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Sanitary Evaluation of Curd Dairy Products

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Key Words:
Plain yoghurt, Kareish cheese, Ras cheese, *Coliforms, Enterococci, Staphylococcus aureus, yeasts and molds.*

ABSTRACT:

A total of 90 samples, (30 of each plain yoghurt, Kareish cheese, and Ras cheese) were randomly collected from street-vendors, groceries and supermarkets of different sanitary levels in Mansoura city, Dakahlia Governorate, Egypt. All samples were subjected to sanitary, chemical and microbiological evaluation. The mean values of acidity% and fat% in plain yoghurt, Kareish cheese, and Ras cheese were 0.644±0.106, 1.54±0.066, 1.97±0.0578; 0.64±0.124, 5.88±0.7004 and 48.94±0.43 , respectively. Meanwhile, the mean values of protein%, lactose%, and SNF% in plain yoghurt were 2.2±0.094, 3.28±0.138 and 5.98±0.25, respectively. The mean values of salt% and moisture% in Kareish cheese and Ras cheese were 2.55±0.248, 2.38±0.079; 67.18±0.891 and 32.75±0.899, respectively. The mean values of *Staphylococcus aureus, Coliforms and Enterococci* count in plain yoghurt, Kareish cheese and Ras cheese samples were $9.2x10^4±2.9x10^4$, $4.12x10^5±1.3x10^5$, $4.64x10^5±8.82x10^4$; $10.5x10^4±2.16x10^4$, $6.65x10^5±1.27x10^5$, $2.39x10^5±6.54x10^4$; $9.99x10^5±1.94x10^5$, $3.73x10^5±6.11x10^4$ and $3.38x10^5±9.17x10^4$ cfu/g, respectively. The mean values of *yeast and mold* count in Kareish cheese and Ras cheese were $1.27x10^5±1.24x10^4$, $3.82x10^4±3.48x10^3$; $1.16x10^5±4.24x10^4$ and $7.06x10^4±3.27x10^4$ cfu/g, respectively. Thus, strict hygienic measures should be followed during processing, handling and distribution to improve the hygienic quality of plain yoghurt, Kareish cheese and Ras cheese.

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1. INTRODUCTION

Milk and milk products are universally recognized as first class food stuff due to their exceptional richness in high quality animal protein, milk fat, high content of calcium, phosphorous and performed vitamin A and B2 *(Yasen, 2011).*

Yoghurt is the most popular type of fermented milk in Egypt. According to the FAO/WHO definition, yoghurt is the coagulated milk product obtained by lactic acid fermentation through action of Lactobacillus bulgaricus and Streptococcus thermophillus on milk *(Robinson, 1991).*

Kareish cheese is the one of the ancient Egyptian, fresh white soft cheeses. It is consumed largely in Egypt due to its low price and high nutritive value *(Ahmed and El-Bassiory, 1977 and Deeb et al, 2004).*

Ras cheese is valued for its portability, long life and high content of fat, protein, calcium and phosphorus. Ras cheese is more compact and has a longer shelf life than milk and the most of other dairy products.

Microorganisms may gain entrance to such products during processing, handling and distribution which lead to public health hazard or render the product unmarketable causing economic losses *(Thatcher and Clark, 1978).*

Coliforms are routinely used as indicator to the quality of the milk and milk products as some members of coliforms are responsible for the development of objectionable taints in milk and its products rendering them of inferior quality or even unmarketable *(Yabaya and Idris, 2012).*

Enterococci are a good general index of faecal contamination, good manufacturing practice (GMP) as well as food quality in dairy farms and factories of fermented milks. Moreover, they are responsible for food poisoning *(Roushdy et al, 1998).*

Staphylococcus aureus possess a public health hazard due to production of thermostable enterotoxins that were responsible for food poisoning *(Wernozy.Rozand et al, 1996).*

Presence of *Yeasts* and *molds* in dairy products is undesirable even when found in few numbers as rapidly grow in the product at a wide range of temperature, pH and humidity resulting in

objectionable changes that render the product of inferior quality or even unmarketable *(Mossel, 1982)*.

1. Collection of samples:

A total of 90 samples, (30 of each plain yoghurt, Kareish cheese, and Ras cheese) were collected from street-vendors, groceries and supermarkets of different sanitary levels in Mansoura city, Dakahlia Governorate, Egypt.

2. Chemical and sanitary criteria for evaluation of examined samples.

2.1. Plain yoghurt:

2.1.1. Determination of titratable acidity of yoghurt (Ling, 1963)

2.1.2. Determination of fat, protein, lactose, total solid and solid not fat percentages by using Milk Scan apparatus (lactostarmini3510).

1- 2.2. Cheese (Kareish cheese & Ras cheese):

2.2.1. Determination of acidity percent in examined cheese samples (kariesh and ras) (Antherton and Newlander, 1977).

2.2.2. Determination of sodium chloride content in examined cheese samples (FAO, 1977).

2.2.3. Determination of moisture content in examined cheese samples (A.P.H.A., 1992).

2.2.4. Determination of fat content using Gerber method in examined cheese samples (FAO, 1977).

3. Microbiological examination:

3.1. Preparation of serial dilution (APHA, 1985)

3.2. Total *Coliforms* count (ICMSF, 1978).

3.3. *Enterococci* count (ICMSF, 1982).

3.4. Enumeration and isolation of *Staphylococcus aureus* (Baird parker, 1962).

3.5. Total *yeasts* and *molds* count (Bailey and Scott, 1998)

1. 3. RESULTS AND DISCUSTION

Chemical examination of samples:

The results given in Table (1) revealed that the mean values of acidity percent in examined plain yogurt, Kareish cheese and Ras cheese samples were 0.644±0.106, 1.5420±0.06611 and 1.9740±0.0578, respectively. The high acidity of some yoghurt samples may be due to increasing the amount of starter, long incubation period or failing of cooling after curdling. On other hand, the high level of the encountered acidity in the examined samples was sufficient to inhibit or inactivate most pathogens. The inhibition of potential pathogens was reinforced by the production of antibiotic substances by lactic acid bacteria in yoghurt (Arnott et al., 1974). While, the relatively high acidity percent in Kareish cheese may attributed to the method of Kareish cheese manufacture (farm method) in which skim milk is kept for about 36 hours at room temperature giving the chance for lactics or other bacteria to grow and produce acid as its manufacture depends upon acid coagulation (Amer, 2002). High acidity percent in examined Ras cheese due to prolonged storage of the product.

Therefore, the present study is planned to evaluate the compositional and microbial quality of examined curd dairy products.

2. MATERIAL AND METHODS

Results presented in table (1) revealed that the mean values of fat% in examined plain yoghurt, Kareish cheese, and Ras cheese samples were 0.64±0.124, 5.88±0.7004 and 48.94±0.43, respectively. The low fat content in plain yoghurt and Kareish cheese is due to manufacture them from skimmed milk and detected percent may be due to incomplete separation of fat during skimming. While all Ras cheese samples were complied with the legal requirements for fat/DM % stipulated by the Egyptian Standards (1991), should not less than 45%.

2. Microbiological evaluation of examined samples:

1- *Coliforms* count:

Results given in Table (2) revealed that the incidence of *coliforms* in examined plain yogurt, Kareish cheese and Ras cheese samples were (60%), (86.6%) and (83.3%), respectively with mean values of$10.5x10^4$±$2.16x10^4$, $6.65 \times 10^5 \pm 1.27 \times 10^5$ and $2.39 \times 10^5 \pm 6.54 \times 10^4$ cfu/g.

The results indicated that 40% of examined plain yoghurt samples were complied with the EOSQ (2005), which stated that *Coliforms* count in yoghurt should not be more than 10 cfu/g, while 60% of examined samples were out of this specification.

On the other hand, 86.67% of examined Kareish samples were complied with EOSQ (2005), which stated that total *Coliforms* count in Kareish cheese should not be more than 10 cfu/g, while 13.33%of examined samples were out of this specification. Moreover, 83.33% of examined Ras cheese samples were complied with the EOSQ (2005), which stated that *Coliforms* count in Ras cheese should not be more than 10 cfu/g, while 16.67% of examined samples were out of this specification.

On the other hand, 86.67% of examined Kareish samples were complied with EOSQ (2005), which stated that total *Coliforms* count in Kareish cheese should not be more than 10 cfu/g, while 13.33%of examined samples were out of this specification.

Table (1): Statistical analytical results of compositional quality of the examined curd dairy product samples. (N=30 for each product).

Paramaters	Plain yoghurt			Kareish cheese			Ras cheese		
	min	max	Mean±SEM	No.	min	max	Mean±SEM	No.	min
Acidity%	0.06	1.46	0.64±0.11	30	0.75	2.20	1.54 ±0.06	30	1.32
Fat%	0.06	1.46	0.64±0.12	30	6.11	12.55	5.88±0.70	30	45.07
Protein%	1.56	2.52		-	-	-	-	-	-
Lactose%	2.34	3.72	2.2±0.09	-	-	-	-	-	-
SNF%	4.26	6.8		-	-	-	-	-	-
Moisture%		-	3.28±0.14	30	59.17	73.61	67.19 ±0.89	30	25.32
salt%				30	0.83	4.83	2.55±0.24	30	1.71
			5.98±0.25						
			-						

N= number of samples.
SEM= Standard error of mean.

Table (2): Statistical analytical results of microbiological quality of the examined curd dairy product samples. (N= 30 for each product)

Parameters	Plain yoghurt			Kareish cheese			Ras cheese		
	Positive samples			Positive samples			Positive samples		
	No.	%	Mean±SEM	No.	%	Mean±SEM	No.	%	Mean±SEM
Coliforms	18	60	$10.5x10^4±2.16x10^4$	26	86.6	$6.65x10^5 ±1.27x10^5$	25	83.3	$2.39 x10^5 ± 6.54 x 10^4$
Staph.aureus	12	40	$9.2x10^4±2.9x10^4$	24	80	$4.12 x 10^5 ± 1.3 x 10^5$	24	80	$4.64 x 10^5 ± 8.82 x 10^4$
Enterococci	18	60	$9.99x10^5±1.94x10^5$	26	86.6	$3.73 x10^5 ± 6.11 x10^4$	23	76.6	$3.38 x10^5 ± 9.17 x10^4$
Yeast	-	-	-	23	76.6	$1.27 x10^5 ± 1.24 x 10^4$	22	73.3	$1.16 x10^5 ± 4.24 x 10^4$
Mold	-	-	-	23	76.6	$3.82 x 10^4± 3.48x 10^3$	24	80	$7.06 x10^4 ± 3.27 x 10^4$

N= number of samples.
SEM= Standard error of mean.

Moreover, 83.33% of examined Ras cheese samples were complied with the EOSQ (2005), which stated that *Coliforms* count in Ras cheese should not be more than 10 cfu/g, while 16.67% of examined samples were out of this specification.

Presence of *Coliforms* in such high incidence in plain yoghurt, Kareish cheese and Ras cheese declared neglected sanitary measures reflecting the using of poor quality raw milk and presence of other enteric pathogens. Moreover, *Coliforms* are considered as an indicator of post processing contamination in yoghurt manufacture has been established and recommended by public health authorities worldwide (El- Bakri et al., 2009).

2- *Staphylococcus aureus* count:

It is evident from table (2) that the incidences of *Staphylococcus aureus* in examined plain yogurt, Kareish cheese and Ras cheese samples were (40%), (80%) and (80%), respectively with mean values of $9.2x10^4 \pm 2.9x10^4$, $4.12 \times 10^5 \pm 1.3 \times 10^5$ and $4.64 \times 10^5 \pm 8.82 \times 10^4$ cfu/g .

The results showed that 60% of examined plain yoghurt samples were complied with the EOSQ (2005), which stated that in plain yoghurt should be free from *Staphylococcus aureus*, while 40% of examined samples were out of this specification. While, 20% of examined Kareish cheese samples were complied with the EOSQ (2005), which stated that Kareish cheese should be free from *Staphylococcus aureus*, while 80% of examined samples were out of this specification. Moreover, 20% of examined Ras cheese samples were complied with the EOSQ (2005), which stated that Ras cheese should be free from *Staphylococcus aureus*

Presence of large number of *Staph.aureus* in dairy products is considered a good indicator of personal hygiene of workers with respiratory infections and suppurative lesions as boils (Kamat et al., 1991).

3- *Enterococci* count:

As presented in Table (2) incidences of *Enterococci* were (60%), (86.6%) and (76.6%) in examined plain yogurt, Kareish cheese and Ras cheese samples , respectively with mean counts $9.99x10^5 \pm 1.94x10^5$, $3.73 \times 10^5 \pm 6.11 \times 10^4$ and $3.38 \times 10^5 \pm 9.17 \times 10^4$ cfu/g.

Enterococci can be used as indicators of faecal contamination, they have been implicated in outbreaks of foodborne illness and they have been ascribed beneficial or detrimental role in foods. mycotoxicosis, which sometimes leads to death. Epidemiological studies indicated that chronic consumption of contaminated food with mycotoxins may play a major role in the high incidence of liver cancer (Neal et al., 1998 and Egmond, 1994).

Enterococci may survive heat processing and cause spoilage of the products as well as causing food infection (Franz et al., 1999).

Enterococci may induce food poisoning because of their ability to produce extracellular toxic metabolites (Erwa, 1972). They occasionally become the causative organisms in case of urinary tract infection, neonatal meningitis, endocarditis and septicemia (Coleman and Ball, 1984).

4- *Yeasts* count:

The results in Table (2) showed that the incidences of *yeast* in examined Kareish cheese and Ras cheese samples were (76.6) and (73.3) respectively with mean counts $1.27 \times 10^5 \pm 1.24 \times 10^4$ and $1.16 \times 10^5 \pm 4.24 \times 10^4$ cfu/g .

Yeast play a significant role in producing unpleasant flavors and odours (Sarais et al., 1996).

5- *Molds* count:

The data presented in Table (2) showed that the incidences of *Molds* in examined Kareish cheese and Ras cheese samples were (76.6%) and (80%), respectively with mean counts $3.82 \times 10^4 \pm 3.48 \times 10^3$ and $7.06 \times 10^4 \pm 3.27 \times 10^4$ cfu/g .

Molds and *yeasts* are widely spread in nature and can grow at wide range of temperature. They are strongly fermentive or oxidative in their metabolism, although some species are lipolytic in certain dairy products especially cheese (Foster et al., 1983). The molds and yeast are used as index of proper plant sanitation and high quality products (Walker, 1977 and Foster et al., 1983).

In view of the potential ability of some molds to produce mycotoxins during their growth. Thus, the *mold* growth on Ras cheese may possess potential hazard to food safety and human health (Scott, 1989).

The cheese is considered as an excellent medium for *yeast* and *molds* that may induce undesirable changes such as colour defects, off-flavor and actual rots (Mislivec et al., 1992).

Mycotoxins are biological compounds produced naturally as secondary metabolites of mycotoxic fungi which associated with certain disorders in animals and humans. The manifestation of toxicity in animals and humans is as diverse as the fungal species which produce these compounds. In addition to being actuely toxic. Some mycotoxins are now linked with the incidence of certain types of cancer and severe cases of human food poisoning or

Generally, results recorded in Table (2) gave a picture about the degree of microbiological contamination especially with *Coliforms*, *Enterococci*, *Staphylococcus aureus*, *Yeast* and *Molds*. Most of examined samples appear to be

microbiologically not acceptable when compared with the Egyptian Standards. This may be attributed to the traditional processing in manufacturing of such products.

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5-CONCLUSION

Finally, the present study allows concluding that the majority of examined samples were microbiologically contaminated at different degree. This indicates poor sanitary measures adopted during manufacturing, handling, storage and distribution of milk products.

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