PHYSICOCHEMICAL EXAMINATION OF RAW MILK PROVIDED TO VARIOUS HOSPITAL CANTEENS AND STUDENT HOSTELS

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ABSTRACT

Physicochemical and sanitary quality tests of the samples of milk sold at canteens of various hospitals and student hostels in Faisalabad city were determined by standard methods. The following average values for the major milk constituents were observed: fat, 3.44% and 3.74%; protein, 2.74% and 2.52%; lactose, 2.87% and 3.43%; ash, 0.46% and 0.46%; total solids, 9.50% and 10.13%; moisture, 90.48% and 89.86% in the milk samples obtained from hospitals and student hostel-canteens, respectively. The test conducted for the evaluation of sanitary quality of these milk samples revealed the following results: Titrable acidity, 0.11% and 0.13%; total bacterial count, 534x10⁷/ml and 223x10⁷/ml. The time required for the reduction of methylene blue dye in milk samples collected from canteens of hospitals and student hostels were 2.20 and 3.01 hrs, respectively. The above-mentioned results have suggested that milk samples collected from the student and hospital canteens checked were being generally polluted and malpractice such as cream separation and adulteration with unhygienic water as evidenced from the low fat contents and their high bacterial count. It may be suggested that strict measures should be taken to stop supply of unhygienic and adulterated food at these public places.

Keywords: Raw milk, Physicochemical examination, Protein, Fat, Moisture Total Solids, Ash, Lactose

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INTRODUCTION

Milk has high biological value in nature as it contains almost all ingredients of food in right proportion and in an easily digestible form. Milk possesses a dynamically balanced mixture of proteins, fat, carbohydrates, salts, vitamins and water, co-existing as emulsion, colloidal suspension as well as in the solution form. The nature and composition of milk has been a subject of interesting investigations for researchers since the earliest day of science. The importance of knowledge concerning variations in the composition of milk has well evident. The composition of milk differs not only among various species but also within species and even among individuals within that species (Jensen, 1995). Some of the constituents, such as fat, protein, sugar and minerals are not found in balanced form in most of the other foods. For this reason, no single food can serve as a complete substitute for milk in diet. However, before it reaches the consumer, milk is often persistently exposed to environmental contamination, adulteration caused by adding unclean water presumably to adjust specific gravity of milk disturbed by cream separation (Dayyani, 2000).

West Pakistan Pure Food Rules (1965) state that market milk shall contain not less than 3.5% fat and 8.5% Solids Not Fat. Its objective is to detect the milk adulteration most commonly practiced in developing countries. In this way supply of clean and wholesome milk is crucial as consumed by patient and students. It, therefore, seemed appropriate to conduct a study to determine physicochemical as well as sanitary quality of raw milk supplied to canteens at various hospitals and student hostels in the city of Faisalabad.
MATERIALS AND METHODS

Eighty raw milk samples collected from canteens of the following hospitals and some of the college/university hostels situated in various localities of Faisalabad city including: District Head quarters Hospital, Punjab Social Security Hospital, Mujahid Hospital, Al-Razi Hospital, Saeed surgery Hospital, Govt. Girls College, Karkhana Bazar, Shiblee College for Women, Gulberg, Govt. Girls college, Medina Town, University of Agriculture and G.C. University, Faisalabad, Pakistan

The milk samples were collected in sterilized bottles and kept in a refrigerator in order to check the bacteriological activity. For analysis, each sample was divided into two parts, one each for bacteriological and chemical analyses. The physical appearance of the samples was also observed. The following tests were carried out: Physical examination (Khan et al., 2004) and Chemical composition including: Percent Fat by Gerber’s method, Percent Lactose by difference (% Total solids – (% Fat + % Protein + % Ash) Khan et al., 2004), Percent Total solids, Percent Protein: formal titration (Kirk et al., 1991) and Percent Ash and moisture (Awan et al., 2001). Sanitary quality tests conducted were: Percent acidity (Khan et al., 2004), Total bacterial count and Methylene blue reduction test (Awan and Rehman, 2005).

RESULTS AND DISCUSSION

Physical examination

Results for general appearance include odour. 82.5% and 77.5% were having normal odour, while 77.5% obtained from both hospitals and student hostel canteens was white of colour, whereas 57.5% were thick and 42.5% were thin from both sites. In the same way, 10% and 22.5% samples from canteens of hospitals and student hostel have sediment while others have not. These results are in agreement with those of Han and Ding (1994).

Chemical quality

Fat content: the average fat content was 3.44 ± 0.21% and 3.74 ± 0.19%, respectively. Taking 3.5% fat in unclassified milk as the legal standard (West Pakistan Pure Food Rules, 1965), it was observed that fat content was almost the same as reported by Suchanek and Gajusek (1991) i.e., about 3.5%.

Table 1: Chemical composition of raw milk samples collected from canteens of various hospitals and student hostels.

<table>
<thead>
<tr>
<th>Constituents</th>
<th>Milk from canteens of hospital</th>
<th>Milk from canteens of student hostels</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean±SEM(%)</td>
<td>Range (%)</td>
</tr>
<tr>
<td>Fat</td>
<td>3.44±0.21</td>
<td>1.20-6.00</td>
</tr>
<tr>
<td>Protein</td>
<td>2.74±0.24</td>
<td>0.19-5.73</td>
</tr>
<tr>
<td>Lactose</td>
<td>2.87±0.27</td>
<td>0.22-6.92</td>
</tr>
<tr>
<td>Ash</td>
<td>0.46±0.02</td>
<td>0.19-0.81</td>
</tr>
<tr>
<td>Total solids</td>
<td>9.50±0.37</td>
<td>4.51-14.85</td>
</tr>
<tr>
<td>Moisture</td>
<td>90.48±0.38</td>
<td>85.15-95.49</td>
</tr>
</tbody>
</table>

Proteins

In the present study, protein content of milk sold at hospitals and student hostel canteens averaged 2.74± 0.24% and 2.52±0.22%, respectively. The low protein content resulted due to gross adulteration of milk with water. Dairy and Animal nutritionists were improving the protein content of milk through manipulation of cow’s diet (Gill, 1991), whereas milk deliverers in our society are undesirably diluting even the already existing protein content in milk, which in the hospitals and student hostel-canteens is mainly meant for patients and students.
Lactose and ash
The average values determined were 2.87±0.27% and 3.43±0.25% and ash 0.46±0.02% and 0.46±0.03% from the hospitals and student hostel canteens respectively. The average value for lactose content was significantly lower than the value given in the manual of United States Public Health Services (1967).

SANITARY QUALITY TESTS

Titrable acidity
The average value for acidity was 0.11% and 0.11% from the hospitals and student hostel canteens respectively was almost the similar to those of freshly obtained acidity of milk increases rapidly as storage temperature increases as studied by Oretega (1971) and Mutukumira (1996).

Total bacterial count
The average value of total bacterial count was 534 (10⁴/ml) and 223 (10⁴/ml) from the hospitals and student hostel canteens respectively. When these results were compared with those reported by Dasyyani (2000) and Yoo (1996) their bacterial counts were found low.

Table 2: Percent acidity, TBC and MBRT in the raw milk samples collected from the canteens of hospitals and student hostels.

<table>
<thead>
<tr>
<th>Institution</th>
<th>Percent acidity</th>
<th>Total bacterial count (10⁴/ml)</th>
<th>Methylene blue reduction test (hrs.)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>Range</td>
<td>Mean±SE</td>
</tr>
<tr>
<td>Hospital</td>
<td>0.11</td>
<td>0.05-0.25</td>
<td>534±307.75</td>
</tr>
<tr>
<td>Hostel</td>
<td>0.11</td>
<td>0.05-0.23</td>
<td>223±89.87</td>
</tr>
</tbody>
</table>

Methylene blue reduction test
The mean value for hospitals and student hostel canteens was 2.20±0.31hr’s and 3.01±0.39 hrs, respectively. The result obtained from present study was supported by Garg (1997). By studying the raw milk samples collected from the canteens of hospitals and student hostels of Faisalabad area, it was observed that bacterial count of milk was markedly high as compared to standards of APHA (1967).

It may, therefore, be conceived that certain factors like poor hygiene, air pollution, animal health and awareness among the farmers regarding the concepts of milk quality and impact on public health due to lack of knowledge are considered responsible for poor bacteriological quality and chemical composition.

REFERENCES


