberry pulp in preparation of *kulfi*" was undertaken during 2021-2022 at the Department of Animal Husbandry and Dairy Science, College Of Agriculture, Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani, Maharashtra. "Sensory evaluation of the product was carried out by the panel of experts for the parameters, color and appearance, body and texture, flavor, and overall acceptability by using 9 points hedonic scale. Result revealed that the blended with 15 per cent strawberry pulp scored highest score for all sensory attributed as *Kulfi* compared to control as well as *kufli* blended with 10 per cent, 20 per cent and 25 per cent strawberry pulp" [1]. "Naturally, milk & milk products are devoid of dietary fiber hence there is scope of dietary fiber fortification of dairy products like yoghurt, flavoured milk ice cream and kulfi. Hence considering the benefits of supplementation of fiber in the diet with respect to its textural nutritional, medicinal value and technological properties" [2]. "Hence considering the benefits of supplementation of strawberry pulp in the diet; concerning its nutritional, medicinal value, and technological properties. It is decided to study the effect of the addition of strawberry pulp on the sensory attributes of *Kulfi*".

# 2. MATERIALS AND METHODS

## 2.1 Treatment Combinations

"For preparation of *kulfi*, strawberry pulp is tried in different levels and compare with control /the treatment combinations used were as detailed below.

**T$_o$:** 100 parts concentrated buffalo milk (control)
**T$_1$:** 90 parts of concentrated buffalo milk + 10 parts of strawberry pulp
**T$_2$:** 85 parts of concentrated buffalo milk + 15 parts of strawberry pulp
**T$_3$:** 80 parts of concentrated buffalo milk + 20 parts of strawberry pulp
**T$_4$:** 75 parts of concentrated buffalo milk + 25 parts of strawberry pulp" [1]

## 2.2 Experimental Methodology

Prior to preparation of strawberry pulp first removal of leaves then strawberry fruit will be washed with clean water. The slices was cut with the help of knife and finally it was converted in homogenous mass by putting into mixer.
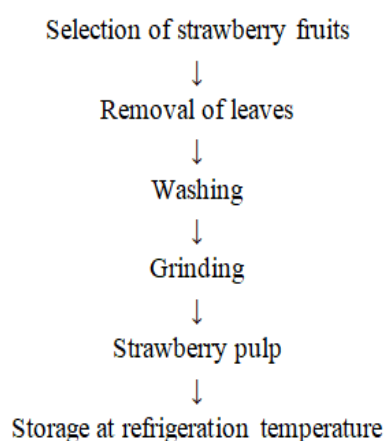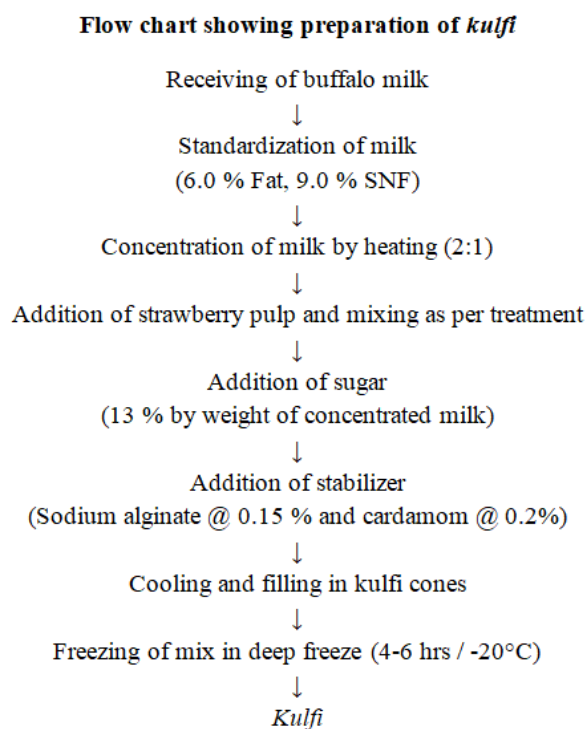
Selection of strawberry fruits
↓
Removal of leaves
↓
Washing
↓
Grinding
↓
Strawberry pulp
↓
Storage at refrigeration temperature

**Fig. 1. Preparation of strawberry pulp [1]**

*Kulfi* was prepared by using the method described by Kale AB, [3] with slight modifications.

**Flow chart showing preparation of *kulfi***

Receiving of buffalo milk

↓

Standardization of milk

(6.0 % Fat, 9.0 % SNF)

↓

Concentration of milk by heating (2:1)

↓

Addition of strawberry pulp and mixing as per treatment

↓

Addition of sugar

(13 % by weight of concentrated milk)

↓

Addition of stabilizer

(Sodium alginate @ 0.15 % and cardamom @ 0.2%)

↓

Cooling and filling in kulfi cones

↓

Freezing of mix in deep freeze (4-6 hrs / -20°C)

↓

*Kulfi*

**Fig. 2. Preparation of *kulfi* [10]**

## 2.3 Sensory Evaluation

Sensory evaluation of kulfi samples were organoleptically evaluated by a semi-trained panel of 6-judges using 9-point Hedonic scale [4].

## 2.4 Statistical Analysis

The data was analyzed statistically by using standard method i.e. Completely Randomized Design (CRD) as per Panse and Sukmatme, [5].

## 3. RESULTS AND DISCUSSION

Sensory evaluation of *kulfi* blended with strawberry pulp. The experimental *kulfi* samples were served to a panel of semi trained judges for sensory evaluation such as flavour, colour and appearance, body and texture and overall acceptability using "9 point hedonic scale". The numerical score given by judges for individual attribute was computed to obtain mean and these means were subjected to statistical analysis. The data was analyzed statistically by using Completely Randomized Design (CRD) as per Panse and Sukhatme [5]. Results obtained are shown in Table 1.

## 3.1 Flavour

It may be apparent from Table 1. The flavour score for various treatments ranged between 7.90 to 8.48. The score for treatment T2 (8.48) was maximum followed by T1 (8.25), T3 (8.18), T0 (8.16) and T4 (7.90). The acceptable maximum score was for treatment T2 (8.48) which have 15 parts of strawberry pulp. The lowest score was recorded in treatment T4 (7.90) which contain 25 parts of strawberry pulp having maximum acidity contain. This showed that as the level of strawberry pulp increases, the flavour score of *kulfi* also increases to treatment T2 (15 parts ofstrawberry pulp), but in treatment T3 (20 parts of strawberry pulp) and T4 (25 parts of strawberry pulp) the flavour score decreases. The result obtained from research work are analogous with Shelke [6] reported that as the proportion of mango pulp level increased, the flavor scored [7-10].

**Table 1. Effect of various levels of Strawberry pulp on organoleptic evaluation of *Kulfi***

| Treatment | Flavour | Colour and Appearance | Body and texture | Overall Acceptability |
|---|---|---|---|---|
| T0 | 8.16$^b$ | 8.15$^a$ | 8.24$^b$ | 8.30$^c$ |
| T1 | 8.25$^b$ | 8.44$^{ab}$ | 8.42$^{ab}$ | 8.37$^b$ |
| T2 | 8.48$^a$ | 8.57$^a$ | 8.58$^a$ | 8.53$^a$ |
| T3 | 8.18$^b$ | 8.23$^b$ | 8.22$^{ab}$ | 8.18$^d$ |
| T4 | 7.90$^c$ | 7.69$^c$ | 7.90$^c$ | 7.82$^e$ |
| S.E. + | 0.03831 | 0.07552 | 0.03397 | 0.01675 |
| C.D. at 5% | 0.1154 | 0.2276 | 0.1023 | 0.05051 |

## 3.2 Colour and Appearance

The colour and appearance score of *kulfi* influenced by various levels of strawberry pulp has been depicted in Table 1. The data presented in Table 1 indicated that, the colour and appearance score of control *kulfi* (T0) and *kulfi* prepared by using different levels of *kulfi* pulp *viz.*, 10, 15, 20, 25 (T1,T2,T3 and T4) ranged between 7.69 to 8.57. The colour and appearance score for treatment T2 was highest (8.57), followed by T0 (8.51) T1 (8.44) there after it was decreased from treatment T3 (8.23) and T4 (7.69). Among the different levels of strawberry pulp, the highest score for colour and appearance uses kulfi prepared by using 15 parts of strawberry pulp with faint reel colour appeared attractive whereas kulfi obtained from 25 parts of strawberry pulp gave darker red colour which was like moderately to like very much (7.69). The significant differences were observed between treatments T0, 1, T2, T3 and T4.

## 3.3 Body and Texture

It may be apparent from Table 1. The body and texture score for various treatments ranged between 7.90 to 8.58. The score for treatment T2 (8.58) was maximum followed by T1 (8.42), T0 (8.26), T3 (8.22) and T4 (7.90) respectively. The acceptable highest score was for treatment T2 (8.58) which have 15 parts of strawberry pulp. The lowest score was for treatment T4 (7.90) which has 25 parts of strawberry pulp and formed more granular texture in *kulfi* by increasing acidity. The results show that the treatment T3 (15 parts of strawberry pulp) indicate that the alter significant body and texture, whereas increasing level of strawberry pulp which affect body and texture of *kulfi* they form sticky body and big granular texture. This may due to the increase in moisture content and acidity in *kulfi* with addition of strawberry pulp.

## 3.4 Overall Acceptability

Overall acceptability of *kulfi* under different treatment combination of strawberry pulp *kulfi* was determined. The average Overall acceptability score for control *kulfi* (T0) and *kulfi* prepared from different level of strawberry pulp *viz.* 10, 15, 20 and 25 per cent (T1, T2, T3 and T4) are depicted in Table 1. It may be apparent from table the Overall acceptability score for various treatments ranged between 7.82 to 8.53. The score for treatment T2 (8.53) was maximum followed by T1 (8.37), T0 (8.30), T3 (8.18) and T4 (7.82). The acceptable maximum score was for treatment T2 (8.53) which have 15 parts of strawberry pulp. The lowest score was recorded in treatment T4 (7.82) which contain 25 parts of strawberry pulp. Since the score of all the samples were above 5.5, it was defined that strawberry pulp which prepared under all treatments were acceptable. Total sensory score of strawberry pulp *kulfi* differed significantly due to the different levels of strawberry pulp added. Among all the samples, T2 sample has greasier with grainy texture, good flavour with no deleterious effect on colour and appearance. It was having significant natural flavour of strawberry pulp and smooth to granular texture. Therefore, it was liked by all judges among all the treatments including control sample.

## 4. CONCLUSION

*Kulfi* blended with 15 per cent strawberry pulp scored highest score for all sensory attributed as compared to control as well as *kufli* blended with 10 per cent, 20 per cent and 25 per cent strawberry pulp.

## CONFERENCE DISCLAIMER

Some part of this manuscript was previously presented in the conference: 3rd International Conference IAAHAS-2023 "Innovative Approaches in Agriculture, Horticulture & Allied Sciences" on March 29-31, 2023 in SGT

University, Gurugram, India. Web Link of the proceeding: https://wikifarmer.com/event/iaahas-2023-innovative-approaches-in-agriculture-horticulture-allied-sciences/.

## ACKNOWLEDGEMENT

## COMPETING INTERESTS

Authors have declared that no competing interests exist.

## REFERENCES

1. Sontakke MM, Narwade SG, Londhe GK. Effect of addition of strawberry pulp on physicochemical attributes of Kulfi. The Pharma Innovation Journal. 2023;12(1): 2401-2403.
2. Zine PL, Londhe GK, Narwade SG. Influence of Partially Hydrolyzed Guar Gum, Psyllium and Inulin as on Physicochemical, Characteristics of Shrikhand, Asian Journal of Dairy and Food Research; 2023.
   Available: 10.18805/ajdfr.DR-2102.
3. Kale AB. Studies on preparation of kulfi blended with kesar mango pulp M.Sc. (Agri.) Thesis Submitted to MKV, Parbhanni; 2011.
4. Gupta SA. Sensory Evaluation of Food Industry. Indian Dairyman. 1976;28(8): 293-295.
5. Panse VG, Sukhatme PV. Statistical Methods for Agricultural Workers. ICAR Publication, New Delhi; 1985.
6. Shelke CY. Preparation of mango *burfi.* M.Sc. (Agri.) Thesis submitted to M.K.V., Parbhani; 2007.
7. De S. Outlines of Dairy Technology. Oxford University, press. New Delhi, India. 2011;419.
8. Haenlein GFW. Goat milk in human nutrition. Small Ruminant Research. 2004;51:155-163.
9. Mukhekar AS. Preparation of Basundi Blended with Mango Pulp cv. Kesar. M.Sc (Agri.) Thesis, Submitted to VNMKV, Parbhani. Pagote, C.N. 2003. Basundi: A Traditional Delicious Milk Product. Beverage and Food World. 2014;30(6): 29.
10. Wagh MV. Studied on preparation of kulfi blended with custard apple pulp. M.Sc. (Agri.) Thesis, Submitted to MKV, Parbhani; 2011.

---

*Peer-review history:*
*The peer review history for this paper can be accessed here:*
*https://www.sdiarticle5.com/review-history/100374*

---