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MICROBIOLOGICAL QUALITY OF COW MILK SHRIKHAND BLENDED WITH SAPOTA PULP

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ABSTRACT

Present investigation was carried out to assess microbiological quality of shrikhand during storage. Shrikhand was prepared from 90 per cent cow milk chakka blended with 10 per cent sapota pulp. Shrikhand was stored at both room temperature and refrigeration temperature. The observations were taken for microbial count from day of preparation of shrikhand up to 10 days at 2 days interval. On 10th day of storage bacterial count of shrikhand increased from 14.26×10^3 /gram to 82.61×10^3 /gram and 62.03×10^3 /gram at both room temperature and refrigeration temperature respectively and yeast and moulds count increased from 0.00×10^1 /gram to 27.25×10^1 /gram and 4.25×10^1 /gram at both room temperature and refrigeration temperature respectively. It is reported that cow milk shrikhand blended with sapota pulp spoiled within 4 days when stored at room temperature while it was acceptable up to 8 days when stored at refrigeration temperature ($4 \pm 1^\circ\text{C}$).

Keywords: *Shrikhand, Sapota Pulp, Standard Plate Count, Yeast, Moulds*

INTRODUCTION

The total milk production of India is 127.9 million tonnes, out of which 46.00 per cent is consumed as liquid milk and 54.00 per cent is converted into products (Anonymous, 2012). Shrikhand is one of the important fermented milk products which derive its name from the Sanskrit word “Shikharani” meaning a curd prepared with added sugar, flavoring agents (Saffron), fruits and nuts. It is popular in western part, especially in Maharashtra, Gujarat and Karnataka. Shrikhand is known for its high nutritive, characteristic flavor, taste, palatable nature and possible therapeutic value. It is very refreshing particularly during summer months. It can be recommended as health food for specific patients suffering from obesity and cardiovascular disease due to its low fat and sugar contents. It has nutritive goodness of fermented milk products. The organized sector of dairy industry is yet to accept it as a commercial product. Mainly shrikhand is prepared in urban areas by *Halwais*. Since manufacturing of shrikhand does not need special equipment and it seems to be the only economical product for small quantity surplus milk at house level, it has bright chances to be produced on large scale on industry basis. This indigenous fermented milk product contains high percentage of casein and large amount of sugar therefore; it is a heavy dish for digestion. Gastric juice secreted by dahi improves digestion and according to research work of Nebraska University in the United State consumption of dahi has definite inhibitory action against certain type of cancer cells. The amino acid methionine in the curd which removes the excessive fat from the liver can improve the general condition of arteriosclerosis which usually leads to heart attack. Fermented milk products have better keeping quality and are easily digestible because of breakdown of proteins into peptides and free amino acids as a result of microbial action. The substances like lactic acid, alcohol, non-protein substances, volatile acids, calcium and phosphorous appear in more assimilable level in curd as compared to milk (Laxminarayan and Shankar, 1980). Typically shrikhand constitutes 39.0% moisture and 61.0% of total solids of which 10.0% is fat, 11.5% proteins 78.0% carbohydrates and 0.5% ash, on a dry matter basis. It has a pH of about 4.2–4.4 (Boghra and Mathur, 2000). The past research indicated that the chakka can be preserved for a period of 10-15 days at refrigeration temperature (Patel *et al.*, 1993). Sapota is considered as energy producing fruit and having high nutritive value. It contains higher percentage of vitamin C. Sapota fruit is rich in carbohydrates and provides good amount of proteins and minerals like calcium, phosphorous and iron. The fruits are tonic, enrich blood, increase muscular strength, cooling, sedative to the heart and relieve vomiting.

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MATERIAL AND METHODS

Treatment Details

Shrikhand prepared from 90 per cent cow milk chakka blended with 10 per cent sapota pulp was used for studying the keeping quality of shrikhand. Sugar was added in chakka @ 40% as per weight of chakka. After that shrikhand was poured into plastic containers and then stored each at room temperature and refrigeration temperature to detect keeping quality of shrikhand.

The two factors considered for the study were as follows:

Factor A: Temperature (room temperature and refrigeration temperature)

Factor B: Time in days (0, 2, 4, 6, 8, 10 days)

Collection of Cow Milk

The whole fresh and clean cow milk was obtained from Livestock Instructional Farm of Department of Animal Husbandry and Dairying, Dr. PDKV, Akola. Fully ripened and good quality sapota (variety 'Kalipatti') fruits were procured from the College of Horticulture, Akola.

Culture used for Preparation of Curd

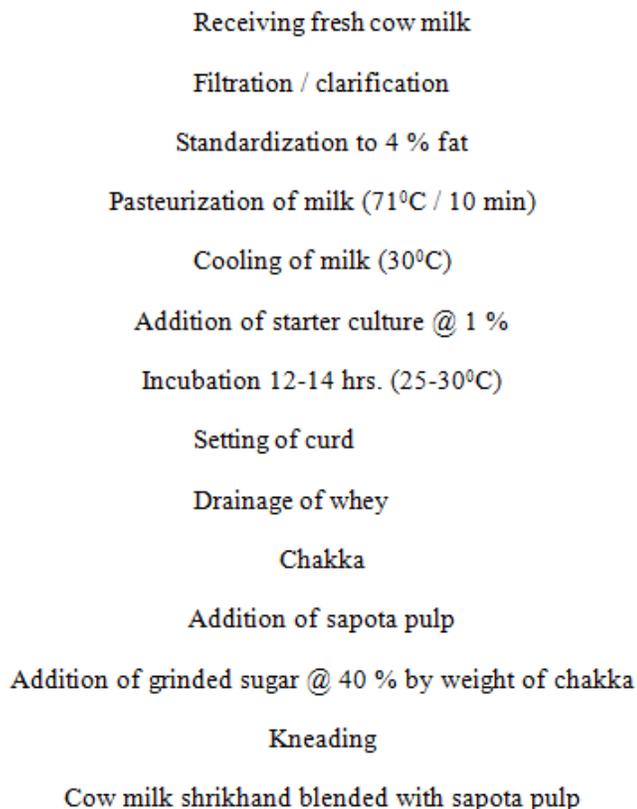
The freeze dried curd cultures of *Lactobacillus bulgaricus* and *Streptococcus thermophilus* were procured from National culture collection unit, National Dairy Research Institute, Karnal (Haryana) and used in 1:1 proportion @ 1 per cent.

Collection of Sapota Fruits

Fully ripened sapota (variety 'Kalipatti') fruits were procured from the College of Horticulture, Akola and used in the present investigation for preparation of shrikhand. While selecting the sapota fruits, stage of ripening, size, colour and taste were considered so that there should not be variation in the quality of the pulp to be extracted from the fruits.

Methods used for Preparation of Shrikhand

Method of preparation of shrikhand suggested by Aneja *et al.* (1977) was used with slight modifications.



Flow chart for preparation of cow milk shrikhand blended with sapota pulp

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Microbiological Analysis

a) Standard Plate Count (SPC)

The composition of nutrient agar medium is as:

- i) Peptone - 5g
- ii) Beef extract - 3g
- iii) Agar – agar powder - 15g
- iv) Sodium chloride - 5g
- v) Distilled water - 1000 ml
- vi) Final pH - 6.8 ± 0.1

One ml of each of the appropriate dilution (10^3) of the sample was plated using about 10 ml of nutrient agar medium. Plates were incubated at 37°C for 48 hours. The colonies were counted with the help of Quebec Colony Counter.

b) Yeast and Moulds Count

Microbiological qualities in respect of yeast and mould count were determined using chloramphenicol agar (YGC agar) medium (ISO 7954).

The composition of chloramphenicol agar medium is as:

- i) Chloramphenicol – 0.10 g/l
- ii) Dextrose – 20.00 g/l
- iii) Bacteriological agar – 12.00 g/l
- iv) Yeast extract – 5.00 g/l
- v) Final pH – 6.6 ± 0.2 at 25°C

One ml of each of the appropriate dilution (10^1) of the sample was plated using chloramphenicol agar medium. Plates were incubated at $25^{\circ}\text{C} \pm 1^{\circ}\text{C}$ and the colonies were counted with the help of Quebec Colony Counter.

Place of Experiment

The experiment was conducted at the Department of Animal Husbandry and Dairying, and Department of Plant Pathology, Dr. PDKV, Akola.

RESULT AND DISCUSSION

Table 1: Effect of storage interval and storage temperature on standard plate count ($\times 10^3$)/gram of shrikhand

Temperature	Storage interval in days						Individual effect (Mean)
	0	2	4	6	8	10	
Room temperature	14.26	29.15	38.61	52.48	65.36	82.61	47.08
Refrigeration temperature	14.26	20.45	25.81	34.10	45.45	62.03	33.68
Individual effect (Mean)	14.26	24.80	32.21	43.29	55.40	72.32	-
F test	Temperature		Storage interval		Interaction		
SE(m) \pm	SIG		SIG		NS		
CD (p=0.05)	1.49		2.58		3.66		
	4.30		7.43		-		

The mean of standard plate count of fresh shrikhand was same at room temperature and refrigeration temperature *i.e.* 14.26×10^3 /gram. The standard plate count has been increased from 2nd day to 10th day of storage at both room temperature as well as refrigeration temperature. According to Prevention of Food Adulteration Act (1954, 2009) the total plate count should not be more than 50,000/gram for shrikhand. On 10th day of storage mean standard plate count of shrikhand increased from 14.26×10^3 /gram to 82.61×10^3 /gram and 62.03×10^3 /gram at both room temperature and refrigeration temperature respectively which are not within the limits. The increase in standard plate count was faster at room temperature than

Research Article

at refrigeration temperature. The results obtained confirm the findings of Kumar *et al.* (2011). They observed that the total plate count increases with increase in storage days. Shubhangi *et al.* (2010) reported that the total plate count of shrikhand was less than standards. It is due to sugar, which acts as a preservative and inhibits the bacterial growth.

Yeast and Moulds Count

Table 2: Effect of storage interval and storage temperature on yeast and moulds count ($\times 10^1$)/gram of shrikhand

Temperature	Storage interval in days						Individual effect (Mean)
	0	2	4	6	8	10	
Room temperature	0.00	3.75	7.25	13.25	18.75	27.25	11.71
Refrigeration temperature	0.00	0.25	1.25	2.25	4.25	6.25	2.38
Individual effect (Mean)	0.00	2.00	4.25	7.75	11.50	16.75	-
F test	Temperature		Storage interval		Interaction		
SE(m) \pm	SIG		SIG		SIG		
CD (p=0.05)	0.119		0.206		0.29		
	0.342		0.593		0.838		

The yeast and moulds were absent in fresh shrikhand. The yeast and moulds has been increased from 2nd day to 10th day of storage at both room temperature as well as refrigeration temperature. According to Prevention of Food Adulteration Act (1954, 2009) the total plate count should not be more than 50/gram for shrikhand. On 10th day of storage mean yeast and moulds count of shrikhand increased from 0.00×10^1 /gram to 27.25×10^1 /gram and 4.25×10^1 /gram at both room temperature and refrigeration temperature respectively.

The increase in yeast and moulds count was faster at room temperature than at refrigeration temperature. The results obtained in agreement with Borate (2011). He observed that the yeast and moulds count increases with increase in storage days and the rate of increase was faster at room temperature than at refrigeration temperature. Shubhangi *et al.*, (2010) reported that the yeast and moulds of shrikhand was more than standards as these organisms can grow at low pH and in low water activity created by high sugar concentrations.

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Research Article

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