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

Hakan Kalender*

Department of Food Technology, Keban Vocational School, University of Firat, 23119 Elazig, Turkey

*Corresponding author: hkalender@firat.edu.tr

**ABSTRACT**

The present work aimed to investigate the prevalence of *Listeria monocytogenes* in ground beef and chicken meat 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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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 (Oxoid) 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 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 species. 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 typed as type 1 and 17 (37.8%) of them were typed 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 (Inoue 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 (Suiolos 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% (Guven 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.

REFERENCES


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

<table>
<thead>
<tr>
<th>Sample type</th>
<th>Number of samples</th>
<th>Number of Listeria positive samples (%)</th>
<th>Number (%) of positive samples for Listeria species</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ground beef</td>
<td>180</td>
<td>52(28.8)</td>
<td>L. monocytogenes (13(7.2) )  L. innocua (32(17.8))  L. welshimeri (10(5.5))  L. seeligeri (4(4.4))  L. murrayi (2(1.1))</td>
</tr>
<tr>
<td>Chicken meat</td>
<td>180</td>
<td>118(65.5)</td>
<td>L. monocytogenes (32(17.8))  L. innocua (66(36.7))  L. welshimeri (10(5.5))  L. seeligeri (8(4.4))  L. murrayi (2(1.1))</td>
</tr>
<tr>
<td>Total</td>
<td>360</td>
<td>170(47.2)</td>
<td>L. monocytogenes (45(12.5) )  L. innocua (94(26.1))  L. welshimeri (21(5.8))  L. seeligeri (8(2.2))  L. murrayi (2(0.5))</td>
</tr>
</tbody>
</table>


