OCCURRENCE OF MOULD IN MILK AND SOME DAIRY PRODUCTS IN SHARKIA PROVINCE

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ABSTRACT

One hundred and fifty samples of raw milk, yoghurt and soft cheese were collected from groceries and supermarkets at Sharkia governorate (fifty of each). The samples were transferred to the laboratory to be examined for presence of mould genera. The obtained results revealed that the mean count was 3.33 10^2 in raw milk samples. 8.72 10^2 in yoghurt samples and 7.37 10^2 in soft cheese samples. Out of 50 strains of mould 34 (68%) aspergillus spp., 13 (26%) penicillium spp., 1(2%) fusarium spp. and 2 (4%) mucor spp. can be isolated from raw milk samples, while in yoghurt samples 80 mould strains be isolated, 42 (84%) were aspergillus spp., 24(48%) penicillium spp., 5 (10%) fusarium spp., 4 (8%) mucor spp., 2 (4%) trichsporon, 3 (6%) geotrichium spp. and 1 (2%) cladosporium spp., in soft cheese samples 96 mould strain be recovered 48 (96%) aspergillus spp., 2 (4%) mucor spp., 1 (2%) trichsporon spp., 3 (6%) geotrichium spp. and 6 (12%) cladosporium spp. Moreover isolated aspergilli were further identified into 14 (41.2 %) A. niger, 7 (20.6%) A. flavus, 10 (29.4%) % and 3 (8.8%) A. terrus in raw milk samples while in yoghurt samples were 17 (40.5 %) A. niger, 7 (16.7%) A. flavus, 9 (21.4%) A. candidus and 9 (21.4%) A. terrus. In soft cheese samples 22 (45.8 %) A. niger, 11 (22.9 %) A. flavus, 9 (18.8%) A. candidus and 6 (12.5%) A. terrus. Economic importance and public health significance of isolated mould as well as suggestive measures to improve the quality of milk and dairy products were discussed.

INTRODUCTION

Dairy products are considered the most perfect food. It contain constituents necessary to sustain life as the essential amino acid, vitamins, lactose, calcium, phosphorous, sulfur and iron. Milk is highly nutritious media in which moulds will survive and so are susceptible to deterioration and spoilage. Milk may gets contamination with moulds from different sources as air, water, soil, dust and manure also from handling and distribution (**Farghaly, 1985 and Rosenzweig et al., 1986**). Moulds are know to be the most important contaminants in some types of dairy products, such as soft cheese normally kept under refrigeration and so spoilage is confined to

moulds which are psychrotolerant as penicillium spp., which can grow at 5°C (**El-Bassiony et al., 1980 and Pitt and Hocking, 1985**). Some species of moulds are beneficial in dairy industry as geotrichium candium which play an important role in the ripening of soft cheeses development of taste and aroma. While other have a public health hazards (**Todd, 1983 and Boutrou and Gueguen, 2005**). Therefore, this work was done to determine the hygienic quality of milk, yoghurt and soft cheese in Sharkia governorate, the public health and economic importance as well as the suggestive measures for minimizing the milk pollution and safeguard consumers were discussed.

MATERIAL AND METHODS

A- Collection of samples :

One hundred and fifty samples of raw milk, yoghurt and soft cheese (fifty of each) were purchased from different groceries and supermarkets in Sharkia governorate. Collected samples were transferred aseptically to the laboratory with a minimum of delay to be examined for the occurrence of mould.

B- Preparation of samples :

Each sample of raw milk and yoghurt was perfectly mixed while soft cheese sample was thoroughly mashed in a sterile blinder before being examined.

C- Preparation of serial dilutions (A.P.H. A., 1992):

Milk:

One ml of the prepared samples was added to 9 ml of sterile phosphate buffered saline and thoroughly mixed to make a dilution 1/10 from which ten fold serial dilutions were prepared.

Yoghurt and soft cheese:

Eleven ml of each yoghurt or eleven grams of soft cheese samples were aseptically transferred to a sterile blinder container to which 99 ml of sterile 2% sodium citrate were added and thoroughly mixed till complete emulsification to make dilution 1/10, from which decimal dilutions were prepared using a sterile phosphate buffered saline.

Determination of total mould counts (A.P.H.A., 1985):

Duplicate plates of malt extract agar medium acidified with lactic acid sol. 10% (**Oxoid, 1990**) were inoculated each with one ml from the previously prepared serial dilutions.

Inoculated plates were incubated at 25°c for 5-7 days before being examined. The total mould count/ml or gm. were calculated and recorded.

Identification of isolated moulds:

The isolated mould genera from raw milk, yoghurt and soft cheese on malt extract agar medium were purified and identified according to the technique recommended by **Raper and Fennel (1965) for genus aspergillus, Raper and Thom (1949) and Ramirez (1982)** for genus penicillium, **Booth (1977)** for genus fusarium, **Zycha et al., (1969)** for zygomycetes, **Barnett and Hunter (1972); ARX (1976); Samson et al., (1981) and Pitt and Hocking (1985)** for other mould genera.

The identification of the colonies was carried out by macroscopical and microscopical characteristics of the mould colonies.

RESULTS & DISCUSSION

Results reported in table (1) show that moulds were detected in 43 (86%) out of 50 examined raw milk samples. The mould count/ml ranged from 1.0×10^2 to 1.0×10^2 with a mean value of $3.3^2 \times 10^2$. Low mould count in raw milk were estimated by **Randolph et al., (1973); Mutukumira et al., (1996) and Gihan (2001)**. However, higher mould counts were determined by **Sukhotskene (1974) and Grega et al., (1997)**. These results in table (2) revealed that the isolated mould species from raw milk samples were aspergillus 34 (68 %), penicillium 13 (26%), fusarium spp. 1 (2%) and mucor 2 (4%). Similar mould genera were isolated by **Vadillo-Machota et al., (1987) and Jodral et al., (1993)**.

Environmental sources such as soil, air, water and utensils play a significant role for contamination of raw milk and it's products during production, handling, processing and distribution. High mould count is indicative of improper plant sanitation and neglected hygienic measures **(Engel, 1986 and Vadillo et al., 1987)**.

Results presented in table (1) reveal that moulds could be isolated from 90% of examined yoghurt samples, with a count ranging from 1.0×10^2 to 2.0×10^5, with a mean value of 8.72 x 102. Lower counts were obtained by **Varabioff (1983), Lalas and Mantes (1984), Jordano**

(1986), Rodriguez (1990) and Bahout and Moustafa (2003), while higher counts were recorded by **El-Badry (1998) and El-Bagoury and Moussad (2002)**.

Moulds are widely distributed in nature. The presence of moulds in yoghurt may by attribute to the unsanitary measures adopted during production, handling and distribution **(Ray, 1996)**.

The isolated moulds from the examined yoghurt samples were identified as aspergillus 84%, penicillium 48%, fusarium 10%, mucor spp., 8%, trichsporon spp., 4%, geotrichium spp., 6% and cladosporium spp., 2% (Table 2). Similar mould genera were isolated from yoghurt by **Mansour et al., (1986), El - Shinawy (1987), Farag (2002) and El-Bagoury and Moussad (2002)**.

It is evident from the results recorded in table (1) that the samples of soft cheese were contaminated with moulds. The count/g. was ranged from 1.0×10^2 to 2.0×10^7, with a mean value of 7.37×10^2. The obtained results agree to a certain extent with those reported by **Abdel-Hakiem and El-Kosi (1999)**. While higher counts were recorded by **Kivanc (1990)**.

The isolated mould species from soft cheese samples were aspergillus spp., 48 (96%), penicillium spp., 31 (62%), fusarium spp., 5 (10%), mucor spp., 2 (4%), trichsporon spp., 1 (2%), geotrichium spp., 3(6%) and cladosporium spp., 6 (12%) as shown in table (2). Most of these species detected by **Bahout and El-Shawaf (1999) and Bars-Bailly et al., (1999)**.

Moulds species play an important role in deterioration of milk through production of proteolytic and lipolytic enzymes.

Isolated aspergilli were further identified into groups of A. niger, A. flavus, A. candidus and A. terrus which were detected in all samples as shown in table (3) with a percentage of 14 (41.2%), 7(20.6%), 10(29.4%) and 3 (8.8%) of raw milk respectively, while in examined yoghurt samples were 17 (40.5 %), 7 (16.7%), 9 (21.4 %) and 9 (21.4 %) respectively and in soft cheese samples were 22 (45.8%), 11 (22.9%), 9 (18.8%) and 6 (12.5%) respectively.

From the public health point of view species of aspergillus may induce pulmonary aspergillosis, pulmonary allergy, skin infection and sinusitis also some species of aspergillus produce aflatoxins, which proved to have a carcinogenic effect in human as well as chronic damage of bone of milk consumer **(Deger, 1976, Onions et al., 1981 and Niles, et al., 1985)**. Some penicillium species may induce pulmonary infection, external otomycosis, mycotic keratitis and endocarditis. Penicillic acid is a mycotoxin produced by penicillium species which had a carcinogenic effect in human **(Trenk et al., 1971 Bullerman, 1979 and Cole et al., 1983)**.

Therefore, to improve the quality of produced milk and it's products and to safeguard the consumer from being infected the following suggestions are to be recommended strict hygienic measures should to imposed during milk production and handling, only healthy workers who

have a sense of personal cleanliness should be employed and adequate control through periodical examination of milk and it's products by specialists to ensure correction of errors and that mistakes are not repeated.

Table (1): Statistical analytical results of mould counts in examined samples.

Examined samples	No .of examined samples	Positive samples		Count / g or ml		
		No.	%	Minimum	Maximum	Mean
Raw milk	50	43	86	1.0×10^2	1.0×10^5	3.33×10^2
Yoghurt	50	45	90	1.0×10^2	2.0×10^5	8.72×10^2
Soft cheese	50	48	96	1.0×10^2	2.0×10^7	7.37×10^2

Table (2): Incidence percentage of mould genera isolated from examined samples

Isolated mould species	Raw milk		Yoghurt		Soft cheese	
	No.	%	No.	%	No.	%
Aspergillus	34	68	42	84	48	96
Penicillium	13	26	24	48	31	62
Fusarium	1	2	5	10	5	10
Mucor	2	4	4	8	2	4
Trichsporon	0	0	2	4	1	2
Geotrichum	0	0	3	6	3	6
Cladosporium	0	0	1	2	6	12

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

Isolated aspergillus species	Raw milk		Yoghurt		Soft cheese	
	No.	%	No.	%	No.	%
A. niger	14	41.2	17	40.5	22	45.8
A. flavus	7	20.6	7	16.7	11	22.9
A. candidus	10	29.4	9	21.4	9	18.8
A. terrus	3	8.8	9	21.4	6	12.5
Total	34	100	42	100	48	100

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الملخص العربى

تواجد الفطريات فى اللبن وبعض منتجاته فى محافظة الشرقية

عصام على النبراوى أحمد عبدالخالق السيد إبراهيم الشوربجى

الرقابة الصحية على الأغذية - معهد بحوث صحة الحيوان بالدقى

تعد الألبان ومنتجاتها وخاصة الزبادى والجبن الطرى من أكثر المنتجات إستهلاكاً وإنتشاراً فى مصر وحيث أن تلك المنتجات عرضة للتلوث بالفطريات من مصادر مختلفة وتعد من أخصب الأوساط لنمو وتكاثر الفطريات مايترتب عليه من حدوث وظهور عيوب فى المنتج تؤثر على جودته وقيمته الغذائية والآثار الضارة بصحة المستهلك.

لذلك فقد أجريت هذه الدراسة على مائة وخمسون عينة من اللبن والزبادى والجبن الطرى (خمسون لكل منتج) جمعت من محلات الأغذية والبقالة فى محافظة الشرقية لتحديد مدى تلوثها بالفطريات، وقد أسفرت الدراسة عن النتائج الآتية :

أولاً : تحديد العدد الكلى للفطريات :

بلغ متوسط العدد الكلى للفطريات فى اللبن والزبادى والجبن الطرى (مل - جم). ٣,٣٣ × ٢١، ٨,٧٢ × ٢١ و ٧,٣٧ × ٢١ على التوالى، وكانت نسبة تواجدها ٨٦٪، ٩٠٪، ٩٦٪ على التوالى.

ثانياً : عزل وتصنيف الفطريات فى كلاً من :

١- اللـــــبن : الاسبرجلس، البنسليوم، الفيوزاريم والميوكر، بنسب مختلفة تراوحت بين ٢٪ إلى ٦٨٪.

٢- الزبـــادى : الاسبرجلس، البنسليوم، الفيوزاريم، الميوكر، تريكوسبورن، الجيوتريكم، الكلادوسبورم، بنسب مختلفة تراوحت بين ٢٪ إلى ٨٤٪.

٣- الجبن الطرى : الاسبرجلس، البنسليوم، الفيوزاريم، الميوكر، تريكوسبورن، الجيوتريكم، الكلادوسبورم، بنسب مختلفة تراوحت بين ٢٪ إلى ٩٦٪.

كما تم تصنيف فطر الاسبرجلس إلى ٤ عترات وهى الاسبرجلس نيجر والاسبرجلس فلافس والاسبرجلس كانديدس والاسبرجلس تيرز.

هذا وقد تم مناقشة الأهمية الصحية للفطريات ومدى تأثيرها على صحة المستهلك وكذلك طرق الحد من تلوث الألبان ومنتجاتها بهذه الميكروبات.