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## Development and quality assessment of papaya kalakand

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### Abstract

Kalakand is one of the important indigenous milk product which contains milk solid in a fourfold concentration, its food and nutritive value is very high. Papaya is a tropical fruit which has good antioxidant property, it has broad spectrum of photochemical including polysaccharide, vitamins, minerals, enzyme, protein, alkaloid, fat and oil, flavanoids. The study was made with attempts to develop kalakand blended with papaya in different concentrations by using whole milk. The data collected by different aspect were tabulated and analyzed statically using methods of analysis of variance and critical difference. Experimental sample of kalakand treatment T<sub>1</sub> was blended with 15% of papaya pulp, T<sub>2</sub> with 25% of papaya pulp and T<sub>3</sub> with 35% of papaya pulp. Nutritional content was estimated by physio-chemical analysis such as protein, total solids, moisture, and ash. Organoleptic characteristics like (flavor and taste, body and texture, color and appearance, overall acceptability) were judged by panel on 9 point hedonic scale. According to analysis treatment T<sub>3</sub> with 35% of papaya pulp was found best among three. Thus product acceptability can be rated as T<sub>3</sub> > T<sub>2</sub> > T<sub>1</sub> > T<sub>0</sub>.

**Keywords:** Indigenous, antioxidative, phytochemicals, flavonoids.

### 1. Introduction

Milk is an extremely complex biological fluid with scores of nutrient content contained in fluid characteristics of three physical phases: diluted emulsion, colloidal dispersion and solution. The chemical makeup of milk and its physiochemical behavior provide scientific basis for process of milk and manufacture of products. The increased availability of milk during the flush season coupled with inadequate facilities to keep liquid milk fresh during transit from rural production areas to urban market has led to the conversion of milk into traditional milk products. In addition manufacture of this traditional dairy product help in preservation of milk solids for longer time at room temperature and also creates employment opportunity.

**Kalakand** is one of the traditional milk products which are made by desiccation of heat with caramelized flavor and granular texture prepared from acidified milk [1]. It also accompanies reduction of water activity results in destruction of pathogenic micro-organism and inactivation of enzyme activity. The main reaction in preparation is denaturation and coagulation of milk proteins. The color of kalakand varies from off white to light caramel color. Being a whole milk concentrate, kalakand is a good source of proteins, minerals, energy giving fat and lactose. It is 4-6 times more nutritious than milk in terms of per unit weight and calorific value.

**The papaya** (*Carica papaya* Linn.) is a tropical fruit of which belongs to the genus *Carica*. It is also known as common man's fruit as it has reasonable price and high nutritive value. It is low in calories and rich in natural vitamins and minerals. Papaya when consumed regularly ensures good supply of vitamin A and C which are essential for good health especially for eyesight and prevent early stage night blindness in children. Papaya contains broad spectrum of photochemical including polysaccharide, vitamin, minerals, enzyme, proteins, alkaloids, glycosides, fat and oil, lactin, flavonoids, saponin, sterols etc [2]. There are various medicinal and pharmacological uses of papaya fruit such as for stomach ache, dysentery and chronic diarrhea, relive obesity, bleeding piles, wounds of urinary tract, skin disease psoriasis, anti-implantation activity, antibacterial activity etc [3].

**2. Materials and Methods**

Whole milk, sugar, fully ripened papaya, Citric acid, was procured from local market. Pulp was extracted from papaya fruit after discarding seeds and skin. Control and experimental kalakand were prepared by method using [4, 5]. Experimental sample of kalakand was prepared by using papaya pulp in different ratio 15% (T<sub>1</sub>), 25% (T<sub>2</sub>), 35% (T<sub>3</sub>) whereas control sample (T<sub>0</sub>) contained 100% whole milk. The product was evaluated by conducting sensory evaluation of panel of trained judges using 9 point hedonic scale<sup>6</sup>. The data collected on different aspects were tabulated and analyzed statically using the methods of analysis of variance and critical difference.

The samples were further analyzed for chemical and microbial characteristics namely Fat by Gerber method [7], Total solids using method as per Indian standards [8], Moisture using standard gravimetric method [9] Protein by following micro kjeldahl method [10], Ash [9], Titratable acidity [9] and Carbohydrate was calculated [formula:(% by difference) = 100 - (fat % + protein % + ash % + moisture%)], Active antioxidant by free radical scavenging method [11]. Coli form and Yeast and mould by manual of Dairy bacteriology, ICAR [12].

**3. Results**

Sensory score of experimental (papaya) kalakand are presented in table. It depicted that flavor, color and appearance, body and texture and overall acceptability score were varied significantly. It is evident from the table that the significantly higher score was given to experimental kalakand T<sub>3</sub> (35% pulp). With the increase of papaya pulp in kalakand there was significant increase in moisture, ash, carbohydrate and active antioxidant and vice versa in fat, protein, total solids and acidity. The yield of product was recorded highest for sample T<sub>3</sub> and lowest for T<sub>0</sub>. The cost of production was found to be in decreasing order (T<sub>0</sub> > T<sub>1</sub> > T<sub>2</sub> > T<sub>3</sub>). Maximum yeast and mould were found in experimental sample T<sub>3</sub> whereas coli forms were found negative in all the control and experimental samples.

**Table:** Average data obtained from different parameters of papaya kalakand

Parameters	T <sub>0</sub>	T <sub>1</sub>	T <sub>2</sub>	T <sub>3</sub>
Moisture%	26.12	32.88	37.81	47.12
Fat%	21.47	16.18	12.40	9.12
Protein%	18.66	15.91	15.24	13.44
Carbohydrate%	29.63	29.85	31.20	26.35
Acidity%	0.82	0.64	0.63	0.63
Ash%	2.70	3.17	3.34	3.85
Active antioxidant %	2.87	76.20	64.19	82.01
Total solids%	72.31	64.92	61.61	52.92
Yeast & mould	4.60	5.40	8.00	8.60
Coli form	Nil	Nil	Nil	Nil
Color & appearance	7.76	7.36	7.94	23.52
Body & texture	7.36	7.78	7.92	8.06
Flavor & taste	8.20	7.80	7.83	8.39
Overall acceptability	7.80	7.77	8.07	8.30
Yields%	27.05	27.53	27.87	28.51
Cost (Rs)	66.72	62.97	60.48	57.96

**2.2 Discussions**

In this study the replacement of papaya pulp in different ratio to whole milk showed different sensory chemical and microbial results. Papaya kalakand containing 35% of pulp gave best sensory attributes this could be due to normal liking.

There were variations in chemical and microbial composition of control and experimental sample. Fat, protein, total solid and acidity was found low in T<sub>3</sub> it might be due to high amount of pulp and moisture content. Carbohydrate was found high it might be due to fruit contains high amount of carbohydrate. Similarly yeast and mould were found highest in T<sub>3</sub> due to increase of moisture content. Similar observation was made by many researchers [1, 13, 14, 15]. The yield was found to be highest (28.51) in T<sub>3</sub> this was due to higher moisture content (90.33%) in papaya pulp resulting into lower moisture in control lead to increase yield<sup>16</sup>. The total manufacturing cost decreased marginally. Similar observation was also found<sup>17</sup>.

**4. Conclusion**

Finally it can be concluded that good quality kalakand can be made from mixture of papaya pulp and whole milk. Whole milk and papaya pulp in ratio 65:35 gave the entirely new product whose overall acceptability of was marvelous. There is a great scope of manufacturing kalakand blended with papaya pulp as it is proved to have nutritional properties as well as health benefits and it is good for all age group people.

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