تتواجد الميكروبات المكور المتعقد في اللبن
وبعض منتجات الألبان

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أجريت الدراسة على عدد 110 عينة من اللبن الخام، الجبن الدماطي،
الجبن القريش، والابيس كريم، جمعت بطريقة عشوائية من أسواق مدينة أسوان.
ومحلات البقالة ومزارع الألبان بالنسبة للبن الخام، وقد فحصت هذه العينات
لمعرفة مدى تواجد الميكور المكور المتعقد، وقد تبين من الفحص أن 60.3%،
6.7، 4.7% من العينات المفحوضة تحتوي على المكور المتعقد الذبيبي، وكان
متوسط عدد في هذه العينات 1×10٣، 1×10٤، 1×10٥، 1×10٦ لكل مل جرام على
التوالي.

من العينات Micrococi， staph. epidermidis

وقد تم عزل ميكور المفحوضة فيما بعد الأليس كريم، وبدراسة الخصائص السمية للمكور المتعقد الذبيبي
المعزول من العينات وتم قدرة عليه افراز السموم المعوية B & C.
وجد أن كـ التحتمات المعزولة من هذا الميكور لا تفرز أي منها.

وقد تم مناقشة الشروط الصحية الواجب اتخاذها لمنع تلوث اللبن ومنتجاته

بما هذا الميكور وكذلك لمنع افرازه للسموم المعوية.
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OCCURRENCE OF STAPHYLOCOCCI IN MILK
AND SOME MILK PRODUCTS
(With Two Tables)

By
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SUMMARY

A sum of 110 random samples of raw milk and some milk products, including raw milk, Damietta cheese, kareish cheese and ice-cream, were collected from Assiut City markets, groceries and dairy farms. The samples were examined for staphylococci and the isolated S. aureus strains were tested for production of enterotoxins A and C3. S. aureus could be isolated from 60, 23.5, 27.5 and 20% of the examined samples with an average count of 1x10^6, 9x10^6, 5x10^5 and 1x10^7 S. aureus/ml or g respectively. While, Staph. epidermidis and micrococci could be isolated from the examined samples except ice-cream. All of the tested S. aureus strains failed to produce enterotoxins A and C3. The public health hazard and the suggestive measures were discussed.

INTRODUCTION

Staphylococci have undoubtedly caused food poisoning for centuries, and outbreaks were reported by several workers in the early 1900s. The role of staphylococci in food poisoning was rediscovered by DACK et al. (1930), who demonstrated conclusively that contamination of food with S. aureus could cause gastroenteritis. So far, and despite advances achieved in dairy technology, several outbreaks of staphylococcal food poisoning have been reported, involving large number of people throughout the world. Comprehensive reviews on staphylococcal food poisoning and on the occurrence of S. aureus in milk and milk products have been published (ENHUBER, 1971; TATINI et al., 1971; MILJKOVIC et al., 1974; HOL and VINCENTIE, 1975; EL-BASSIONY, 1977; AHMED, 1978 & 1980; REYES et al., 1984; MAHMOUD, 1985 and GUPTA, 1986).

Although staphylococci are widely distributed in the environment, the increased incidence of staphylococcal mastitis has made the occurrence of S. aureus in milk and consequently in dairy products a problem of considerable significance. AHMED (1978) reported that 68, 42, 60 and 78% of examined raw milk, Damietta & Kareish cheese and ice-cream contained S. aureus in average counts of 668, 1546, 992 and 16354/ml or g respectively. In 1980 the same author stated that 48.5, 44.5, 26 and 90% of the examined raw milk, Damietta & Kareish cheese and ice-cream contained S. aureus, respectively. He added that 68 out of 347 S. aureus strains isolated were enterotoxigenic. Furthermore, enterotoxigenic S. aureus strains producing enterotoxins A, B, C and D could be isolated from cheese samples examined by REYES et al. (1984); MAHMOUD et al. (1985) and NOUR et al. (1986).

Therefore, this work was done to assess the occurrence of *S. aureus* and other staphylococci in milk and some milk products available at retail levels in Assiut City, and to assess the ability of the isolated *S. aureus* strains to produce enterotoxins A and C₃.

**MATERIAL and METHODS**

A total of 110 random samples of raw milk and some milk products including 20 raw milk, 30 Damietta cheese, 40 Kareish cheese and 20 ice-cream samples, were collected from Assiut City markets, groceries and dairy farms. The samples were dispatched to the laboratory in clean dry and sterile containers with a minimum of delay. Preparation of samples for examination was carried out according to standard methods for the examination of dairy products (A.P.H.A., 1978).

1- *S. aureus* count:

Numbers of *S. aureus* were determined by using Baird Parker agar plates (Difco). Duplicate plates were prepared and incubated 48h. at 37°C. Some of the colonies were randomly selected for confirmation as *S. aureus* according to FINEGOLD and MARTIN (1982), and were tested for their ability to produce heat stable deoxyribonuclease (DNase) as described by LACHICA et al. (1971).

2- Isolation and identification of staphylococci was carried out according to FINEGOLD and MARTIN (1982).

3- Detection of entero-toxicogenicity of isolated *S. aureus* strains.

The isolated *S. aureus* strains were tested for their ability to produce enterotoxins A and C₃, the available two types kindly supplied by Dr. M.S. BERGDOLL, Food Research Institute, Madison, Wisconsin, USA. Extraction of enterotoxins was done by using cellophane over agar technique recommended by HALLANDER (1965) and modified by JARVIS and LAWRENCE (1970). Optimum sensitivity plate (OSP) described by ROBBINS et al. (1974) was used for detection of enterotoxins.

**RESULTS**

All the results were recorded in Tables 1 and 2.

**Table (1):** *S. aureus* count/ml or g of examined raw milk, Damietta & Kareish cheese and ice-cream samples.

<table>
<thead>
<tr>
<th>Samples</th>
<th>No. of samples examined</th>
<th>No. Positive samples</th>
<th>Min</th>
<th>Max</th>
<th>average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Raw milk</td>
<td>20</td>
<td>12</td>
<td>60</td>
<td>4×10⁴</td>
<td>1×10²</td>
</tr>
<tr>
<td>Damietta cheese</td>
<td>30</td>
<td>7</td>
<td>23.3</td>
<td>5×10⁵</td>
<td>9×10⁴</td>
</tr>
<tr>
<td>Kareish cheese</td>
<td>40</td>
<td>11</td>
<td>27.5</td>
<td>6×10⁶</td>
<td>5×10⁴</td>
</tr>
<tr>
<td>Ice-cream</td>
<td>20</td>
<td>4</td>
<td>20</td>
<td>2×10⁴</td>
<td>1×10⁴</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>110</strong></td>
<td><strong>34</strong></td>
<td><strong>30.9</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*: No colonies could be detected on the plate.
STAPHYLOCOCCI IN MILK

Table (2): Frequency distribution of isolated strains recovered from examined milk and milk products samples.

<table>
<thead>
<tr>
<th>Samples</th>
<th>No. of isolates</th>
<th>S. aureus</th>
<th>Staph. epidermidis</th>
<th>Micrococci</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No.</td>
<td>%</td>
<td>No.</td>
<td>%</td>
</tr>
<tr>
<td>Raw milk</td>
<td>33</td>
<td>12</td>
<td>36.4</td>
<td>17</td>
</tr>
<tr>
<td>Damietta cheese</td>
<td>29</td>
<td>7</td>
<td>24.1</td>
<td>21</td>
</tr>
<tr>
<td>Kareish cheese</td>
<td>50</td>
<td>11</td>
<td>22</td>
<td>38</td>
</tr>
<tr>
<td>Ice-cream</td>
<td>4</td>
<td>4</td>
<td>100%</td>
<td>-</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>116</strong></td>
<td><strong>76</strong></td>
<td><strong>6</strong></td>
<td></td>
</tr>
</tbody>
</table>

**DISCUSSION**

Table 1 shows that 60, 23.3, 27.5 and 20% of the examined raw milk, Damietta cheese, Kareish cheese and ice-cream contained S. aureus with an average count of $1 \times 10^2$, $9 \times 10^4$, $5 \times 10^6$ and $1 \times 10^9$ /ml or g respectively. Higher incidence of S. aureus was previously reported by AHMED (1978 & 1980). While, EL-BASSIONY (1985) recorded that 53.3 and 30% of the examined raw milk and kareish cheese samples were positive for S. aureus. The average count of S.aureus/ml or g of our examined samples was higher than that recorded by AHMED (1978).

MAHMOUDE et al. (1985) recorded $2.4 \times 10^6$ S. aureus/g of examined cheese samples as an average count. Furthermore, 80 and 50% of the examined cheese samples contained $10^7$ and $10^8$ S. aureus/g respectively as stated by NOUR et al. (1986).

The results in Table 2 reveal that Staph. epidermidis represented 51.5, 72.4 and 76% of the isolated staphylococcci from raw milk, Damietta and Kareish cheese, respectively. While, Micrococci were found to be 12.1, 3.5 and 2% of the isolated strains recovered from the examined samples respectively. Staph. epidermidis and micrococci could not be isolated from ice-cream samples. Several research papers previously reported the isolation of Staph. epidermidis and micrococci from milk and milk products (PISANO, 1975; DABROWSKA and ORANTWITYK, 1973; EL-BASSIONY, 1977; AHMED, 1978 and NOUR et al., 1986).

Regarding the enterotoxigenicity of S. aureus, all of the isolated strains failed to produce enterotoxins A & C. The probability of these strains to produce other enterotoxins is expectable. AHMED (1980) reported that the tested S. aureus strains recovered from milk and milk products different types of enterotoxins. Higher incidence of enterotoxigenic S. aureus strains (41.25%) were obtained by REYES et al. (1984), while MAHMoud et al. (1985) found that 8 out of 60 S. aureus strains isolated from cheese were enterotoxigenic.

It is worth to mention that, the presence of S. aureus in milk and dairy products even in low numbers must be regarded as a public health hazard, because it has been established that S. aureus may lose its viability in food but enterotoxins still exist. Strict hygienic measures, pasteurization of milk and proper cooling are recommended to avoid contamination by S. aureus and to prevent enterotoxins production.

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REFERENCES


