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Sensory quality of red pumpkin (*Cucurbita pepo* L.) Burfi

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Abstract

The experimental treatments prepared without addition of red pumpkin powder in the *burfi* (Control) (T₀), incorporation of 15 per cent (T₁), 17 per cent (T₂) and 19 per cent red pumpkin powder in the *burfi* (T₃), and 30 per cent sugar. The mean sensory score for colour and appearance, consistency, flavour and overall acceptability ranged from 7.2 to 8.1, 7.4 to 7.9, 7.5 to 8.2 and 7.4 to 8.2, respectively for the treatments T₀, T₁, T₂ and T₃. The experiment was laid out in completely randomized design (CRD) with three replications for preliminary and five replications for experimental trials.

Keywords: *Burfi*, cow milk, khoa, red pumpkin powder, sensory quality

Introduction

Burfi is indisputable product having economic importance especially in rural as well as urban part of India as it provides good means for converting surplus milk into value added products. It has unique importance in market as it is liked by the people from all classes. *Burfi* retains its quality for considerable long period at atmospheric storage temperature due to its low moisture content and higher concentration of sugar. The method of preparation also ensures the destruction of almost all microorganisms present in raw material. In post manufacturing contamination from undesirable microorganisms during preparation, handling, packaging and storage of final product is avoided.

Typically, *burfi* has a mildly caramelized and pleasant flavour. When additives like cardamom, chocolate, coconut, fruit etc., are added, the mild pleasant flavour is further complemented to enhance both product appeal and value. The colour of *burfi* may range from off white to creamy or light caramel, depending mainly upon the type of milk solids used as base material and also the extend of heat desiccation during preparation of *burfi*. The body characteristics of *burfi* and its flavours vary considerably among product varieties. It may range from very loosely compacted to a closely-knit body, the texture could also vary from smooth to granular and crisp to chewy.

Red Pumpkin (*Cucurbita pepo* L.) plant is a fast-growing vine that creeps along the ground surface in a similar fashion like that of other Cucurbitaceae family vegetables and fruits such as cucumber, squash, cantaloupes etc. It is one of the most popular field crops cultivated around the world, including USA at the commercial scale for its fruit and seeds.

Pumpkin belongs to genus *Cucurbita* of the family Cucurbitaceae is one of the largest families of vegetable kingdom. They are widely grown and consumed in many tropical and sub-tropical countries around the world (Juna *et al.*, 2006) [4]. Trace elements such as Copper, Calcium, Magnesium, Phosphorous and Vitamins such as carotenoids, tocopherol and other substances like proteins, phytosterols, poly-unsaturated fatty acids and flavonoid poly-phenolic antioxidants such as leutin, xanthin and carotenes are in abundance antioxidants which are naturally present in pumpkin that can be beneficial to human health. (Pasha *et al.*, 2013) [6].

Materials and Methods

The *burfi* samples under preliminary and experimental trials were subjected to sensory evaluation using the method described in IS: 6273, Part –I and II (1971) [3] adopting 9 point Hedonic Scale. A panel of 5 trained judges was formulated for this purpose. The samples were coded every time to conceal their identity and were offered to the judges for evaluation of the quality attributes.

Pre-experimental trials

Preliminary trials were conducted to choose the levels of addition of red pumpkin powder in the *burfi*, by using 1, 3, 5, 7, 9, 11, 13, 15, 17, 19 per cent red pumpkin powder. Control samples were also prepared without addition of pumpkin powder. The *burfi* samples were subjected to sensory evaluation by five trained judges. On the basis of the results of sensory evaluation, the best three levels 0, 15, 17, 19 per cent were chosen for experimental trials.

For the preparation of red pumpkin burfi the treatment combinations were as follows.

T₀: Control, prepared cow milk (Standardized with 4.5 % fat) without addition of red pumpkin powder.

T₁: Khoa + 1 per cent red pumpkin powder by weight of khoa.

T₂: Khoa + 3 per cent red pumpkin powder by weight of khoa.

T₃: Khoa + 5 per cent red pumpkin powder by weight of khoa.

T₄: Khoa + 7 per cent red pumpkin powder by weight of khoa.

T₅: Khoa + 9 per cent red pumpkin powder by weight of khoa.

T₆: Khoa + 11 per cent red pumpkin powder by weight of khoa.

T₇: Khoa + 13 per cent red pumpkin powder by weight of khoa.

T₈: Khoa + 15 per cent red pumpkin powder by weight of khoa.

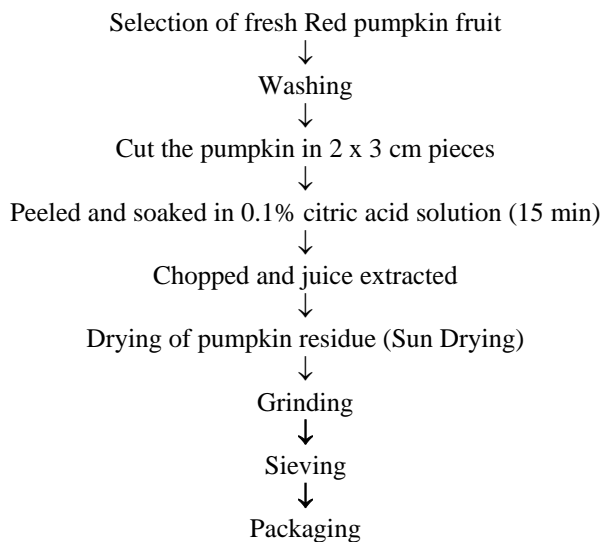
T₉: Khoa + 17 per cent red pumpkin powder by weight of khoa.

T₁₀: Khoa + 19 per cent red pumpkin powder by weight of khoa.

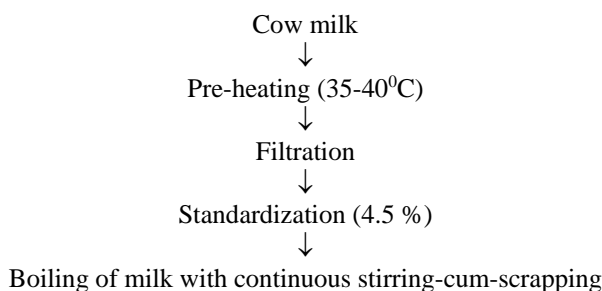
Table 1: Sensory score of red pumpkin *burfi*

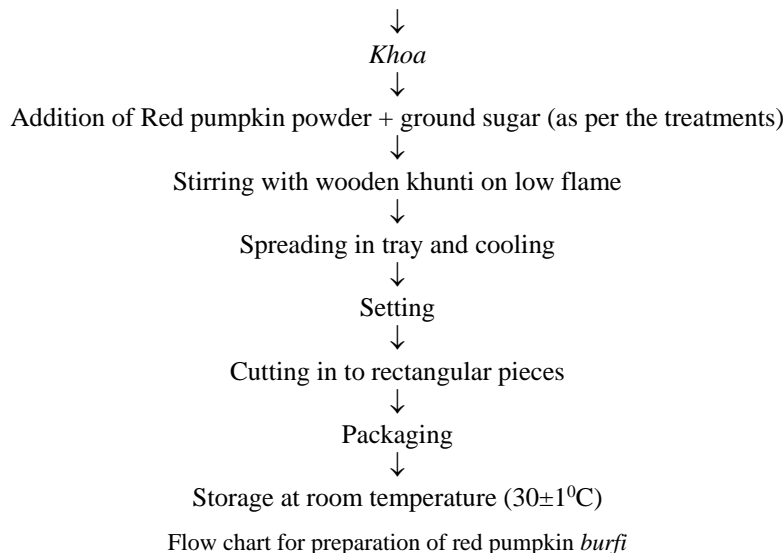
Treatments	Colour and appearance	Body and Texture	Flavour	Overall acceptability
T ₀ (0)	7.47 ^e	7.25 ^b	7.32 ^f	7.31 ^e
T ₁ (1 %)	7.52 ^{de}	7.27 ^{gh}	7.43 ^{ef}	7.45 ^{de}
T ₂ (3 %)	7.65 ^{cd}	7.38 ^{fgh}	7.50 ^{def}	7.58 ^{cd}
T ₃ (5 %)	7.70 ^{bc}	7.46 ^{efg}	7.56 ^{cde}	7.69 ^{bc}
T ₄ (7 %)	7.73 ^{bc}	7.57 ^{def}	7.68 ^{cd}	7.66 ^{bc}
T ₅ (9 %)	7.75 ^{bc}	7.67 ^{cd}	7.70 ^{cd}	7.67 ^{bc}
T ₆ (11 %)	7.79 ^{bc}	7.64 ^{cde}	7.57 ^{cde}	7.68 ^{bc}
T ₇ (13 %)	7.87 ^b	7.41 ^{fgh}	7.71 ^c	7.71 ^{bc}
T ₈ (15 %)	8.18 ^a	7.91 ^{ab}	8.15 ^a	8.21 ^a
T ₉ (17 %)	8.27 ^a	8.05 ^a	8.23 ^a	8.24 ^a
T ₁₀ (19 %)	8.11 ^a	7.78 ^{bc}	7.94 ^b	7.78 ^b
S.E. \pm	0.06	0.06	0.06	0.05
CD at 5 %	0.18	0.20	0.20	0.15

(Sensory score out of 9)

Preparation of red pumpkin powder

Flow chart for pumpkin powder preparation (Kumar *et al.*, 2015) ^[5]

Preparation of red pumpkin *burfi*



The *burfi* samples were prepared by using the standard procedure described by Aneja *et al.* (2002)^[1] with suitable modifications.

Table: Experimental Treatment details

T₀ (Control)	Khoa + 0 % without red pumpkin powder + 30 % Sugar
T ₁	Khoa + 15 % red pumpkin powder + 30 % Sugar
T ₂	Khoa + 17 % red pumpkin powder + 30 % Sugar
T ₃	Khoa + 19 % red pumpkin powder + 30 % Sugar

Sensory Evaluation

The *burfi* samples under preliminary and experimental trials were subjected to sensory evaluation using the method described in IS: 6273, Part –I and II (1971)^[3] adopting 9 point Hedonic Scale. A panel of 5 trained judges was formulated for this purpose. The samples were coded every time to conceal their identity and were offered to the judges for evaluation of the quality attributes.

Statistical Analysis

Experiment was laid out in Completely Randomized Design (CRD) with 3 replications for preliminary trials and 5 replications for experimental trials. The data was tabulated and analyzed according to Snedecor and Cochran (1994)^[8].

Result and Discussion

Colour and appearance

The results for colour and appearance presented in the Table 2. The mean colour and appearance score for the treatments T₀, T₁, T₂ and T₃ were 7.40, 8.20, 8.28 and 7.64, respectively. It was revealed that the mean sensory score for colour and appearance of the product under different treatments was significant (P<0.05 %). It means that the addition of different levels of pumpkin powder in the *burfi* influenced the colour and appearance of the product. It become more dense with increased levels of pumpkin powder which adversely affected sensory score. All the treatments differed significantly among themselves. The treatment T₂ had 8.28 colour and appearance score which was superior among other treatments in term of its colour and appearance under study. Whereas treatment T₀ (7.40) had the lowest but sensorily acceptable sensory score.

Table 2: Sensory quality of fresh red pumpkin *burfi*

Treatments	Sensory quality			
	Colour and appearance	Body and Texture	Flavour	Overall acceptability
T ₀	7.40 ^c	7.53 ^a	7.35 ^d	7.38 ^c
T ₁	8.20 ^a	7.46 ^b	8.12 ^b	8.10 ^b
T ₂	8.28 ^a	7.56 ^a	8.30 ^a	8.30 ^a
T ₃	7.64 ^b	7.39 ^b	7.54 ^c	7.45 ^c
S.E. ±	0.04	0.02	0.02	0.06
CD at 5 %	0.14	0.06	0.06	0.19

(Sensory score out of 9)

Body and Texture

The mean body and texture score for the *burfi* samples were 7.53, 7.46, 7.56 and 7.39, respectively (Table 2). The body and texture of the *burfi* significantly (P<0.05 %) differed due to addition of pumpkin powder in *burfi* samples. The treatment T₀ and T₂ had highest body and texture score where as the treatment T₃ had lowest consistency score. It indicated that the *burfi* become more hard texture with increased level of pumpkin powder. The treatment T₀ and T₁ were at par.

Flavour

The flavour score for red pumpkin *burfi* in present study for different treatments were 7.35 (T₀), 8.12 (T₁), 8.30 (T₂) and 7.54 (T₃), respectively (Table 2). The influence of incorporation of red pumpkin powder in the *burfi* samples was significant (P<0.05). All the experimental treatments significantly (P< 0.05) differed among themselves at all the stages of storage. Decrease in flavour score of *burfi* samples was observed in all the samples, but decrease in extent was more in T₀ and T₃ as compare to other samples. The decrease

in flavor may be attributed due to loss in freshness, which is inherent with any food product. It was due to rancid flavour developed in the *burfi* samples. Similar observation with respect to flavour degradation was recorded on kalakand by Rao and Gayal (2007)^[7].

Overall acceptability

The overall acceptability of any food product depends on mainly sensory attributes i.e. colour and appearance, body and texture, flavour and taste of particular product. The overall acceptability score for red pumpkin *burfi* sample was 7.38 (T₀), 8.10 (T₁), 8.30 (T₂) and 7.45 (T₃), respectively (Table 2). The overall acceptability of red pumpkin *burfi* sample was significantly (P<0.05) influenced due to incorporation of pumpkin powder in the product. The treatment T₂ (8.30) had highest overall acceptability score followed by T₁ (8.10), T₀ (7.38) and T₃ (7.45), respectively. All the treatments significantly (P<0.05) differ among themselves. The treatment T₁ and T₂ comparatively had higher overall acceptability score over the treatments T₀ and T₃. Waghmare (2012)^[9] described the preparation of burfi from buffalo milk with constant level of sugar (30 per cent weight of khoa) and

different levels of bottle gourd pulp (5, 10 and 15 per cent by weight of khoa). He observed that the overall acceptability score ranged in between 6.87 to 8.53. The burfi prepared by using 5 per cent pineapple pulp secured highest score for overall acceptability i.e. 8.40 and ranked as the most acceptable product.

Bankar *et al.* (2013)^[2] described the preparation of burfi from buffalo milk with constant level of sugar (30 per cent weight of khoa) and different levels of pineapple pulp (5, 10 and 15 per cent by weight of khoa). Who observed that the overall acceptability score ranged in between 7.74 to 8.47. The burfi prepared by using 10 per cent pineapple pulp secured highest score for overall acceptability i.e. 8.47 and ranked at most acceptable product.

Conclusion

The most acceptable red pumpkin *burfi* can be prepared using 17 per cent pumpkin powder and 30 per cent sugar. The prepared red pumpkin *burfi* from 17 per cent pumpkin powder had 8.28 colour and appearance score, body and texture 7.56, flavour score 8.30 and overall acceptability score 8.30.

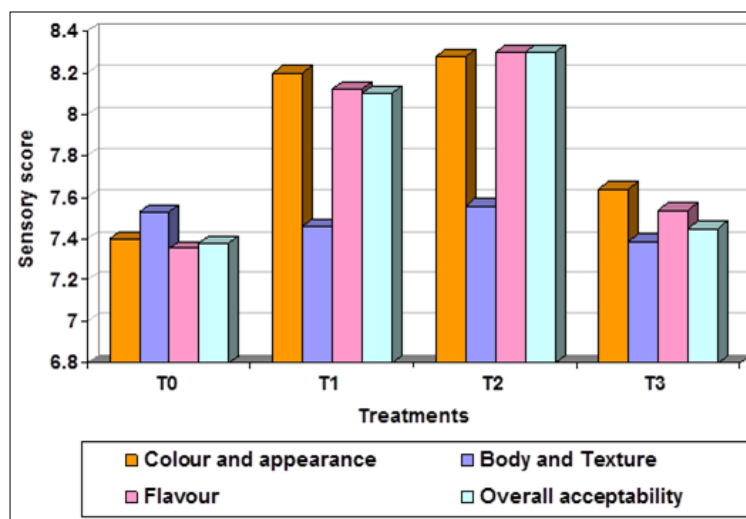


Fig 1: Type of sensory score

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