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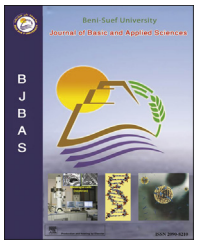

Full Length Article

Public health risk of some milk borne pathogens

Mohamed M.A. Zeinhom [a,*], *Gihan K. Abdel-Latef* [b]

[a] *Food Hygiene & Control Department, Faculty of Veterinary Medicine, Beni-Suef University, Egypt*
[b] *Hygiene, Management and Zoonoses Department, Faculty of Veterinary Medicine, Beni- Suef University, Egypt*

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ABSTRACT

A total of 150 samples of raw milk, 75 each of farm and market milk were collected from different farms and supermarkets in Beni-Suef Governorate, in addition to 30 stool samples from milk handlers and 25 milker's hand swabs were examined for the presence of *Escherichia coli*, *E. coli* O157:H7, *Salmonella*, *Aeromonas* and *Yersinia*. Isolates were identified biochemically and serologically. The obtained results revealed that *E. coli* was detected in a percentage of 26.7% and 16% in the examined raw market and bulk farm milk respectively, while in stool and hand swabs samples were 16.6% and 16%, respectively. *E. coli* O157:H7 and *Salmonella* spp. failed to be detected in any of the examined samples. Additionally, 45% and 16.7% of the recovered *E. coli* strains from the examined raw market and farm milk samples were enteropathogenic O166, while 55% and 83.3 were untypable, respectively. On the other hand 60% of human stool samples isolates were O 148 and 40% of the isolates were untypable, while 100% of the hand swab isolates were untypable. The results also exhibits isolation rate of *Aeromonas hydrophila* in a percentage of 24%, 13.3%, 10% and 16% from market milk, farm milk samples, stool and hand swabs respectively. While *Yersinea enterocolitica* represent 3.3% in the stool samples only. The public health significance of isolated strains as well as suggested control measures were discussed.

1. Introduction

Milk ranks high among other foods and is considered as the most perfect food for human from birth to senility as it is not only has good sensory properties and all nutrients required for the body for rapid growth but also could prevent or reduce risks of many nutritional deficiency diseases (Kalkwarf et al., 2003; Marshall et al., 2003).

Raw milk is still used by large number of farm families and workers and by a growing segment of the general population who believe that the milk is not only safe but also imparts beneficial health effects that are destroyed by pasteurization (LeJeune and Rajala-Schultz, 2009). Milk and products derived from milk can harbor a variety of microorganisms and can be important sources of food borne pathogens. The presence of food borne pathogens in milk may be due to direct contact with contaminated sources in the dairy farm environment and to excretion from the udder of an infected animal.

Escherichia coli is a normal inhabitant of the intestines of animals and humans but its recovery from food may be of public health concern due to the possible presence of

* *Corresponding author*. Tel.: +20 1100900905; fax: +20 822327982.
E-mail address: m_ma3roof@yahoo.com (M.M.A. Zeinhom).
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enteropathogenic and/or toxigenic strains which lead to sever gastrointestinal disturbance (Soomro et al., 2002). It is considered as the major indicator of fecal pollution in food production. Its presence in processed foods results from recontamination, because this bacterium usually does not survive food preservation processes. The main reasons for the presence of *E. coli* in food products are nonobservance of relevant technological regimes, incompliance with recommended process standards, and the lack of personal hygiene (Law, 2000).

The majority of *E. coli* rods do not constitute a serious health hazard, but some serotypes can cause food poisoning and alimentary intoxications. The most dangerous among them are enterohemorrhagic *E. coli* strains, especially serotype O157:H7. *E. coli* O157:H7 has become a pathogen of major concern in both food and dairy industries, and to the public, because of its ability to cause severe illness, in particular, haemorrhagic colitis, hemolytic uremic syndrome and thrombotic thrombocytopenic purpura (Picozzi et al., 2005; Reuben et al., 2013). The sources of infections with enterohemorrhagic *E. coli* strains are mostly meat products, especially underdone steaks and hamburgers (Chinen et al., 2001), but also other foodstuffs as unpasteurized milk and dairy products manufactured from raw milk, have been implicated in many outbreaks, (Maher et al., 2001).

Salmonellosis is the most common food-borne bacterial disease worldwide (Forshell and Wierup, 2006). *Salmonella* is the second leading cause of food borne illness in most developed countries causing diarrhea, cramps, vomiting, and often fever. Food-borne salmonellosis has remained a neglected zoonosis in Egypt and other developing countries of the world. Food borne Salmonellosis has been recognized due to consumption of raw or improperly pasteurized milk and milk products (Karshima et al., 2013).

The genus *Yersinia* comprises an important group of bacterial pathogens, with *Yersinia enterocolitica*, *Y. pseudotuberculosis*, and *Y. pestis* representing the species of interest. *Y. enterocolitica* is the most common agent of this genus that are associated with a spectrum of clinical syndromes in man, with gastroenteritis as the most frequently encountered manifestation. Most cases are sporadic or occur in small clusters, but large outbreaks have been reported worldwide in families, schools, hospitals, and in association with community gatherings (Bottone, 1997; Leclercq et al., 2005) although *Y. enterocolitica* has been isolated from a number of environmental, food, and water sources, there have been relatively few documented outbreaks of human illness where food was proved by culture to be the source of infection. According to (Ackers et al., 2000) the three well-documented outbreaks in which contaminated chocolate milk, raw milk, and tofu were the vehicles of transmission.

The genus *Aeromonas* includes at least 13 species, among which is the motile, mesophilic *Aeromonas hydrophila* (Abbott et al., 2003). The mesophilic species have been associated with a wide range of infections in humans that have been isolated frequently from various food products, and from patients with diarrhea. Drinking water and food are reservoirs of *A. hydrophila* and therefore may be important sources of human infections, leading to intestinal and non-intestinal diseases. Epidemiological studies implicated *Aeromonas* species in causing water and food-borne outbreaks and traveler's diarrhea (Vila et al., 2003) that are increasingly recognized by researchers as a cause of various clinical syndromes (Doyle and Hugdahl, 1983; Tsai et al., 2006). The presence of *Y. enterocolitica* and *A. hydrophila* in food products is of a special concern since those organisms are capable of growth at refrigerator temperatures.

Therefore, this study was carried out to determine the prevalence of some pathogenic bacteria spread by contamination of raw milk and among people who may be carriers as well as discussing the public health significance of the isolated microorganisms and suggestive control and preventive measures.

2. Materials and methods

2.1. Collection of samples

A total of 150 raw milk samples were collected randomly (75bulk farm milk and 75 raw market milk from different dairy shops, groceries and supermarkets) in Beni-Suef Governorate, Egypt. Milk samples were identified and rapidly delivered to the Food hygiene and control laboratory, Faculty of Veterinary Medicine, Beni-Suef University in an insulated ice-box to be examined. In addition to 25 hand swab samples and 30 stool samples were collected from milk handlers from the same examined dairy farm and shops in Beni-Suef Governorate (APHA, 1992). A swab was taken from each stool samples using a sterile swab and then inserted into sterile buffered peptone water (BPW) tubes under aseptic conditions (Sadoma, 1997). The tubes were labeled then ice packed and transferred immediately to the lab.

2.2. Isolation and identification of E. coli from raw milk (APHA, 1992)

25 ml from the collected raw milk samples were added to sterilized tubes containing 225 ml of BPW and incubated aerobically at 37 °C for 24 h. One ml from incubated BPW was transferred to 5 ml MaCconkey broth and incubated at 37 °C for 24 h. A loopful from the incubated broth was streaked on Eosin methylene blue (EMB) agar and incubated at 37 °C for 24 h. Morphologically typical colonies (at least 5 per plate) producing metallic sheen were taken into nutrient broth for further identification.

2.3. Isolation of E. coli O157 from raw milk (De-Boer and Heuvelink, 2000)

25 ml of each milk sample was directly added to modified Tryptone soy broth supplemented with novobiocin (20 mg/litter). The inoculated broth was incubated at 37 °C for 24 h. A loopful from the incubated broth was streaked onto Tellurite-Cefixime Sorbitol MacConkey agar plate and incubated at 37 °C for 24 h. Sorbitol negative colonies (colorless) were picked up and purified then examined Biochemically (tests were performed to confirm *E. coli* using Gram staining, Catalase test, Indole, Methyl red, Voges–Proskauer test, Nitrate