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Formulation and sensory evaluation of fig (Anjeer) incorporated camel and buffalo milk based khoa burfi

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Abstract

The fig, one of the most important fruit species is a power house of nutrients such as dietary fiber and minerals like calcium and potassium. The development of Fig (Anjeer) incorporated Camel and Buffalo Milk based Khoa Burfi is an attempt to popularize the variety of value added Indian sweet meats, which are now in demand for export to the western countries where a sizable Indian population reside. Keeping in view, the present study was conducted to formulate and assess the sensory evaluation of Fig (Anjeer) incorporated Camel and Buffalo Milk based Khoa Burfi. Khoa was prepared by using 50% of camel milk and 50% of buffalo milk and then the incorporation of Fig (Anjeer) paste was done. A control sample (T₀) was prepared without incorporation of fig paste but different treatments were prepared by adding different level of fig paste as T₁ (90 parts of buffalo and camel milk khoa and 10 Parts of Fig paste), T₂ (90 parts of buffalo and camel milk khoa and 20 Parts of Fig paste) and T₃ (90 parts of buffalo and camel milk khoa and 30 Parts of Fig paste). Burfi samples were subjected to the sensory evaluation by using the 8-point hedonic scale by a group of semi-trained panelists. On the basis of sensory assessment, a highly significant difference ($p < 0.01$) was observed between the treatments of camel and buffalo milk based khoa burfi mixed with fig paste for all the sensory parameters like flavour, body and texture, appearance and colour and overall acceptability. Thus from the present study it may be concluded that various levels of fig paste have a substantial effect on the sensory quality of camel and buffalo milk based khoa burfi blended with fig paste with very good acceptability.

Keywords: Camel milk, buffalo milk, khoa, fig, burfi

Introduction

Milk and milk products are nutrient-dense foods and their consumption can add diversity to diets. Animal milk play an important role in the diets of children in populations with very low fat intakes and limited access to other animal source foods (Devi, 2018) [4]. Approximately 50-55 per cent of total milk produced in India is converted into traditional dairy products such as paneer, dahi, khoa etc. while the share of khoa is around 7 per cent of total dairy production (Kumar, 2013) [12].

Camel milk is considered to have anti-cancer (Magjeed, 2005) [14], and anti-diabetic properties (Agarwal *et al.* 2003) [1]. Camel milk is unique in terms of having low fat (1.5-3 per cent) and low protein (2.5 per cent) (Gorachiya, 2017) [6]. Camel milk is not only consumed as food, but also as remedy. It is the closest to human mother milk but different from other milks, however, having low sugar, cholesterol and high minerals (sodium, potassium, iron, copper, zinc and magnesium, and vitamin C). Fresh and fermented camel milk is having antibacterial, therapeutic properties and important nutritional and functional source (Wernery, 2006) [18].

Milk from buffalo is preferred for dairy products of western and traditional (indigenous) type and is nutritionally superior. It contains less cholesterol (total cholesterol 275 mg and free cholesterol 212 mg per 100 g of fat) compared to cow milk (total cholesterol 330 mg and free cholesterol 280 mg per 100 g of fat). The main buffalo milk proteins show high homology to their cow counterparts; therefore, buffalo milk proteins are potential precursors for diversified functionalities (D'Ambrosio *et al.* 2008) [7].

Amongst the traditional milk products, khoa is an important indigenous heat coagulated, partially dehydrated milk product, popular throughout the country. The food and nutritive value of khoa is very high. Khoa contains all the milk solids in approximately four fold concentration, therefore, the food and nutritive value of khoa is very high. Burfi is one of the most popular khoa based indigenous milk product prepared from cow and buffalo milk and is relished all over India.

Several varieties of this product are available in the market depending on the special ingredient used in the preparation of the product. The generic nomenclature “burfi” covers a wide range of product variations that include plain, danedar, dudh, chocolate, fruit and coconut burfi. Typically, it has a mildly caramelized and pleasant flavour. Multi-layered and multi-coloured varieties are also produced (Varma *et al.* 2013) [17].

Fig (*Ficus carica*) is an important member of the genus *Ficus*. It is ordinarily deciduous and commonly referred to as “fig”. The fig is an important harvest worldwide for its dry and fresh consumption. Its common edible part is the fruit which is fleshy, hollow, and receptacle. Fruits can be eaten raw, dried, canned, or in other preserved forms. Fruits contained the highest levels of polyphenols, flavonoids, and anthocyanins and exhibited the highest antioxidant capacity (Caliskan and polat, 2011) [3]. The dried fruits of *F.carica* have been reported as an important source of vitamins, minerals, carbohydrates, sugars, organic acids, and phenolic compounds. The fresh and dried figs also contain high amounts of fiber and polyphenols. Its fruit, root, and leaves are used in traditional medicine to treat various ailments such as gastrointestinal (colic, indigestion, loss of appetite, and diarrhea), respiratory (sorethroats, coughs, and bronchial problems), and cardiovascular disorders and as anti-inflammatory and antispasmodic remedy (Mawa *et al.* (2013) [5].

Materials and Methods

Material collection and sample preparation

Fresh camel milk was collected from camel dairy maintained at ICAR-NRC on Camel, Bikaner and fresh buffalo milk was collected from buffaloes maintained under the „Buffalo Unit“ of Dept. of LPT, CVAS, RAJUVAS, Bikaner. All samples were collected manually in sterile bottles and were kept under chilled condition to perform the different experiments

Formation and accessibility of camel and buffalo milk based khoa burfi blended with or without fig paste

Formation of khoa was done by using different ratio of camel and buffalo milk. Best result was obtained on the basis of high yield, consistency of khoa and low cost of production by combination of 50% camel milk and 50% buffalo milk. On the basis of evaluation for quality parameters like yield, consistency of khoa, cost of production, sensory evaluation and physico-chemical characteristics, optimum ratio of admixture of camel and buffalo milk was determined.

Burfi was prepared as per the method described by Reddy (1985) [9]. Received milk was preheated at 35-40°C before filtration. Then milk was filtered in order to remove the visible dust and dirt particle. The process involved standardization of camel and buffalo mixed milk to 6 per cent fat and 9 per cent SNF, taken in an iron karahi and heated on gentle fire. At the time of boiling, milk was stirred with the help of a khunti in a circular manner. The stirring-cum-scrapping process was continued till a pasty consistency was reached. Then temperature was lowered upto 77-79 °C. At this stage, watermelon seeds as per treatment and sugar @ 30 per cent of khoa were added. Finally this mixture was heated on a low fire with stirring till the desired texture was obtained. It was then spread in a tray and allowed to cool. After setting, camel and buffalo milk khoa based watermelon seeds burfi was cut into rectangular blocks and stored at refrigeration ($4 \pm 1^\circ\text{C}$) followed by packaging.

Product development

For the preparation of fig incorporated camel and buffalo milk khoa burfi the following treatment combinations were taken for study:

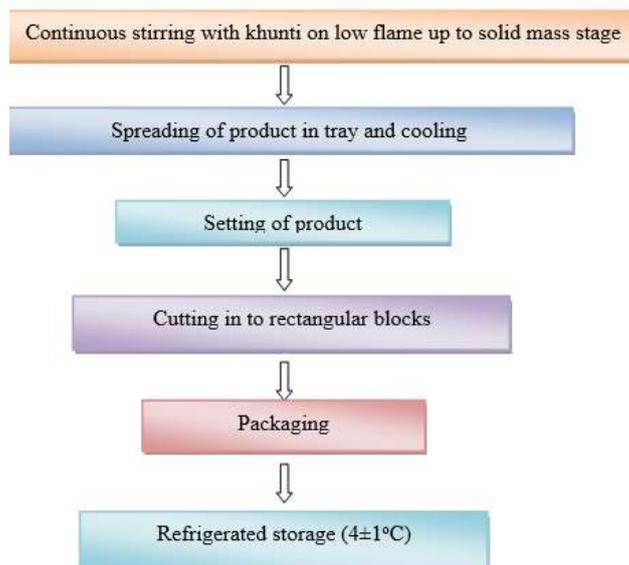
T₀= 100 parts of buffalo and camel milk khoa by weight + 0 Parts of Fig paste.

T₁= 90 parts of buffalo and camel milk khoa by weight + 10 Parts of Fig paste.

T₂= 80 parts of buffalo and camel milk khoa by weight + 20 Parts of Fig paste.

T₃= 70 parts of buffalo and camel milk khoa by weight + 30 Parts of Fig paste.





Sensory evaluation of camel and buffalo milk based khoa burfi blended with fig paste

Using the 8-point hedonic scale, the sensory assessment of camel and buffalo milk dependent khoa burfi mixed with fig paste was carried out to understand the sensory characteristics such as appearance and color, taste, body and texture, and overall acceptability. Eight semi-trained panelists were participating in the sensory appraisal, composed of university

staff and pupils. In plastic plates under fluorescent light, the control camel and buffalo milk khoa burfi and all the preparations of camel and buffalo milk based khoa burfi blended with fig paste were presented. Both samples were labelled with digital code, and for each panelist, the order of presentation of samples was randomized. The result of camel and buffalo milk based khoa burfi blended with fig paste have been presented in Table 1 and depicted in Fig 1.

Table 4.6.1(a): Effect of various levels of fig paste on sensory quality of camel and buffalo milk burfi (mean \pm SE)

Type of khoa	Flavour	Body and Texture	Appearance and Colour	Overall acceptability
T ₀	7.33 ^c \pm 0.034	7.04 ^d \pm 0.027	7.23 ^b \pm 0.029	7.20 ^a \pm 0.050
T ₁	7.64 ^b \pm 0.052	7.28 ^c \pm 0.049	7.34 ^b \pm 0.058	7.42 ^a \pm 0.040
T ₂	7.14 ^c \pm 0.039	6.91 ^c \pm 0.036	6.93 ^b \pm 0.049	6.99 ^a \pm 0.028
T ₃	6.93 ^a \pm 0.011	6.72 ^a \pm 0.064	6.81 ^a \pm 0.009	6.82 ^a \pm 0.041

Note: Means bearing different superscript in a column (small letter) differ significantly. T₀ – camel and buffalo milk khoa without any fig paste incorporation, T₁ – camel and buffalo milk khoa with fig paste (10 per cent), T₂ – camel and buffalo milk khoa with fig paste (20 per cent), T₃ – camel and buffalo milk khoa with fig paste (30 per cent)

The average values for all the attributes like flavour, body and texture, appearance and colour and overall acceptability for different camel and buffalo milk khoa burfi varies from 6.81 \pm 0.009 to 7.64 \pm 0.052.

The average score for flavour of control camel and buffalo milk khoa burfi (T₀) was found to be 7.33 \pm 0.034 and for camel and buffalo milk based khoa burfi blended with fig paste i.e. for T₁, T₂ and T₃ it was found to be 7.64 \pm 0.052, 7.14 \pm 0.039 and 6.93 \pm 0.011 respectively. Thus it may be concluded that T₁ (10 per cent fig incorporated camel and buffalo milk khoa burfi) scored maximum point 7.64 \pm 0.052 for flavour by the panellist.

The average score for body and texture of control camel and buffalo milk khoa burfi (T₀) was found to be 7.04 \pm 0.027 and for T₁, T₂ and T₃ it was found to be 7.28 \pm 0.049, 6.91 \pm 0.036 and 6.72 \pm 0.064 respectively. Thus it may be concluded that T₁ scored maximum point i.e. 7.28 \pm 0.049 for body and texture by the panelist whereas T₃ obtained minimum point i.e. 6.72 \pm 0.064 for body and texture.

The average appearance and color point of the control camel and buffalo milk khoa burfi (T₀) was observed to be 7.23 \pm

0.029 and 7.34 \pm 0.058, 6.93 \pm 0.049 and 6.81 \pm 0.009 respectively for T₁, T₂ and T₃. It can therefore be estimated that T₁ (10 per cent fig paste incorporated camel and buffalo milk khoa burfi) scored a maximum of 7.34 \pm 0.058 for the appearance and color of the panelists. Whereas camel and buffalo milk based khoa burfi combined with 30 per cent fig paste (T₃) obtained a minimum appearance and color point of 6.81 \pm 0.009. Maximum overall acceptability was obtained for T₁, i.e. 7.42 \pm 0.040. Whereas control and burfi blended with fig paste (T₂) and (T₃) it was found to be 7.20 \pm 0.050, 6.99 \pm 0.028 and 6.82 \pm 0.041 respectively.

From the data related to analysis of variance between treatments as shown in Table 2. A highly significant difference ($p < 0.01$) was observed between the treatments of camel and buffalo milk based khoa burfi mixed with fig paste for flavour, body and texture, appearance and colour and overall acceptability. It can therefore be assumed that the various levels of fig paste have a substantial effect on the sensory quality of camel and buffalo milk based on khoa burfi blended with fig paste.

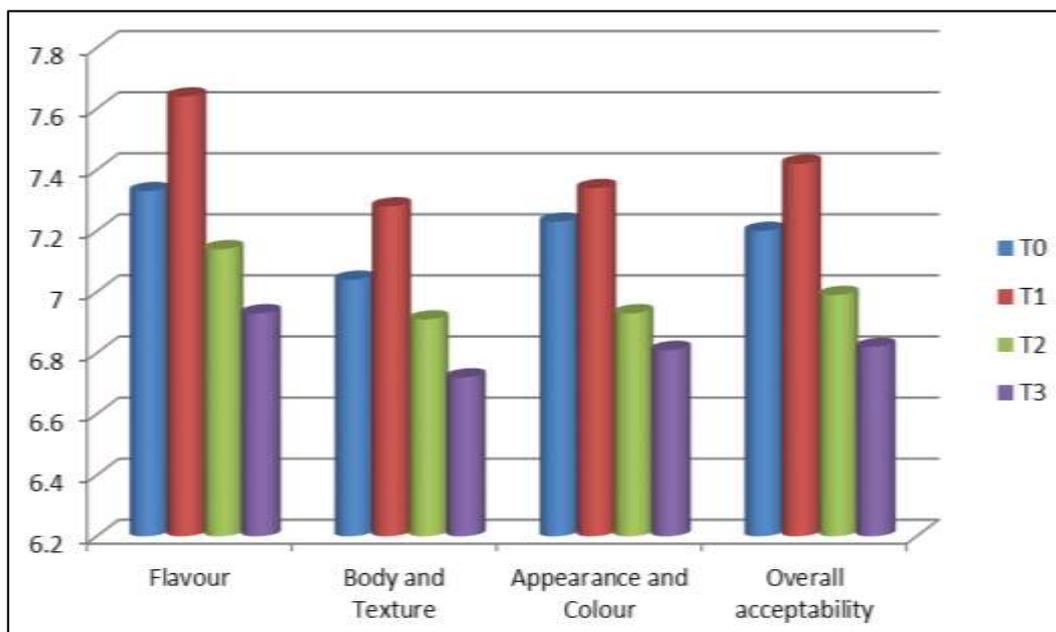


Fig 1: Effect of various levels of fig paste on sensory quality of camel and buffalo milk burfi

Table 2: Analysis of variance of sensory quality (between treatments) for camel and buffalo milk based khoa burfi blended with fig paste

Parameter	D.F.	Mean square	Level of sig.
Flavour	3	0.363467	S**
Body and Texture	3	0.221167	S**
Appearance and Colour	3	0.247400	S**
Overall acceptability	3	1.194717	S**

** = Highly Significant ($P < 0.01$)

The results of sensory evaluation in present study are in accordance with the results reported for pineapple burfi (Kamble *et al.* 2010) [10], Sweet orange burfi (Golande *et al.* 2012) [8], ash gourd burfi (Nikam, 2012) [15], pineapple burfi (Kumar *et al.* 2016) [11], finger millet burfi (Kapare, 2017) [13] and green chick pea burfi (Baburao *et al.* 2019) [2], in which 10 per cent incorporation of respective ingredient was selected as best with respect to other treatments. The results for flavour and overall acceptability for camel and buffalo milk based khoa burfi blended with watermelon seeds as per the findings of Singh (2020) [16] however the results for body and texture and appearance and colour are not in accordance with findings of Singh (2020) [16].

Conclusion

From Findings of the present study it may be concluded that the inclusion of fig, enhanced the sensory quality like flavour, Body and Texture, Appearance and Colour and overall acceptability. It can therefore be assumed that the various levels of fig paste have a substantial effect on the sensory quality of camel and buffalo milk based on khoa burfi blended with fig paste.

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