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## Study on physio-chemical and sensory properties of chhana burfi incorporate with chocolate flavoured whey protein powder

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### Abstract

Chhana burfi blended with chocolate flavored whey protein powder is a unique innovative product with rich chocolaty taste and flavour and has soft body texture. In present investigation, Chhana burfi was manufactured from buffalo milk chhana. The burfi was incorporated with chocolate flavoured whey protein powder. Sugar was added at the rate of 24 per cent of original wight of chhana for all three treatments. Whey protein powder was used at different levels viz., 5 per cent (T<sub>1</sub>), 10 per cent (T<sub>2</sub>) and 15 percent (T<sub>3</sub>) of the plain chhana (w/w). Among these levels, Chhana burfi prepared with 10 per cent level of addition of chocolate flavoured whey protein powder found to be acceptable by sensory panel (9 point hedonic scale). The prepared chhana burfi was subjected to physico-chemical and microbial analysis. Addition of whey protein powder in chhana burfi improved sensory quality and acceptability of the product. It is concluded that chhana burfi incorporated with 10 per cent whey protein powder is best in overall acceptability and microbial quality.

**Keywords:** Chhana, burfi, whey protein, chocolate

### Introduction

Heat and acid coagulated dairy products are prepared by coagulation of milk with organic/inorganic acid at higher temperature followed by cooling and straining of coagulum (Sahu & Das 2010). Chhana is an indigenous milk product obtained by heat and acid coagulation of milk followed by drainage of major quantity of whey. As chhana has a fairly high fat and protein content, and also contains some minerals, especially calcium and phosphorus, its food and nutritive value is fairly high. It is also a good source of fat-soluble vitamins A and D. With its high protein and low sugar content, chhana is highly recommended for diabetic patients.

Whey protein is a mixture of beta-lactoglobulin, alpha-lactalbumin, bovine serum albumin and immunoglobins. Whey proteins are rich with EAAs (Essential Amino Acids) including three BCAAs (Branched Chain Amino Acids) and also contain subcomponents of micro fractions which provide the benefits of elemental nitrogen and amino acids. Whey protein is considered a complete protein as it contains all nine essential amino acids. It is low in lactose content.

*Burfi*, is a khoa based, popular confection from the Indian sub-continent. It is a type of mithai. Different types of burfi vary greatly in their colour and texture. It is highly popular mainly because of their delicious taste and high nutritive value.

### Material and Methods

For preparation of chhana burfi incorporated with chocolate flavoured whey protein powder, buffalo milk was received from Dairy farm, College of Agriculture, Dapoli, whereas chocolate flavoured whey protein powder was of Muscle Blaze company and sugar were purchased from the local market. The base of burfi, chhana was prepared as per the procedure given by Kadam *et. al.* (2017) and the chhana burfi was prepared as per the procedure standardized by Aneja *et. al.* (2002) with slight modifications.

The fresh good quality buffalo milk was filtered and heated at 80°C to 82°C for 10 minutes. The milk was cooled to 70°C and coagulated with citric acid (2 % solution). After coagulation, chhana was separated and the clear whey was drained by muslin cloth. Sugar was added @ 24 per cent of obtained weight of chhana.

Chocolate flavoured whey protein powder was added as per treatment i.e., @ 5, 10 and 15 per cent of chhana. The mixture were properly kneaded and heated on low flame for 2-3 minutes. Spreading of mixture on greasy tray for cooling / setting (1-2 hrs). After that, cut it into pieces and stored at refrigerated temperature.

### Flow diagram for preparation of chhana

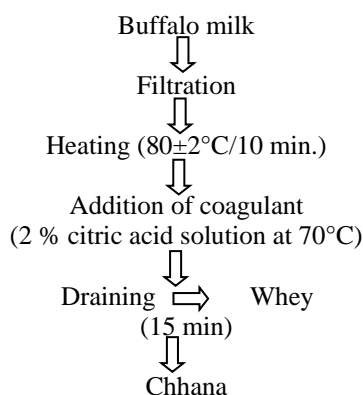


Fig 1: Flow diagram for preparation of chhana

### Flow diagram for preparation of chhana burfi

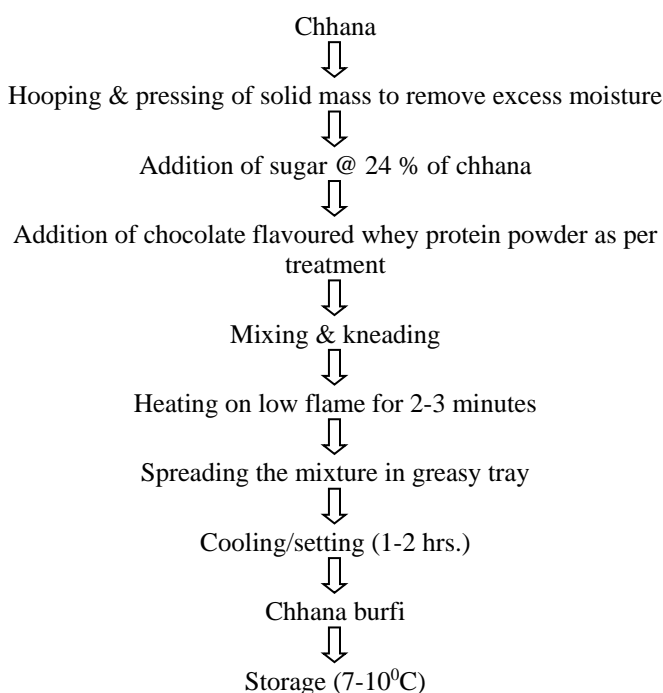


Fig 2: Flow diagram for preparation of chhana burfi

The total solids and protein content of milk and chhana burfi were determined as per IS: 1479 (part II), 1961 [6]. The fat content of milk and chhana burfi was determined by using standard Gerber method as per IS: 1224 (part I), 1977 [7]. The acidity of milk and chhana burfi was estimated according to IS: 1479 (part I), 1960 [5]. The ash content of milk and chhana burfi was determined as per the procedure given in A.O.A.C. (1975) [1]. The lactose content of milk and chhana burfi was estimated as per IS: 1479 (II) 1961. The data were statistically analyzed according to Snedecor and Cochran (1994) [12] using randomized block design.

### Results and Discussion

The chemical analysis of the buffalo milk used for preparation

of chhana burfi indicated on an average 15.54 per cent total solids, 6.32 per cent fat, 3.81 per cent protein, total sugar 4.81 per cent, 0.16 per cent acidity and 0.82 per cent ash. All these values lie within the range of legal standards for buffalo milk as described by PFA rules, 1976 cited by De (2011). The results are furnished in Table 2.

### Chemical analysis of chhana burfi

#### Total solid content

The total solids content of chhana burfi showed gradual increase with the increase in level of whey protein powder with values of 60.15 (T<sub>1</sub>), 61.55 (T<sub>2</sub>) and 62.83 (T<sub>3</sub>) per cent at 5, 10 and 15 per cent level of whey protein powder. This gradual increase of total solid content from T<sub>1</sub> to T<sub>3</sub> may be due to higher amount of total solids content in whey protein powder (98 %). The highest total solids content was noticed at T<sub>3</sub> (62.835 %) i.e. Chhana burfi manufactured with 15 per cent whey protein powder, while lowest was observed at T<sub>1</sub> (60.15 %) i.e. Chhana burfi manufactured with 5 per cent whey protein powder.

#### Fat content

The average fat content of Chhana burfi at 5, 10 and 15 per cent level of whey protein powder was 22.94, 22.22 and 21.55 per cent respectively. It was noticed that highest fat content was observed at T<sub>1</sub> (22.94) i.e. Chhana burfi prepared with 5 per cent whey protein powder and lowest at T<sub>3</sub> (21.55) i.e. 15 per cent whey protein powder. Due to low fat content of whey protein powder i.e. 3.5 per cent, its incorporation reduced fat of the final product. Despite of that the difference between highest and lowest average fat content values of Chhana burfi as influenced by whey protein powder was only 1.39.

#### Protein content

The perusal of data revealed that incorporation of whey protein powder had significantly affected the protein content of Chhana burfi. The significance of protein in dairy products is highly regarded due to its distinguishable role for adding nutritional quality to the product. It was observed that that incorporation of whey protein powder increased the protein content of Chhana burfi. The protein content of Chhana burfi increased with incorporation of whey protein powder from treatment T<sub>1</sub> to T<sub>3</sub>. Due to higher protein per cent in whey protein powder i.e. 70 per cent, it increased the protein trend in the Chhana burfi incorporated with whey protein powder.

The average protein per cent of Chhana burfi was 13.98, 16.28 and 18.41 per cent at 5, 10 and 15 per cent of whey protein powder respectively. The highest protein value of Chhana burfi was reported for treatment T<sub>3</sub> i.e. 18.41 per cent (@ 15 % WPP) and that of lowest value was reported for treatment T<sub>1</sub> i.e. 13.98 per cent (@ 5 % WPP).

#### Total sugar

The total sugar content of chhana burfi was found to be 21.12, 20.75 and 20.41 per cent for treatment T<sub>1</sub>, T<sub>2</sub> and T<sub>3</sub> respectively. The total sugar content in Chhana burfi results in gradual decrease from 21.12 to 20.41 per cent with increasing level of whey protein powder. The decreasing sugar content level of Chhana burfi may be due to low amount of sugar content in whey protein powder i.e. 11.2 per cent. The sugar (lactose) content of chhana was merely 1.9 per cent. During manufacturing of burfi cane sugar was added @ 24 per cent. This resulted in increasing total sugar percentage of mass of chhana and sugar, however WPP which contains negligible sugar resulted in reducing sugar percentage.

### Ash content

The perusal of data revealed that the ash content showed gradual decrease with increase in the level of whey protein powder. The average ash content of chhana burfi at 5, 10 and 15 per cent level of whey protein powder was 1.853, 1.829 and 1.807 per cent, respectively. The decreasing trend of ash in Chhana burfi may be due to the fact that whey protein powder contained lower percentage of ash i.e. 1.2 per cent.

### Acidity

The results indicated that average acidity of burfi at 5, 10 and 15 per cent level of whey protein powder was 0.371, 0.383, and 0.393 per cent, respectively. The acidity showed increasing trend with an increase in the level of whey protein powder.

### Sensory analysis of chhana burfi

Sensory evaluation of any consumable product is the best method of judging the acceptability of the product by the consumers. Sensory evaluation plays vital role in product development as well as in determining the shelf-life of a product. The sensory assessment was done by studying the parameters like colour and appearance, body and texture, flavour and overall acceptability of the product by the panel of judges by using "Nine Point Hedonic Scale" score card. The results of the study presented herein under.

### Colour and appearance

Colour and appearance is an important sensory attribute in the organoleptic assessment. Acceptance of any milk product by customers chiefly depends upon colour and appearance of the product.

The colour and appearance of Chhana burfi was significantly improved by addition of chocolate flavoured whey protein powder. There was increase in dark colour of Chhana burfi due to chocolaty colour of whey protein powder. As whey

protein powder increases, the burfi resemble brown to chocolaty brown in colour. The average score for colour and appearance was recorded at 5, 10 and 15 per cent level was 7.24, 7.99 and 8.05 respectively. The highest score (8.05) was obtained by the treatment T<sub>3</sub> and that of lowest score (7.24) was obtained by treatment T<sub>1</sub>.

### Flavour

Whey protein used in the burfi is of chocolate flavoured. Consequently, the resultant product obtained chocolate flavour. The average score for flavour was recorded at 5, 10 and 15 per cent level was 7.38, 8.34 and 7.96 respectively. The highest score (8.34) was obtained by the treatment T<sub>2</sub> i.e. chhana burfi prepared with 10 per cent whey protein powder and that of lowest score (7.38) was obtained by treatment T<sub>1</sub> i.e. chhana burfi prepared with 5 per cent whey protein powder.

### Body and texture

The score for body and texture was recorded are 7.52, 8.43 and 8.07 at 5, 10 and 15 per cent level respectively. The highest score (8.43) was obtained by the treatment T<sub>2</sub> i.e. chhana burfi prepared with 10 per cent whey protein powder and that of lowest score (7.52) was obtained by treatment T<sub>1</sub> i.e. chhana burfi prepared with 5 per cent whey protein powder.

### Overall acceptability

The score for overall acceptability of chhana burfi was recorded 7.53, 8.62 and 8.13 at 5, 10 and 15 per cent level respectively. The highest score (8.62) was obtained by the treatment T<sub>2</sub> i.e. chhana burfi prepared with 10 per cent whey protein powder and that of lowest score (7.53) was obtained by treatment T<sub>1</sub> i.e. chhana burfi prepared with 5 per cent whey protein powder.

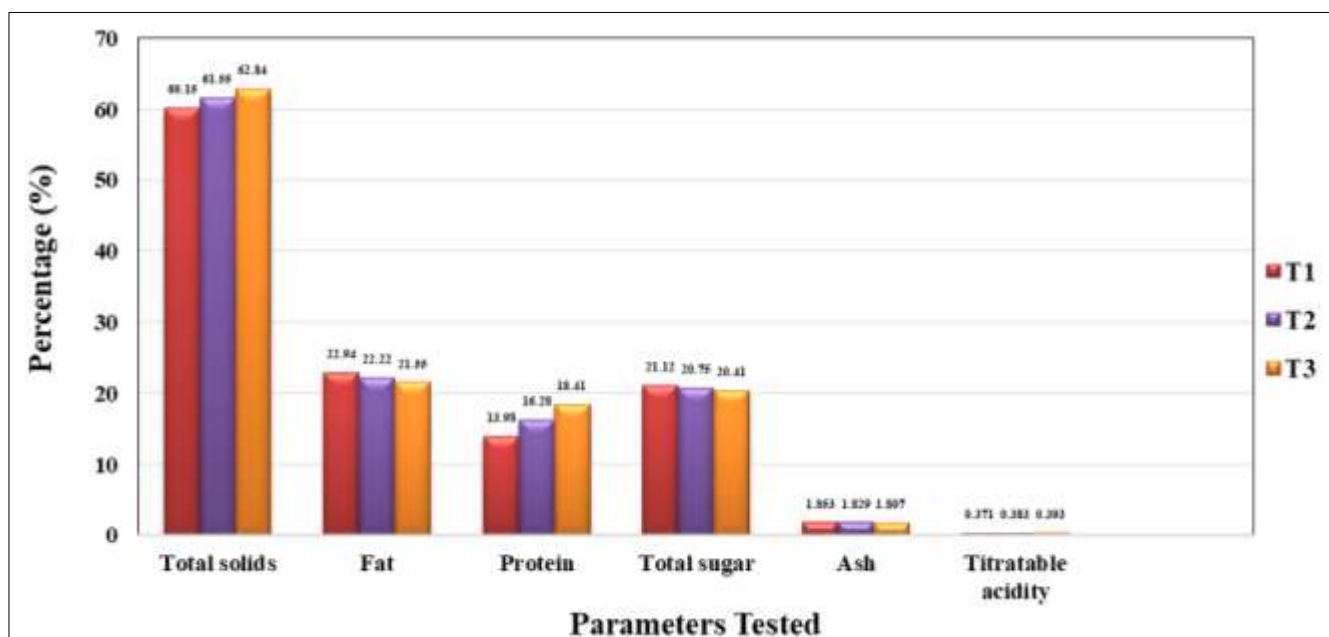


Fig 3: Physico-chemical analysis of chhana burfi

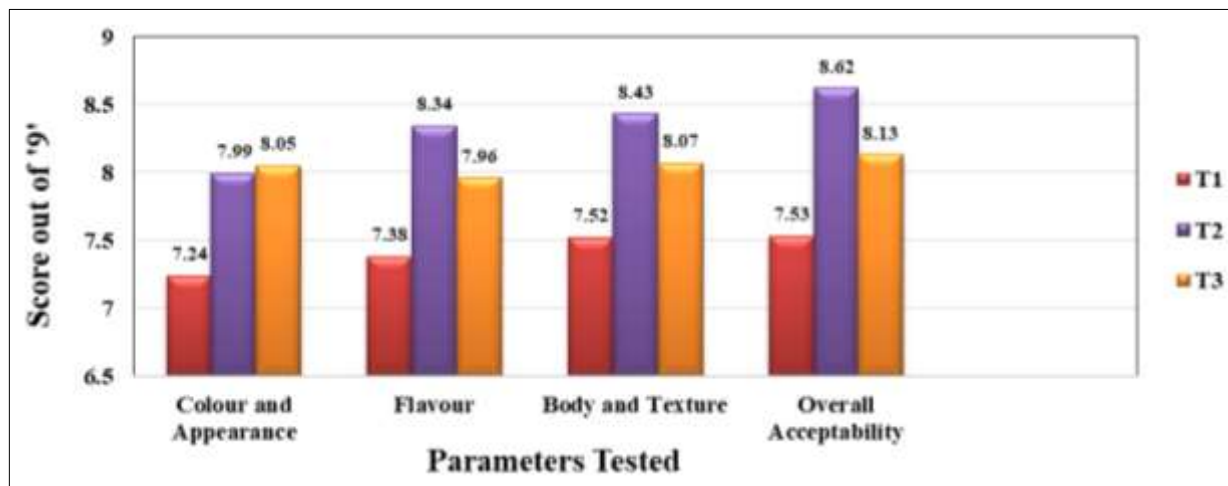


Fig 4: Sensory Analysis of chhana burfi

### Conclusion

From the results, it could be concluded that chocolate flavoured whey protein powder could be successfully utilized for the manufacture of Chhana burfi. Addition of chocolate flavoured whey protein powder improves the acceptability of product. Being enriched with whey protein powder, it can increase nutritional quality of burfi. The chhana burfi prepared from treatment T<sub>2</sub> i.e. 10 per cent level of whey protein powder was most acceptable than rest of the treatments.

Table 1: Average chemical quality of buffalo milk (%)

Sr. No.	Constituents	(%)
1.	Total Solids	15.54
2.	Fat	6.321
3.	Protein	3.815
4.	Total sugar	4.81
5.	Ash	0.82
6.	Titrateable Acidity	0.16

Table 2: Average chemical quality of chhana burfi (%)

Levels of whey protein powder (%)	Constituents					
	Total solids	Fat	Protein	Total sugars	Ash	Acidity
5	60.15	22.94	13.98	21.12	1.853	0.371
10	61.55	22.22	16.28	20.75	1.829	0.383
15	62.84	21.55	18.41	20.41	1.807	0.393
SE±	0.010301025	0.174569311	0.099398189	0.011155467	0.00277889	0.004899
CD	0.03245919	0.550079104	0.313210074	0.035151593	0.00875645	0.014

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