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Studies on Sensory Evaluation and Proximate Analysis of Camel and Goat Milk Paneer Incorporation of Cardamom and Black Paper

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ABSTRACT

In present study the paneer is obtained by camel and goat milk (70:30) used for ready to cook milk product by incorporating spices. The sensory evaluation of spices incorporated camel and goat milk paneer was performed by using 8-point hedonic scale by a group of panellists to know the sensory characteristics such as appearance and colour, flavour, body and texture and overall acceptability. 0.6% cardamom incorporated camel and goat milk paneer (T₂) had obtained maximum overall acceptability 7.27 ± 0.009. Proximate study concluded that the overall proximate composition of paneer showed a wide variation in value of Moisture content, Crude Protein (CP), Ether Extract (EE), Crude Fibre (CF) and Total ash for control and all treatment samples. From the study it was concluded that spices incorporated camel and goat milk paneer could be products as of developed products (T₀, T₁, T₂ and T₃) and the same could be used for its shelf life study during refrigerated storage.

Keywords

Camel milk, Goat milk, Paneer, Spices, Black pepper, Cardamom

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Introduction

Milk and milk products are nutrient-dense foods and their consumption can add diversity to diets. Animal milk play an important role

in the diets of children in populations with very low fat intakes and limited access to other animal source foods. Milk contains approximately 3.5% protein of high quality and still considered the nutritionally best

valued food proteins due to their content of essential amino acids and a high digestibility (Devi, 2018).

Camel milk is known in Asia and Africa for 5000 years for its benefits to human health. Therefore, it is not only consumed as food, but also as remedy. Camel milk is the closest to human mother milk. It is different from other milks, however, having low sugar, cholesterol and high minerals (sodium, potassium, iron, copper, zinc and magnesium and vitamin C). Fresh and fermented camel milk is having antibacterial, therapeutic properties and important nutritional and functional source (Wernery, 2006).

The impressive health benefits of goat milk and the recent research into its positive effects on the human body have made it an especially popular choice. People with intolerance to lactose digest goat milk far better than cow milk because of its higher levels of beneficial fatty acids (twice that of cow milk). Goat milk is usually transformed into cheese, butter, ice cream and yogurt.

Paneer contains about 40 per cent total solids, 17.5 per cent proteins, 25 per cent fat, 2 per cent carbohydrates and 1.5 per cent minerals, which is one of the major sources of animal protein for vegetarian people (Sachdeva, 1998). Paneer is an ideal food for expectant mothers, infants, growing children, adolescents and adults because of its high nutritional value. Paneer is also advised by clinicians for patients with diabetic and coronary heart disease (Chopra and Mamtani 1995).

Spices added to food preparations worldwide for their taste and flavour are being recognized for their medicinal, antioxidant, antimicrobial and food stabilizing properties. Considerable research has been carried on the assessment of the antioxidant activity of many herbs, spices and their extracts when added to

a variety of foods (Ismail *et al.* 2006). Cardamom has well-established medicinal and culinary values and is used in a wide range of sweets and confectionery (Parthasarathy and Prasath 2012). Pepper is valued for its pungency contributed by the alkaloid piperine and flavour contributed by the volatile oil. The chemical structure of pepper is presented, together with quality issues and techniques used in industrial processing. The functional properties of black pepper and its applications in medicine and in food are well known (Ravindran and Kallapurackal 2012).

The shelf life of the paneer at 6 ± 1 °C was 8 days, which with vacuum packaging could be extended to 38 days. In order to increase the shelf life of the paneer, various workers have recommended the use of additives, modification of the paneer manufacturing process, surface treatment and use of various packaging materials (Sachdeva *et al.* 1991).

Effects of different coagulants on the physico-chemical and sensory quality of cow and buffalo milk paneer and their chemical quality as average solid content of 47.54, 47.89, 45.61, 47.28 per cent, fat content of 25.23, 25.52, 23.86, 24.55 per cent, protein content of 17.08, 17.04, 17.04, 16.95 per cent, ash content of 1.98, 1.92, 1.94, 1.81 per cent. Titratable acidity of 0.65, 0.67, 0.71, 0.75% for T1, T2, T3 and T4 treatments, i.e. citric acid (T1), lactic acid (T2), tartaric acid (T3) and lemon juice (T4), respectively. (Karande, 2011).

Materials and Methods

The control and sample of different treatment paneer or the spices incorporated camel and goat milk paneer prepared as per the formulations were subjected to sensory evaluation on 8 point hedonic scale by a panel of eight semi-trained members from academic staff and students of the department for

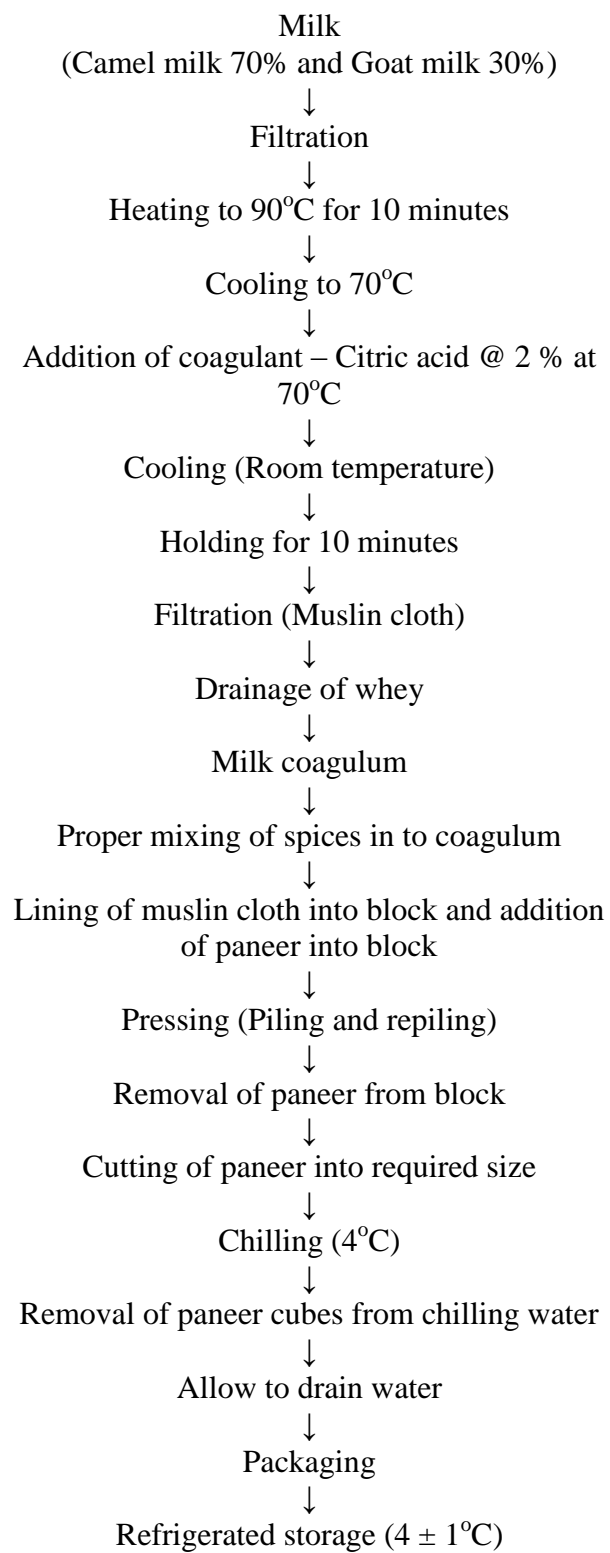
various sensory attributes viz., appearance & colour, flavour, body & texture and overall acceptability using 8 point descriptive scale (Keeton, 1983), where '8' denotes 'Excellent' and '1' denotes 'extremely poor'. Camel and goat milk paneer samples were presented in plastic plates. All samples were marked with digital code, and the order of presentation of samples was randomized for each panelist.

Proximate analysis of camel and goat milk paneer with or without incorporation of spices was done according to method described by A.O.A.C. (2000) (Official methods of analysis), including estimation of Moisture content, Crude Protein (CP), Ether Extract (EE), Crude Fibre (CF) and Total ash.

Formation and accessibility of paneer with Incorporation of spices

Formation of paneer was done by using 70% camel milk and 30% goat milk with incorporation of spices. The milk used for preparation of paneer was subjected to heating 90°C for 10 minutes. The milk was subsequently cooled to 70°C. Citric acid was added at the rate of 2% by weight of milk in form of 2% solution. The solution was added with continuous agitation until the coagulation was complete. The curd or milk coagulum was allowed to settle for 10 minutes. Whey was drained through a muslin cloth by gentle squeezing with hand and coagulum was collected and spices were added as per treatment. Each sample of coagulum was then filled in a round shaped per sterilized stainless steel hoop lined with clean muslin cloth. The coagulum was pressed for 20 minutes and cut in to required size followed by immersing in chilled water (4°C) for 1-2 hours. The samples were removed from chilled water and blocks on wooden planks for allowing the water to drain off for 15 minutes and developed paneer is stored at refrigeration followed by packaging.

Flow diagram for preparation of spices incorporated camel and goat milk paneer



Product development

On the of sensory quality of various levels of black pepper, cardamom and black pepper + cardamom incorporated camel and goat milk paneer it was concluded that the inclusion of 0.6% black pepper, 0.6% cardamom and 0.3% black pepper + 0.3% cardamom would be most suitable for preparation or formation of treatment paneer under study. T₀ – camel and goat milk paneer without inclusion of any spices; T₁ – camel and goat milk paneer with inclusion of black pepper (0.6%); T₂ – camel and goat milk paneer with inclusion of cardamom (0.6 %); T₃ – camel and goat milk paneer with inclusion of black pepper + cardamom (0.3+0.3%).

Results and Discussion

Sensory evaluation of spices incorporated camel and goat milk paneer

The sensory evaluation of spices incorporated camel and goat milk paneer was performed by using 8-point hedonic scale to know the sensory characteristics such as appearance and colour, flavour, body and texture and overall acceptability. Eight semi- trained panelists consisting of academic staff and students were included in sensory evaluation. Control camel and goat milk paneer and all the preparations of spices incorporated camel and goat milk were presented in plastic plates under fluorescent light.

All samples were marked with digital code and the order of presentation of samples was randomized for each panelist.

The average values for all the attributes like appearance and colour, flavour, body and texture and overall acceptability for different camel and goat milk paneer varies from 6.75 ± 0.064 to 7.27 ± 0.009 .

The average score for flavour of control camel and goat milk paneer (T₀) was found to be 6.88 ± 0.063 and for spices incorporated camel and goat milk paneer i.e. for T₁, T₂ and T₃ it was found to be 6.98 ± 0.048 , 7.00 ± 0.091 and 6.85 ± 0.087 respectively. Thus it may be concluded that T₂ (0.6% cardamom incorporated camel and goat milk paneer) scored maximum point 7.00 ± 0.091 for flavour by the panellist.

The average score for body and texture of control camel and goat milk paneer (T₀) was found to be 7.08 ± 0.063 spices incorporated camel and goat milk paneer i.e. for T₁, T₂ and T₃ it was found to be 6.83 ± 0.111 , 7.03 ± 0.085 and 7.03 ± 0.075 respectively. Thus it may be concluded that T₀ (without incorporated camel and goat milk paneer) scored maximum point 7.08 ± 0.063 for body and texture by the panellist whereas black pepper incorporated camel and goat milk paneer (T₁) obtained minimum point 6.83 ± 0.111 for body and texture.

The average point for appearance and colour of control camel and goat milk paneer (T₀) was found to be 7.08 ± 0.085 and spices incorporated camel and goat milk paneer i.e. for T₁, T₂ and T₃ it was found to be 7.05 ± 0.096 , 7.14 ± 0.014 and 7.13 ± 0.125 respectively. Thus it may be concluded that T₂ (0.6% cardamom incorporated camel and goat milk paneer) scored maximum point 7.14 ± 0.014 for appearance and colour by the panelists.

On the basis of data presented in Table 1 the cardamom incorporated camel and goat milk paneer (T₂) had obtained maximum overall acceptability 7.27 ± 0.009 . Whereas control and spices incorporated camel and goat milk paneer (T₁) and (T₃) it was found to be 6.82 ± 0.11 , 6.75 ± 0.064 and 6.95 ± 0.08 respectively.

Proximate analysis of spices incorporated camel and goat milk paneer

The mean moisture content percentage in spices incorporated camel and goat milk paneer for control it was observed to be 56.25 ± 0.19 whereas in black pepper incorporated camel and goat milk paneer (T_1), cardamom incorporated camel and goat milk paneer (T_2) and in mixed (black pepper and cardamom) incorporated camel and goat milk paneer (T_3) were found to be 56.23 ± 0.118 , 56.08 ± 0.095 and 56.1 ± 0.122 respectively. Moisture content in sample T_0 (56.25 ± 0.19) was found to be higher than sample T_1, T_2 and T_3 .

The mean ether extract percentage of sample T_0, T_1, T_2 and T_3 were observed 21.19 ± 0.03 , 21.23 ± 0.062 , 21.26 ± 0.059 and 21.29 ± 0.062 respectively. The mean crude protein percentage of sample T_0, T_1, T_2 and T_3 were observed 19.2 ± 0.041 , 19.1 ± 0.158 , 19.08 ± 0.103 and 19.03 ± 0.125 % respectively

whereas the value of 0 ± 0 , 0.04 ± 0.001 , 0.06 ± 0.001 and 0.05 ± 0.001 % were observed for the mean crude fibre percentage of sample T_0, T_1, T_2 and T_3 respectively. The mean carbohydrate percentage of sample T_0, T_1, T_2 and T_3 were found 2.65 ± 0.027 , 2.67 ± 0.021 , 2.71 ± 0.046 and 2.71 ± 0.018 % respectively. The mean total ash percentage of sample T_0, T_1, T_2 and T_3 were found 0.96 ± 0.059 , 0.92 ± 0.023 , 0.89 ± 0.035 and 0.91 ± 0.064 respectively.

The literature on chemical composition of paneer indicates that the moisture, fat, protein, lactose and ash content of paneer vary from 47.68 to 59.70, 22.90 to 27.00, 16.81 to 33.27, 2.07 to 2.61 and 1.30 to 2.18 % respectively (Bhattacharya *et al.* 1971, Pal and Yadav 1991, Singh *et al.* 1991, Goel, 2000, Desale *et al.* 2009, Dhole *et al.* 2009). Therefore, in the present study data obtained for chemical composition of paneer are well within those reported in the literature.

Table.1 Sensory evaluation of spices incorporated camel and goat milk paneer

Treatment	T ₀	T ₁	T ₂	T ₃
Flavour	6.88 ± 0.063	6.98 ± 0.048	7.00 ± 0.091	6.85 ± 0.087
Body and Texture	7.08 ± 0.063	6.83 ± 0.111	7.03 ± 0.085	7.03 ± 0.075
Appearance and Colour	7.08 ± 0.085	7.05 ± 0.096	7.14 ± 0.014	7.13 ± 0.125
Overall acceptability	6.82 ± 0.110	6.75 ± 0.064	7.27 ± 0.009	6.95 ± 0.080

T_0 – camel and goat milk paneer without any spices, T_1 – camel and goat milk paneer with black pepper (0.6%), T_2 – camel and goat milk paneer with cardamom (0.6 %), T_3 – camel and goat milk paneer with black pepper + cardamom (0.3 + 0.3%)

Table.2 Proximate analysis (mean \pm SE) of spices incorporated camel and goat milk paneer

Constituent (%)	T ₀	T ₁	T ₂	T ₃
Moisture	56.25 ± 0.19	56.23 ± 0.118	56.08 ± 0.095	56.1 ± 0.122
Ether extract	21.19 ± 0.03	21.23 ± 0.062	21.26 ± 0.059	21.29 ± 0.062
Crude Protein	19.2 ± 0.041	19.1 ± 0.158	19.08 ± 0.103	19.03 ± 0.125
Carbohydrate	2.65 ± 0.027	2.67 ± 0.021	2.71 ± 0.046	2.71 ± 0.018
Total ash	0.96 ± 0.059	0.92 ± 0.023	0.89 ± 0.035	0.91 ± 0.064
Crude Fibre	0.0	0.04 ± 0.001	0.06 ± 0.001	0.05 ± 0.001

T_0 – camel and goat milk paneer without any spices, T_1 – camel and goat milk paneer with black pepper (0.6%), T_2 – camel and goat milk paneer with cardamom (0.6 %), T_3 – camel and goat milk paneer with black pepper + cardamom (0.3 + 0.3 %)

From the present study it may be concluded that the inclusion of spices enhanced the sensory quality like flavour, color/appearance and overall acceptability of camel and goat milk paneer and spices like black pepper and cardamom may be used to incorporate in camel and goat milk paneer with very good acceptability. For proximate study it may be concluded that the overall proximate composition of Paneer showed a wide difference in value of Moisture content, Crude Protein (CP), Ether Extract (EE), Crude Fibre (CF) and Total ash for control and all treatment sample. Incorporation of functional ingredients like black pepper and cardamom will be beneficial to health conscious consumers. It also results in development of new varieties of paneer which further will increase paneer market.

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