

YEASTS IN MILK AND DAMIETTA CHEESE AT DAMIETTA GOVERNORATE

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ABSTRACT

A total of 50 random samples of raw milk and Damietta cheese (25 each) were collected from different outlets at Damietta Governorate. All samples were examined for detection of yeasts. Results revealed that all raw milk and cheese samples were contained yeasts at different counts. The mean yeast count was 3.4×10^3 /ml and 3.7×10^4 /g in the examined raw milk and Damietta cheese samples, respectively. Also results declared isolation of five genera of yeasts including *Candida*, *Torulopsts*, *Trichosporon*, *Rhodotorula* and *Saccharomyces* at varying incidence. The predominating yeasts were belonging to genus *Candida*. Public health significance as well as recommendations and suggestive measures to improve the hygienic quality of raw milk and Damietta cheese were discussed.

الملخص العربي

الخمائر في اللبن والجبن الدمياطي بمحافظة دمياط

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مركز البحوث الزراعية - معهد بحوث الصحة الحيوانية بالدقي - معمل دمياط

أجريت هذه الدراسة للوقوف على مدى تواجد الخمائر في عدد خمسة وعشرون عينة عشوائية لكل من اللبن الخام والجبن الدمياطي المجمعة من المنافذ المختلفة بمحافظة دمياط وقد أسفرت النتائج على مايلي : أن متوسط العد الكلي للخمائر 3.4×10^3 / مل من اللبن الخام أما في الجبن الدمياطي فقد بلغ 3.7×10^4 / جرام. كما أسفرت تصنيف الخمائر المعزولة عن تواجد كانديدا ليهوليتكا، كانديدا تروبيكالس، كانديدا سيدوتروبيكالس، كانديدا باراهيلوسيس، كانديدا ألبيكانز، كانديدا كروس، أنورولوسيس سفيريكا، تورولوسيس فيرستالز، تريكوسپورون فيرميتانس، تريكوسپورون كيو تانيرم، رودوتورولا رويرا، سكاروميسيس سيرفيزي، سكاروميسيس لانتس في عينات اللبن الخام بنسب تتراوح من ٤٪ إلى ١٢٪ من العينات، كما أسفرت تصنيف الخمائر المعزولة عن تواجد كانديدا ليهوليتكا، كانديدا تروبيكالس، كانديدا سيدوتروبيكالس، كانديدا باراهيلوسيس، كانديدا ريكارفيبا، تورولوسيس سفيريكا، تورولوسيس فاجيتا، تورولوسيس

ليبرستانز، تريكوسترون فيرميتانس، تريكوسترون فيرميتانس، تريكوسترون كيرتانيوم، تريكوسترون، بيهرندياي، رودوتورولا رورا، سكاروميسيس سيرلجزي، سكاروميسيس لاكتيس في عينات.

INTRODUCTION

Milk and dairy products may contaminated with yeasts from different sources, where, yeasts are widely distributed in the environment and can enter foods through inadequately sanitized equipment or as air-borne contamination. In addition, growth of yeasts may be responsible for spoilage of dairy foods including cheese because yeasts can grow at a wide range of temperature, they are strongly fermentative or oxidative in their metabolism of carbohydrates and some species of yeasts are lipolytic and proteolytic for certain dairy products (Walker, 1977 and Comi et al., 1981). On the other aspect, some species of yeasts proved to be pathogenic to human being constituting a public health hazard (AL-Doory, 1980 and Washington, 1981). Therefore, this work was planned to throw light on the content of contamination of raw milk and Damietta cheese by yeasts as well as their public health significance.

MATERIALS AND METHODS

1. Collection of samples :

A total of 50 random samples of raw milk and Damietta cheese (25 each) were collected in sterile air tight sampling Jars from different outlets at Damietta Governorate. Each sample of raw milk was represented by 500 ml, while each sample of the cheese was represented by 250 g. Collected samples were immediately transferred to the laboratory under aseptic condition for mycological examination.

2 . Enumeration and isolation of yeasts :

Preparation of samples, Serial dilutions, Counting and Culturing techniques as well as isolation of yeasts on malt extract agar medium acidified with lactic acid solution 10% at PH (3.5-4) were done as described in standard methods for examination of dairy products (A.P.H.A,1992).

3 . Identification of isolated yeasts :

The identification of isolated yeasts from each sample was based on macroscopical, microscopical and physiological properties according to the techniques recommended by Rieth and Schonfeld (1959), Lodder and Kreger Van - RLJ (1970), Koneman et al. (1978), Barnett et al. (1983) and by Kwon - Chung and Bennett (1992).

RESULTS & DISCUSSION

Total yeast count :

The results achieved in Table (1) declared that all examined samples of raw milk and Damietta cheese contained yeasts at various counts. In the examined raw milk samples, yeast count /ml was ranged from 3×10^2 to 1.2×10^4 with a mean value of 3.4×10^3 . Nearly similar results were obtained by Engel (1986) and Moustafa et al. (1988). While lower result was obtained by Amemiya and Tashiro (1978). Higher result was obtained Mansour et al. (1993). Results recorded in Table (1) showed that yeast count /g was ranged from 8×10^2 to 1.6×10^5 with a mean value of 3.7×10^4 in examined samples of Damietta cheese. Lower result was obtained by

Mohamed et al. (1982). While higher results were obtained by **Amer et al. (1986)** and **Welthagen and Viljoen (1998)**.

Previously mentioned results showed that yeast count in examined Damietta cheese samples was higher than yeast count obtained in raw milk samples. Yeast count is used as an index of proper plant sanitation and high quality products (**Walker, 1977** and **Foster et al., 1983**). High yeast count is indicative of improper plant sanitation and neglected hygienic measures. Where, different environmental sources such as air, soil, water and utensils play significant roles in contamination of milk and its products during milking, manufacturing, processing, distribution and handling.

Incidence of isolated yeasts :

The most prevalent yeasts could be isolated from raw milk and Damietta cheese samples were belonged to genus *Candida*, while members of the genera *Torulopsis*, *Trichosporon*, *Rhodotorula* and *Saccharomyces* were isolated from examined samples at varying incidence (Table, 2).

Candida species could be isolated from 48% and 52% of examined raw milk and Damietta cheese samples, respectively (Table, 2). *Candida lipolytica*, *C. tropicalis*, *C. pseudotropicalis*, *C. parapsilosis*, *C. albicans* and *C. krusei* were isolated from the examined raw milk samples at percentages of 12,12,4,8,8 and 4, respectively (Table,3). While, *Candida lipolytica*, *C. tropicalis*, *C. pseudotropicalis*, *C. parapsilosis* and *C. reukauffii* were isolated from examined Damietta cheese samples at percentages of 20,12,8,8

and 4, respectively, (Table,3). Nearly similar results were reported by **Sakural (1984)**, **Amemiya and Tashiro (1978)** and **Mansour et al. (1993)** in raw milk samples and **El-Bassiony et al. (1980)**, **Mohamed et al. (1982)** and **Amer et al. (1986)** in Damietta cheese samples.

Torulopsis species could be isolated from 20% and 28% of examined raw milk and Damietta cheese samples, respectively (Table, 2). *Torulopsis sphaerica* and *Tor. verstalii* could be isolated from 12% and 8% of examined samples of raw milk, respectively (Table,3). While, *Tor. sphaerica*, *Tor.famata* and *Tor. verstalii* were isolated at percentages of 8,16 and 4 from examined Damietta cheese samples, respectively (Table, 3). Nearly similar results were reported by **Sakural (1984)** and **Mansour et al. (1993)** in raw milk samples and **El-Bassiony et al. (1980)**, **Mohamed et al. (1982)** and **Amer et al. (1986)** in Damietta cheese samples .

Trichosporon species could be isolated from 16% of examined raw milk samples and from 28% of examined Damietta cheese samples (Table, 2). Two *Trichosporon* species were identified in examined raw milk samples, *Tri. fermentans* which isolated with an incidence of 8% and *Tri. cutaneum* which isolated also with an incidence of 8% (Table, 3). While, *Tri. fermentans*, *Tri. cutaneum* and *Tri. behrendii* were identified with percentages of 16,8 and 4 from the examined Damietta cheese samples, respectively (Table, 3). Isolated *Trichosporon* species were in an agreement with those isolated from raw milk by **Sakural (1984)**, **Engel (1986)** and **Mansour et al. (1993)**, and with those isolated from Damietta cheese by **Mo-**

hamed et al. (1982) and Amer et al. (1986).

Only *Rhodotorula rubra* could be isolated from all examined samples which identified from 4% and 8% of raw milk and Damietta cheese samples, respectively (Tables 2&3). The result was in an agreement with those obtained by Suarez and Inlgo (1982) and Mansour et al. (1993).

Saccharomyces species could be isolated from 8% and 12% of examined raw milk and Damietta cheese samples, respectively (Table, 2). Two *Saccharomyces* species were identified from all examined samples, *Sac. cerevisiae* which isolated at incidence of 4% and *Sac. lactis* which isolated also at incidence of 4% from the examined raw milk samples (Table, 3). While, *Sac. cerevisiae* isolated at incidence of 8% and *Sac. lactis* isolated at incidence of 4% from the examined Damietta cheese samples (Table, 3). The isolated *Saccharomyces* species were in an agreement with those isolated from raw milk by Ame-miya and Tashiro (1978) and Mansour et al. (1993), and with those isolated from soft cheese by Mohamed et al. (1982), Amer et al. (1986), Sarais et al. (1996) and Viljoen et al. (2003).

Previously mentioned data revealed that the examined samples of raw milk and Damietta cheese were contaminated by different yeast species. Yeast contamination may start within the apparently healthy udder before milking, during milking from contaminated utensils and contaminated air, during milk transportation as well as during marketing and bad storage. Yeasts reach cheese from different sources such as milk, brine, soil, air,

utensils and packaging materials, where they can grow in the product inducing certain defects that may render the product of inferior quality, unmarketable or even unfit for consumption. Yeasts are strongly fermentative and oxidative in their metabolism of carbohydrate that may induce certain undesirable changes and some yeast species are lipolytic and proteolytic for dairy products and may be responsible for spoilage of dairy foods including cheese (Wauschkuhn, 1970; Walker, 1977; Comi et al; 1981 and Foster et al., 1983). On the other hand, some species of yeasts have to be considered as one of the causative agent of food poisoning (Todd, 1983) and certain species of yeasts are proved to be pathogenic to man constituting a public health hazard (Al-Doory, 1980; Taylor, 1980 and Washington, 1981).

CONCLUSION AND RECOMMENDATION

Information given by obtained results allow to conclude that yeast counts and various yeast species which recorded in the examined samples of raw milk and Damietta cheese were attributed to the unsanitary measures adopted during milking, production, manufacturing, handling and distribution of raw milk and cheese. Contamination of milk and its products with objectionable yeasts result in development of undesirable changes rendering it unfit for human consumption and increase the risk of infection with respective diseases to consumers. Therefore, to improve the quality of milk and its products and to safeguard the consumer from being infected, the following suggestions are recommended :

Strict hygienic measures should be adopted during milk production and handling as well as during manufacturing and storage of the dairy products. Periodical inspection on dairy plants and farms, Periodical medical examination of persons sharing in production and handling of milk and its products. Utensils and equipment used

in the production should be well constructed, perfectly cleaned and sterilized. Use of proper heat treatment of milk and refrigerated storage. In conclusion, it seems necessary that concerned authorities should impose regulations and mycological standards to govern production of milk and dairy products.

Table (1) : Statistical analytical results of total yeast count / ml or g of examined samples.

Examined samples	Positive samples		Min.	Max.	Mean	S.E.M.±
	No.	%				
Raw milk	25	100.0	3×10^2	1.2×10^4	3.4×10^3	7.4×10^2
Damietta cheese	25	100.0	8×10^2	1.6×10^5	3.7×10^4	9.6×10^3

n = 25

Table (2) : Incidence of yeast genera isolated from examined samples.

Isolated yeast genera	Raw milk		Damietta cheese	
	NO.	%	NO.	%
Candida	12	48.0	13	52.0
Torulopsis	5	20.0	7	28.0
Trichosporon	4	16.0	7	28.0
Rhodotorula	1	4.0	2	8.0
Saccharomyces	2	8.0	3	12.0

n = 25

Table (3) : Incidence of yeast species isolated from examined samples.

Isolated yeast species	Raw milk		Damietta cheese	
	N0.	%	N0.	%
<i>Candida lipolytica</i>	3	12.0	5	20.0
<i>C.tropicalis</i>	3	12.0	3	12.0
<i>C.pseudotropicalis</i>	1	4.0	2	8.0
<i>C.parapsilosis</i>	2	8.0	2	8.0
<i>C. albicans</i>	2	8.0	0	0.0
<i>C. krusei</i>	1	4.0	0	0.0
<i>C. reukaufii</i>	0	0.0	1	4.0
<i>Torulopsis sphaerica</i>	3	12.0	2	8.0
<i>Tor. famata</i>	0	0.0	4	16.0
<i>Tor. verstitialis</i>	2	8.0	1	4.0
<i>Trichosporon fermentans</i>	2	8.0	4	16.0
<i>Tri. cutaneum</i>	2	8.0	2	8.0
<i>Tri. behrendii</i>	0	0.0	1	4.0
<i>Rhodotorula rubra</i>	1	4.0	2	8.0
<i>Saccharomyces cerevisiae</i>	1	4.0	2	8.0
<i>Sac. lactis</i>	1	4.0	1	4.0

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