



## The development of *burfi* with date paste

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*Burfi* with date paste was prepared by mixing the date paste with *khoa* as per standard method. Date paste was added at 10%, 20%, 30% and 40% levels to the weight of *khoa*. *Burfi* prepared with addition of date paste up to 30% level was best accepted and resembled the control in sensory attributes. Addition of date paste into *burfi* changed the composition of *burfi*. The moisture, total solids, ash, lactose, fat, protein and HMF changed significantly however, FFA remained unchanged in final product when compared to control sample. Addition of date paste into *burfi* significantly increased the acidity and lowered the pH of *burfi*. The production cost of *burfi* with date paste was slightly higher than control *burfi* due to additional cost of date paste.

**Keywords:** Burfi, Composition, Date, Date paste

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Development of new products is essential for the growth of dairy and food industry. The main driver behind the development of new products that can meet the needs of the targeted consumer groups has been the rapid change in lifestyle and rise in the incidences of lifestyle-related disorders like obesity, coronary heart disease, diabetes etc. The food business is always looking to diversify its product lines to ensure its long-term viability. Milk is considered as “complete food” owing to nutrients and physiologically active component it contains but, it too lacks critical micronutrients like copper, iron and vitamin C. Additionally, the acceptance of developed products may not be improved by utilizing milk alone. Therefore, it is undeniable that milk has to be supplemented with vital micronutrients as well as components that promote health from relevant sources. For supplementing milk with other source of nutrients and health promoting factors, many options like fruit, vegetables, cereals, millets, legumes etc. are available. Milk is being supplemented with non-dairy ingredients principally to increase its sensory qualities and boost its health benefits.

Date (*Phoenix dactylifera*), often known as date palm, has been a staple diet in desert regions for hundreds of years since it is a nutritious, assimilative

fruit that also produces energy. Dates contain a substantial amount of dietary fiber (6.4-11.5%), a high amount of protein (2.3-5.6%), a significant amount of salts and minerals (15) and a high amount of carbohydrates (44-88%)<sup>1</sup>. Date fruit consumption would considerably help to meet the daily needs for key nutrients, including carbohydrates, minerals like Ca, Mg, Fe, Zn, P, Cu, Se and I, and vitamins like B<sub>6</sub>, niacin and folate. Thus, regular consumption of date fruit may be a feasible choice for tackling the deficiency related disorders including anemia, rickets, osteomalacia, goiter, arthritis and other diseases associated to bone metabolism through supplementation of minerals for the body needs<sup>2</sup>. Date is considered to have antioxidant, antimutagenic and antimicrobial properties<sup>3</sup>. Dates being an excellent source of iron, provides an useful form of supplementation in cases of iron deficiency anemia in pregnancy, puberty and childhood<sup>4</sup>. Thus, date provides a good source of rapid energy and good nutritional value. Various products from dates are prepared which includes date paste, powder, pickles, jams, jellies, candy, syrups, sugar, alcohol, organic acids, yoghurt, etc. Najjar, *et al.*<sup>5</sup>, reviewed the application of date by-products in the food industry. Thus, incorporation of date into milk and milk products will be an innovative avenue for dairy industry for value addition. Therefore, taking into account the medicinal and nutritional value of

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date fruit following study is planned to prepare *burfi* of an acceptable quality from soft date.

## Material and Methods

### Chemicals

Copper sulphate, potassium sulphate, boric acid, sodium hydroxide, sulfuric acid, Iso-amyl alcohol, phenolphthalein indicator, hydrochloric acid, nitric acid, acetic acid, buffer tablets of pH 4 and pH 7, mixed indicator, phosphotungstic acid, thiobarbituric acid, potassium iodide, mercuric chloride (Himedia laboratories, Mumbai), ammonia solution, oxalic acid, zinc sulphate, diethyl ether, petroleum ether, ethyl alcohol, trichloroacetic acid (AR Grade, Molychem, Mumbai).

### Equipments

Digestion and distillation assembly for protein estimation (KELPLUS) was provided by Pelican Instruments, Chennai; Research Polarimeter 220 MM by BD Instrumentations (India), Ambala; UV-Vis Spectrophotometer by Electronics India, Mumbai and DTC-96 Muffle Furnace by Innovative muffle furnace, Mumbai.

### Preparation of *burfi* with date paste

Good quality seedless date of “Falcon” brand and pooled buffalo milk were procured from local market of Pusad city. *Burfi* with date paste was prepared by the suggested method of Bhatele<sup>6</sup>, with some modifications. The preparation of *burfi* was divided in two stages. Initially, the date paste was prepared by method standardized by Kale<sup>7</sup> with slight modification and in later stage the *burfi* was prepared by combining the date paste with *khoa* prepared by heat desiccation of buffalo milk<sup>8</sup> and sugar until uniform mixing (Fig. 1). Control *burfi* sample was also set by blending sugar and *khoa* in similar manner.

The method required sugar @ 30% of *khoa*. *Burfi* with date paste prepared by using sugar @ 30% was considered as control and date paste was added at different levels on the basis of *khoa* followed by uniform mixing to improve colour, appearance and flavor of final product. Treatment and levels were as follows;

Control = 100 g *Khoa* + 30 g sugar

T<sub>1</sub> = 100 g *Khoa* + 30 g sugar + 10 g date paste.

T<sub>2</sub> = 100 g *Khoa* + 30 g sugar + 20 g date paste.

T<sub>3</sub> = 100 g *Khoa* + 30 g sugar + 30 g date paste.

T<sub>4</sub> = 100 g *Khoa* + 30 g sugar + 40 g date paste.

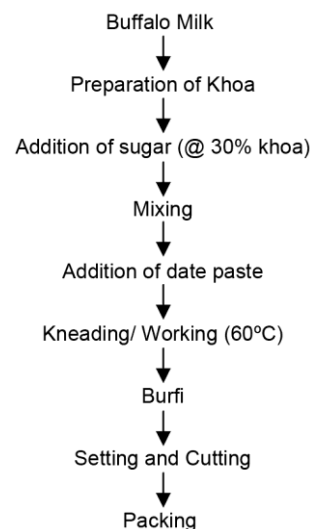


Fig. 1 — Flow diagram for preparation of *burfi* with date paste

### Chemical analysis of milk and date paste

Buffalo milk used for preparation of *khoa* was analyzed for fat, total solids, titratable acidity, protein, ash by following methods described in IS: SP Part XI<sup>9</sup>. The prepared date paste was investigated for moisture, ash, protein and pH<sup>10</sup> as well as titratable acidity<sup>11</sup>.

### Chemical composition of *burfi* with date paste

The composition of *burfi* with date paste and control sample was assessed for moisture, total solids, protein, ash, pH, fat by Rose-Gottlieb method, lactose by polarimetric method and titratable acidity<sup>9</sup>, hydroxymethyl furfural (HMF)<sup>12</sup> and free fatty acid content<sup>13</sup>.

### Sensory evaluation

A panel of seven judges from the faculty of the College of Dairy Technology, Warud (Pusad), assessed the samples of control *burfi* and *burfi* with date paste for various sensory attributes such as sweetness, colour and appearance, body and texture, flavour and overall acceptability using a 9-point hedonic scale score card<sup>14</sup>. The panelists were selected based on triangle test in judging the traditional Indian dairy products. The judges were suitably trained to get acquainted with the attributes of product to be tested. For sensory analysis, *burfi* samples tampered at room temperature (~30°C) was offered to each panelist in closed HDPE container.

### Cost of production

Cost of production of *burfi* with date paste was determined by method used by Narnaware<sup>15</sup>. For

determination of cost of production of date *burfi*, data was collected by actual observation.

**Statistical analysis**

A one-way analysis of variance (ANOVA) was used in all experiments to compare data from multiple samples, followed by the least significant difference (LSD) test. This was done to check for any variations in the mean values across all treatments that were statistically significant ( $p < 0.05$ )<sup>16</sup>. For statistical analysis, data from three replications of each experiment were examined.

**Results and Discussion**

**Analysis of milk and date paste**

Buffalo milk and date paste used as raw material for preparation of *burfi* was analyzed for its composition and acidity. The results are shown in Table 1.

**Chemical composition of *burfi* with date paste**

Addition of the date paste to *burfi* at all the levels (10%, 20%, 30% and 40%) exhibited a significant difference ( $p < 0.05$ ) in moisture, fat, protein, ash, lactose and HMF compared to control (Table 2). However, *burfi* with date paste noticed no change in free fatty acid content with addition of date paste at different levels in respect to control. High moisture

and low total solids were noticed for *burfi* with more than 20% rate of addition of date paste. This could be explained by the high moisture and low total solids in date paste compared to control *burfi* contributing for the significant difference. Fat, protein and ash content decreased with increased percentage of date paste in *burfi* due to lower fat, protein and ash content of date paste. However, slightly lower but significant decrease in lactose content in *burfi* samples was due to absence of lactose in dates and increased rate of addition. It was evident that HMF content in *burfi* with date paste changes significantly with the addition of date paste. This could be due to presence of higher HMF content in date products<sup>17</sup>. High HMF of liquid date products are due to presence of reducing sugars and amino acids<sup>18</sup>.

**Titrateable acidity and pH**

Significant ( $p < 0.05$ ) decrease in pH was observed in *burfi* samples with increase in rate of addition of date paste against control (Table 2). As level of date paste in samples of *burfi* increased, pH was significantly reduced and affected the sensory attributes of samples. The observed decrease in pH of *burfi* with increasing rate of addition of date paste was due to lower pH of date paste. *Burfi* samples with date paste had considerably higher ( $p < 0.05$ ) titrateable acidity than control (Table 2). Increase in the rate at which date paste was added to the *burfi*, led to rise in the titrateable acidity values of the samples. Our results were in line with the results of Haneen<sup>19</sup> and Bilyk<sup>20</sup> who also reported an increase in the acidity and decrease in pH of yoghurt and ice cream, respectively with increase in addition of date paste and date syrup.

**Sensory evaluation of *burfi* with date paste**

Sensory analysis (Table 3) revealed that T<sub>3</sub> samples were best accepted which possessed the same

Table 1 — Composition of milk and date paste

Parameters	Milk	Date paste
Total solids (%)	14.70±0.16	81.00±0.40
Fat (%)	5.90±0.20	NE
Protein (%)	3.59±0.05	2.23±0.21
Ash (%)	0.71±0.01	1.68±0.60
Titrateable acidity (%)	0.14±0.01	0.53±0.01
Moisture (%)	NE	18.99±0.43

NE – Not Evaluated, All scores are average of 3 trials. Data are presented as means ± SD

Table 2 — Chemical composition, acidity and pH of *burfi* with date paste

Parameters	Control	T <sub>1</sub>	T <sub>2</sub>	T <sub>3</sub>	T <sub>4</sub>
Moisture (%)	14.18±0.18 <sup>a</sup>	14.23±0.06 <sup>a</sup>	15.14±0.25 <sup>b</sup>	15.37±0.18 <sup>b</sup>	15.66±0.67 <sup>b</sup>
Total solid (%)	85.81±0.18 <sup>a</sup>	85.76±0.06 <sup>a</sup>	84.85±0.25 <sup>b</sup>	84.62±0.18 <sup>b</sup>	84.33±0.67 <sup>b</sup>
Protein (%)	15.16±0.00 <sup>a</sup>	15.15±0.00 <sup>a</sup>	14.54±0.01 <sup>b</sup>	14.33±0.01 <sup>c</sup>	14.15±0.00 <sup>d</sup>
Fat (%)	21.13±0.01 <sup>a</sup>	20.60±0.00 <sup>b</sup>	20.18±0.00 <sup>c</sup>	19.56±0.00 <sup>d</sup>	19.19±0.00 <sup>e</sup>
Lactose (%)	16.13±0.01 <sup>a</sup>	16.10±0.00 <sup>ab</sup>	16.08±0.08 <sup>ab</sup>	16.05±0.00 <sup>bc</sup>	16.00±0.00 <sup>c</sup>
Ash (%)	2.91±0.01 <sup>a</sup>	2.75±0.01 <sup>b</sup>	2.67±0.00 <sup>c</sup>	2.57±0.01 <sup>d</sup>	2.43±0.01 <sup>e</sup>
HMF (µmol/lit)	6.43±0.68 <sup>c</sup>	7.11±0.66 <sup>c</sup>	7.35±0.57 <sup>c</sup>	8.38±0.46 <sup>b</sup>	10.09±0.24 <sup>a</sup>
FFA (% oleic acid)	0.06±0.00 <sup>a</sup>	0.06±0.00 <sup>a</sup>	0.06±0.00 <sup>a</sup>	0.06±0.00 <sup>a</sup>	0.06±0.00 <sup>a</sup>
Acidity (% Lactic Acid)	0.33±0.01 <sup>a</sup>	0.37±0.02 <sup>b</sup>	0.38±0.01 <sup>b</sup>	0.42±0.02 <sup>c</sup>	0.43±0.02 <sup>c</sup>
pH	6.51±0.05 <sup>a</sup>	6.42±0.08 <sup>ab</sup>	6.38±0.08 <sup>bc</sup>	6.32±0.03 <sup>bc</sup>	6.27±0.01 <sup>c</sup>

All scores are average of 3 trials. Mean in each row with different superscripts were significantly different CD ( $p < 0.05$ ) from each other. Data are presented as means ± S.D

Table 3 — Sensory scores of *burfi* with date paste

Treatment	Color	Appearance	Body & Texture	Flavor	Overall acceptability
Control	7.33±0.90 <sup>a</sup>	7.33±0.84 <sup>a</sup>	7.38±0.77 <sup>a</sup>	7.27±0.75	7.44±0.61 <sup>ab</sup>
T <sub>1</sub>	6.77±0.87 <sup>ab</sup>	6.94±0.72 <sup>a</sup>	7.11±0.75 <sup>a</sup>	7.05±1.05	7.11±0.67 <sup>b</sup>
T <sub>2</sub>	6.88±0.90 <sup>ab</sup>	6.97±1.28 <sup>a</sup>	7.25±0.64 <sup>a</sup>	7.19±0.98	7.38±0.86 <sup>ab</sup>
T <sub>3</sub>	7.22±1.39 <sup>a</sup>	7.05±1.16 <sup>a</sup>	7.27±0.75 <sup>a</sup>	7.55±1.24	7.75±0.91 <sup>a</sup>
T <sub>4</sub>	6.16±1.29 <sup>b</sup>	6.13±1.36 <sup>b</sup>	6.38±1.03 <sup>b</sup>	7.38±1.03	6.41±1.08 <sup>c</sup>

All scores are average of 3 trials. Mean in each row with different superscripts were significantly different CD (p<0.05) from each other. Data are presented as means ± S.D.

Table 4 — Cost of production of *burfi* with date paste

Particulars of component	Total cost for control <i>Burfi</i> (Rs./kg)	Total cost for date <i>Burfi</i> (Rs./kg)
Raw material	127.10	152.06
Fuel	10.17	10.17
Electricity	23.56	23.56
Packaging	01.98	01.98
Labour	39.38	39.38
Depreciation of Building	07.06	07.06
Depreciation of Equipments	01.73	01.73
Administration	03.00	03.00
Maintenance	00.44	00.44
Quality Control	13.60	13.60
Miscellaneous	03.00	03.00
Total	231.02	255.98

desirable sweetness, colour, appearance, body and texture, flavour and overall acceptability resembling control. It is evident that there was a significant (p<0.05) low sensory scores of other treatments when compared to control. Sensory scores for colour and appearance decreased in the order of T<sub>4</sub>< T<sub>1</sub>< T<sub>2</sub><T<sub>3</sub>% of date paste addition. *Burfi* sample T<sub>3</sub> showed maximum acceptance for colour and appearance. T<sub>4</sub> reported lowest colour score due to dark colour of *burfi* attributed to highest percentage of date paste addition. Sensory scores for body and texture decreased in the order of T<sub>4</sub><T<sub>1</sub>< T<sub>2</sub><T<sub>3</sub>% of date paste addition. However, flavour scores for *burfi* with date paste ranked higher compared to control but were statistically non-significant. *Burfi* sample T<sub>3</sub> showed maximum score for overall acceptability and resembled control.

#### Cost of production

*Burfi* prepared with the addition of date paste was slightly costlier than control. The cost of production of one kg *burfi* without addition of date paste was Rs. 231.02 and cost of *burfi* with date paste (30%) was Rs. 255.98 (Table 4). The increase in cost of production of *burfi* with date paste was due to

additional cost for raw material for inclusion of date paste.

#### Conclusion

*Burfi* was prepared by addition of date paste obtained by crushing soft seedless dates at different levels. *Burfi* samples containing 30% date paste was found highest in sensory scores and was more acceptable than control by trained panel of judges. The level of acceptance decreased when dates were added with increasing concentration of 10 to 40% in comparison to control. Addition of date paste into *burfi* changed its composition. The moisture, total solids, ash, lactose, fat, protein and HMF changed significantly. However, FFA remained unchanged when compared to control sample. Addition of date paste into *burfi* significantly increased the acidity and lowered the pH of final product. The production cost of *burfi* with date paste (Rs. 255.98) was found to be slightly higher than control *burfi* (Rs. 231.02) due to additional cost of date paste.

#### Conflict of Interest

There is no conflict of interest declared by the authors.

#### Authors' Contributions

BDM conceived and presented the idea; ANV performed the experimentation and analysis; ANV and HMG wrote the original manuscript, reviewed and edited under the supervision of BDM and RRK. RRK conducted the statistical analysis of data. All authors contributed to the manuscript.

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