



Studies on development of process technology for preparation of burfi using ragi flour

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Abstract

The main aim to prepare Ragi Burfi was to provide a nutrient rich confection to the consumers. The main ingredient used for preparation of Burfi were Ragi flour, Milk and Jaggery. All ingredients are the good source of vitamins and minerals such as Vitamin B1 (Thiamin), Vitamin B2 (Riboflavin), Vitamin B3 (Niacin), Vitamin B6 (pyridoxine), Vitamin K, Minerals such as Ca, Fe, K, Zn, P, Mg, Mn etc. Burfi is a good typically made from khoa. The formulation was made by varying levels of Ragi flour, Milk, Jaggery etc. For preparation of Burfi, firstly khoa prepared than mix all Ragi flour, Jaggery to make a good consistency through heating. For Sensory evaluation three treatments T1, T2, T3 were taken and from these three trials T2 was selected. Proximate analysis of Burfi was Moisture content (16.22%), Ash (2.54%), Fat (19.6%), and Protein (14.48%), Carbohydrate (47.16%), Energy (367 kcal) were best among all the levels of Burfi prepared recorded highest score in all the quality attributes and good storage ability. Storage study concluded that the Burfi made from Ragi flour can be stored for two months in High density polyethylene pouches at room temperature and three months at cold temperature. So the Burfi made from Ragi flour can be satisfy the consumer in accepts and quality.

Keywords: ragi flour, milk, jaggery, sensory evaluation, proximate analysis, storage study

Introduction

Burfi is one of the popular confection made in India. It is generally made from milk in the form of khoa, sugar and other ingredients such as nuts and other dry fruits like almond, cashews and pista. Which predominantly used for flavouring purposes. The base material for burfi is khoa, as khoa can blend with different foods easily various preparations of burfi can be made. In Indian market several varieties of burfi on the basis of the additives present in them such as cashew burfi, coconut burfi, mango burfi, chocolate burfi, mawa burfi, orange burfi etc. are sold. Good quality of burfi is characterised by moderately sweet taste, slightly greasy body, smooth texture and fine grains. It can be made into square and rectangular form. Burfi has great importance during festivals, anniversaries, marriages and other important occasions. The demand for burfi is ever increasing. (P.B. Kapare 2017). India is one of the highest milk producing country in the world with an annual growth rate of 4.53% and annual milk production is 187.7 million metric tons in the previous year 2019 with a per capita availability 394 gm/day (NDDDB statistics 2019). Most of the milk that is produced in India is utilized for the preparation of variety of dairy products i.e. ghee, khoa, milk powder, paneer, cheese, butter etc. Around 6.5 per cent of total milk produced in India is utilized for making khoa. (P.B. Kapare 2017). Dairy by-products have high nutritive value. A number of by-products like whey, buttermilk, skim milk and derived by-products like caseins, caseinates, lactose, whey proteins etc. are produced by the dairy industry. (Syed Mansha Rafiq *et al.* 2019). Buffalo milk contains water (82.98%), total solids (17.02%), fats (7.06%), SNF (9.96%), proteins (3.90%), ash (0.78%). (Khedkar *et al.*)

Ragi scientifically known as *Eleusine coracana* L. is a cereal rich in many nutrients. Millets is the common name given to the group of crops that are from grass family that is gramineae/paniceae. It is widely grown around the world for food and feed. They have general adaptations and can resist poor irrigation and low rainfall. (ICAR, 1987) ^[10]. Finger millet is an annual herbaceous cereal crop which is grown widely and is rich in proteins, minerals and other nutrients as compared with the other cereal crops such as wheat, rice, sorghum etc. (Gupta *et al.*, 2017; Sharma *et al.*, 2017) ^[27, 21]. Studies on Finger millets composition revealed the presence of moisture (6.99%), ash (2.37%), crude protein (10.28%), crude fibre (3.10%), crude lipid (0.83%) and carbohydrate (76.43%). The mineral composition were potassium (14.19 mg/g), sodium (6.86 mg/g), copper (0.10 mg/g), calcium (1.13 mg/g), magnesium (6.25 mg/g), zinc (0.22 mg/g), manganese (0.32 mg/g), Iron (0.11 mg/g). The phytochemical constituents present were tannins, steroids, phenols, alkaloids, terpenoids, cardiac glycosides and balsams. (Bwai Macham David *et al.* 2014). Finger millets has several health benefits as it is rich in nutrients. Its main health beneficial effects includes anti-diabetic, anti-tumorigenic, atherosclerogenic effects, and antioxidant and antimicrobial properties. (Palanisamy Bruntha 2011) ^[18]. Jaggery is a natural sweetener, made by the concentration of sugarcane juice. It is a traditional unrefined non-centrifugal sugar consumed in continents such as Asia, Africa etc. India is the largest producer and consumer of Jaggery. Out of the total world production, more than 70% is produced in India. (Nath A *et al.*). Jaggery is rich source of micro nutrients it contains minerals like Calcium (40-100 mg), Magnesium (70-90 mg), Potassium (1056 mg),

Phosphorus (20-90 mg), Sodium (19-30 mg), Iron (10-13 mg), Manganese (0.2-0.5 mg), Zinc (0.2- 0.4 mg), and Chloride (5.3 mg) per 100 g of Jaggery, it contains vitamins such as Vitamin A (3.8 mg), Vitamin B1 (0.01 mg), Vitamin B2 (0.06 mg), Vitamin C (7.00 mg), Vitamin D2 (6.50 mg), Vitamin E (111.30 mg), and protein 280 mg per 100 g of Jaggery. The micronutrients present in the Jaggery has antitoxic and anti-carcinogenic properties. It contains various health benefits such as blood purification, cures bile disorder and jaundice. (Nath A e.t.al).

Materials and methods

Procurement of materials for Burfi

Raw materials required during present investigation were procured from local markets such as Milk, Ragi flour, Cardamom, Dry Fruits, Jaggery, Ghee. Most of the equipments and machineries and chemicals were available in the College of Food Technology, Saralgaon, Thane (MH)

Physical properties of ingredients and burfi incorporated with Ragi flour

The colour of Rag burfi was determined by visual observations, the length, breadth and width was measured by vernier calliper. The weight of Ragi burfi was measured on analytical weighing balance.

Chemical properties of ingredients and burfi incorporated with Ragi flour

Proximate composition such as moisture, ash, crude fat, crude protein and crude fiber of all the Ingredients and Ragi burfi was determined according to the procedures given in AOAC (2000). For moisture determination samples were dried in oven at 130 °C for 60 minutes. For ash determination samples were placed in muffled furnace at 550 °C to burn out all carbon compounds leaving in organic part (ash). Fat was determined by fat extraction unit by using n. Hexane. For fiber determination, samples were treated with 1.25% Sulphuric acid and Sodium Hydroxide solution. After filtration of digested material it was washed with hot water and then ignited. By calculating loss of weight after ignition, crude fiber contents were determined. Protein contents were determined by using Kjeldahl's unit.

Sensory Evaluation

Prepared product were evaluated for sensory characteristics in terms of appearance, color, flavour, aftertaste, texture and overall acceptability by 10 semi-trained panel members comprised of academic staff members using 9- point Hedonic scale. Judgments were made through rating the product on a 9 point Hedonic scale with corresponding descriptive terms ranging from 9 'like extremely' to 1 'dislike extremely'. The obtained results were recorded in sensory score card.

Storage of Ragi burfi

Storage of Ragi burfi was done at two different conditions viz. ambient storage (30 °C) and cold storage (4 °C) for a period of two months.

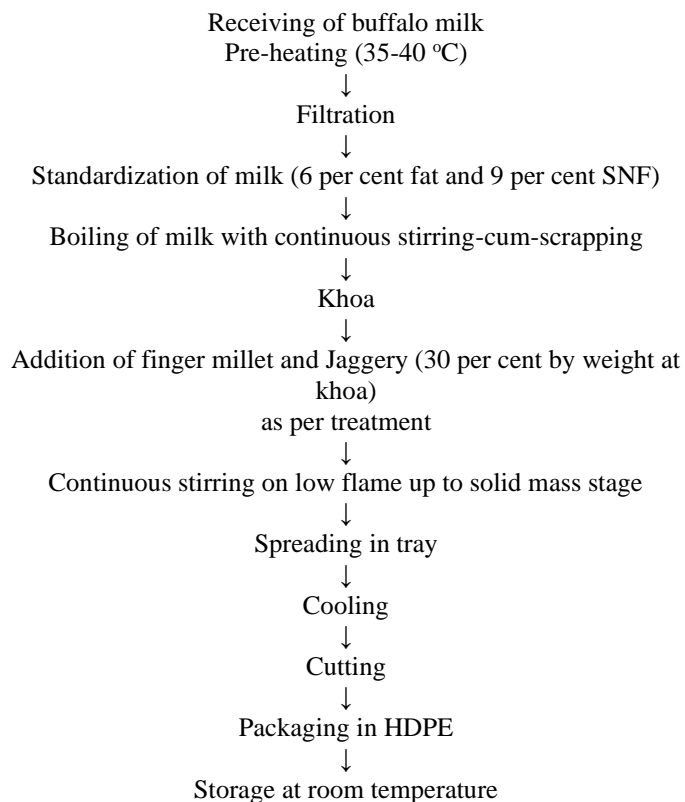
Statistical Analysis

The analysis of variance of the data obtained was done by using completely randomized design (CRD) for different treatments as per the method given by Panse and Sukhatme (1967). The

analysis of variance revealed at significance of $p < 0.005$ level S.E and C.D. at 5 percent level is mentioned wherever required.

Process and method

Flow-diagram for preparation of burfi blended with finger millet (P.B. Kapare 2017)



Result and discussion

Physical and chemical Properties of Raw Materials

Physical and chemical Properties of Ragi flour

Table 1

Physical Parameters	Units	Chemical Parameters	Units
Size	153 µm	Ash	1.81%
Bulk density	731.25 Kg/m ³	Moisture content	10.87%
Angle of repose	31.6°	Fat	2.2%
Water absorption capacity	1.08 ml/gm	Protein	9.2%

The physical properties of Ragi flour were carried out which shows values colour-Brown, Size(153µm) bulk density (731.25 Kg/m³), angle of repose (31.6°), water absorption capacity (1.08 ml/gm) and size (153 µm) were more or less similar accordingly S.B. Swami *et al.* (2010), Adebowale *et al.* (2012) [1], Goswami *et al.* (2015) [4]. Chemical parameters of Ragi flour was found to be moisture content (10.857%), fat (2.2%), protein (9.2%) and ash (1.81%) were more or less similar accordingly Pwarpp *et al.*, (2020), Chetan and malleshi *et al.*, (2007) [26], Venkatasatish (2017) respectively.

Physical and chemical Properties of Burfi from Ragi Flour**Table 2**

Physical Parameter	Units	Chemical Parameter	Units
Colour	Brown	Ash	2.54±0.02%
Shape	Rectangular	Moisture	16.22±0.11%
Thickness	7mm	Fat	19.6±0.12%
Length	5cm	Protein	14.48±0.08%
-----	-----	Carbohydrate	47.16 ±0.024%
-----	-----	Energy	367 Kcal

It was evident tabulated that the physical properties of Burfi were colour brown which was determined by visual observation. Shape of Burfi was rectangular determined by visual observation. Length of the Burfi was 5cm determined by centimetre scale. Thickness of Burfi was 7mm which was determined by Vernier Calliper. It was evident tabulated that the chemical properties of Burfi such as Ash Content (2.54±0.02%), Moisture content (16.22±0.11%), Protein content (14.48±0.08%), carbohydrate (47.16 ±0.024%) and energy was found to be 367 Kcal respectively.

Sensory Evaluation of Ragi Burfi**Table 3**

Sample→ Parameter↓	T0	T1	T2	T3
Colour	08	08	08	07
Flavour	07	07	7.5	06
Taste	6.5	6.5	07	07
Texture	7.5	07	7.5	07
Appearance	7.5	08	08	7.5
Overall acceptance	08	07	8.5	07

Sensory evaluation of sample carried out by using 9 point Hedonic Scale. Prepared various formulations of Ragi Burfi concludes that sample T2 has highest score as compare to the other samples. The colour of T2 sample as per graph is 8 point while samples T0 (08), T1 (08), T3 (07). The flavour of sample T2 was acceptable with 7.5 while samples T0 (07), T1 (07), T3 (06). The taste of sample T2 was selected by 07 points while other sample are T0 (6.5), T1 (6.5), T3 (07). The texture of sample T2 was selected by 7.5 points while other samples points are T0 (7.5), T1 (07), T3 (07). The appearance of sample T2 was selected is 8 while other samples points are T0 (7.5), T1 (08), T3 (7.5). The overall acceptability of sample T2 was selected by 8.5 points while other samples points are T0 (08), T1 (07), T3 (07).

Storage study**Organoleptic Evaluation of Ragi Burfi Stored at Ambient Temperature (30 °C)**

On the basis of results of organoleptic evaluation of Ragi Burfi, it was clear that sample Ragi Burfi prepared with Ragi flour was organoleptically acceptable and hence it was selected for further storage study. Sample T₂ was packed in aluminium foil and stored up to 60 days for specific time interval of 15 days kept at ambient temperature (30°C). The data on changes in organoleptic

properties are depicted in Table. The data in the Table revealed that there was significant change in sensorial parameters during 60 days storage period. Changes in organoleptic qualities were observed at 15 days interval. It was observed that fresh Ragi Burfi scored highest score (8.5) as compare to stored Ragi Burfi.

Table 4

Storage Days	Colour	Flavour	Taste	Texture	Appearance	Overall Acceptability
0	8	7.5	7.0	7.5	8.0	8.5
15	7.9	7.4	6.9	7.5	8.0	8.5
30	7.8	7.2	6.9	7.4	7.9	8.3
45	7.6	7.1	6.8	7.2	7.8	8.2
60	7.5	7.0	6.7	7.1	7.8	8.0

Organoleptic Evaluation of Ragi Burfi Stored at Refrigeration Temperature (4 °C)

The sensory evaluation of selected Ragi Burfi (T₂) was further carried out for storage study of 60 days at refrigerated condition. The different sensory attributes like color and appearance, taste, texture and overall acceptability were evaluated by panel members.

Table 5

Storage days	Colour	Flavour	Taste	Texture	Appearance	Overall acceptability
0	8	7.5	7.0	7.5	8.0	8.5
15	8	7.5	7.0	7.5	8.0	8.5
30	7.9	7.4	6.9	7.4	7.9	8.4
45	7.9	7.3	6.8	7.4	7.8	8.4
60	7.8	7.2	6.7	7.3	7.7	8.3

The data in the above Table revealed that there was slight change in sensorial parameters of sample stored at refrigeration temperature (4 °C) for 60days. Changes in organoleptic qualities were observed at 30 days interval. It was observed that fresh Ragi Burfi scored the highest score (8.5) as compared to stored Ragi Burfi. From the above Table it was clear that there was slight variations in taste of the Ragi Burfi (7.0 to 6.7) observed during the storage period of 60 days. During storage of Ragi Burfi from 0 to 60 days there was decrease in sensory score for overall acceptability was found from (8.5 to 8.3) on 60th day of storage. There was significant decrease in sensory score for texture; taste and overall acceptability were reported by the panel members. There was no significant evidence of microbial spoilage. It could be concluded from the table that Ragi Burfi can be stored for 60 days at refrigerated temperature (4 °C) without affecting sensorial parameters. However its acceptability score was slightly decreased and liked moderately. Similar results were reported during storage of increase shelf life of Ragi Burfi.

Conclusion

In the present study finally it is concluded that Burfi prepared from different Variations of Ragi flour has high Nutrition quality and rich in Protein, carbohydrates and some vital minerals such as calcium, zinc and iron in proper amount and has great health benefits. The present investigation carried out for information of Burfi in which T₂ sample found more superior than sample T₁ and T₃ so, T₂ sample is more acceptable on its sensory attributes.

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