

Proximate Analysis of Branded Shrikhand.

Meena Mehta*

Department of Food Science and Nutrition, Dr. BM Nanavati College of Home Science, 338 RA Kidwai Marg, Matunga, Mumbai 400 019, Maharashtra, India.

Research Article

Received: 02/08/2013
Revised: 29/08/2013
Accepted: 25/09/2013

*For Correspondence

Department of Food Science and Nutrition, Dr. BM Nanavati College of Home Science, 338 RA Kidwai Marg, Matunga, Mumbai 400 019, Maharashtra, India.

Keywords: Branded Shrikhand, Proximate analysis, and Nutritional parameters

ABSTRACT

Shrikhand is a popular fermented dish consumed by Indians during festival and wedding occasions. Variety of shrikhand is available in the market with different flavor and aroma. Shrikhand is marketed with different brands and it is expected that quality of shrikhand may vary. Five major branded shrikhand was collected from Mumbai city and characterized by various physical and chemical properties. Each sample was investigated for selected microorganism and evaluated the shelf life of the product. The samples were also diagnosed for their nutritional value particularly with respect to fat and protein and mineral content. It was found that Aarey and Amul brand shrikhand is popular and has good nutritional qualities.

INTRODUCTION

India has a very rich variety of fermented foods prepared from milk, cereals, pulses vegetables, fruits and fish. Milk and milk products like curd, buttermilk lassi and shrikhand is inseparable dish in a regular diet of Indians. In all these milk-based products, the biochemical change is the production of lactic acid from lactose by lactic acid bacteria (LAB) like Lactococci, Leuconostocs, Streptococci and Lactobacilli. Shrikhand is a very popular and delicious product liked by many Indian and does consume it regularly during various occasions due to its pleasant taste and aroma. Because of which, shrikhand has a good market value and manufactured with different brands. Shrikhand with different aroma and taste was prepared by incorporating different fruit pulps and spices. The manufacturing process is identical with every brand, but the ingredients and quality of milk in terms of fat content used during the process differs. Shrikhand is prepared on small scale in a highly unorganized manner, which has great impact on microbiological characteristics of shrikhand. Wide variations in the organoleptical, microbiological and chemical qualities of shrikhand have been reported [1] due to its variation in techniques of production. This has led to exigency for process standardization to obtain shrikhand with uniform quality for its commercial production. Hence, it is worthwhile investigating differently branded shrikhand for its chemical composition and microbiological parameters.

The present study deals with the chemical composition and microbial analysis of differently branded shrikhand available in the local Indian market of Mumbai city. The entire study was planned with the following main objectives.

- To examine each branded shrikhand for various physico-chemical properties.
- To analyse each brand of shrikhand for its chemical parameters like titrable acidity, total ash, total fat, total reducing sugar and minerals like calcium and phosphorus.
- The microbial study was restricted to SPC, YMC and coliform bacteria.
- To establish and comment upon shelf life of the product based on the above findings.

METHOD AND MATERIALS

Preparation of Shrikhand

Shrikhand is a semi soft sweetish sour milk product prepared from lactic acid fermented curd. The curd is partially strained through cloth to remove the whey, which produces a solid mass called chakka. It is the basic ingredient for srikhand. Further, chakka is mixed with the appropriate quantity of sugar. Different aroma and varieties can be prepared by adding different fruit pulps, dry fruits, saffron, cardamom and other spices.

The different sources of milk (Cow or Buffalo) can change the total fat, calcium and phosphorus content in the srikhand. Also, the process of fermentation to prepare curd will differ with respect to time and microorganism used. These parameters can change the total acidity of the product. It is also expected that the preparation of chakka by removing whey and incorporation of sugar will affect the moisture content and total solid mass of the srikhand.

Sample Collection

A preliminary survey was conducted in the different areas of Mumbai city using pre-planned questionnaire, which includes the factors like brand of shrikhand, frequency of consumption and cost of shrikhand. The sample of five popular brands of shrikhand was selected based on their popularity and consumers response. The samples were collected from the local market in the small package. Each time shrikhand sample was purchased at a regular interval of 15 days from local grosser. The samples were transported to analytical laboratory in a plastic bag and stored at 5°C in a refrigerator before analysis.

Various Analysis of Shrikhand

Each sample was analyzed for various physical and chemical parameters using standard methods of analysis. The moisture content was determined by drying the known weight of sample in a silica crucible at 105°C in oven till constant weight. The loss in weight was reported as % moisture in the sample. The percentage of total solids was obtained by difference. Similarly, the % ash was calculated by igniting the sample at 600°C in a furnace and residue left was considered as ash. The lactic acidity was determined by titration of water extract with standard alkali and reported as titrable acidity. The protein was estimated by micro Kjeldahl's method, while amount of fat was obtained by method reported in the literature. The reducing sugar was estimated by Willstarer's method. The calcium was estimated by complexometric titration and phosphorus by molybdenum blue method using spectrophotometer [2].

The shrikhand samples were drawn aseptically and examined for the microbiological parameters in terms of Most Probable Number (MPN) of particular microorganism by method reported in the literature. The samples were investigated for Standard Plate Count (SPC), Coliform Count and Yeast/Mold Count (YMC) according to BIS method. Each experiment was repeated for five times to check the reproducibility of the results within experimental errors. The mean value of each parameter of market sample was compared with the standard values reported in the literature. The results were further supported by evaluating figure of merits for each parameters investigated [3,4].

RESULTS AND DISCUSSION

Physical and Chemical Characteristic

Shrikhand samples were collected and stored under refrigeration before the chemical analysis. Analytical sample size was drawn every time before the analysis and determined different properties of each branded shrikhand. The physical and chemical characteristic of each branded shrikhand is listed in the table 1.

Table 1: Physico-chemical parameters of different brands of shrikhand

Brands/ Parameters	Variety	Color	% Moisture	% Total solids	% Ash	pH	Titrable acidity
Amul	Elaichi	Cream	48.79	51.21	0.99	5.8	0.89
Aarey	Mango	Yellow	45.73	54.27	0.79	5.8	0.91
Warna	Elaichi	Cream	44.23	55.77	1.10	5.3	0.96
Mahanand	Elaichi	Cream	47.68	52.32	0.84	5.9	0.88
Loose	Elaichi	Cream	52.45	47.55	0.68	4.7	1.10
Standard	-	-	42.00	58.00	0.90	6.0	1.40

Shrikhand is known as a milky white semi solid delicious dish. Some time permissible food colors are added to increase its aesthetic value. Shrikhand sample under investigation is generally marketed with either pure white or creamish yellow in color. Aarey brand shrikhand was yellow due to ripe mango pulp. However, on qualitative examination it does show the presence of small amount of titan yellow as a food color. Similarly, other brands also show the positive test for the food color but the amount was within permissible limit. Each brand of shrikhand was examined for their physical properties. All the brands had good consistency and texture.

The result indicates that the moisture content of differently branded shrikhand is in the range of 45% to 52%. Aarey brand shrikhand has 45% of moisture while loose shrikhand had maximum moisture content. The higher moisture content in the shrikhand may be attributed to less removal of whey while preparing the chakka. Similarly, the percentage of total solid is within the range 47% to 56%. The literature reveals that the percentage of total solid should be pointed around 58% only. It is reported that shrikhand with lower value of moisture has a better shelf life and palatability. Upadhaya KG found that the level of total solids in sweet cream affects the chemical, physical and sensory qualities of the shrikhand. The shrikhand of any brand should not have total ash more than 1%. The total ash value of the shrikhand ranges between 0.79% and 0.99%, which accounts for total inorganic matter in the shrikhand sample [5].

The samples were tested for their pH value. It was found that shrikhand has acidic pH in the range 4.7 to 5.9. The BIS reports that pH of shrikhand should be between 5.0 and 6.0. Loose shrikhand has subnormal acidic pH of 4.7, which is lower than the permissible value. The sour taste of the shrikhand is attributed to such acidic pH of the sample and also due to heterogeneous fermentation process. The titrable acidity of the shrikhand should be lower than 1.4%. The higher acidity of the product will accelerate the bacterial growth, which will reduce the shelf life of the product. Almost all brands of shrikhand had a titrable lactic acid value close to 1%. The titrable acidity can also be related with the pH of the shrikhand. Loose shrikhand has a higher titrable acidity 1.1 and has lowest pH, while Mahanand shrikhand has pH 5.9 with acidity lowest value of pH pointed at 0.88. The lower pH will retard the growth of certain bacteria and may increase the shelf life of shrikhand.

Nutritional Parameters

Shrikhand is a delicious dish, which also has nutritional value. Some important nutritional parameters were determined to ascertain quality of shrikhand. The results of experimental findings are summarized in the table 2.

Table 2: Nutritional parameters of different brands of shrikhand/100g

Brands/ Parameters	Fat (g)	Protein (g)	%Reducing sugar	Calcium (mg)	Phosphorus (mg)
Amul	7.61	8.9	46.71	110	98
Aarey	5.34	9.2	45.96	98	84
Warna	6.79	8.5	49.93	126	100
Mahanand	4.56	7.7	47.77	100	89
Loose	3.17	5.4	51.34	75	79
Standard	5.00	10.5	72.50	100	100

It can be seen that the total fat content of the shrikhand is in the range 5.34% to 7.61%. The reported BIS value for the total fat is 5%. The values have greater degree of variance amongst the different brands. This difference is attributed to the quality of milk used for the preparation of chakka and subsequently, shrikhand. The Amul brand shrikhand was found to contain highest amount of total fat, which may be due to the use of high fat whole milk, while Aarey brand shrikhand has 5.34% fat value very close to standard value. The nutritive value of such shrikhand and acceptability of the product increases with the fat content. Ingle and Joglekar found that shrikhand with 3% fat has better palatability and acceptability Ingle, Ghatak and Dutta reported that mixing the cow and buffalo milk in the ratio 1:1 improves the smooth texture and desirable gumminess to shrikhand and also controls the fat content [6,7]. Milk and milk products are rich sources of proteins. Protein value of shrikhand was determined which ranges between 5.4mg/100g and 9.2mg/100g. The Aarey brand shrikhand has maximum protein of 9.2mg/100g can be recommended as source of protein. However, loose shrikhand with only 5.4mg/100g sample is a poor source of protein.

The value of reducing sugar is related to quantity of sugar added to make the product sweet. Total reducing sugar in the shrikhand averaged to 48%, which is lower than the standard value. The higher value of reducing sugar in the Warna brand shrikhand indicates that product has more free aldehyde and ketone group. Higher free aldehyde group will reduce the shelf life of the product and spoilage process will be accelerated.

The ash value has a direct relevance with the inorganic mineral content like calcium and phosphorus. The calcium and phosphorus content of the Warna branded shrikhand was 126mg/100g and 100mg/100g

respectively, is also reflected in the higher value of total ash. Similarly, in loose shrikhand amount of calcium and phosphorus are very low and averages about 75mg/100g and 79mg/100g of the solid product. The higher mineral content increases the nutritional importance of the shrikhand. The higher content of the mineral may be attributed to the quality of milk used for the preparation of chakka. Boghra reported that the fermentation process could bring major changes in the mineral content of the chakka [8].

Microbiological Investigation

A good packaging plays an important role of protector for every product. An appropriate packaging material is essential for the shrikhand to maintain its quality. Differently branded shrikhand are marketed in different size and design of packaging materials made up of paper cup and polypropylene. The use of sterile material for packaging and good storage conditions is expected to ensure good quality of shrikhand with respect to microbial parameters. Shrikhand possess antibacterial properties against pathogenic as well as spoilage organisms. The safe use of shrikhand samples can be recommended on the basis of their microorganism content. SPC, YMC and Coliform microorganism was selected as a representative and samples were tested for their presence. The experimental findings are tabulated in the table 3.

Table 3: Microbiological investigations on different brands of shrikhand

Brands/ Parameters	SPC c.f.u./g	YMC c.f.u./g	Coliform count c.f.u./g
Amul	2050	3000	550
Aarey	100	586	230
Warna	3400	Uncountable	970
Mahanand	19000	24000	1050
Loose	Uncountable	Uncountable	Uncountable
Standard	<100	50	10

The quality of shrikhand is dependant on all the above nutritional parameters and is closely related to the microbial findings. Loose shrikhand show very high uncountable growth of the microbial count, while Aarey brand shrikhand has a lowest count of 586 colonies. Surprisingly, Warna brand product also had very high count of colonies. Such abnormal value of microbial count may be attributed to the poor packaging material and unhygienic storage conditions. Sarkar have reported that sugar can be the chief source of contamination in the product [9]. Conclusively, the Aarey brand shrikhand was found to be best product with respect to its nutritional value and microbial analysis. However, the market survey indicates the popularity of Amul brand shrikhand while loose shrikhand was most economic to buy.

ACKNOWLEDGEMENT

I sincerely thank my student Ms. Shruti Mudliyar who has shown keen interest in helping me in completion of this research work.

REFERENCES

1. Sarkar S, Mishra AK. Commercial production of shrikhand. *Indian Food Ind.* 1997;16(1):20-25.
2. AOAC, Official methods of Analysis, 11th Edition, Association of Official Agricultural Chemists, Washington DC, 1970
3. Indian Standard IS: 5404. Code for practice of handling of samples for Microbiological analysis, Indian Standards Institutions, New Delhi, 1969.
4. Bureau of Indian Standards, ISI Hand book of Food Analysis, Part 4, 1984.
5. Upadhaya KG. Effect of varying levels of total solids in sweet cream better milk on the quality of fresh shrikhan. *Indian J Dairy Sci.* 1999;52(2):95-99.
6. Ingle UM, Joglekar NV. Effect of fat and sugar variation on the acceptability of shrikhand preparation. *J Food Sci Tech.* 1974;2:120-123.
7. Ghatak PK, Dutta S. Effect of admixing of cow and buffalo milks on compositional and sensory qualities of shrikhand. *Indian J Nutr Diet.* 1998;35(1-6):150-152.
8. Boghra VR. A comparative study on mineral composition of different whey systems obtained during channa, paneer and shrikhand preparation. *Indian J Dairy Sci.* 1998;51(4):420-422.
9. Sarkar S. Antibacterial properties of shrikhand. *Indian J Dairy Sci.* 1996;49(3):270-276.