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# Studies on preparation and sensory evaluation of paneer spread developed from cow milk using ginger and garlic

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**Abstract**
Spices can work as natural preservative and helps to increase the shelf life of the product. Keeping in view, the present study was conducted to formulate and accesses the sensory evaluation of spices incorporated cow milk based paneer spread. Paneer spread was prepared by using cow milk with incorporation of spices was done. A control sample ($T_0$) was prepared without incorporation of any spices but different treatments were prepared by adding different spices as $T_1$ was cow milk paneer spread with ginger (2%), $T_2$ was cow milk paneer spread with garlic (2%) and $T_3$ was cow milk paneer spread with ginger + garlic (1% + 1%). The sensory evaluation of spices incorporated cow milk paneer spread was performed by using 8-point hedonic scale by a group of panelists to know the sensory characteristics such as appearance and colour, flavour, body and texture and overall acceptability. 2% garlic incorporated cow milk paneer spread ($T_2$) had obtained maximum overall acceptability 7.47 ± 0.226. Thus from the present study it may be concluded that the inclusion of spices, enhanced the sensory quality like flavour, colour/appearance and overall acceptability of cow milk paneer spread and spices like ginger and garlic may be used to incorporate in paneer spread with very good acceptability. It was concluded that spices incorporated cow milk paneer spread could be products as of developed products ($T_0$, $T_1$, $T_2$ and $T_3$) and the same could be used for its shelf life study during refrigerated storage.

**Keywords:** cow milk, paneer spread, spices, sensory evaluation, proximate study

## Introduction
Milk has high nutritive value which supplies body building proteins, bone forming minerals and health-giving vitamins and provide energy giving lactose and milk fat. Milk and milk products are nutrient-dense foods and their consumption can add diversity to diets. The cow milk is a nutritious food because of low calorie, low cholesterol and high micro-nutrients and vitamins. Milk carrying the A2 beta-casein protein is beneficial for hormonal disorders such as diabetes and hypertension whereas milk containing the A1 beta-casein genotype is harmful to health. A2 milk contain Omega 3 fatty acids to increase immunity and metabolism (Joshi *et al.* 2021) [4]. In India 46 per cent of total milk production consumed as liquid milk, 54 per cent is converted into milk products and 3 per cent is utilized for Chhana and Paneer production.
There are mainly two types of spreads available in the domestic market, namely, butter and cheese spreads. Since Butter is a high fat, most of the consumers particularly fat conscious group is hesitant to consume butterfat because of the possibility of coronary heart diseases (Prajapati *et al.* 1991) [9]. Cheese spread, though meets all the nutritive requirements of the people of all age groups, is not so popular among Indian population because of its characteristic flavour and religious sentiments of the people (common belief that rennet used in cheese manufacture is obtained by slaughtering young calves). Therefore, an alternative to butter and cheese spread needs to be produced. Paneer is common dish among Indian population. The key advantage of paneer over butter is that it has a lower fat content and lacks the characteristic cheese flavour. As a result, paneer spread would be a good alternative to other dairy spreads on the market, and it can be further flavoured with either spices or herbs or fruits, all of which have multiple functions. Ginger is an important spice and has many uses in flavouring and medicinal properties in food. Ginger is a spice with distinct flavour due to a combination of zingerone, shogaols, and gingerols, as well as volatile oils (Olaniran and Abiose, 2018) [7]. The most abundant pungent component of ginger is 6-gingerol and is claimed to contain antioxidant activity (Baliga *et al.* 2011) [2].

Garlic is used in food not only for its flavour, but also for its antimicrobial properties. Garlic is used as a preservative in many foods due to its antioxidant and functional properties (Ankri, 1999) [1].

Now a days there has been increasing trend of the consumers about foods free from chemical preservatives because of their possible toxic effect in human beings. The consumers are also demanding foods with long shelf life and absence of risk of causing food borne diseases. There is an increasing demand for foods containing natural ingredients (Jagannath, 2012) [3]. The spices offer a promising alternative in food safety. The spices have been well known for their medicinal, preservative and antioxidant properties (Souza *et al.* 2005) [10]. The present study was aimed at determining the changes in sensory attributes and proximate analysis of paneer spread prepared from cow milk.

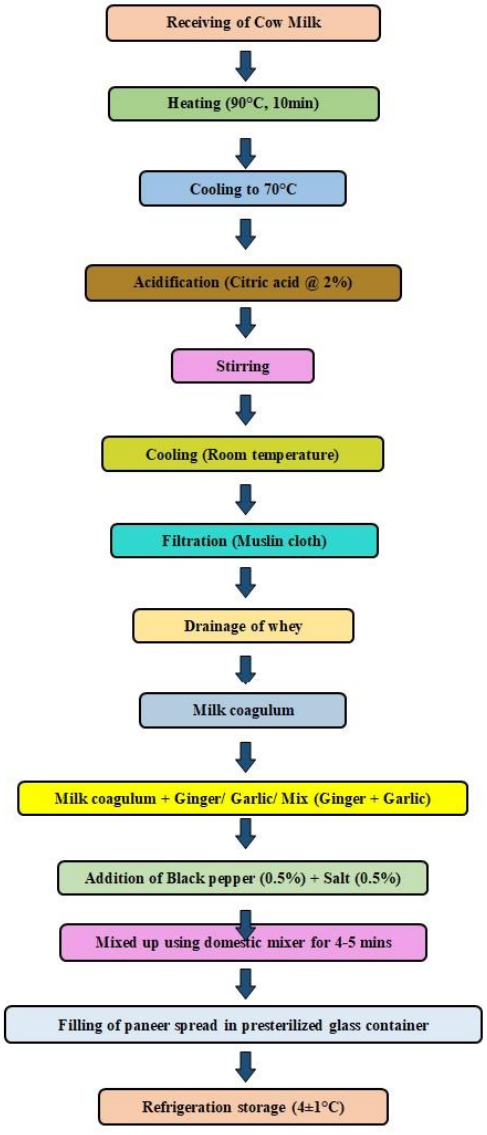
## Materials and methods

The control and sample of different treatment paneer spread or the spices incorporated cow milk paneer spread 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, technical 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) [5], where '8' denotes 'Excellent' and '1' denotes 'extremely poor'. Paneer spread samples were presented in plate. All samples were marked with digital code, and the order of presentation of samples was randomized for each panelist.

### Formation and accessibility of paneer spread with incorporation of spices

For formation of paneer spread, first the milk coagulum was prepared. For formulation of milk coagulum, cow milk was taken in a neat and clean utensil made up of stainless steel and was heated to 90 °C and cooled to 70 °C. Meanwhile, 2 per cent citric acid solution was prepared and heated to 70 °C. The hot milk was coagulated using citric acid solution till clear whey was obtained. The whey was drained and the coagulated mass (paneer curd) was collected through a muslin cloth. Predetermined quantity of all the ingredients viz. coagulum, black pepper, salt, ginger/ garlic/ mixture of ginger and garlic (1:1) were mixed using domestic mixer for a period of 4-5 minutes. The prepared paneer spread was filled in pre sterilized glass containers with air tight screw caps and stored at refrigeration temperature (4±1°C).

**Flow diagram for preparation of spices incorporated cow milk paneer spread**



On the basis of sensory quality of various levels of ginger, garlic and ginger + garlic incorporated cow milk paneer spread, it was found that the inclusion of 2% ginger, 2% garlic and 1% ginger + 1% garlic was most suitable for preparation or formation of treatment paneer spread under study.

$T_0$: Cow milk paneer spread without inclusion of any spices,
$T_1$: Cow milk paneer spread with inclusion of ginger (2%),
$T_2$: Cow milk paneer spread with inclusion of garlic (2%),
$T_3$: Cow milk paneer spread with inclusion of ginger + garlic (1% + 1%).

## Results and Discussion

The sensory evaluation of spices incorporated cow milk paneer spread was performed by using 8-point hedonic scale to know the sensory characteristics such as flavour, body and texture, appearance and colour and overall acceptability. Eight semi- trained panelists consisting of academic staff, technical staff and students were included in sensory evaluation. Control paneer spread and all the preparations of spices incorporated paneer spread were presented in 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 flavour, body and texture, appearance and colour and overall acceptability for different paneer spread varies from 5.0 ± 0.548 to 7.8 ± 0.2.

The average score for flavour of control paneer spread ($T_0$) was found to be 6.0 ± 0.707 and for spices incorporated paneer spread i.e. for $T_1$, $T_2$ and $T_3$ it was found to be 7.4 ± 0.245, 7.8 ± 0.231 and 7.6 ± 0.245 respectively. Thus it may be concluded that $T_2$ (2% garlic incorporated paneer spread) scored maximum point 7.8 ± 0.231 for flavour by the panellist.

The average score for body and texture of control paneer spread ($T_0$) was found to be 5.0 ± 0.548 spices incorporated paneer spread i.e. for $T_1$, $T_2$ and $T_3$ it was found to be 7.0 ± 0.632, 7.4 ± 0.453 and 7.2 ± 0.583 respectively. Thus it may be concluded that $T_2$ (2% garlic incorporated paneer spread) scored maximum point 7.4 ± 0.453 for body and texture by the panelists whereas control paneer spread ($T_0$) obtained minimum point 5.0 ± 0.548 for body and texture.

The average point for appearance and colour of control paneer spread ($T_0$) was found to be 5.6 ± 0.748 and spices incorporated paneer spread i.e. for $T_1$, $T_2$ and $T_3$ it was found to be 7.6 ± 0.245, 7.2 ± 0.374 and 7.4b ± 0.475 respectively. Thus it may be concluded that $T_1$ (2% ginger incorporated cow milk paneer spread) scored maximum point 7.6 ± 0.245 for appearance and colour by the panellists. Whereas control paneer spread ($T_0$) obtained minimum point 5.6 ± 0.748 for appearance and colour.

On the basis of data presented in Table 1, the garlic incorporated paneer spread ($T_2$) had obtained maximum overall acceptability 7.47 ± 0.226. Whereas control and spices incorporated paneer spread ($T_0$), ($T_1$) and ($T_3$) it was found to be 5.54 ± 0.389, 7.34 ± 0.236 and 7.4 ± 0.194 respectively.

A highly significant difference ($p<0.01$) was observed between treatment of spices incorporated paneer spread for overall acceptability and significant difference ($p<0.05$) was observed between treatment of spices incorporated paneer spread for flavour, body and texture, appearance and colour of sensory evaluation as shown in Table 2. Thus, it may be interpreted that the different levels of spices significantly affect the sensory quality of paneer spread. The variation in the sensory scores awarded for various spices incorporated paneer spread could be attributed to the personnel preference of consumers to the particular flavour, appearance and colour, body and texture and overall acceptability. The results related to sensory evaluation of spices incorporated cow milk paneer spread are in accordance with Meena *et al.* (2020) [6] and Prajapat *et al.* (2021) [8].

**Table 1**: Sensory evaluation of spices incorporated paneer spread

| Treatment | $T_0$ | $T_1$ | $T_2$ | $T_3$ |
|---|---|---|---|---|
| **Flavour** | $6.0^a$ ± 0.707 | $7.4^b$ ± 0.245 | $7.8^b$ ± 0.231 | $7.6^b$ ± 0.245 |
| **Body and texture** | $5.0^a$ ± 0.548 | $7.0^b$ ± 0.632 | $7.4^b$ ± 0.453 | $7.2^b$ ± 0.583 |
| **Appearance and colour** | $5.6^a$ ± 0.748 | $7.6^b$ ± 0.245 | $7.2^{ab}$ ± 0.374 | $7.4^b$ ± 0.475 |
| **Overall acceptability** | $5.54^a$ ± 0.389 | $7.34^b$ ± 0.236 | $7.47^b$ ± 0.226 | $7.4^b$ ± 0.194 |

Note– Means bearing different superscript in a row (small letter) differ significantly.

$T_0$ – control paneer spread, $T_1$ –paneer spread with ginger (2%), $T_2$ –paneer spread with garlic (2%), $T_3$ –paneer spread with ginger + garlic (1 + 1 %)

**Table 2:** Analysis of variance (Between Treatments) for spices incorporated paneer spread

| Parameter | D.F. | Mean square | Level of sig. |
|---|---|---|---|
| **Flavour** | 3 | 3.333333 | S* |
| **Body and Texture** | 3 | 6.183333 | S* |
| **Appearance and Colour** | 3 | 4.183333 | S* |
| **Overall acceptability** | 3 | 4.37037 | S** |

** = Highly Significant ($P<0.01$), * = Significant ($P<0.05$) and NS = Non significant

## Conclusion

From the present study it may be concluded that the inclusion of spices enhanced the sensory quality like flavour, colour/appearance and overall acceptability of cow milk paneer spread and spices like ginger and garlic may be used to incorporate in cow milk paneer spread with very good acceptability. Incorporation of functional ingredients like ginger and garlic will beneficial to health conscious consumers. It also results in development of new varieties of paneer spread which further will increase paneer spread market.

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