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Research Article

EFFECT OF FRUCTOOLIGOSACCHARIDES (FOS) ON PHYSICO CHEMICAL AND SENSORY CHARACTERISTICS OF KHOA (INDIGENIOUS MILK PRODUCT)

Praveen, A.R*., Arunkumar,H., Jayaprakasha H.M and Manjunatha, H

Dept of Dairy Technology, Dairy Science College, Hebbal Bengaluru-560024

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ABSTRACT

An attempt has been made to develop khoa (Indian concentrated milk product) by replacing milk fat with FOS at 25, 50, 75 and 100 per cent level. The entire treated sample was recorded significantly higher moisture, fiber and yield of the product but recorded lower fat, protein, lactose, ash content. Whereas, colour and appearance scores were found non significant difference but at 25 per cent product was awarded significantly higher flavor (8.51) and overall acceptability (8.33) than the control. This indicates addition of FOS could significantly improve the functional and sensory characteristic of the khoa.

INTRODUCTION

Khoa is one of the most popular tradional dairy products in India. Among the traditional dairy products, khoa occupies significant place. It is also known as khoya, khava, kava, Khawa, palghoa or mawa. According to (FSSR 2011), khoa defined as Khoya, by whatever variety of names it is sold such as Pindi, Danedar, Dhap, Mawa or Kava, means the product obtained from cow or buffalo or goat or sheep milk or milk solids or a combination thereof by rapid drying. The milk fat content shall not be less than 30 percent on dry weight basis of finished product. Khoa contains concentrated quantities of proteins, minerals fat and lactose in addition fat soluble vitamins. Furhter utilization of khoa as base material for production of peda and kalakand increases value of the product. Peda, kalakand and many khoa based sweets are prepared throughout the country. These are prepared by mixing khoa with abut 30 per cent sugar intern provides preservative effect, giving long shelf life. Peda is popular in north as sandesh in east. The best peda comes from the land of Brindavan in Mathura. Aneja *et al.,* (2002).

With the changing lifestyle in affluent and technologically developed societies diseases like obesity, diabetes and cardiovascular diseases have become major health problems. India is one of the 6 countries of the IDF south East Asia region. 425 million people have diabetes in the world and 82 million people in the SEA Region; by 2045 this will rise to 151 million. There were over 72.946.400 cases of diabetes in India in 2017 (IDF, 2017). It's the need of the hour to create the low calorie food and dairy products for the needy diabetic and CVD patients without much affecting the taste and sweetness, in this context several low calorie dairy products were in the market but still market for these product under established because of the myth of side effects.

FOS is considered as health promoting food ingredient and many researchers were already enlightened the role and functions of these ingredients in food product preparation. The variation of chemical and structural confirmation characterized FOS makes them feasible and appealing by products for different food applications (Borromei, 2009). Currently FOS is increasingly included in food products and infant formulas due to their prebiotic effect stimulate the growth of non-pathogenic intestinal microflora. Now people are interesting towards in low calorie foods. But fat plays important role in providing characteristic texture, colour and flavour to the product. Being aware of the impact of the fat on health, today health conscious consumer is looking for the low fat dairy products with added functional ingredient such as fiber content

Corresponding author:* **Praveen, A.R
Dept of Dairy Technology, Dairy Science College, Hebbal Bengaluru-560024

MATERIALS AND METHODS

Fructooligosaccharide (FOS) i.e fossenceL95 was procured from Tata chemicals Bengaluru, Fat, protein, ash and moisture was estimated by (IS: SP18 (PartX1), 1981). Fibre content was estimated by as per AOAC (2000). Poly ethylene terephthalate (PET) cups was used for packaging of product.

The method followed for khoa preparation as respect to Aneja *et al.,* (2002).

Fresh milk(4.5% fat and 8.5% Snf) was standardized and heat treatment with vigorous stirring, the product attained to doughy stage the addition of FOS @25, 50, 75 and 100% level then cooled, moulded and khoa was obtained

RESULTS AND DISCUSSION

Effect of various levels of fat replacers on the quality of khoa

The control khoa recorded moisture fat, protein, lactose, ash and yield per cent of 33.19, 22.95, 17.34, 22.95, 3.57, 0.84 and 19.60 per cent respectively. As the FOS incorporation increased from 25 to 100 per cent there was significant increase in the moisture from 34.69 to 39.02 per cent, fibre from 5.09 to 19.50 percent, water activity (a_w) from 0.86 to 0.87 and yield of from 19.88 to 20.72 per cent respectively. However khoa prepared by replacing milk fat with 25 to 100 per cent level the fat 16.97 to 0.09 per cent, protein 17.10 to 16.40 per cent, lactose 22.63 to 22.71 and ash content 3.57 to 3.37 was observed in decreased trend respectively. This could be due to increase in the moisture and increased yield of the treated samples with increase in incorporation of FOS. Whereas, fiber content of all treated samples were found to significantly higher than that of control. Ahmadi *et al.,* (2014) reported that addition of FOS in yoghurt ice cream improves chemical properties and Srisuvor, et *al.,* (2013), studied that the addition of polydextrose (FOS) could improve physical and sensory properties of the yoghurt.

Effect of replacement of milk fat with FOS on the sensory characteristics of khoa

The khoa was prepared by replacing milk fat with FOS at 25, 50, 75 and 100 and control results pertaining to the sensory characteristics were presented in Table 2. The highest colour and appearance score was awarded to control (8.26) whereas, product prepared by replacing milk fat with FOS at 25, 50, 75 and 100 per cent were 8.17, 8.19, 8.16 and 8.15 respectively. The FOS incorporated samples were found statistically non significant on colour and appearance scores ($p \leq 0.05$) at all levels. Similarly Ramesh and Beniwal (2009), concluded that no effect of additives (preservatives) on storage stability of khoa based product called peda (sweet).

There was non significant difference in body and textural score 8.32 was awarded to the product prepared by replacing milk fat with FOS at 25 per cent compared to control and significantly lower when compared to other treated samples. Hence, incorporation of FOS at 25 per cent level was found to be optimum. At higher levels of FOS incorporated product scored less could be due to poor body and texture. The maximum flavour score was awarded to 25 per cent fat replaced khoa sample (8.51) when compared with control khoa (8.26) this may be due to slight increase in sweet taste of the product imparted from the addition of FOS. Further there was significant decrease of flavour scores was recorded with increase in addition of FOS was observed.

Similarly Renuka *et al.,* (2010) concluded that FOS as a low calorie sweetener and healthier alternative for sucrose in the preparation of some of the popular Indian sweet delicacies. The 25 fat replaced khoa sample secured maximum mean score for overall acceptability 8.33 whereas, control khoa secured the score of 8.31. (Rani and vidya 2016) and Handa, *et al*., 2012 utilized FOS in yoghurt and cookies preparation successfully with higher sensory scores.

Table 1 Effect of replacement of milk fat with FOS on the physico chemical characteristics of khoa

Fat replacement levels (%)	Moisture %	Fat%	Protein%	Lactose%	Ash %	Fibre %	a_w	Yield %
Control	33.19^a	22.95^a	17.34^a	22.95^a	3.57^a	0.00	0.84^a	19.60^a
25	34.69^b	16.97^b	17.10^a	22.63^b	3.52^a	5.09^a	0.86^b	19.88^b
50	36.10^c	11.16^c	16.86^b	22.37^c	3.47^a	10.04^b	0.87^a	20.16^c
75	37.64^d	5.50^d	16.63^c	22.01^d	3.42^a	14.80^c	0.87^a	20.44^c
100	39.02^e	0.09^e	16.40^c	21.71^e	3.37^a	19.50^d	0.87^a	20.72^d
CD ($p \leq 0.05$)	0.54	3.60	0.24	0.18	NS	2.52	0.001	0.36

Table 2 Effect of replacement of milk fat with FOS on the sensory characteristics of khoa

Fat replacement levels (%)	Colour and appearance	Body and texture	Flavour	Overall acceptability
Control	8.26	8.40^a	8.26^a	8.31^a
25	8.17	8.32^a	8.51^b	8.33^a
50	8.19	7.48^b	8.20^a	7.42^b
75	8.16	7.16^c	7.50^c	7.20^c
100	8.15	6.50^d	6.70^d	6.70^d
CD($p \leq 0.05$)	NS	0.18	0.21	0.17

All values are average of three trials
NS: Non significant

Figures with the same superscripts in column indicates non significance difference

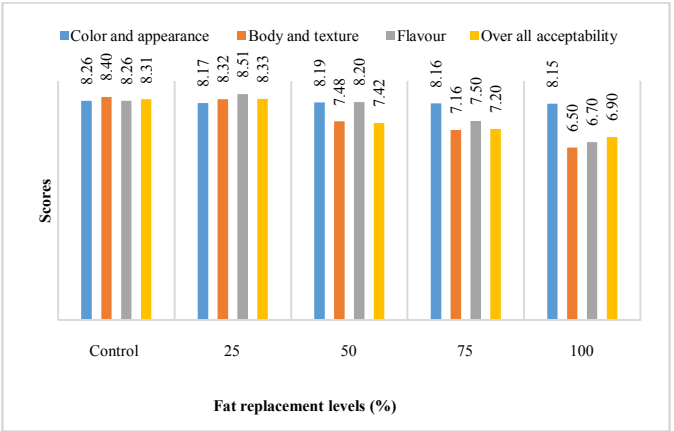

Fig 1 Effect of replacement of milk fat with FOS on the sensory characteristics of khoa

CONCLUSION

The partial replacement of milk fat with FOS could be the reason for significant increase in moisture, yield and fiber content of the product. Hence FOS could be used as a functional ingredient in the product development n which creates consumers interest and market potentiality.

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