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Importance of *Listeria monocytogenes* as Food-borne Infection Transmissible to Man Through Food

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ABSTRACT

Listeria monocytogenes is considered one of the most important food-borne pathogens that is transmitted to human mainly via contaminated food. In an attempt to throw more light on zoonotic importance of *L. monocytogenes* as food-borne pathogen, a total of 340 samples were used for this study; these samples included 250 food samples (50 beef burger, 50 sausages, 25 Luncheon, 25 minced meat, 50 raw milk and 50 kariesh cheese) were randomly collected from retail markets, groceries and restaurants in different localities in El Giza Governorate. In addition swabs were taken from 40 food refrigerators and stool samples from 50 diarrheic children. All samples were cultured for the isolation of *L. monocytogenes* using the conventional International Organization for standardization (ISO,

11290-1) method. The isolates were tested biochemically using Listeria Microbact 12L and confirmed by PCR. The results revealed that the isolation rates of *L. monocytogenes* were 8 %, 4%, 4% for beef burger, minced meat and Luncheon respectively, while sausage samples were totally negative. *L. ivanovii* and *L. seeligeri* were recovered in a percentage of 2% for each in both sausage and beef burger samples. Moreover, 8% of raw milk samples were positive for *L. monocytogenes*, whereas kariesh cheese samples and refrigerator swabs were negative. Moreover *Listeria grayi* was isolated from human stool (2.5%) rising the question about the opportunistic nature of such nonpathogenic bacteria. DNA sequencing of *hlyA* gene for PCR products of the obtained meat products isolates and the deduced phylogenetic analysis revealed that the isolates were *L. monocytogenes* with homology results (98-99%). The next generation sequencing is helpful in rapid acquisition of sequence data to facilitate detection and characterization of pathogenic strains of *L. monocytogenes*. In conclusion, the high isolation rates of *L. monocytogenes* among the examined food stuffs highlighted the crucial role of food to be an important vehicle for such pathogen.

Keywords: *L. monocytogenes*, meat, milk, culture, PCR, phylogenetic analysis.

Dedicated with gratitude to everyone encouraged me.....

My Father

(Asking Allah give him mercy and forgivness)

My mother

My husband

My daughters (Ahlam and Roaa)

My brothers and sisters

My friends (Asmaa and Heba)

They are the true roses of my life……..

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Introduction

Listeria monocytogenes (*L. monocytogenes*) is considered one of the most important pathogens responsible for food-borne illness. It is often incriminated in outbreaks of human illness **(Ryser and Marth, 2007)**. It causes serious disease called listeriosis with high fatality rates (20–30%) compared with other food borne microbial pathogens **(Jeyaletchumi *et al.*, 2010)**. Listeriosis is one of the important emerging bacterial zoonotic infections worldwide which arises mainly from the consumption of contaminated food products **(Malik *et al.*, 2002)**. In human, *L. monocytogenes* causes febrile gastroenteritis in immunocompetent individuals **(Piana *et al.*, 2005)** and life-threatening invasive infections in more susceptible individuals **(Mead *et al.*, 2006)**, such as the young, old, pregnant and immune-compromised people **(De Cesare *et al.*, 2006)**.

The most severe clinical manifestations of invasive human listeriosis include septicemia, encephalitis, meningitis and spontaneous late-term abortion **(McLauchlin *et al.*, 2004)**. Moreover, *L. monocytogenes* infections are responsible for the highest hospitalization rates (91%) among known food-borne pathogens through both sporadic episodes and large outbreaks worldwide (**Jemmi and Stephan, 2006)**.

Listeria spp. infect wide range of animals (domestic pets, livestock, other mammals, rodents, amphibians, fish and arthropods) and more than 17 avian species **(Posfay-Barbe and Wald, 2009)**. Both

L. monocytogenes and *L. ivanovii* are of great veterinary importance and they were reported to be responsible for illness in animals used for food as cattle, sheep and goats causing encephalitis, abortion and septicemia **(Dhanashree *et al.*, 2003)**.

Listeria spp. have unique physiological characteristics that allow its growth at refrigeration temperature which are usually adverse for most pathogenic food borne bacteria; the organism can also tolerate a pH between 5.4 and 9.6 **(Rocourt and Cossart, 2001)**. In food staff, *L. monocytogenes* was found in raw or processed food samples including dairy products, meat, vegetables and seafood **(Meng and Doyle, 1997 and Gugnani, 1999)**. In addition, its ability to persist in food-processing environments and multiply under refrigeration temperatures make *L. monocytogenes* a significant threat to public health (**Jemmi and Stephan, 2006)**.

There is a need to continue research on the incidence in different foodstuff in Egypt and it is necessary to give an honest report on the incidence of the dangerous pathogen *L. monocytogenes* due to the acute toxicity, pathogenicity and ability of *Listeria* to grow in severe conditions (**Ismaiel *et al.*, 2014**).

Therefore the current study aimed to:

1- Determine the prevalence of *L. monocytogenes* in some popular food staff (meat products, milk and kariesh cheese).

2- Investigate the prevalence of *L. monocytogenes* in food refrigerators.

3- Investigate the prevalence of *L. monocytogenes* in human stool samples from childern suffering from fever and diarrhea.

4- Phylogenetic analysis of some *L. monocytogenes* isolates to find out the association between human listeriosis and food contaminated with *L. monocytogenes*.