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MYCOLOGICAL EVALUATION OF SOME EGYPTIAN CHEESES AT THE STAGE OF CONSUMPTION

(With One Table)

By

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التقييم الميكولوجي للجبن المصري المعد للاستهلاك

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أجريت هذه الدراسة للتعرف على مدى تواجد الفطريات الصحية فى بعض أنواع الجبن المحليه حيث تم جمع ١٢٠ عينه عشوائيه من الجبن الدمياطى الطازج والمخزون والقريش المملح المخزون والمطبوخ المحلى من بعض أماكن بيع وتصنيع الجبن بمدينة أسيوط ، وقد أمكن عزل ٢٦ species من ١٦ genera من أصناف الجبن المختلفه المفحوصه ، واتضح أن أكثر أنواع الجبن تلوثاً بالفطريات هو الجبن الدمياطى الطازج بينما الجبن المطبوخ أقلها تلوثاً . وكان أغلب الفطريات المعزوله من نوع *Asperigillus* and *Penicillium* فى العينات المفحوصه . كما تم عزل فطر مرضى واحد *Chrysosporium tropicoum* من الجبن القريش المملح المخزون . هذا وقد تمت مناقشة النتائج لبيان تأثير الفطريات المعزوله على جودة المنتج وعلى صحة المستهلك واقتراح ما يجب أن يتبع فى انتاج أنواع الجبن المحليه .

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SUMMARY

One hundred and twenty (120) random samples of some locally manufactured Egyptian cheeses including fresh and stored Damietta, stored pickled kareish and Processed (30 samples each) were collected from different retail in Assiut City and subjected for mycological examination. Twenty-six species of molds were identified on sabouraud's dextrose agar medium at 25°C. Damietta cheese was the most contaminated kind, while processed cheese was the lowest polluted one. *Aspergillus* and *Penicillium* species were the most common molds on the examined samples. One pathogenic mold species was isolated from stored pickled kareish cheese namely *Chrysosporium tropicum*.

Keywords: mycology, evaluation, Egyption cheese, stage of consumption.

INTRODUCTION

Cheeses considered one of the most important consumed foods in Egypt and other developing countries. During the storage periods, preservation methods or treatments are not applied to cheese so that a hard rined layer heavily contaminated with molds occur (ARAN and EKE, 1987 a). The high levels of mycoflora in cheese may be due to subsequent handling by the attendants or because of failure to clean or sterilize the processing equipments (ARAN, 1975).

Mold contamination on cheese affects the yielded quality and nutritional value of the products. Moreover, some cheeses may contain toxic mold metabolites (mycotoxins) as a result of mold growth. During processing, handling and distribution of cheese as one of the most important milk products, it may be subjected to contamination with several types of molds from different sources which impair its utility and sometimes rendering the products unsafe and of public health hazard. At the stage of consumption these molds are deaned mechanically. As it is known, that application has no effect on mold spores or mycotoxins if produced.

The aim of this work is to study the degree of contamination of some locally manufactured cheese with molds and yeasts.

MATERIALS AND METHODS

120 random samples of cheeses including fresh and stored Damietta, stored pickled kareish and processed cheeses (30 samples each) were collected from retail markets in Assiut City. Each sample was transferred to the laboratory in a clean, dry and sterile wide mouth glass stoppered jars and kept in cool place (3-5°C) till molds and yeasts analysis.

Determination of molds and yeasts:

The dilution-plate method was used for determination of cheese molds (JOHNSON and CURL, 1972). Ten grams of each cheese sample were transferred into a sterile mortar and thoroughly mashed. 90 ml of sterile 2% sodium citrate solution were added to obtain a dilution of 1/10, then serial dilutions were carried out as described by (A.P.H.A., 1978) till the final desired dilution is reached. One ml of the desired dilution is transferred aseptically into each of several petri-dishes. 12-15 ml of an appropriate sabouraud's dextrose agar medium (MORS and McQUOWM, 1969) cooled to just above solidifying temperature were added to each dish. The plates were incubated at 37°C for 48 hours then left at room temperature (20-25°C) for 7 days. The developing molds were identified, counted and the numbers were calculated per gram of each substrate.

Identification of the molds was carried out by the taxonomic methods of CHARMICHAEL (1962), ELLIS (1971), Booth (1971), RAPER and FENNELL (1977), PITT (1979, 1985), DOMSCH *et al.* (1980), RAMIREZ (1982) and SIVANESAN (1987).

RESULTS

The obtained results were recorded in Table 1.

DISCUSSION

Twenty-six species representing 16 genera of molds were isolated from the four types of cheese. The total counts of filamentous molds were isolated from the four types of cheese. The total counts of filamentous in all samples tested widely varied from 3500-11000 colonies/g cheese. The most contaminated samples were fresh Damietta cheese having the high total counts (11000 colonies) and number of genera (9) and species (15). While the lower polluted samples were the processed cheese which contained the minimum total counts (3500 color) and number of genera (7) and species (12) as shown in Table 1. From the samples examined in this laboratory mycoflora of Egyptian cheeses appear to be similar to other cheese samples analyzed

in other countries (COOKE and BRAZIA, 1968, GADDI, 1974, BULLERMAN, 1970, 1981, NORTHOLT et al., 1980, AMAN, 1985, ZERFIRIDIS 1985 and ARAN and EKE, 1987 a).

The results recorded in Table 1 show that the total counts of yeasts fluctuated between 3900-11700 colonies/g cheese. As in filamentous molds the most polluted one was fresh Damietta cheese and the lowest one was processed cheese. They encountered in 80, 83, 63, and 50% of the samples comprising 51.5, 61.4, 45.0 and 52.75 of total mycoflora in fresh and stored Damietta, stored pickled kareish and processed cheeses, respectively. These observations have tended towards those indicated by several workers in many parts of the world (FAHMY and YOUSSEF, 1974, MEHRAN et al., 1975, EL-BASSIONY, 1977, NAKASE and KOMAGATA, 1977, SEHAM et al., 1982 and EMAN, (1987).

The results in Table 1 revealed that the most common molds in the four types of cheese were *ASPERGILLUS* and *PENICILLIUM* species. They were occurred in 23-53% and 17-33% of examined samples comprising 26.1-65.7% and 17.131.8% of total molds, respectively. The most prevalent species were *A.flavus*, *A.niger*, *A.terreus*, *P.chrysogenum* and *P.citrinum*. They isolated from three or four types of cheese. The remaining *Aspergillus* and *Penicillium* species were isolated only from one or two kinds of cheese. GALIKEEV et al. (1971), BULLERMAN and OLIVIGNI (1974), BULLERMAN (1976), LEISTNER (1984) and PITT and HOCKING (1985) have indicated that the majority of molds isolated from various foodstuffs (including cheese) consisted of *Penicillium* and *Aspergillus* species. Also, ARAN and EKE (1987 a) observed that 90-93% of the molds isolated from Turkish cheese consisted of *Penicillia*. But, ZERFIRIDIS (1985) reported that more than 78% of the isolated molds from Greece cheese were *Penicillium* species, while *Aspergillus* made up 3.8-3.9%.

Nectria haematococca and *Rhizopus stolonifer* were isolated from three or four substrates. But *Cladosporioides*, *C.sphaerosperum* and *Fennellia flavipes* were on two. The remaining species were found only on one substrate (Table 1). These molds are nearly similar of those reviewed by BULLERMAN and OLIVIGNI (1974), SUTIC et al., (1979), LEISTNER (1984) and ZERFIRIDIS (1985).

One pathogenic mold species was isolated (*chrysosporium tropicum*) from stored pickled kareish cheese. It was detected in 10% of the tested samples having 3.4% of total molds. In Egypt, there is no Knowledge in hand about its isolation from locally produced cheese. But, MEHRAN et al (1976) isolated pathogenic *Trichosporon* form Iranian white cheese.

From the previous results, some molds were encountered from two types of cheese as: *Aspergillus sydowii* and *A. tamaris* from fresh and processed cheese; *Cladosporium dadosporioides*, *C. spaeroserum*, *Fennellia flavipes* and *Penicillium* from fresh and damietta cheeses.

Other molds were isolated only from one cheese namely: *Aspergillus ochraceus*, *Cochliobolus spicifer* and *Scopulariopsis brevicanta*, *Gibberella funjikuroi*, *Mucor circinelloides* *Penicillium duclauxii* from stored kareish; *A. sclerotiorum*, *Emericella nidulans*, *Thielavia sepedonium* and *Trichoderma hamatum* from processed cheeses.

In conclusion, mycological analysis of different types Egyptian cheese reveals that those substrates were contaminated with several mold, especially members of *Aspergillus* and *Penicillium*. There is no specific fungal characteristics of any of these substrates. Many of the mold species isolated from cheese samples have strains which able to produce mycotoxins. This could be referred to improper manufacture methods, processing storage or handing of the cheeses. Also, the result made our attention to further examination of cheese for mold or mold metabolites (mycotoxins) to make sure of healthiness of human consumption.

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Table 1: Total counts (Tc, calculated per g fresh cheese in all samples), number of cases of isolation (NCI, out of 30 samples) and occurrence remarks (OR) of fungal genera and species recovered from four types of cheese on sabouraud's dextrose agar at 25°C.

Genera & species	Cheeses								
	Fresh Damietta		Stored Damietta		Stored pickled kareish		Processed		
	TC	NCI & OR	TC	NCI & OR	TC	NCI & OR	TC	NCI & OR	
<i>Alternaria alternata</i> (Kunze : Pers.) Wiltshire	-	-	-	-	-	-	-	-	-
<i>Aspergillus</i>	5200	16H	2400	10M	600	3R	-	2300	11M
<i>A. flavus</i> link	1500	9M	100	1R	2300	7R	-	300	3R
<i>A. niger</i> Van Tieghem	3000	11M	2000	8M	1100	5L	-	1000	8M
<i>A. ochraceus</i> Wilhelm	100	1R	-	-	-	-	-	-	-
<i>A. sclerotiorum</i> Huber	100	1R	-	-	-	-	-	100	1R
<i>A. sydowii</i> (Bain. & Sart.) Thom & Church	400	2R	-	-	-	-	-	200	1R
<i>A. tamarii</i> Kita	100	1R	300	1R	900	3R	-	200	2R
<i>A. terreus</i> Thom	-	-	-	-	300	3R	-	500	2R
<i>Chrysosporium tropicum</i> carmichael	-	-	-	-	-	-	-	-	-
<i>Cladosporium</i>	1200	5L	1100	4L	-	-	-	-	-
<i>C. cladosporioides</i> (Fres.) de Vries	700	3R	500	2R	-	-	-	-	-
<i>C. sphaerospermum</i> Penzig	500	3R	600	3R	-	-	-	-	-
<i>Cochliobolus spicifer</i> Nelson	400	1R	-	-	-	-	-	-	-
<i>Emmericella nidulans</i> (Eidam) Vuillemin	-	-	-	-	-	-	-	200	2R
<i>Femmelia flavipes</i> Wiley & Simmons	300	2R	500	2R	-	-	-	-	-
<i>Gibberella fujijuroi</i> (Sawada) Ito	-	-	100	1R	300	1R	-	-	-
<i>Mucor</i>	-	-	-	-	1600	8M	-	-	-
<i>M. arcinelloides</i> Van Tieghem	-	-	-	-	1600	8M	-	-	-
<i>M. racemosus</i> Fresenius	-	-	-	-	100	1R	-	-	-
<i>Nectria haematococca</i> Berkeley & Brown	100	1R	100	1R	1000	3R	-	-	-

Genera & species	Cheeses									
	Fresh Damietta		Stored Damietta		Stored pickled kareish		Processed			
	TC	NCI & OR	TC	NCI & OR	TC	NCI & OR	TC	NCI & OR	TC	NCI & OR
<i>Penicillium</i>	3500	10M	1400	6L	1500	9M	700	5L		
<i>P. chrysogenum</i> Thom	1300	3R	600	4L	1100	7L	500	3R		
<i>P. citrinum</i> Thom	-	-	300	1R	300	2R	200	2R		
<i>P. didanixii</i> Delacroix	-	-	-	-	100	1R	-	-		
<i>P. oxalicum</i> Currie & Thom	2200	7L	500	1R	-	-	-	-		
<i>Rhizopus stolonifer</i> (Ehrenb.) Lind	100	1R	300	3R	1200	62	100	1R		
<i>Scopulariopsis brevicaulis</i> (Sacc.) Bainier	200	2R	-	-	-	-	-	-		
<i>Trichia septodontium</i> Emmons	-	-	-	-	-	-	100	1R		
<i>Trichoderma hamatum</i> (Bon.) Bainier	-	-	-	-	-	-	100	1R		
Yeasts	11700	244	9400	25H	7200	194	3900	15H		
Total count		22700		15300		16000		7400		
Number of genera = 16		9		8		9		7		
Number of species = 26		15		12		12		12		

Occurrence remarks (OR)

H = high occurrence, between 15-30 cases (our of 30).

M = moderate occurrence, between 8-14 cases.

L = low occurrence, between 4-7 cases.

R = rare occurrence, between 1-3 cases.