Detection Of Some Chemical Preservatives And Antibiotic Residues In Market Milk With Relation To Public Health In Sharkia Governorate

Abd-El-Kaliek A. A. and Azza G. M. Ayoub
Animal Health Research Institute (Zagazig Lab.).

ABSTRACT

A total of 100 raw market milk samples collected from Sharkia Province were examined for the presence of some microbial inhibitory substances.

Out of examined 100 market milk samples, chemical preservatives were detected in 17 samples (17%) of which 9 samples (9%), 3 samples (3%) and 5 samples (5%) contained carbonates, H_2O_2 and borax, respectively. Quaternary ammonium compounds and hypochlorite each was detected in one sample (1%) only.

Using Delvo and BR tests, 9% of total samples proved to be contain antibiotic residues , 4% of these residues were related to β- lactam antibiotics and 5% to the other antibiotics.

INTRODUCTION

Milk is the most unique and ideal food for human. It meets the nutritional needs of the body than any other single food. Natural milk intended for human consumption requires to be of natural composition, free from adulteration and admixture of non permissible substances.

The increased use of chemicals for control of mastitis and other diseases of dairy animals, cleaning and sanitation of milking utensils may leads to production of milk containing such residues and have heightened the significance of these residues in relation to the quality of dairy products *(1-4)*. Antibiotics are used in food producing animals not only to treat diseases but also to maintain and promote growth. Misuse of antibiotics , sanitizers and preservatives may result in potential adverse effects on human health *(5)* . The present investigation was conducted to through some lights on: Incidence of chemical preservatives, sanitizes and antibiotic residues in market milk. Suggestive control measures to safeguard consumers from such residues and to save a lot of milk from manufacturing faults.

MATERIALS AND METHODS

A total of 100 market raw milk samples were collected from Sharkia Province. Samples (200ml each) were collected in sterile sampling bottles. The collected samples were transferred directly in an ice box to the laboratory with a minimum delay. Each sample was tested for heat treatment and those proved to be raw were subjected to detection of chemical preservatives, residues of chemical sanitizers and antibiotics.

Storch's test was used for detection of heat treatment *(6)*.

Detection of chemical preservatives

The following preservatives were detected *(7,8)* :

a. Formaldehyde (formalin).
b. Salicylic acid.
c. Hydrogen peroxide.
d. Boric acid and borax.
e. Carbonate.

Detection of residues of chemical sanitizers.

The following chemical sanitizers were tested *(8)*:

a.Hypochlorites.
b.Quaternary ammonium compounds (Q.A.C.).

Detection of antibiotic residues.

The following tests were used for detection of :

a.Delvotest –P- anpule *(9)*.
b.Brillient black reduction test (BR test) *(10)*.

RESULTS

Table 1. Incidence of some microbial inhibitory substances in the examined market raw milk samples

Types of inhibitory substances	No of samples	Positive samples	
		Market milk	
		No.	%
Chemical preservatives	100	17	17.0
Chemical sanitizers		2	2.0
Antibiotics		9	9.0

Table 2. Incidence of chemical preservatives and sanitizers in the examined market milk samples.

Preservatives and sanitizers	No of samples	Positive samples	
		Raw market milk	
		No.	%
Preservatives			
Carbonates	100	9	9.0
Hydrogen peroxides (H_2O_2)		3	3.0
Borax		5	5.0
Formalin		0	0.0
Salicylic acid		0	0.0
Sanitizers			
Hypochlorite		1	1.0
Quaternary amm. Compound (Q.A.C.)		1	1.0

Table 3. Types of antibiotic residues in the examined raw market milk samples.

Test used	No of samples	Positive samples					
		Antibiotics					
		B-lactam		Other		Total	
		No.	%	No.	%	No.	%
Delvotest	100	2	2	1	1	3	3
BR test		-	-	1	1	1	1
Both Delvotest & BR test		2	2	3	3	5	5

DISCUSSION

It is commonly accepted that presence of microbial inhibitory substances, such as chemical sanitizers as well as antibiotics in market milk is considered a mean of adulteration. Such inhibitory substances may cause a public health hazard, beside economic losses due to the action on starters during manufacture of dairy products. These stresses the importance of periodical examination of milk for presence of such dangerous residues.

Results recorded in Table 1 showed that chemical preservatives could be detected in 17% of samples. Carbonates, H_2O_2 and borax proved to be present in 9, 3 and 5% of examined samples respectively, while formalin and salicylic acid fail to be detected (Table 2).

Moustafa (11) and Abdel-Hakeim (12) could not detect any chemical preservatives in market raw milk samples in Assiut city. H_2O_2 in higher concentrations may oxidizes protein with aldehyde , ketons and acids being formed, and softening the curd during cheese making . It also create problems in the milk industry by interfering with starter cultures resulting in products of inferior quality and economical losses, *(8).* Results obtained in Tables 1 & 2 point out that one sample (1%) of market milk was contaminated with quaternary ammonium compounds and other sample contained hypochlorites. Several authors have recommended that quaternary ammonium compounds and other chemical sanitizers were detected in raw milk by variable levels as a results of post-milking disinfection as prophylactive measures in control of mastitis *(1,3,13).* Results of antibiotic residues recorded in Table 1 revealed that 9% of the examined samples contained detectable amounts of antibiotic residues. This finding is nearly concided with previously cited results *(14 ,15).* Higher incidence of antibiotic residues in dry powdered milk was recorded *(16).* While lower incidence was reported in marked milk samples *(17,18).*

Results of antibiotic residues presented in Table 3 showed that antibiotics were detected using Delvotest – P and BR test in 3 and 1% of samples respectively.

The incidence of B- lactam antibiotics was nearly similar to those previously recorded *(19).* Lower incidence of pencillim was recorded by other investigators *(17).* While higher incidence of antibiotic residues was obtained in Teheran area *(20).*

Conclusion

To avoid contamination of milk with chemical preservatives and sanitizers as well as antibiotics, the following steps should be taken in consideration:

1. Milk producers and distributors should have enough and detailed information about the danger of the presence of chemical preservatives, sanitizers and antibiotic residues in milk on public health and the economic point of view.
2. Dairy farms and plants should be subjected to strict veterinary control to follow up correct use of antibiotics
3. Periodical evaluation of the withholding times of drugs used for treatment of dairy animals using the most modern methods.

REFERENCES

1. ***El-Kholy, M. A. and Mahmoud, A. A. (1988):*** Effect of post milking disinfectant as prophylactive measure in control of mastitis. Assiut Vet. Med. J. Vol. 19 , No. 38 : 107-111.
2. ***Samaha, H. And Eissa, A. (1990):*** Post milking teat dipping for control of mastitis . Zagazig Vet. J. 18 (40: 237-244.
3. ***Draz, A. A.; Samaha, A. H. and Zamzam, Abdel Wahed , A. (1994):*** Milking test disinfection as a method of controlling mastitis . 6th Sci., Cong. 20 – 22 Nov., 1994 , Fac. Vet. Med., Assiut , Egypt.
4. ***Pizzano, R., Nicoloi , M. A.; Siciliono, R.; Manzo , C.; Mazzeo M. F. and Addeo , F. (2004):*** Immuno chemical detection of formylated gamma (2): casein in cheese. J. Agric. Food Chem. Feb. 25; 52 (4): 649-54.

5.Serrano, J. M. and Silva , M. (2006): Trace analysis of amino glycoside antibiotics in bovine milk by MEKC with LTF detection. Elic trophoresis, Dec. 27 (33): 4703-10.

6.Lampert, L. M. (1975): Modern dairy products 3rd Ed. Chemical publishing Company Inc. New York.

7.Ling, T. R. (1963): Textbook of Dairy Chemistry , Vol. II, 3rd Ed., P. 1 . 30, Chapman and Hall, London.

8.Atherton, H. A. and Newlander, J. A. (1987): Chemistry and testing of dairy products. Chapman and Hall, London 4th Ed.

9.Oliver, S. P.; Duby, R. T.; Tritschler, II, J. P. and Prange, R. W. (1984): Residues in dairy cows following antibiotic administration. pp. 125-132. In Proc. 23rd Annual Mtg. Natl. Mastis Council, Washington, DC.

10.Kraack, J. and Tolle, A. (1969): Determination of inhibitory substances in milk by the brilliant black reduction test. Improved techniques./ Archiv. Fur Lebensmittelhygiene ; 20 (7): 145-149.

11.Moustafa, K. M. (1980): Studies on some antibiotics and sulfa residues in milk Ph. D. Thesis , Fac. of Vet. Med. Assiut Univ.

12.Abdel-Hakeim, E. H. (1986): Sanitary condition of milk, fermented milk, Kareish cheese and butter manufactured in Assiut Province , M. V. Sc. Thesis, Fac. Vet. Med. Assiut. Univ.

13.Conard, L. and Hemeken, E. (1987): Effect of disinfectant udder wash and a post milk test dip on the bacterial population on the teat. J. of Dairy Science , 61 : 776-781.

14.Calhau, L.; Correia, M. and Barhosa, M. (1992): Milk antibiotics control aspects of an actual topic. Rev. Port. Clinc. Vet. 87 (502): 94-98.

15.De Ruvch H. and De Ridder H. (2007): Determination of tetracycline antibiotic in cow's milk by liquid chromatography mass spectrometry. Rapid column Mass Spectrom :21, (9): 1511-1520.

16.Hafez, N. M. El-Eassawy, A. H.; Saudi, M. A. And Salem, S. S. (1990): Antibiotic residues in dry powdered milk sold in Cairo City. Zagazig Vet. J. 18 (40: 42-47.

17.Cook, R. C.; Katz, K. W. and Meara, P. J. (1976): The incidence and sources of pencillin in milk supplied to the city of Johannesburg. J. of the S. Afr. Vet. Ass. 47 (3): 205-207.

18.Freeza, L.; Tredici, E. and Mauro, A. (1976): Antibiotics and sulfonamide residues in market milk samples . Latte 1 (7): 372-374 . Dairy Sci. Abrt. 39 : 1369.

19.Hafez, N. M. (1988): Studies on antibiotic residues in milk. Ph. D. Thesis, Fac. Vet. Med. , Cairo University.

20.Taghdissian, H. and Navobpoor, S. (1982): Detection of antibiotic residues in raw milk in Teheran area. XXI. International Dairy Congress. Vol. 1 Book 2 Moscow, USSR , 582-583.

الملخص العربى

اكتشاف بعض المواد الكيميائية الحافظة وبقايا المضادات الحيوية فى البان السوق مع علاقتها بالصحة العامة فى محافظة الشرقية

أحمد عبدالخالق السيد ، عزة جودة مصيلحى أيوب

باحث بمعهد بحوث صحة الحيوان بالزقازيق

أجريت الدراسة على مائة عينة من اللبن المباع بالأسواق . أستهدفت الدراسة فحص العينات التى تم جمعها لبيان ماقد يوجد بها من مواد كيميائية حافظة أو بقايا المطهرات الكيميائية والمضادات الحيوية . كما أشتملت الدراسة أيضاً الكشف عن مدى تواجد بعض أنواع المضادات الحيوية .

وقد اسفرت الدراسة عن النتائج الآتية :

أولاً : تواجد بعض المواد الكيميائية الحافظة:

- دلت النتائج على وجود بعض المواد الحافظة فى ١٧% من عينات المفحوصة من الألبان بالأسواق وكانت هذه المواد كربونات ، ماء أكسجين وحمض بوريك بنسب ٩%، ٣ % ، ٥% على التوالى .

ثانياً : تواجد بقايا المطهرات الكيميائية :

- أسفرت الدراسة عن أكتشاف وجود بقايا مركبات الأمونيوم الرباعية والهيبوكلورات المستخدمه فى تطهير أوانى الحليب فى عينة واحدة ١% لكل منهما.

ثالثا: تم الكشف عن تواجد بقايا بعض المضادات الحيوية فى الألبان المباعة بالأسواق حيث تواجدت المضادات الحيوية فى ٣ عينات (٣%) باستخدام اختبار الدلفو (Delvo) وعينة واحدة باستخدام اختبار BR وبأختبار Delvo و BR معاً وجدت فى ٥ عينات (٥%).