

Detection of *Listeria monocytogenes* in Faeces from Chickens, Sheep and Cattle in Elazığ Province

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Received: 29.03.2002

Abstract: Faecal samples collected from 206 chickens, 170 sheep and 130 cattle were investigated for the presence of *Listeria monocytogenes* in animals slaughtered at local abattoirs in Elazığ. The prevalence of *L. monocytogenes* was 4.36% in chickens, 0.58% in sheep and 1.53% in cattle. Of the 12 *L. monocytogenes* isolates, seven (58.33%) and five (41.66%) belonged to serotypes 1 and 4, respectively. Other species isolated were *L. innocua*, *L. welshimeri*, *L. seeligeri*, *L. murrayi* and *L. grayi*. These results indicate that animal faeces could be a source of contamination of carcasses with *L. monocytogenes* and may lead to foodborne listeriosis.

Key Words: Chicken, sheep, cattle, faeces, *L. monocytogenes*

Elazığ İlinde Tavuk, Koyun ve Sığırların Gaitalarında *Listeria monocytogenes*'in Saptanması

Özet: Bu araştırmada Elazığ'da mezbahalarda kesilen 206 tavuk, 170 koyun ve 130 sığira ait gaita örneklerinde *L. monocytogenes*'in varlığı araştırıldı. Tavukların % 4,36'sından, koyunların % 0,58'inden ve sığırların % 1,53'ünden *L. monocytogenes* izole edildi. Toplam 12 *L. monocytogenes* suşunun 7'si (% 58,33) serotip 1 ve 5'i (% 41,66) serotip 4 olarak tiplendirildi. İzole edilen diğer türler *L. innocua*, *L. welshimeri*, *L. seeligeri*, *L. murrayi* ve *L. grayi*'dir. Sonuç olarak, hayvanların gaitalarında bulunan *L. monocytogenes* karkaslara bulaşarak insanlarda gıda kaynaklı Listeriozis'e sebep olabilir.

Anahtar Sözcükler: Tavuk, koyun, sığır, gaita, *L. monocytogenes*

Introduction

Listeria monocytogenes is a Gram positive, facultatively intracellular bacterium that is a potential pathogen for both humans and animals (1). *L. monocytogenes* is widely distributed in the environment and may be transmitted to humans through contaminated food products (2). Animals can carry the bacterium without appearing ill and can contaminate animal food products such as meat and milk (3,4). *L. monocytogenes* has been isolated from the faecal samples of cattle (5-9), sheep (10,11) and chickens (7,8,12) in many countries.

Sporadic animal listeriosis cases have been reported (13-15), and *L. monocytogenes* has been isolated from white cheese (16), sheep faecal samples (17) and brain samples from chickens (18) in recent years in Turkey. However, the prevalence of *L. monocytogenes* in different animal species has not been investigated in detail in Elazığ. Therefore, the purpose of this study was to investigate the frequency of *L. monocytogenes* in the faecal samples of chickens, sheep and cattle.

Materials and Methods

Faecal samples: Samples, from 206 chickens, 170 sheep and 130 cattle were collected on the slaughter line of two abattoirs in Elazığ between March and August 2001. The samples were taken from the bowels of the animals.

Isolation and Identification of *Listeria* spp: Faecal samples were transferred into *Listeria* Enrichment Broth (LEB: Oxoid). After incubation at 30 °C for 48 h, 0.1 ml of the enrichment broth was inoculated onto *Listeria* Selective Agar Base (LSA: Oxoid) supplemented with acriflavine, colistin sulphate, cefotetan, fosfomycin and cycloheximide. The agar plates were incubated at 37 °C for 48 h. Five typical colonies per sample were subcultured onto Tryptic Soy Agar-Yeast Extract (Difco). Each isolate was tested for Gram staining, umbrella-shaped motility at 20 °C, catalase production, β -hemolysis on sheep blood agar plates, fermentation of mannitol, rhamnose and xylose, nitrate reduction and CAMP test with *Staphylococcus aureus* and *Rhodococcus*

equi (1,7,9). *L. monocytogenes* isolates were serotyped with Listeria O antiserum types 1 and 4 (Difco).

Statistical Analysis: The chi-square test was used to determine significant differences between proportions. A probability of less than 0.05 was considered statistically significant.

Results

All results are shown in the Table. Listeria species were isolated from 24 (11.65%) of 206 chickens, five (2.94%) of 170 sheep and six (4.61%) of 130 cattle. Twelve (34.28%) of 35 Listeria spp. isolates were *L. monocytogenes*. *L. monocytogenes* was isolated from nine (4.36%) chickens, one (0.58%) sheep and two (1.53%) cattle. The overall percentage of *L. innocua* was higher than *L. monocytogenes*. Other species isolated were *L. welshimeri*, *L. seeligeri*, *L. murrayi* and *L. grayi*. The difference between the rate of isolation of Listeria spp. and *L. monocytogenes* from animal species was statistically significant ($p < 0.05$). Of the 12 *L. monocytogenes* isolates, seven (58.33%) and five (41.66%) belonged to serotypes 1 and 4, respectively.

Discussion

In this study, the frequency of *L. monocytogenes* in faecal samples from chickens, sheep and cattle was 4.36%, 0.58% and 1.53%, respectively. Higher rates for cattle have been reported in Denmark, Sweden and Yugoslavia (3,7,9). In Germany, a rate of 33%, 8% and 8% for cattle, sheep and chickens, respectively has been reported (11). However, a similar rate (1.9%) to that of present study has been reported in cattle in Japan (8). *L. monocytogenes* has been isolated in 1.11% of faecal

samples of sheep in Turkey (17). Silage feeding has been related to increased incidence of listeriosis. The contamination of animal faeces by *L. monocytogenes* has been linked to feeding practices such as feeding with spoiled silage (4,7,19,20). Silage is not widely used for feeding cattle and sheep in the area where the present study was conducted. Therefore, the lower rates found in the present study were probably due to feeding with dry feed. Differences between sampling and isolation methods should also be considered in the context of discrepancies between results. Some researchers used the cold enrichment method at 4 °C for six to eight weeks for isolation (8,17). In the present study, Listeria species were isolated from faecal samples using the heat enrichment method at 30 °C for 48 h as reported previously (3,7,9).

The presence of Listeria spp. in faeces was associated with the prevalence of these bacteria in feed (2,3). In the present study, the majority of Listeria species isolated were *L. innocua*. *L. innocua* is probably present in much larger numbers in feed than other species, and therefore has a higher chance of being detected in animal faeces.

Carcass meat may be contaminated by faeces (7). The presence of *L. monocytogenes* has been reported in studies of meat products in other countries (3,12,19). *L. monocytogenes* has been found in 50% of chicken meat samples (21) and 28% of minced beef samples (22) in Turkey. In the present study, the lower rates were detected in faecal samples. This suggests that the number of carriers of *L. monocytogenes* is low and that the higher incidence found in meat products can be due to the growth of *L. monocytogenes* during storage following inadequate processing.

Table. Presence of *Listeria* species in animal faeces.

Animal species	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>	<i>L. grayi</i>
Chickens	206	24 (11.65)	9 (4.36)	10 (4.85)	2(0.97)	2 (0.97)	1 (0.48)	0
Sheep	170	5 (2.94)	1 (0.58)	3 (1.76)	1 (0.58)	0	0	0
Cattle	130	6 (4.61)	2 (1.53)	3 (2.30)		0	0	1 (0.76)
Total	506	35 (6.91)	12 (2.37)	16 (3.16)	3 (0.59)	2 (0.39)	1 (0.19)	1 (0.19)

Human listeriosis is related to consumption of contaminated foods. *L. monocytogenes* serotypes 1 and 4 are responsible for outbreaks of human listeriosis. In this study, the isolation of these serotypes may indicate the probability of the occurrence of foodborne listeriosis in Turkey.

The results of this study indicate that animal faeces can represent a source of *L. monocytogenes* contamination of carcasses at abattoirs. This constitutes a serious hazard to human health as it may lead to outbreaks of human listeriosis. Further studies should be performed to provide a better understanding of the epidemiology of listeriosis in Turkey.

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