RESEARCH ARTICLE Asian Journal of Dairy and Food Research, Volume 45 Issue 2: 215-218 (April 2026)

Effect on Physic-chemical Quality of Soymilk Blended Channa based Sweetmeat by using Natural Coagulant

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10.18805/ajdfr.DR-1886

ABSTRACT

Background: Animal origin protein prices are beyond the purchasing capacity of average population. So for those who cannot afford costly protein available in market, plant origin protein source is very good choice *e.g.* Soybean. Many food scientists are working on to enhance the nutritive value of milk products. In this investigation an attempt has been carried out to enhance nutritive value of sweetmeat with low cost of production by using natural coagulant.

Methods: In this investigation soymilk used for partial replacement of cow milk in order to reduce cost of production of Channa Murki. Passion fruit juice (PFJ) having good nutritional properties successfully used for coagulation.

Result: From this investigation it has been concluded that passion fruit juice can be successfully used instead of traditional coagulants in making of coagulated dairy products with high nutritive value.

Key words: Channa, Channa Murki, Passion fruit, Soymilk, Sweetmeats.

INTRODUCTION

Milk is widely used in the preparation of sweetmeats. The sweetmeats made from milk are delicious, highly nutritious and very popular items. On occasions like birthday, marriages, funerals, religious festivals everywhere sweetmeats are unavoidable. Channa Murki has a longer shelf life owing to its preparation by heat desiccation of Channa in sugar syrup in an open pan, reducing its water activity and thus spoilage (Gurditta *et al*., 2020).

Soyabean regarded as an ideal food because it contains high quantity and quality protein. So to fulfil our body protein requirement soyabean is a very cheap and nutritious source. Soymilk is good alternative for people who cannot consume dairy products due to their lactose intolerance, milk protein allergy or galactosemia (Xu and Chang, 2009). Soymilk is a water solution of soybean constituents, such as high quality proteins, essential fatty acids, carbohydrates, vitamins and minerals; however it does not contain cholesterol, gluten and lactose (Roque *et al*., 2013). Due to use of soymilk replace some quantity of cow milk so reduces the cost of product and also increases the protein content of it.

Passion fruit (*Passiflora edulis*) is native to Southern Brazil. It is commercially cultivated in tropical and subtropical areas for its sweet, seedy fruit. The fruit is both eaten and juiced, the juice often added to other fruit juices to enhance aroma. Raw Passion fruit contain 73% water, 22% carbohydrates. In a 50 gram amount (roughly size of one fruit) fresh passion fruit contains 18% of the Daily value (DV) of vitamin C. Santo *et al*. (2013) they prepared probiotic yoghurts enriched with passion fruit fibre. Vieira *et al*. (2015) spotted that yogurt added with passion fruit peel flour. Malaka *et al*., (2017) they were use passion fruit juice as a coagulant in preparation of Dangke fresh cheese. Dhanya *et al*. (2019) manufactured channa podo by incorporation of passion fruit pulp.

By considering nutritive value of passion fruit as well as soymilk Channa Murki was prepared with following objective *i.e*. 1) To prepare the channa by incorporating of soymilk in different proportions. 2) To study the quality and yield of such channa using different natural coagulant. 3) To evaluate the acceptability of the products and study its physicochemical properties.

MATERIALS AND METHODS

The materials were used in laboratory for analytical purpose during the entire research work was milk, soyabean, passion fruit, sugar and citric acid brought from local market.

The analysis of raw milk was conducted for sensory evaluation of colour and appearance, flavour, mouth feel as well as chemical analysis for fat, protein, total solids, acidity, pH and ash.

Preparation of Soymilk by method suggested by Kapoor and subsequently modified by Grover (1983).

Standardization of Cow milk as well as soymilk at 4% fat and 8.5% SNF was done.

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How to cite this article: Honkar, A.S. and Hembade, A.S. (2026). Effect on Physic-chemical Quality of Soymilk Blended Channa based Sweetmeat by using Natural Coagulant. *Asian Journal of Dairy and Food Research*. **45(2):** 215-218. doi: 10.18805/ajdfr.DR-1886.

Submitted: 07-02-2022 **Accepted:** 06-01-2023 **Online:** 13-02-2023

Preparation of passion fruit coagulant

Fresh ripe passion fruits were used for extraction of juice. Cut the fruit and take out all pulp and seeds of passion fruit with the help of spoon. Before extraction lightly crush seeds of fruits for this use pestle mortar or use a mixer for very short time. After that all pulp and crushed seeds of fruit squeezed and strained through muslin cloth to remove impurities if any. Due to squeezing of pulp, juice was separated and that juice used as coagulant in making of Channa Murki (Ingale *et al*., 2020).

Preparation of Channa Murki

Researcher finalizes 70:30 ratio (S_3) of cow milk and soymilk blend at primary level by six trained judges with 3 replications for further study (Table 1).

Good quality of milk purchased from local market. Standardize it at prescribed rate of fat and SNF. Blended it with fresh prepared soymilk [70:30 ratio (S_3) cow milk and soymilk] and strained with the help of muslin cloth. Then milk was transferred to stainless steel vessel and boils it up to 90°C temperature. After that vessel removed from fire and brought temperature of milk down to 75°C to 80°C. At this temperature the coagulant Passion fruit juice added slowly in to the milk in different proportions like in T_0 treatment citric acid used as control sample, in T_1 passion fruit juice 2.9%, in T_2 it was 3.5% and in T_3 it was 4.1% then stirred it to mix properly (Table 2).

After some time coagulation of milk takes place, then the coagulated milk strained through muslin cloth in another vessel to drain the whey. After draining of whey, remaining solid mass *i.e.* channa which was the base of Channa Murki. Channa was then cut it into blocks or dicing into one cm cubes. Then take 50% of sugar by weight of channa in a karahi and make sugar syrup. These cubes cooked in to boiling sugar syrup for 5-10 minutes in a karahi. Take out karahi from fire stirring for another 10 to 15 minutes till coating of sugar on cubes takes place. Allowing it to cool and there was ready of Channa Murki to serve (Arora *et al*., 2019).

RESULTS AND DISCUSSION

The data obtained were subjected to statistical analysis following completely randomized design recommended by Snedecor and Cochran, (1994).

From the Table 3, it is observed that mean score of ascorbic acid for Passion fruit Channa Murki ranged between 43.89 to 46.57. The lowest score was observed in T_1 (44.28) where as highest score observed in T_3 (46.57). Score for Ascorbic acid increased as the rate of coagulant increased it might be due to high vitamin C content in kiwi fruit and due to Vit. C there is separation of fatty acids from other ingredients.

The results in this study also collaborates with Pallavi *et al*. (2020) they discovered that in preparation of nutrient rich lassi by using different fruit pulp, kiwi fruit pulp added lassi have 45.76 per cent of ascorbic acid in it.

From the Table 3, it is observed that mean score of moisture for Passion fruit Channa Murki ranged between 16.72 to 23.06. The lowest score was observed in T_1 (16.72) where as highest score observed in T_3 (23.06). Score for moisture increased as the rate of coagulant increased. In the study Rana *et al*. (2017a) unearthed that cottage cheese prepared from buffalo milk with different levels of papaya latex moisture content of cottage cheese was lying from 42.10 per cent to 42.57 per cent as compared to cheese prepared by rennet it was 42.00 per cent. The results in relation to moisture contents was in agreement with

Table 1: Per cent soymilk added.

Treatments	% of Soymilk added
S_0	Nil
S_1	10
S_2	20
S_3	30

S_0- Control, S_1- 90% cow milk and 10% soymilk, S_2- 80% cow milk and 20% soymilk, S_3- 70% cow milk and 30% soymilk.

Table 2: Per cent passion fruit coagulant added.

Treatments	% of passion fruit coagulant (PFC) added
T_0	Citric acid
T_1	2.9
T_2	3.5
T_3	4.1

T_0- Control, T_1- 2.9% PFC added, T_2- 3.5% PFC added and T_3- 4.1% PFC added.

Table 3: Effect of different level of Passion fruit juice as coagulant on physic-chemical quality of Channa Murki.

Treatment	Ascorbic acid		Moisture		Total mineral		Protein		Fat		Carbohydrate	
T_0	43.897	0.069	18.607	0.288	1.127	0.085	15.793	0.069	19.453	0.282	34.507	0.217
T_1	44.280	0.130	16.723	0.194	1.247	0.049	16.553	0.203	21.117	0.265	34.940	0.347
T_2	44.773	0.219	19.260	0.131	1.187	0.066	18.107	0.271	23.663	0.215	35.613	0.116
T_3	46.570	0.256	23.063	0.295	1.023	0.062	23.017	0.193	30.410	0.106	35.930	0.166
C.D.	0.609		0.785		N.S.		0.656		0.754		0.756	
SE(m)	0.184		0.237		0.066		0.198		0.228		0.228	
SE(d)	0.260		0.335		0.094		0.280		0.322		0.323	
C,V.	0.710		2.114		10.049		1.867		1.666		1.121	

T_0- Control, T_1- 2.9% PFC, T_2- 3.5% PFC and T_3- 4.1% PFC, C.D- Critical difference.

Karki and Ojha (2018) testify that there was moisture content 50.46 per cent by using kiwi juice in coagulated mozzarella cheese as compared to animal rennet it was 54.12 per cent.

From the Table 3, it is observed that mean score of total mineral for Passion fruit Channa Murki ranged between 01.02 to 01.24. The lowest score was observed in T_3 (01.02) where as highest score observed in T_1 (01.24). Score for total mineral decreased as the rate of coagulant increased. This may be probably due to very low ash content of passion fruit juice. Our results also coincide with Toledo *et al.* (2018) use passion fruit by-products in drinkable yogurt ash content decrease very low as passion fruit flour increase. In control 1.2% ash and in treatment it was decreased from 1.2 to 1.4%. Dhanya *et al*. (2019) observed that ash of channa podo manufactured by incorporation of passion fruit pulp was 1.36 per cent compared to control 1.65 per cent. The results for ash content depicted that addition of passion fruit pulp resulted in decrease in the ash content of channa podo.

From the Table 3, it is observed that mean score of protein for Passion fruit Channa Murki ranged between 15.79 to 23.01. The lowest score was observed in T_1 (16.55) where as highest score observed in T_3 (23.01). Score for protein increased as the rate of coagulant increased. Our results coincide with Celia *et al*. (2015) observed that in fermented milk enriched with passion fruit peel flour, protein content increase with addition of passion fruit peel flour. In control protein 2.19% as compared to in treatment 1, 2 and 3 it was 2.44%, 2.59% and 3.24% respectively. Jesmin *et al*. (2021) used papaya plant latex for making cottage cheese from cow milk content protein per cent from 26.20 to 30.97.

From the Table 3, it is observed that mean score of fat for Passion fruit Channa Murki ranged between 19.45 to 30.41. The lowest score was observed in T_1 (21.11) where as highest score observed in T_3 (30.41). Score for fat increased as the rate of coagulant increased. The reported value was in consistent with the value revealed by Olorunnisomo and Adewumi (2016) they native that fat content in soft cheese made from fresh and reconstituted milk by using Lime and Mango juice as a coagulant was in between 17.90 to 22.40 per cent. Dhanya *et al*. (2019) observed that fat of channa podo manufactured by incorporation of passion fruit pulp, the variation in the fat content of channa podo due to the incorporation of passion fruit pulp was found to be significant. Ingale *et al*. (2019) detected that fat level increased as there was increase in quantity of kiwi juice.

From the Table 3, it is observed that mean score of carbohydrate for passion fruit Channa Murki ranged between 34.50 to 35.93. The lowest score was observed in T_1 (34.94) where as highest score observed in T_3 (35.93). Score for carbohydrate increased as the rate of coagulant increased. This result was in agreement with Sharma *et al*. (2018) concluded that total carbohydrates content of cottage cheese produced with Kiwi fruit enzyme was high (9.18) as compared to animal rennet (7.27). In another study Ibrahim *et al*. (2019) located that carbohydrate content in range between 12.72 to 17.10 per cent in cheese produced from soymilk by using some selected coagulants of natural origin.

CONCLUSION

From the present investigation it is cleared that all the samples were satisfactory in terms of physic-chemical properties like ascorbic acid, moisture, total mineral, protein, fat and carbohydrate content. By this study it may be concluded that due to use of soymilk cost of product decreased and nutritional value in terms of protein increased. Passion fruit juice can be successfully used as a natural coagulant in preparation of channa based sweetmeats.

Conflict of interest

All authors declare that they have no conflict of interest.

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