الحالة البكتيرولوجية لأغذية الأطفال اللبناني
عادل سعدى، حمدي الميسوى، عبد الوهاب مرسي

تم الفحص البكتيرولوجي لخمسين عينة من الأغذية اللبنانية للأطفال المجهزة عن طريق الأماطور، جمعت من مستشفى الأطفال من مدينة القاهرة لتحديد مدى تلوثها بالأنواع المختلفة من الميكروبات.

وقد دلت النتائج على أن متوسط العدد الكلي للميكروبات هو 424.91 x 10^6 في الملف الواحد من العينات، بينما بلغ متوسط العدد الكلي للميكروبات الس előية المعوية 141.6 x 10^3.

كما أمكن عزل ميكروبات الكوليفورم من 50% من العينات التي تم فحصها بعوضة قدره 224.26 x 10^6.

وأسفر تصنيف ميكروبات الكوليفورم بالعمولة عن أنواع الآتية: انتربراكتر، انتربراكتر كلاكس، انتربراكتر ليكوفيتشان، كليسيلا أبوروبيز، كليسيلا أوروزي، كليسيلا أورد وارد بيرا وكذلك كليسيلا رينوسكلوباتس.

كما تم عزل ميكروب أشريشا كولايا من عينات (4%) وأسفر تصنيفها بسولوجيا عن أنواعية تبريوي: 17، 0124، K72، B17، K58، B4.

وقد أمكن عزل العذر العنقودي الذهبية من ثلاث عينات (2%).

وقد نوقشت الأهمية الصحية للميكروبات المختلفة التي تنمو عزلها وما يجب أن يتبع لتحسين الحالة الصحية لهذا النوع من الأغذية.
BACTERIOLOGICAL QUALITY OF INFANT MILK FOODS
(With 3 Tables)

By
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SUMMARY

Fifty samples of already home prepared infant milk foods were collected from infant hospitals, to be examined for determination of its bacteriological quality.

The maximum colony count/ml. was 96 X 10^3, the minimum was 50, with a mean value of 91.934 X 10^2/ml. 52% of samples contained coliform organisms. The maximum coliform count (MPN/100 ml.) was 69 X 10^4, the minimum was 20, with a mean value of 26.264 X 10^3. Enteropathogenic Escherichia coli (0124 872 B17 and 0111 858584) could be isolated from two samples.

Enterobacter aerogenes, Ent. cloacae, Ent. liquifaciens, Klebsiella aerogenes, K. Ozaenae, K. Edwardsii v.e.d. and K. rhinoscleromatis could be isolated at varying percentages ranging from 4% to 24%. Staph. aureus could be isolated from three samples, while proteus species could be detected in 56% of examined samples.

The total enterococci count/ml. ranged from 20 to 39 X 10^3, with a mean value of 60.41 X 10^2.

The public health importance of existing microorganisms as well as suggestive control measures were discussed.

INTRODUCTION

Infant milk foods in Egypt include either dried or raw buffaloes or cows milk which at times is mixed with a cereal base.

The sanitary procedure adopted during preparation of that food for infants varies greatly according to educational and social status of the family, thus dictating the hygienic quality of such prepared food. Such prepared milk food is liable to contamination by different organisms from various sources during its preparation and handling, which find opporunity to grow and multiply in that product rendering it unsafe to be consumed by infants.

Many intestinal disturbances has been attributed to consumption of such contaminated infant milk foods specially in summer time (LOVE et al. 1972 and ICMSF, 1980).

Realizing that cases of gastrointestinal disturbances among infants prevail in summer time specially among lowincome families where the sanitary precautions in preparation and handling of foods is mostly neglected, thus exposing such foods to contamination with various types of microorganisms.
As far as we know, the bacteriological quality of infant milk foods has not yet been tackled specially concerning the incidence of organisms implicated in cases of gastrointestinal disturbances. Therefore, this work was accomplished to fulfill this gap.

MATERIAL and METHODS

Fifty random samples of already home-prepared infant milk foods, collected from feeding bottles at infant hospitals in Cairo, were bacteriologically examined for determination of the total colony count, coliform content (MPN/100 ml.), and enterococcal count, as well as for incidence of staphylococci, salmonellae and shigellae.

Isolated coliforms and staphylococci were identified according to COWAN and STEEL (1965), enterococci by using Enterococcus selective differential medium (EFTHYMIOU et al. 1974), while isolated non-lactose fermenters were identified according to EDWARD and EWING (1972).

DISCUSSION

Total colony count:

Results given in Table (1) reveal that the maximum colony count/ml. of examined samples was 96 x 10^3, the minimum was 50, with a mean value of 91.934 x 10^2 ± 29.345 x 10^2. The highest frequency distribution (68%) lies within the range 10^2-10^4 (Table 2).

The relatively high counts met with in this work, show to what extent infant foods are exposed to the risk of contamination.

Coliform content:

It is evident from the results recorded in Table (3) that out of the 50 samples examined, 26 samples (52%) contained coliforms with a mean count (MPN/100 ml.) of 26.264 x 10^3 ± 13.993 X 10^3. The highest frequency distribution (69.235%) lies within the range 10^2-10^4 (Table 2).

Lower coliform counts in infant milk foods were reported abroad by LEZNIK et al. (1973); RANGNEKAR A SULEBEBE (1974); ADEMOLLO et al. (1979) and ROSA et al. (1979).

Types of isolated coliforms

Results presented in Table (3) show that Escherichia coli could be isolated from 4% of examined samples. Isolated strains proved to be O_124 : K_72 : H_17 and O_111 : K_58 : H_6.

Enterobacter aerogenes, E. cloacae, E. liquifaciens, Klebsiella aerogenes, K. ozaenae, K. edwardsii v. ed. and K. rhinoscleromatis could be isolated at varying percentages ranging from 4% to 24%.

Nearly similar types of coliforms could be isolated from baby milk foods by KONNING (1972), LOVE et al. (1972), and ADEMOLLO et al. (1979).

Presence of coliforms in any food article is indicative of sanitary neglected measures during its production, processing and handling, besides they may at times constitute a public health hazard. Enteropathogenic serotypes of Escherichia coli have been implicated in cases of gastroenteritis, epidemic diarrhoea in infants, sporadic summer diarrhoea in children as well as in cases of food-poisoning (ROLLE and MAYER, 1966; SINGH A RANGANATHAN, 1974 and ICMSF 1980).

BACTERIOLOGICAL QUALITY OF INFANT MILK FOODS

Proteus Species:

Proteus vulgaris, P. mirabilis, and P. morganii could be isolated from 14%, 24% and 18% of examined samples respectively (Table 3).

Proteus organisms could be isolated from baby milk foods by ADEMOLLO et al. (1979). Some proteus species have been encountered with in cases of summer diarrhoea in infants, as well as urinary infections (MACKI & MACCARTNEY, 1962, and FRAIZER, 1967).

Enterococci content:

Results given in Table (1) reveal that the total enterococci count/ml. of baby milk foods ranged from 20 to 39 X 10^2, with a mean value of 60.41 X 10^2 ± 11.906 X 10^2. The highest frequency distribution (73.33%) lies within the range 10^2-10^4 (Table 2).

The mean count of Strept. faecalis, Str. faecium and Str. intermediate was 41.46 X 10^2 ± 7.255 X 10^2, 14.542 X 10^2 ± 3.681 X 10^2 and 40.43 X 10^2 ± 7.197 X 10^2 per ml/respectively (Table 1).

Nearly similar types of enterococci were isolated by KONNING (1972) and ROSA et al. (1979).

Enterococci being a normal inhabitant in the intestinal tract of man and animals, thus their presence in any food article is indicative of faecal contamination. Moreover some species can grow at wide range of temperature and can withstand heat treatment, hence, they may be at times implicated in cases of food poisoning (SEIDEL & MUSCHTER, 1967 and THE INTERNATIONAL COMMISSION ON MICROBIOLOGICAL SPECIFICATIONS FOR FOODS, 1980).

Staphylococci:

Staph. aureus could be isolated only from 3 of the 50 samples examined (6%). Isolated strains proved to be strong coagulase positive, while only two strains of them produced DNase proving to be intertoxigenic. Such isolated strains whenever found as contaminants in baby milk foods may find opportunity to grow and multiply producing thermostable enterotoxin in the product inducing symptoms of food poisoning.

Incidence of Staph. aureus and its enterotoxin in infant foods was reported by HOPPNER et al. (1972), KRAMPRT (1972) and SINGH et al. (1980).

The results achieved allow to conclude that home prepared baby milk foods proved to contain different types of organisms at various rates, which can be attributed to low quality ingredients and/or unsatisfactory methods of preparation and handling of such foods. Most of isolated organisms proved to be of public health importance. It is worth mentioning that most infants complaining form gastrointestinal disturbances were fed on infant milk food highly contaminated with coliforms.

For the welfare of infants it deems necessary that instructions should be emphasized for mothers to get acquainted with self-hygiene as well as the sanitary measures adopted in cleaning baby feeding bottles, besides choosing best quality ingredients for preparation of their baby foods.

REFERENCES


BACTERIOLOGICAL QUALITY OF INFANT MILK FOODS

RESULTS

Table (1)
Statistical analytical results of different types of organisms in examined samples

<table>
<thead>
<tr>
<th>Organisms</th>
<th>Total No. of samples</th>
<th>Positive No.</th>
<th>Min.</th>
<th>Max</th>
<th>Mean</th>
<th>S.E.M.</th>
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</thead>
<tbody>
<tr>
<td>Total colony count/ml</td>
<td>50</td>
<td>50</td>
<td>100</td>
<td>50</td>
<td>96x10^3</td>
<td>91.93 x10^2</td>
</tr>
<tr>
<td>MPN/100 ml.</td>
<td>50</td>
<td>26</td>
<td>52</td>
<td>20</td>
<td>49x10^4</td>
<td>26.264 x10^3</td>
</tr>
<tr>
<td>Total enterococci count/ml.</td>
<td>50</td>
<td>30</td>
<td>60</td>
<td>20</td>
<td>39x10^3</td>
<td>60.410 x10^2</td>
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<tr>
<td>Differential count</td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>Str. Faecalis</td>
<td>50</td>
<td>20</td>
<td>40</td>
<td>20</td>
<td>20x10^3</td>
<td>41.460 x10^2</td>
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<td>Str. Faecium</td>
<td>50</td>
<td>12</td>
<td>24</td>
<td>100</td>
<td>72x10^3</td>
<td>14.59 x10^2</td>
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<td>Str. Intermediate</td>
<td>50</td>
<td>20</td>
<td>40</td>
<td>220</td>
<td>19x10^3</td>
<td>40.430 x10^2</td>
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</table>

Table (2)
Frequency distribution of examined samples based on their bacterial content

<table>
<thead>
<tr>
<th>Intervals</th>
<th>Total colony count/ml</th>
<th>MPN/100 ml.</th>
<th>Str. Faecalis</th>
<th>Str. Faecium</th>
<th>Str. Intermediate</th>
<th>Total enterococci count/ml.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No.</td>
<td>%</td>
<td>No.</td>
<td>%</td>
<td>No.</td>
<td>%</td>
</tr>
<tr>
<td>10^-10^2</td>
<td>9</td>
<td>18</td>
<td>4</td>
<td>15.39</td>
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<td>10^-10^1</td>
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<td>12</td>
<td>46.15</td>
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<td>6</td>
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<tr>
<td>10^-10^-1</td>
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<td>2</td>
<td>7.69</td>
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<td>15</td>
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<tr>
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<td>0</td>
<td>2</td>
<td>7.69</td>
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<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>50</td>
<td>100</td>
<td>26</td>
<td>100</td>
<td>20</td>
<td>100</td>
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</table>

<table>
<thead>
<tr>
<th>Isolates</th>
<th>No. of samples</th>
<th>%</th>
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<tbody>
<tr>
<td><em>Escherichia coli</em></td>
<td>2</td>
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<td><em>Enterobacter aerogenes</em></td>
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<td><em>Enterobacter liquefaciens</em></td>
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<td><em>Klebsiella aerogenes</em></td>
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<td><em>Klebsiella ozaenae</em></td>
<td>8</td>
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<tr>
<td><em>Klebsiella ed. v. ed.</em></td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td><em>Klebsiella rhinoscleromates</em></td>
<td>4</td>
<td>8</td>
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<td><em>Proteus vulgaris</em></td>
<td>7</td>
<td>14</td>
</tr>
<tr>
<td><em>Proteus mirabilis</em></td>
<td>12</td>
<td>24</td>
</tr>
<tr>
<td><em>Proteus morganii</em></td>
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<td>18</td>
</tr>
<tr>
<td><em>Staphylococcus aureus</em></td>
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<td>6</td>
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