قســـم : الصحة ومراقبة التغذيـــة .

كلية الطب البيطرى ـ جامعة القاهرة .

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الحالة البكتريولوجيه لأغذية الاطفال اللبنيه

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تم الفحص البكتريولوجي لخمسين عينة من الأغذية اللبنيـــة للأطفال المجهزة عن طريق الامهات ، جمعت من مستشفيات الأطفال من مدينة القاهرة لتحديد مدى تلوثها بالأنـــواع المختلفة من الميكروبات .

وقد دلت النتائج على أن متوسط العدد الكلي للميكروبـــات هو ٩١ر٩٣٤ × 10^2 في المليلتر الواحد من العينـــات ، بينما بلغ متوسط العدد الكلي للميكروبات السبحية المعويـــة ٤١ر٦٠ × 10^2 .

كما أمكن عزل ميكروبات الكوليفورم من ٥٢ ٪ من العينات التـي تم فحصها بمتوسط قدره ٢٦٤ر٢٦ × 10^3 .

وأسفر تصنيف ميكروبات الكوليفورم بالمعزوله عن الانواع الآتيه :

ـ انتروباكتر ايروجينز ، انتروباكتر كلوكا ، انتروباكـــــتر ليكوفيشانس ، كلبيسيلا ايروجينز ، كلبيسيلا أوزوني ، كلبيسيـلا أد وارد ياى وكذلك كلبيسيلا رينوسكليوماتس .

كما تم عزل ميكروب اشريشا كولاى من عينتين (٤ ٪) واســـفر تصنيفها سيرولوجيا عن انتمائها لنوعي : B_{17} : K_{72} : O_{124} , B_4 : K_{58} : O_{111} وقد أمكن عزل المكور العنقودى الذهبـــي من ثلاث عينات (٦ ٪) .

وقد نوقشت الاهمية الصحيه للميكروبات المختلفة التي تـــم عزلها ومايجب أن يتبع لتحسين الحاله الصحيه لهذا النــوع من الأغذيـــة .

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BACTERIOLOGICAL QUALITY OF INFANT MILK FOODS
(With 3 Tables)

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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 96×10^3, the minimum was 50, with a mean value of 91.934×10^2/ml. 52% of samples contained coliform organisms. The maximum coliform count (MPN/100 ml.) was 49×10^4, the minimum was 20, with a mean value of 26.264×10^3. Enteropaqthogenic Escherichia coli (0_{124} :K_{72} :B_{17} and 0_{111} :K_{58}:B_4) could be isolated from two samples.

Enterobacter aerogenes, Ent. cloacae, Ent. liquifaciens, Klebsiella aerogenes, K. Ozaenae, K.edwardsii v.ed. 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 39×10^3, with a mean value of 60.41×10^2.

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 toeducational 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 oppurtionity 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 negleted, thus exposing such foods to contamination with various types of microorganisms.

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As far as we know, the bacteriological quality of infant milk foods has not yet bien tackled specially concerning the incidence of organisms implicated in cases of gastrointestinal disturbances. Therefore, this work was accomplished to fullfil this gap.

MATERIAL and METHODS

Fifty random samples of already home-prepared infant milk foods, collected form 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 96×10^3, the minimum was 50, with a mean value of $91.934 \times 10^2 \pm 29.345 \times 10^2$. 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 $26.264 \times 10^3 \pm 13.993 \times 10^3$. The highest frequency distribution (69.23%) 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 & SULEBELE (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 $O_{124}:K_{72}:B_{17}$ and $O_{111}:K_{58}:B_4$.

Enterobacter aerogenes, E. cloacae, E. liquifaciens, Klebsiella aerogenes, K. ozaenae, K. edwardsii v. ed. and K. rhinoscleromatis could be isolated at varying percentasges 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 meassures 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 diarrhoae in infants, sporadic summer diarrhaea in children as well as in cases of food-poisoning (ROLLE and MAYER, 1966; SINGH & RANGANATHAN, 1974 and ICMSF 1980).

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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 diarrhoae 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 10^3, with a mean value of 60.41 X 10^2 $\pm$ 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 $\pm$ 7.255 X 10^2, 14.542 X 10^2 $\pm$ 3.681 X 10^2 and 40.43 X 10^2 $\pm$ 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 graw 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 out 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 opportionity 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), KRAMPR (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 aequainted 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.

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RESULTS

Table (1)

Statistical analytical results of differnt types of organisms in examined samples

Organisms	Total No. of samples	Positive No.	%	Mini.	Max	Mean	S.E.M. ±
Total colony count/ml	50	50	100	50	96×10^3	91.934×10^2	29.345×10^2
MPN/100 ml.	50	26	52	20	49×10^4	26.264×10^3	13.993×10^3
Total enterococci count/ml.	50	30	60	20	39×10^3	60.410×10^2	11.906×10^2
Differential count							
Str. Faecalis	50	20	40	20	20×10^3	41.460×10^2	7.255×10^2
Str. Faecium	50	12	24	100	72×10^2	14.54×10^2	3.681×10^2
Str. intermediate	50	20	40	220	19×10^3	40.430×10^2	7.197×10^2

Table (2)

Frequency distribution of examined samples based on their bacterial content

Intervals	Frequency											
	Total colony count/ml.		MPN/100 ml.		Str. Faecalis		Str. Faecium		Str. inter mediate		Total enter cocci count/ml.	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
$10 - 10^2$	9	18	4	15.39	1	5	0	0	0	0	1	3.33
$10^2 - 10^3$	16	32	12	46.15	4	20	9	75	4	20	10	33.33
$10^3 - 10^4$	18	36	6	23.08	12	60	3	25	14	70	12	40.00
$10^4 - 10^5$	7	14	2	7.69	3	15	0	0	2	10	7	23.34
$10^5 - 10^6$	0	0	2	7.69	0	0	0	0	0	0	0	0
Total	50	100	26	100	20	100	12	100	20	100	30	100

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Table (3)

Incidence of isolated organisms in examined samples

Isolates	No. of samples	%
Escherichia coli	2	4
Enterobacter aerogenes	10	20
Enterobacter cloacae	3	6
Enterobacter liquifaciens	12	24
Klebsiella aerogenes	4	8
Klebsiella ozaenae	8	16
Klebsiella ed. v. ed.	2	4
Klebsiella rhinoscleromates	4	8
Proteus vulgaris	7	14
Proteus mirabilis	12	24
Proteus morganii	9	18
Staphylococcus aureus	3	6