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## Studies on physico-chemical quality of *Shrikhand* sold in Kolhapur city

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### Abstract

*Shrikhand* is one of the important fermented milk products which derives its name from the Sanskrit Word "shrikhirmi" meaning a curd prepared with added sugar flavoring agent, fruits and nuts. *Shrikhand* is popular in western part of southern peninsula of India. Hence, present study was undertaken to evaluate the quality of *shrikhand* sold in Kolhapur city for its sensory, chemicals and microbial qualities. Preliminary survey was conducted and on the basis of survey five brands of *shrikhand* were selected, coded with KS<sub>1</sub>, KS<sub>2</sub>, KS<sub>3</sub>, KS<sub>4</sub>, and KS<sub>5</sub>. Packed pouch (package) of selected brands were collected from the market and brought to laboratory under condition for further analysis. In this study physico-chemicals properties for moisture, total solids, fat, protein, reducing sugar, non-reducing sugar, acidity and pH, were examined.

Significant ( $P < 0.05$ ) difference were also recorded in all the chemical quality of *shrikhand* sold in Kolhapur city. The average of moisture content in samples 40.50% to 44.09%. The maximum moisture 44.09% was observed in the KS<sub>3</sub> sample and minimum moisture 40.50% was observed in the KS<sub>2</sub> sample. The total solid content in samples was 55.50% to 59.13%. Sample KS<sub>2</sub> content maximum 59.13 TS and Sample KS<sub>3</sub> content minimum 55.50 TS. The fat content in *shrikhand* samples were 8.33, 8.10, 5.73, 7.57 and 7.00 whereas the average protein content were 7.10, 7.12, 5.5, 5.75 and 7.20 in KS<sub>1</sub>, KS<sub>2</sub>, KS<sub>3</sub>, KS<sub>4</sub> and KS<sub>5</sub> respectively. However, the mean of total sugar content of *shrikhand* samples in KS<sub>1</sub>, KS<sub>2</sub>, KS<sub>3</sub>, KS<sub>4</sub> and KS<sub>5</sub> were 42.32, 43.43, 43.83, 43.25 and 41.68 percent respectively. The average acidity (% LA) of market sample of *shrikhand* KS<sub>1</sub>, KS<sub>2</sub>, KS<sub>3</sub>, KS<sub>4</sub>, KS<sub>5</sub>, were 1.01, 1.20, 1.45, 1.00, and 1.50, respectively whereas, the pH in *shrikhand* sample was ranged from 4.00 to 5.13. The ash content in market sample of *shrikhand* ranged from 0.75 to 0.90.

**Keywords:** Shrikhand, physico-chemical, Kolhapur city

### Introduction

Fermented or cultured dairy products constitute a vital component of the human diet in India as in many other regions of the world. Dahi, *lassi*, mishti dahi and *shrikhand* like milk products figure prominently in people's diet in different parts of India. There are more than 400 type of fermented dairy products are prepare in the world some of them are kefir, kumiss, Bulgarian sour milk, dahi, yogurt, acidophilus milk, *lassi*, *Shrikhand* etc. *Shrikhand* is fermented and sweetened milk product of Indian origin which is derived from Sanskrit word 'shrikhirmi' meaning a curd prepared with addition of sugar. flavouring material, dried fruits etc. it is regularly consumed in Gujarat, Maharashtra and certain parts of Karnataka, Madhya Pradesh and Rajasthan in addition to these places, because of its typical sweet-sour taste, it is becoming popular in other parts of country. *Shrikhand* has a typical semi-solid consistency with a characteristic smoothness, firmness and palatability that make it suitable for consumption directly after meal or with 'puree' or bread. 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) [6]. 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 sensory, chemical and 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 analysis of differently branded *Shrikhand* sold in Kolhapur city.

## Material and Methods

### Materials

For analytical purpose i.e. sensory, chemical, microbial characteristics of *shrikhand* samples in the laboratory, following material has been used.

### 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* have been selected and considered for this study.

### Chemical analysis of *Shrikhand*

*Shrikhand* samples were analyzed for its chemical parameters by adopting standard procedure as listed. *Shrikhand* samples (market and laboratory made) were analyzed as; fat was determined by Gerber method. Moisture content was determined by the gravimetric method as described in AOAC (2000). Total solids were determined by subtract moisture from total weight of product used for analysis. Total protein content in *Shrikhand* was determined using Kjeldhal method (AOAC, 2000). Lactose of *shrikhand* sample was determined by the method described in IS: SP 18 (Part XI, 1981).

Reducing and non-reducing sugar content was determined as per lane-eynon method of SP: 18 (part XI, 1981). The pH of *shrikhand* samples was determined by using digital pH meter following the procedure stated in IS: 1479 (part – II, 1961).

### Statistical analysis

Randomized Block Design (RBD) with six replications was used for analysis of data (Panse and Sukhatme, 1985) [5].

### Results and Discussion

The market samples of *shrikhand* were analyzed chemically for its constituent's viz., moisture, total solids, fat, protein, reducing and non-reducing sugar, acidity and pH. Results are presented and discussed as follows.

#### Moisture

The average values of moisture content in samples are presented in table 4.6 and fig.4.6 which showed significant ( $P < 0.05$ ) variation. The maximum moisture ( $46.62 \pm 0.19\%$ ) was observed in the  $KS_3$  sample, which was inferior to others, while minimum moisture ( $42.73 \pm 0.20\%$ ) was observed in the  $KS_2$  sample. The moisture content of  $KS_2$  sample was at par with sample  $KS_1$  ( $43.84 \pm 0.07\%$ ).

**Table 1:** physico-chemical composition of *shrikhand* sold in Kolhapur city

<i>Shrikhand</i> samples	Moisture	TS (%)	Fat (%)	Protein (%)	Reducing sugar (%)	Non-reducing sugar (%)	Acidity % (LA)	pH	Ash (%)*
$KS_1$	$43.84^a \pm 0.07$	$56.07^c \pm 0.22$	$8.33^e \pm 0.08$	$7.10^b \pm 0.04$	$5.92^b \pm 0.13$	$36.40^a \pm 0.11$	$1.01^a \pm 0.05$	$5.00^d \pm 0.15$	$0.90^d \pm 0.05$
$KS_2$	$42.73^a \pm 0.20$	$57.27^c \pm 0.32$	$8.10^d \pm 0.04$	$7.12^b \pm 0.18$	$6.06^c \pm 0.10$	$37.37^a \pm 0.08$	$1.20^{ab} \pm 0.04$	$4.22^a \pm 0.09$	$0.78^a \pm 0.09$
$KS_3$	$46.62^e \pm 0.19$	$53.28^a \pm 0.14$	$5.73^a \pm 0.06$	$5.5^a \pm 0.03$	$3.52^a \pm 0.09$	$40.31^c \pm 0.08$	$1.45^{bc} \pm 0.03$	$4.18^d \pm 0.09$	$0.85^d \pm 0.09$
$KS_4$	$45.31^c \pm 0.20$	$55.11^b \pm 0.08$	$7.57^c \pm 0.05$	$5.75^a \pm 0.06$	$6.23^c \pm 0.08$	$37.02^a \pm 0.29$	$1.00^a \pm 0.03$	$5.13^c \pm 0.07$	$0.83^c \pm 0.07$
$KS_5$	$46.00^d \pm 0.15$	$54.11^a \pm 0.36$	$7.00^b \pm 0.09$	$7.20^b \pm 0.06$	$3.13^b \pm 0.05$	$38.55^b \pm 0.13$	$1.50^c \pm 0.06$	$4.00^a \pm 0.05$	$0.75^a \pm 0.05$
Standard Error	0.10	0.07	0.06	0.08	0.10	0.06	0.09	0.11	0.8
CD at 5%	0.36	0.21	0.28	0.34	0.28	0.26	0.25	0.32	0.10

#### Total solids

The average values of TS content of sample which observed significant ( $P < 0.05$ ). Sample  $KS_2$  content max ( $57.27 \pm 0.32\%$ ) TS and showed superiority over others which was at par with sample  $KS_1$  ( $56.07 \pm 0.22\%$ ). Sample  $KS_3$  ( $53.28 \pm 0.14\%$ ) was found inferior with respect to TS. Which was at par with sample  $KS_5$  ( $54.11 \pm 0.36\%$ ).

#### Fat

Fat is an important constituted and which improves the taste and richness of the products. The mean values pertaining to fat content in market samples presented in table 4.8 and fig 4.8 values in the table are statistically significant ( $P < 0.05$ ). Sample  $KS_1$  content maximum ( $8.33 \pm 0.08\%$ ) fat and showed superiority over others while sample  $KS_3$  content minimum ( $5.73 \pm 0.06\%$ ) fat and inferior to all samples.

#### Protein

The average values pertaining to protein content in market samples presented in table 4.9 and in fig.4.9 statistically significant ( $P < 0.05$ ) variations were observed in these values. The maximum protein ( $7.20 \pm 0.06\%$ ) observed in the  $KS_5$  sample. This was superior to another sample.  $KS_1$ ,  $KS_2$  and  $KS_5$  are at par to each others. Whereas sample  $KS_3$  observed inferior with minimum ( $5.5 \pm 0.03\%$ ) protein content. The range of protein content observed in present study is in close approximation with the values reported by Sharma and Zarewala (1980).

#### Reducing sugar (Lactose)

Average values pertaining to reducing sugar content in market samples are depicted in table 4.10 and fig 4.10 observed values are statistically significant ( $P < 0.05$ ) sample  $KS_4$  was with maximum ( $6.23 \pm 0.08\%$ ) reducing sugar and at par with sample  $KS_2$  ( $6.06 \pm 0.10\%$ ) while sample  $KS_5$  was with minimum ( $3.13 \pm 0.05\%$ ) reducing sugar. Lactose content of *shrikhand* is depends on the extent of lactose degradation, moisture content of *shrikhand* Bogra *et al.* (2000).

#### Non reducing sugar (Sucrose)

The average values pertaining non reducing sugar content in market samples, significant ( $P < 0.05$ ) variations were observed in these values. On the basis of statistical analysis sample  $S_3$  was inferior with maximum ( $40.31 \pm 0.08\%$ ) non reducing sugar, while sample  $KS_1$  was superior with minimum ( $36.40 \pm 0.11\%$ ) non reducing sugar which was at par with sample  $KS_2$  and  $KS_4$  similar range of total sugar was also recorded by Sakore (1998) [7]. Sugar slowed down the chemical changes due to fermentation Bogra *et al.* (2000). Higher value of sugar indicated that product has more aldehyde and ketone group. Higher the free aldehyde group will reduce the shelf life of product.

#### Acidity

The average values of acidity of market sample presented in table 4.12 and fig 4.12 statistically significant ( $P < 0.05$ ) variation were observed in these values. Sample  $KS_5$  showed

maximum (1.50 ± 0.06%) acidity and was inferior to other sample. Sample KS<sub>5</sub> is at par with sample KS<sub>3</sub>. Sample KS<sub>1</sub> and S<sub>4</sub> were superior and at par with minimum acidity (1.04%).

### pH

The average value of pH market samples presented in table 4.13 and fig 4.13 statistically significant ( $P < 0.05$ ) variations were observed in these values. Sample S<sub>5</sub> showed minimum (4.00 ± 0.05) pH and which was inferior to other sample. Sample KS<sub>5</sub> was at par with KS<sub>3</sub> and KS<sub>2</sub>. Sample KS<sub>2</sub> and KS<sub>4</sub> were at par with were superior with maximum (5.13<sup>c</sup> ± 0.07) pH.

### Ash

The ash content ranged from 0.75 to 0.90 percent. It was observed that mean of ash content in *shrikhand* samples were ranged from 0.75 ± 0.05 to 0.90 ± 0.05 percent.

### Conclusion

From the result it is concluded, that on the basis of, chemical quality studied here, KS<sub>1</sub> and KS<sub>4</sub> brands of *shrikhand* was significantly superior over the other brand under study. There was significant variation in respect of fat, protein, sucrose, total sugar and total solids content in all of the *shrikhand* samples examined. 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<sub>3</sub> and KS<sub>5</sub> brands is suggested to adopt proper hygiene condition and use good quality raw materials. 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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