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Isolating Some Pathogenic Bacteria from Packed Milk and Detecting of Formalin in its Components

Zainab Alag Hassan[1], Ali Aboud Shareef[2], Majid Ahmed Kadhim[3], Abdulameer Abdullah Al-Mussawi[4]

[1]Lecturer / College of Nursing, University of Basrah, Basrah, Iraq, [2]Assisstant Professor / Department of Biology, College of Education for Pure Sciences, University of Basrah, Basrah, [3]Assisstant lecturer / Al-Sadr Teaching Hospital, Central Laboratory, Iraq, [4]Professor / College of Nursing, University of Basrah, Basrah, Iraq

Abstract

Aims: The main aims of thisstudyis to isolate pathogenic bacteria from packed milk in Basrah city, and to detect the presence of formalin in milk samples.

Methodology:A total of 9types of packed milk were collected from the market in different period. The samples were transported to the laboratory in cooling conditions. They were stored in a refrigerator and analyzed within 24 hours. One ml from each sample was diluted in 9ml sterile distilled water, the diluted sample was a streak inoculated on chromogenic media**.** Three ml of milk sample was taken in a test tube and diluted with equal size of water. 5ml of sulfuric acid (90%) were added to the diluted milk slowly to the side of test tube which must handle with slant position in order to form separation layer. In case of formaldehyde presence a violet layer will form. This method detect of 1 part of formaldehyde in 200000 parts of milk

Result: The result showed only *Staphylococcus saprophyticus* and *Staphylococcus aureus* have been isolated from milk samples (23.4 %) and (10.6 %) respectively. The result showed that high temperature not very effective since two pathogenic bacterial species have been isolated and formalin have been detected in milk samples. The result showed no effect of addition of formalin in some sample and did not inhibit the growth of bacteria.

Conclusions: This study concludes that most of the packed milk under study contaminated with some pathogenic bacterial species, most of milk samples contained formalin.

Key words: *Bacteria, Milk, Formalin, Basrah*

Introduction

Milk and its products have been an important part of the human diet for some 8000 years and are part of the official nutritional recommendations in many countries worldwide. Milk products are rich in calcium, protein, potassium and phosphorus and it is very important for children and adolescents because it contains numerous essential nutrients so itprovides around 52–65 % of the dietary reference intake of calcium and 20–28 % of the protein requirement[1,2].Some of the bacteria contained in milk (such as *Lactobacillus spp* or *Bifidobacterium spp*.) are also present in the healthy human gastrointestinal tract, aiding in digestion and protection from other infections, while other bacteria can be extremely harmful to human health.Milk can be polluted by *Mycobacterium bovis*, *Brucella* species, *Streptococci* and *Coxiellaburnetti*from infected cattle. Agents from human sources such as *Salmonella* species, *Shigella* species, *Corynebacterium diphtheria* and *Streptococcus* species can also be presented in milk[3].

Many preservatives such as nitrate, boric acid, salicylic acid, hydrogen peroxide, formalin, carbonate and bicarbonate are adding to milk to improve keeping quality of milk and to delay spoilage is a problem for regulatory bodies from the early history of dairying. The toxic effect, hypersensitivity, teratogenic effect

Corresponding Author
Zainab Alag Hassan
E-mail id:drzainabA2018@gmail.com
Tel. No: 00964-7718883937

and carcinogenic effect are the most common serious public health hazard appears as a result of accumulation of preservatives[4].The addition of Formalinas adulterant in milk affects on the health of consumers; it causes vomiting, diarrhea and abdominal pain. Larger doses may cause decreased body temp, shallow respiration, weak irregular pulse and unconscious. It also affects the optic nerve and cause blindness. It is one of the potent carcinogens[5]. Therefore the present study was performed to throw out a light on the microbiological examination for detecting pathogenic bacteria and formalin detection in packed milk.

Methodology

Collection of milk products

Nine types of packed milk were collected from the market in different period. The samples weretransported to the laboratory in cooling conditions. They werestored in a refrigerator and analyzed within 24hours[6].

Microbiological analysis

One ml of each sample was diluted in 9ml sterile distilled water.The diluted sample was a streak inoculated on chromogenic media as given below:

**Staphylococcus* chromagar (Paris, France) used to isolate *Staphylococcusaureus*and *Staph. Saprophyticus*.

**E. coli* chromagar (Paris, France) used to isolate *Escherichia coli* and other gram negative bacteria.

*Salmonellchromagar (Paris, France) used to isolate *Salmonella* spp.

**Pseudomonas*chromagar (Paris, France) used to isolate *Pseudomonasaeruginosa*

Detection of formaldehyde presence

Three ml of milk sample was taken in a test tube and diluted with equal size of water. 5 ml of sulfuric acid (90%) were added to the diluted milk slowly to the side of test tube which must handle with slant position in order to form separation layer. In case of formaldehyde presence a violet layer will form. This method detect of 1 part of formaldehyde in 200000 part of milk[7].

Results

The recent study was detected of pathogenic bacteria(*Escherichia coli*, *Salmonella typhi*, *Staphylococcus aureus*,*Staphylococcus saprophyticus* and *Pseudomonas aeroginosa*) in packed milk samples from different origin of products in more than one date of production (November 2018 to February 2019). Only,*S. saprophyticus* and *S. aureus* have been isolated from milk samples (23.4%) and (10.6%) respectively.The CFU number of *S. aureus* and *S. saprophyticus* isolated from milk samples was documented in Table 1.

Table 1: number of bacterial colony forming unit (CFU) on chromo agar media

Type of sample/origin of product	No. of samples	Number of CFU	
		S. aureus	S. saprophyticus
Safio /KSA	1		Uncountable
Almarai/ KSA	1	1	
	2		1
	3		1
KDD/ Kuait	1	2	6
	2	Uncountable	
	3		1
	4		3
	5		Uncountable
	6		1
Kalleh /Iran	1	1	
	2		1
	3		1

All samples under study have been written on its packet "sterilized by high temperature" and no added preservative was mentioned. However, the result showed that high temperature not very effective since two pathogenic bacterial species have been isolated and formalin have been detected in milk samples (Table 2).In some samples, the addition of formalin to milk also did not inhibit the growth of bacteria.

The lack of mention of the ingredients of any particular food products, especially the presence of preservatives is a commercial fraud.

Table 2: Number of milk samples contain formalin

Sr.No.	Type of sample / origin of product	Total number of samples	No. of the samples contain formalin
1	Safio /KSA	8	2
2	Almarai/ KSA	8	8
3	KDD/ Kuait	11	11
4	Kalleh /Iran	6	_
5	Farms alsaba/Syria	3	_
6	Tiffany /UAE	6	3
7	Nesquik/ Turky	2	2
8	Alis / Iran	2	2
9	Nada/ KSA	1	1

Discussion

Iraq relies heavily on imported products, so that there was no Iraqi milk available during the collection of samples from the market. There are Iraqi products of yogurt and cheese, but not packaged milk. The packaged milk found in the Iraqi markets is a Saudi, Kuwaiti, Turkish, Iranian, UAE and few Syrian ones. Since, the war in Syria have been started, Syrian products decreased in Iraqi markets. Formaldehyde is quickly absorbed from the gastrointestinal tract following ingestion and quickly diffuses into many tissues, including the brain, testis, and liver[8]which makes it a dangerous chemical to be used as preservative[9,10].Toxicological effects including histopathological alteration in the stomach (i.e., gastrointestinal lesions (such as papillomata's hyperplasia and hyperkeratosis), allergy, asthma[11], abdominal pain and vomiting.

A Bangladesh study showedsome severe histological alterationsin liver and kidney in treated mice, which werefed with formalin as 30µl, 3µl and 0.3µlfor 30 days[12].Formalin is significantly related with cancer, particularly nasopharyngeal cancer in humans through inhalation during occupational exposure[13].Sometimes caused gastrointestinal cancer when present withhigh concentration in drinking water[14].Consumption of foods contaminated with this dangerous chemical exposes humans, particularly kids and elderly to severe health problems in Iraq and some developing countries.We conclude that most of the packed milk under study contaminated with some pathogenic bacterial species, most of milk samples contained formalin.

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