Nutritional and Microbial Quality Evaluation of Kulfi Sold at Tamil Nadu

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ABSTRACT

The present experiment was conducted to assess the chemical and microbiological quality of kulfi sold at three selected districts (Thanjavur, Trichy and Namakkal) of Tamil Nadu state. Kulfi samples were collected from local vendors. There was a significant difference observed in different district samples of kulfi with regard to fat, protein, total solids, ash and pH values. According to microbial quality there was no significant difference between kulfi samples of different districts. The values of fat (%), protein (%) and total solids (%) were highest in kulfi samples of Trichy which are 10.23 ± 0.02, 5.52 ± 0.10 and 35.81 ± 0.16, respectively. Total plate count of all the samples were much higher than the BIS standards. Coliform and yeast and mould were also found present in all the samples. According to nutritional point of view, it can be concluded that kulfi sold at Trichy was good. But in the food safety concern, all the kulfi samples collected from road side vendors were of very poor in quality.

Keywords: Kulfi, nutritional quality, microbial quality

Kulfi is a popular Indian ice cream made with boiled milk typically from water buffalo. It comes in many flavours, including pistachio, malai, mango, cardamom (elaichi), apple, orange, pea nut, avocado, anchovie and saffron. Kulfi differs from western ice cream, that it is richer in taste and creamier in texture as well, and it contains no air or over run and it is solid dense milk. It is one of the widely consumed milk products in India. Since this milk based food forms an excellent culture media, the growth and reproduction of saprophytic and pathogenic micro-organisms are possible. The most contaminants of kulfi are coliforms and psychrotrophic group of organisms (Yadav, 1993).

As per the PFA (1995), Kulfi should contain not less than 10% milk fat, 3.5% protein and 36% total solids. The nutritive value of milk products depends upon their cleanliness, purity and wholesomeness of raw milk. Meagre works have been done on the quality of kulfi in India. It is well known that, the status of kulfi production, storage, transportation and distribution is far from satisfactory in India. Such a situation warrants a strict vigilance and the need for suitable sanitary standard for the manufacture and sale of kulfi. Hence, an attempt was made to evaluate the nutritional and microbiological quality of kulfi sold in different districts of Tamil Nadu.

The study on quality of kulfi was conducted based on 100 samples collected from road side vendors for each districts viz., Thanjavur, Trichy and Namakkal. The collected kulfi samples were carried to the laboratory in a cool box within 4 h immediately after collection. The sample analysis was conducted at the Department of Dairy Science, Veterinary College and Research Institute, Namakkal. Total solid content and ash per cent of the milk samples were determined by oven dry method according to AOAC (1990). Fat per cent was determined by Babcock method and protein was determined by Kjeldahl procedure (AOAC, 1990). Measurement of pH done with the help of a pH meter-215. Microbiological parameters (total count, coliform count, yeast and mould count) were determined according to the method described by APHA (1992). Dehydrated tryptone glucose yeast extract (TGYE) agar, Mac Conkey agar and potato dextrose agar (PDA) were used to enumerate the total count, coliform bacteria, and yeast and mould count of kulfi samples, respectively.

In India, the road side vendors of kulfi are being the major contributors in kulfi marketing. Hence the study was focussed only on road side vendor’s kulfi sample.
The nutritional quality and microbial quality of the samples were analysed. Fat, protein, total solids and ash percentage of kulfi samples of Trichy were 10.23 ± 0.02, 5.52 ± 0.10, 35.81 ± 0.16 and 1.12 ± 0.06, respectively. All these values are met with the standard values according to the PFA, 1995. Though the chemical composition of kulfi from Thanjavur and Namakkal were near to the standard values of PFA, still the improvement in quality is needed.

The total count was found to be maximum in Trichy samples (8.01 ± 0.04 log cfu/ml), followed by that of Thanjavur (7.92 ± 0.02 log cfu/ml) and Namakkal (7.59 ± 0.05 log cfu/ml) and all these counts were much higher than the BIS standards (1983) (Table 1). Similar results were observed in the findings of Elango (2010) where the total count of kulfi samples collected from road side vendors was 1.55 x 10^7 cfu/g. The level of mean coliform count were found to be highest in Namakkal samples (4.2 ± 0.03 log cfu/ml), followed by that of Trichy and Thanjavur samples. The level of coliform count was very high in all the samples when compared to Bureou of Indian Standards which is of less than 100/g. The presence of coliform bacteria indicated the presence of fecal contamination and other intestinal pathogens in kulfi. Singh (1970) reported that 80% of kulfi samples contained E. coli with a count ranging from 18.8 x 10^3 - 34.5 x 10^5 (cfu/g). Doraismay and Elango (2009) found that, kulfi samples had mean total bacterial and coliform counts of 218 x 10^3 ± 28.02 cfu/g and 0.7 x 10^2 ± 0.28 cfu/g, respectively. All the samples were found with yeast and mould colonies in one gram of sample, which is unsatisfactory as per BIS regulations. Very limited literature was found pertaining to the microbial quality of kulfi. Since kulfi has a high post-processing handling, there must be a rich attention to avoid contamination. Ramachandran (2005) observed yeast and mould (13-33 cfu/g) colonies from laboratory prepared kulfi. Fat, protein, total solids and ash content of kulfi samples collected from Trichy was significantly higher than Thanjavur and Namakkal samples. But the microbial quality of all kulfi samples was very poor.

Government should take strict action to restrict the road side vendors having poor microbial quality kulfi with proper implementation of Bureau of Indian Standards guidelines to ensure safety and quality of milk products. Local kulfi manufacturers need to be appraised regarding quality of preparation and hygienic handling in order to avoid any food poisoning and to safeguard the health of the consumers.

Table 1. Chemical composition of kulfi sold at Thanjavur, Trichy and Namakkal

<table>
<thead>
<tr>
<th>Parameters (%)</th>
<th>Thanjavur</th>
<th>Samples Trichy</th>
<th>Namakkal</th>
<th>LSD value</th>
<th>Level of significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fat</td>
<td>8.82 ± 0.12</td>
<td>10.23 ± 0.02</td>
<td>9.02 ± 0.035</td>
<td>0.82</td>
<td>*</td>
</tr>
<tr>
<td>Protein</td>
<td>3.522 ± 0.13</td>
<td>5.52 ± 0.10</td>
<td>4.11 ± 0.03</td>
<td>0.65</td>
<td>**</td>
</tr>
<tr>
<td>Total solids</td>
<td>25.52 ± 0.03</td>
<td>35.81 ± 0.16</td>
<td>31.38 ± 0.05</td>
<td>3.891</td>
<td>**</td>
</tr>
<tr>
<td>Ash</td>
<td>0.71 ± 0.40</td>
<td>1.12 ± 0.06</td>
<td>0.98 ± 0.06</td>
<td>0.12</td>
<td>**</td>
</tr>
</tbody>
</table>

*significant (P<0.05) **highly significant (P<0.01)

Table 2. Microbial quality of kulfi sold at Thanjavur, Trichy and Namakkal

<table>
<thead>
<tr>
<th>Parameters (log cfu/ml)</th>
<th>Thanjavur</th>
<th>Samples Trichy</th>
<th>Namakkal</th>
<th>Level of significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total count</td>
<td>7.92 ± 0.02</td>
<td>8.01 ± 0.04</td>
<td>7.59 ± 0.05</td>
<td>NS</td>
</tr>
<tr>
<td>Coliform count</td>
<td>3.22 ± 0.13</td>
<td>3.51 ± 0.14</td>
<td>4.2 ± 0.03</td>
<td>NS</td>
</tr>
<tr>
<td>Yeast and mould count</td>
<td>1.45 ± 0.25</td>
<td>1.71 ± 0.65</td>
<td>1.62 ± 0.13</td>
<td>NS</td>
</tr>
</tbody>
</table>

References


Singh, R.S. 1970. Ph.D. Thesis. NDRI, Punjab University, Chandigarh, India..