Incidence of Fecal Coliforms and Serovars of Enteropathogenic Escherichia Coli in Naturally Contaminated Cheese

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ABSTRACT

A survey of 60 cheese samples from three different manufacturers and marketed in Mosul were analyzed during the summer of 1987 for fecal coliform counts and also for the presence of enteropathogenic Escherichia coli. Among these samples there was a wide variations in counts, which ranged from <10 to 26000/g while the average ranged from 500 to 14000/g. Only 43 E. coli isolates were recovered from the cheese. Four of them agglutinated with antisera used to screen for classical enteropathogenic serotypes.

Despite the increase in production and utilization of locally processed cheese, the bacteriological quality of cheese sold in the Mosul market is not satisfactory (2-4). Processing of this cheese is crude and far from the standardized. This product is characterized by high moisture (average 53.36%) and high pH (5.3) and the final salt concentration of the fresh product varies between 0.12-3.84%, as reported by Saleem et al. (75). Coupled with these facts, the retail shops display cheese samples for salt not only in cool compartments but often on shelves without packaging form. Recently, work done in this direction indicated that milk and milk products have frequently been implicated in transmission of human pathogens, including enteropathogenic Escherichia coli (EPEC) and other enteric pathogens (5,6,12,13).

One of our previous studies (1) dealt with frequency of occurrence of enterotoxigenic strains of E. coli isolated from butter. Enterotoxins were produced by three strains of the EPEC. These findings provided us with an opportunity to examine a naturally contaminated dairy product with known infectious potential. This report also sheds some light on the incidence of different serotypes of EPEC in domestically processed cheese offered for retail sale in Mosul.

RESULTS AND DISCUSSION

Table 1 depicts the quantitative enumeration of fecal coliforms with the maximum, minimum and average values found in 60 samples of cheese manufactured by three different manufacturers in Mosul. The total count varied widely from <10 to 26,000/g while the average values ranged from 500 to 14,000/g. The results indicate that except in 5 samples from manufacturer C, all the rest of the samples from manufacturers A and B were much higher than 10/g. The literature is abundant so far as occurrence of fecal coliforms in milk products is concerned. However, wide variations in the incidence of fecal coliforms in the pasteurized milk products have been reported (1,8,17). Overall, taking into consideration the limitations in the degree of accuracy of the fecal coliform count, it may be pointed out that except in 5 samples from manufacturer C, all the rest of the samples from manufacturers A and B were much higher than 10/g. The literature is abundant so far as occurrence of fecal coliforms in milk products is concerned. However, wide variations in the incidence of fecal coliforms in the pasteurized milk products have been reported (1,8,17). Overall, taking into consideration the limitations in the degree of accuracy of the fecal coliform count, it may be pointed out that except in 5 samples from manufacturer C, all the rest of the samples from manufacturers A and B were much higher than 10/g.

MATERIALS AND METHODS

A total of 60 cheeses (20 each from different sources viz, A, B and C in Mosul area) was purchased during the summer of 1987 (April to June). Samples were held at (4-6°C) until time of analysis (6 to 12 h). Approximately 50 to 500 g of a homogenous sample was available for subsequent analyses.

Bacteriological analyses

All bacteriological media were obtained from Difco Laboratories (Detroit) unless otherwise indicated. Procedures used for bacteriological analyses of samples were those recommended by Standard Methods for the Examination of Dairy Products (16). The level of fecal coliform counts was determined by the 3-tube MPN method based on gas production in lauryl sulfate tryptone (35°C) and EC (44°C) broths. Suspect colonies were isolated on desoxycholate lactose agar (Oxoid) plates streaked from gas-positive EC broths and confirmed using the following biochemical reactions for E. coli: indole-positive, acid and gas from glucose, methyl red-positive, H2S not produced, urease not produced, and failure to utilize citrate. An attempt was made here to serologically determine enterotoxigenic strains of E. coli.
but because of poor product quality, four of these strains could not be serotyped. Jones et al. (11) also reported three serotypes of EPEC were isolated from Canadian pasteurized dairy products. The occurrence of such EPEC in cheese is of public health importance as some established serotypes may cause gastroenteritis in infants (3, 14) and in adults (9). It has also been proven that certain strains of E. coli produce heat-labile or heat-stable enterotoxin resulting in diarrheal disease (18). EPEC contaminate the cheese through raw milk used without sufficient heat treatment or through contaminated equipment used for preparation or distribution of the cheese. Therefore, stringent hygienic measures must be enforced in the production and sale of cheese in the country. Also, rapid development of lactic acid by a good starter culture is essential for making the product unfavorable for growth and survival of EPEC.

**REFERENCES**


**TABLE 1. Fecal coliform counts of various market cheese samples and occurrence of E. coli.**

<table>
<thead>
<tr>
<th>Manufacturer</th>
<th>No. of samples analyzed</th>
<th>Maximum</th>
<th>Minimum</th>
<th>Average</th>
<th>No. positive for E. coli</th>
<th>EPEC serotype</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>20</td>
<td>26,000</td>
<td>10,000</td>
<td>14,000</td>
<td>25</td>
<td>0119K69, 0125K70</td>
</tr>
<tr>
<td>B</td>
<td>20</td>
<td>14,000</td>
<td>770</td>
<td>8,600</td>
<td>13</td>
<td>086K61</td>
</tr>
<tr>
<td>C</td>
<td>20</td>
<td>1,600</td>
<td>&lt;10a</td>
<td>500</td>
<td>5</td>
<td>0111K58</td>
</tr>
</tbody>
</table>

Five samples out of 20 gave fecal coliform count below 10/g.