Abstract
Curd is an indigenous, popular and very nutritious fermented milk product. Various preparations are made from curd such as mishtidahi, buttermilk and chakka which used to make shrikhand. These preparations and easily get contaminated if handled poorly and also due to unhygienic conditions. Hence, the present study was carried out to examine hygiene conditions and bacterial safety of chakka and buttermilk sold in Amravati city. Samples collected from different parts of the city were evaluated for bacterial safety. Also, hygiene conditions were observed and noted while procuring the samples from vendors and found unsatisfactory. Total bacterial count of chakka and buttermilk ranged from $2 \times 10^4$ to $9 \times 10^4$ cfu/ml and $3 \times 10^4$ to $11 \times 10^4$ cfu/ml, respectively. From the total samples of chakka, 66 per cent samples were found contaminated with coliform and 53 per cent with staphylococcus. Similarly, 60 per cent and 30 per cent samples of buttermilk were found contaminated with coliform and staphylococcus, respectively.

1. INTRODUCTION
The practice of preserving milk by fermentation is common household technology in India. Curd is semi-soft sweeten whole milk product of buffalo or cow or from standardized milk (4.5%). Curd is highly palatable and easily digestible by human digestive system. Sivakumar and Kalaiarasu, (2010) stated that curd contains all macronutrients like protein, carbohydrates fat and minerals like calcium and phosphorus. According to Srilakshmi (2015), nutritive value almost remains same during curd making but the digestibility is better than ordinary milk, lactose is converted to lactic
acid and the organisms involved in curd formation belongs to the group of *lactobacillus* and *streptococcus* – *L. Casei, L. brevis, L. bulgaris, S. Lactis* and *S. Thermophiles*.

Chakka is a condensed solidified curd also known as hung curd is generally used for making shrikhand. Chakka is the intermediate product obtained by drainage of whey from curd. Buttermilk is milky liquid leftover after the churning of cream, which is processed for the preparation of butter. The fat contain in buttermilk remains very low. Buttermilk has been mentioned as one of the best among milk products due to its immense therapeutic and nutritional value Buttermilk is known to be very useful in the digestive problems and the diseases associated with the digestion.

Coliform bacteria are commonly found in the intestine of the human and warm animals. Symptoms include diarrhea, stomach cramp, nausea and vomiting. Excessive gas, bloating, loss of appetite and malaise are some of the other common symptoms of this infection. Staphylococcus food poisoning is one of the most common types of food poisoning caused by the toxins produced by staphylococcus. Milk is highly vulnerable to bacterial contamination because it supports the growth and multiplication of pathogenic organisms leading to food spoilage, foodborne infection and poisoning.

Sometimes unhygienic process of making chakka and buttermilk can cause contamination with pathogenic bacteria that affect the health of consumers. presence of coliform in dairy products is an indication of fecal contamination when the hygiene is poor. Unhygienic conditions (presence of staphylococcus aureus and E.coli) are related with spoilage of dairy product’s quality and also create health problems. Hence, it becomes essential to understand the quality of these products available in the market before their use for human consumption.

### 2. MATERIALS AND METHODS

Samples of chakka and buttermilk were collected from different location of Amravati city such as Gadge Nagar, Rajapeth, Itwara Bazar, Frezerpura, Dastur Nagar. For the study, total 30 samples were collected. Out of 30 samples 15 were chakka and other 15 samples were buttermilk. All samples were collected in sterilized bottle to avoid external contamination.

### 3. OBSERVATION OF HYGIENE CONDITIONS

The hygiene condition of food handlers like use of gloves, apron and head scarf, whether had long finger nails and money handling simultaneously were observed. Also, surrounding conditions like dust free surfaces, food storage in refrigerator, presence of garbage bin, cleaned walls and floors and use of cleaned utensils were observed.

### 4. BACTERIOLOGICAL ANALYSIS OF SELECTED CURD PRODUCTS

- **Preparations of Media**

  Different types of media were used for selective growth, enrichment culture and identification of specific properties and characteristics of different microorganisms. Nutrient agar was used as common media for cultivation of bacteria. MacConkey agar was used for the isolation of coliforms. Pink color colonies were observed on MacConkey Agar for presence or absence of coliform.
Mannitol salt agar is selective, differential and indicator medium which was used to isolate and identified staphylococcus aureus from samples

- **Cultural characteristics of microbial growth**
  Cultural characteristics were observed in terms of number of types of colonies, margins, forms, elevation and colour.

- **Counting total colonies and determination of number of organism per ml**
  Serial dilution was carried out ($10^{-1}$, $10^{-2}$, $10^{-3}$ and $10^{-4}$) and inoculated total colonies on petri plates were counted by using colony counter. Petri plates with colonies ranging from 30 to 300 (valid counts) were selected for counting and total number of organisms in terms of colony forming units per ml were determined (cfu/ml)

### 5. RESULTS AND DISCUSSION

- **Hygiene conditions observed**
  It was observed and noted that none of the food handlers were using of apron, hair covering and hand gloves. Among all 15 dairy vendors, 8 food handlers had long finger nails and 13 food handlers were found handling money simultaneously. Similarly, regarding hygiene of surroundings, it was observed that 11 shops had surface free form dirt and dust, all dairy shop keepers were found storing chakka and buttermilk in refrigerator and also had garbage bin, 8 dairy shops were found with clean walls and floors and in 11 shops were with cleaned utensils.

- **Cultural characteristics of microbial growth on nutrient agar**
  Cultural characteristics of bacterial isolates on nutrient agar were observed based on morphology in terms of margins, forms, elevation and color. Cultural characteristics of bacterial growth in chakka and buttermilk on nutrient agar were studied. It was observed that in the entire samples are more types of colonies were present. This means that not only one type of microorganism present but indicates a mix type of microorganism in cultural media.

- **Total bacterial count in terms of cfu/ml**
  The data pertaining to total bacterial count in terms of cfu/ml for curd products; chakka and buttermilk is presented in table 1

#### Table 1: Total Bacterial count in chakka and buttermilk

<table>
<thead>
<tr>
<th>Area</th>
<th>Sample Number</th>
<th>Total Bacterial Count</th>
<th>Chakka</th>
<th>Buttermilk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gadge Nagar</td>
<td>1</td>
<td>$5.2 \times 10^6$</td>
<td>$4.5 \times 10^4$</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>$6.3 \times 10^6$</td>
<td>$4.9 \times 10^4$</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>$4.3 \times 10^5$</td>
<td>$9.0 \times 10^4$</td>
<td></td>
</tr>
<tr>
<td>Rajapeth</td>
<td>4</td>
<td>$2.2 \times 10^4$</td>
<td>$6.6 \times 10^4$</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>$3.1 \times 10^4$</td>
<td>$3.3 \times 10^4$</td>
<td></td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>$2.9 \times 10^4$</td>
<td>$2.8 \times 10^4$</td>
<td></td>
</tr>
<tr>
<td>Itwara Bazar</td>
<td>7</td>
<td>$8.2 \times 10^5$</td>
<td>$8.6 \times 10^4$</td>
<td></td>
</tr>
<tr>
<td></td>
<td>8</td>
<td>$7.3 \times 10^5$</td>
<td>$9.1 \times 10^5$</td>
<td></td>
</tr>
</tbody>
</table>
The table 1 showed that bacterial count of chakka and buttermilk ranged from $2.2 \times 10^4$ to $8.9 \times 10^4$ cfu/ml and $2.8 \times 10^4$ to $10.5 \times 10^4$ cfu/ml respectively. Among the 15 samples of chakka the highest total bacterial count was indicated in the sample of Itwara Bazar $8.9 \times 10^4$ cfu/ml and the samples of Rajapeth areas indicated lowest count $2.2 \times 10^4$. Itwara bazar is the area with dense crowd and vegetable and fruit market. Among the 15 samples of buttermilk one sample from Dastur Nagar showed highest total bacterial count i.e. $10.5 \times 10^4$ cfu/ml. The lowest count was indicated in the samples collected from Rajapeth $2.8 \times 10^4$ cfu/ml.

- **Presence of coliform and staphylococcus**

  Presence of coliform on MacConkey agar was studied for all the samples of chakka and buttermilk. Pink color colonies were observed which indicated towards presence of coliform. The presence of staphylococcal was determined for both chakka and buttermilk samples. It was found that 66 per cent samples were found contaminated with coliform and 53 per cent with staphylococcus. Similarly, 60 per cent and 30 per cent samples of buttermilk were found contaminated with coliform and staphylococcus, respectively.

6. CONCLUSION

  From the findings of the study poor hygiene of food handlers was revealed. Among the samples of chakka 66 per cent samples were found contaminated with coliform and 53 per cent with staphylococcus and for samples of buttermilk 60 per cent and 30 per cent were found contaminated with coliform and staphylococcus, respectively. Chakka samples were found more with coliform and staphylococcus contamination than buttermilk samples. There is a need to educate food handlers regarding personal hygiene, care and precautions to avoid contamination in the dairy products.

7. REFERENCES


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