

## Detection of microbial contaminants of some locally produced fruit juices, ice creams, and yogurts.

Raja'a Khazl. Ali

Department of Clinical Laboratory Sciences College of Pharmacy  
University of AL-Mustansiriyah

### Abstract:

The study included (45) samples of fruit juices, ice creams and yogurts which locally produced and available at Baghdad markets including some small markets and booths. The study focused on the detection of microbial contaminants by accounting total number of aerobic bacteria, coliform bacteria, *E.coli*, *S. aureus* and *Salmonella*.

Results of microbial tests of (20) randomly collected samples of juices selected from local stores and boxes in Baghdad city area showed contamination and invalidity of these samples for human consumption comparing to Iraqi standards with a failure rate reached to 15 % for total count of bacteria, 10% for coliform.

The microbial test (15) samples showed a failure rate of 66.5% for aerobic bacteria (T.C) , 60% for *E.coli*, 65.6 % for *coliform bacteria* , 13.3 % for *staphylococcus aureus*. No sign if *Salmonella* existence was recorded for all tested samples in compare with Iraqi standards. As for yogurts, the microbial tests of (10) samples showed a failure rate of 30% for coliform, no sign of *Salmonella* existence was recorded for all tested samples.

**Keyword:** microbial contaminations, juices contamination, ice creams, yogurts contamination, *E-coli*, *Staphylococcus arouse* ,*coli form*, aerobic bacteria

### الخلاصة:

تضمنت الدراسة (45) عينة اختيرت عشوائيا من بعض العصائر والاييس كريم واللبن المصنع محليا والمتوفرة في اسواق مدينة بغداد.

ركزت الدراسة على التحري عن الملوثات المايكروبية فيها وحساب العدد الكلي لكل من البكتريا الهوائية aerobic bacteria وبكتريا القولون coliform bacteria , وبكتريا القولون البرازية *Escherichia coli* , والمكورات العنقودية الذهبية *Staphylococcus aurous* , وبكتريا السالمونيلا *Salmonella*. أظهرت نتائج الفحوصات المايكروبية لـ(20) عينة من العصائر المفحوصة عشوائيا من الاسواق المحلية عدم صلاحيتها للاستهلاك البشري بنسبة فشل (15%) بالنسبة للعدد الكلي للبكتريا , 10 % بالنسبة لبكتريا القولون مقارنة بالموصفات القياسية العراقية .

في حين اظهرت الفحوصات المايكروبية لـ(15) عينة من المثلجات نسبة فشل بلغت (66.5%) بالنسبة للعدد الكلي للبكتريا , 65.6 % بالنسبة لبكتريا القولون , 60 % بالنسبة لبكتريا القولون البرازية , 13.3% بالنسبة لبكتريا المكورات العنقودية الذهبية .

اما بالنسبة لبكتريا السالمونيلا فقد خلت جميع العينات منها حسب المواصفات العراقية في حين أظهرت نتائج الفحوصات المايكروبية لـ(10) عينات من اللبن المصنع محليا نسبة فشل 30% لبكتريا القولون . في حين خلت جميع العينات من السالمونيلا حسب المواصفات العراقية .

### Introduction:

There are considerable amounts of fruit juices, ice creams, and yogurts products with a bewildering types and varieties available in most markets and street boxes at city of Baghdad. unfortunately, beside of these products are not natural as decline by manufactured companies , they are out of governmental

control in form of there preparing, processing, storing, these products are very vulnerable to microbial contamination<sup>[1]</sup>.

Found in survey study of such products of high percentage of artificial processed materials such as chemical acid, gums, gelatin, and pectin.

During summer time where temperature is high, the rate of

contamination of these products is at the peak. Knowing that the activity of enzymes of microbe's increases potentially with the increasing of temperature<sup>[2]</sup>. One can easily expect a serious health challenge faces resident of Baghdad this time of the year. Infact the contamination of these products can be noticed even in restricted and controlled measured countries.

Recently<sup>[3]</sup> reported that most shipments of imported orange juice from Canada and Brazil to the USA have been tested positive for the presence of some types of fungicides. Also<sup>[4]</sup>. showed a positive identification of *E.coli* in ice cream in (100) samples of some traditional ice cream old in Damascus. However in most microbial contamination studied carried out of these locally produced product such as<sup>[5,6,7]</sup>. the emphasis was on soft drinks and plastic bottled drinking water. In this study however, the aim is to detect microbial contaminations such as aerobic bacteria *E.coli*, *coliform*, *Staphylococcus*, *Salmonella*, in locally produced orange juices, ice creams, and yogurts.

## **Materials and methods:**

### **A-Sampling:**

45 samples of locally processed and available in markets of city of Baghdad included juices, ice creams and yogurts were randomly collected during summer time (June, July, and August 2012). Twenty samples from juices of different fruits, 15 samples from ice creams and 10 samples from yogurts were collected.

Samples were collected from local markets and booths then transported to a sterilized strait closing bottle of (100) ml of each sample for microbial tests.

### **B-Microbial tests:**

1- The total number account of bacteria were estimated using aerobic plate count- buffered peptone water (BPW) and standard plate count (SPC) / nutrient agar according to procedure cited in<sup>[8]</sup>. Then 25 ml of sample was taken and added to 225 ml of (BPW)

and mixed thoroughly for (3-5) min. and dilution was carried out up to 1-10000. One ml of each dilution was taken and placed in patredish adding 10 ml from (SPC) which has been restored at (45)°C, mixed well and left for hardening for (24-48) hours, then number of colonies in the plate was counted (30-300) colonies, results of each dilution were recorded.

2- Method of counting coliform and *E.coli* In this method both media of MaCconkey agar and MaCconkey broth were used and mixed well with samples and following the same previous procedures as cited in<sup>[8]</sup>. Samples incubated at (37)°C for (24-48) hours, then colonies counted at patredish (30-300) and data for each sample was recorded.

3- In detection for *E.coli*, group of tests by (API20) were carried out and according to procedure cited in<sup>[8]</sup>. Five colonies were placed in test tubes contain MaCconkey broth and incubated for (24) hours at (44)°C. indication of *E.coli* was the change in color.

4- Isolation of *Salmonella* Spp:

Tetrathionate broth and Salmonella Shigella agar were used as a media by mixing the sample with broth following same previous procedure. Then incubated for (24) hours at (37) °C, 10 ml of the added media was taken from Tetrathionate broth added to Iodine solution and incubated for (24) hours at (37)°C. Then isolate was prepared by taken loop carrier of each culture and mixed on patredish having (S.S.Agar), incubated at (37)°C for (24) hours. Five colonies of each patredish have been chosen and biochemical carried out according out to procedure cited in<sup>[8,12]</sup>.

## **Results and Discussion:**

The results indicate the existence of aerobic bacteria in most samples tested of juices and the existence of coliform bacteria in several samples. No existence

of *Salmonella* was recorded as shown in table-1.

This finding agreed with results of Almosawi [5]. Regardless of number of both bacteria found in juice sample, their

existence is an indication of microbial contamination.

Also, the table 1 shows that the rate of rejection according to Iraqi standards<sup>[9,11,12]</sup> is 15% for total number count of bacteria, 10% for Coliform .

**Table-1: Microbial Contamination of locally processed juices.**

Sample No.	Count of aerobic bacteria CFU/(ml)	Count of Coliform (CFU/ml)
1	2*10 <sup>2</sup>	Zero
2	2*10 <sup>4</sup>	Zero
3	Zero	Zero
4	Zero	Zero
5	Zero	Zero
6	3*10 <sup>2</sup>	4*10 <sup>2</sup>
7	4*10	2*10
8	Zero	Zero
9	4*10	8*10
10	3*10	1*10
11	2.8*10 <sup>3</sup>	Zero
12	4*10 <sup>4</sup>	Zero
13	1.5*10 <sup>2</sup>	Zero
14	Zero	Zero
15	1.5*10 <sup>2</sup>	8*10
16	Zero	Zero
17	4*10	Zero
18	1*10 <sup>4</sup>	2*10 <sup>2</sup>
19	Zero	Zero
20	3*10 <sup>2</sup>	Zero

In table-2 the results indicate the existence of aerobic and coliform bacteria in almost all samples tested of ice cream existence of *E.coli* and *Staphylococcus* in several samples tested.

Table-2 also shows that the rate of rejection comparing to Iraqi standards for ice cream as follow: 66.5% for total

number count of bacteria, 65.6 % for coliform bacteria, 60% for *E.coli*, 13.3 for *Staphylococcus aureus*. No existence for *Salmonella* was noticed for all samples according to Iraqi standards<sup>[11,12]</sup>.

These bacteria are also an indication of microbial contamination of ice cream according to Iraqi standards<sup>[11]</sup>.

Table-2: Microbial Contamination detection for ice creams.

Sample No.	T.N aerobic (CFU/ml)	No. of Coliform (CFU/ml)	No. of E.coli(CFU/ml)	No. of Staph aureus (CFU/ml)
1	$9 \times 10^2$	$8 \times 10^2$	$1 \times 10$	Zero
2	$3 \times 10^2$	$8 \times 10^3$	Zero	Zero
3	$7 \times 10^5$	$6 \times 10^3$	Zero	Zero
4	$2 \times 10^2$	$6 \times 10$	Zero	Zero
5	Zero	Zero	Zero	Zero
6	$2 \times 10^5$	$1.6 \times 10^5$	$1 \times 10$	$8 \times 10$
7	$7 \times 10^5$	$2 \times 10^5$	$4 \times 10^2$	Zero
8	$1 \times 10^7$	$2 \times 10^5$	$6 \times 10^4$	$3 \times 10^2$
9	$1.2 \times 10^5$	$2.9 \times 10^4$	$1.7 \times 10^7$	Zero
10	$2 \times 10^5$	$1.2 \times 10^4$	$1 \times 10$	Zero
11	$4 \times 10^6$	$2 \times 10^4$	Zero	$1.5 \times 10^2$
12	$9.2 \times 10^4$	$4 \times 10^2$	$1.2 \times 10^3$	$1 \times 10$
13	$4.5 \times 10^6$	$1.6 \times 10^5$	Zero	$8 \times 10$
14	$2.5 \times 10^5$	$1 \times 10^3$	$1 \times 10^3$	$1 \times 10$
15	$4 \times 10^5$	$1.7 \times 10^4$	$2 \times 10^3$	$3 \times 10$

Also in table-3 the results indicate the existence of coliform bacteria in 50% of tested samples for yogurt with rate of

contamination of 30%. No existence for *Salmonella* was recorded in all tested samples. CFU: colony forming unit.

Table-3: Microbial Contamination in yogurt.

Sample no.	No. of Coliform (CFU/ml)	Salmonella (CFU/ml)
1	Zero	Zero
2	$1 \times 10^3$	Zero
3	Zero	Zero
4	Zero	Zero
5	Zero	Zero
6	$1 \times 10^4$	Zero
7	$2 \times 10^3$	Zero
8	$1 \times 10^4$	Zero
9	$1 \times 10$	Zero
10	Zero	Zero

The absence of *Salmonella* may attributed to the olddish of samples or/and the heigh temperature. (Sampling was carried out during summer time), since *Salmonella* known as low thermal tolerance bacteria and low active in non-fresh food. Also, may PH is another factor contribute to absence of these bacteria<sup>[2]</sup>.

### Conclusion:

All tested samples showed indication of microbial contamination at

different levels for juices, ice creams, and yogurts. This contamination may attributed to the primitive process of preparing, producing storing and marketing of these products, mainly the process of no or insufficient sterilization processes which allows for suitable media for existence of these harmful bacteria, thus according to Iraqi standers, these products are not valid for human consumption.

Thus, this study recommends a full cooperation among related organizations such as ministries of health, interior affairs,

and planning together with central Bureau of Iraqi standardization in term of controlling and supervision of all of these products.

**References:**

- 1- Lebania, O. M. Hidden secrets of processed food. Al-Mareffa journal 2004. Vol. 108. Pp: 118 .
- 2- Adams, M. R .and Moss M.O. food microbiology. New age international. India. 2008.
- 3- Ford, J. New contamination in orange juice. Report issued by Orlando landscape garden examiner U.S.A. 2012.
- 4- Salaq, S. and S. Abu – Gora Study of some microbial properties of local milk ice cream. Journal of Damascus University for agricultural sciences. 2004. Vol. 20. (2). Pp: 223-241.
- 5- AL-Mosawi, M. Soufi, and Aziz, R. Detection of microbial and chemical of some carbonated drinks and juices that are available in local markets. Iraqi journal for market research and consumer protection. 2010. Vol. 2. (3).
- 6- Al-Azawi, A. S. N.; AL-Taie, W. A, and Th. Sultani. Study of some microbial contaminants of Iraqi at international soft drinks. Journal of Babylon- pure and applied sciences. 2011. Vol. 19. (1).
- 7- AL-Mosawi, B. E, and I. S. H. Al-Zubiadi. Detection of microbial and chemical contaminants of the plastic bottled drinking waters. Iraqi journalfor markets research and consumer protection. 2010. Vol. 3. (2).
- 8- AOAC official methods of analysis, 18<sup>th</sup>ed. Edited by Horwitz, and Latiner, G. W. AOAC international. 2005.
- 9- Iraqi standardization. Microbial limits in food. Identification of microbial groups in food. 2006. Vol. 3. (2270/3). Pp: 30.
- 10- Wareing, P. and Davenport R. R. Microbiology of soft drinks and fruit juices. 1980. Pp: 279-297.
- 11- Iraqi central bureau for standardization and quality control. Ministry of planning. Iraqi central bureau for standardization and quality control for microbial limits for juices and drinks. No. 2270. Table (3-6). Ministry of Planning. 2011.