Original Research Article

Microbial Quality Analysis of Shrikhand Sold in Kolhapur City, India

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A B S T R A C T

Milk is known to carrier both pathogens as well as spoilage microorganism. This results in the economic loss of producers/processors/consumers and can pose a serious public health concern. Spoilage microorganisms group can degrade milk components, creating negative sensory attributes, decreasing processed product shelf life and adversely affecting fermented dairy product yield. Some microorganisms are beneficial and carrying out desirable fermentation in milk (prevent spoilage through fermentation). The extent of contamination is depending upon the practices followed and available environment during and after the preparation of products. Hence, present study was undertaken to evaluate the microbial quality of *shrikhand* sold in Kolhapur city. Preliminary survey was conducted in market of Kolhapur city to know the availability of *shrikhand* samples and on the basis of survey five brands of *shrikhand* were selected. These brands were coded with KS_1, KS_2, KS_3, KS_4, and KS_5. Packed pouch (package) were brought to laboratory under condition for further analysis. It was observed that the, SPC ($x10^6$ cfu g^1) recorded in market samples of *shrikhand* were various 18.00, 19.00, 21.5, 19.5 and 23.00, respectively and that difference in count were significant whereas, coliform count in market samples were range of $1.00\pm$ to 3.10 cfu g^{-1}. The highest Coliform count was in KS_3 and lowest KS_1 brand. The YMC in *shrikhand* samples collected from Kolhapur market ranging from 15.91 to 30.18 (cfu g^1) and all samples were free from *salmonella* contamination.

Introduction

Fermented products are those prepared where the milk is inoculated with starter culture organism mainly Lactose fermented bacteria which hydrolyze the lactose of milk into lactic acid and thus raise the acidity and decrease pH of milk. Fermented milk and milk products have occupied a place of satisfaction in satisfying the palate and nutritional requirements of human being since the time ancient. There are more than 400 type of

fermented dairy products are available in the world. *Shrikhand* is fermented and sweetened milk product of Indian origin popular in western and part of southern peninsula of India (Nigam *et al.*, 2009).

The product is prepared with addition of sugar, Flavoring, material, dried fruits etc.in dahi and blended very well still getting typical semi-solid consistency with a characteristic smoothness, firmness and palatability. Despite so much of market size the *Shrikhand*

manufacturing is still unstandardized process. Market studies carried out by Sharma and zariwala (1978), Bogra and matur (1992), Kumbhar *et al.,* (2009) have shown great variation in *Shrikhand* quality in terms of chemical and microbiological attributes. In view of current liberalization program, more dairy units are coming up and *Shrikhand* manufacture being one of the most profitable business as pointed out by Aneja (1992.

Milk is known to carrier both pathogens as well as spoilage microorganism. This results in the economic loss of producers/ processors / consumers. Presence of pathogen can pose a serious public health concern. (Kumbhar *et al.,* 2009). Spoilage microorganisms group can degrade milk components, creating negative sensory attributes, decreasing processed product shelf life and adversely affecting fermented dairy product yield. The extent of contamination is depending upon the practices followed and available environment during and after the preparation of products.

A Kolhapur district is the top in buffalo milk production in Maharashtra. At present, Kolhapur District Milk Union (Gokul), Warna Milk Union, Yelgud Milk Union, Shahu Milk Union are the key leader in collecting and processing of milk in the district. Number of branded *Shrikhand* is being prepared and marketed in Kolhapur district.There are no microbiological standard for *shrikhand* in PFA, however, BIS (IS: 5432-1980) has given the limit of 50 cfu/g for yeast and molds count and 10cfu/g for coliform.

Since then no information on microbiological quality of *shrikhand* in this area is available whereas, on other side, the product growth in the market has increased substantially in last few years. Hence, the present study deals with the microbiological analysis of differently branded *Shrikhand* sold in Kolhapur city.

Materials and Methods

The study entitled, 'Microbial quality analysis of *shrikhand* sold in Kolhapur city' was undertaken in the laboratory of Division of Animal Science and Dairy Science of college of Agriculture, Kolhapur, MPKV, Rahuri (Maharashtra).

Materials

All the glassware's *viz.*, petriplates, dairy microbiological pipette, test tubes, glass beakers, conical flask etc. of Borosil make was used to analyze *shrikhand* for different parameters throughout the study. AR/GR grade chemicals were used for chemical analysis of *shrikhand* for different parameters throughout the study. Chemicals and ingredients of qualigens and glaxo India limited. M/S Himedia laboratories used for preparation of media and used for microbial examination of *shrikhand.* Different equipments were used viz. Weighing balance, Autoclave, Hot air oven, Colony counter, Laminar air flow, Water bath, pH meter.

Analysis

Standard plate count of *shrikhand* samples was determined as per the procedure described in Amin J.B. (1997) Using Plate Count Agar (PCA); (Hi- media) was used to enumerate the standard plate counts in the *Shrikhand* samples. The yeast and mould count of *shrikhand* samples was determined as per the procedure described by Anshu *et.al.* (2014), Using Potato Dextrose Agar (PDA) of Hi- media was used to enumerate yeast and mould counts in the *shrikhand* samples. The coliform count of market samples of *shrikhand* was determined as per the Procedure described in IS: 5404, (1995) using violet Red Bile Agar (VRBA).of Hi-media was used to enumerate the coliform counts in *shrikhand* samples.

Methods

Selection of Brands of *Shrikhand*

Preliminary survey was conducted in the Kolhapur market, to know the brands and to ascertain the availability of *shrikhand* throughout the study period. On the basis of survey, five brands of *shrikhand* was selected and considered for this study.

Collections of *shrikhand* samples

Shrikhand of predetermined brands was collected from the local market and brought to the laboratory in the chilled condition as and when required to complete analysis.

Sample details

KS_1	-	Market *shrikhand* sample-1
KS_2	-	Market *shrikhand* sample- 2
KS_3	-	Market *shrikhand* sample- 3
KS_4	-	Market *shrikhand* sample- 4
KS_5	-	Market *shrikhand* sample- 5

Results and Discussion

The market samples of *shrikhand* were subjected for determination of microbial counts viz. Standard Plate Count, Yeast and mould, coliform and salmonella count. The results obtained from the present investigation as well as relevant discussion have been summarized under following heads:

Standard plate count

The average standard plate count (SPC) of market *shrikhand* samples sold in Kolhapur city is presented in table 1.
The results on standard plate count (SPC) *shrikhand* of various brand sold in Kolhapur city are presented in Table 1 along its statistical analysis SPC ($x10^6$ cfu/ml) recorded in KS_1, KS_2, KS_3, KS_4 and KS_5 of

market *shrikhand* samples under study were 18.99 $\pm$ 0.10, 19.14 $\pm$ 0.08, 21.99 $\pm$ 0.19, 19.77 $\pm$ 0.18, and 23.29 $\pm$0.06, respectively.

The highest SPC was observed in sample KS_5 and lowest in sample KS_1. These results are in line with the findings in study of Kolpe *et al.,* (2010), who reported SPC from 18.25 to 23.25 x 10^6/ml of control sample of *shrikhand* prepared to evaluation of microbial quality of papaya *shrikhand*.

SPC from 3.31 to 7.34 x 10^7/ml of branded dahi sold in various market of Pakistan, reported by Yonus *et al.,* (2013), Somewhat similar findings were also reported by Shekh *et al.,* (2009) in market dahi,

The mean value of total plate count (log cfu g^{-1}) of *shrikhand* showed significantly (p>0.05) increasing trend with increasing storage days. Parveez (2015), however lower values of SPC in market sample of *shrikhand* of Gujarat (24,500 to 16, 50,000 cfu/g) reported by Upadhyay *et al.,* (1975).

Coliform

The average coliform count of market *shrikhand* samples sold in Kolhapur city is presented in table 2.

The presence of coliform in milk and milk products is suggestive of insanitary condition or practices followed during production, processing, handling and storage. There, the *shrikhand* samples of present study were subjected to determination of coliform counts.

Sample S_3 showed maximum (3.10 $X10^2$c.f.u./g) coliform and inferior to other samples. sample $S_1$and S_3 also showed coliform counts 1.0X 10^2c.f.u./g and $1x10^2$c.f.u/g respectively remaining two (S_2 and S_4) samples were free from coliform organisms and hence safe for consumption.

BIS as prescribed the maximum limits of 10 coliform c.f.u/g of *shrikhand* but no such regulations exits in PFA act except three samples, remaining were no meeting the prescribed BIS limits.

Reported values of coliform counts in the present study were in close accordance with the counts with Karthikeyan (1993) and Salunke et. al. (2005). The coliform counts in product were in the range of 1.00 to3.10 c.f.u. x 10^2/g. It is between the standard prescribed by IS (0.00 to 5.00 c.f.u./g) (Anonymous,2009). Low number of *E. coli* was found by Kumar and Prasad (2010) in *Dahi* sold in market. Similar observations were also made by Obande and Azua (2013).

Yeast and mould

The average Yeast and Mould count of market *shrikhand* samples sold in Kolhapur city is presented in table 3.

Yeast and mould perhaps and important group of micro-organism responsible for spoilage of dairy products. the result of yeast and mould count are presented in table 3. It was revealed from result that all market samples showed presence of yeast and mould. Sample S_3 showed maximum (30.18 ± 0.08 x10^1c.f.u/g) count and which is microbiologically inferior.

While sample S_4 showed least (14.19 ± 0.12 x10^1 c.f.u/g) count and microbiologically better than other samples Though the overall YMC content was significantly affected, however the YMC count between the *shrikhand* sample were at par with KS_1 (15.91 ± 0.08 x10^1c.f.u/g) and the variation was found to be statistically non-significant. All the market *shrikhand* samples were showing

vary high counts and showed more yeast than moulds indicating the sugar as a possible source of contaminant.

None of the *shrikhand* sample met the requirement of BIS (1980) standard. The present observation are in confirmation with Kartikyen (1993) Prajapati et.al (1993), Upadhyay *et al.,* (1975) reported values of (YMC) (0 to 1,83,000/g) in *shrikhand* samples of Gujarat market.

Sharma and Zariwala (1980) reported 1 to 800 x 10^3 cfu/g of sample from market *shrikhand* stored at 10 and 37 ^{0}c respectively. Whereas, Obande and Azua, (2013) found highest YMC in Nono (a fermented milk product) and yoghurt sold in Nigeria and the counts were 9.20 and 1.07x10^6/ ml, respectively.

The presence of yeast and mould were also reported by Phadatare (2009) in *lassi*, Shekh *et al.,* (2009) in dahi. Yeast and mould may get in product from utensils, human hands, atmosphere, starter culture, etc. during handling and repeated transfer, as reported by Ali *et al.,* (2002).

Salmonella count

The average *Salmonella* count of market *shrikhand* samples sold in Kolhapur city were free from *salmonella* contamination. Therefore, the *Shrikhand* sold Kolhapur city was safe for consumption from *Salmonella* contamination point of view.

A similar finding was also reported by Kumbhar *et al.,* (2009) in market *lassi*. However, Okonkwo (2011) found *salmonella* count in Nono a fermented milk based food sold in Nigeria.

Table.1 Standard plate count for market samples of *shrikhand*

Shrikhand samples	SPC (10^6 cfu/ml)
KS1	18.99 ± 0.10
KS2	19.14 ± 0.08
KS3	21.99 ± 0.19
KS4	19.77 ± 0.18
KS5	23.29 ±0.06
Standard Error	0.06
CD at 5 %	0.19

* Means of six replications within column followed by the same letter are not significantly different at $p < 0.05$

Table.2 Coliform count (c.f.u. x 10^1 /g) in *shrikhand* samples sold in Kolhapur City

Shrikhand samples	Coliform (c.f.u. x 10^1 /g)
KS_1	1.00
KS_2	0
KS_3	3.10
KS_4	0
KS_5	1.43
Standard Error	0.08
CD at 5 %	0.24

* Means of six replications within column followed by the same letter are not significantly different at $p < 0.05$

Table.3 Yeast and mould counts of market samples of *shrikhand* sold in Kolhapur City

Shrikhand samples	Yeast and mould (c.f.u /g)
KS_1	15.91 ± 0.08
KS_2	22.3 ± 0.17
KS_3	30.18 ± 0.08
KS_4	14.19 ± 0.12
KS_5	28.36 ± 12
Standard Error	0.05
CD at 5 %	0.15

*Means of six replications within column followed by the same letter are not significantly different at $p < 0.05$

From the result it is concluded, that on the basis of microbial quality evaluation, studied here, KS$_1$ and KS$_4$ brands of *shrikhand* was significantly superior over the other brand under study. The wide variation was found among the market *shrikhand*, due to disorganized, lack of awareness to maintain hygienic and nutrition condition in *shrikhand*. Therefore to make quality *shrikhand*, KS$_3$ and KS$_5$ brands is suggested to adopt proper hygiene condition and use good quality raw materials to attract public health attention. It is also need to establish quality standards and enforcement of restriction on the quality of *shrikhand* in market, which is not appeared from the present study.

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