



ISSN (E): 2277- 7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2022; SP-11(2): 1680-1682
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www.thepharmajournal.com
Received: 22-12-2021
Accepted: 25-01-2022

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Effect of wood apple pulp on physico-chemical properties of kalakand

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Abstract

The present investigation was conducted at Department of Animal Husbandry and Dairy Science, Dr. PDKV Akola, Maharashtra during the year 2020-2021. Wood Apple Kalakand was prepared with different combinations of cow milk khoa and wood apple pulp like 100:00 (T₁), 95:05 (T₂), 90:10 (T₃), 85:15 (T₄) and 80:20 (T₅). The samples of kalakand were analysis chemical evaluation it was found that fat, protein, total sugar, total solids and pH content was decreased while ash, acidity and moisture was increased with increase in levels of Wood apple pulp in kalakand preparation. Chemical Properties of Kalakand was prepared from 85 per cent cow milk khoa and 15 per cent wood apple pulp (T₄) was recorded 17.14, 14.58, 32.12, 3.32, 65.27, 34.73, 0.92, 5.54 per cent of Fat, Protein, Total Sugar, Ash, Total Solids, Moisture, Acidity, pH, respectively.

Keywords: Cow milk khoa, wood apple pulp, kalakand, chemical properties

Introduction

Milk and milk products are the important food for humans and many other animals since ancient times. Milk is utilized in various forms like cream, butter, cheese, concentrated milk (Khoa) and dried milk products. India ranks first in milk production in the world, We are producing 187.7 million ton per annum, in India per capita availability of milk is 394g per day (NDDB, 2018-19). Out of the total milk production in India, 46% of milk is consumed as a whole and 54% is used for conversion into different dairy products. It is estimated that about 7% of total milk in India is converted into heat and acid coagulated milk product among which kalakand one of the products (Bhutkar *et al.* 2015) [5]. Traditional milk products in India is gaining great commercial importance as they are accounting for over 90% of all the milk products consumed in the country (Aneja 2002) [2].

Among the indigenous milk products, kalakand occupies an important place and found to be an attractive product amongst all classes of consumers. Kalakand is a partially desiccated milk product with caramelized flavour and granular texture prepared from acidified milk (David, 2009) [6]. The wood apple (*Limonia acidissima*) is the only species of its genus in the family Rutaceae. Besides wood apple, it may be called elephant apple, monkey fruit, kathbel, and other dialectal names in India. Other Indian names include Kotha, Vila, Vilanga, Kavith, Vela marum. The fruit is a hard-shelled, many-seeded berry with its pinkish-brown aromatic sour-sweet pulp being the edible portion, the seeds embedded in it. Wood apple has promising therapeutic value because of the presence of various phytoconstituents such as tannins, alkaloids, steroids, flavonoids, terpenoids, fatty acids and vitamins. Hence in the present investigation efforts were taken to incorporate the nutritional and medicinal value of wood apple pulp in kalakand.

Materials and Methods

The present investigation was conducted at Department of Animal Husbandry and Dairy Science, Dr PDKV, Akola during 2020-21. The treatment details are as T₁ - 100% of cow milk khoa, T₂ - 95% of cow milk khoa + 5% of wood apple pulp, T₃ - 90% of cow milk khoa + 10% of wood apple pulp, T₄ - 85% of cow milk khoa + 15% of wood apple pulp, and T₅ - 80% of cow milk khoa + 20% of wood apple pulp in all the treatments sugar was added rate of 30% by wt. of kalakand mix. Fresh riped wood apple were acquired from Deptt. of Horticulture Dr. PDKV, Akola. Process line was followed as prescribed by De (2009) [7] with slight modification.

Determination of chemical properties of kalakand

Moisture, fat, protein and ash were determined by the AOAC, (2000) [3] methods, while the refractometric method described by Akinsanya, (1998) [11] was used to determine the total sugar content of burfi. SNF was obtained by subtracting the percentage of fat from the percentage of total solids in burfi. The data obtained was subjected to the statistical analysis by following the Randomized Block Design (RBD) for testing

their differences as per the procedure described by Gomez and Gomez (1984) [8].

Results and Discussion

The data pertaining to the chemical composition of kalakand differed by blending with different levels of wood apple pulp are presented in Table 1.

Table 1: Average chemical composition (%) of kalakand reared with different combinations levels of Cow milk khoa and Wood Apple pulp

Treatments	Parameter (Per cent)							
	Fat	Protein	Total Sugar	Ash	Total Solids	Moisture	Acidity	pH
T1	21.1	16.36	36.7	2.65	74.81	25.19	0.55	6.37
T2	20.11	15.91	35.23	2.82	72.43	27.57	0.64	6.16
T3	19.12	15.47	34.77	2.98	70.04	29.96	0.74	6.04
T4	18.13	15.02	33.3	3.15	67.66	32.34	0.83	5.94
T5	17.14	14.58	32.12	3.32	65.27	34.73	0.92	5.54
S.E.(m)±	0.263	0.329	0.298	0.209	0.549	0.358	0.022	0.19
C.D. at 5%	0.785	0.981	0.891	0.623	1.64	1.069	0.066	0.568

Fat content of kalakand

The fat content of wood apple kalakand decreased from (T₁) 21.10 to (T₅) 17.14 per cent. The mean value of fat content under treatments T₁, T₂, T₃, T₄ and T₅ were 21.10, 20.11, 19.12, 18.13 and 17.14 per cent respectively. The fat content was higher in T₁ i.e. (21.14%) kalakand prepared from 70 per cent cow milk khoa and 30 per cent sugar (control). Lowest fat content was observed in T₅ (17.14%), kalakand prepared from cow milk khoa with 20 per cent wood apple pulp. The results are in agreement with Kumar *et al.* (2017) [11] studied on preparation of wood apple kalakand and reported that, increased the level of wood apple pulp blended with whole milk decreased the fat from 25.12 (T₀) to 21.38 (T₃) per cent content in kalakand. Verma *et al.* (2018) [17] reported that, the kalakand prepared by using buffalo milk blended with coconut milk and sapota decreased the fat content in kalakand from 25.32 (T₁) to 22.41 (T₃) per cent.

kalakand decreased due to addition of strawberry pulp (T₁) 35.74 per cent to (T₅) 29.63 per cent.

Ash content of kalakand

The ash content of wood apple pulp kalakand ranged from (T₁) 2.65 to (T₅) 3.32 per cent. The mean ash content in treatments T₁, T₂, T₃, T₄ and T₅ were as 2.65, 2.82, 2.98, 3.15 and 3.32 per cent respectively. The ash content was lowest in T₁ treatment kalakand prepared with 100 per cent cow milk khoa and highest ash content in kalakand was observed in T₅ with addition of 20 per cent wood apple pulp in kalakand. Results are in agreement with Sawant *et al.* (2007) [14] observed that, the ash content of different combinations of mango fruit pulp in kalakand increased from 2.67 to 2.81 per cent. Bhagyashri Thakur (2015) [4] reported that the ash content in custard apple kalakand increased from 2.43 to 3.10 per cent.

Protein content of kalakand

The average protein content of wood apple kalakand ranged from 16.36 to 14.58 per cent. The mean value of protein content under treatments T₁, T₂, T₃, T₄ and T₅ were 16.36, 15.91, 15.47, 15.02 and 14.58 per cent respectively. The protein content was higher in T₁ i.e. 16.36 per cent kalakand prepared from 100 per cent cow milk khoa (control). Lowest protein content was observed in T₅ (14.58%), kalakand prepared with 80 per cent cow milk khoa and 20 per cent wood apple pulp. Kumar and Singh (2017) [11] studied on protein content of different combinations of wood apple kalakand which was decreased from 17.45 to 15.09 per cent with increases the level of wood apple pulp. Verma *et al.* (2018) [17] noted that the decreased protein content of different combinations of coconut milk and sapota kalakand from 16.91 to 14.47 per cent.

Total solids content of kalakand

The total solids content of wood apple kalakand under different treatment combinations ranged from 74.81 to 65.27 per cent. The mean total solids content in treatments T₁, T₂, T₃, T₄ and T₅ were 74.81, 72.43, 70.04, 67.66 and 65.27 per cent respectively. The total solids content was lowest in T₅ (65.27%) with the combination 80 per cent cow milk khoa, 20 per cent wood apple pulp and 30 per cent sugar by weight of mix and highest total solids content in kalakand was observed in treatment T₁ (74.81%). Results are in agreement with Patel and Roy (2015) [13] observed that total solids content of different combination of papaya pulp kalakand was decreased from 75.52 to 71.49 per cent. Kumar and Singh (2017) [11] reported that, the total solids content of different level of wood apple in kalakand was decreased from 82.97 to 75.68 percent.

Total sugar content of kalakand

The total sugar content of wood apple kalakand ranged from (T₁) 36.70 to (T₅) 32.12 per cent. The mean total sugar content was 36.70, 35.23, 34.77, 33.30 and 32.12 per cent in treatments T₁, T₂, T₃, T₄ and T₅ respectively. The total sugar content of kalakand was highest in T₁ (36.70 per cent) and lowest total sugar content in kalakand was observed in T₅ (29.13 per cent) with blended of 20 per cent wood apple pulp. Thikare *et al.* (2020) [16] reported that the sugar content of

Moisture content of kalakand

The moisture content of wood apple pulp kalakand ranged from 25.19 to 34.73 per cent. The mean moisture content was 25.19, 27.57, 29.96, 32.34 and 34.73 per cent under treatments T₁, T₂, T₃, T₄ and T₅ respectively. The moisture content was lowest in T₁ (25.19 per cent) i.e. kalakand prepared from cow milk khoa (control) and highest moisture content in kalakand was observed in 20% wood apple pulp T₅ (34.73 per cent). The results are in agreement with Bhutkar

(2015)^[5] observed the moisture per cent by utilization of ash gourd pulp for kalakand preparation. The moisture content was increased from 17.40 to 28.75 per cent by increases the level of ash gourd pulp. Verma *et al.* (2018)^[17] studied on development and quality assessment of kalakand prepared by using buffalo milk blended with coconut milk and sapota and observed that maximum moisture of 25.14 per cent was found in the treatment T₀ followed by treatments T₃ (23.32%), T₂ (22.21%) and T₁ (21.09%).

Titrateable acidity content of kalakand

The acidity content of wood apple kalakand was ranged from 0.55 to 0.92 percent. The mean acidity content was 0.55, 0.64, 0.74, 0.83 and 0.92 percent in treatment T₁, T₂, T₃, T₄ and T₅ respectively. The acidity content was observed lowest in T₁ treatment and highest acidity content in kalakand was observed in T₅ with addition of 20 percent wood apple pulp. This might be due to higher acidity content in wood apple pulp as compared to cow milk khoa. The results are in agreement with Verma *et al.* (2018)^[17] reported that acidity of kalakand increase in T₃ (0.61) as compare to T₂ (0.57) when kalakand blended with coconut milk and sapota. Kumar *et al.* (2017)^[11] reported that acidity of kalakand increase due to addition of pineapple pulp (10 to 30%) from 0.45 to 0.67 per cent.

pH content of kalakand

The pH content of wood apple kalakand under different treatment combinations was ranged from 6.37 to 5.54. The mean pH in treatments T₁, T₂, T₃, T₄ and T₅ were 6.37, 6.16, 6.04, 5.94 and 5.54 respectively. The pH was higher in T₁ (Control) i.e. 6.37 kalakand prepared from 100 per cent cow milk khoa and 30 per cent sugar which is constant for all the treatments and lowest pH content was observed in T₅ i.e. 5.54, kalakand prepared from 80 per cent cow milk khoa, 20 per cent wood apple pulp with 30 per cent sugar by weight of mix. The results are in agreement with Tayade (2016)^[15] reported that for the addition of different combination of mango pulp in the kalakand pH increases significantly.

Conclusions

On the basis of present investigation it is concluded that fat, protein, total sugar, total solid and pH were decreased due to increasing in rate of addition of wood apple pulp, while the increasing trends was recorded for moisture, titrateable acidity and ash content of kalakand.

Future Scope

Research study will help to prepare value added and nutritional milk products aware consumers.

Acknowledgement

Authors acknowledge their sincere thanks to Head, Department of Animal Husbandry and Dairy Science, Dr. P.D.K.V., Akola (Maharashtra) for providing laboratory facilities to conduct present research trials.

Conflict of Interest

Value addition in kalakand and to increase incentives to wood apple growers.

References

1. Akinsanya OP. Sugar Laboratory, National Cereal Research Institute, Badeggi, Niger State (Personal

Communication), 1998.

2. Aneja, Technology of Indian milk product. A Dairy India Publication, New Delhi, 2002.
3. AOAC. Official methods of analysis of AOAC International, 17th edn. AOAC International, Washington, USA, 2000.
4. Bhagyashri Thakur, Desale RJ, Ashwini Mukhekar. studies on Physicochemical properties of custard apple kalakand..Trends in Biosciences. 2017;10(3):ISSN 0974-8431, 1074-1075.
5. Bhutkar SS, Nimbalkar SS, Kumbhar TV. Effect of Ash Gourd Pulp for manufacturing of kalakand. M.Sc. (Agri.) Thesis Balasaheb Sawant Kokan Krishi Vidyapeeth, Dapoli 461 601 (M.S.) India, 2015.
6. David J. Heat desiccated milk products in technological advances in indigenous milk products. Kitabmahal, New Delhi, 2009, 56-59.
7. De, S. Outline of Dairy Technology. Oxford University Press, New Delhi, 2009.
8. Gomez KA, Gomez AA. Statistical Procedure for Agricultural Research. John Wiley and Sons, New York, 1984, pp 241-266
9. Kumar P, Singh SB. Formulation and evaluation of wood apple supplemented kalakand. The Pharma Innovation Journal. 2017(a);6(4):145-147.
10. Kumar A, Deen B. Study on Preparation and Storage Stability of Wood Apple RTS Beverage. Int. J. Pure App. Biosci. 2017(b);5(6):879-886, ISSN: 2320 – 7051
11. Kumar A, Deen B. Studies on Bio-Chemical Changes in Wood Apple (*Limonia acidissima* L.) Fruits during Growth and Development. International Journal Curr. Microbiol. App. Sci. 2017;6(8):2552-2560.
12. NDDB statistics, Milk Production of India, 2019. www.nddbstatistics.com.
13. Patel KM, Roy SK. Development of Value Added Milk Cake Using Custard Apple Fruit. Indian Journal of Dairy Science, 2015, 68(1).
14. Sawant YV, Chauhan DS, Padyhan PV, Thombare BM. Formulation and evaluation of mango fruit Kalakand. J Dairying Foods and H.S. 2007;26(2):102-105.
15. Tayade DN. Preparation of kalakand from cow milk blended with mango pulp. M.sc. (Agri.) Thesis, submitted to Dr. PDKV, Akola, 2016.
16. Thikare AK, Shelke RR, Kahandal SS, Kahate PA, Shegokar SR, Dalal SR. Effect of different levels of strawberry pulp (*Fragaria ananassa*) on physico-chemical quality of Kalakand. Journal of Pharmacognosy and Phytochemistry. 2020;Sp9(5):544-54.
17. Verma G, Singh SS, Singh R, Singh A. Development and quality assessment of kalakand prepared by using buffalo milk blended with coconut milk and sapota. The Pharma Innovation Journal. 2018;7(8):52-56.