Low fat lassi prepared by incorporation of lemon grass (Cymbopogon citratus L.) extract

Department of Animal Husbandry and Dairy Science, Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli -415 712, Maharashtra, India.
Received: 21-11-2017 Accepted: 25-01-2018

ABSTRACT
In the present study the lassi was prepared from buffalo skim milk by using lemon grass extract at different levels viz. 2.5 per cent (T1), 5.0 per cent (T2), 7.5 per cent (T3) and 10 per cent (T4) of the content. This prepared lassi was compared with control (T0) i.e. without addition of lemon grass extract. From the result of present investigation it may be concluded that lemon grass extract could be successfully utilized for preparation of herbal lassi. The most acceptable quality lassi can be prepared by using 5.0 per cent lemon grass extract. Such flavoring did not appreciably affect the composition of lassi.

Key words: Low fat, Lassi, Lemon grass.

INTRODUCTION
Milk is regarded as the complete food in the human diet. Milk provides all the nutrient elements, for the nourishment of the human body. In India, consumption of milk and milk products can be dated back to the times of Lord Krishna whom rendezvous with Gopikas and stealthy eating of butter and dahi has been gloriously described. It proves the point that milk and milk products have been ‘assimilated’ into Indian culture and ethos. No wonder then that today India has the largest population of livestock and stands to produce more milk than any other country in the world.

Milk is also considered to be divine, holy and a symbol of purity. In ancient times, a country was said to be prosperous based on its cattle population and milk production. “Land of milk and honey” was always symbol of richness and prosperity so much, that so availability of milk and milk products in a house was an indicator of its flourishing prosperity. Indigenous milk products have been woven into the fabric of our culture and therefore, they must be listed in the priorities.

Among the traditional milk products fermented milk products occupy most important place in our diet. It has been evidently proved that the fermented milk products have unique importance in the diet of human being. Fermented milk products have been known for their “cure all” and life extending properties since ancient times (Gandhi and Nambudripal, 1977).

Dahi is one of the oldest and well known fermented products consumed by the larger section of population throughout the country as a part of daily diet.

Lassi a product prepared from dahi is an ancient refreshing beverage for quenching thirst. There is a large variation in the quality. In rural India lassi is also known as buttermilk. Lassi is creamy viscous fluid with rich aroma and mildly acidic in taste. Lassi contains 79 per cent water, 3 per cent fat, 2.8 per cent, 4.5 per cent lactose and 12 per cent sugar (Sharma, 2006).

In the northern region of the country, whole milk curd beaten up and served as a beverage. In Maharashtra also generally lassi is prepared from buffalo milk curd which gives creamy appearance with pleasant mildly acidic sweet taste and rich aroma.

Milk fat is composed of higher concentration of saturated fat and cholesterol to add the problems of calorie conscious people. Hence preparing low fat lassi i.e. from buffalo skim milk will help in greatly restricting the calorie intake. Milk fat is the main contributor to the rich flavour and mouthful. Low fat lassi may affect the rich taste and pleasant flavour of milk fat, but addition of natural herbal flavour may suppress this drawback.

Lemon grass (Cymbopogon citratus L.) is a perennial grass in the family Poaceae grown for its fragrant leaves and stalks which are used as a flavoring agent. Lemon grass is also known as Gavatichaha in marathi and is used as an addition to tea and in preparations such as kadha which is traditional herbal soup used against cough, colds, etc. It has medicinal properties and is used extensively in Ayurvedic medicine. It is supposed to help with relieving cough and normal congestion.

Hence, considering the medicinal properties of lemon grass and use of skim milk in restricting the caloric intake, the present research project entitled “Low fat lassi by incorporation of lemon grass (Cymbopogon citratus L.) extract” was conducted.

MATERIALS AND METHODS
For preparation of lassi, buffalo milk was collected from dairy farm of College of Agriculture, Dapoli and skim milk was obtained by centrifugal cream separation method.

*Corresponding author’s e-mail: sachinmulehh235@gmail.com
Cane sugar, salt and lemon grass were purchased from local market. Local starter culture i.e. previous days good quality curd was used as culture. The starter culture selected for use was not having any defects in the curd produced from it.

**Preparation of lemon grass extract/Juice:** Green, fresh lemon grass leaves were selected. The leaves of lemon grass were washed with running tap water to remove dirt and dust. For extraction, leaves were cut into small pieces and then taken into electrically operated grinder cum mixer to make homogenous mixture of leaves. Small quantity of fresh clean water was added for proper grinding and mixing. Extract was obtained by squeezing the lemon grass and then filtering through four fold muslin cloth. Extract obtained was used to mix at different levels during lassi preparation.

**Lassi preparation:** Lassi was prepared as per the procedure described by Kadlag (1982) with partial modifications while mixing lemon grass extract.

The fat content of milk, dahi and lassi were determined by using standard Gerber method as per IS : 1224 (part-I), 1977. The acidity of milk, dahi and lassi were estimated according to IS : 1479, (part-I), 1960. The total solids and protein content of milk, dahi and lassi were determined as per IS : 1479 (part-II), 1961. The ash content of milk, dahi and lassi were determined as per the procedure given in A.O.A.C. (1995). The moisture, total solids, acidity, protein and fat content of lemon grass extract were determined as per the procedure given in A.O.A.C. (1995).

**TREATMENT DETAILS**

T<sub>0</sub> - No lemon grass extract (Control)
T<sub>1</sub> - Addition of lemon grass extract @ 2.5 per cent of plain lassi (W/w)
T<sub>2</sub> - Addition of lemon grass extract @ 5.0 per cent of plain lassi (W/w)
T<sub>3</sub> - Addition of lemon grass extract @ 7.5 per cent of plain lassi (W/w)
T<sub>4</sub> - Addition of lemon grass extract @ 10.0 per cent of plain lassi (W/w)

The trial was conducted with six replications.

**Flow Diagram**

- Lemon grass leaves
  - Washing
  - Cutting into pieces
  - Grinding cum mixing
  - Squeezing
  - Filtration (muslin cloth)
  - Lemon grass extract/juice

Buffalo whole milk
  - Pre-heating (35-40°C)
  - Filtration
  - Separation
  - Cream
  - Skim milk
  - Pasteurization (80±2°C/10 min)
  - Cooling (37°C)
  - Inoculation (@1%)
  - Incubation (overnight at ambient temp)
  - Cooling of curd in refrigerator (2-3 hours)
  - Breaking of coagulum and sampling
  - Addition of cane sugar (16%)
  - Hand mixing
  - Addition of lemon grass extract as per treatment
  - Addition of salts (1-2%)
  - Mixing cum churning in mixer
  - Lemon grass lassi

**RESULTS AND DISCUSSION**

The chemical analysis indicated that the buffalo milk used for lassi preparation had average 0.55 per cent fat, 9.42 per cent total solids, 3.69 per cent protein, 0.78 per cent ash and 0.80 per cent acidity. All these values lie within legal standards for skim milk in Maharashtra state as prescribed by PFA rules, 1976 cited by De, (2008).

The average chemical composition of dahi used in present study showed fat content 0.52 per cent, total solids 9.42 per cent, protein 3.69 per cent, ash 0.78 per cent and acidity 0.80 per cent.

The average chemical composition of lemon grass extract used in present study showed moisture 93.39 per cent, fat content 1.47 per cent, protein 15.07 per cent, ash 14.37 per cent, acidity 0.87 per cent.

The data pertaining to chemical composition and quality of lassi as influenced by different levels of lemon
Grass extract are presented in Table 1. There was significant decrease in total solids content of lassi with the increase in the levels of lemon grass extract. The fat, protein, ash, and acidity were increases with the increase in level of lemon grass extract.

Total Solid: It would be seen from the data that the variation in total solids content of lassi was found to be significant. The average total solids content of lassi were 19.338 (T0), 18.779 (T1), 18.024 (T2), 17.347 (T3) and 16.663 (T4) per cent. It was observed that the total solids content showed gradual decrease with the increase in level of lemon grass extract. This simultaneous decrease from T0 to T4 may be due to lower amount of total solids content in lemon grass extract. The lowest total solids content was noticed at T4 i.e., (16.663 %) lassi prepared with 10 per cent lemon grass extract, while highest total solids content was observed at T0 (19.338 %) i.e. lassi prepared without lemon grass extract.

The results of present research work were in close agreement the values reported by Velve et al. (1970), Kumar et al. (1987), Kalokhe (1991), Pagote and Balchandran (1993). They reported 16-18.5 per cent, 21.20 per cent, 13.76-18.35 and 21.27 per cent total solids in cultured milk beverages from skim milk lassi type cultured beverage from cheese whey, flavoured buttermilk and lassi, respectively.

From the present investigation it was observed that treatment differences are significant at 1 per cent level of significance. The total solids content was significantly decreased with the increase in the level of lemon grass extract.

Fat: The perusal of data from Table 1, revealed that the fat content in lemon grass lassi varied within the narrow range of 0.471 to 0.675 per cent. This is due to very low amount of fat in plain skim milk lassi which was the major ingredient in all the treatments. The average fat content of lassi was 0.566 per cent. The highest fat content in lassi (0.675 %) was observed in T4 i.e. treatment with 10 per cent lemon grass extract and lowest (0.471 %) in treatment T0.

It was observed that incorporation of lemon grass extract increased the fat content of lassi. This increasing trend of fat content can be attributed to the fact that lemon grass extract contained higher amount of fat than that of skim milk. Besides obvious reason is that as the level of lemon grass extract increased, there was reduction in the amount of plain lassi on added percentage basis. The lowest fat content in control may be due to fact that no fortifying agent (lemon grass extract) was added in the treatment. The results are in accordance with those of Chaudhari (1959), Velve et al. (1970) and Laxminarayana and Shankar (1980).

From the Table 1, it was observed that treatment differences are statistically significant at 1 per cent level of significance, indicating that there was significant increase in fat content of lassi due to increase in level of lemon grass extract.

Protein: The perusal of data from Table 1, revealed that addition of lemon grass extract had significantly affected the protein content of lassi. Incorporation of lemon grass extract showed gradual increase in protein content of lassi. This increase can be attributed to the fact that as the level of lemon grass extract increased, there was reduction in amount of plain lassi on added percentage basis. Secondly due to high protein content of lemon grass extract (15.07 %) its addition increases the protein content of the final product.

The average protein content of lassi was 4.741 per cent. The highest protein content in lemon grass lassi (5.790 %) was observed in treatment T1 i.e. lassi with 10 per cent lemon grass extract and the lowest (3.587 %) at T0 i.e. lassi without lemon grass extract (T0). The results of present investigation are well comparable with the value of protein reported by Chaudhari (1959), who observed protein in skim milk lassi ranges from 3.3 to 3.5 per cent whereas Laxminarayana and Shankar (1980) mentioned that protein content of lassi is 3.4 per cent.

From the Table 1, it was observed that treatment differences are statistically significant at 1 per cent level of significance indicating that there was significant increase in protein content of lassi due to increase in level of lemon grass extract.

Ash: The data in Table 1 revealed that the average ash content of lemon grass extract was 1.741 per cent. The ash content of lassi increased with the increase in the level of lemon grass extract. Lowest ash content in lassi (0.822 %) was observed at T0 i.e. lassi without lemon grass extract and the highest (2.844 %) at T4 i.e. lassi with 10 per cent lemon grass extract (T4). It was observed that incorporation of lemon grass extract increases the ash content of lassi. The obvious reason is that as the level of lemon grass extract increases, there was reduction in amount of plain lassi on added percentage basis.

The results of the present investigation compare very well with the findings of Chaudhari (1959) and Laxminarayana and Shankar (1980), who recorded the

Table-1 Chemical quality of lemon grass lassi (%).

<table>
<thead>
<tr>
<th>Constituents</th>
<th>Levels of lemon grass (%)</th>
<th>SE±</th>
<th>CD(At 1%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0</td>
<td>2.5</td>
<td>5.0</td>
</tr>
<tr>
<td>Total solids</td>
<td>19.338</td>
<td>18.779</td>
<td>18.024</td>
</tr>
<tr>
<td>Fat</td>
<td>0.471</td>
<td>0.507</td>
<td>0.569</td>
</tr>
<tr>
<td>Protein</td>
<td>3.587</td>
<td>4.231</td>
<td>4.803</td>
</tr>
<tr>
<td>Ash</td>
<td>0.822</td>
<td>1.138</td>
<td>1.792</td>
</tr>
<tr>
<td>Titratable</td>
<td>0.801</td>
<td>0.811</td>
<td>0.813</td>
</tr>
</tbody>
</table>
average ash content of skim milk lassi as 0.70 to 0.75 and 0.7 per cent ash in plain lassi, respectively.

From the Table 1, it was observed that treatment differences are statistically significant at 1 per cent level of significance indicating that there was significant increase in ash content of lassi due to increase in level of lemon grass extract.

**Titratable acidity:** The results presented in Table 1 indicated that average acidity of lassi at T₀, T₁, T₂, T₃ and T₄ was 0.801, 0.811, 0.813, 0.813 and 0.818 per cent, respectively. The acidity showed increasing in trend with an increase in the level of lemon grass extract. The highest acidity level (0.818 %) at treatment T₄, i.e. lassi with 10 per cent lemon grass extract, while the lowest (0.801 %) at treatment T₀, i.e. lassi without lemon grass extract.

The values of acidity of lassi were more or less similar with the values recorded by Chaudhari (1959) as 0.5 to 1.1 per cent for skim milk lassi and Laxminarayan and Shankar (1980) as 0.5 to 1.6 per cent for plain lassi. Sayyad (1992) noticed that the lassi prepared by using different cultures had 0.70 to 1.02 per cent acidity. It was observed that incorporation of lemon grass extract increase the acidity of lassi which may be due to slightly higher acidity of lemon grass extract (0.87 %) as compared to curd (0.80 %).

From Table 1, it was observed that treatment differences due to increase in the level of lemon grass extract are statistically non-significant at 1 per cent level of significance.

**CONCLUSION**

From the results of the present investigation, it may be concluded that lemon grass extract could be successfully utilized for preparation of lassi. Addition of lemon grass extract in lassi improved the sensory as well as chemical quality and acceptability of the product. Besides typical flavour, it also adds medicinal properties to the product. Such flavouring did not appreciably affect the composition of lassi. The most acceptable quality lassi can be prepared by using 5.0 per cent lemon grass extract. Being a low fat, such type of lassi will be beneficial to the health conscious people.

**REFERENCES**