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Standardization and development of value added cottage cheese recipes

Dr. A Thahira Banu, M Aswini

Assistant Professor, The Gandhigram Rural Institute- Deemed University, Gandhigram, Dindigul, Tamil Nadu, India, India

Abstract
Paneer (Cottage Cheese): 'Paneer' the 'very young Cheese' is most familiar to Indian households. In smaller towns and rural areas, consumers still prefer non-branded cottage cheese processed by local dairy owners. Paneer or cottage cheese it is not only developed from animal source, but can be developed from plant sources. Paneer or cottage cheese is one of the indigenous traditional dairy foods, it is prepared by milk. Cottage cheese is value added with coconut, millet and soy milk. Millet and soy are rich in protein and they are nutritionally beneficial to human being in controlling various disorders. Moreover milk extracted from plant sources may enrich and fortify the cottage cheese with phytochemical and in turn help to fight degenerative diseases. The sources from which milk can be extracted are coconut, millets and pulses etc. Three variations of the cottage cheese was developed and coded as V_1, V_2 and V_3 were developed using different proportions of the milk taken from millet, coconut and soy and also prepared two different recipes using developed cottage cheese and standard was also prepared for comparison. Among the three variations of recipes (V_1) was finally selected after understanding its sensory quality and consumer acceptability. The composition of variation V_1 was perpared with 1:2 ratios of cow's, coconut, soy and millet milk. The sensory evaluation and consumer acceptability was evaluated using 9 point hedonic scale. Thus, from the result of the present study it is concluded that the developed cottage cheese recipes (V_1) had good quality best sensory and consumer acceptability.

Keywords: Cottage cheese, phytochemical, degenerative disease, standardization, Indigenous

1. Introduction
Food processing industry in India is one of the largest in terms of production, consumption, export and growth prospects. Important sub sectors in food processing industries are grains, fruits, vegetables, fish, milk, meat and poultry (Aaker, 2000) [1]. According to Ministry of food Processing Industries (2012), the size of the food processing industry is about Rs. 3, 15,000 crores and this included Rs. 99,000 crores of value added products. About 300 million upper and middle class people consume processed food; 200 million more consumers are expected to shift to processed foods by 2013. Processed products like 'chapaties', 'subjis' and protion packs of concentrated curries are fast becoming regular diets, especially for young couples. The product range includes foods like 'puri-bhaji' and 'dosa-vada'. Processed food products like pickles, chutneys, juices and curry powders had made their entry into the kitchens of most middle class households (Balaswamy *et al.*, 2012) [5].

Paneer is used as stuffing for popular deep-fried north Indian snacks such as paneer pakora, bread pakora and paneer roll. It is also used as stuffing for some south Indian snacks like paneer dosa and paneer bonda. It is also frequently used in Indian curries and other vegetable preparations (Jayadevan, 2013) [10].

Paneer is recommended for diabetic patients, dental carriers, growing children and pregnant women due to supplement calcium and protein (Reeta *et al.*, 2012) [12]. Paneer a popular indigenous dairy products of India, is similar to a un ripened variety of soft cheese which is used in the preparation of a variety of culinary dishes and snacks (Sunil Kumar *et al.*, 2014) [14]. Paneer is characterized by a mild acidic flavour with slightly sweet taste, and a soft cohesive and compact texture. It is an excellent substitute for meat in Indian cuisine.

Cottage cheese is value added with coconut, millet and soy milk. Coconut milk is rich in phosphorus the milk supplies the body with nearly a quarter of daily value of iron thereby resulting in the prevention of anaemia. The milk helps to decrease the risk of joint inflammation due to its high selenium content. The health of prostate gland could be promoted due to the presence of zinc in coconut milk (Belewu *et al.*, 2005) [6].

Millets are good sources of magnesium and phosphorus. Magnesium has the ability to help reduce the effects of migraine and heart attacks, while, phosphorus is an essential component of adenosine triphosphate (ATP) a precursor to energy in the body (Badau *et al.*, 2005; Liang *et al.*, 2010; Devi *et al.*, 2011) [4, 11, 8].

Soy milk protein causes the maintenance of calcium in the body and reduces the hypercalciuria however; its calcium content is lower in comparison with dairy milk (Riaz, 2006) [13]. Soy protein provides several functionalities such as water-holding, binding and emulsifying properties therefore, using soy protein may affect on the food quality (Akesowan, 2009) [2].

Phyto- or plant estrogens called isoflavones remain in the soy protein. The two major soy isoflavones are genistein and daidzein. But further processing can affect the level of isoflavones. Raw soybeans, roasted soybeans, soy flour, and textured vegetable protein have similar isoflavone content. Tofu and soy milk have lower isoflavone levels due to rinsing or the addition of water and flavorings. Soy protein isolate (SPI) is more refined than soy protein and contains lower amounts of isoflavones. SPI is used to make meat and cheese substitutes. Soy protein has been shown to lower total blood cholesterol by lowering LDL, the bad cholesterol. It does not affect the good blood cholesterol, HDL.

Paneer or cottage cheese can be developed by combination of coconut, millet, soy and cow's milk. The cottage cheese was developed to provide a new line of paneer, rich in minerals and phytonutrient with milk extracted from millets, soy and coconut.

It is believed that the so developed cottage cheese can also be an alternate for the traditional breakfast items. Therefore, the present study was to standardize and develop a value added cottage cheese recipes. The hypothesis framed for the study as "There is no mean difference between sensory evaluation and consumer acceptability of the standard and three variations of the developed cottage cheese and recipes".

2. Materials and methods

Collection and Preparation of Coconut, Millet and Soy Milk

Fresh mature coconuts were purchased from the local market. Mature coconuts were subjected to deshelling and removal water. The white coconut meats (kernel) were disintegrated using rotary wedge cutter. Coconut meat (kernel) were washed and grated. The grated coconut was grinded using an electric blender and pressed through a muslin cloth and strained to obtain coconut milk. Millets was washed and soaked in the water. The soaked millets was ground using an electric blender with water and the blend was pressed through a muslin cloth and strained to obtain millet milk. Soybean was washed and soaked overnight in the water. The soaked soybean was ground using an electric blender with water and was pressed through a muslin cloth and strained to obtain soy milk.

Preparation of Coconut, Millet and Soy Milk Cottage Cheese

Three variation of the cottage cheese were developed and coded as variation 1 (V_1), variation 2 (V_2) and variation 3 (V_3). variation 1 (V_1) [100 ml cow's milk + 100 ml coconut milk + 200 ml millet milk + 75 ml soy milk], variation 2 (V_2) [75 ml cow's milk + 100 ml coconut milk + 200 ml millet milk + 100 ml soy milk] and variation 3 (V_3) [100 ml coconut milk + 200 ml millet milk + 175 ml soy milk] respectively. Boil the milk, coconut and soy milk in a separate container. Millet milk was kept in a separate container. Two tablespoon of lemon juice was added to the milk for coagulation. After completion of coagulation the curd was drained using a muslin cloth the curd was set to form a firm cheese and the same procedure was followed for standard with cow's milk. The prepared cottage cheese was then cut into pieces and boiled in water for 5 minutes. The product was kept in a refrigerator for further use.

Preparation of the Recipes

Two recipes namely a sweet dish and uppma was prepared. These recipes were selected due to its ease of preparation and wide preference. The prepared recipes can also be a ready to eat alternate for traditional breakfast items. One serving of the prepared recipes can be a replacement for a breakfast or dinner meal. The sweet and uppma made out of the three variations was subjected to sensory evaluation in order to find out the variation that is best among the three. The evaluation was done by a panel of 5 experts using a 9 point hedonic scale. The method used for preparation of the cottage cheese recipes are given below.

Method of Preparation of the Sweet

Boil the cottage cheese for 5 minutes and grate the boiled cottage cheese and mix coconut and sugar to the grated cottage cheese.

Method of Preparation of the Uppma

Boil the cottage cheese for 5 minutes with 100 ml of water and grate the boiled cottage cheese using a grater. Add little amount of oil in a pan and saute with onion, chili, cinnamon, tomato and mustard. Add 100 ml of water with the seasoned ingredients. Then add 100 gm of the grated cottage cheese and cook for 5-8 minutes.

Standardization of the Recipes

Standardization of a recipe is a formula specific of a quality of each ingredient required to produce a specific quality and quantity of a particular food. All the three variations of the developed cottage cheese recipes were standardized for one serving and repeated. The developed cottage cheese sweet and uppma were subjected to sensory evaluation. Five semi trained experts evaluated the products using a 9 point hedonic scale.

Evaluation of the Consumer Acceptability of the Recipes

Consumer acceptability of the products was also carried out. Fifty college going students were selected to assess the overall acceptability of the cottage cheese sweet and uppma. A 9 point hedonic scale was used to assess the sensory quality of the sweet and uppma.

3. Results and discussion

Standardization of the Recipes

The three variations V_1, V_2 and V_3 of cottage cheese recipes were prepared, standardized and the result is presented in below in Table 1 and 2.

Table 1: standardization of the cottage cheese sweet

S. No	Name of the Recipe	Preparation Involved	Ingredients Used	Equipments Used	Time taken (Minutes)
1	Standard	Boiling Grating	Grated cottage cheese, Coconut, Sugar	Kadai,, Ladle, Grater	10 minutes
2	Cottage Cheese Sweet	Boiling Grating	Grated cottage cheese, Coconut, Sugar	Kadai, Ladle, Grater	10 minutes
	V_1				
	V_2				
	V_3				

It was clear from the above data that the preparation time for all the three variation V_1, V_2 and V_3 of the sweet and the standard was 10 minutes. The equipments used were same for the standard and the developed sweet.

Table 2: standardization of the cottage cheese uppma

S. No	Name of the Recipe (Uppma)	Preparation Involved	Ingredients Used	Equipments Used	Time taken (Minutes)
1	Standard	Boiling Grating	Grated cottage cheese, Onion, Chili, Tomato, Oil, Cinnamon, Mustard	Kadai, Ladle, Grater	5 minutes
2	Cottage Cheese Uppma	Boiling Grating	Grated cottage cheese, Onion, Chili, Tomato, Oil, Cinnamon, Mustard	Kadai, Ladle, Grater	5 minutes
	V_1				
	V_2				
	V_3				

It was clear from the above data that the preparation time for all the three variation V_1, V_2 and V_3 of the uppma and the standard was 5 minutes. The equipments used were same for the standard and the developed uppma.

Sensory Evaluation of the Recipes

The results of the sensory evaluation of the cottage cheese sweet and uppma are given in Table 3, 4.

Table 3: sensory evaluation of the cottage cheese sweet

Attributes	V_1	V_2	V_3	'F' Value	Significance level
Appearance	8.0 ± 1.3	7.2 ± 1.6	7.6 ± 1.4	11.07	0.04
Colour	7.0 ± 1.9	7.4 ± 2.1	7.8 ± 1.2	6.9	0.05
Flavor	7.4 ± 1.9	7.8 ± 1.6	7.6 ± 1.7	34.67	0.001
Texture	7.8 ± 1.2	7.6 ± 1.7	7.8 ± 1.6	15.8	0.06
Taste	8.0 ± 1.3	7.6 ± 1.6	8.0 ± 1.3	9.87	0.000
Overall acceptability	8.2 ± 0.9	7.8 ± 1.6	8.0 ± 1.3	20.4	0.01

The above table 3 shows overall acceptability of the sweet cottage cheese. It was noted that the overall acceptability of the sweet cottage cheese V_1,V_2, V_3 had 8.2 ± 0.9, 7.8 ± 1.6, 8.0 ± 1.3 Thus, the result shows that V_1 of the sweet made out of the cottage cheese had the highest score.

ANOVA one way table (analysis of variance) was applied to find, if there is a significant difference between three variations of the developed cottage cheese sweet in terms of sensory attributes. The "F" values shows there is a significant difference between three variations V_1, V_2 and V_3 in terms of appearance, colour, flavor, texture and taste for the cottage cheese sweet. Hence, the null hypothesis was rejected.

Gadhave (2000) [9], prepared the paneer from safflower milk blended with buffalo milk and reported that decrease in acceptability due to the increase in proportion of safflower milk.

Table 4: sensory evaluation of the cottage cheese uppma

Attributes	V_1	V_2	V_3	'F' Value	Significance level
Appearance	8.8 ± 0.4	9.0 ± 0	9.0 ± 0	16.05	0.03
Colour	8.8 ± 0.4	9.0 ± 0	8.2 ± 0.4	6.97	0.05
Flavor	8.8 ± 0.4	9.0 ± 0	8.8 ± 0.4	4.59	0.002
Texture	8.4 ± 0.5	9.0 ± 0	8.8 ± 0.4	5.86	0.01
Taste	9.0 ± 0	9.0 ± 0	8.8 ± 0.4	6.55	0.001
Overall ceptability	9.0 ±0.6	9.0 ± 0	8.6 ± 0.5	5.67	0.013

The above table 4 shows overall acceptability of the cottage cheese uppma. It was noted that the overall acceptability of the cottage cheese uppma V_1, V_2, V_3 had 9.0 ± 0.6, 9.0 ± 0, 8.6 ± 0.5. Thus, the result shows that V_1 of the uppma made out of the cottage cheese had the highest score.

ANOVA one way table (analysis of variance) was applied to find, if there is a significant relation between three variations of the developed cottage cheese uppma in terms of sensory attributes. The "F" values shows there is a significant difference between three variations V_1, V_2 and V_3 in terms of appearance, colour, flavor, texture and taste for the cottage cheese uppma. Hence, the null hypothesis was rejected.

Ann John (2002) [3], recorded the overall acceptability as 7.66 for Shrikhand, which was prepared from buffalo milk blended with sago powder.

Consumer Acceptability of the Recipes

The developed cottage cheese sweet and uppma was served to fifty respondents and a 9 point hedonic scale was used to assess the consumer acceptability and the results of the score obtained are presented in Table 5, 6.

Table 5: consumer acceptability of the cottage cheese sweet

Attributes	V_1	V_2	V_3	'F' Value	Significance level
Appearance	8.2 ± 1.1	8.1 ± 1.5	7.6 ± 1.4	28.47	0.002
Colour	7.7 ± 1.4	7.8 ± 1.3	7.5 ± 1.4	19.91	0.000
Flavor	7.7 ± 1.4	7.6 ± 1.3	7.4 ± 1.8	21.19	0.000
Texture	8.1 ± 0.9	7.6 ± 1.3	7.6 ± 1.5	86.34	0.005
Taste	8.4 ± 0.5	7.9 ± 1.4	7.6 ± 1.4	17.41	0.000
Overall acceptability	8.2 ± 0.8	7.5 ± 1.4	7.7 ± 1.4	23.59	0.001

The results of the consumer acceptability of the cottage cheese sweet showed that the score was high for $V_1$of the cottage cheese recipes than other variations. Among these developed cottage cheese V_1 has got the high mean acceptability for the cottage cheese sweet.

Thus, the results of sensory evaluation and consumer acceptability it may be concluded that the cottage cheese sweet, V_1 was the most accepted variation than the V_2 and V_3.

The calculated F value is greater than the table value of F, for given degree of freedom at 5 % level of significance. Hence, the null hypothesis was rejected. The mean of three variations V_1, V_2 and V_3 of the cottage cheese sweet are not equal. Thus, from the results it has been concluded that there is significant difference between the three variations with regard to appearance, colour, flavour, texture and taste for the cottage cheese sweet.

Bhadekar *et al.,* (2008) [7], prepared a paneer from buffalo milk added with sago powder and reported that the overall acceptability scores for the finished products including control ranged between 8.9 and the test T_3 had 7.4. The mean scores of overall acceptability showed a decreasing trend with increases in level of sago powder, there was a decrease in the acceptability in the finished products due to addition of sago powder.

Table 6: consumer acceptability of the cottage cheese uppma

Attributes	V_1	V_2	V_3	'F' Value	Significance level
Appearance	8.3 ± 0.9	8.2 ± 1.0	8.3 ± 1.3	48.15	0.002
Colour	8.2 ± 1.0	7.8 ± 1.1	7.8 ± 0.8	20.92	0.000
Flavor	8.0 ± 1.3	8.0 ± 1.3	7.8 ± 1.1	13.17	0.005
Texture	7.8 ± 1.1	7.9 ± 1.4	7.9 ± 1.3	13.12	0.000
Taste	7.9 ± 1.4	8.0 ± 1.0	7.9 ± 1.2	16.65	0.002
Overall acceptability	8.1 ± 1.1	7.8 ± 1.1	8.0 ± 1.2	17.01	0.001

The results of the consumer acceptability of the cottage cheese uppma showed that the score was high for $V_1$of the cottage cheese recipes than other variations. Among these developed cottage cheese V_1has got the high mean acceptability for the cottage cheese uppma.

Thus, the results of sensory evaluation and consumer acceptability it may be concluded that the cottage cheese uppma, V_1 was the most accepted variation than the V_2 and V_3.

The calculated F value is greater than the table value of F, for given degree of freedom at 5 % level of significance. Hence, the null hypothesis was rejected. The mean of three variations V_1, V_2 and V_3 of the cottage cheese uppma are not equal. Thus, from the results it has been concluded that there is significant difference between the three variations with regard to appearance, colour, flavour, texture and taste for the cottage cheese uppma.

Reeta *et al.,* (2012) [12], conducted a study on "Sensory and Textural Properties of Paneer Using Edible Coating". The study reported that the overall acceptability score for paneer ranged between 6.7 to 8.0%. The co-efficient of determination (R^2) for regression model for overall acceptability.

4. Conclusion

It may be concluded from the study that the sensory evaluation of the developed cottage cheese was high for V_1. The overall consumer acceptability of developed cottage cheese recipes was also high for V_1. Developed cottage cheese has all the potential to be used as a value added product and new taste and flavoured product and can be introduced as an innovative and line extended product.

5. References

1. Aaker DA. Building brands without mass media. Harvard Associates, New York, U.S.A, 2000.
2. Akesowan A. Influence of Soy Protein Isolate on Physical and Sensory Properties of Ice Cream. Thai Journal of Agricultural Science, 2009; 42(1):1-6.
3. Ann John. M.Sc. (Agri.) Thesis, Marathwada Agriculture University, Parbhani (M.S.) India, 2002.
4. Badau MH, Nkama I, Jideani IA. Phytic acid content and hydrochloric acid extractability of minerals in pearl millet as affected by germination time and cultivar. Food Chem, 2005; 92(3):425-435.
5. Balaswamy T, Anil Kumar K, Srinivasa Rao, Buying Behavior of Consumers towards Instant Food Prodcuts. International Journal of Research and Computational Technology, 2012; 2:2-10.
6. Belewu MA *et al.,* Soy coconut yoghurt, preparation, compositional and organoleptic qualities. Bioscience Research Bulletin, 2005; 21(2):129-137.
7. Bhadekar SV *et al.,* Sensory evaluation and overall acceptability of paneer from buffalo milk added with sago powder. J. Dairying, Foods and H.S., 2008; 27(2):99-103.
8. Devi PB *et al.,* Health benefits of finger millet (*Eleusine coracana* L.) polyphenols and dietary fiber: a review. J. Food Sci. Technol. 2011. DOI: 10.1007/s13197-011-0584-9
9. Gadhave DK. M.Sc. (Agri.) Thesis, Marathwada Agriculture University, Parbhani (M.S.) India, 2000.
10. Jayadevan GR. A Strategic Analysis of Cheese and Cheese Products Market in India, 2013.
11. Liang Yang SG, Ma Y. Chemical characteristics and fatty acid profile of foxtail millet bran oil. J. Am. Oil Chem. Soc. 2010; 87:63-67.
12. Reeta *et al.,* Study of sensory and textural properties of paneer using edible coating. 1:562 doi: 10.4172/ scientific reports. 2012, 562.
13. Riaz MN. Soy Applications in Foods. London: CRC Taylor and Francis, 2006, 39-226.
14. Sunil Kumar *et al.,* Paneer- An Indian soft cheese variant: a review. J. Food Sci Technol. 2014; 51(5):821-31.