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Assessment of chemical quality of paneer incorporated with turmeric powder

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Abstract

Paneer is an important heat and acid coagulated indigenous dairy product, the poor keeping quality of paneer is a major obstacle in its large-scale industrial production. Various herbs and spices have been recognized for their antimicrobial activity and used throughout the past as an alternative approach to preserve foods. Turmeric is one of them, yet there is a very scanty work has been reported about use of turmeric in extending shelf life of paneer. The present study has been contemplated to evaluate effect of turmeric on chemical quality of paneer. The study carried out to assess the chemical quality of paneer by addition different levels of turmeric powder. During the study cow milk paneer incorporated with turmeric was analyzed for chemical properties such as fat, protein, lactose, total solid, moisture, ash, pH, acidity. The data were statistically analyzed by using Completely Randomized Design (CRD). The result observed for chemical quality was significantly affected, as progress in treatment there was decrease in mean value for fat, protein, lactose, total solid, ash, acidity and increase in value for moisture and pH.

Keywords: Turmeric powder, paneer, chemical evaluation

Introduction

India is considered as an agrarian country in which major proportion of population is vegetarian. Milk is complete food and one of the sources of animal proteins. India is the largest milk producer in the world with a production of 221.06 MT in 2021-22, contributes 23% of total global milk production. The per capitata availability of milk 444 g/day. About 55% of the total production is buffalo milk and then cow milk rank second in total milk production.

Paneer is an important indigenous product which is obtained by heat treating the milk followed by acid coagulation using suitable acid viz. citric acid, lactic acid, tartaric acid, alum, sour whey. According to Prevention of Food Adulteration Rules (PFA 2010), Paneer means the product obtained from cow or buffalo milk or a combination thereof by precipitation with sour milk, lactic acid or citric acid. It shall not contain more than 70% moisture and the milk fat content shall not be less than 50% of the dry matter.

Herbs and spices have also been well known for their medicinal, preservative and antioxidant properties hence they could be used for food preservation as main or adjuvant antimicrobial substances. In addition to imparting flavour, certain herbs prolong the shelf life of foods due to their bacteriostatic or bacteriocidal activity and prevent rancidity by their antioxidant activity. This approach enhances safety of the foods (Farag *et al.* 1990) [5]. Traditional Ayurveda's, turmeric plant was an excellent natural antiseptic, disinfectant, anti-inflammatory, and analgesic, while at the same time the plant has been often used to aid digestion, to improve intestinal flora, and to treat skin irritations. Therefore, the present study has been contemplated to select stage for addition of turmeric, a well-known antibiotic in paneer and to evaluate turmeric as a preservative for paneer.

Materials and Methods

The present study was conducted on the studies on preparation of turmeric incorporated paneer at Department of Animal Husbandry and Dairy Science, Post Graduate Institute MPKV rahuri the year 2019-20.

The material used and methods employed for conducting the experiments are as follows.

Materials

Fresh, clean, composite samples of milk of crossbred cow was obtained from herd maintained at Research Cum Development Project (RCDP) on Cattle, Department of Animal Husbandry and Dairy Science, MPKV, Rahuri, Dist. Ahmednagar (MS). The turmeric powder, LR grade Citric acid and ionized salt were procured from local market, Rahuri.

Phase I - Preliminary trials

A) Selection of Level of Turmeric powder

According to Shweta Buch, Sunita Pinto, and K. D. Aparnathi (2012) [1] in the first part of study, turmeric was incorporated in the product at the rate of 0.2, 0.4, 0.6 and 0.8, 1.0% by weight of expected yield of product based on sensory evaluation; slight modification was done in the quantity of turmeric powder. Various levels of turmeric powder were tried, and paneer samples were prepared. The samples were subjected to sensory evaluation to finalize the level of turmeric powder. Based on the sensory evaluation result based rated four levels of turmeric will be used for the final experimental trial.

B) Stage of addition of turmeric

Turmeric was incorporated at different stages during paneer making.

1. Before heat treatment of milk.
2. After heating of milk.
3. After heat treatment of milk but before addition of coagulant.
4. Directly into the coagulum.
5. Dipping of paneer blocks in turmeric containing chilled water instead of plain chilled water.

Based on the sensory evaluation result best stage of turmeric addition was used for the Final experimental trial.

Methods

Treatments included different combinations like.

Whereas,

T₀ = Paneer without turmeric powder (control)

T₁ = 0.2% turmeric powder by expected weight yield of paneer

T₂ = 0.4% turmeric powder by expected weight yield of paneer

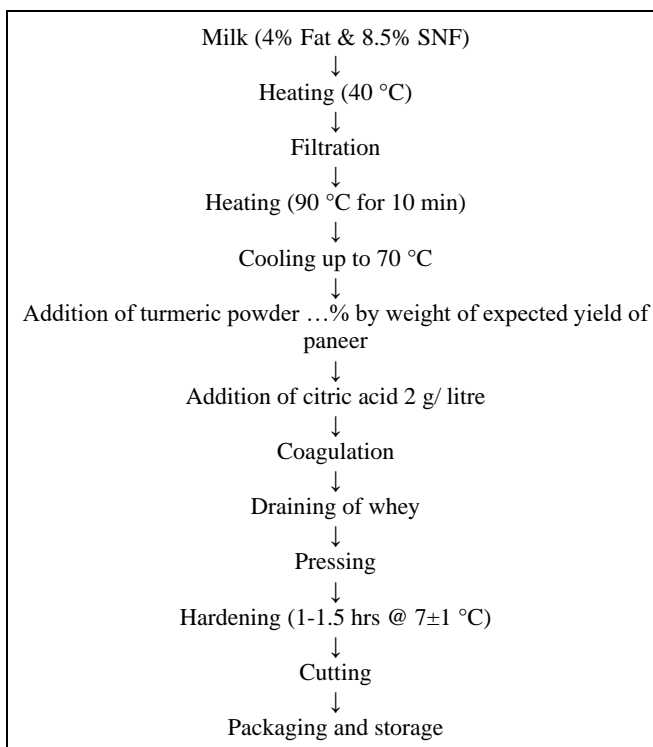
T₃ = 0.6% turmeric powder by expected weight yield of paneer

T₄ = 0.8% turmeric powder by expected weight yield of paneer

Procedure for preparation of turmeric incorporated paneer

The standardized milk sample was taken in stainless steel container. It was heated to 40 °C, then filtered, and again heated to 90 °C for 10 min. Milk allowed cooling up to 70 °C and immediately addition of turmeric powder as per treatment, just before coagulation of milk and stirred it to avoid formation of lumps. Citric acid at the rate of 2 g per liter was used as coagulant and added in milk. Then it was allowed to coagulate. After coagulation, whey was drained through muslin cloth and coagulum was separated. Coagulum then pressed by using in pressing machine by

using weight. Paneer prepared was kept in brine solution for 1-1.5 hrs @ 7±1 °C. The block of paneer was cut and stored.



Flow chart for preparation of turmeric incorporated paneer

The observations were recorded for colour, general appearance and overall acceptability on the basis of 9 point hedonic scale (Nelson and Trout, 1964) [7].

Results and Discussion

I. Physico-chemical analysis of turmeric incorporated paneer

A) Milk

Cow milk samples used in this study contained on an average 3.92% fat, 12.48% total solid, 87.4% moisture, 3.84% protein, 4.16% lactose, 0.56% ash and 0.16% acidity.

B) Chemical composition of turmeric incorporated paneer

The results obtained were tabulated and analysed as follows

a) Fat

Mean value for the treatment T₀, T₁, T₂, T₃ and T₄ were 18.60, 18.20, 17.80, 17.55 and 17.40 percent, respectively. Treatment T₀ (controlled paneer without turmeric powder) had highest mean value while treatment T₄ (1.0% turmeric powder) had lowest mean value for fat. The mean value showed decreasing trend. The mean values for the fat percentage ranged between 17.40 (T₄) and 18.60 percent (T₀). Fat content of the paneer was decreased as the level of turmeric powder increases. This was due to less fat content in turmeric powder. Similar result was reported by Dahiphale (2019) [4] in vegetable impregnated ready to eat spice paneer for treatment T₀, T₁, T₂, T₃, T₄ were 16.57, 16.10, 15.72, 15.57 and 15.37 percent, respectively.

b) Protein

Treatment T₀ had highest mean value i.e., 17.55 percent. The mean values were decreasing from T₀ (control) 17.55 to T₄ (1.0% turmeric powder) 16.25 percent. It was observed

that the mean values of treatment T₀, T₁, T₂, T₃ and T₄ were 17.55, 17.30, 16.92, 16.45 and 16.25 percent, respectively. Protein content of the paneer was decreased as the level of turmeric powder increases. This was due to less protein content in turmeric powder. The result obtained in study agreed with research worker Dahiphale (2019) [4] reported protein content in ready to eat vegetable impregnated spice paneer. She reported that for treatment T₀, T₁, T₂, T₃, T₄ were 16.49, 16.22, 15.86, 15.39 and 15.19 percent, respectively.

c) Lactose

The mean value for lactose content ranged between T₀ (1.60) to T₄ (1.49) percent. Treatment T₀ had highest mean value 1.60 percent while treatment T₄ (1.49) had lowest mean value for lactose content at 5% level of significance. Treatment T₀ and treatment T₁ were at par with each other. Treatment T₀, T₁, T₂, T₃ and T₄ had mean values 1.60, 1.58, 1.55, 1.51 and 1.49 percent, respectively. It was observed that mean treatment values were decreased from T₀ (1.60) to T₄ (1.49). Lactose content decreased significantly at 5% level of significance. The result obtained in study agreed with research worker Dahiphale (2019) [4] reported lactose content in ready to eat vegetable impregnated spice paneer. She reported that for treatment T₀, T₁, T₂, T₃, T₄ were 1.57, 1.55, 1.53, 1.49 and 1.46 percent, respectively.

d) Ash

It was statistically analyzed that mean value of T₀, T₁, T₂, T₃ and T₄ was found to be 1.40, 1.38, 1.36, 1.33 and 1.31 percent, respectively. The mean values ranged between 1.31 (T₄) and 1.40 (T₀). Highest mean ash content was recorded in T₀ (1.40 percent) followed by T₁ (1.38), T₂ (1.36), T₃ (1.33) and T₄ (1.31). Treatment T₀ (control), treatment T₁ (0.2% turmeric powder) and treatment T₂ (0.4% turmeric powder) were at par with each other. Similar result for ash was observed by Khatua (2013) [2] while working on process standardization of restructured paneer and ready to eat spicy paneer

e) Total solids

The mean values for the treatments T₀, T₁, T₂, T₃ and T₄ were 46.40, 46.00, 45.75, 45.50 and 45.40 percent, respectively. Treatment T₀ (control) had highest mean value i.e., 46.40 percent followed by treatment T₁ (0.2% turmeric powder) (46.00 percent). Mean value for the total solid was decreasing from T₀ to T₄ at 5% level of significance. Treatment T₀ and treatment T₁ were at par with each other. This same trend of result was given by Dahiphale (2019) [4]

in vegetable impregnated ready to eat spice paneer for treatment T₀, T₁, T₂, T₃, T₄ were 48.40, 48.00, 47.75, 47.50 and 47.47 percent, respectively.

f) Moisture

The mean value for moisture content ranged from 53.60 percent (T₀) to 54.60 percent (T₄). The highest mean value for moisture was observed for treatment T₄ while lowest value observed for treatment T₀. Treatment T₄ (0.8% turmeric powder), treatment T₃ (0.6% turmeric powder) and treatment T₂ (0.4% turmeric powder) were at par with each other. Moisture percentage increased from T₀ to T₄ significantly. Moisture percent in the sample was increased due to increased level of turmeric powder. This was because turmeric powder holds amount of moisture. This same trend of result was given by Dahiphale (2019) [4] in vegetable impregnated ready to eat spice paneer for treatment T₀, T₁, T₂, T₃, T₄ were 51.60, 52.00, 52.25, 52.50 and 52.52 percent, respectively.

g) Acidity

Treatment T₀ (control) was significantly superior over rest of all the treatments at 5% level of significance. Treatment T₃ (0.6%) and T₂ (0.4%) were at par with each other at 5% level of significance and were superior to T₁ and T₀. The mean values for acidity content for treatments T₀, T₁, T₂, T₃ and T₄ were 0.22, 0.22, 0.20, 0.20 and 0.19 percent, respectively. Highest mean value for the acidity was observed for treatment T₀ (0.22 percent) while lowest value observed for treatment T₄ (0.19 percent). Acidity of paneer was decreased due to addition of turmeric powder. As the level of turmeric powder increased, the acidity of turmeric incorporated paneer decreased. This is due to alkaline nature of turmeric powder. Similar result for acidity was observed by Khatua (2013) [2] while working on process standardization of restructured paneer and ready to eat spicy paneer.

h) pH

All the treatments were significant at 5% level of significance. The mean values for pH were ranged between 5.48 to 5.62. Treatment T₀ (control) had highest mean value (5.48) of pH at 5% level of significance. pH values were increasing from treatment T₀ (5.48) to treatment T₄ (5.62). All treatments were significantly different at 5% level of significance. The mean value for pH was increased as the level of turmeric powder decreased. Acidity was decreased and hence pH was increased due alkaline nature of turmeric.

Table 1: Effect of turmeric powder on chemical composition of paneer

Treatments Proportion	Parameters						
	Fat	Protein	Lactose	Total solids	Moisture	Acidity	pH
T ₀ (Control)	18.60 ^a	17.55 ^a	1.60 ^a	46.40 ^a	53.60 ^c	0.22 ^a	5.48 ^e
T ₁ (0.2% TP)	18.20 ^b	17.30 ^a	1.58 ^b	46.00 ^a	54.00 ^b	0.22 ^a	5.50 ^d
T ₂ (0.4% TP)	17.80 ^c	16.92 ^b	1.55 ^c	45.75 ^b	54.25 ^b	0.20 ^b	5.53 ^c
T ₃ (0.6% TP)	17.55 ^c	16.45 ^c	1.51 ^d	45.50 ^c	54.50 ^b	0.20 ^b	5.56 ^b
T ₄ (0.8% TP)	17.40 ^d	16.25 ^c	1.49 ^d	45.40 ^c	54.60 ^a	0.19 ^c	5.62 ^a
SE (m) ±	0.117	0.104	0.008	0.087	0.135	0.002	0.006
CD at 5%	0.348	0.308	0.025	0.259	0.401	0.005	0.018

(TP – Turmeric Powder)

Conclusion

The paneer prepared by adding turmeric powder from 0.2 to 0.8% shows decrease in chemical composition. This mainly

due to the increase in moisture content in paneer as percent of turmeric powder increases. It observed that chemical quality was significantly affected, as progress in treatment

there was decrease in mean value for fat, protein, lactose, total solid, ash, acidity and increase in value for moisture and pH.

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