



Bacterial Assessment of The Cow's Milk from Different Areas in Baghdad City

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Abstract

The study was designed to investigate the raw cow's milk contamination with foodborne *Staphylococcus aureus* bacteria in different regions outside of Baghdad: (Mahmoudiyah, Al-Fadhilia, Abu-Ghraib, and Madinat Al-shuela). Milk samples (n=10) were randomly collected from healthy cows; media were prepared and cultured with diluted raw milk, the results of regions (Mahmoudiyah, Abu-Ghraib) showed that 1,0 out of 10 samples for both and 3, 2 of 10 samples were contaminated with *Staphylococcus aureus* bacteria of regions (Al-Fadhilia, Madinat Al-shuela). Therefore, in this study, we can estimate milk contamination with *Staphylococcus aureus* that may cause food poisoning if it is drunk by people. Therefore, we advise the manufacture of milk in high hygienic conditions and continuous pasteurization of milk, and treatment of the cases of subacute mastitis.

Keywords: Cow's milk, *Staph. aureus*, Baghdad city, Contamination.

Introduction

Food safety is a hot topic these days. Bacteria, fungi, viruses, and parasites are among the more than 200 diseases that food can spread. According to “public health and food safety” experts, foodborne germs cause millions of infections each year in the U.S.A. and across the globe. Yet, as stated by the “Centers for Disease Control and Prevention, the United States has one of the safest food sources in the world” [1].

The udder of the animal secretes milk as a sterile fluid. However, Contaminants can happen inside the udder and during the milking procedure, handling, and storage, in addition to the animals' diet, soil, and excrement being considered possible causes of contamination [2]. Pathogenic bacteria should not be present in raw milk that is meant to be consumed by humans [3]. Raw milk is thought to provide a perfect environment for aerobic bacteria, *Lactococcus*, *Coliforms*, *Streptococcus*, yeasts, and molds to develop and multiply [2]. “Coliform bacteria” present in raw milk can be utilized as a sign of pathogenic bacteria contamination [4]. Many initiatives are currently being made to use technologies to manufacture safe food supplies, such as low-additive dairy food in good quality “natural foods” [5].

Raw milk is described as milk that was not been handled to change the quality or composition produced in compliance with recognized risky processing. "Milk products that have not been pasteurized or subjected to ultra-high temperature treatment" are defined as raw milk products. Staphylococcus aureus contamination substantially impacts the safety and quality of dairy products. Because it produces staphylococcal enterotoxins, this bacterium is the most prevalent cause of food poisoning (SEs).

"Staphylococcus aureus" is one of the most prevalent bacteria that causes poisoning [6]. It's a multipurpose human and animal pathogen that causes everything from minor skin infections to more serious ailments like pneumonia and septicemia [7, 8] Furthermore, human origins were found in 65 percent to 84 percent of all strains [9]. Human skin, mucosa, nose, throat, hair, gastrointestinal, and urogenital tracts carry S. aureus. As a result, any product operated by hand is a staphylococcal potential source of infection. In addition, the risk of staphylococcal contamination of raw materials increases when suitable hygiene measures are not taken.

Staphylococcal food poisoning is a foodborne infection caused by staphylococcal enterotoxins generated in food by enterotoxigenic strains of Staphylococcus aureus (SFP). Milk is an excellent source of S. aureus development and enterotoxin production and contaminating raw milk has been linked to several SFP outbreaks [10]. Mastitis caused by S. aureus is a significant problem in the dairy industry, and diseased animals can affect bulk milk. Human workers, milking tools, the environment, or the udder and teat skin of dairy cows are all potential sources of bulk milk contamination; this is a problem in terms of food safety because enterotoxigenic S. aureus could cause SFP after consuming raw milk products [11].

S. aureus can manufacture a wide range of enterotoxins "(A, B, C, D, E, G, H, I, J, K, L, M, N, O, P, Q, R, and U)," It is usual for S. aureus to create these toxins at about the same time, despite the fact that classical enterotoxins are not produced by S. aureus "(A, B, C, D, E, G, H, I, J, K, L, M, N, O, P)" [12].

"Food poisoning caused by Staphylococcus aureus (SFP)" is the third biggest foodborne illness globally even though it is a mild, self-limiting illness with a low fatality rate and is regarded as one of the most important economic illnesses [13].

S.aureus bacteria can be killed by food processing without damaging SEs, which can withstand high temperatures and gastric proteases like pepsin [14].

Due to contamination induced by inadequate hygienic standards or milk origin from mastitis cows, S. aureus is frequently discovered in raw milk and dairy products.

Materials And Methods

Healthy calves were chosen at random to receive raw cow samples (n = 10) and taken to the laboratory in a refrigerator with an ice pack, in which they were treated one hour later.

Aseptic techniques were used to process the samples as soon as they arrived. "1mL of each milk sample was inoculated on Baird-Parker agar" to detect S. aureus (Difco, Detroit, Michigan, USA). Suspect colonies then "sub-cultured on blood agar plate (Difco, Detroit, Michigan, USA)" and incubated for twenty-four hours at 37 °C after 24 - 48 hours of incubation at 37 °C. [15]. Gram stain, colony shape, catalase activity, "coagulase, and Voges-Proskaver (VP0)" tests were performed on suspicious colonies to identify S. aureus [16].

Results

S. aureus is typically found in raw "milk and dairy products" due to contamination caused by low sanitary standards or the origin of the milk, which can be from mastitic cows.

As noted in the below table, the percentage of infected raw milk samples of Mahmoudiyah was 10%, Al-Fadhilia 30%, Abu-Ghraib 0%, and Al-shuela 20%.

Table (1): The isolation percentages of raw milk samples contaminated by *S. aureus* that collected from districts of Baghdad province.

Region	Raw samples	Positive for <i>S. aureus</i>	Percentage
Mahmoudiyah	10	1	10%
Al-Fadhilia	=	3	30%
Abu-Ghraib	=	0	0%
Al-shuela	=	2	20%

Discussion

The overall occurrence of *S. aureus* in the studied samples was more significant in Al-Fadhilia cow milk, possibly due to bacterium shedding from dairy cows' infected mammary glands, which is the most likely "source of *S. aureus* contamination of milk and dairy products." Besides, the contamination might be referring to sub-acute mastitis. The sample may get contaminated during the chilling, serving of milk, and storage. The result of the Abu- Ghraib sample shows that there is good hygienic condition and healthy cows. Nevertheless, the significant incidence of *S. aureus* contamination highlighted the possible public health risk. The prevalence of these bacteria in raw milk is frequently cited as a serious public health risk, particularly among those who still consume raw milk. The prevalence of indicator bacteria was studied in this study to determine the microbiological quality and safety of raw milk (*Staph. aureus*). "The high isolation percentage" of *Staph. aureus* in raw milk is due to the fact that up to 65 % of individuals are nasal carriers of *Staph. aureus* bacteria, and 5-20 percent of people comment; If the paper is about cows, is it correct to mention people here? carry the germs as part of their regular skin flora (30 percent) could be attributable to contamination by handlers [17]. The storage temperature is critical because it affects microbial development and emphasizes the necessity of maintaining an excellent cool chain to safeguard the quality of raw milk. Dairy products must be kept cool at all times, and the practice of displaying them at room temperature should be avoided. Since refrigeration at 4°C is one of the most effective ways to suppress the development of many bacteria, including *Staphylococcus aureus*, and thus the generation of staphylococcal toxin, this refrigeration temperature can result in a significant reduction in the bacterial population [18]. Without refrigeration, bacteria might grow and reproduce, and the bacterial count in unchilled raw milk can double in less than 3 hours. Also, present microbial growth numbers are based on the milk's temperatures maintained shortly after milking [19].

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