Study the Effect of Addition of Kinnow Juice on Physicochemical Properties of *Kalakand*

Abstract Kalakand was prepared from buffalo milk (standardized with 6 per cent fat and 9 per cent SNF) with constant level of sugar (6 per cent by volume of milk) and different levels of kinnow juice (10, 15, 20 and 25 part by vol. of milk). It was observed that the on an average kinnow juice *kalakand* of treatments T1, T2, T3, T4 and T5 contained moisture 17.05, 17.40, 19.30, 20.75 and 22.63 per cent, fat 21.33, 20.90, 20.14, 18.89 and 17.48 per cent, protein 15.30, 14.94, 14.22, 13.51 and 12.84 per cent, ash 3.1, 2.85, 2.8, 2.55 and 2.43 per cent, total solids 82.95, 82.60, 80.70, 79.25 and 77.38 per cent, total carbohydrate 41.67, 42.70, 44.96, 44.60 and 44.23 per cent, titratable acidity 0.33, 0.38, 0.52, 0.59 and 0.75 per cent L.A., pH 6.74, 6.59, 6.40, 6.21 and 6.05 respectively

Key words: Physicochemical analysis, Kalakand and Kinnow juice

Introduction: Milk is a food of outstanding interest, not least because it was designed to be a complete food for young growing animals. A balanced diet is essential for proper health and growth. Among the indigenous milk products kalakand occupies a prominent place in India especially in the eastern part of India. Now a day's getting popular in northern and central part of India. Kalakand is the indigenous milk product obtained by heat Desiccation /concentration of whole standardized milk with subsequent addition of Proper coagulant and sugar. Among the indigenous milk products kalakand occupies a prominent place in India especially in the eastern part of India. Now a day's getting popular in northern and central part of India. Kalakand is the indigenous milk product obtained by heat Desiccation /concentration of whole standardized milk with subsequent addition of Proper coagulant and sugar. Kinnow is a member of Rutaceae family that belongs to order Sapindales and Class magnoliopsida. Kinnow has 3rd rank after banana and mango. Indian states like Panjab, Haryana, Rajasthan, Himachal Pradesh, Jammu and Kashmir are major Growing regions. Kinnow has origin in South East Asia. Worldwide, it is well known for its medicinal properties and nutrients rich juice (Chopra et al., 2004; Kelebek et Al., 2008). **[2]** Kinnow juice is good source of vitamin-C and various antioxidant Compounds that are require to sustain healthy life style Hence, considering the benefits of fruits in the human diet with respect to its Nutritional, medicinal values and technological properties, it was decided to

undertake Research work on, "**Study the Effect of Addition of Kinnow Juice on Physicochemical Properties of *Kalakand***".

Materials and Method

Treatment details

Kinnow Juice was added at different levels viz., 0, 10, 15, 20 and 25 percent on the basis of parts of milk in T1, T2, T3 T4 and, T5 .

Treatment details:

Preparation of *kalakand* with addition of kinnow juice following treatment combinations was taken for study:

T1= 100 parts of Buffalo milk + 0 parts of kinnow juice.

T2= 90 parts of Buffalo milk + 10 parts of kinnow juice.

T3= 85 parts of Buffalo milk + 15 parts of kinnow juice.

T4= 80 parts of Buffalo milk + 20 parts of kinnow juice.

T5= 75 parts of Buffalo milk + 25 parts of kinnow juice.

In above all preparation, sugar will be added @ 6 % of original volume of milk.

Preparation of *kalakand*:

The preparation of *kalakand* from buffalo milk standard method are used given by De (1982) with slight modification. **[3]**

Buffalo milk

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Filtration/clarification

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Standardization (6 per cent fat and 9 per cent SNF)

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Boiling of milk (20-25 minutes)

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Addition of citric acid @ 0.02 % (w/v of milk)

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Stirring till semisolid consistency

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Addition of kinnow juice (40°C)

↓

Addition of sugar @ 6 per cent and mix well

↓

Keep on low fire for five minutes with continuous stirring

↓

Setting of Kalakand in greased trays

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Cool and store at room temperature (25-30°C).

Flowchart 1 .Diagram for preparation of kalakand with addition of kinnow juice

Statistical Analysis:

The data obtained will be analyzed statistically by using Completely Randomized Design (CRD) as per Panse and Sukhatme (1985). **[9]**

Chemical Analysis

The kinnow juice *kalakand* were chemically analyzed for moisture as per the procedure described by ISI: 2785 (1964) [6], fat by ISI: 1224 (part II) (1977) [8], protein as per the procedure described in ISI: (1981) [7].

RESULTS AND DISCUSSION

Proximate chemical analysis of kinnow juice *kalakand*

Kalakand sample prepared under each treatment were analysed for moisture, fat, protein, total solid, ash, acidity, pH and carbohydrate. The results are depicted in following tables.

Table no. 1 Effect of various level of kinnow juice on sensory properties of *kalakand*

Constituents	Treatments				
	T1	T2	T3	T4	T5
Moisture	17.05	17.40	19.30	20.75	22.63
Fat	21.33	20.90	20.14	18.89	17.48
Protein	15.30	14.94	14.22	13.51	12.84
Total solid	82.95	82.60	80.70	79.25	77.38
Total Carbohydrate	41.67	42.70	44.96	44.60	44.23
Ash	3.10	2.85	2.80	2.55	2.43
Acidity	0.33	0.38	0.52	0.59	0.75
pH	6.74	6.59	6.40	6.21	6.05

1. Moisture content of kinnow juice *kalakand*

Moisture content in kinnow juice *kalakand* under different treatment combination was determined. Moisture affects various biochemical and microbiological activities which directly influences the shelf life of the *kalakand*. The results obtained to moisture content of control *Kalakand* (T1) and *Kalakand* prepared from different level of Kinnow juice *viz.* 10, 15, 20 and 25 per cent (T2, T3, T4 and T5) are presented in Table 1. It is seen from table 1 that the moisture content of *kalakand* are lowest for treatment T1 and it increased gradually to T5. The moisture content for treatment T1, T2, T3, T4 and T5 were 17.05, 17.40, 19.30, 20.75 and 22.63 per cent respectively. The treatment T3 (15 parts of kinnow juice) recorded the moisture content 19.30 per cent. The moisture content of *kalakand* increase in treatment T3 (19.30 per cent) as compare to T2 (17.40 per cent) and T1 (17.05 per cent), whereas decrease in treatment T4 (20.75 per cent) and T5 (22.63 per cent). As kinnow juice level increased, moisture content in *kalakand* increased and vice-versa.

The results obtained in the present research work are in analogous with Wadewale (2010) and Thikare (2020), they used mandarin orange juice and strawberry pulp respectively in their study. **[12], [10].**

2. **Fat content of kinnow juice *kalakand***

It was observed from table 1 that the fat content of *kalakand* was significantly affected due to addition of kinnow juice. The average fat content was significantly highest for treatment T1 (21.33 per cent) and it decreased gradually to T5 (17.48 per cent). The fat content for treatment T1, T2, T3, T4 and T5 were 21.33, 20.90, 20.14, 18.89 and 17.48 per cent respectively. The treatment T3 (15 parts of kinnow juice) recorded the fat content 20.14 per cent. The fat content of *kalakand* decrease in treatment T3 (20.14 per cent) as compare to T2 (20.90 per cent) and T1 (21.33 per cent), whereas increase in treatment T4 (18.89 per cent) and T5 (17.48 per cent). As kinnow juice level increased, fat content in *kalakand* decreased and viceversa.

3. Protein content of kinnow juice *kalakand*

It may be apparent from table 1 that the protein content of *kalakand* was significantly affected due to addition of kinnow juice. The average protein content was significantly highest for treatment T1 (15.30 per cent) and it decreased gradually to treatment T5 (12.84 per cent). The protein content for treatment T1, T2, T3, T4 and T5 were 15.30, 14.94, 14.22, 13.51 and 12.84 per cent respectively. The treatment T3 (15 parts of kinnow juice) recorded the protein content 14.22 per cent. The protein content of *kalakand* decrease in T3 (14.22 per cent) as compare to T2

(14.94 per cent) and T1 (15.30 per cent), whereas increase in T4 (13.51 per cent) and T5 (12.84 per cent). As kinnow juice level increased, protein content in *kalakand* decreased and vice-versa. The results obtained in the present research work are in analogous with Wadewale (2010), Bhutkar (2015) and Thikare (2020) they used mandarin orange juice, ash gourd pulp, custard apple and strawberry pulp respectively in their study **[**12**], [1], [10].**

4. Total solid content of kinnow juice *kalakand*

It may be apparent from table 1 that the total solid content of *kalakand* was significantly affected due to addition of kinnow juice. The maximum total solid content in treatment T1 (82.95 per cent), whereas minimum in treatment T5 (77.38 per cent). The total solid content for treatment T1, T2, T3, T4 and T5 were 82.95, 82.60, 80.70, 79.25 and 77.38 per cent respectively. The treatment T3 (15 parts of kinnow juice) recorded the total solid content 80.70 per cent. Total solid content of *kalakand* decrease in T3 (80.70 per cent) as compare to treatment T2 (82.60 per cent) and T1 (82.95 per cent). It is indicated that as the kinnow juice level increased, total solid content in *kalakand* decreased. This was due to decreased in fat and protein content in *kalakand*.

The results obtained in analogous with Wadewale (2010) of *burfi* due to addition of mandarin orange juice, Verma (2018) of *kalakand* blended with coconut milk and sapota pulp and Thikare (2020) of *kalakand* blended with strawberry pulp. **[**12**], [11], [10].**

5. Total carbohydrate content of kinnow juice *kalakand*

It is apparent from table 1 that the total carbohydrate content of *kalakand* was significantly affected due to addition of kinnow juice. The maximum total carbohydrate content in treatment T3 (44.96 per cent), whereas minimum in treatment T1 (41.07 per cent). The total carbohydrate content for treatment T1, T2, T3, T4 and T5 were 41.67, 42.70, 44.96, 44.60 and 44.23 per cent respectively. The treatment T3 (15 parts of kinnow juice) recorded the total solid content 44.96 per cent. The total carbohydrate content of *kalakand* increase in T3 (44.96 per cent) as compare to all other treatment. It is indicated that as the kinnow juice level increased, total carbohydrate content in *kalakand* increased.

6. Ash content of kinnow juice *kalakand*

It is apparent from table 1 that the ash content of *kalakand* was significantly affected due to addition of kinnow juice. The maximum ash content in treatment T1 (3.10 per cent), whereas minimum in treatment T5 (2.43 per cent). The ash content for treatment T1, T2, T3, T4 and T5 were 3.10, 2.85, 2.80, 2.55 and 2.43 per cent respectively. The treatment T3 (15 parts of kinnow

juice) recorded the ash content 2.80 per cent. The ash content of *kalakand* decrease in T3 (2.80 per cent) as compare to T2 (2.85 per cent) and T1 (3.10 per cent) whereas, increase in treatment T4 (2.55 per cent) and T5 (2.43 per cent). It is indicated that as the kinnow juice level increased, ash content in *kalakand* decreased.

The results obtained in analogous with Wadewale (2010) of *burfi* due to addition of mandarin orange juice, Verma *et. al*. (2018) of *kalakand* due to addition of coconut milk and sapota pulp. **[**12**], [10].**

7. Acidity content of kinnow juice *kalakand*

It is apparent from table 1 that the acidity content of *kalakand* are significantly affected due to addition of kinnow juice. The maximum acidity content in treatment T5 (0.75 per cent), while minimum in treatment T1 (0.33 per cent). The acidity content of treatment T1, T2, T3, T4 and T5 were 0.33, 0.35, 0.52, 0.59 and 0.75 per cent respectively. The treatment T3 (15 parts of kinnow juice) recorded the acidity content 0.52 per cent. The acidity content of *kalakand* increase in T3 (0.52 per cent) as compare to T2 (0.35) and T1 (0.33 per cent), whereas decrease in treatment T4 (0.59 per cent) and T5 (0.75 per cent). It is indicated that as the kinnow juice level increased, acidity content in *kalakand* increased.

Wadewale (2010) reported that the acidity content in mandarin orange *burfi* is range from 0.41 to 0.46 per cent respectively. He reported that the mandarin orange juice level increased, acidity content in *kalakand* increased. **[**12**].**

8. pH content of kinnow juice *kalakand*

It may be apparent from table 1 that the pH content of kalakand was significantly affected due to addition of kinnow juice. The maximum pH content for treatment T1 (6.74) while minimum pH content in treatment T5 (6.05). The pH content for treatment T1, T2, T3, T4 and T5 were 6.74, 6.59, 6.40, 6.21 and 6.05, respectively. The treatment T3 (15 parts of kinnow juice) recorded the pH content 6.40. The pH content of kalakand decrease in T3 (6.40) as compare to T2 (6.59) and T1 (6.74), whereas increase in T4 (6.21) and T5 (6.05). It is indicated that as the kinnow juice level increased, pH content in kalakand decreased. This might be due to higher pH content in kinnow juice as compare to buffalo milk kalakand.

The results obtained in analogous with those reported by Thikare (2020) of *kalakand* due to the addition of strawberry pulp and found that decreases the pH in *kalakand* with increase in strawberry pulp. **[10].**

CONCLUSION

The level of addition of Kinnow juice (10, 15, 20 and 25 part) was standardized on the sensory sensory score for higher and lower level than the standardized level of kinnow juice addition.

Addition of kinnow juice in *Kalakand* increased moisture and acidity while decreased fat, protein, total solid total carbohydrates and ash content significantly in finished product as compare to control.

From the results of present investigations, it was revealed that:

1) Kinnow juice could be successfully used in preparations of dairy product like *kalakand*.

2) Use of kinnow juice treatment T3 (15 parts of kinnow juice) of *kalakand* preparation was more acceptable and desirable.

3) While in chemical composition scores, control (T1) was acceptable and liked very much but as compared to other treatment levels, T3 with 15 parts of kinnow juice gained acceptable score with like very much score. Hence, it is concluded that treatment T3 is more nutritious and cheaper for consumers.

4) The chemical composition of T3 contains moisture 19.30 per cent, fat 20.14 per cent, proteins 14.22 per cent, ash 2.43 per cent, titratable acidity 0.52 per cent LA, total carbohydrate 24.25 per cent, total solids 80.70 per cent and pH 6.40.

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