The Value Addition and Sensory Evaluation of Coca Powder and Jaggery Incorporation in Kalakand Preparation

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Abstract*— Traditional Indian dairy products, also known as Indian indigenous milk products, are any milk products that are indigenous to India and have evolved over time using locally accessible fuels and cooking utensils. Approx150 types of milk-based sweets are available in India but they have been infested with several trouble during production on large scale due to short shelf life. Kalakand is a popular Indian sweet prepared from solidified, sweetened milk, Kalakand, is made by heating milk, adding sugar, and finally using the right coagulant. In this study we have prepared kalakand incorporating with coca powder and jaggery, the sample with 1% of incorporation of coca powder is accepted very well, when we packed and stored in the modified atmospheric condition it extend shelf life up to 14 days.

Indexed Terms- Kalakand, Coca Powder, Jaggery, Modified Atmospheric Packaging

I. INTRODUCTION

India's milk production rose by 3.78%, reaching 239.30 million tonnes in 2023-24, reinforcing its status as the world's largest producer. This growth is driven by better productivity in milch cattle and a rise in per capita milk availability, which increased to 471 gm per day. Milk-based sweets are an important feature of the Indian subcontinent's diet. These delicacies are traditionally served at weddings, festivals, and other special occasions. Traditional Indian dairy products, also known as Indian Indigenous milk products, are any milk products that are indigenous to India and have evolved over time using locally accessible fuels and cooking utensils (Arsul Shriram at al.,2021). Approx. 150 types of milk based sweets are available in India but they have been infested with several troubles during production on large scale due to short shelf-life (Bandyopadhyay 2006). Among 100% of total milk production, 46% milk is consumed as a liquid form while remaining 54% used for the preparation of milk products, in which 7% is used for the preparation of converted into heat and acid coagulated indigenous milk products among which Kalakand is one of the products (Bhutkar et al., 2015) [3]. Kalakand is a popular Indian sweet prepared from solidified, sweetened milk, it was invented in 1947 by Baba Thakur Das in Alwar, Rajasthan, India. Fruits/vegetable juices or pulp has been used for the fortification process to improve the taste and acceptability of kalakand (Patel and Roy, 2015) [10].

Milk and milk products have long been recognized as important sources of key nutrients in the human diet. Milk products are very suitable vehicle for delivery of bioactive ingredients (Kaur et al. 2018). Kalakand is an important indigenous milk product that is appealing to all consumer classes. One of the native milk products, Kalakand, is made by heating milk, adding sugar, and finally using the right coagulant. Even though both types of milk had the same nutritional value, it was observed that Kalakand made from buffalo milk was more popular than Kalakand made from cow milk and acidic milk. Due to its higher fat content, buffalo milk is preferred to cow milk when making Kalakand, which is traditionally made with danedar Khoa. Furthermore, since citric acid and sugar have such a big impact on the product’s texture and flavor, it is crucial to add the right amount to the mixture (David, 2015). Danedar Khoa is used in the preparation of Kalakand and gourd burfi, where granulation is highly valued. Kalakand, a whole milk concentrate, contains a good amount of lactose, minerals, fat, and energy giving proteins. On a per-unit weight and calorific value basis, it is 4-6 times more nutrient-denser than milk. One of the most well-known sweets made from Khoa is called Kalakand; it is made from Khoa and sugar and has a flavour that is mildly caramelised and pleasant. The sensory qualities, nutritive values, and physico-chemical

properties of Kalakand are impacted by the addition of flaxseed Hemanth kumar et al., 2024).

A byproduct of sugarcane, jaggery is abundant in vital minerals. (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, copper: 0.1–0.9 mg, and chloride: 5.3 mg per 100 g of jaggery), vitamins (vitamin A: 3.8 mg, vitamin B1: 0.01 mg, vitamin B2: 0.06 mg, vitamin B5: 0.01 mg, vitamin B6: 0.01 mg, vitamin C: 7.00 mg, vitamin D2: 6.50 mg, vitamin E: 111.30 mg, and vitamin PP: 7.00 mg), and protein: 280 mg per 100 g of jaggery, which can be widely distributed to reduce the issues of under nutrition and malnutrition (Pattnayak and Misra 2004)(Neha Solunke et al.,2023)

Cocoa powder is made by grinding and pressing fermented cocoa beans (Theobroma cacao seeds) to remove the natural cocoa butter. After removing the cocoa butter, a dry and bitter powder remains. Since the taste is so bitter, cocoa powder is generally combined with other ingredients to make products such as chocolate and chocolate milk. For instance, it is mixed with hot milk and sugar to make hot chocolate. It can also be combined with cocoa butter and sugar to make a chocolate bar. Cocoa powder is light brown in color, and it is very rich in nutrients, calories 400 kcal, carbohydrates 57.9g,fiber 33.2g, sugar 1.8g, saturated fat 8.1g, monounsaturated fat 4.6g, polyunsaturated fat0.4g.

It is in view of paucity of information available on preparation of kalakand by incorporation of different products the present study designed for standardizing the preparation of value added kalakand by incorporating coca powder and jaggery for increasing the nutritional and aesthetic quality kalakand.

Materials method

Milk
The standardized milk with (5% fat,9% SNF) was procured from the Karnataka milk federation, Bellary.

Citric Acid
Citric acid was used as a coagulant for the preparation of kalakand.

Cocoa Powder
Cocoa powder obtained from the local market of Bellary.

Jaggery
Organic jiggery is used for the preparation of kalakand, to retain brown colour which is procured from the local market ballary.

Sensory evaluation
Sensory evaluation of the product is done by using 9 point hedonic scale

Proximate analysis
Proximate analysis of kalakand like moisture, fat, protein, carbohydrates and ash is done by using standard AOAC (1970)

Method of preparation;
A standardized milk with (5% fat and 9% SNF) was taken for the preparation of kalakand. After boiling the milk for 20-25 minutes citric acid was added for coagulation. Stirring milk until to obtain semi-solid constant. Addition of jaggery powder mix well. After addition of cocoa powder for flavour enhancement. Keeping it on a low flame for five minutes after formation of khoa. Later the khoa transferred to trays greased with ghee. Molded and given a desirable shape.

Methods Treatment details Preparation of kalakand with addition of coca powder following treatment combinations were taken for study: T1= 94 parts of buffalo milk +5 parts of jiggery+ 1 parts of coca powder, T2=93 parts of buffalo milk +5 parts of jiggery+2 parts of coca powder, T3= 92 parts of buffalo milk +5 parts of jiggery +3 parts of coca powder.

Result and discussion
Sensory evaluation of kalakand using jaggery and coca powder is shown in the table 1. The overall acceptability is more in T2 (2 % coca powder) treatment, By showing appearance 8,colour 7.9,flovour 7.6, texture 8 and least was examined in the T1(1% coca powder). The overall acceptability of T2 sample my be because of improve floor,taste,colour and appearance by incorporation of coca powder.

Table 1. Sensory evaluation of coca powder incorporated Kalakand

Samples	Appearance	colour	Flovour	Taste	Texture	Overall acceptability
T1	8	7.8	7.5	7.9	8	8.6
T2	8	7.9	7.6	7.8	7.8	8.8

Table 2 shows the proximate composition of the coca powder incorporated kalakand, moisture (34%) , fat(21%),protein(18%) and ash(3%) was high in control sample that is KMF sample, moderate amount of moisture(32%),fat(18.1%),protein(16.3%) and ash(2.63%) present in T2 sample and least was found in T1 that is moisture (31.8%),fat(18%),protein(16.1%) and ash(2.6%). the highest moisture content in the KMF sample may be because of presence of only milk and sugar content in the product, least in the treated sample may be because of incorporation of coca powder with reducing milk solids.

Table 2: Proximate composition of coca powder incorporated kalakand

SI.no	Properties	KMF Bellary standards	T1 (1% coca powder)	T2(2% coca powder)
1.	Moisture	34%	31.8%	32%
2.	Fat	21%	18%	18.1%
3.	Protein	18%	16.1%	16.3%
4.	Ash	3%	2.6%	2.63%

Table 3: Sensory and storage study of coca powder incorporated kalakand

Number of days	Appearance	colour	Flovour	Taste	Texture	Overall acceptability
0^{th} day	6.5	7.2	6.9	6.7	6.8	7.4
7^{th} day	6.3	6.8	6.2	6.1	6.3	6.6
14^{th} day	6.2	6.2	6.1	6	6.2	6.1
21th day	6.2	6.2	6	6	6.2	6.1

For the enhancement of the shelf life of the product modified atmospheric packaging is used to extend the shelf life of the kalakand because kalakand contains more moisture, which is susceptibility growth of microbes. Modified atmospheric packaging less than 0.5% oxygen and less than 30% of the carbon dioxide is used for the packaging of the kalakand. Modified atmospheric packaging increase the shelf life of the product up to 14 days. In normal room temperature the product stay only 2-3 day and in refrigeration condition up to 7 day the product is safe for consumption.

CONCLUSION

Incorporation of coca powder (2%)with jaggery and milk in preparation of kalakand reduced the proximate composition some extent but enhanced the flour , taste , colour of the product and overall acceptability of the coca powder incorporated kalkand. Addition of coca powder increased the photochemical content of the kalakand.

REFERENCES

[1] Anonymous, 1970, Official Methods of Analysis of the Association of Official Analytical Chemists, Washington, p. 579.

[2] Arsul, S, R., John David ., Giram Kishor., K(2021) Studies on quality assessment and value addition of kalakand by admixing sapota and papaya pulp with Ashwagandha (Withania somnifera L.) Powder. Journal of Pharmacognosy and Phytochemistry, 10(6): 343-347

[3] Hemant Kumar, Ankita, H., Urvashi, V., Himanshu Rai., (2024) Process optimization for the manufacturing of flax seed powder enriched Kalakand, Indian J Dairy Sci ence, 77(4): 310-317

[4] Bandyopadhyay P., (2006) Technological advancement on traditional Indian desiccated and heat-acid coagulated dairy products. Indian Dairyman, 58(11):59-65. 3.

[5] Bhutkar S. S., Nimbalkar. S. S., Kumbhar. T.V., (2015) Studies on effect of different levels of ash gourd pulp for manufacturing of kalakand. IOSR

Journal of Agriculture and Veterinary Science.; 8(3):4-6.

[6] Neha Solunke, SG Narwade and GK Londhe(2024) Studies on physio-chemical properties of kalakand using jaggery powder International Journal of Veterinary Sciences and Animal Husbandry; SP-9(1): 754-756

[7] Kartik M Patel, S K Roy (2015) Development of value added kalakand using papaya fruit Indian Journal of Dairy Science. 68(1)

[8] David J. (2015)Effect of malto dextrin as fat replacer on physico chemical properties of low fat dietetic kalakand. The Pharma Innovation;4(10, Part A):13

[9] Goh K. K, Ye A, Dale N (2006). Characterization of ice cream containing flaxseed oil. IJFST41(8): 946-953