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**ENTEROBACTERIACEAE IN EGYPTIAN SOFT CHEESE  
AND THEIR PUBLIC HEALTH SIGNIFICANCE**  
(With 3 Tables and One Figure)

By

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البكتريا المعوية في الجبن المصري وأهميتها على الصحة العامة

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يعتبر الجبن القريش والدمياطي من منتجات الألبان التي تستعمل بكثرة في مصر إلا أنها عرضة للتلوث بمختلف الميكروبات مما يعرض صحة المستهلك للخطر وكذلك تعرض المنتج للتلوث مسببا خسارة اقتصادية لذلك أجريت هذه الدراسة على 50 عينة من الجبن المصري (قريش طرازج) (20 دمياطي) جمعت من مدينة بني سويف وذلك لعزل وتمييز الميكروبات المعوية ومعرفة أهميتها على الصحة العامة. وقد وجد أن متوسط العدد الكلي للبكتريا المعوية في الجرام الواحد هو:  $1.0 \times 10^2$  ±  $1.0 \times 10^2$  ،  $1.0 \times 10^2$  ±  $1.0 \times 10^2$  لكل من القريش الطازج والدمياطي على التوالي. وقد أمكن عزل ميكروب القولون المصري بنسبة 22.22% في النوعين السابقين على التوالي وكذلك تم عزل الميكروبات التالية:

*Enterobacter*, *Klebsiella*, *Citrobacter*, *Proteus*, *Providencia*, *Obesumbacterium Proteus* biogroup I and *Morganella morganii* species.

من العينات سالفة الذكر بنسب متفاوتة ولم يتم عزل ميكروب *Shigella* or *Salmonella* ، وقد تسم ذكر خطورة هذه الميكروبات على الصحة العامة وكذلك الشروط الصحية الواجب اتخاذها لتحسين هذا المنتج.

**SUMMARY**

A total of 50 samples of Egyptian soft cheese (fresh Kareish and Domiati) were collected from Beni-Suef City markets and shops for enumeration, isolation and identification of Enterobacteriaceae organisms. The mean value of Enterobacteriaceae count/gm were  $1.34 \times 10^2 \pm 92.61 \times 10^2$  and  $5.85 \times 10^2 \pm 3.72 \times 10^2$  for examined Kareish and Domiati cheese respectively. *E.coli* was detected in 22.22% and 10% of the examined samples respectively. *Enterobacter*, *Klebsiella*, *Citrobacter*, *Proteus*, *Providencia*, *Obesumbacterium proteus* biogroup I and *Morganella morganii* spp. were isolated in different percentages. *Salmonellae* and *Shigellae* organisms could not be detected. The public health importance of the isolated organisms as well as the suggested measures for improving the quality of such products were discussed.

## INTRODUCTION

The control of Enterobacteriaceae in Egyptian soft cheeses (Kareish and Domiati) is one of the most essential objective of sanitary control before being delivered for human consumption. This kind of food proved to be a very good source of animal protein and minerals. In fresh foods of animal origin, most Enterobacteriaceae stem from faecal contamination, and their occurrence in high numbers may indicate unsanitary handling and/or inadequate storage (HECHELMANN *et al.*, 1973; HUNYADY *et al.*, 1973 and COX *et al.*, 1975) as well as being a reliable indicators of faecal contamination (MOSSSEL, 1957 and WHO, 1976). Moreover, the presence of Enterobacteriaceae in dairy products may be responsible for certain undesirable changes which render the products of inferior quality or even unfit for human consumption as they have been implicated in many cases of food poisoning FRANK *et al.*, 1977; SHARP *et al.*, 1980; TAYLOR *et al.*, 1982; ANON, 1984 and as well as other foodborne diseases. These organisms were previously isolated from cheese by (SADEK & EISSA, 1956; HEGAZI, 1972; SHELAIH, 1979; MOURSU *et al.*, 1982 and ABOUL-KHIER *et al.*, 1985). Therefore, the present work was carried out to secure information regarding the hygienic conditions of this popular food article.

## MATERIAL and METHODS

A total of 50 random samples of Egyptian soft cheese (30 fresh Kareish and 20 Domiati) were collected from Beni-Suef City markets and shops. The samples were directly transferred to the laboratory and tested bacteriologically and chemically as follows:

### I- Bacteriological examination :

**A- Enumeration of Enterobacteriaceae :** The total Enterobacteriaceae count was carried out according to ICMSF (1978) by plate count, using V.R.B.G.A.

**B- Pre-enrichment and Enrichment processes :** The pre-enrichment and enrichment processes were performed by using buffered peptone water, selenite and rappaport vassiliadis (RV) enrichment broth (oxid) according to Amtliche Sammlung 35 LMBG (1982).

**C- Isolation :** The isolation of organisms were performed by using MacConkey and Modified Brilliant Green Agar (oxid) according to Amtliche Sammlung 35 LMBG (1982).

**D- Identification :** The identification of Enterobacteriaceae was carried out according to NOEL and JOHN (1984).

### II- Chemical examination :

The sodium chloride content and acidity % were determined according to C.T.D.P (1977).



## RESULTS

Table (1): Enterobacteriaceae count/gm in fresh Kareish and Domiati cheeses.

Types of cheese	Maximum	Minimum	Mean
	per gram		
Fresh Kareish	$2 \times 10^9$	$\frac{1}{100}$	$1.34 \times 10^8 + 92.61 \times 10^6$
Domiati	$7.5 \times 10^3$	$\frac{1}{100}$	$5.85 \times 10^2 + 3.72 \times 10^2$

Table 2: Average Sodium chloride content and acidity % in fresh Kareish and Domiati cheeses.

Variations	Kareish cheese		Domiati cheese	
	Sodium chloride	Acidity	Sodium chloride	Acidity
Minimum	7.6	0.45	6.8	0.45
Maximum	9.0	2.85	9.0	4.1
Mean	$8.3 \pm 0.08$	$1.1 \pm 0.15$	$8.2 \pm 0.15$	$1.85 \pm 0.21$

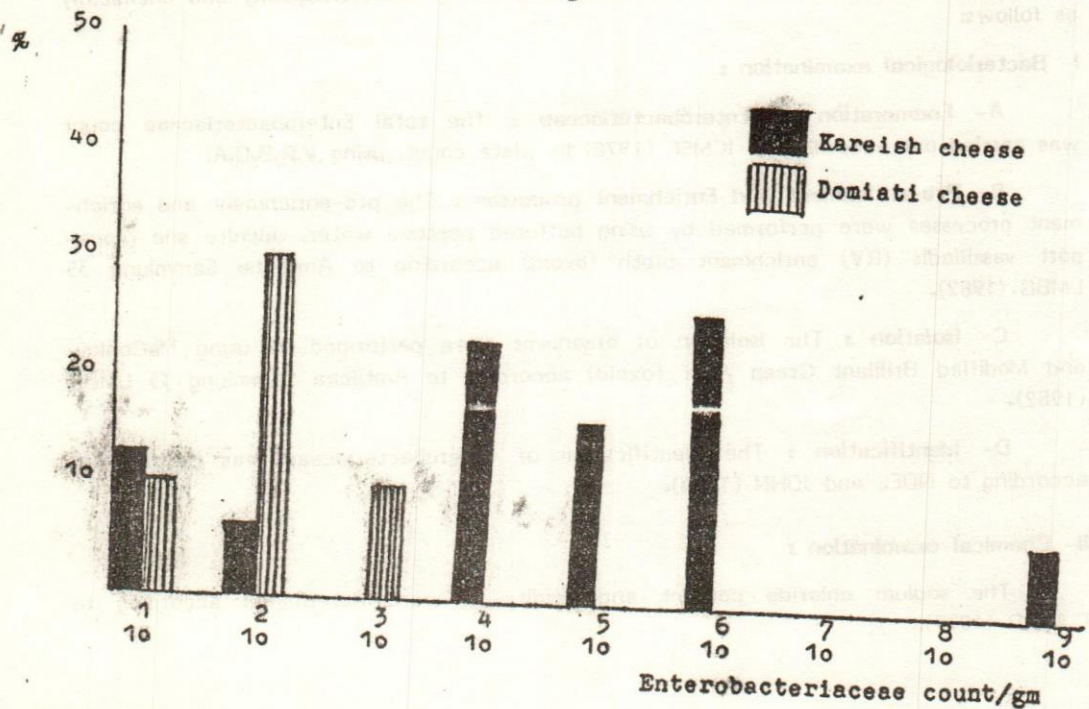


Figure 1: Histogram of examined Kareish and Domiati cheeses samples based on their Enterobacteriaceae count.

Table 3: Incidence percentage of Enterobacteriaceae isolates recovered from fresh Kareish and Domiati cheese samples.

Isolates	fresh Kareish cheese		Domiati cheese	
	No of +ve samples	%	No of +ve samples	%
<i>E.coli</i>	7	23.33	2	10
<b>Enterobacter</b>				
<i>Ent.aerogenes</i>	-	-	2	10
<i>Ent.cloacae</i>	2	6.67	-	-
<i>Ent.agglomerans</i>	1	3.33	-	-
<b>Klebsiella</b>				
<i>K.pneumoniae</i> subsp.1 <i>pneumoniae</i>		3.33	5	25
<i>K.pneumoniae</i> subsp.- <i>rhinoscleromatis</i>		-	1	5
<i>K.oxytoca</i>	4	13.33	-	-
<b>Citrobacter</b>				
<i>C.freundii</i>	1	3.33	-	-
<b>Proteus</b>				
<i>P.mirabilis</i>	4	13.33	-	-
<i>P.myxofaciens</i>	1	3.33	-	-
<b>Providencia</b>				
<i>Pr.rettgeri</i>	2	6.67	-	-
<b>Obesumbacterium pr- oteus biogroup I</b>	-	-	2	10
<b>Morganella morganii</b>	-	-	1	5

## DISCUSSION

It is evident from table (1) that the mean value of total Enterobacteriaceae count/gm was  $1,34 \times 10^8 \pm 92.61 \times 10^6$  in examined fresh Kareish cheese. The highest frequency distribution, 66.7% lies within  $10^4 - 10^6$ , while 20% contained Enterobacteriaceae between  $10^1 - 10^2$  (Fig. 1). It was found also that 93.3% of Kareish cheese samples contaminated with Enterobacteriaceae. These findings are slightly more than those obtained by ABOUL-KHIER *et al.* (1985). The high count of Enterobacteriaceae organisms in examined samples may be attributed to improper sanitary measures during handling and manufacture of the product.

Of examined Domiati cheese samples 50% showed to be contaminated with Enterobacteriaceae, while the highest frequency distribution 40% lies within the range of  $10^2 - 10^3$  (Fig. 1). The mean value of total Enterobacteriaceae count/gm was



$5.85 \times 10^2 \pm 3.72 \times 10^2$  (Table 1). The obtained result was lower than those recorded by ABOUL-KHIER *et al.* (1985).

The mean value of sodium chloride content and acidity % of examined fresh Kareish and Domiati cheese samples were  $8.3 \pm 0.08$ ,  $1.1 \pm 0.15$  and  $8.2 \pm 0.15$ ,  $1.85 \pm 0.21\%$ , respectively (Table 2). It was found that the quantitative relationship between the salt, acidity and Enterobacteriaceae content in the examined Kareish cheese samples is not significant, while in case of Domiati cheese samples there is significant relationship only between the acidity % and Enterobacteriaceae content.

Table (3) reveals that the *E. coli*, *Enterobacter*, *Klebsiella*, *Citrobacter*, *Proteus*, *Providencia*, *Obesumbacterium proteus* biogroup I and *Morganella morganii* species could be isolated from examined samples of Kareish and Domiati cheese at varying percentages, EL-BASSIONY (1977), SHELAIH (1979); MOURSY *et al.* (1982) and ABOUL-KHIER *et al.* (1985) could be isolated such organisms. *Salmonellae* and *Shigellae* could not be detected in any of the examined samples of the two kinds of cheese. The presence of Enterobacteriaceae in higher populations, pathogenic and/or deteriorating organisms may constitute a public health hazard as well as economic losses. Therefore, it is highly recommended that strict hygienic measures should be adopted during manufacturing and handling of such products, educational programmes to those sharing in processing of dairy products by specialists, should be encouraged and finally periodical inspection of processing plants should be conducted by specialists.

The results obtained concluded that there is neglected sanitary control adopted during manufacture, handling and distribution of fresh Kareish cheese. Finally, it is advisable to applicate the previously mentioned measures to improve its quality and safeguard consumers against infection.

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