



SHORT COMMUNICATION

Prevalence of *Listeria* Species in Ground Beef and Chicken Meat Sold in Eastern Turkey

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ARTICLE HISTORY

Received: October 14, 2011
Revised: December 01, 2011
Accepted: January 03, 2012

Key words:

Chicken Meat
Ground Beef
L. monocytogenes

ABSTRACT

The present work aimed to investigate the prevalence of *Listeria monocytogenes* in ground beef and chicken samples put into the market during the period of April to September 2011 in the eastern part of Turkey. A total of 360 food samples consisting of 180 ground beef and 180 chicken meat samples were examined in terms of the presence of *Listeria* species. *L. monocytogenes* was isolated from 7.2 % ground beef samples and 17.8 % of chicken meat samples. While in 15.5% of the ground beef samples *L. innocua* was detected, *L. welshimeri* was detected in 6.1% of them. As for chicken meat samples, *L. innocua* was detected in 36.7% of them while *L. welshimeri* was detected in 5.5%, *L. seeligeri* was detected in 4.4% and *L. murrayi* was detected in 1.1% of them. Out of 45 *L. monocytogenes* isolates, 28 were type 1, while 17 of them were type 4. These results indicated that *L. monocytogenes* and other *Listeria* species are widely distributed in the ground beef and chicken meat samples in the eastern part of Turkey. Thus, meat products may be a potential food safety concern in Turkey.

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To Cite This Article: Kalender H, 2012. Prevalence of listeria spp in ground beef and chicken meat sold in eastern Turkey. Pak Vet J, 32(3): 456-458.

INTRODUCTION

Listeria monocytogenes is a serious pathogen available all over the world. *Listeria spp.* is inhabitant in soil, poor quality silage, sewage, slaughterhouse wastes and animal intestines. Products may get contaminated during production, processing and transportation of foods. Through consumption of raw or inadequately cooked foods the agent infects humans. Meat and milk products are the most significant source of human listeriosis (Güven and Patir, 1998; Yan *et al.*, 2010).

There are a total of 7 species of *Listeria* as *L. monocytogenes*, *L. innocua*, *L. welshimeri*, *L. seeligeri*, *L. ivanovii*, *L. murrayi* and *L. grayi* (Gebretsadik *et al.*, 2011). Among these species only *L. monocytogenes* is a species that is pathogen for both humans and animals. In ruminants *L. monocytogenes* causes miscarriages and reproductive disorders. On the other hand, animals may carry *L. monocytogenes* in their intestines without showing any symptoms (Esteban *et al.*, 2009). Pregnant women, children, elders and people with inadequate immune system are more sensitive to the disease. *L. monocytogenes* causes meningitis, septicemia, intrauterine infection and sometimes death are reported (Gebretsadik *et al.*, 2011). With the studies made in different countries, it has been determined that meat and meat products are intensely contaminated with *Listeria spp.* (Inoue *et al.*,

2000; Baek *et al.*, 2000; Capita *et al.*, 2001; Soutos *et al.*, 2003; Bohaychuk *et al.*, 2006; Ochiai *et al.*, 2010; Awaisheh, 2010; Gebretsadik *et al.*, 2011). In Turkey, it has been reported that *L. monocytogenes* isolated from chicken meats was 30-38%, while for ground beef samples it was 13-28% (Güven and Patir, 1998; Erol and Sireli, 1999; Sireli and Erol, 1999). Although occurrence of *L. monocytogenes* in meat and meat products has been investigated in several countries, little has been reported about the prevalence of *L. monocytogenes* in meat products in Turkey.

This research was carried out in order to determine the prevalence of *Listeria spp.* with special reference to *L. monocytogenes* in ground beef and chicken meat put into the market in the eastern part of Turkey.

MATERIALS AND METHODS

Food Samples: A total of 360 food samples consisting of 180 ground beef and 180 chicken meat samples, which had been obtained from the butcher shops and markets in the eastern part of Turkey from April to September 2011, were examined. The samples were immediately brought into the laboratory within sterile containers preserved in ice cold packs.

Isolation and Identification of Listeria Species: Presence of *Listeria* species within the samples were examined by taking the method recommended by the United States Department of Agriculture and Food Safety and Inspection Service. 25 grams of samples taken under aseptic conditions were homogenized within 225 ml of Listeria Pre Enrichment Broth (Oxoid) and incubated for 48 hours at 30°C, and then 1 ml was taken from this medium, transferred into 9 ml of Listeria Enrichment Broth (UVM 1) and incubated for 24 hours at 35°C. Afterwards, 1 ml was taken from the UVM 1 medium, transferred into UVM 2 medium and was incubated for 24 hours at 35°C. A 0.1 ml suspension from the UVM 2 medium was then transferred to Listeria Selective Agar (Oxoid) and incubated for 48 hours at 35°C. In order to obtain pure culture, the *Listeria* suspected colonies within the selective agar were transferred into the Tryptic Soy Agar-Yeast Extract (Difco) medium. Each isolate was identified by means of Gram staining, motility test, catalase test, mannitol, rhamnose and xylose fermentation, nitrate reduction, beta hemolysis activity and CAMP test (Erol and Sireli 1999; Yucel *et al.*, 2005; Gebretsadik *et al.*, 2011). *L. monocytogenes* isolates were typified by using Listeria O antiserum type 1 and type 4 (Difco).

RESULTS AND DISCUSSION

Distribution of the *Listeria* types isolated from the samples is shown in Table 1. It was detected that 52 of the total 180 ground beef samples (28.8 %) and 118 of the total 180 chicken meat samples (65.5%) were contaminated with *Listeria spp.* From 13 of the ground beef samples (7.2%) *L. monocytogenes*, 28 of them (15.5%) *L. innocua* and 11 of them (6.1%) *L. welshimeri* were isolated. As for the chicken meat samples, from 32 of them (17.8%) *L. monocytogenes*, 66 of them (36.7%) *L. innocua*, 10 of them (5.5%) *L. welshimeri*, 8 of them (4.4%) *L. seeligeri* and 2 of them (1.1%) *L. murrayi* were isolated. Out of total 45 *L. monocytogenes* isolates, 28(62.2%) were typified as type 1 and 17 (37.8%) of them were typified as type 4.

Listeriosis is a serious zoonosis disease reported in many countries. The real source for infection in humans was recorded through contaminated food and food products. It has been reported that *L. monocytogenes* was isolated from 12.2% of ground beef and 37% from minced chicken meat in Japan (Inou *et al.*, 2000), from 19% of beef in Jordan (Awaisheh, 2010), from 32% of the chicken meats in Spain (Capita *et al.*, 2001), from 52% of the beef meat and from 34% of chicken meats in Canada (Bohaychuk *et al.*, 2006), from 2.6% of raw beef in Ethiopia (Gebretsadik *et al.*, 2011), from 30.2% of the chicken meat in Korea (Baek *et al.*, 2000). In the present study, *L. monocytogenes* was isolated from 17.8% in the chicken meat samples and from 7.2% in the ground beef samples collected from commercial market in and around the eastern part of Turkey. When compared with the

findings obtained from many other studies, different prevalence rates detected in this study might be due to variations in food-processing environment, human activity, poultry and livestock farm management, sampling and isolation methods. However, a similar isolation rate (18%) to that of the present study has been reported in chicken meat samples in Ireland (Soults *et al.*, 2003).

In a research made in Turkey between the years of 1993-1994, *L. monocytogenes* was detected in chicken meat samples with a ratio of 38% and in minced meat samples with a ratio of 13% (Güven and Patir, 1998). In Ankara, the capital city of Turkey, *L. monocytogenes* was isolated from 30% of chicken meats (Erol and Sireli, 1999) and from 28% of ground beef meats (Sireli and Erol, 1999). *L. monocytogenes* isolation rates found in this study were close to the recovery rates found by Akpolat *et al.* (2004) in chicken meat (18%) and with those found by Yucel *et al.* (2005) in ground beef samples (6.1%).

The more frequently isolated species from the samples in this study was *L. innocua*. But this specie is not considered as pathogen for humans. It is probable that *L. innocua* exists in the environment and in animal intestines quite commonly. It was also reported by other researchers that in food samples this specie is more commonly found than other *Listeria spp.* (Erol and Sireli, 1999; Yucel *et al.*, 2005). When compared with the past, in recent years *L. monocytogenes* was detected in lower rates in Turkey. This may be the result of a higher level of compliance to hygiene and sanitation rules in ranches, slaughterhouses and butcher shops. When compared with the findings obtained from many other studies, it was found that in this research lower rates of *Listeria spp.* were isolated from ground beef samples. In the eastern parts of Turkey, feeding animals with silage is not a widely used implementation. It is probable that in the intestines of the animals of this region, *Listeria spp.* are present with lower rates. This may result in a reduction in the cases of *Listeria* contamination during slaughtering in slaughterhouses.

In conclusion, this study has demonstrated the presence and distribution of *L. monocytogenes* and other *Listeria* species in meat products in the eastern part of Turkey. From this understanding, meat products may be considered as a potential source of human listeriosis in Turkey. Appropriate hygienic measures in food industries may be implemented to reduce the risk of *L. monocytogenes* infection. Consumers should take proper care for prevention of the organism such as storing at cold temperature and cooking before consumption.

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Table 1: Distribution of *Listeria* species isolated from animal food samples

Sample type	Number of samples	Number of <i>Listeria</i> positive samples (%)	Number (%) of positive samples for <i>Listeria</i> species				
			<i>L. monocytogenes</i>	<i>L. innocua</i>	<i>L. welshimeri</i>	<i>L. seeligeri</i>	<i>L. murrayi</i>
Ground beef	180	52(28.8)	13(7.2)	28(15.5)	11(6.1)	-	-
Chicken meat	180	118(65.5)	32(17.8)	66(36.7)	10(5.5)	8(4.4)	2(1.1)
Total	360	170(47.2)	45(12.5)	94(26.1)	21(5.8)	8(2.2)	2(0.5)

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