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Studies on incorporation of date seed (*Phoenix Dactylifera* L.) powder for development of *burfi*

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Abstract
In view of the growing thrust towards value-addition of milk products the present investigation has been aimed at optimization of Date Seed Powder for development of *burfi*. To prepare this protein, fiber and antioxidant rich product, Date Seed Powder, Standardized milk (Fat 4.5% and 8.5% SNF), Carboxymethyl Cellulose (CMC), sugar and cocoa powder were used @ 1, 28 and 0.5% respectively. *Burfi* was prepared by incorporating Date Seed Powder added @ 1 (T_1), 2 (T_2), 3 (T_3) and 4 (T_4) %. The developed product was evaluated for sensory quality on 9-point hedonic scale. Results on sensory evaluation of the product revealed that the *burfi* prepared by incorporating 1% Date Seed Powder secured highest sensory score of 8.27, 8.53, 8.04 and 8.08 for colour and appearance, body & texture, flavor and overall acceptability as compared to other *burfi* samples.

Keywords: Date seed powder, value-addition, *burfi*, antioxidant

Introduction
India leads the world in milk production, accounting for 22% of global output in 2021, with an annual output of 210 million tonnes (NDDB 2021) [6]. In India, 46% of total milk production is consumed as liquid milk, while 54% is converted into variety of traditional milk products such as; Ghee, Curd, Khoa, Butter, Milk powder, Paneer, Chhana etc. Out of total milk produced, 6.5% is utilized for *Khoa* making (Anonymous, 2016) [2]. Among these "*Burfi"* which was previously limited to household production, has gained an international market in recent years due to its delicious taste, flavour and texture. Fruit, nut, chocolate, saffron, and rava *burfi* are the most popular types of *burfi* (Aneja *et al*., 2002) [1]. *Burfi* is Indian most famous milk sweet and the base material is *khoa*. It has smooth to granular texture with white to light cream in colour.

Date seed (*Phoenix dactylifera* L, family - Arecaceae) is the by-product of date processing industry. It has as an important nutritional and medicinal health promoting properties such as; dietary fibre, protein, antioxidant, phenolic compounds, iron and other essential ingredients. In India date is cultivated in 12493 hectares area in Kachchh district of Gujarat with a production of 85351 tons of dates per annum (https://en.m.wikipedia.org/wiki/Date_palm_farming_in_India). Furthermore, Rajasthan, Maharashtra, Tamil Nadu and Kerala are also the top producer of date.

Converting date seeds into flour overcomes the problem of shorter life span and also allows adjunction with wide arrays of flours to be used for value addition while providing extra advantage of nutrients and polyphenolic compound. *Burfi* can be prepared by incorporating the Date Seed Powder (DSP) to extend its nutritional and medicinal values of the traditional indigenous milk product.

In India, *burfi* is most popular khoa based milk sweet, white to light cream in colour with firm body and smooth to granular texture. *Burfi* was prepared by many research workers using various fruits like ber, papaya and sapota, mango, orange, fig etc. These fruits enhance the acceptability of *burfi* to the masses as well as choosy classes. Other ingredients are also incorporated in different proportions to meet the special needs of flavour, body and texture.

Nowadays incorporation of fruit seeds or seed powder in *Burfi* manufacture is gaining popularity amongst consumers due to typical, highly liked flavour and nutritional value. A new range of product in dairy industry, value addition as a supplement of different nutrients and high impact of growth and immune protective on the health of consumer are the advantages of developing this type of product.

Milk is deficient in fiber and antioxidant and while, incorporation of Date Seed Powder (DSP) can increases the nutritional and medicinal value of *burfi.* Thus value-added DSP based *burfi* would be an attempt towards an innovative product. There is no literature available regarding the addition of DSP in the manufacture of traditional Indian dairy products, further the DSP can also be used as fat replacer along with Carboxymethyl Cellulose (CMC). Hence the present investigation has been carried out to prepare *burfi* by incorporating the DSP and analysed the sensory quality.

2. Materials and Methods

The study has been carried out in the Department of Dairy Technology, College of Dairy Science and Food Technology, Raipur (C.G). The DSP was prepared by using the procedure given by Darwish *et al.* (2020) [3] with slight modification and the obtained powder was kept in polyethylene bags at refrigeration temperature for further use. Raw materials utilized during investigation like standardized milk**,** cane sugar, Carboxymethyl Cellulose (CMC) and cocoa powder used for manufacture of *burfi* were purchased from local market of Raipur (C.G). Four lots of *burfi* were prepared by incorporating DSP @ 1, 2, 3 and 4%. The Carboxymethyl Cellulose (CMC), sugar and cocoa powder were kept constant @ 1, 28 and 0.5% respectively.

T_1 – 1% DSP incorporated *burfi*
T_2 – 2% DSP incorporated *burfi*
T_3 – 3% DSP incorporated *burfi*
T_4 – 4% DSP incorporated *burfi*

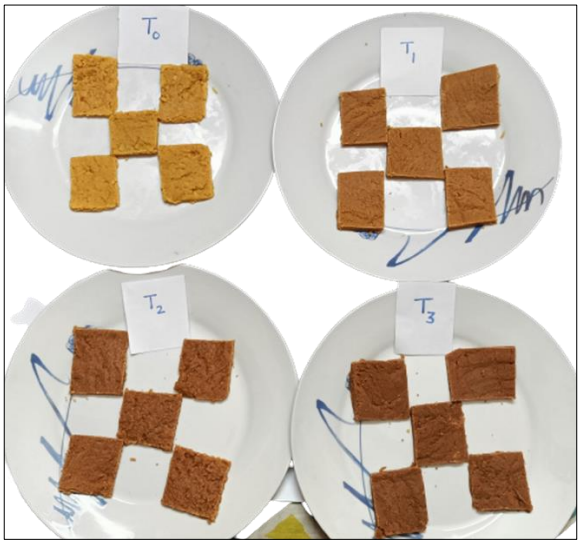


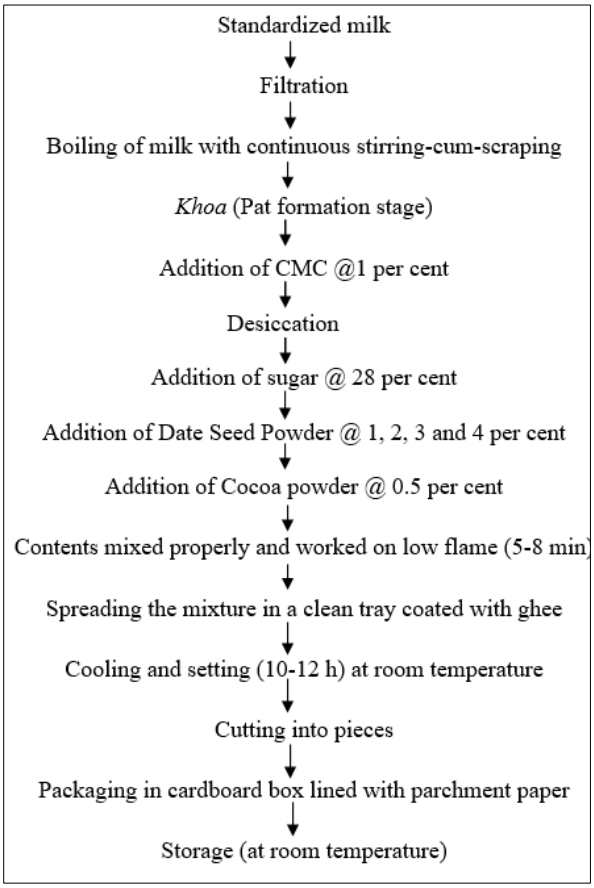
Fig 1: Images of developed *burfi*

Fig 2: Image of prepared Date Seed Powder (DSP)

2.1.1 Preparation of Date Seed Powder (DSP) incorporated *burfi*

Date Seed Powder (DSP) *burfi* was prepared as per the procedure laid down by (Kamble 2010) [5], with slight modification. Standardized milk with 4.5% fat and 8.5% SNF was concentrated in a stainless-steel pan by open pan boiling with continuous stirring and scraping until a semi-solid mass of was obtained and at this stage CMC (Carboxymethyl Cellulose) was added @1% which acts as texture improver. Sugar @ 28% of *khoa* was added to sweeten the product and desiccation was continued on low flame. When the product showed a tendency to form compact mass, the temperature was lowered to 88–90°C and then DSP was added @1, 2, 3, and 4% to make four different levels of *burfi*. This mixture was heated on a low fire with gentle stirring till the desired consistency of *burfi* was obtained, finally cocoa powder was added @ 0.5% in order to have uniform colour. It was then spread uniformly in a tray coated with ghee and allowed to cool at room temperature for 10-12 h at room temperature. The *burfi* mass was cut into pieces and packed in cardboard box lined with parchment paper and then stored at room temperature. The preparation of DSP incorporated *burfi* is shown in flow chart -1.

Preparation of Date Seed Powder (DSP) incorporated burfi



Flow chart 1: Flow chart of Date Seed Powder (DSP) incorporated *burfi*

2.1.2 Sensory evaluation for preparation of *burfi*

The sensory evaluation of Date Seed Powder incorporated *burfi* lots were subjected to sensory analysis on 9-point hedonic scale suggested by comprising *viz*. color and

appearance, body and texture, flavor, and overall acceptability (Sukanya and Michael, 2014) [8] by faculty members from College of Dairy Science and Food Technology, Raipur.

2.1.3 Statistical Analysis
The obtained data in the present investigation were statistically analysed. All data were taken as a mean of four replicates and subjected to statistical analysis using 'Completely Randomized Design' in WASP - Web Agri Stat Package 2.0 (www.ccari.res.in).

3. Results and Discussions
3.1.1 Effect of Date Seed Powder (DSP) incorporation on the sensory quality *Burfi*
The sensory evaluation is a science that measures, analyzes, and interprets the reaction of people to products as perceived by the senses of sight, smell, taste, touch and it differentiate the perceptible in terms of color and appearance, body and texture, flavor and overall acceptability as follows. The data on effect of DSP incorporation on sensory quality of fresh *burfi* is presented in Table-1.

3.1.2. Effect of Date Seed Powder (DSP) incorporation on the color and appearance of *Burfi*
It is evident from the Table 1 that the color and appearance of developed *burfi* were significantly affected by addition of Date Seed Powder (DSP) at different levels. The color and appearance scores of treatments ranged from 8.27 (T_1) to 6.26 (T_4). The *burfi* made from 1% DSP (T_1) secured the significantly highest scores (8.27) for color and appearance. Higher addition of DSP up to 3% was not found desirable as it resulted in low color and appearance score. The decrease in the score might be due to basically the DSP powder had very light brown in colour.

3.1.3. Effect of Date Seed Powder (DSP) incorporation on the body and texture of *Burfi*
The result on body and texture of product are presented in Table 1. The body and texture was greatly improved with DSP incorporation. The T_1 *burfi* had the highest body and texture score of 8.53 as compared to rest of the samples. It was clearly seen that increased rate of DSP incorporation at and above 3% lead to decrease in the body and texture score of the *burfi*, which might be ascribed to more dryness in the finished product.

3.1.3. Effect of Date Seed Powder (DSP) incorporation on the flavor of *Burfi*
Flavor is the most important characteristic of a product Also; it can be defined as, either the sensory perception of taste or smell, or a flavoring in food that produces such perception of ingested food (Romagny *et al*., 2017) [7]. The results in Table 1 revealed that there was a steady decline in the flavor score of *burfi* as the level of DSP incorporation increased and this might be associate with little bitterness as well as blandness associated with DSP. The flavor score ranged from 6.48 (T4) to 8.04 (T1). The *burfi* incorporated with 1% DSP secured the highest score of 8.04 for flavor.

3.1.4. Effect of Date Seed Powder (DSP) incorporation on the overall acceptability of *Burfi*
The values presented in Table 1 indicated that the overall acceptability scores of developed *burfi* were 8.08, 7.37, 6.94 and 6.14 for T_1, T_2, T_3 and T_4 respectively. It was observed that the *burfi* developed with addition of 1% DSP had the highest overall acceptability score of 8.07 and was found superior to the rest of the product as it secured highest score for color and appearance, body and texture and flavor.

Table 1: Effect of incorporation of Date Seed Powder (DSP) on sensory quality of *burfi*

Treatment	Sensory Score*			
	Color & appearance	Body & texture	Flavor	Overall acceptability
T1	8.27^{a}	8.53^{a}	8.04^{a}	8.08^{a}
T2	7.44^{b}	7.58^{b}	7.95^{ab}	7.37^{b}
T3	7.12^{b}	7.10^{b}	7.31^{b}	6.94^{b}
T4	6.26^{c}	6.51^{c}	6.48^{c}	6.14^{c}
'F' value	24.22	24.47	10.51	19.22
SE (m)	0.06	0.08	0.12	0.09
CD at 5%	0.52	0.53	0.69	0.57
CV	4.68	4.58	5.98	5.22

*Values represent the average of four replications

T_1 = 1% Date Seed Powder (DSP),
T_2 = 2% Date Seed Powder (DSP)
T_3 = 3% Date Seed Powder (DSP),
T_4 = 4% Date Seed Powder (DSP)

4. Conclusion
The incorporation of Date Seed Powder (DSP) in *burfi* preparation was attempted to produce an acceptable quality of *burfi* with optimum DSP incorporation. The results revealed that sensorily good quality *burfi* could be prepared by incorporating 1% DSP with good sensory score of 8.27, 8.53, 8.04 and 8.08 for colour and appearance, body & texture, flavor and overall acceptability as compared to other *burfi* samples.

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