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PREVALENCE OF *CAMPYLOBACTER* SPECIES IN RETAIL POULTRY CARCASSES IN AHVAZ, IRAN

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ABSTRACT

Campylobacter spp. are often found on poultry meat and can cause gastroenteritis in human. The aim of this study was to detect thermophilic *Campylobacter* species in quail, partridge, and ostrich meat in Ahvaz, Iran. From July 2009 to February 2010, samples of quail (n = 50), partridge (n = 30) and ostrich (n = 24) meat for sale in retail outlets in Ahvaz, Iran, were analyzed for the presence of *Campylobacter*. *Campylobacter* sp. was isolated from 28 of 50 (58%) quail meat, 9 of 30 (30%) partridge meat and 3 of 24 (12.5%) ostrich meat samples. Of the 40 *Campylobacter* positive samples 90% (36) samples had *Campylobacter jejuni* and 10% (4) *C. coli*. The study concluded that high proportion of poultry meats marketed in Ahvaz, Iran is contaminated by *Campylobacter* with a possible risk to human health.

Key-words: *Campylobacter*, quail, partridge, ostrich, poultry meat, prevalence

INTRODUCTION

Campylobacter spp. are among the most common causes of acute bacterial enteritic disease in humans throughout the world (Nachamkin, 1995). Undercooked poultry and cross contamination during kitchen handling of poultry meat is considered to be one of the main sources for sporadic *Campylobacter* infections (Corry and Atabay, 2001; Son *et al.,* 2007). The disease in 90% of cases is caused by *C. jejuni* but in its pathogenesis may also participate other species such as *C. coli, C. lari*, and *C. upsaliensis* (Wieczorek, 2009). The majority of *Campylobacter* infections result in an acute, self-limited gastrointestinal illness. However, in some of patients, *Campylobacter* infection is followed by complications, including septicaemia or autoimmune neuropathies (Wieczorek, 2009).

During slaughter and processing intestinal contents can contaminate the surface of chicken carcasses, leading to a contamination with *Campylobacter*. Although, different processing procedures have influence on the number of *Campylobacter* on the surface of carcasses, a total elimination is not possible (Rahimi *et al.,* 2010; Franchin *et al.,* 2007). Several epidemiological studies demonstrated high prevalence's of *Campylobacter* in poultry, ranging from 40% to 100% (Dickins *et al.,* 2002). *Campylobacter* prevalence of up to 100% has been reported on dressed poultry carcasses (Domingvez *et al.,* 2002; Sallam, 2007).

Most microbiological research is focused on chicken and turkey meat, but little works are carried out on the other poultry meats. This work was aimed to investigate the prevalence of *Campylobacter* species in quail, partridge and ostrich meat in Ahvaz, Iran.

MATERIALS AND METHODS

Samples

From July 2009 to February 2010, 104 poultry meat samples including quail (n = 50), partridge (n = 30), and ostrich (n=24) were randomly purchased from 15 retail outlets in Ahvaz, Iran. Samples collected in this study included leg and breast. All samples were taken by using sterilized utensils, placed in separate sterile plastic bags to prevent spilling and cross contamination, and were immediately transported to the laboratory in a cooler with ice packs.

Isolation and Identification Campylobacter

The samples were processed immediately upon arrival using aseptic techniques. Of each meat sample, 25 g was homogenized and transferred to 225 mL of Preston enrichment broth base (HiMedia Laboratories, Mumbai, India, M899) containing *Campylobacter* selective supplement IV (HiMedia Laboratories, Mumbai, India, FD042) and 5% (v/v) defibrinated sheep blood. After incubation at 42 °C for 24 h in a microaerophilic condition (85% N_2, 10% CO_2, 5% O_2), 0.1 mL of the enrichment was then streaked onto *Campylobacter* selective agar base (HiMedia Laboratories, Mumbai, India, M994) containing an antibiotic supplement for the selective isolation of *Campylobacter* species (HiMedia Laboratories, Mumbai, India, FD006) and 5% (v/v) defibrinated sheep blood and incubated for 48 h at 42 °C under the same condition. For the chiller tank sample was, 50 mL of water samples were added to 50 mL double-strength *Campylobacter* enrichment broth (Preston enrichment broth base, HiMedia Laboratories, M899) and incubated as described above. One presumptive *Campylobacter* colony from each selective agar plate was subcultured and identification of presumptive *Campylobacter* species was performed using standard microbiological and biochemical procedures including Gram staining, production of catalase, oxidase, hippurate hydrolysis, urease activity, indoxyl acetate hydrolysis, and susceptibility to cephalotin (Bolton *et al.*, 1992; Whyte *et al.*, 2004).

Statistical Analysis

Data were transferred to a Microsoft Excel spreadsheet (Microsoft Corp., Redmond, WA, USA) for analysis. Using SPSS 16.0 statistical software (SPSS Inc., Chicago, IL, USA), a chi-square test and fisher's exact two-tailed test analysis was performed and differences were considered significant at values of $P < 0.05$.

RESULTS AND DISCUSSION

Poultry meat comprises a substantial source of a high quality protein source in most countries. Poultry meat is rich in essential amino acids along with vitamins and minerals. Poultry meat contains more protein then the same amount than those of beef, pork or sheep. Additionally, poultry meats especially chicken are eaten widely due to their low price. The consumption of poultry meats, however, is implicated over the recent years in high numbers of out–breaks of acute Campylobacter enterocolitis in human worldwide in both industrialized and developing countries (Sallam, 2007). Due to relative increase in the consumption of quail, partridge and ostrich meat in Iran we included 104 quail, partridge and ostrich meat samples in this study.

Table 1 shows the prevalence of *Campylobacter* spp. isolated from quail, partridge and ostrich meat in Ahvaz, Iran. A total, 40 of 104 meat samples (38.5%) were found to be contaminated with *Campylobacter*. The highest prevalence of *Campylobacter* spp. was found in quail meat (58%), followed by partridge (30%) and ostrich meat (12.5%). There were significant different ($p<0.05$) in the level of contamination with *Campylobacter* between different meat samples.

Table 1. Prevalence of *Campylobacter* spp. isolated from quail, partridge and ostrich meat in Ahvaz, Iran.

Meat sample	No. of samples	*Campylobacter* spp. positive	*C. jejuni*	*C. coli*
Quail	50	28 (58.0%)[a]	26 (92.8%)[a]	2 (17.2%)[a]
Partridge	30	9 (30.0%)[b]	7 (77.8%)[a]	2 (22.2%)[a]
Ostrich	24	3 (12.5%)[c]	3 (100%)[b]	0 (0.0%)[b]
Total	104	40 (38.5%)	36 (90.0%)	4 (10.0%)

[*]Results expressed as the number of *Campylobacter*-positive samples / number of samples analyzed (%).Values in the same column with different superscripts are significantly different ($P < 0.05$).

Many papers have reported on the level of contamination with *Campylobacter* spp in retail chicken and turkey meat worldwide (Alter *et al.*, 2005; Corry and Atabay, 2001; Dickens *et al.*, 2002; Franchin *et al.*, 2007; Praak-Amin *et al.*, 2007; Taremi *et al.*, 2006; Yun-Sook *et al.*, 2006; Zhao *et al.*, 2001; Rahimi *et al.*, 2010; Rahimi and Tajbakhsh, 2008) and rare studies have been reported on prevalence of Campylobacter on meat and commercial products of quail , partridge and ostrich.

In a study conducted in Isfahan of Iran , *Campylobacter* spp. was identified in 145 of 212 (68.4%) quail and 7 of 60 (11.7%) ostrich meat samples using cultural method (Rahimi and Tajbakhsh, 2008). In another study

conducted in USA 19 *Campylobacter* isolates were recovered from 191 ostrich meat samples (Ley *et al*., 2001). No pervious report could be found on the occurrence of *Campylobacter* spp. on the partridge meat. *Campylobacter* spp. are frequently found in the intestinal tract of poultry where colonization lead to contamination of carcasses during processing especially at the defeathering, evisceration and chilling stages (Franchin *et al.,* 2007).

Campylobacter isolates were identified into the species level by conventional cultural method based on the colonial appearance, microscopic examination and biochemical tests. Of the 40-positive samples of poultry meat, 36 (90%) isolated were identified as *C. jejuni* while the remaining 4 isolates (10%) were identified as *C. coli* (Table 1). The present findings are in close agreement with data from other countries (Hussain *et al.,* 2007; Sozuki and Yammoto, 2009; Sallam, 2007; Meremae *et al.,* 2010).

These results are in agreement with data from other studies (Willis and Murray, 1997; Kapperud *et al.,* 1993; Peterson *et al.,* 2001; Rahimi and Tajbakhsh, 2008). The increase in the number of positive samples in similar for those observed for farm-raised poultries in cages and on floors (Willis and Murray, 1997) during the warmer months. In many cases, *Campylobacter* could not be detected during the winter months, as is described in subsequent studies (Willis and Murray, 1997).

In conclusion, the prevalence of *Campylobacter* spp. in quail and partridge meat marketed in Ahvaz, Iran was found to be high. Therefore there was a possible risk to the human to such microorganism especially due to consumption of undercooked meat or post-cooking contamination with poultry products.

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