

Prevalence of *Listeria spp* in Chicken, Turkey and Ostrich Meat from Isfahan, Iran

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Abstract: *Listeria spp.* are Gram positive, short, non-sporing, microaerophilic rods. Of the six species currently recognized, *Listeria monocytogenes* is the most important as it causes a range of infections in humans and animals. The present study was undertaken to determine the occurrence of *Listeria* species in retail poultry meat products in Isfahan, Iran. A total of 52 sample of various poultry meat products, including: chicken (n=30), turkey (n=10) and ostrich (n=12) obtained from retail stores in Isfahan and detected by using standard culture methods and biochemical tests. Out of 52 samples 12 (23.07%) were positive for *Listeria spp.* The occurrence of *Listeria spp.* in samples of chicken, turkey and ostrich meat was 20, 30 and 25% respectively. Only one sample was contaminated with *L. monocytogenes* (1.92%) and other samples were contaminated with *L. innocua* (21.15%).

Key words: Chicken • Culture Method • *Listeria* Species • Ostrich And Turkey

INTRODUCTION

The marked increase of contamination in food industry especially meat and chicken products by pathogenic bacteria has raised a great public concern, *Listeria spp.* especially *L.monocytogenes* has been associated with a wide variety of food sources particularly meat and chicken [1].

Listeria are gram positive, facultative anaerobic, non-spore forming, rod shaped bacteria with a low C+G content. The genus consists of six species: *Listeria monocytogenes*, *Listeria innocua*, *Listeria selegeri*, *Listeria welshimeri*, *Listeria ivanovii* and *Listeria grayi*. Just *L. monocytogenes* is the primary human pathogen although there have been rates of illnesses caused by *L. selegeri*, *L. ivanovii* and *L. innocua* [2].

Listeria spp. has been isolated from poultry, red meat and meat products in many countries around the world, although these foods have not been associated

with documented outbreaks of human listeriosis (1). The detection of *Listeria spp.* in meat is a particular concern in terms of consumer safety, as these organisms are capable of growing on both raw and cooked meat at refrigeration temperatures [1].

In the past 25 years, *Listeria monocytogenes* has become increasingly dangerous bacteria as a food-associated pathogen. Because of its high case fatality rate, listeriosis is one of the most frequent causes of death due food borne illness (1)

Listeria monocytogenes is an intracellular pathogen affecting mainly children, pregnant women, the aged and immune-challenged individuals [3, 4]. In addition a wide variety of animals including sheep, cattle, goats, pigs, rabbits, mice, birds and fish are also infected. The pathogen is also responsible for infections that can lead to abortion, bacteremia, sepsis and meningoenzephalitis [5]. The incidence of listeriosis is relatively rare and represents less

than 0.1% of all food-borne illnesses but causes infections with very high mortalities (20 to 30% deaths) [6].

The first epidemiologically confirmed food borne outbreak of listeriosis occurred in 1981 in Canada [3] and was linked to the consumption of coleslaw. Other outbreaks of human listeriosis have been associated with milk [6], soft cheese [7, 8], Jellied pork tongue and other foods of animal or vegetable origin [9].

There is limited information regarding the prevalence of *Listeria* spp. in Chicken, Turkey and Ostrich Meat in Isfahan. Therefore, the present study was undertaken to determine the prevalence of *Listeria* strains isolated from Chicken, Turkey and Ostrich Meat samples in Isfahan, Iran.

MATERIALS AND METHODS

Culture Method for Isolation and Identification of *Listeria* spp: In the present study 52 samples of various poultry meat products, including: chicken (n=30), turkey (n=10) and ostrich (n=12) meat obtained from retail stores in Isfahan. All products had been properly stored or refrigerated.

Detection of *listeria* spp. in the poultry meat products was performed according to the Rahimi *et al.* 2012.

25 g of each sample were aseptically taken, blended for 2 min in 225 mL of *Listeria* enrichment broth (UVM I) (Merck, Germany) and incubated at 37 °C for 24 h. One mL of primary enrichments was transferred to 9 mL of UVM II (Frazer broth) (Merck, Germany) and incubated at 37°C for 24 h. Secondly enrichments were streaked onto Oxford and Palcam agars (Merck, Germany) and incubated at 35°C for 48 h. The plates were examined for typical *Listeria* colonies (black colonies with black sunken centres) and at least 3 suspected colonies were subcultured on Trypton Soy agar supplemented with 0.6% of yeast extract (TSAYE) (Merck, Germany) and incubated at 37 °C for 24 h. All the isolates were subjected to standard identification and biochemical tests including Gram staining, catalase test, motility at 25°C and 37°C, acid production from glucose, mannitol, rhamnose, xylose, α -methyl-D-mannoside and nitrate reduction, hydrolysis of esculin, MR/VP test, shaemolytic activity and CAMP test (10).

RESULTS

Out of a total of 52 poultry meat samples, 12 (23.07%) were positive for *Listeria* spp. *Listeria* species were

Table 1: Distribution of *Listeria* species in different poultry meat samples

Sample type	Examined	Positive	%
Turkey	10	3	30
Ostrich	12	3	25
Chicken	30	6	20
Total	52	12	23.07%

isolated from chicken, turkey and ostrich samples. Distribution of *Listeria* species in poultry meat products considered in this study is presented in Table 1..

The occurrence of *Listeria* spp. in samples of chicken, turkey and ostrich meat was 20, 30 and 25% respectively. Only one sample was contaminated with *L. monocytogenes* (1.92%) and other samples were contaminated with *L. innocua* (21.15%).

The level of contamination of food samples by *Listeria* species varied. The highest rate was observed in turkey samples (30 %) followed by ostrich (25 %) and chicken (20 %).

DISCUSSION

Meat and chicken products have been frequently contaminated with *L. monocytogenes* and may serve as vehicle of other pathogenic organisms. The frequent occurrence of *L. monocytogenes* in meat and chicken may pose a potential risk for consumers.

Human infections primarily result from eating contaminated food which may lead to serious and potentially life-threatening listeriosis [1].

Increasing evidence suggests that substantial portions of cases of human listeriosis are attributable to the food borne transmission of *L. monocytogenes* [12].

Molla *et al.* [11] reported that raw meat products, as expected showed a high level of contamination with *Listeria* species (50.6%). It is generally assumed that such products cannot be free from *Listeria* because of slaughter methods and food processing that allows greater chance for contamination. Furthermore, *Listeria* species are ubiquitous in the environment [13]. People handling food at different levels can also be sources of contamination.

In our study, 52 poultry meat samples were examined for the presence of *Listeria* spp. Of the total of 52 meat samples 11 (21.15%) isolates were *L. innocua* and only one sample was contaminated with *L. monocytogenes*. The occurrence of *Listeria* spp. in chicken, turkey and ostrich meat samples was 20, 30 and 25% respectively. This is comparable with results of surveys undertaken in other countries. This suggests the presence of a significant public health hazard linked to the consumption of foods contaminated with *Listeria* spp.

In the present study *L. innocua* was the predominant isolated species. It was the more frequently isolated than the other *Listeria* species. These results are comparable with other researchers, the considerably higher level of contamination of poultry raw meat from supermarkets in Spain was reported by Capita *et al.* [13]. *Listeria* was found in as much as 95% of examined carcasses and 32% of them were recognized as *L. monocytogenes* and 66% as *L. innocua*. Vitas *et al.* [12] reported 36.1% positive samples of raw poultry in their carried out in Northern Spain. Kosek-Paszowska *et al.* [14] reported 63% contamination from poultry meat products.

When several studies in various countries are compared, *L. monocytogenes* isolation rates seem to vary significantly [15]. This wide variation may be explained in terms of geographic location, isolation methods, kinds of media employed and what a bout hygienic production, HACCP application etc...

Researchers found out that *L. innocua* grows faster than the pathogenic species in enrichment broth media. It was indicated that *L. innocua* occupies the same ecological niche and its high incidence signifies potential contamination by *L. monocytogenes* [19].

Higher records were reported by several investigators as Hassan *et al.* who found *Listeria spp.* in 17 (73.9%) of 23 samples of imported frozen beef in Malaysia [16]. Also, (Inoue *et al.* this isolated *L. monocytogenes* in 12.2, 20.6, 37.0 and 25.0% of 41 minced beef, 34 minced pork, 46 minced chicken and 16 minced pork-beef mixture samples, respectively in Japan [17] It is interesting to note that *L. innocua* was isolated predominantly among *Listeria spp.*

Other studies indicated that *L. innocua* is the most predominant isolated species in a variety of meat samples for example Yucel *et al.* reported the occurrence of *L. istria spp* from 146 meat samples, 79 (54.10%) (18). In this study the highest incidence (86.4%) reported in raw minced meat. *Listeria monocytogenes* was reported 6.16%. Other species isolated included *L. innocua* 46.57%, *L. welshimeri* 0.68% and *L. murrayi* 0.68%.

Furthermore, detection of *L. monocytogenes* in foods can be difficult as these bacteria are normally found in very low numbers in the presence of a heterogeneous micro flora. The most frequent *Listeria* isolates from food are *L. monocytogenes* and *L. innocua*. Several studies have demonstrated that *L. innocua* is found in food more frequently than *L. monocytogenes* [19]. The reasons for the higher frequency of recovery of *L. innocua* remain unclear yet. However, this may result from either a naturally higher prevalence or from preferential selection of *L. innocua* during laboratory detection procedures(9).

In conclusion, the presence of *Listeria spp.* has been shown in variety of poultry meat in Iran. The results of this study indicate the potential risk of infection with *Listeria* in people consuming these products. Further extensive prevalence studies on the occurrence of *Listeria spp.* among poultry meat and on possible dangers of poultry meat will be needed to elucidate the epidemiology of listeriosis in Iran

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