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Effect of raw turmeric extract on shelf life of paneer prepared from blends of raw turmeric extract and buffalo milk

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Abstract

In present study investigation was carried out to evaluate shelf life of raw turmeric extract added *paneer* prepared from blends of raw turmeric extract and buffalo milk. Turmeric, derived from the plant *Curcuma longa*, is a gold-colored spice commonly used not only for health care but also for the preservation of food. The *paneer* was prepared by considering treatment combination of buffalo milk and raw turmeric extract as 95%, 90% and 85% of buffalo milk and 5%, 10% and 15% of raw turmeric extract in treatments T₂, T₃ and T₄ and treatment T₁ taken as a control prepared from buffalo milk only. The object of using raw turmeric extract was to development of *paneer* by improving physio-chemical properties and increasing its shelf life. The storage life of *paneer* is reported to be 12 days under refrigeration condition and at room temperature 3 days.

Keywords: Buffalo milk, paneer, channa, turmeric, curcuma longa

Introduction

Paneer is similar to soft cheese and is not only very popular in Indian subcontinent but has also made appearance in Western and Middle East markets. It is marble white, somewhat spongy with mildly acidic flavour and is generally prepared from buffalo milk (Patel, 1991)^[6]. *Paneer* is of great value in diet because it is a rich source of high quality proteins, fat, minerals and vitamins (Shrivastava and Goyal, 2007)^[9]. It forms base for a variety of culinary dishes, stuffing material for various vegetable dishes, snacks and sweetmeats. *Paneer* is a rich source of animal protein available at a comparatively lower cost and forms important source of animal protein for vegetarians. Over and above its high protein content and digestibility, the biological value of protein in *paneer* is in the range of 80-86% (Shanaziya *et al.* 2018)^[7].

The functionality of *paneer* increased by using herbal extracts with antioxidant property which helps in increasing shelf life of *paneer*.

Turmeric is one of the greatest beneficial medicinal plants in the entire world and it's also one of the most researched medicinal plants in history. Curcumin is a bioactive substance of turmeric. Curcumin fights inflammation at the molecular level and is the main active ingredient posing as a very strong anti-bacterial, anti-septic, anti-spasmodic, antifungal, anti-inflammatory, anti-allergic anti-oxidant, anti-mutagenic, anti-carcinogenic, astringent, carminative, cholagogue, digestive diuretic, stimulant and vulnerary. There are at least 20 molecules that are anti-biotic, 14 that are known cancer preventives, 12 that are anti-tumor, 12 are anti-inflammatory and at least 10 different anti-oxidants. Ayurveda especially recommends turmeric for cancers of the female reproductive system, specifically breast and uterine cancer and to treat benign tumors as well. Mechanisms of action, curcuminor turmeric were effective in animal model in prevention and treatment of colon cancer, mammary cancer, prostate cancer, murine hepatocarcinogenesis (liver cancer in rats), esophageal cancer and oral cancer (Vyas *et al.* 2015)^[10].

Material and Methods**Buffalo Milk and Raw turmeric**

Already standardized fresh Buffalo milk was procured from local market of Latur city, of Natural Milk Pvt., Ltd., Latur having 6.0 per cent fat and 9 per cent SNF. The pure raw turmeric (Selam variety) required for preparation of *paneer* was obtained from local market of Latur city. Analytical (AR) or guaranteed grade (GR) reagents were used in the chemical analysis. Polythene bags (200 gauges) was obtained from local market and used for packaging the raw turmeric added *paneer*.

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Equipments and accessories include stainless steel vessels of requisite capacity, knives, fruit extractor/mixture, muslin cloth, standard weight balance, thermometer, gas shegdi, *paneer* press machine, etc. used for preparation of *paneer*. Before using this material, it was properly cleaned and washed with detergent solution and all the precautionary measures was considered during the conduct of trials to avoid contamination.

Preparation of raw turmeric extract

The fresh raw turmeric was collected, washed, peeled and cut into small pieces. After cutting raw turmeric pieces were grinded in the mixer for homogenous fine mixture by adding 1:5 ratio of water for extract filtration through muslin cloth.

Preparation Buffalo milk *Paneer* blended with Raw Turmeric extract.

The buffalo milk (6% fat and 9% SNF) was taken in pan then raw turmeric extract was added before heating and mixed properly through glass rod. Milk was heated to 86 °C and cooled up to temperature 76 °C. After cooling citric acid were added in milk @ 1-3% at 76 °C with stirring. After complete coagulation the stirring was stopped and allow the curd to sink to the bottom.

The whey was then drained through a stainless steel strainer. The curd was collected and filled in stainless steel *paneer* hoopes. The hoopes used was circular blocks with holes on its side to facilitate the expulsion of whey. *Paneer* was pressed 10-15 minutes @ 3 kg/sq cm. The pressed block of curd was removed from the hoop, cut into pieces and immersed in chilled water (4 °C) for 2 to 3 hours. The chilled *paneer* was then removed from water to drain out and packed in polythene bag and finally storage in refrigerator (5 °C).

Shelf-life of raw turmeric extract added *paneer*:

Shelf life of raw turmeric extract added *paneer* was evaluated on the basis of sensory score for its shelf life after interval of three days at cold storage condition by a semi expert panel of five judges and common consumer.

Result and Discussion

Shelf-life of raw turmeric extract added *paneer*

According to the FSSAI rules, *chhana* or *paneer* is defined as a milk product obtained by precipitating a part of milk solids by boiling whole milk of cow and or buffalo or a combination thereof by addition of lactic acid, citric acid or any other suitable coagulating agent and subsequent drainage of whey (FSSAI, 2006) [2].

With the enhancement of storage period SPC increased steadily and gradually at every storage interval and temperature. Buch (2010) [1] evaluated seven different herbs viz. ajwain, asafoetida, coriander, cumin, fenugreek, mint and turmeric for extending the shelf life of *paneer*. Amongst 7 different herbs turmeric was found most effective. Addition of turmeric at the rate of 0.6 per cent extends the shelf life of *paneer* up to 12 days on storage at 7 °C±1 °C.

In the present study shelf life of raw turmeric added *paneer* was evaluated on the basis of sensory score for its shelf life after interval of three days at refrigerator temperature and room temperature by a semi expert panel of five judges and common consumer.

The raw turmeric added *paneer* was examined organoleptically for various qualities attributes such as colour and appearance, flavour, body and texture and

mouthful/smoothness by a panel of judges. The average values of evaluators are presented in table no. 1.

Shelf life of raw turmeric extract added *paneer* at 5 °C:

The analysis of variance also showed that there was significant change in the penetration value of raw turmeric extract added *paneer* during storage at 5 °C. *Paneer* made from control treatment (T₁) scored highest on sensory, followed by T₂, T₃ and T₄ treatment at initial days but decreased progressively with faster rate up to 12 days of storage as compared to raw turmeric extract added *paneer* as the time interval pass. This may be due to the antimicrobial effect of turmeric used in others treatments and supported by Niranjana and Dhan 2008 [5] and Ikpeama *et al.* 2014 [3].

Table 1: Storage life of raw turmeric extract added *paneer* at refrigerated temperature and at room temperature on sensory basis (in Days)

Colour and appearance											
Days	0 Day		3 rd Day		6 th Day		9 th Day		12 th day		
Treatment	5 °C	37 °C	5 °C	37 °C	5 °C	37 °C	5 °C	37 °C	5 °C	37 °C	
T ₁	8.69	8.20	8.30	7.20	8.00	-	7.50	-	7.00	-	
T ₂	8.38	8.15	8.20	7.40	7.80	-	7.40	-	7.10	-	
T ₃	7.19	7.00	7.10	6.50	6.90	-	6.70	-	6.50	-	
T ₄	6.81	6.96	6.68	6.00	6.50	-	6.20	-	6.00	-	
Flavour											
Days	0 Day		3 rd Day		6 th Day		9 th Day		12 th day		
Treatment	5 °C	37 °C	5 °C	37 °C	5 °C	37 °C	5 °C	37 °C	5 °C	37 °C	
T ₁	8.81	8.80	8.40	6.30	7.70	-	7.23	-	6.80	-	
T ₂	8.25	8.20	8.00	6.50	7.60	-	7.00	-	6.90	-	
T ₃	7.81	7.50	7.30	6.10	6.65	-	6.10	-	6.00	-	
T ₄	6.94	6.68	6.30	5.50	5.58	-	5.05	-	4.70	-	
Body and texture											
Days	0 Day		3 rd Day		6 th Day		9 th Day		12 th day		
Treatment	5 °C	37 °C	5 °C	37 °C	5 °C	37 °C	5 °C	37 °C	5 °C	37 °C	
T ₁	8.88	8.50	8.40	7.00	8.02	-	6.70	-	6.40	-	
T ₂	8.13	8.01	7.80	7.20	7.90	-	6.90	-	6.60	-	
T ₃	7.25	7.19	7.00	6.20	6.50	-	6.03	-	5.80	-	
T ₄	6.19	6.11	6.00	5.50	5.40	-	5.10	-	4.90	-	
Mouthful/Smoothness											
Days	0 Day		3 rd Day		6 th Day		9 th Day		12 th day		
Treatment	5 °C	37 °C	5 °C	37 °C	5 °C	37 °C	5 °C	37 °C	5 °C	37 °C	
T ₁	8.75	8.45	8.23	7.00	7.26	-	7.00	-	6.40	-	
T ₂	8.13	8.00	8.00	7.20	7.50	-	7.20	-	6.60	-	
T ₃	7.19	6.95	7.60	6.20	6.60	-	6.00	-	5.70	-	
T ₄	8.06	7.73	7.20	6.50	6.10	-	5.70	-	5.50	-	
Overall acceptability											
Days	0 Day		3 rd Day		6 th Day		9 th Day		12 th day		
Treatment	5 °C	37 °C	5 °C	37 °C	5 °C	37 °C	5 °C	37 °C	5 °C	37 °C	
T ₁	8.67	8.40	8.25	7.01	7.65	-	7.00	-	6.50	-	
T ₂	8.22	8.13	7.95	7.25	7.70	-	7.25	-	6.80	-	
T ₃	7.36	7.08	6.91	7.00	6.50	-	5.75	-	6.30	-	
T ₄	6.50	6.33	6.03	7.50	5.38	-	5.00	-	6.00	-	

Shelf life of raw turmeric extract added *paneer* at 37 °C:

It is noticed from table no. 1 that all the sensory parameters i.e. colour and appearance, flavour, body and texture, mouthfeel/smoothness were slowly down for sensory test in turmeric extract added *paneer* samples as compared to control samples. Control *paneer* was found fit for consumption up to two days only whereas developed *paneer* was safe up to 3 days at room temperature. This indicates that turmeric definitely affected on the storage life of *paneer* at room temperature. The raw turmeric extract added *paneer* was found acceptable up to 12th days of its storage period at refrigerator temperature (5 °C) secured overall acceptability

score between the ranges of 6.0 to 7.0. The storage period of *paneer* on the basis of sensory parameters was affected by the blending of turmeric in buffalo milk for *paneer*. In study it is observed that colour and appearance, mouthfeel and body and texture reduced slowly whereas this parameter secured fewer score initially as compared to control samples. This may be due to that slightly banny off flavour was observed in blended treatment which may be due to the turmeric and reduced slowly during storage period. In control sample acidic flavour was observed, might be due to the more acid production in storage period by psychrophilic bacteria. The body and texture was observed hard after 3 days of storage period at room temperature in all treatment due to the reduction in moisture. The rate of declination for raw turmeric added treatments in this study from 1st day to 12th days of storage period was slow. It may be due to the antimicrobial ability of turmeric which effect on the spoilage of the product by controlling the growth of microbes.

The relatively short shelf life of *paneer* is a major handicap in the commercial adoption of *paneer* manufacture. The storage life of *paneer* is reported to be only 12th days under refrigeration condition and at room temperature within 3rd days.

Singh *et al.* (2014) ^[8] conducted a study to evaluate the properties of turmeric incorporated *paneer* prepared from different types of milk i.e. cow milk, buffalo milk and mix milk. Addition of turmeric powder at the rate of 0.6% by weight of expected yield of paneer and packed in aluminum foil extends the shelf life of *paneer* up to 15 days on storage at refrigerated temperature (below 5 °C).

Maji *et al.* (2018) ^[4] prepared quality herbal lassi fortified with turmeric extract. The sensory evaluation of turmeric lassi was done during storage at 7±2 °C. On the basis of chemical, microbial and sensory evaluation lassi prepared by addition of turmeric extract @ 1per cent was adjudged best. The final products showed a shelf life of 9 days on the basis of chemical, microbial and sensory parameters when kept in a glass bottle and stored at 7±2 °C.

Conclusion

In this investigation raw turmeric showed that slower declination in score for raw turmeric extract added treatments from 1st day to 12th days of storage period. It may be due to the antimicrobial ability of turmeric which effect on the spoilage of the product by controlling the growth of microbes. The storage life of *paneer* is reported to be only 12th days under refrigeration condition and at room temperature within 3rd days. *Paneer* has quality shelf life by adding raw turmeric extract because of turmeric has anti-bacterial, anti-septic, antifungal, anti-allergic and anti-oxidant active ingrredients.

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