

Studies on Physico Chemical Qualities of Khoa Burfi Blended with Guava (*Psidium guajava* L.) pulp

B. D. Patil¹, S. M. Rahate² and K. B. Kubade³

Mahatma Phule Krishi Vidyapeeth, Rahuri - 413 722 (India)

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Abstract

The levels of guava pulp, sugar and skimmed milk powder for final experimental trials were finalized in pre-experimental trials on the basis of sensory evaluation and physico chemical evaluation of the levels of guava pulp 11, 14 and 17 per cent. 25 per cent of sugar and 4 per cent skimmed milk powder were selected for further study. The results obtained from physico-chemical were analyzed by Completely Randomized Design (CRD) the data revealed that fat, protein, total solids and ash per cent of burfi were decreased with increased in the levels of guava pulp while moisture and acidity (%LA) percentage was increased with increased in the levels of guava pulp. The burfi prepared with addition of 14 per cent (T₂) of guava pulp contained 16.35 per cent fat, 13.51 per cent protein, 79.49 per cent total solids, 2.96 per cent ash, 0.40 per cent acidity (%LA) and 20.51 per cent moisture. burfi samples were evaluated for textural qualities hardness, cohesiveness, adhesiveness and springiness for treatment (T₀) was 0.571 kg, 0.206, 0.181 kg and 0.169 mm for treatment, T₁, it was 0.564 kg, 0.199, 0.198 kg and 0.167 mm, for T₂ it was 0.550 kg, 0.187, 0.211 kg and 0.165 mm and for treatment T₃, it was 0.530 kg, 0.143, 0.228 kg, 0.164 mm. Hence, it is concluded that best quality burfi can be prepared by using 14 per cent of guava pulp, 25 per cent sugar and 4 per cent skimmed milk powder

Key word : Burfi, guava pulp, physico-chemical evaluation.

Milk is consumed as a whole or by converting it into various milk products such as coagulated, fermented, heat desiccated and frozen milk products (Venketesh, 2003). India is rising as a largest milk producing country in the world (NDDB, Statistic, 2019). However, out of total milk production 55 per cent of milk is converted into milk product. Therefore, it needed to convert more and more milk into milk products to satisfy the demand of consumer and for better life of agriculture (Adani, 2011). Also, in maintaining and nutritional well-being of people and traditional dairy products gradually becoming popular all over the world (Bandyopadhyay *et al.*, 2006).

It has also been estimated that 6.5 per cent of total milk produced in India is converted into

khoa and condensed milk products (Shete *et al.*, 2012). The value of *khoa* manufactured annually in India becomes almost double on its conversion into variety of popular indigenous *khoa* based sweets particularly *burfi*, *peda*, *gulabjamun*, *milk cake*, *kalakand* etc. which have become popular in India and neighbouring countries and amongst these, *burfi* is the most popular, nutritious *khoa* based sweet and has occupied a significant place in the hearts of consumers belonging to all age groups because of its rich flavour and palatability. Among various classes of society, it is very popular because of its taste.

Burfi is a *khoa* based indigenous milk product of considerable economic and nutritional importance. It is one of the most popular milks based sweet in India. (Aneja *et al.*, 2002). Good quality *burfi* is characterized by

1. Associate Professor, 2. M.Sc., Dairy Science and 3. PhD Scholar.

moderately sweet taste, soft and slightly greasy body and smooth texture with very fine grains. colour should be uniform, white or slightly yellowish depending on the type of the milk used. (Pal and Raju, 2006) the shelf life of *burfi* is about 7-10 days under ambient conditions (Khan *et al.*, 2008).

Today's upward consumer awareness and interest to follow healthy nutrition and dietary strategy in achieving health benefits from foods beyond their basic nutrition, the market for value added foods has expanded manifold and thustremendous potential scope for development of functional food by fortification in which utilization of Garden cress for preparation of *Burfi* (Khomane *et. al.*, 2021)

Guava (*Psidium guajava*) regarded as "Apple of Tropics". Guava is a small tree or shrub, 2-8 m in height with wide spreading branches (Singh, 1988).It has been demonstrated to have several biological activities such as anti-cough, antibacterial and anti-spasmodic action (Abdelrahim *et al.*, 2002). Recently, it has been reported high potential for antioxidant activity.

Guava is highly perishable fruit after ripening the ripened guava fruit are mostly deteriorate before reaching to the market. Such a fully ripened guava fruits can be processed in to good quality value added products, like *burfi*, Jain and Asathi (2004) evaluated the different cultivars of guava for pulp, which can be used as a raw material for guava *burfi*. Thus, preparation of guava pulp by simple technology and its utilization for *burfi* making has great scope.

Material and method

Materials : The fresh crossbred cow milk samples were procured from Research-Cum-Development Project (RCDP) on Cattle, MPKV, Rahuri, Dist. Ahmednagar (Maharashtra) for preparation of *burfi* samples. Good quality sugar

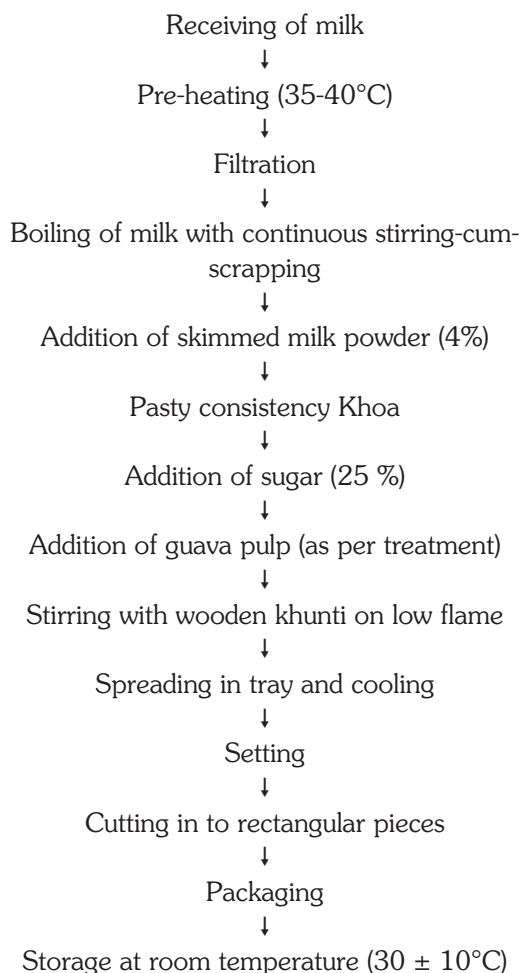
was procured from the local market, Good quality well matured fresh Guava fruits were procured from the local market, Good quality Skimmed milk powder was procured from local market.

Equipments : Guava pulp and milk was kept in convenient sized stainless steel vessels before preparation of *burfi*, Iron Karahi with 31 cm diameter and 8.5 cm depth along with stainless steel laddle were used for preparation of *burfi*, It was the source of heating of milk during Preparation of our products, Iron kunthi were used for continuously stirring cum scraping the milk during preparation of *burfi*, Stainless steel cutting knife was used to cut *burfi* pieces of desirable size, Rectangular stainless trays (size 28x23x3.5) were used to cool, flatten, and shape of *burfi*, Borosil and Corning glassware were used to analyse milk and *khoa* , electronic precision balance (BT 2245, Sartorius ISO 9001) was used for weighing samples and chemicals during research work., hot air oven manufactured by Yorko Company was used for sterilizing the glassware and analysing moisture from milk and *burfi* throughout the study period, muffle furnace was used for determination of ash in milk and *burfi*sample, the textural properties were determined with the help of TAXT2 textural profile analyser available at PHT laboratory Dr. A.S. college of Agriculture Engineering and Technology, MPKV, Rahuri

Methodology

Experimental Trails : On the basis of results of sensory evaluation 11, 14 and 17 per cent guava pulp levels, 25 per cent sugar levels and 4 per cent SMP levels were selected for experimental trails. Treatment details are T_0 - (Control) *Khoa* + 25 % Sugar + 0% guava pulp, T_1 - *Khoa* + 25 % Sugar + 4% SMP + 11% guava pulp, T_2 - *Khoa* + 25 % Sugar + 4% SMP + 14% guava pulp - T_3 - *Khoa* + 25 % Sugar + 4% SMP + 17% guava pulp.

Preparation of Guava Burfi : The *burfi* samples were prepared by using standard procedure described by Aneja *et al.* (2002) with suitable modifications as per given in Preliminary trials.



Flow diagram for preparation of guava *burfi*

Physico chemical analysis of burfi

Moisture : Moisture content in the sample was determined by subtracting the total solids content from 100 in the sample. Moisture (%) = 100 - total solids (%).

Fat : Fat content in *burfi* was determined by Mojonnier fat extraction apparatus method as

prescribed in B.I.S. Handbook of food analysis. ISO 3889:1977.

Protein : Protein percentage of *burfi* was determined as per the procedure recommended in BIS Hand book of Food Analysis Dairy Products in SP: 18 part XI (1981).

Total Solids : The total solid percentage in *burfi* was determined by using gravimetric method as per the procedure of IS: 1479 (Part II) (1961).

Ash : Ash content of *burfi* was determined as per the procedure recommended in Handbook of Food Analysis Dairy Product in SP: 18 part XI (1981).

Acidity : Acidity percentage of *burfi* was determined as per the procedure recommended in Handbook of Food Analysis Dairy Products in SP: 18 part XI (1981).

Textural Properties of Burfi : The textural properties were evaluated using the TA XT plus texture analyser of stable Micro system equipped with 50 kg load cell. The analyser is linked to a computer a computer that recorded the data via a software programme..

Statistical Design : The data were analysed as per the Completely Randomized Design in which four treatments were replicated four times. Data was analysed by giving the statistical treatments to the findings describe by Gomez and Gomez. (1984).

Result and discussion

PhysicoChemical Composition of Guava Burfi

Moisture : The moisture content in *burfi* samples of treatments T₀, T₁, T₂ and T₃ were 13.29, 18.86, 20.51 and 22.09 per cent respectively. All treatments showed the significant difference for moisture contents in

guava *burfi*. As guava pulp level increased in *burfi*, the moisture content in *burfi* was also increased. This might be due to the high moisture content in guava pulp than *khoa*.

Chaudhary *et al.* (2019) noticed that, moisture content in the *burfi* was highest in treatment T₅ (17.02%) and lowest in T₁ (8.72%). The moisture content in *burfi* was significantly increased with different levels of aloe vera juice

Fat : It was recorded that the average fat content for the mean fat content in *burfi* was 18.92, 16.73, 16.35 and 16.03 per cent for treatment T₀, T₁, T₂ and T₃ respectively. It was also observed that maximum fat content was in T₀ (18.92) and minimum fat content in T₃ (16.03). The fat percentage of *burfi* was decreases continuously with increase in the levels of guava pulp.

Bankar *et al.* (2013) studied the fat content of plain *burfi* is higher T₁ (20.11%) and it was decreased with the addition of pineapple pulp. (It was 18.37 per cent in *burfi* samples with 15% pineapple pulp). Navale *et al.* (2014) reported that fat content in *burfi* decreased with the increase in wood apple pulp level in preparation of *burfi* i.e. 20.41 per cent in plain *burfi* to the 17.00 per cent (15% wood apple pulp). Patil (2015) observed that, the fat content was lowest 14.76 per cent in T₄ (20%) and highest 16.96 per cent in T₁ (0%) in dried date *burfi*.

Tanuja *et al.* (2017) observed fat content of Apple pomace *burfi* with different proportions of 0% (T₁), 5% (T₂), 10% (T₃) and 15% (T₄) apple pomace to *khoa* as 24.65, 19.43, 18.24 and 17.42 per cent, respectively. Deshmukh (2020) reported that, the fat content was highest 18.92 per cent in T₀ (0%) and lowest 15.15 per cent in T₃ (30%) in orange *burfi*

Protein : It was observed that the protein

content of the product ranged between 13.90, 13.75, 13.51 and 13.29 per cent for treatment T₀, T₁, T₂ and T₃. The differences were statistically significant ($P < 0.05$) among the various treatments. It was also observed that as the addition of guava pulp level decreases the protein content of the product was decreased.

Bhutkar *et al.* (2015) observed that, the average protein content was highest 14.91 per cent in T₁ (0%) and 12.18 in T₄ (20%) elephant foot yam pulp *burfi*. Gadekar *et al.* (2018) prepared wood apple *burfi* and observed that, protein content was highest 13.50 (T₁) lowest 10.42 (T₄) in *burfi* prepared with wood apple.

Total Solid : The total solid content of product was found to be 86.71, 81.14, 79.49 and 77.91 per cent for treatment T₀, T₁, T₂ and T₃ respectively. The highest total solid content was recorded for treatment T₀ and lowest total solid content was recorded for treatment T₃.

It was observed that, total solid per cent decreased as increase in level of guava pulp.

The results are also in agreement with the results obtained by Tanuja *et al.* (2017), Girase (2016), Bhutkar *et al.* (2015), Dhande (2014). Bhosle (2017) and Deshmukh (2020), who noted that, with the increased in fruit pulp level there was proportionately decreased in total solids content of *burfi*.

Ash : It was observed that the average ash content in T₀, T₁, T₂ and T₃ were 3.08, 3.03, 2.96 and 2.91 per cent respectively. All the treatments showed the significant difference for ash contents in guava pulp added *burfi*. As the guava pulp level increases the ash content level of the product decrease.

Chaudhary *et al.* (2019) noticed that, ash content in the *burfi* was decrease with increase in levels of aloe vera juice but decrease was non-significant. The results of present study agreed

with the findings of Bhutkar *et al.* (2015), Girase (2016), Tanuja *et al.* (2017), noted that, with the increased in the levels of fruit pulp there was proportionate decreased in the levels of ash content in *burfi*.

Acidity (% LA) : It was observed that the average acidity in T₀, T₁, T₂ and T₃ was 0.28, 0.35, 0.40 and 0.43 per cent respectively. All the treatment showed the significant difference for acidity in guava pulp added *burfi*. It was observed that, acidity per cent was increased significantly as level of guava pulp goes on increasing treatment T₀ contain (0.28) per cent acidity and treatment T₃ contain highest (0.43) per cent acidity.

Patil (2015) was reported the titrable acidity of date *burfi* increased with increase in level of date. This finding were in accordance with Kadam (2008), Navale *et al.* (2014) and Deshmukh (2020) who reported that increase in level of mango pulp, wood apple pulp and

orange pulp the acidity was increased in *burfi*, respectively.

Textural Properties of *Burfi* : *Burfi* sample was evaluated for textural qualities *viz.*, hardness, cohesiveness, adhesiveness and springiness of the treatment T₀ was 0.571, 0.206, 0.181 and 0.169 for treatment T₁ was 0.564, 0.199, 0.198 and 0.167, for treatment T₂ was 0.550, 0.187, 0.211 and 0.165, for treatment T₃ was 0.530, 0.143, 0.228, 0.164.

Arora *et al.* (2010) observed variation in textural properties of *burfi* made from sucrose and artificial sweeteners. The compositional changes contribute towards total solid. Total solids affect hardness of *burfi*, hardness increased with increased total solids content.

Chaudhary *et al.* (2019) reported that decrease in the cohesiveness and springiness of aloe vera *burfi* with increases concentration of aloe vera juice in *burfi* also increase in the adhesiveness of aloe vera *burfi* with increase in concentration of aloe vera juice (0 to 50 %) Kapare (2017) studied same analysis for cohesiveness in case of *burfi* prepared by blending finger millet. Tulavi *et al.* (2018) studied that springiness of inulin fiber added *burfi* decreases from 1.7264 to 1.6388.

Conclusion

Sensorily best quality guava *burfi* can be prepared by using 14 per cent guava pulp, 25 per cent sugar and 4 per cent skimmed milk powder. *Burfi* prepared with addition of 14 per cent guava pulp (T₂) was found superior over the rest of all the treatment. The most preferred guava *burfi* sample (14% guava pulp) had the physico-chemical composition 16.35 per cent fat, 13.51 per cent protein, 79.49 per cent total solids, 2.96 per cent ash 0.40 per cent acidity, and 20.51 per cent moisture. The textural properties of *burfi*, i.e., hardness, cohesiveness, and springiness, were decreases with increase in

Table 1. Physico chemical Composition of Guava *Burfi*

Treat- ment	Mois- ture	Fat	Pro- tein	Total solid	Ash	Acidity
T ₀	13.29 ^d	18.92 ^a	13.90 ^a	86.71 ^a	3.08 ^a	0.28 ^d
T ₁	18.86 ^c	16.73 ^b	13.75 ^b	81.14 ^b	3.03 ^b	0.35 ^c
T ₂	20.51 ^b	16.35 ^c	13.51 ^c	79.49 ^c	2.96 ^c	0.40 ^b
T ₃	22.09 ^a	16.03 ^d	13.29 ^d	77.91 ^d	2.91 ^d	0.43 ^a
S.E.±	0.051	0.028	0.009	0.050	0.010	0.010
CD at 5%	0.159	0.089	0.030	0.154	0.032	0.031

Table 2. Effect of different levels of guava pulp on textural properties of *burfi*

Treat- ment	Hard- ness (kg)	Cohesi- veness	Adhesi- veness (kg)	Spring- iness (mm)
T ₀	0.571	0.206	0.181	0.169
T ₁	0.564	0.199	0.198	0.167
T ₂	0.550	0.187	0.211	0.165
T ₃	0.530	0.143	0.228	0.164

level of guava pulp while adhesiveness was increase with increase in guava pulp. Hence, it is concluded that best quality guava *burfi* can be prepared by using 14 per cent of guava pulp, 25 per cent sugar and 4 per cent skimmed milk powder.

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