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Mycological Quality of Processed Cheese

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Abstract

Sixty samples of locally manufactured processed cheeses were collected from different centers in Sharkia Governorate and subjected to mycological examination. Our results revealed that, moulds and yeasts were detected in locally processed cheese in 33(55%) with mean value $16X10^4 \pm 8X10^4$ c.f.u/ gm. Mould count was 17 (28.33%) and yeast count was 10 (16.66%).The mean value of isolated mould and yeast were $6X10^4 \pm 3X10^4$ c.f.u./gm and $6X\ 10^4 \pm 2X10^4$ c.f.u/gm respectively. Frequency distribution for total mould was 8 (47.06%) lied within $10\text{-}10^2$ and for yeast was 4(40%) lied within $10\text{-}10^2$. Aspergillus spp. 10 (58.82%) distributed {A. Flavous 3(17.62%), A.niger 4(23.53%), A.terreus 3(17.62%)}, Penecillium spp.1(5.88%), Rhizopus spp. 3(17.64%), Cladosporium spp. 1(5.88%), and Mucor 2 (11.76%) were isolated. From the examined samples Aflatoxin was present in 3 samples (5%) with mean values 11.68±0.16 ng / gm and Ochratoxin was present in 4 samples (6.67%) with mean values 7.05±0.13 ng/gm.

It could be concluded that the examined locally processed cheeses contain moulds and yeasts, beside presence of aflatoxin and ochratoxin in some examined samples due to unsatisfactory hygienic measures adopted during manufacturing, handling and storage.

Key words: *Processed Cheese, mould, yeast.*

Introduction

Processed cheese is a food product made from normal cheese and sometimes other unfermented dairy ingredients, plus emulsifiers, extra salt, food colorings or whey **(WHO, 2002)**. Good processed cheese should have a smooth, homogeneous structure, uniform colour and free of fermentation gas eyes **(Chambre and Laurelled, 2000).** Cheese is considered an excellent source of easily digested nutrients; its importance in human nutrition lives in supplying the consumer with a high quality protein rich in essential amino acids, high fat which contain essential fatty acids and phospholipids **(Mayer, 2001),** vitamin A & B_2 and minerals, especially calcium and phosphorous (**Kapoor, *et al.*, 2007).** Mould growth appearance during storage harmful to the human health due to its contamination during its production, handling and storage (**Guinee, *et al.*, 2011).**

This study aimed to investigate the total moulds and yeasts content, isolation and identification of moulds and yeasts beside throw light on the public health importance of the isolated moulds and yeasts.

Materials and Methods

Sixty random samples of locally manufacture processed cheese from different centers in Sharkia Governorate. Samples were transferred

directly to laboratory to be mycological examined. Samples were mixed with 99 ml of sterile 2% sodium citrate solution in sterile blender for 2 mintes and 10 fold steril dilution is prepared. One ml from each previously prepared dilutions was inoculated into duplicate plates. Then about 10 ml. sterile Sabaroud Dextrose agars cooled to 45°C were poured into each Petri-dish. Inoculated plates, after being mixed and solidified, were incubated at room temperature (25°C) for 5-7 days, then yeast and mould count/g was calculated **(APHA, 1992)**.Identification of the isolated mould genera were carried out **(Pitt and Hocking, 1985)**.

The isolates mould were subcultured on malt extract agar and Czapeck dox agar **(Oxoid, 1998)** by three point technique method; the plates were incubated at 25°C for 4-6 day. Identification of the colonies was carried out by careful observation and measurements of the macroscopically and microscopically characteristics of the mould. Detection mycotoxin in processed cheese samples using enzyme-linked

immunosorbent assay (ELISA). Commercial ELISA kits were purchased from Bio-Pharm: RIDA Screen.

Results and Discussion

In the present study the results recorded in (Table 1) revealed that mould and yeast were detected in locally processed cheese 33(55%) with mean value $16X10^4 \pm 8X10^4$ c.f.u/gm. The total mould count/g in the examined samples was 17 (28.33%) with mean value $6X10^4 \pm 3X10^4$.Where the isolated yeast was 10, (16.66%) with mean value $6X10^4 \pm 2X10^4$. The highest frequency distribution for total mould was 8, (47.06%) lied within $10\text{-}10^2$ and for yeast was 4(40%) lied within $10\text{-}10^2$ as shown in (Table 2). Nearly similar mould count was recorded by **Ghazal**, **Gihan (2001)** and **Abd-El-Kaliek (2007),** where lower level of mould count was recorded by **Sallam (1981)** and **Boghra**, ***et al.,* (2006)**. Nearly mean mould value was obtained by **Maged (2011),** lower mean value of mould and yeast was recorded by **Younis *et al.,* (1991)** and **Ahmed Wallaa** (**2007**) but **Roubo *et al.,* (2004)** not detect mould and yeast in processed cheese. Mould isolates from the examined samples were identified as Aspergillus spp 10, (58.82%) distributed as {A.Flavous3, (17.62%). A.niger 4 (23.53%), A.terreus 3, (17.62%) as shown in Table (4)}, Penecillium spp.1,(5.88%), Rhizopus spp3, (17.64%), Cladosporium spp.1 (5.88%), and Mucor 2 (11.76%) were isolated. It is noticed that from the examined samples Aflatoxin was present in 3 samples (5%) with mean values 11.68±0.16 ng/gm, where Ochratoxin was present in 4 samples (6.67%) with mean values 7.05±0.13 ng/gm as noticed from Table (5). Previously similar results were obtained by **Abd-El-Hakiem and EI Kosi (1999)** found that the mean value of moulds count were $2.3x10^2$ c.f.u/gm in processed cheese, but higher levels were reported by **Hamd** (**2002)** in locally processed cheese. **Khalefa**, **Marwa (2006)** isolate Aspergillus, Pencillium, Cladosporium and Mucor from locally processed cheese. Presence of mould and yeast in processed cheeses may be due to poor sanitary practices during manufacturing, packing and distribution or the use of bad quality raw ingredients **(Peters and Gilles 1995**, **Ray 1996).** It is noticed that from the examined samples Aflatoxin was present in 3 samples (5%) with mean values 11.68±0.16 ng/gm and Ochratoxin was present in 4 samples (6.67%) with mean values 7.05±0.13 ng/gm respectively as it is noticed from Table (5).Same percentage of aflatoxin was reported by **Abd-El-Hakiem**, **and El- kosi (1999**) and for ochratoxin **Abd-El-Kaliek (2007).** In present study, it has been showed that total yeast count/g. in the examined samples was 10 (16.66%) with mean value $6X\ 10^4 \pm 2X10^2$ as it shown in Table (1). Lower level was recorded by **Wahba and Ahmed (2009).** Mould spores especially Aspergillus, Mucor, Penicillium, Rhizopus and Cladosporium spp. had been incriminated as causative agents of many human mycotic infections such as allergic responses, mycotic endocarditis, brain abscess, nail infection, external otomycosis and carcinogenic ef-

fect in the human (**Bullerman, 1979**). Rhizopus species induce external otomycosis, orbital cellutitis and deep wound infection (**Washington, 1981**). Some moulds excrete mycotoxins (**Roseberg, *et al.*, 1977)** as aflatoxins and ochratoxin in which they highly toxic, carcinogenic, mutagenic and tetratogenic compound (**Bahout and Moustafa 2003; Sun and Chen 2003**). The diseases resulting from the ingestion of mycotoxin contaminated processed cheese (mycotoxicoses) are sometimes more serious than the fungal infections **(Pitt and Hocking 1985)**. Aflatoxins proved to have a carcinogenic effect in human and chronic damage of bone (**Zerfiridis *et al.*, 1987)**. Penicillic acid, sterigmatocystin are mycotoxins produced by penicillium spp which had a carcinogenic effect while the causal agent of the human disease (**Bullerman, 1979).**

In the present study, it could be concluded that the examined locally processed cheeses contain yeasts, moulds beside presence aflatoxin and ochratoxin in some examined samples due to unsatisfactory hygienic measures adopted during manufacturing, handling and storage of locally processed cheeses. Despite great advances in modern technology producing a safe food, it remains a worldwide public health problem.

Table (1). Total moulds and Yeasts Count/g. in examined processed cheese.

	No. of examined samples	+ ve samples		Mean count/ g. ± S.E.
		No.	%	
mould & Yeast	60	33	55	$16X10^4 \pm 8X10^4$
mould	60	17	28.33	$6X10^4 \pm 3X10^4$
Yeast	60	10	16.66	$6X10^4 \pm 2X10^4$

Table (2). Frequency distribution of processed cheese based on their total moulds and yeasts counts.

Interval		$10\text{-}10^2$	$10^2\text{-}10^3$	$10^3\text{-}10^4$	$10^4\text{-}10^5$	Total
Mould & Yeast	No. of samples	13	10	7	3	33
	%	39.39	30.30	21.21	9.10	100
mould	No. of samples	8	6	2	1	17
	%	47.06	35.30	11.76	5.88	100
yeast	No. of samples	4	3	2	1	10
	%	40	30	20	10	100

Table (3). Number and percentages of moulds strains isolated form processed cheeses

Interval	Aspergallus spp	Pncillum spp.	Rhizopus spp.	Cladosporium spp.	Mucor spp.	Total
No. of samples	10	1	3	1	2	17
%	58.82	5.88	17.64	5.88	11.76	100

Table (4). Aspergillus species isolated from examined processed cheeses.

Interval	Asp Flavus	Asp Niger	Asp terreus	Total
No. of samples	3	4	3	10
%	17.62	23.53	17.62	100

Table (5). Occurrence of mycotoxin (ng/gm) in the examined processed cheese samples

Type of mycotoxin	Total samples	+ ve samples		Mean
		number	(%)	
Aflatoxin	60	3	5	11.68±0.16
ochratoxin	60	4	6.67	7.05±0.13

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