International Journal of Chemical Studies

P-ISSN: 2349–8528
E-ISSN: 2321–4902
IJCS 2019; 7(5): 1852-1854

Received: 01-07-2019
Accepted: 03-08-2019

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Effect of singhara (*Eleocharis dulcis*) flour on sensory quality of peda

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Abstract
The research work on effect of different combinations of singhara flour on sensory quality, proximate composition of buffalo milk peda was conducted during 2018-2019 in the section of Animal Husbandry and Dairy Science at College of Agriculture, Nagpur. The different level of singhara flour were T1 (0%), T2 (05%), T3 (10%) and T4 (15%) with 30% sugar was mixed in a khoa for preparation of peda. The different levels of singhara flour had a definite effect on the sensory quality like flavour and sweetness, body and texture, colour and appearance also on overall acceptability of singhara flour peda. The score showed that the peda prepared by utilizing buffalo milk khoa with 5% singhara flour had secured highest score (86.47 out of 100) and ranked as most acceptable product. Thus, it is inferred that a good quality buffalo milk peda with utilizing singhara flour can be prepared by 95% khoa + 5% singhara flour with 30% sugar (Costing Rs. 323.86 kg^{-1}).

Keywords: Khoa, singhara flour, peda, sensory evaluation

Introduction
Khoa is used as base material for production of traditional dairy product *peda*. It is indigenous *khoa* based heat desiccated milk sweet prepared by heating mixer of *khoa* and sugar with addition of natural and/or artificial color and flavor until the desired characteristics texture and flavor develops. *Peda* is made into round balls of about 20-25g size, normally by rolling between the palms and flattened (Pal, 2000) [6].

Peda is highly nutritious product as it contains almost all milk solids plus sugar and other additives. It is heat desiccated indigenous milk sweet prepared by heating a mixture of *Khoa* and sugar until the desired granular and firm texture and flavor develops. The quantity of *peda* produced in India exceeds any other indigenous milk based sweet and it has also special importance in various celebrations (wedding, inaugural functions, etc.) throughout the year (Ghule *et al*., 2013) [3].

The singhara (*Eleocharis dulcis*) is one of the most popular foods for Asian people owning to its unique taste. This herbal plant belongs to the sedge family, which is often found in wet farm lands or pool districts. It has been suggested that this fruit possesses some health benefits such as antimicrobial effects on bacteria. It also has antioxidant**,** antiviral and anticancer properties, inhibition of inflammation and treatment for pharyngitis and laryngitis. *Singhara* is effective on Jaundice and loose motion due to their detoxifying properties. It is rich in polyphenolic and flavonoid compound (Ge Zhan *et al.*, 2014) [2].

Now a days, consuming low fat food gaining more importance in human diet to avoid bad cholesterol for preventing heart attack, blood pressure and obesity etc. *Singhara* contain Calories – 97 (2.40 per cent), Fat - 0.1 gm (0.010 per cent), Potassium – 584 mg (58.4 per cent), Sodium – 14gm (1.4 per cent), Carbohydrate – 24 gm (2.40 per cent), Protein – 1.4 gm (0.13 per cent), Fiber – 2 gm (0.2 per cent), Vit. C – 6 per cent, Vit. B6 – 15 per cent as per 100 gm. *Singhara* is highly nutritious as well as low in calories and almost fat free (Gopalan, *et al.*1989) [4].

In Maharashtra, especially Eastern Vidarbha region of Chandrapur, Gadchiroli, Nagpur, Gondia and Bhandara district people are loving to eat singhara. It is seasonal nut available in winter therefor market demand of *singhara* is high. Also, *peda* is popular in this area and consume throughout the year. Hence considering the benefits of supplementation of low fat in the diet with respect to its nutritional and medicinal value, decided to blend singhara flour for preparation of peda.

Materials and Methods

The present study was conducted on the studies on preparation of peda blended with singhara flour at Animal Husbandry and Dairy Science Section, College of Agriculture, Nagpur during the year 2018-2019. Peda prepared from buffalo milk was standardized at 6% fat. Singhara flour was added in peda at different levels, *i. e.* 0 (T_1), 5 (T_2), 10 (T_3) and 15 (T_4) part of khoa with five replications and sugar was added @ 30% of khoa.

Procedure for preparation of peda

The buffalo milk was concentrated in khoa making machine on gentle fire for obtaining khoa. Milk heated gently till pat formation, when the product started to leave the sides of machine (within 5 to 8 min), close machine and collect khoa. Khoa received in iron Karahi and heat at 90°C. Sugar (30%), cardamom (0.5%) on weight basis of khoa and roasted Singhara flour was added @ rate of 0 (T1), 5 (T2), 10 (T3), 15 (T4) as per treatment.

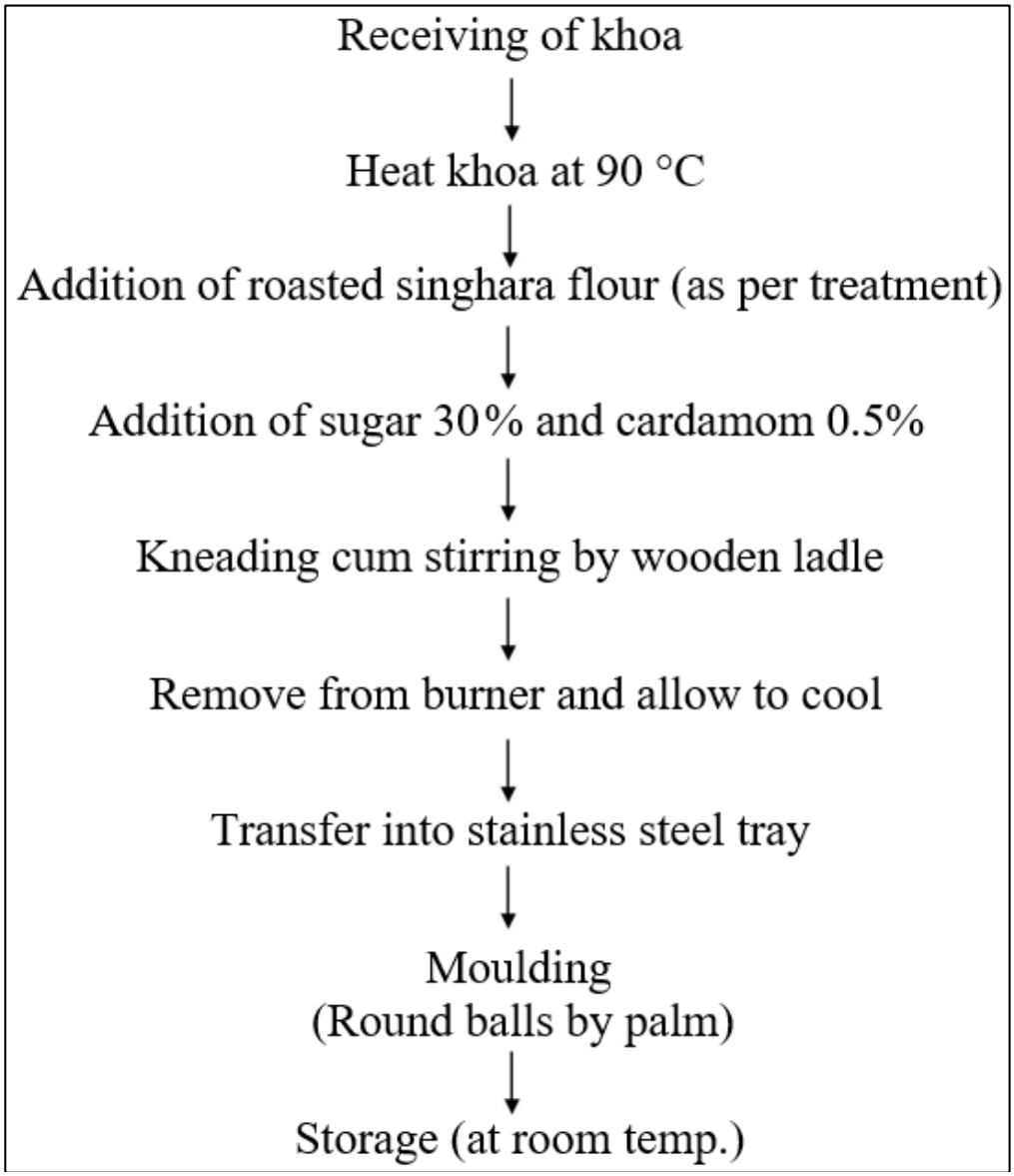

Fig 1: Flow chart for preparation of Peda blended with Singhara flour

The quality of peda was judged by offering the sample to the panel of 5 judges in each trial separately by score card method for sensory evaluation by using100 point score card prescribed by Pal and Gupta with some modifications (1985).

Table 1: Effect of Singhara flour on sensory evaluation and overall acceptability of Peda

Parameter				
Treatments (BMK:SF)	Flavour and Sweetness (45)	Body and Texture (35)	Colour and Overall	
			Appearance (20)	Acceptability (100)
T_1 (100:00)	37.44[b]	30.07[b]	17.70[b]	85.21[b]
T_2 (95:05)	38.20[a]	30.52[a]	17.75[a]	86.47[a]
T_3 (90:10)	33.56[c]	28.51[c]	16.72[c]	78.79[c]
T_4 (85:15)	32.28[d]	27.55[d]	16.12[d]	75.95[d]
S.E.(m) ±	1.09	0.75	0.30	1.76
C. D. at 5%	3.27	2.25	0.92	5.29
Result	Sig.	Sig.	Sig.	Sig.

(BMK - Buffalo Milk Khoa, SF - Singhara Flour, * P<0.05)

Results and Discussion

The statistical analysis of data were analyzed by using Completely Randomized Design (CRD) as per Steel and Torrie (1981) having four treatments with five replications for flavour and sweetness, body and texture, colour and appearance and overall acceptability.

Flavour and sweetness

The score for flavour and sweetness was increased upto T_2 i.e. 5 parts addition of singhara flour, thereafter score was declined simultaneously. The highest score (38.20) was obtained by the treatment T_2 i.e. at 5 parts level of singhara flour and the lowest score (32.28) was obtained by treatment T_4 i.e. peda prepared with 15 parts addition of singhara flour. This finding is in tune with Datarkar (2012) [1] in singhara flour burfi.

Body and texture

The highest score (30.52) was obtained by the treatment T_2 i.e. at 5 parts level of singhara flour and the lowest score (27.55) was secured by in treatment T_4 i.e. peda prepared with 15 parts of singhara flour. Similar results were reported by Pawar (2008) [7] in sago powder peda.

Colour and appearance

The highest score (17.75) was obtained by the treatment T_2 i.e. at 5 parts level of singhara flour and the lowest score (16.12) was secured by in treatment T_4 i.e. peda prepared with 15 parts of singhara flour. Similar results were reported by Datarkar (2012) [1] in singhara flour burfi.

Overall acceptability

The overall acceptability of peda was significantly affected by addition of singhara flour. Peda prepared with treatment T2 (86.47) was significantly superior over the rest of the treatments i.e. T_1 (85.21), T3 (78.79) and T4 (75.95). The lowest score obtained by peda prepared with 15 parts addition of singhara flour (T4). The present results study are in line with Sirsat (2011) [11] and Datarkar (2012) [1] in ash gourd peda and singhara flour burfi respectively.

Conclusions

It can be concluded from the research study that the,

1. It may be inferred that the superior, nutritional and medicinal quality singhara peda can be prepared by addition of 5 parts of singhara flour and 95 parts buffalo milk khoa with 30 per cent sugar level which had mild pleasant flavour, soft, smooth body with grained texture and light yellowish to brown colour.
2. Singhara flour (5%) could be successfully and economically used for preparation of peda.

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