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Studies on preparation of burfi from a blend of whole milk and soymilk

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Abstract
Experimental Burfi from a blend of Whole Milk and Soymilk samples were prepared and evaluated for various quality (sensory, chemical and microbial) parameters. The minimum score obtained by sample T_1 (8.12 ± 0.05) and T_2 was graded as "liked very much". About the chemical parameters the Fat content in *Control and Experimental burfi* sample T_0, T_1, T_2 and T_3 differed significantly ($P < 0.05$). The fat content of *Control and Experimental burfi* in T_3 was lowest (20.22%) while it was highest in T_0 (21.35%). The protein content of *Control and Experimental burfi* in T_0 was lowest (13.35%) while it was highest in T_3 (14.59%). Ash content in *Control and Experimental burfi* sample T_0, T_1, T_2 and T_3 differed significantly ($P < 0.05$). The ash content of *Control and Experimental burfi* in T_0 was lowest (2.35%) while it was highest in T_3 (3.25%). The carbohydrate content of *Control and Experimental burfi* in T_0 was lowest (44.61%) while it was highest in T_3 (45.54%). The total solid content of *Control and Experimental burfi* in T_0 was lowest (81.68%) while it was highest in T_3 (83.61%). The acidity content of *Control and Experimental burfi* in T_0 was lowest (0.25%) while it was highest in T_3 (0.58%). Sensorily best sample (T_2) was considered. The SPC was observed highest in T_3 (2220 cfu/gm) while it was lowest in T_1 (1520 cfu/gm). Coliforms was nil which is an indicative that means hygienic conditions were followed during production, processing, handling and storage.

Keywords: *Burfi, Whole Milk, Soymilk*

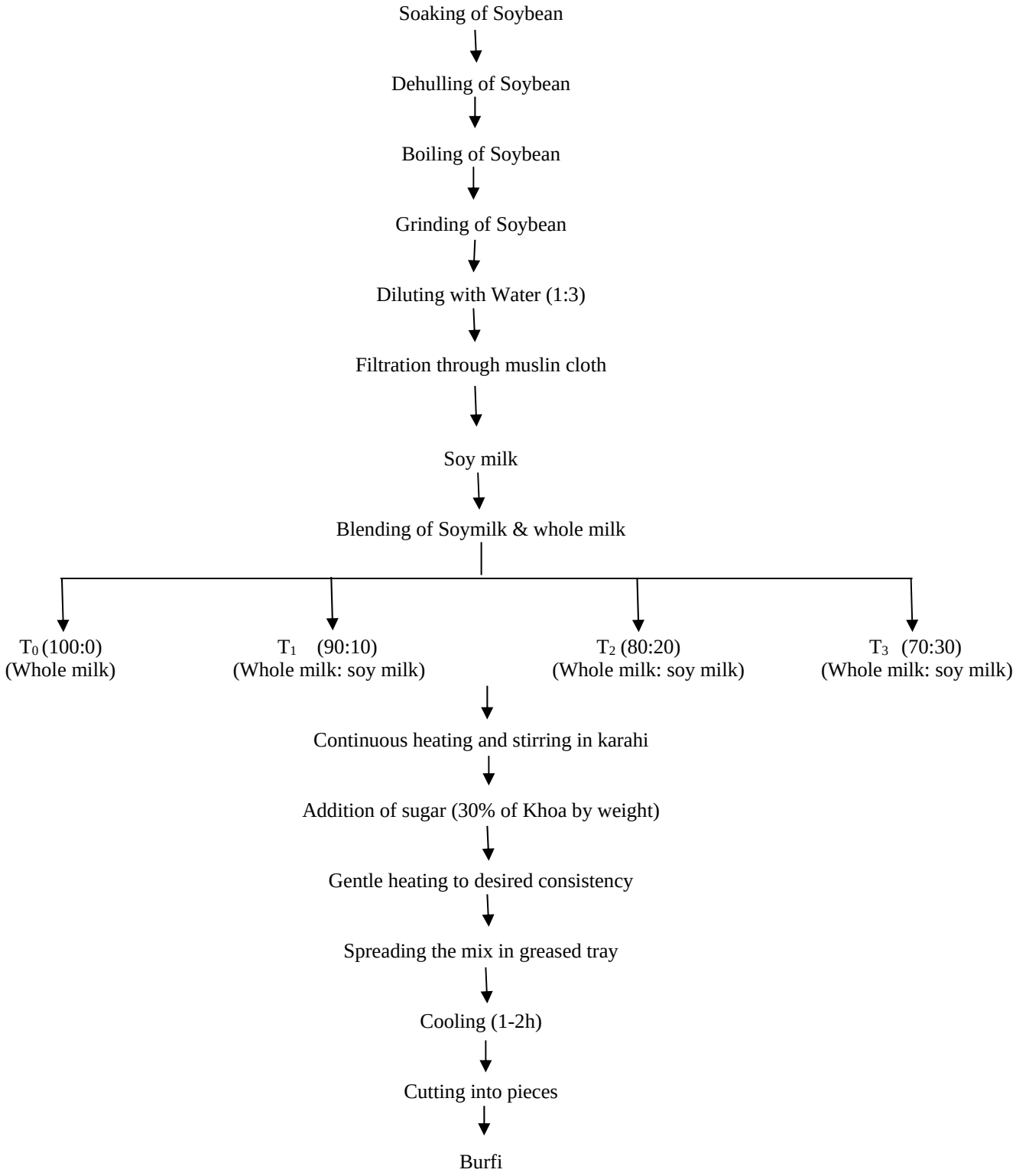
1. Introduction
At present, India is the largest milk producer in the world with annual production around 140.6 MT in 2014 (US Department of agriculture, report 2014) [7]. It has been estimated that 6.5 per cent of total milk produced in India is converted into Khoa and condensed milk products (Khan *et al.*, 2006) [4]. According to Prevention of Food Adulteration Act, as amended up to March, 2006, khoa is the product obtained from cow or buffalo (goat or sheep) milk, or a combination thereof by rapid drying containing milk fat content not less than 30 percent on dry weight basis of the final product (Kumar *et al.*, 2010) [5]. Burfi is one of the khoa based indigenous milk products prepared from cow milk or buffalo milk and is relished in India. It is highly nutritious product as it containing almost all milk solids in concentrated, easily digestible carbohydrates in form of sugar cane and variety of other additives. The total Indian sweet market is around Rs. 520 billion in terms of annual sales (Kamble *et al.*, 2010) [3].
The Soybean plant (*Glycine max)* belongs to the legume family and also called meat of the field from ancient time. Soy beans have been a food in China for thousands of years. It is both a useful pulse and an oilseed. Health professional consider soy protein as superior protein. Soybean is rich in protein content and can furnish protein supply to bridge up the protein deficiency gap at low-cost than any other crop (Rehman *et al.*, 2007) [6]. The soybean seeds contain 13- 25% oil, 30-50% protein, and 14-24% carbohydrates. The major fatty acids are linoleic acid (55%) followed by oleic acid (21%), palmitic acid (9%), stearic acid (6%) and other fatty acids (9%) It has been reported that soy protein intake about 25 g per day reduces the risk of coronary heart disease and lower blood cholesterol levels (Belewu *et al.*, 2007) [2]. Soymilk is a healthy drink and is important for people who are allergic to cow milk protein and lactose (Cheman *et al.*, 1989) [1]. Soy milk is nutritious and is considered as a cost effective source of energy and protein, it also has a great potential to solve the problem of protein energy malnutrition in India and many other developing countries.

2. Materials and method
Based on the results of various pre -experimental trials, the experimental trials were planned and conducted. Soymilk at pre-decided levels was incorporated in *Whole milk (6% Fat & 9% SNF)* for the preparation of *Experimental Burfi from a Blend of Whole Milk and Soymilk.* Levels of

sugar were kept *(30% of Khoa by weight)* constant for each treatment.

On the basis of different levels of Soymilk; various lots of *Experimental Burfi* were prepared and evaluated for sensory, chemical and microbial quality. Rests of the conditions were maintained uniform.

Schematic Flow diagram for manufacturing of Burfi



Proximate analysis: Fat content was determined by Soxhlet method as per procedure stated in IS: 1224 (Part – I) 1977. Protein nitrogen content was determined by semi – microkjeldahl's method described in IS: 1981 (Part – II). This was multiplied by 6.38 to obtain protein percentage. Carbohydrate was determined as per "Lane and Eynon" volumetric method given in IS – 4079-1967, Ash content was determined by IS: 1479 (Part – II) 1961. Total solids were determined by IS: 4079- 1967. Moisture content was determined by deducting the total solids from 100. Acidity (% LA) was determined by IS: 1479 (Part– I) 1960. For sensory evaluation score card given by Dharam Pal and Gupta (1985) with slight modification (Ashwani, 1992) was used for sensory evaluation of *Experimental Burfi from a blend of whole milk and soymilk*. Standard Plate Count (SPC) was determined by adopting standard procedure using Standard Plate Count Agar (SPCA) media as mentioned by Amin (1997). Coliform count of *Experimental Burfi from a blend of*

whole milk and soymilk samples was determined as per procedure described in IS: 5550 (1970) using McConkey's agar. Different media like SPCA, MA, LPA and MRS were prepared as per the procedures explained by Amin (1997).

Results and discussion

Chemical evaluation: It is observed that the highest mean of total solids percentage in *Control and Experimental Burfi* samples was recorded in T_3 (83.61) followed by T_0(81.68), T_1(82.06), and T_2(82.38), respectively and it differed significantly ($P < 0.05$) from each other (Table 1). The Fat content of *control and experimental Burfi* samples were T_0 (21.35) followed by T_1(21.12), T_2(20.52), and T_3(20.22) respectively and it differed significantly ($P < 0.05$) from each other (Table 1). The protein content in *control and experimental Burfi* sample of T_3 (14.59) followed by T_2(14.21), T_1(13.75), and T_0(13.35) respectively and it differed significantly ($P < 0.05$) from each other (Table 1). The carbohydrate content in *control and experimental* Burfi sample of T_3 (45.54) followed by T_3(45.12) T_1(44.71), and T_0(44.61) respectively and it differed significantly ($P < 0.05$) from each other (Table 1). The ash content in *control and experimental Burfi* sample of T_3 (T_3 (3.25) followed by T_2(2.55) T_1(2.52), and T_0(2.34) respectively and it differed significantly ($P < 0.05$) from each other (Table 1). The highest mean of Lactic acid percentage was recorded in T_3 (0.58), followed by T_2 (0.49), T_1 (0.37) and T_0 (0.25), respectively and it differed significantly ($P < 0.05$) from each other (Table 1). The T.S, Protein, Carbohydrate and Ash increases as increase in the level of Soymilk.

Table 1: Organoleptic evaluation of control and experimental Burfi

Constituents (per 100 gm)							
Treatments	**T. S.**	**Moisture**	**Fat**	**Protein**	**Carbohydrate**	**Ash**	**Acidity**
To	81.68	18.32	21.35	13.35	44.61	2.34	0.25
T_1	82.06	17.94	21.12	13.75	44.71	2.52	0.37
T_2	82.38	17.62	20.52	14.21	45.12	2.55	0.45
T_3	83.61	16.39	20.22	14.59	45.54	3.25	0.58
C.D at 5%	0.25	0.25	0.26	0.10	0.21	0.06	0.04

Organoleptic evaluation: It is noticed that the colour and appearance score of T_0, T_1, T_2 and T_3 sample of burfi was 8.14, 8.26, 8.50 and 8.28 percent respectively which differ significantly ($P > 0.05$) (Table 2). The flavour and taste of T_0, T_1, T_2 and T_3 is 8.26, 8.36, 8.58, and 8.27 respectively which differ significantly ($P > 0.05$). The Body and Texture of T_0, T_1, T_2 and T_3 of *Control and Experimental Burfi* were 8.12, 8.00, 8.60 and 7.82, respectively which differ significantly ($P > 0.05$). The overall acceptability score of T_0, T_1, T_2 and T_3 of *Control and Experimental Burfi* was 8.21, 8.20, 8.56 and 8.12, respectively which differ significantly ($P > 0.05$).

Table 2

Treatments	Colour & appearance	Flavor & Taste	Body & texture	Overall acceptability
T_0	8.14	8.38	8.12	8.21
T_1	8.26	8.36	8.00	8.20
T_2	8.50	8.58	8.60	8.56
T_3	8.28	8.27	7.82	8.12
C.D. at 5%	0.24	8.12	0.45	0.21

Microbial evaluation: From the present study it was observed that the Standard Plate Count of T_0, T_1, T_2 and T_3 is 1520, 1480, 1840, and 2220 (cfu /g) respectively which differ significantly ($P < 0.05$) (Table 3). The coli form count in *Control and Experimental Burfi* sample T_0, T_1, T_2 and T_3 was 0.00, 0.00, 0.00 and 0.00 per gram respectively.

Table 3: Microbial Analysis of control and experimental Burfi

Treatments	SPC (cfu /g)	Coliform count / gm
T_0	1520	0.00
T_1	1480	0.00
T_2	1840	0.00
T_3	2220	0.00
C.D at 5%level	538.57	0.00

Cost analysis: It is observed that supplementing soy milk in burfi reduces its cost of production because of it is cheaper in cost than Whole milk.

Table 4: Cost analysis of Control & Experimental Burfi /kg.

Ingredient	Quantity required For 1 kg Burfi				Rates in Rs/kg	Cost in Rs.			
	T_0	T_1	T_2	T_3		T_0	T_1	T_2	T_3
Whole Milk (l)	2.70	2.43	2.16	1.89	46	124	111.70	99.36	86.94
Soymilk (l)	_	0.27	0.54	0.81	12	_	3.24	6.48	9.72
Sugar (kg)	0.3	0.3	0.3	0.3	40	12	12	12	12
Cost of Production	approximately 20% of cost of Ingredients					27.20	25.38	23.56	21.60
Grand total					Cost/kg	163.20	152.32	141.4	130.26

Conclusion

It may be concluded that Burfi can be successfully prepared by using the blend of whole milk & soymilk. Supplementing soy milk in burfi not only reduces its cost but also increases its nutritional value. Burfi made with Soymilk of treatment T_2 was best in organoleptic characteristics and received highest score (colour & appearance, body & texture, Flavour & taste, overall acceptability).

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