I J T A
© Serials Publications
National Academy of Agricultural Science (NAAS)
Rating : 3. 03

Assessment of Microbial Qualities of Lassi sold in Kolhapur city

B. K. Ghule, M. S. Gavhane, B. B. Munde and D. D. Patange*

Abstract: *Lassi is a refreshing summer beverage popular in North India. Variants of lassi include butter milk, chhach and mattha that are consumed with relish in other regions too. Lassi is a white to creamy white, viscous liquid, with a sweetish, rich aroma and mild high acidic taste. It is flavoured either with salt or sugar together with condiments, depending on regional preferences. Lassi is obtained from pasteurised milk or part of skim milk cultured lactic and aroma /flavoured producing organisms. Quality of market lassi varies not only town to town but also within the lassi venders and brands, from the same town. Unless some quality standards are fixed for this product, consumer will not be assured of getting uniform and good quality lassi. Number of branded lassi is being prepared and marketed in Kolhapur city. The SPC ($x10^7$ cfu/ml) recorded in KS_1, KS_2, KS_3, KS_4, KS_5 and KS_6 of market lassi samples of various brands under study were 13.17, 10.36, 7.65, 8.50, 11.81, and 6.75, respectively and that difference in count were significant whereas, the average LAB content of lassi varied from 3.89 to 7.90 ($x10^5$ cfu/ml). Coliform count in market lassi samples were range of 1.50 to 41.83 $x10^1$ cfu/ml. The highest Coliform count was in KS_4 and lowest KS_1 brand. The YMC ($x10^1$ml) in lassi samples collected from Kolhapur market ranging from 1.77 to 46.50 and all samples were free from salmonella contamination.*

Keywords: *Lassi, Microbial quality,*

INTRODUCTION

Lassi is a refreshing summer beverage popular in North India. Variants of *lassi* include butter milk, chhach and mattha that are consumed with relish in other regions too. *Lassi* is a white to creamy white, viscous liquid, with a sweetish, rich aroma and mild high acidic taste. It is flavoured either with salt or sugar together with condiments, depending on regional preferences. *Lassi* is obtained from pasteurised milk or part of skim milk cultured lactic and aroma /flavoured producing organisms. Due to creamy consistency, sweet rich aroma, and mild acidic flavour, *lassi* becomes refreshing palatable product (George *et al*., 2010).

The term *lassi* is also used for a phospholipids rich fluid fraction obtained as a by- product during the churning of dahi while making makkhan (deshi fresh butter). *Lassi* making was earlier confined to the cottagesector for homes. It was mainly a rural product. Now it is commercially prepared in several part of north India. Salted *lassi* is marketed in number of cities in the southern region of India.It can be flavored in various ways with salt, mint, cumin, sugar, fruit or fruit juice and even spicy additions, such as ground chilies, fresh ginger or garlic. In Industry *lassi* is prepared from dahi/ probiotic dahi by breaking the curd and mixing sugar syrup / salt and flavoured followed by packing and stored under refrigerated conditions. Thick *lassi* is made with four parts dahi to one part of water, and/or crashed ice. During the mixing stage, probiotic biomass can be supplemented for preparing the functional probiotic *lassi*. It is packaged in traditional milk cartons /sachets/UHT boxes. Aseptically packaged long life *lassi* is also becoming popular in market.

It has amazing thirst quenching ability along with nutritive and therapeutic properties (Gupta *et al*., 2014). The beverage, is enjoyed chilled as

* Deptt. of Animal Husbandry and Dairy Science, MPKV, Rahuri, Maharashtra, India

refreshing, beverage during extreme summers. *Lassi* is served on very large scale in cold drink shops, bars and restaurants during summer in almost every state in India. There aredifferent types of *lassi* prepared from milk like sweet *lassi*, bhang *lassi*, soya *lassi*, plain *lassi*, fruit *lassi* (mango, papaya and passion fruit -*lassi*), Mumtaz*lassi* and amritsan*lassi*.It is generally prepared from either whole or skim milk dahi or butter milk and dressed with malai or ice-cream while serving.

Now a day, due to the mechanization of dairy industry, *lassi* is manufactured, packed and sold in retail market. Even though general method of preparation of *lassi* is known there have been no serious attempts to standardize its composition and method of manufacture for production in large quantities (Machewad and Phalke, 2014). Quality of market *lassi* varies not only town to town but also within the *lassi* venders, from the same town. Unless some quality standards are fixed for this product, consumer will not be assured of getting uniform and good quality *lassi*.

Kolhapur is the top most districts 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. Consumption of milk and milk products in the Kolhapur city is also quite high due to economic status and awareness of the people about nutritional importance of milk and milk products in the diet (Patange *et al*., 2011). Number of branded *lassi* is being prepared and marketed in Kolhapur district. However there are no any standards to make good quality *lassi*. Hence, the present investigation was undertaken to evaluate the quality of *lassi* sold in Kolhapur city for microbial qualities.

MATERIAL AND METHODS

Collection of *lassi* samples

Packed *lassi* samples of selected brands were collected from the local market of Kolhapur city and brought to the laboratory under chilled condition for further analysis.

Sample Details

KS_1 - Market *lassi* sample-1
KS_2 - Market *lassi* sample- 2
KS_3 - Market *lassi* sample- 3
KS_4 - Market *lassi* sample- 4
KS_5 - Market *lassi* sample- 5
KS_6 - Market *lassi* sample- 6

Microbial quality of market samples of *lassi*

The analysis microbial quality of lassi sample were carried out for detection of standard plate count, lactic acid bacteria count, coliform count, yeast and mould count and salmonella, by adopting standard procedure as listed below.

Standard plate count

The standard plate count of market *lassi* samples was determined as per the dairy bacteriology manual of ICAR, (1982) using Plate Count Agar**.**

Lactic acid bacteria

The lactic acid bacteria of market *lassi* samples were determined as per procedure described by Prajapati (1997) using Lactose Purple Agar.

Coliform count

The coliform count of six market samples of *lassi* were determined as per the procedure described in IS: 5404, 1995 using Violet Red Bile Agar.

Yeast and Mould Count

The yeast and mould count of market *lassi* samples was analyzed as per the procedure described in IS: 5403 (1969) using Potato Dextrose Agar (PDA).

Salmonella count

The Salmonella count of market samples of *lassi* were determined as per procedure described in IS: 5887 (1999) using Baired Parker Agar.

Statistical Analysis

Complete Randomized Design (CRD) with six replication was used for analysis of data (Panse and Sukhatme, 1985).

RESULTS AND DISCUSSION

Microbial quality *lassi*

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. Some microorganisms are beneficial and carrying out desirable fermentation in milk (prevent spoilage through fermentation). The extent of contamination is depend upon the practices followed and available environment during and after the preparation of products. Considering these views, the present study was conducted to know the microbial load of market samples of *lassi* such as standard plate count, lactic acid bacteria count, coliform count, yeast and mould count and salmonella count and the results obtained thereof are presented in Tables 1 to 2.

Standard plate count

The results on standard plate count (SPC) *lassi* of various brand sold in Kolhapur city are presented in Table 1 along its statistical analysis

Table 1
Standard Plate Count (x10^{7}cfu/ml) in lassi samples sold in Kolhapur City

Particular	*Market lassi Samples*					
	KS_1	KS_2	KS_3	KS_4	KS_5	KS_6
Mean values*	13.17^g	10.36^d	7.65^b	8.50^c	11.81^f	6.75^a
SE	±0.09	±0.23	±0.15	±0.08	±0.13	±0.09
SEm	0.10					
CV	0.60					
CD (p<0.05)	0.29					

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

SPC (x10^7 cfu/ml) recorded in KS_1, KS_2, KS_3, KS_4, KS_5 and KS_6 of market *lassi* samples under study were 13.17 ±0.09, 10.36 ±0.23, 7.65±0.15, 8.50 ±0.08, 11.81 ±0.13, and 6.75 ±0.09, respectively. From Table 4.16, it is revealed that the SPC found in all the samples were varied significantly (p<0.05). The highest SPC was observed in *lassi* sample KS_1 and lowest in *lassi* sample KS_6.

Lactic acid bacteria count

The results presented in Table 2 show that the average lactic acid bacteria (LAB) content (x10^{5}cfu/ml) of *lassi* varied from 3.89 to 7.90 The LAB count in *lassi* differed significantly (P<0.05) from brand to brand however, the LAB count of KS_6, KS_2 and KS_3, were at par with each other.

Table 2
Lactic Acid Bacterial count (x10^{5}cfu/ml) in *lassi* samples sold in Kolhapur City

Particular	*Market lassi Samples*					
	KS_1	KS_2	KS_3	KS_4	KS_5	KS_6
Mean values*	7.90^d	4.13^a	4.19^a	5.21^b	6.20^c	3.89^a
SE	±0.11	±0.04	±0.03	±0.16	±0.10	±0.06
SEm	0.19					
CV	4.80					
CD (p<0.05)	0.55					

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

The average LAB count of KS_1, KS_2, KS_3, KS_4, KS_5 and KS_6 of market *lassi* samples were 7.90 ±0.11, 4.13 ±0.04, 4.19 ±0.03, 5.21 ±0.16, 6.20 ±0.10, and 3.89 ±0.06 (x10^5) cfu/ml, respectively (Table: 4.17). The maximum lactic acid bacteria count was observed in *lassi* sample KS_1 (7.90x10^{7}cfu/ml) and lowest in *lassi* sample KS_6 (3.89 x10^5). Very close number of LAB count in *lassi* samples might be because of use of defined starter culture under proper condition of fermentation for manufacture of it (Yonus *et al*., 2002).

Coliform count

The average coliform count of market *lassi* samples sold in Kolhapur city is presented in Table 3.

Table 3, clearly indicate that, the average coliform count (x10^{1}cfu/ml) in market *lassi* samples were range of 1.50 to 41.83 and which showed significantly (P<0.05) variation. The highest coliform

Table 3
Coliform count (x10¹cfu/ml) in lassi samples sold in Kolhapur City

Particular	*Market lassi Samples*					
	KS_1	KS_2	KS_3	KS_4	KS_5	KS_6
Mean values*	6.17^{ab}	9.67^{bc}	28.50^{d}	41.83^{e}	14.67^{c}	1.50^{a}
SE	±1.54	± 2.75	±2.63	±2.33	±0.71	± 0.76
SEm	1.86					
CV	26.66					
CD (p<0.05)	5.41					

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

count was observed in *lassi* sample of KS_4 brand (41.83 ±2.33 x10¹ cfu/ml) and lowest in *lassi* sample of brand KS_1 (1.50 ±0.76x10¹ cfu/ml). The mean values of coliform count (x10¹cfu/ml) were 6.17, 9.67, 28.50 and 14.67 in *lassi* sample of KS_1, KS_2, KS_3 and KS_5, respectively. Further, it is revealed from the table that the coliform count in the sample KS_1 was higher than KS_6 and lower than KS_2, however it was at par with KS_6 and KS_2.

Yeast and mould count

The mean of yeast and mould count (YMC) of market *lassi* sold in Kolhapur city is presented in Table 4.

Table 4
Yeast and Mould count (cfux10¹ml) in *lassi* samples sold in Kolhapur City

Particular	*Market lassi Samples*					
	KS_1	KS_2	KS_3	KS_4	KS_5	KS_6
Mean values*	46.50^{d}	15.00^{b}	32.33^{c}	21.50^{b}	18.50^{b}	1.77^{a}
SE	±1.03	±1.14	±0.58	±0.19	±0.34	±0.38
SEm	02.39					
CV	26.02					
CD (p<0.05)	06.96					

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

Table 4 revealed that, the YMC (cfux 10¹/ml)in *lassi* samples collected from Kolhapur market ranging from 1.77 to 46.50, which showed significant(p<0.05) variation. The maximum yeast and mould count was observed in *lassi* sample KS_2 (46.50 ±1.03 x10¹/ml) and lowest in *lassi* sample KS_6 (1.77 x10¹cfu/ml). Though the overall YMC content was significantly affected, however the YMC count between the *lassi* samples KS_2, KS_5 and KS_6 were at par with each other and the count of these samples were 15.00 ±1.14, 18.50 ±0.34 and 21.50 ±0.19, respectively.

Salmonella count

The *Salmonella* count of market *lassi* samples sold in Kolhapur city is presented in Table 5.

Table 5
***Salmonella* Count (x10¹cfu/ml) in *lassi* samples sold in Kolhapur City**

Particular	*Market lassi Samples*					
	KS_1	KS_2	KS_3	KS_4	KS_5	KS_6
Mean values*	Nil	Nil	Nil	Nil	Nil	Nil
SE	Nil	Nil	Nil	Nil	Nil	Nil
SEm	-					
CV	-					
CD (p<0.05)	—					

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

It is observed from the table 5 that all the samples were free from *salmonella* contamination. Therefore, it can be stated that the *lassi* sold Kolhapur city was safe for consumption from *Salmonella* contamination point of view.

Overall Microbial qualities of *lassi*

Table 6

Parameters	*Mean score/ value/ count of lassi samples*						SE_m	*CD*
	KS_1	KS_2	KS_3	KS_4	KS_5	KS_6		*(p<0.05)*
Microbial qualities								
SPC (x10⁷ cfu/ml)	13.1^{g}	10.3^{d}	7.65^{b}	8.50^{c}	11.8^{f}	6.75^{a}	0.10	0.29
LAB (x10⁵cfu/ml)	7.90^{d}	4.13^{a}	4.19^{a}	5.21^{b}	6.20^{c}	3.89^{a}	0.19	0.55
Coliform count (x10¹ml)	6.17^{ab}	9.67^{bc}	28.5^{d}	41.8^{e}	14.6^{c}	1.5^{a}	1.86	5.41
YMC (x10¹/ml)	46.5^{d}	15.0^{b}	32.3^{c}	21.5^{b}	18.5^{b}	1.77^{a}	2.39	6.96
Salmonella	Nil	Nil	Nil	Nil	Nil	Nil	0	0

CONCLUSIONS

1. Along with the quite good number of lactic acid bacteria count in lassi the occurrence of coliform and yeast and mould count is moderate to attract public health attention.
2. The wide variation was found among the market lassi, with respect to unity aspects. It also indicates that there in establish quality standards and enforcement of restriction on the quality lassi in market.

References

George,V., Arora, S., Sharam, V., Wadhwa, B.K., Singh, A.K. (2010). Stability, physico-chemical, microbial and sensory properties of sweetener blends in *lassi* during storage. *Journal of food bioprocess technology*.5 (1): 323-330.

Gupta, A., Ghatak, P.K., Ray, P.R. and Bandopadhyay, A.K. (2014). Effect of addition of carrot juice and stabilizer on the acceptability of lassi. Beverage and Food World: 41 (7): 32-33.

ICAR (1982). Manual of dairy bacteriology, Indian Council of Agriculture Research Publication.

IS: 5403, (1969). Methods for yeast and mould count in food stuffs. Indian Standards Institute, Manak Bhvan, New Delhi.

IS: 5887 (1999). Methods for detection of bacteria responsible for food poisoning.

IS:. 5404, (1995). Methods, for drawing and handling of food samples for microbiological analysis.

Kumbhar, S.B., Ghosh, J.S. and Samudre, S.P. (2009). Microbiological analysis of pathogenic organisms in indigenous fermented milk products. Advance journal of food science and Technology. 1(1):35-38

Machewad, G.M. and Phalke, M. (2014). A review on flavoured lassi from soyabean and buttermilk. Beverage and Food World, 41 (7): 34-36.

Panse, V. G. and Sukhatme, P.V. (1985). Statistical methods for agricultural workers. Indian Council of Agriculture Research, New Delhi, pp. 143-147.

Patange, D.D., Dhole, P.T., Kamble, S.S., Jadhav, B.S. and Patil, G.R. (2011). Production system of milk from Pandharpuri buffaloes on *Dudh Kattas* in Kolhapur city. *Indian dairyman*, 63(6):48-53.

Prajapati, J.B. (1997). Microbial analysis of milk products. Compendium of laboratory quality assurance in dairy industry, pp. C-31 -35.