

## **INCIDENCE OF *Escherichia coli* IN CERTAIN EGYPTIAN DAIRY PRODUCTS**

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### **ABSTRACT**

Forty five samples of raw milk obtained from milk shops, vendors and farms, 20 samples of Ras cheese, 30 samples of Yoghurt, 20 samples of Domiati cheese, 10 of Karich and 5 of Morta were collected from the local market of Domiatti governate. They were all analyzed for the incidence of *E.coli* . Most of these samples were positive for acid and gas formation in Mac Conky broth. 130 isolates from these were further analyzed for the confirmation of the presence of *E.coli* and 77 of them were found to be positive.

### **INTRODUCTION**

*E. coli* is the abbreviated name of the bacterium named Escherichia (Genus) coli (Species). *E.coli* belongs Family (Enterobacteriaceae ) and named enteric bacteria. It is Gram- negative, facultative, non-sporeforming rod. It is a typical mesophile, growing from 7-10°C up to 50°C with an optimum temperature around 37°C. Optimum growth is at a pH near neutral, but growth is possible at as low as pH 4. *E. coli* is serotyped to three major antigens on the surface: O (lipopolysaccharide somatic), H (flagella) and K (capsule)(Adams & Moss, 2002).

Escherich is the name of first person who isolated and characterized this bacterium in 1885 so it named after him. The organisms inhabit the intestinal tract as normal flora. (Karmali *et al.*, 1983). Presence of *E.coli* in our intestine is necessary for our healthy, it helps us to inhibit the harmful bacteria, and it provides us with some necessary vitamins such as K and B-complex as results of its biological process. But there are some rare strains within *E.coli* can be harmful to the human. Presence of *E.coli* in milk and other dairy products often indicates that these products were contaminated by manure , unclean water or feces of dairy cattle which consider the main reservoir for pathogenic *E.coli* ( Wells *et al.*, 1991; Garber *et al.*, 1999).

### **MATERIAL AND METHODS**

The obtained samples of raw milk, cheese, yoghurt and Morta were randomly collected from the local market of Domiatta governate. The samples of raw milk were collected from small shops, vendors and farm, whereas cheese samples, yoghurt and morta were gathered from small dairy laboratories, which prevailed in the governate and which make these products under unhygienic conditions. All of these samples were presumptively analyzed for the presence of *E. coli* in the Mac Conkey broth. Further examination of the positive for acid and gas was carried out as a confirmatory test of these isolates, according to Bergey's Manual of

Determinative Bacteriology (1957). during that the isolates were subjected to staining with Gram, Catalase test, fermentation of glucose at both of 37 and 45°C, Indole production, Methyl red test, Voges – Proskaur test, Urease test and Oxidase reaction.

## **RESULTS AND DISCUSSION**

### **1. Incidence of *E.coli* in some local dairy products:**

Some dairy products, i.e. raw milk (from milk shops, farms and vendors), fresh Ras cheese, Karish cheese, Domiati cheese, Morta, and different yoghurt samples were analyzed for the presence of *E.coli*. All of the examined samples were found to be positive for coliform with different ratio, except 5 raw milk samples taken from udder directly in aseptically glasses and Morta samples, which were negative for coliform. Other samples were coliform positive, 25 out of 25 samples raw milk from dairy shops (100%), 15 out of 15 samples of raw milk from vendors, 20 out of 20 (100%) Ras cheese samples, 27 out of 30 (90%) Yoghurt samples, 12 out of 20 (60%) Domiatti cheese samples and 10 out of 10 (100%) Karish Cheese samples. Most of these samples have a high ratio of *E.coli*, 13 out of 25 (52%) raw milk from dairy shops samples, 13 out of 15 (86.6%) raw milk from vendors, 13 out of 20 (65%) Ras cheese, 19 out of 30 (63.3%) Yoghurt samples, 9 out of 20 (45%) Domiatti cheese and 10 out of 10 (100%) Karish cheese samples (Table 1).

**Table 1: Contamination ratio with all of coliform and *E.coli* in raw milk and some local dairy products**

| <b>Source and kind</b>        | <b>No. of sample</b> | <b>No. of sample positive for Coliform</b> | <b>No. of sample positive for <i>E.coli</i></b> | <b>% <i>E.coli</i></b> |
|-------------------------------|----------------------|--|---|------------------------|
| 1- milk shops (raw milk)      | 25                   | 25   | 13  | 52%                    |
| 2- vendors (raw milk)         | 15                   | 15   | 13  | 86.6%                  |
| 3- farm (raw milk from udder) | 5                    | 0  | 0   | 0                      |
| 4- Rass cheese                | 20                   | 20   | 13  | 65%                    |
| 5- Yoghurt                    | 30                   | 27   | 19  | 63.3%                  |
| 6- Domiatti cheese            | 20                   | 12   | 9   | 45%                    |
| 7- Karish cheese              | 10                   | 10   | 10  | 100%                   |
| 8- Morta                      | 5                    | 0  | 0   | 0%                     |

*E.coli* was detected in 45% of Domiatti cheese samples, 65% of Ras cheese and 100% of Karish cheese samples. In all cheese types 32 of 50 (64%) samples were contaminated with *E.coli*. Other studies reported that the rates of *E.coli* in cheese were 58% in soft and semi hard cheese ( Ansay & Kaspar, 1997), 32,8% in Domiatta cheese and 20.8% in Kareish cheese ( Aman, Knapstein, & Hahn, 1998). According to these results, the contamination ratio of total samples of raw milk was 26 of 45 samples (57.7%) was in agreement with the results of Ahmed and Sallam, (1991). The milk obtained from milk vendors is highly contaminated with *E. coli* (86.6%), followed by raw milk samples obtained from milk shops (52%), while the milk

obtained from the udder of cows directly and collected in sterilized bottles had no coliform. This indicates that the milk is free from *E.coli* before the milking processing, and the presence of *E.coli* in the raw milk is, therefore, due to unhygienic milking conditions. In different types of cheeses, the highest number 10 out of 10 (100%) of Karish cheese samples were contaminated with *E.coli*, this probably due to the traditional production method of Karish cheese in Egyptian villages, which depended on fermentation of the raw milk through two to three days by the natural flora without any heating treatment. Presence of *E.coli* in high ratio in Karish cheese indicated that the acid formation and the addition of sodium chloride to the cheese are insufficient to suppress the pathogenic microorganisms. Nassib *et al.* (2003) showed that the acid development during manufacturing of Matarred cream insufficient to prevent the growth of *Salmonella enterica* subsp.*enterica*, followed by Ras cheese (65%), which sometimes made from raw milk to accelerate the ripening processing by contribution of the microorganisms enzymes in degrading protein and fat in the curd, but the long time of storage before consumption and reduction of humidity in the ripened cheese may lessen the number of *E.coli*, while the lowest ratio of 45% was detected in Domiatti cheese which often made from raw milk with high content of sodium chloride (15%), specially in the summer season to preserve the milk from high load of contamination. This concentration may delay growth of *E.coli*. EL-Gazzar (1993), concluded that *E.coli* O157:H7 is not salt tolerant. Results from the Analysis suggested that there was a high contamination with *E.coli* in difference analyzed samples collected from Domiatte governate as shown in table 1 and figure 1.

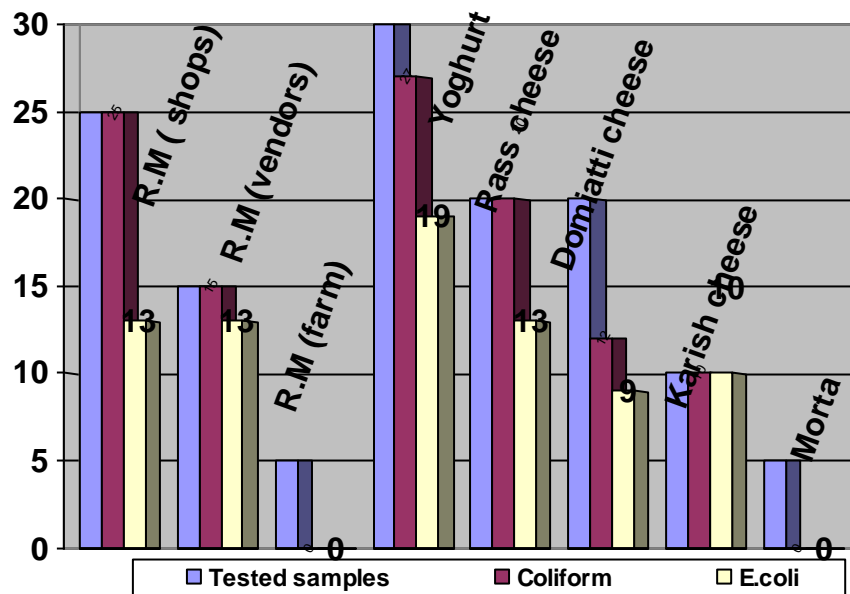


Figure 1: Incidence of Coliform and *E.coli* in raw milk and some local dairy products in Domiatte.

Results in table (2) indicate that the identical characteristics of the examined isolates, which were G -, rod- shaped, positively catalase, acid and gas from glucose at 37 and 45°C, Methyl red reaction. Moreover, they were able to produce indole, and, negatively Voges – Proskaur, Simon's Citrate, Urease, and Oxidase reaction.

The microorganism found in other regions in Egypt in different types of cheeses, milk and ice cream. In Kafer El shiekh 14% in raw milk (El- kholy and Mohmoud, 1988), in Beni suef city 20% in butter (El- kholy, 1994) and karish and Domiatti cheese 25 % and 22.5% respectively (El.Kholy *et al.*, 1995), in Damanhour city 66.7 % and 79.5 % in Domiatti and Karish cheese respectively (El- Kholy, 1986) and in Alexandria 6.6% in ice cream (El-Leboudy *et al.*, 1992).

In conclusion, the present study illustrated the frequent existence of *Escherichia coli* in milk and other local dairy products. The traditional methods of milk production and manufacturing of some local dairy products without any interest to the microbial quality. Such method could adapt a suitable environment for bacterial contamination.

**Table 2: Characterization of selected cultures:**

| Character                                  | Reaction |
|--|----------|
| Gram reaction                              | -        |
| Shape                                      | Rod      |
| Catalase                                   | +        |
| Glucose fermentation at 37°C to acid + gas | +        |
| Glucose fermentation at 45°C to acid + gas | +        |
| Indole Production                          | +        |
| Methyl Red                                 | +        |
| Voges Proskaur                             | -        |
| Simmon's citrate                           | -        |
| Urease                                     | -        |
| Oxidase reaction                           | -        |

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### **وجود ال *Escherichi coli* في بعض منتجات الألبان المصرية**

**طه عبد الحليم نصيب و هاني موسى الجنائني**

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أجريت هذه التجربة لتقدير مدى تلوث اللبن الخام وبعض منتجات الألبان المصرية تحت ظروف إنتاج اللبن الخام وتصنيع وتوزيع هذه المنتجات المحلية والتي تصنع في كثير من الأحيان من اللبن الخام بدون أي معاملات حرارية أو توافرا لشروط الصحية اللازمة مما يعطي مؤشر على مدى أمان هذه المنتجات بالنسبة للمستهلك.

وقد أظهرت الدراسة النتائج الآتية: وجد أن معظم العينات المختبرة كانت ملوثة بالميكروب ماعدا عينات اللبن الخام التي تم الحصول عليها من الضرع مباشرة في أوعية معقمه وكذلك عينات المورثة بينما كانت نسب التلوث في باقي العينات كالاتي: ٢٦ من ٤٥ عينة لبن خام ( ٥٧,٧%) – ١٣ من ٢٠ عينة جبن راس (٦٥%) – ١٩ من ٣٠ عينة زيادي (٦٣,٣%) – ٩ من ٢٠ عينة جبن دمياطي (٤٥%) – ١٠ من ١٠ عينات جبن قريش (١٠٠%) (نسبة التلوث في عينات الجبن مجتمعه ٣٢ من ٥٠ أي ٦٤%).