



Research Article

EFFECT OF DIFFERENT COAGULANTS ON SENSORY PROPERTIES OF LOWFAT PANEER PREPARED FROM DOUBLE TONED MILK

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Abstract: This study was carried out to develop paneer with four different coagulants (Alum, Citric acid, Curd and lemon juice) using double toned milk. Fresh paneer samples were sensory evaluated using a nine-point hedonic rating scale. Double toned milk was successfully utilized for preparation of low fat paneer with acceptable sensory attributes like appearance, colour, flavor, texture and overall acceptability. Four coagulants namely allum, citric acid, curd and lemon at a minimum level of 0.6, 0.2, 22.0 and 3 percent, respectively were needed for coagulation of milk. The sensory evaluation (overall acceptability score) of low fat paneer prepared from double toned milk using curd (22.0 percent) as coagulant was highest i.e., 8.1 ± 0.12 meaning liked very much on Nine Point Hedonic Rating Scale. The paneer prepared from citric acid as coagulant scored second highest 7.41 ± 0.07 means like moderately on Nine Point Hedonic Rating Scale.

Keywords: Low-fat paneer, Coagulant, Sensory attributes

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Introduction

Paneer (Cottage Cheese) also known as chenna, is a non-fermented cheese made from milk. Basically, it is a fresh milk cheese, where the milk is coagulated with an acidic agent like lemon juice, curd, citric acid and vinegar. The whey is removed and the coagulated paneer is allowed to set for some time. Paneer is a popular indigenous dairy product of India and is similar to unripened soft cheese. It is used as a base material for the preparation of large number of culinary dishes and it is a popular food product at a household level. Paneer is marble white in appearance. Paneer has a fairly high level of fat, moisture, protein and low level of lactose and minerals. It contains approximately 53 to 55 per-cent moisture, 23 to 26 per-cent fats, 17 to 18 per-cent protein, 2 to 2.5 per-cent carbohydrate and 1.5 to 2.0 per-cent minerals [1]. Paneer is a rich source of animal protein available at a comparatively lower cost and form an important source of animal protein for vegetarians. Over and above its high protein content and digestibility, the biological value of protein in the paneer is in the range of 80-86 per- cent [2]. It contains precious nutrients like lactose, whey protein, minerals and vitamins. Paneer can be easily manufactured using locally available coagulants at household level.

Paneer prepared from full fat milk is rich source of fat and has a good texture. Paneer (cottage cheese) has been reported to have many health benefits like it helps to regulate blood sugar level. It is rich in magnesium which can ensure better heart health and immune system. The high content of protein in the paneer helps in slow release of sugars into the blood and prevents abrupt hike and decline in the blood sugar levels. Paneer contains potassium which plays an important role in maintaining fluid balance in the body and also helps to minimize the effect of excess sodium on our heart. For the preparation of this type of paneer, generally buffalo milk having a fat to SNF ratio of 1:1.65 is preferred.

Full fat paneer is unsuitable to those consumers who are conscious of high fat as milk fat increases the risk of coronary heart diseases, obesity and hypertension *etc.* Paneer is the first choice of vegetarians as a source of good quality protein but due to high amount of fat it is recommended to be used only in limited amounts by people suffering from diabetes, hypertension, and coronary heart diseases and obesity. Health-conscious people generally do not like to consume conventional paneer because of its high fat content. Therefore, efforts will be made to develop low fat paneer without significantly compromising the sensory properties.

Material and Methods

The study was conducted in the Department of Food Science and Nutrition, College of Community Science, Acharya Narendra Dev University of Agriculture & Technology, Kumarganj Ayodhya. The raw milk sample was procured from the local market. Other material skimmed milk, toned milk and double toned milk required for the product preparation were procured from the local market and Ayodhya market.

Standardization of coagulants

In [Fig-1] to prepare paneer four coagulants namely allum, citric acid, curd and lemon juice were tried and it was found that citric acid @ 0.2 per cent, allum @ 0.6 per cent, lemon @ 3.0 percent and curd @ 22.0 per cent could curdle the milk.

Sensory Evaluation of Paneer

Sensory evaluation of paneer was done by using Nine Point Hedonic Rating Scale. Sensory panel was comprised of member including advisory committee members, staff members, post graduate and Ph.D. student of College of Effect of

Different Coagulants on Sensory Properties of Lowfat Paneer Prepared from Double Toned Milk

Table-1 Minimum level of coagulants needed for preparation of low-fat paneer (Cottage cheese) from double toned milk (Mean \pm SE)

SN	Coagulants	Minimum level of coagulants needed (%)
1	Allum	0.6
2	Citric acid	0.2
3	Curd	22.0
4	Lemon	3.0

Table-2 Sensory evaluation of low-fat paneer (Cottage cheese) prepared from double toned milk using different coagulants on Nine Point Hedonic Rating Scale (Mean \pm SE)

SN	Level of Coagulants	Appearance	Color	Texture	Flavor	Overall acceptability
1	Allum (0.6%)	7.0 \pm 0.14	7.16 \pm 0.29	7.43 \pm 0.15	7.21 \pm 0.27	7.2 \pm 0.11
2	Citric acid (0.2%)	7.25 \pm 0.33	7.58 \pm 0.32	7.58 \pm 0.12	7.25 \pm 0.26	7.41 \pm 0.07
3	Curd (22.0%)	8.1 \pm 0.49	8.1 \pm 0.19	8.1 \pm 0.05	8.1 \pm 0.28	8.1 \pm 0.12
4	Lemon (3.0%)	6.1 \pm 0.23	6.5 \pm 0.10	6.3 \pm 0.17	6.1 \pm 0.21	6.25 \pm 0.19
	SEM \pm	0.33	0.24	0.13	0.26	0.13
	C.D. (P=0.05)	1.07	0.78	0.44	0.85	0.43

Community Science, Ayodhya. The judges were requested to examine and evaluate the product for different sensory attributes such as appearance, colour, texture, flavor/Aroma, and overall acceptability.

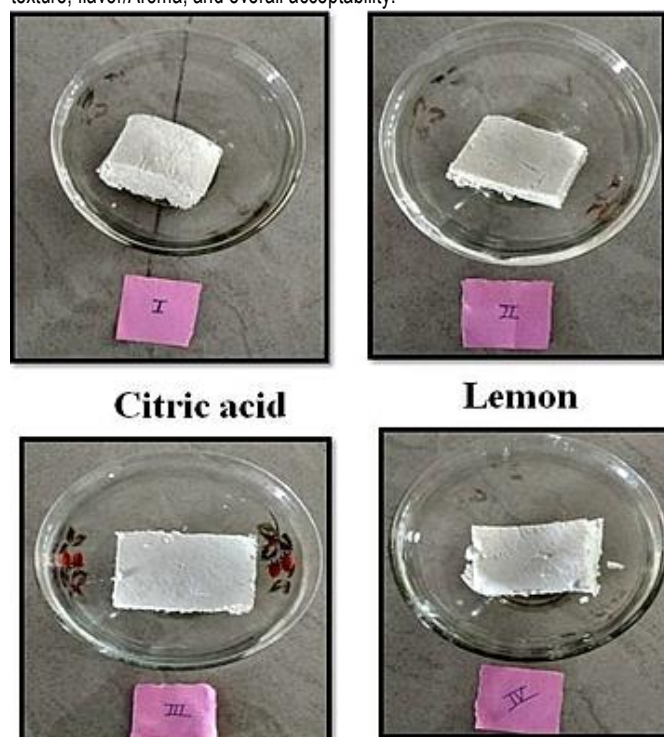


Fig-1 Standardization of coagulants

Result and Discussion

The minimum level of coagulants needed for preparation of low-fat paneer from double toned milk. Four coagulants namely allum, citric acid, curd and lemon were tried [Table-1]. Citric acid @ 0.2 per cent resulted in curdling of milk whereas allum, lemon and curd at the level of 0.6, 3.0, 22.0 per cent resulted in curdling of milk. Various coagulants at various strength have been tested for coagulation of milk. Raja, *et al.*, (2014) [3] prepared paneer using 7.0 per cent buffalo milk and 30 per cent soya milk and 1.0 per cent acetic acid as coagulants. Several coagulants namely lemon juice, citric acid, tartaric acid and lactic acid have been tested for coagulation of milk by Kumar, *et al.*, (1998) [4], Sachdeva and Singh, (1987) [5]. They also reported that citric acid was more acidic as compared to curd. Khan and Pal, (2011) [6] reported that the strength of coagulants has an effect on the body and texture of paneer. Low acid strength results in soft body and smooth texture while, high acid strength results in hard body. Paneer developed with curd yielded soft body and smooth texture, due to low acid strength of curd and paneer developed with citric acid had hard body due to high acid strength.

The sensory evaluation of low-fat paneer prepared from double toned milk using different coagulants is presented in [Table-2] and [Fig-2]. The paneer prepared from curd as coagulants scored highest for appearance, color, texture, flavor and

overall acceptability followed by paneer prepared from citric acid as coagulants. The statistical analysis of data revealed significant difference in the sensory score of paneer prepared using different coagulants. The overall acceptability score of paneer prepared from curd as coagulant was 8.1 \pm 0.12 followed by citric acid 7.41 \pm 0.07, alum 7.2 \pm 0.01 and least for paneer prepared from lemon as coagulant 6.25 \pm 0.19.

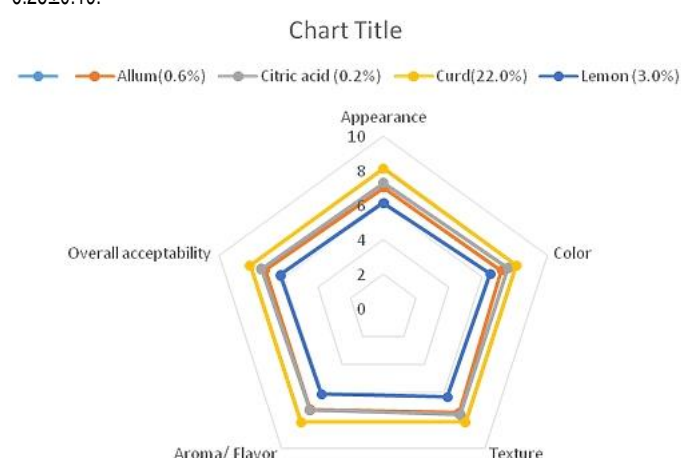


Fig-2 Sensory evaluation of low-fat paneer using different coagulants

Conclusion

Shanaziya *et al.* (2018) [7] reported better quality, soft body and smooth texture of paneer due to low acid strength of curd as coagulants. However, overall acceptability of paneer and whey is greater when citric acid was used as coagulant. Kumar *et al.* (1998) also reported that the sensory quality of paneer prepared using calcium lactate was better with respect to body and texture and overall acceptability then that prepared using citric acid and sour whey. Dwarkanath, *et al.*, (2019) [8] reported that the sensory score for allum coagulated paneer were less as compared to that of both citric acid coagulated paneer and mixture (allum+ citric acid) coagulated paneer but the overall acceptability was found to be the same for all the three coagulants. Sanyal, *et al.*, (2004) [9] reported that desired sensory quality of reduced fat paneer could be obtained through the use of 0.25 per cent sodium chloride in the milk for paneer making. Syed *et al.* (2016) [10] reported that good quality of paneer could be prepared using 2 per cent of lactic acid having good colour, texture, flavor and overall acceptability. Khan, *et al.* (2014) [11] reported the paneer sample prepared with citric acid and tartaric acid had significantly higher body and texture and overall acceptability score than paneer made with malic acid at all concentrations. The flavor, body texture and overall acceptability of paneer decreased with increasing strength of acid.

Application of research: This research will be helpful in providing variety in the type of patient suffering from obesity, cardiovascular diseases, diabetes *etc.* Low fat paneer can satisfy the desire of these patient with aided benefits.

Research Category: Food Science and Nutrition

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Study area / Sample Collection: College of Community Science, Kumarganj, 224229

Cultivar / Variety / Breed name: Buffalo

Conflict of Interest: None declared

Ethical approval: This article does not contain any studies with human participants or animals performed by any of the authors.
Ethical Committee Approval Number: Nil

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