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Enrichment of low fat paneer by incorporating herbal extracts (Basil, Ginger and Mint)

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Abstract

The present study was carried out with objectives to prepare low fat salted herbal paneer and to standardize the level of herbs and brine for it, as well as to assess physico-chemical and microbiological properties of low fat salted herbal paneer. The low fat herbal paneer was prepared by using different percentages of fat levels, i.e. T₀(5% fat and 8.5%SNF) which serves as control. Treatment combinations were BT₁(1.5% fat and 4.5% basil extract), BT₂(2% fat and 4.5% basil extract),BT₃(2.5% fat and 4.5% basil extract), GT₁(1.5% fat and 4.5% ginger extract), GT₂(2% fat and 4.5% ginger extract), GT₃(2.5% fat and 4.5% ginger extract), MT₁(1.5% fat and 4.5% mint extract), MT₂(2.5% fat and 4.5% mint extract), MT₃(2.5% fat and 4.5% mint extract). Solids not fat in all treatments combinations was 8.5%. The experiment was replicated four times. Sensory evaluation was carried out using a 9-point hedonic scale. The product was analyzed for ash, moisture, protein, fat and calcium contents by using AOAC (1980) procedures. The microbial analysis with reference to Yeast and Mold count Standard Plate Count and Coli form count was also done for different replication by using standardized procedures given in 'APHA Standard Methods'. Data obtained during investigation was statistically analyzed by using analysis of variance (ANOVA) and critical difference test (C.D).

On the basis of objectives it is concluded that the treatment BT₁containing 1.5%fat, 8.5%SNF with 4.5% basil extract was found best in terms of flavour and taste, colour and appearance, body and texture and overall acceptability. The low fat salted paneer is rich in protein, ash, fibers and minerals like calcium, iron and magnesium. Whereas it has lower standard plate count and yeast mould count as well as absence of coli forms. The developed product can therefore be helpful from the therapeutic point of view also.

Keywords: Enrichment, fat paneer, herbal extracts

Introduction

Paneer has evolved from a Portugese gift to India, to become a gourmet's delight. Historically, the origin of paneer can be traced to the nomads of South-West Asia, who were first to develop various types of cheese. Among these is a unique 'Iranian cheese' called 'Paneer-khiki'. In India in the last few decades, the popularity of paneer has spread from the northern parts to all over the country. Its growing popularity has led to its integration into the Indian cuisine. Now, it enjoys the status of a national delicacy (Aneja *et al.* 2001) ^[1].

Paneer is an important in indigenous nutritious and wholesome dairy product. It is rich source of protein, fat, minerals and vitamins. Paneer is used as base preparation of the number of culinary dishes. Paneer is obtained through heat/acid coagulation of casein component of standardized buffalo's milk entrapping through complex physico-chemical interactions almost all the fat apart of denatured whey proteins and colloidal salts as well as a part of the soluble milk solids. Typically paneer is marble white in appearance, having slightly spongy body, close-knit texture and possessing a sweetish-acidic-nutty flavour. Patel (1991) ^[10] observed that a good quality paneer can be made successfully with low cost by reducing its fat content up to 3-3.5% as against the 6% milk fat. From the nutritional point of view also, if the fat content is reduced or minimized then the product can be recommended for the both diabetic and hypertensive patients.

Basil (*ocimum basilicum*) is a wonderfully fragrant herb that is grown as a prenninal in warm, tropical climates. Basil is originally native to India and other tropical region of Asia. Basil is an excellent source of minerals like magnesium, iron, manganese, potassium and vitamins like vitamin A. vitamin K and vitamin C. Basil inhibits strains of bacteria from genera staphylococcus, enterococcus and pseudomonas.

Ginger (*gingiber officinalis*) is a member of the zingiberaceace family that is in the tropical forests of many countries as India, China, fiji and Indonesia. Ginger is an excellent source of minerals like potassium, calcium, manganese, and magnesium.

Mint is rich source of vitamins like vitamin A, vitamin C, and vitamin B₂. These vitamins are vital to maintain a healthy body. The vitamin C is an important antioxidant that helps to control cancer and other diseases.

Paneer is deficient in vitamin C, minerals, as iron and crude fiber. Green herbal leafy plants are inexpensive and rich source of vitamin and minerals. Therefore herbs Basil, Mint and Ginger are incorporated in paneer to enhance the nutritional value of paneer.

Brining of the herbal paneer before storage is done to improve its shelf life. Sachdeva and Singh (1985) reported that shelf life of paneer was 22 days with 5% brine solution. The moisture in paneer ranges from 53-55%. Jain and Modi (1982) [9] found that the shelf-life of paneer can be extended over 3 weeks by dipping in brine solution (10-15%) for 30 minutes at room temperature and storing at 5-6

Materials and Methods

1) Procurement of raw materials

Buffalo's milk were collected from student's training dairy technology Allahabad Agricultural institute, Deemed university Allahabad for each replication. Skimmed milk powder manufactured by Lipton sold under the Brand name, Anikspray, was obtained from the local market of Allahabad and used for standardization. Ginger, basil and mint leaves were collected from the vegetable farm of Allahabad Agricultural Institute, deemed university Allahabad.

Experimental Design : In this research study, Tois control paneer and BT₁, BT₂, BT₃, GT₁, GT₂, GT₃, MT₁, MT₂, MT₃ are experimental samples details of which are as follows: To control paneer, BT₁ (1.5% fat basil paneer) BT₂ (2% fat basil paneer), BT₃ (2.5 fat basil paneer), MT₁ (1.5% fat mint paneer), MT₂ (2% fat mint paneer), MT₃ (2.5% fat mint paneer) GT₁ (1.5% fat ginger paneer), GT₂ (2% fat Ginger paneer), GT₃ (2.5% fat ginger paneer).

2.) Preparation of Herbal extracts

The leaves of Basil and Mint and Ginger washed, then crushed them with equal amount of water. Then the extract was procured by sieving through muslin cloth. Thus extract is prepared.

3.) Preparation of Herbal Paneer

Fig. I and II shows the preparation of control and experimental paneer.

4.) Sensory Evaluation of Herbal Paneer

Sensory analysis was done by a semi-trained panel of 5 judges using 9-point Hedonic scale of Srilakshmi (2003) [12].

4.) Chemical Analysis of Herbal Paneer

The nutrient composition like protein, fat calcium ash and moisture were estimated by chemical analysis using standardized procedure of AOAC (1980).

5.) Microbiological Analysis Herbal Paneer

The microbiological analysis i.e. Standard Plate Count, Yeast and Moulds and Presumptive Coliform Test of drumstick leaves incorporated paneer were estimated by using standardized procedure given in 'APHA Standard Methods For the Examination of Dairy Products' (1992).

6.) Statistical Analysis

The data obtained for various parameters were analysis statistically using analysis of variance and critical difference test.

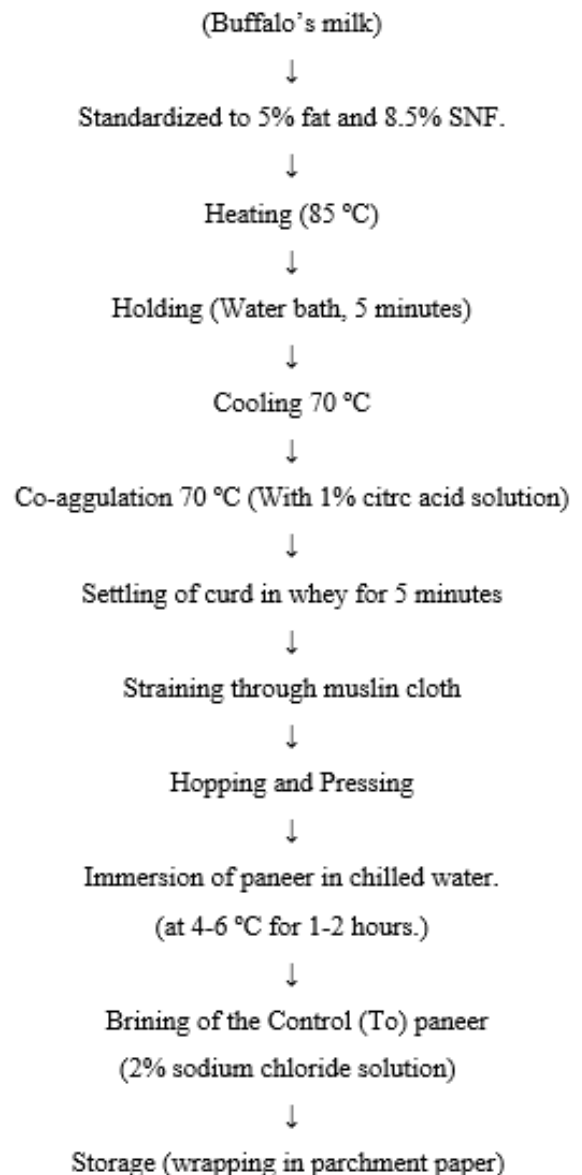


Fig I: Flow chart for preparation of Control paneer

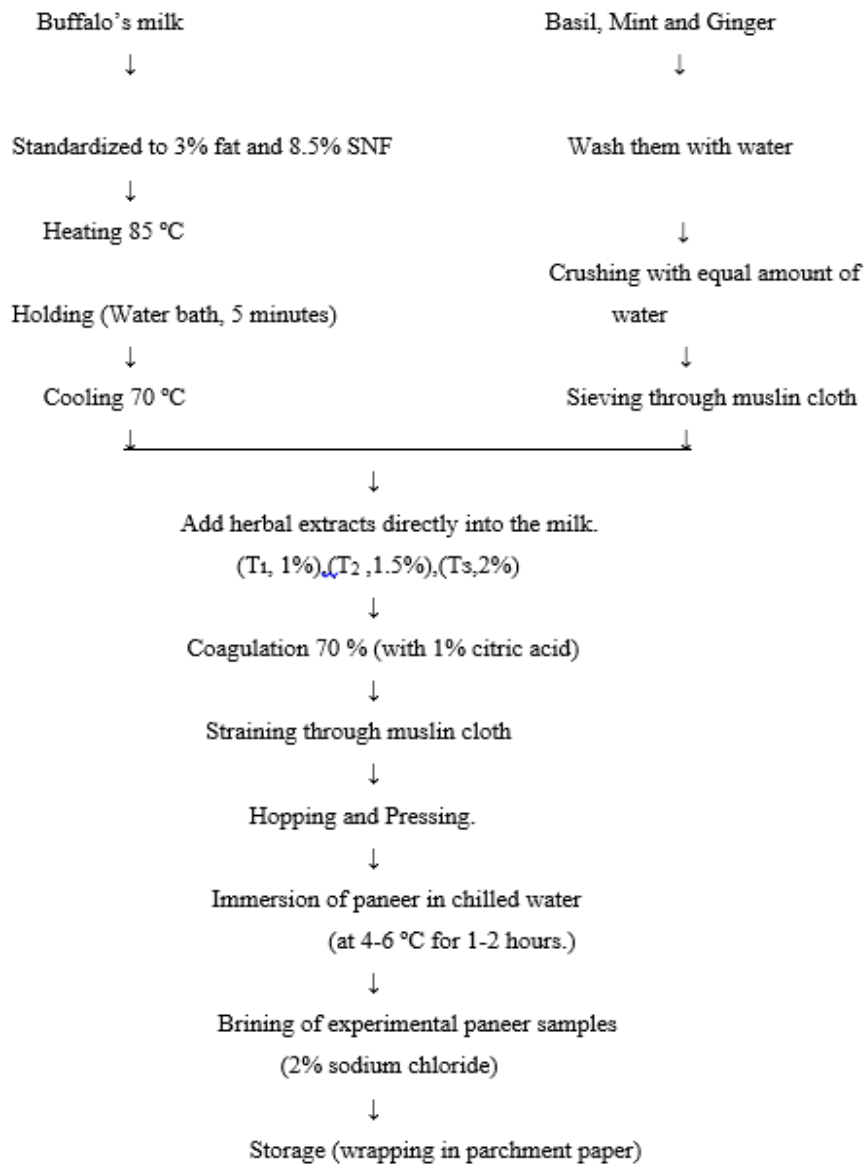


Fig II: Flow chart for preparation of Experimental Paneer

Result and Discussion

The data collected on different aspects as per the methodology have been tabulated and analyzed statistically.

A. Sensory Analysis: Sensory evaluation of the product

including Flavour and taste, Body and texture, Colour and appearance and Overall acceptability. It was done by a semi-trained-panel of 5 judges using a 9-point Hedonic scale of Srilakshmi B (2003) [12].

Table I: Average sensory scores of Herbal Paneer

Treatments	Flavour and Taste	Body and Texture	Colour and Appearance	Overall acceptability
T ₀	8.45	8.43	8.35	8.3
BT ₁	8.0	7.58	7.63	7.58
BT ₂	7.55	7.18	7.05	7.3
BT ₃	7.43	6.75	6.95	7.2
GT ₁	7.68	6.68	6.9	7.15
GT ₂	7.55	6.73	7.03	7.3
GT ₃	8.05	6.8	7.25	7.4
MT ₁	7.7	6.83	7.13	7.13
MT ₂	7.85	6.55	7.05	7.38
MT ₃	7.88	6.55	7.13	7.23
Average	7.81	7.0	7.24	7.39
F _{table} (P<0.05)	2.25	2.25	2.25	2.25
F cal.	4.39	4.4	6.29	2.38
Result	Significant	Significant	Significant	Significant

It is evident from the Table I that the highest average score for flavour and taste was observed in T₀(8.45) followed by BT₁

(8.0),GT₃(8.05), MT₃(7.88), MT₂(7.85), MT₁(7.7), GT₁(7.68), GT₂(7.55), BT₂(7.55), BT₃(7.43) respectively. In herbal

paneer BT₁ (8.0) has got maximum score due to the addition of basil extract. Similarly the highest score for body and texture was observed in T₀(8.43), followed by BT₁(7.58), GT₂(7.55), BT₂(7.18), MT₁(6.83), GT₃(6.8), BT₃(6.75), GT₁(6.68), MT₂(6.55) and MT₃(6.55) respectively. In experimental paneer BT₁ has highest sensory score for body and texture due to the addition of basil extract and low percentage of fat. The highest score for colour and appearance was observed in T₀(8.35), followed by BT₁(7.63), MT₁(7.13), MT₃(7.13), GT₃(6.8), GT₃(7.25), BT₂(7.05), MT₂(7.05), GT₂(7.03), BT₃(6.95), GT₁(6.90) respectively. The control paneer has highest score for colour and appearance, because it

does not contain any herbal extracts. While BT₁ has highest score due to the addition of basil extract. The highest score for overall acceptability was observed in T₀(8.3), followed by BT₁(7.58), GT₃(7.4), MT₂(7.3), BT₂(7.3), GT₂(7.3), MT₃(7.23), BT₃(7.2), GT₁(7.15), MT₁(7.13)S respectively. T₀ has the highest average scores for overall acceptability, since no herbal extract was added in it. Thus BT₁ was found most accepted in terms of flavour and taste, colour and appearance, body and texture and overall acceptability due to the addition of basil extract and lowest fat content.

2.) Chemical Analysis

Table II: Average nutrient percentage of herbal paneer

Treatments	Ash	Moisture	Fat	Protein	Calcium
T ₀	1.57	44.88	14.58	16.01	788.89
BT ₁	2.7	53.73	13.2	17.88	848.52
BT ₂	2.27	51.38	4.03	17.25	832.40
BT ₃	1.92	52.5	5.0	17.0	834.90
GT ₁	2.25	52.45	3.05	17.03	843.52
GT ₂	2.3	52.15	4.20	17.07	845.02
GT ₃	2.05	52.08	5.76	16.85	845.02
MT ₁	2.01	52.08	3.28	16.90	835.90
MT ₂	1.8	53.03	4.62	16.7	830.40
MT ₃	1.92	53.60	5.28	16.7	840.48
Average	2.07	51.75	5.3	16.9	
Ftable (P<0.05)	2.25	2.25	2.25	2.25	-
F cal.	4.37	19.61	21.5	112.85	-
Result	Significant	Significant	Significant	Significant	-

The above table shows proximate composition of control and experimental paneer samples. The ash content was higher in BT₁ (2.7) followed by GT₂ (2.3), BT₂(2.27), GT₁(2.25), GT₃(2.05), MT₁(2.01), BT₃(1.92), MT₃(1.92), MT₂(1.8), and T₀(1.57) respectively. Similarly BT₁(53.73) has higher moisture content followed by MT₃(53.60), MT₂(53.03), GT₁(52.45), BT₃(52.5), GT₂(52.15), GT₃(52.08), MT₁(52.08), BT₂(51.38) and T₀(44.88) respectively. The moisture content was significantly lower in control paneer as compared to experimental paneer higher moisture in experimental paneer may be due to the lower total solid content in the raw material i.e the mixture of milk and skim milk. The fat content was higher in T₀(15.54%) followed by MT₃(5.96%), GT₃(5.8%), BT₃(5.6%), MT₂(4.96%), GT₂(4.9%), BT₂(4.5%), MT₁(3.92%), BT₁(3.4%), GT₁(3.5%), respectively. It is evident from the table II that BT₁(17.88) has higher protein

content followed by BT₂(17.25), GT₂(17.07), GT₁(17.03), BT₃(17.0), MT₁(16.90), GT₃(16.85), MT₂(16.7), MT₃(16.7) and T₀(16.01) respectively. Protein content of different treatments is attributed to the variation in proportions of protein and fat content of initial milk used for preparation of paneer. The calcium content was higher in BT₁(848.52), GT₂(845.52), GT₁(843.53), MT₃(840.48), MT₁(835.90), BT₃(834.90), BT₂(832.30), MT₂(830.40), GT₃(820.80) and T₀(788.79) respectively. Calcium content of experimental samples was higher due to the incorporation of herbal extracts. This is found by Goplan *et.al* (2002) that the herbal extracts are rich source of calcium, iron, riboflavin and folic acid.

3.) Microbiological Analysis

Table III: Microbial count of control and experimental paneer samples.

Microbes Present	Treatments									
	T ₀	BT ₁	BT ₂	BT ₃	GT ₁	GT ₂	GT ₃	MT ₁	MT ₂	MT ₃
SPCx10 ² Cfu/gm	14	6	7	7	7	7	8	12	11	9
Yeast and mould/gm	5	2	2	2	4	3	2	3	3	3
Coliforms	0	0	0	0	0	0	0	0	0	0

It is evident from Table III that highest standard plate count was found in T₀(14) followed by MT₁(12), MT₂(11), MT₃(9), GT₃(8), GT₂(7), GT₁(7), BT₃(7), BT₂(7), BT₁(6) respectively. Similarly the yeast and mould count was higher in T₀(5) followed by GT₁(4), MT₃(3), GT₂(3), MT₁(3), MT₂(3), BT₂(2), BT₃(2), GT₃(2), BT₁(2) respectively. It is due to the anti microbial and anti bacterial properties of herbal extracts (basil, ginger and mint) added in low fat herbal paneer. Sachdeva (1983) ^[11] observed that spoilage of paneer samples during storage was due to growth of micro-organisms on the

surface of paneer. All the treatments were subjected to presumptive coliform test and it is found to be negative coliform test. This shows that the experiment was conducted in strict hygienic condition results in the absence of coliforms

Conclusion

It is concluded that low fat salted herbal paneer with the addition of herbal extracts (Basil, Ginger and Mint) is a feasible product. Among the different treatments prepared, low fat salted herbal paneer (BT₁) from milk standardized

to 1.5% fat and 8.5% SNF and by adding 4.5% basil extract is found to be best in terms of flavour and taste, body and texture, colour and appearance and overall acceptability. The quality of this paneer is very well comparable to that of the control paneer prepared from buffalo milk standardized to 5 percent fat and 8.5 percent SNF.

This low fat salted herbal paneer prepared by adding basil extract has higher ash, moisture, protein, calcium and lower fat percentage as compared to control paneer. Brining of low fat herbal paneer improves its taste and flavour of low fat herbal paneer.s

Recommendation

Milk fat is a possible risk factor in causing coronary heart disease. Low fat herbal paneer is a dairy product which may be utilized as it is nutritionally rich. By incorporating different proportions of fat and SNF of milk, and enriching these products by adding different herbal extracts (Basil, Ginger and Mint) various acceptable products like beverages, puddings and paneer based dessert may be prepared, which have a significantly low fat and higher protein content and may be recommended for inclusion in diets to benefit children and adults as well as patients of cardiovascular disorders, diabetes, obesity and malnutrition syndromes.

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