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Manufacture of chhana podo by incorporation of mango (*Mangifera indica* L.) Pulp Cv. Alphonso

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Abstract

A study on Manufacture of chhana podo by incorporation of mango (*Mangifera indica* L.) pulp cv. Alphonso was carried out by using cow milk. The attempts have been made to study effect of different levels of mango pulp (0, 10, 20, 30 and 40 %) on chemical quality of chhana podo. Chhana podo prepared with 20 per cent mango pulp was found superior over rest of the treatments.

Keywords: chhana podo, mango pulp, chemical quality

Introduction

Chhana podo is an indigenous dairy product of eastern region of India which is known for special chhana-based delicacies. In eastern India, Orissa is the state where chhana podo is popular and is commonly prepared throughout the state.

It is a unique product of light brown colour with characteristic cooked flavour and rich taste. It has moderately spongy cake-like texture and soft body. The product is sweetish due to the addition of sugar and has rich fat taste and flavour (Ghosh *et al.* 1998)^[4].

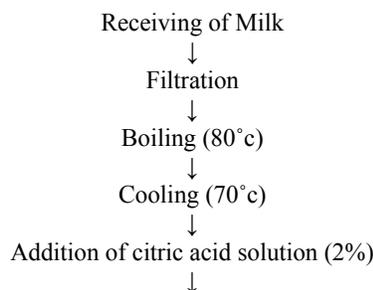
Chhana podo has been served to lord Jagannath in Puri as offering 'Prasad' for hundreds of years. Mr. Kelu Behera in Pahel and Pratihari family in Puri were the first to prepare podo delicacy (Ghosh *et al.* 2002)^[3].

Mango (*Mangifera indica* L.) is the most popular and choicest fruit of the tropics. It is also known as 'King of fruits' due to its high palatability, excellent taste, flavour and nutritive values. It is good source of vitamin A and C. In India more than thousand mango varieties are grown on commercial scale. Alphonso is one of the leading commercial cultivars of mango. It is the best variety for table as well as for processing purpose and is known as the "Pride of the Konkan". Thus, for producing novelty milk product, the present investigation was undertaken to standardize the manufacturing technology of chhana podo by incorporation of alphonso mango pulp.

Material and Methods

For preparation of chhana podo, cow milk was received from Dairy farm, College of Agriculture, Dapoli, whereas alphonso mango pulp, baking powder, maida, ghee and sugar were purchased from the local market.

The chhana podo was prepared as per the procedure given by Ghosh (1998)^[4] with slight modifications. Some preliminary trials were conducted to determine the range and appropriate stage of mango pulp for incorporation in chhana podo. The trials with four levels of mango pulp (10, 20, 30 and 40 %) were selected on the basis of preliminary trials for further studies in six replications.



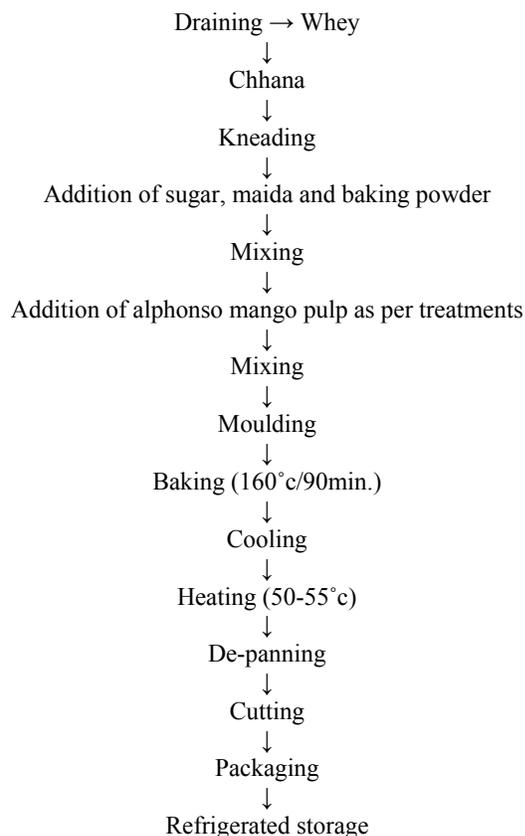


Fig 1: Flow diagram for preparation of chhana podo

The fat content of milk, chhana and chhana podo was determined by using standard Gerber method as per IS: 1224 (part-I), 1977 [7]. The acidity of milk, chhana and chhana podo was estimated according to IS: 1479, (part-I), 1960 [5]. The total solids and protein content of milk, chhana and chhana podo were determined as per IS: 1479 (part-II), 1961 [6]. The ash content of chhana and chhana podo was determined as per the procedure given in A.O.A.C. (1975) [1]. Fat content of mango pulp was determined as per the procedure given by Ranganna, 1975 [11]. The total solids, acidity and protein content of mango pulp were determined as per the procedure given in A.O.A.C. (1975) [1].

The data were statistically analyzed according to Snedecor and Cochran (1994) [12] using randomized block design.

Results and Discussion

The chemical analysis indicated that the cow milk used for chhana podo preparation had average 4.32 per cent fat, 13.09 per cent total solids, 3.57 per cent protein and 0.13 per cent acidity. All these values lie within the range of legal standards for cow milk as described by PFA rules, 1976 cited by De (1983).

The average chemical composition of chhana used in present study showed fat content 23.17 per cent, total solids 44.30 per cent, protein 16.83 per cent, ash 2.17 per cent and acidity 0.33 per cent.

The average chemical composition of mango pulp was as fat 0.89 per cent, total solids 29.82 per cent, protein 0.92 per cent, ash 0.31 per cent, acidity 0.43 per cent, total sugar 15.22 per cent, and as well reducing and non-reducing sugars 4.79 and 10.43 per cent, respectively.

The proximate analysis of chhana podo prepared by using different levels of mango pulp was carried out for total solids, fat, protein, ash and titratable acidity. The results are

furnished in Table 2.

Total solid content

The total solids content of chhana podo shows significant decrease with the increase in level of mango pulp with values of 62.12, 59.92, 55.78 and 52.44 per cent at 10, 20, 30, 40 per cent level of mango pulp, respectively. This was obviously due to very low total solids content of mango pulp as given in Table 2 (29.82 per cent). The chhana podo without mango pulp contained 66.72 per cent total solids.

The average values for total solids content in chhana podo are more or less similar to figures reported by Ghosh *et al.* (1998) [4] as 67.0 to 70.0 per cent total solids and Dash *et al.* (1999) [2] as 65.57 to 73.29 per cent total solids. Mane (2006) [9] observed on an average 74.81 per cent total solids in chhana podo.

Fat content

The perusal of data revealed that the variation in the fat content of chhana podo due to different levels of mango pulp was found to be significant. The fat content decreased significantly with the increase in the level of mango pulp. The average fat percentage of chhana podo at 10, 20, 30 and 40 per cent level of mango pulp was 16.65, 15.15, 14.55 and 13.90 per cent, respectively. The obvious reason is that as the level of mango pulp increased, there was reduction in the amount of chhana podo on added percentage basis. Secondly, due to very low fat content of mango pulp (0.89 per cent), its addition reduced the fat of the final product. The main source of fat in chhana podo is mainly from chhana which contains on an average 23.17 per cent fat. The highest fat content was observed at T₀ (17.10 per cent) i.e. podo without mango pulp.

These results are quite comparable with the result reported by Dash *et al.* (1999) [2], who stated 18.0 to 30.0 per cent fat and Kumar *et al.* (2002) [8] as 15.50 per cent fat. Mane (2006) [9] found average 15.06 per cent fat in chhana podo.

Protein content

Protein content of chhana podo was highly significant due to addition of pulp. It was decreased with the increase in the level of pulp which may be due to its very low protein content (0.92 %). The values are of 15.49, 13.98, 12.47 and 11.96 per cent protein content at 10, 20, 30 and 40 per cent addition of mango pulp, respectively. The podo without mango pulp contained on an average 16.71 per cent protein.

Ghosh *et al.* (1998) [4], Dash *et al.* (1999) [2], Kumar *et al.* (2002) [8] found 15 to 17 per cent, 16.30 to 21.08 per cent and 12.00 per cent protein content in chhana podo, respectively. These results are more or less comparable with the results obtained in present study. Dash *et al.* (1999) [2] stated that the main source of protein in podo was chhana which dependent upon the initial quality of raw milk. Average 13.90 per cent protein content in podo was recorded by Mane (2006) [9].

Ash content

The perusal of data revealed that increase in the level of mango pulp resulted in significant decrease in ash content of chhana podo. This may be due to very low ash content of mango pulp (0.31 %) and obvious reason is that as the level of mango pulp increased, there was reduction in the amount of chhana podo on added percentage basis. The average ash content of chhana podo at 10, 20, 30 and 40 per cent added pulp was 1.35, 1.29, 1.12 and 1.1 per cent, respectively.

Ghosh *et al.* (1998) [4] observed the ash content of chhana podo samples in the range of 0.8-1.0 per cent. Dash *et al.*

(1999)^[2] reported the ash content of chhana podo samples in the range of 0.93 to 1.52 per cent.

These results are more or less comparable with the results obtained in present study. Dash *et al.* (1999)^[2] stated that the main source of ash in chhana podo was chhana which dependent upon the initial quality of raw milk.

Acidity

Addition of mango pulp at the rate of 10, 20, 30 and 40 per cent, resulted in slight increase in acidity of chhana podo i.e. 0.21, 0.23, 0.24 and 0.26, respectively. This increase in acidity was statistically significant. This increase may be due to the fact that mango pulp possessed more acidity (0.43%) as compared to plain chhana podo (0.19%).

Dash *et al.* (1999)^[2] reported the titratable acidity of podo samples in the range of 0.18 to 0.27 per cent and average value was 0.20 ± 0.2 per cent. Further, they stated that these variations in acidity were mainly due to the quality of raw milk, contamination and amount of coagulant addition during the preparation of chhana. Kumar *et al.* (2002)^[8] found 0.25 per cent acidity in podo while studying the process optimization for commercial production of chhana podo.

The results of present investigation in respect of acidity are more or less in agreement with that recorded by Dash *et al.* (1999)^[2] and Kumar *et al.* (2002)^[8]. The perusal of Table 2 indicate that acidity increased significantly with the increase in the level of mango pulp.

Conclusion

It may be concluded from the present study that chhana podo prepared from treatment T₂ i.e. chhana podo with 20 per cent mango pulp was most acceptable than rest of the treatments. The production cost of treatment T₂ was found ₹ 187.50 per kg. Chhana podo with mango pulp has good potential to capture popularity due to its therapeutic and nutritive benefits.

Table 1: Average chemical quality of cow milk, chhana and mango pulp (%)

Sr No.	Constituents	Cow milk	Chhana	Mango pulp
1.	Total solids	13.09	44.30	29.83
2.	Fat	4.32	23.17	0.89
3.	Protein	3.57	16.83	0.92
4.	Ash	0.77	2.17	0.31
5.	Acidity	0.131	0.33	0.43
6.	Reducing sugar			4.79
7.	Non- Reducing sugar			10.43
8.	Total sugar			15.22

Table 2: Average chemical quality of chhana podo (%)

Levels of mango pulp (%)	Constituents (%)				
	Total solids	Fat	Protein	Ash	Titratable acidity
0	66.72	17.10	16.71	1.45	0.19
10	62.12	16.65	15.49	1.35	0.21
20	59.92	15.15	12.47	1.12	0.24
30	55.78	14.55	12.47	1.12	0.24
40	52.44	13.90	11.96	1.10	0.26
SE±	0.15640 3	0.1435 85	0.1061	0.022881	0.010724
CD	0.46002 3	0.4223 21	0.3122	0.0673	0.031541

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