

INCORPORATION OF CHAKKA BY PAPAYA PULP IN THE MANUFACTURE OF SHRIKHAND

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ABSTRACT

Shrikhand was prepared using papaya pulp incorporated in Chakka to increase the nutritional quality and overall acceptability. Papaya pulp was added at 20 per cent, 40 per cent and 60 per cent levels. The fat, protein, lactose, sucrose, ash and total solid contents significantly decreased with increase in the level of papaya pulp. The shrikhand prepared with 20 per cent level of papaya pulp was found most acceptable. On the basis of sensory evaluation the keeping quality of shrikhand was found to be 14 days, when stored at the temperature of 5°C.

Key words : Shrikhand, Chakka, Papaya, Sensory quality, Chemical composition, Storage.

INTRODUCTION

Shrikhand is a delicious and delightful dessert of western India. It is made with *chakka* (strained dahi/curd) which is finely mixed with sugar and flavouring agents. It has the nutritive goodness of fermented milk products. Like *dahi*, it is very refreshing particularly during summer months. It is popular because of its characteristics flavour, taste, palatable nature and possible therapeutic value. Yoghurt is valued for controlling the growth of bacteria and incurring intestinal diseases like constipation, diarrhoea and dysentery (Shahani and Chandan, 1979). It has higher shelf life than milk and curd. Yoghurt is effective in lowering the blood cholesterol (Mana and Spoerry, 1974). Anti-carcinogenic effect of yoghurt has been demonstrated by Ayebo and Shahani(1980). Shrikhand blended with different levels of papaya pulp was prepared with the objective to increase the nutritional quality and overall acceptability of the finished product. The specific objectives of the present investigation were (1) To evaluate the optimum level of papaya pulp to incorporate in *chakka* to manufacture *shrikhand* (2) To assess the effect of storage on physico-chemical quality of *shrikhand* (3) To evaluate the sensory quality of *shrikhand*.

MATERIAL AND METHODS

Preparation of shrikhand : Shrikhand was manufactured from cow milk and standardized at 4% fat and 8.5% (S.N.F.) (Solid not fat). Milk was heated at 85°C for 30 minutes. It was then cooled down at 28° C and inoculated by the starter culture (*S. lactis*) at the rate of 1.5% and incubated at 28-30°C for 10-12 hours until a firm coagulum was formed. Coagulum was then crushed and was transferred to a muslin cloth and pressed in a hoop for expulsion of whey for 4-6 hours. The semi solid mass left after drainage of whey is called *chakka*; the base for *shrikhand*. *Chakka* was mixed with papaya pulp at the levels of, 20 per cent (B2), 40 per cent (B3), and 60 per cent (B4), then sugar was added at the level of 30 per cent (A1), 40 per cent (A2) and 50 per cent (A3) in each pulp level by the weight of total bulk (*chakka* + papaya pulp). The mixture was well kneaded for uniform mixing.

Storage Study : The prepared samples were stored for 0 day (C1), 7 days (C2), 14 days (C3), and 21 days (C4) at 5° C (refrigerator temperature). These samples were tested for sensory and chemical analysis at every storage period.

Sensory Evaluation : The sensory characteristics for overall acceptability of papaya *shrikhand* were determined. The *shrikhand* samples were cooled to 5°C and evaluated for flavour, body and texture,

colour and appearance and over all acceptability by a panel of five judges using nine point Hedonic scale.

Chemical Analysis : The fat, protein, lactose, ash and total solids content of *shrikhand* were determined by the methods recommended by ISI (IS: 1224; 1961, 1479, 1980), respectively. The sucrose content was determined using method given by Lane and Eynon 1981.

Statistical Analysis : In order to study the effect of three sugar level (A), four papaya pulp level (B), four storage periods (C) and their interaction effect on the different characteristics of *shrikhand*, analysis of variance of three variables was worked out using the factorial completely randomized design.

RESULTS AND DISCUSSION

Sensory Characteristics : The sensory scores for flavour, body and texture, colour and appearance, and overall acceptability of *shrikhand* prepared with different levels of papaya pulp and stored for different storage periods are given in Table-1. The flavour score of *shrikhand* decreased with increase in level of papaya pulp and storage period. The highest mean score for flavour was 6.59 in case of *shrikhand* having 30 per cent sugar and lowest mean score was 6.09 in case of *shrikhand*

having 50 per cent sugar irrespective of levels of papaya pulp and storage periods, respectively. It was indicated that an inverse relationship was found among sugar levels, storage periods and flavor score. It may be due to the higher concentration of sugar. The result varied significantly from each other. The body and texture score was decreased with the increase in sugar level, with in levels of papaya pulp and storage period. The intensity of body and texture significantly deteriorated with the increasing periods of storage. This may due to the loss of moisture and microbial activity during storage period. The colour and appearance was also affected by the storage period. The highest score for colour and appearance 6.59 was in case of *shrikhand* prepared from 30 per cent sugars level and lowest score 6.02 was in case of *shrikhand* prepared by 50 per cent sugar level. The level of papaya pulp increased, the colour and appearance score was also found to be increased gradually as the storage period increased. This is because the product turned dull in color and appearance and the surface became dry due to loss of moisture. Among all the samples with papaya pulp blend the sweetness score was in case of fresh *shrikhand* prepared from 30 per cent sugar level and 20 per cent level of papaya pulp. The best sweetness

Table 1. Effect of levels of sugar, papaya pulp and storage periods on sensory scores.

Constituents	Levels of Sugar (Percent)	Levels of papaya pulp (Percent)				Mean	Storage periods (days)				Mean
		0 (B ₁)	20 (B ₂)	40 (B ₃)	60 (B ₄)		0 (C ₁)	7 (C ₂)	14 (C ₃)	21 (C ₄)	
Flavour	30 (A ₁)	7.18	6.75	6.35	6.08	6.59	8.03	7.25	5.98	5.10	6.59
	40 (A ₂)	6.88	6.45	6.05	6.78	6.54	7.73	6.95	5.88	4.80	6.29
	50 (A ₃)	6.60	6.15	6.05	5.58	6.09	7.45	6.65	5.43	4.55	6.02
Body and Texture	30 (A ₁)	7.28	6.86	6.45	6.18	6.69	8.13	7.35	6.08	5.20	6.69
	40 (A ₂)	6.98	6.55	6.15	6.81	6.62	7.83	7.05	5.78	4.90	6.39
	50 (A ₃)	6.70	6.25	5.85	5.68	6.12	7.55	6.75	5.53	4.65	6.12
Color and Appearance	30 (A ₁)	7.20	6.75	6.35	6.08	6.59	8.03	7.25	8.00	5.10	6.59
	40 (A ₂)	6.88	6.45	6.05	5.78	6.29	7.73	6.95	5.88	4.80	6.29
	50 (A ₃)	6.60	6.15	5.75	5.58	6.02	7.45	6.65	5.43	4.55	6.02
Sweetness	30 (A ₁)	7.28	6.85	6.45	6.18	6.69	8.13	7.35	6.08	5.20	6.69
	40 (A ₂)	6.98	6.55	6.15	5.88	6.39	7.83	7.05	5.78	4.90	6.39
	50 (A ₃)	6.70	6.25	5.85	5.68	6.12	7.55	6.75	5.53	4.65	6.12
Overall Acceptability	30 (A ₁)	7.23	6.80	6.40	6.13	6.64	8.08	7.30	6.03	5.15	6.64
	40 (A ₂)	6.93	6.50	6.10	5.83	6.34	7.78	7.00	5.73	4.85	6.34
	30 (A ₃)	6.66	6.20	5.80	5.63	6.07	7.50	6.70	5.48	4.60	6.07

in control *shrikhand* could be obtained from 30 per cent and when it was fresh. The control *shrikhand* of good overall organoleptic quality could be made from 30 per cent level of sugar and when it was fresh. The fresh *shrikhand* of good overall acceptability could be prepared from 30 per cent level of sugar and 20 per cent of papaya pulp. The storage period of *shrikhand* it was observed that the maximum overall acceptability was in fresh *shrikhand*, after that the overall acceptability significantly deteriorated with increase in periods of storage. Storage of *shrikhand* indicated deterioration of overall acceptability, which may be attributed to reduction of moisture and microbial activity during storage. Patel *et al.* (1993) reported that the overall acceptability score of *chakka* decreased with increase in storage period due to deterioration of flavour. Desai *et al.* (1994) prepared yoghurt by using different types of fruit's each at four levels and obtained comparable results with the present study regarding the papaya pulp level. Comparable results were also found by Vagdalkar *et al.* (2002) prepared *shrikhand* by using different levels of cocoa powder and papaya pulp separately.

Chemical Composition of Shrikhand : The chemical composition of different samples is presented in Table 2. *Shrikhand* with papaya pulp blend contained significantly lower amount of fat than the control *shrikhand*. The fat content 11.96 per cent was found in control *shrikhand*. Among all the samples with papaya pulp blend the maximum fat content 10.80 per cent was in case of 40 per cent level of papaya pulp, followed by 8.80 per cent and 5.60 per cent in case of 20 per cent and 60 per cent level of papaya pulp, respectively. This may be due to the low fat content present in the fruits. The fat content increased with increase in the period of storage at each level of papaya pulp. This may be due to loss of moisture during storage. Similar results were found by Desai *et al.* (1994) prepared yoghurt by using different levels of fruits pulp.

The highest protein content 7.79 per cent was found in case of control *shrikhand* with 30 per cent sugar level. However, among all the samples with papaya pulp blend the highest protein content 6.44 per cent was in case of 20 per cent level of papaya pulp followed by 5.12 per cent and 3.79 per cent in case of 40 per cent and 60 per cent level of papaya pulp, respectively. The protein contents decreased

Table 2. Effect of levels of sugar, papaya pulp and storage periods on chemical composition.

Constituents	Levels of Sugar (Percent)	Levels of Papaya pulp (Percent)				Mean	Storage periods (days)				Mean
		0	20	40	60		0	7	14	21	
Fat	30 (A ₁)	11.96	8.80	10.80	7.70	9.81	8.30	9.40	10.33	11.23	9.82
	40 (A ₂)	11.00	8.10	7.30	5.60	8.00	6.75	7.85	8.75	9.65	8.25
	50 (A ₃)	9.30	7.80	6.20	4.70	7.00	5.50	6.60	7.50	8.40	7.00
Protein	30 (A ₁)	7.79	6.44	5.12	3.79	5.78	5.23	5.65	6.07	6.21	5.79
	40 (A ₂)	6.73	5.61	4.50	3.38	5.05	4.50	4.92	5.34	5.45	5.00
	50 (A ₃)	5.70	4.79	3.89	3.01	4.34	3.80	4.22	4.64	4.75	4.35
Lactose	30 (A ₁)	3.05	2.43	1.82	1.20	2.12	2.16	2.14	2.12	2.09	2.12
	40 (A ₂)	2.61	2.08	1.55	1.04	1.82	1.85	1.83	1.81	1.78	1.82
	50 (A ₃)	2.17	1.74	1.30	0.84	1.51	1.54	1.53	1.51	1.49	1.52
Sucrose	30 (A ₁)	30.14	24.13	18.10	12.09	21.11	21.00	21.09	21.16	21.22	21.12
	40 (A ₂)	40.14	32.11	24.10	16.10	28.11	28.00	28.07	28.15	28.23	28.11
	50 (A ₃)	50.09	40.08	30.08	20.09	35.26	35.00	35.06	35.12	35.17	35.08
Ash	30 (A ₁)	0.82	0.76	0.73	0.70	0.75	0.75	0.75	0.75	0.75	0.75
	40 (A ₂)	0.78	0.72	0.69	0.65	0.71	0.71	0.71	0.71	0.71	0.71
	50 (A ₃)	0.71	0.68	0.63	0.57	0.64	0.65	0.65	0.65	0.65	0.65
Total solids	30 (A ₁)	53.74	42.57	36.57	25.48	39.59	37.44	39.02	40.42	41.49	39.59
	40 (A ₂)	61.26	49.62	38.14	26.77	43.94	41.81	43.39	44.78	45.82	43.95
	50 (A ₃)	67.97	55.09	42.10	29.23	48.59	46.49	48.05	49.41	50.46	48.60

significantly with increasing level of papaya pulp. This may be due to very low amount of protein in papaya fruit. The protein content increased with increase in the period of storage. This may be due to loss of moisture during storage. Patel and Chakraborty (1985) studied that storage period affect the chemical composition of the *chakka* and found the similar results. The control *shrikhand* contained the highest lactose content 3.05 per cent followed by 2.43 per cent in case of *shrikhand* with 20 per cent level of papaya pulp. The lactose content decreased with increase in the level of papaya pulp. This may be due to absence of lactose in fruit. The lactose content also decreased with increasing storage period in each level of papaya pulp and sugar. The decrease in lactose content during storage may be due to the microbial activity, which changes lactose in to lactic acid. The sucrose content decreased with increase in the level of papaya pulp. In respect of storage period sucrose content was found to increase with increase in storage period at each level of papaya pulp and sugar. This may be due to loss of moisture during storage. The highest sucrose content 35.17 was found in case of control *shrikhand* prepared from 50 per cent level of sugar and stored for 21 days. The highest ash content 0.82 was found in case of control *shrikhand*, which decreased with increase in the levels of papaya pulp and constant during storage period. Among all the

samples the highest ash content 0.76 was in *shrikhand* with 20 per cent level of papaya pulp followed by 0.73 per cent and 0.70 per cent in case of *shrikhand* prepared with 40 per cent and 60 per cent level of papaya pulp, respectively. The storage period did not affect the ash content of the prepared product. The ash content was found to decrease with increase in the level of sugar, level of papaya pulp and storage period. The control *shrikhand* was found to contain the highest total solids content 67.97 per cent in case of 50 per cent level of sugar. Regarding the storage period the highest total solids content was found in the sample stored for 21 days and fresh *shrikhand* contained the lowest total solids content. The total solids content increased with increase in the storage period at each level of papaya pulp. This may be due to loss of moisture during storage.

CONCLUSION

The present study concludes that the *shrikhand* prepared using 20 per cent level of papaya pulp with 30 per cent sugar was found to best as compared to 40 per cent and 60 per cent level of papaya pulp with respect to chemical composition. The *shrikhand* blended with papaya pulp could be stored for 14 days at 5°C temperature. It can be recommended as health food for specific patients suffering from obesity and cardiovascular diseases due to its low fat and sugar contents.

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