

قسم : الصحة ومراقبة الأغذية .
كلية : الطب البيطرى - جامعة أسيوط .
رئيس القسم : أ. د . علي يوسف لطفي .

الفحص البكتريولوجي لأغذية الاطفال المحلية

مصطفى خليل ، أحمد محمد الحميد ، توليق البسيوني ، فوزى ابوالخسير

تم جمع عدد ٣٠ عينة من أغذية الأطفال المحلية منها
١٦ عينة محلية ، ١٤ عينة مستورده ، وذلك لتحديد
الحاله الصحيه لانتاجيتها . وقد وجد أن متوسط عدد
الميكروبات الكلية في العينات المحلية أكبر منه في المستورده
كذلك أمكن عزل ميكروب ال *B.cereus* من ٨٠ من العينات .
كذلك وجد أن ٥٦,٦٧% ، ٣٦,٦٧% من العينات تحتوى
على الميكروبات القولونية *Fecal coliforms* بالترتيب .
ولم يتم عزل الميكروب المكور العنقودى الذهبى من أى نوع
من العينات المفحوصه . وقد تناول البحث أهمية عدم ترك
غذاء الطفل بعد اعداده مما قد يحدث زيادة في عدد
الميكروبات الى الحد الذى يؤدى الى التسمم الغذائى
في الأطفال .



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MICROBIOLOGICAL QUALITY OF INFANT MILK FOODS
(With 2 Tables and One Plate)

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(Received at 5/1/1984)

SUMMARY

Thirty samples of dried baby foods with milk base (16 locally-made & 14 imported) were obtained from different retailers in Assiut City for bacteriological examination. Total number of different types of microorganisms were counted and the isolates were typed. Most of the locally-made samples contained relatively higher numbers of bacteria, in particular 6 samples contained total bacterial counts $> 10^6$ /g. *Bacillus cereus* was present in 24 samples, usually at levels ≤ 500 /g. Coliforms and fecal coliforms were recovered in 56.67% and 36.67% of examined samples, respectively. Yeasts and molds were found in 28 samples. No staphylococci were found. A marked increase in *B.cereus* count was observed when the reconstituted baby food was stored for 6h. at the ambient temperature.

INTRODUCTION AND LITERATURE

In recent years there has been a growing use of baby foods with dairy base as replacers of fresh milk or in addition to it. The microbial quality of baby foods is of primary concern due to the high susceptibility of children to food-borne diseases.

Food poisoning outbreaks have often been traced to consumption of these kinds of foods which are known to contain staphylococci and/or their enterotoxins. In a study done by SINGH et al. (1980) in India, *S.aureus* organisms were found in 9 out of 10 samples of baby foods, three of the isolates were tested and found to produce enterotoxin A plus B.

Recently, food poisoning outbreaks have also been traced to contamination of food products with *Bacillus cereus* (ORMAY and NOVOTMY, 1968; JONESCU & JONESCU, 1971 and KONNING, 1972). It has been established that as few as 10^5 /g. *B.cereus* be suffice to cause illness in young children (BONAR, 1962). DENECHERE, et al. (1979) found that 3 out of 62 samples of baby foods contained high counts of *B.cereus*.

In addition, pathogenic members of coliform organisms may cause infantile diarrhea and cholera-like syndrome, both of which may be fatal (SACK, 1978). In documented outbreaks of enteropathogenic *E.coli* diarrheal disease around the world, milk and milk products and rice formulations have been implicated (MEHLMAN et al., 1976). JARCHOVSKA et al. (1980) found that 0.78% of examined samples of infant feeds contained coliforms. ADEMOLLO et al. (1979) found *Escherichia*, *Klebsiella*, *Proteus* and *Enterobacter* spp. in 29.6% of examined samples of infant foods. on the other hand, KWUN et al., (1979) and SINGH et al., (1980) found no coliforms in the examined samples of baby foods.

As a result of the scarcity of published microbiological data for baby foods in Egypt, our investigation was planned to assess the incidence and types of microorganisms in some baby foods currently available at the retail level.

MATERIALS and METHODS

Thirty samples of dried baby foods with milk base representing seven brands and packed in cartons were collected at random from shops or pharmacies and dispatched to the laboratory.

The following tests were performed:

- 1- Total Bacterial count: (A.P.H.A., 1978).
- 2- Coliform and fecal coliform organisms: (A.P.H.A., 1978 & KIEIN and FUNG, 1976).
- 3- Isolation and enumeration of *S.aureus*:

Numbers of *S.aureus* were determined by surface plating on Baird-parker agar (BAIRD-PARKER, 1962). Furthermore, an appropriate amount of each sample was inoculated into a tube of sod.chloride broth, which was then incubated for 24 h at 37°C. A loopful of liquid from incubated tubes was streaked onto a plate of mannitol salt agar. Confirmation of colonies suspected to be *S.aureus* was accomplished by the DNase test of LACHICA *et al.*, (1971).

- 4- Isolation and enumeration of *B.cereus*:

K G medium (KIM and GOEPFERT, 1971) was used for isolation and enumeration of *B.cereus*. Confirmatory tests were based on carbohydrate utilisation, nitrate reduction and production of acetylmethylcarbonyl (SPECK, 1976).

- 5- Yeast and mold counts

Yeast and mold count was determined using sabauroud dextrose agar as suggested in standard methods (A.P.H.A., 1978).

- 6- Effect of storage temperatures on reconstituted baby foods

An attempt was made to evaluate the microbial quality of such baby foods after reconstitution and storage at different temperatures and time intervals. After examining the 30 samples, four representative samples of baby foods were reconstituted (as recommended by the manufacturer) and the reconstituted sample was divided into two portions. One portion was stored at 37°C, while the other was stored at 7 °C. These samples were examined at intervals of 0, 3 and 6 h by plating on selective media for determination of total bacterial count, coliform and fecal coliform counts and *B.cereus* count.

RESULTS and DISCUSSION

According to data summarized in Table 1, average total bacterial counts for Egyptian types of baby foods (a & b) were relatively higher than in other types. Type A (Riri), type B (Supramine) and the other types, contained respectively: 16.4×10^5 , 4.6×10^5 and 61.0×10^3 / g. NIKODEMUSZ (1978) found that 76.1% of examined baby food samples had a total bacterial count of 10^4 / g. Also, lower count were found by COLLINS-THOMPSON *et al.*, (1980) and SCHWAB *et al.*, (1982).

In addition to screening for total bacterial counts in baby foods, the authors determined the presence as well as the number of some microorganisms responsible for health hazards

QUALITY OF INFANT FOODS

such as staphylococcal intoxication, *B.cereus* food-poisoning, *Escherichia coli* infection and mycotoxicosis.

Tests for staphylococci were always negative in all samples tested. Negative results also were found in surveys done by KWUN *et al.*, (1979), JARCHOVSKA *et al.*, (1980) and OTTOGALLI *et al.*, (1982). However, enterotoxigenic strains of staphylococci were isolated in samples examined by SINGH *et al.*, (1980).

The level of coliform contamination in positive samples of Egyptian types of baby foods varied from 10 to 2.6×10^2 /g. with an average of 10.3×10^1 /g. in type A and 7.6×10^1 /g. in type B. However, 2 of 14 imported baby food samples contained coliforms at the level of 3/g (Table 1&2). No fecal coliforms could be identified in these imported samples (Table 1). JARCHOVSKA *et al.*, (1980) found coliforms in only 0.78% of examined samples of baby foods. The presence of fecal coliforms in Egyptian samples examined is an indication of postsanitization and postprocessing contamination.

Both types of Egyptian baby foods had an average *B.cereus* count of 0.9×10^2 and 2×10^2 /g, respectively, as indicated in Table 1. Lower levels of *B.cereus* were detected in 11 samples of the other types (Table 2).

Yeasts and molds were recovered from 16 (100%) and 12 (85.7%) samples of Egyptian and other baby foods, resp. (Table 2). Much lower levels of yeasts and molds were detected by NIKODEMUSW (1978) and JARKOVSKA *et al.*, (1980).

The frequency distribution of microorganisms that are undesirable from the standpoint of health are tabulated in Table 2.

In regards to changes in counts of different types of bacteria in the reconstituted baby foods held at refrigeration and ambient temperatures (7 & 37°C), Fig. 1. indicates that at amb.temp. ature, the total bacterial count increased approximately 100- fold while *B.cereus* count increased 1000-fold reaching 3.5×10^4 /ml by the end of the 6 h. Coliforms fecal coliforms were increased also by 100 and 10-fold, respectively. Changes in counts occurred in reconstituted samples kept in refrigerators are shown in Fig. 1.

The high incidence of different types of microorganisms in examined commercial baby food samples, indicates lack of adequate precautions taken either during production and processing of raw milk or during subsequent handling and distribution of the products.

The occurrence of *B.cereus* in 80% of examined samples must be viewed with concern. Although the counts of different types of bacteria in stored reconstituted baby food were generally lower than those commonly associated with food poisoning, the age and nutritional status of the children who could consume the foods put them at risk.

The results of this study emphasize the importance of proper sanitation in the manufacture of the baby food products and suggest that the reconstituted baby foods should not be stored at ambient temperatures before consumption to provide a safer food.

However, the housewife should be reminded that the already made baby food is highly perishable as soon as the container is opened and can be recontaminated by germs from the atmosphere.

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QUALITY OF INFANT FOODS

Table (1): The average numbers of different microorganisms in 30 commercial dried baby food samples.
 Table 1. The average numbers of different microorganisms in 30 commercial dried baby food samples.

Product	No. of samples tested	Total bacterial count/g.	Coliforms count/g.	Fecal coliforms count/g.	B. cereus count/g.	Yeast & mold count/g.
Egyptian A-	8	16.4x10 ⁵	10.3x10 ¹	2.2x10 ²	0.9x10 ²	2.0x10 ²
	8	4.6x10 ⁵	7.6x10 ¹	5.8x10 ¹	2.0x10 ²	1.0x10 ²
	Other types:	14	61.0x10 ³	0.3x10 ¹	0	2.0x10 ¹

Table (2): Distribution of coliforms, fecal coliforms, B.cereus and yeast & mold in milk based baby foods.

Product	No. samples tested	Coliforms			Fecal coliforms			B. cereus			Yeast & mold		
		No. positive samples	Frequency	No. positive samples	No. positive samples	Frequency	No. positive samples	Frequency	No. positive samples	Frequency	No. positive samples	Frequency	
Egyptian A-	8	0	3 5	4	0 3 1	8	0 2 6 0	8	0 1 7				
	8	7	0 5 2	7	0 5 2	5	0 2 2 1	8	0 2 6				
Other types:	14	2	0 2 0	0	0 0 0	11	0 6 5 0	12	0 12 0				
Total	30	17		11		24		28					

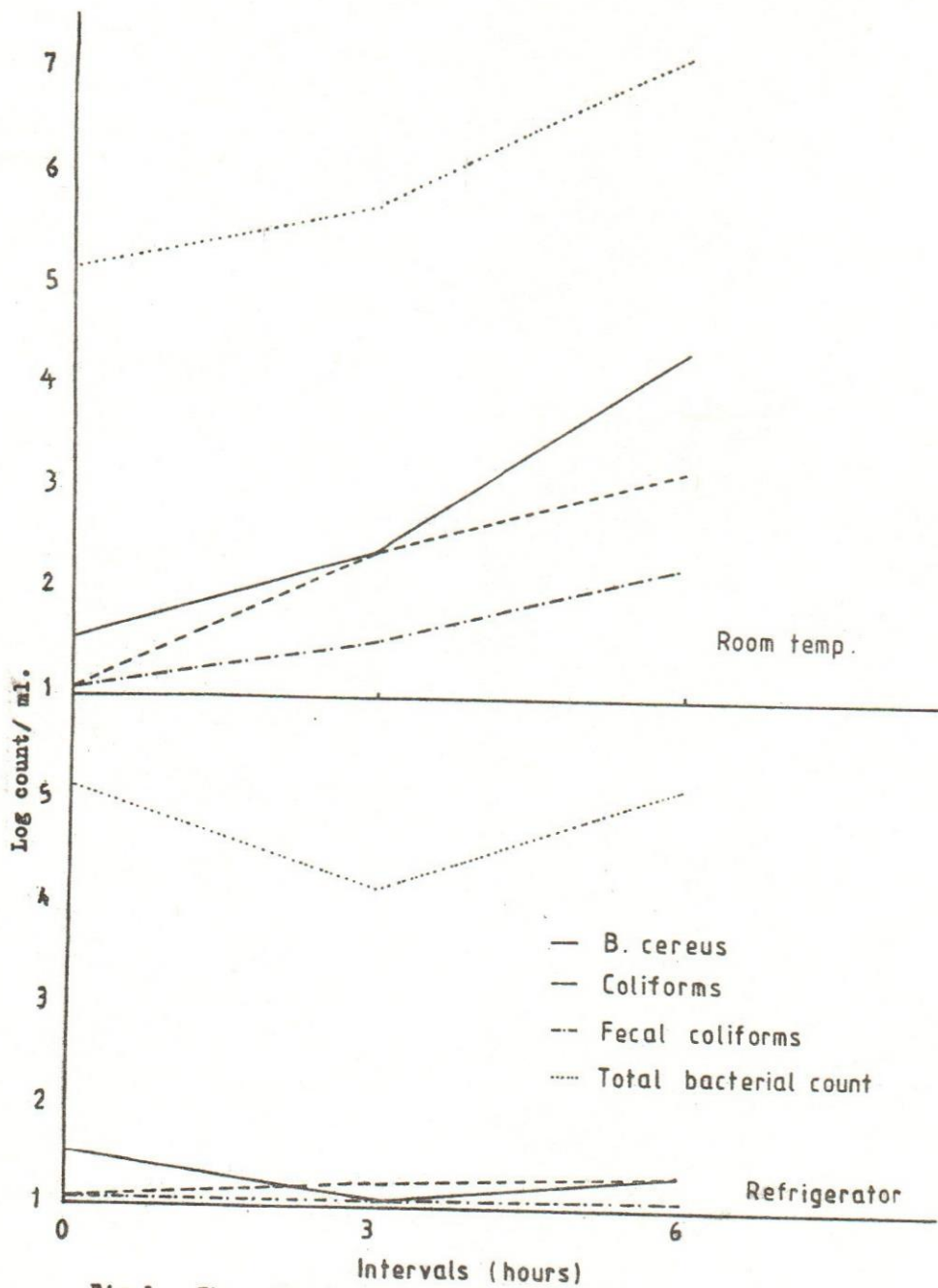


Fig.1. The effect of incubation temperatures on the growth of bacterial content in reconstituted baby Foods (average values).

