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Frequency of *Campylobacter* Spp. In Chicken, Quail, Turkey and Ostrich Meat in Ghom and Yazd, Iran

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Abstract: *Campylobacter* spp. is often on poultry meat and can cause gastroenteritis in human. The aim of this present study is to detect thermophilic *Campylobacter* species in chicken, quail, turkey and ostrich meat in Ghom and Yazed, Iran. From December 2009 to December 2010, 171 samples of chicken (n=70), quail (n=50), turkey (n=34) and ostrich (n=17) meat for sale in retail outlets in Ghom and Yazd, Iran, were analyzed for presence of *Campylobacter*. *Campylobacter* spp. was isolated from 53 of 70 (75.7%) chicken meat, 27 of 50 (54%) quail meat, 11 of 34 (32.4%) turkey meat and 4 of 17 (23.5%) ostrich meat samples. The most prevalent *Campylobacter* species was *Campylobacter jejuni* (95.7%). Significantly higher prevalence rates of *Campylobacter* spp. ($P < 0.05$) were found in meat samples taken in summer (77.5%). The study concluded that high proportion of poultry meats marketed in Ghom and Yazd, Iran are contaminated by *Campylobacter* with a possible risk from such microorganism especially from consumption of undercooked or post-cooking contaminated poultry products.

Key words: *Campylobacter* · Chicken · Auail · Turkey · Ostrich · Poultry meat

INTRODUCTION

Campylobacter has over recent years emerged as one of the leading causes of foodborne illness and is recognized to be an important enteric pathogen causing *Campylobacter* enteritis or campylobacteriosis [1]. A wide spectrum of foods has been implicated in *Campylobacter* enteritis. Foods implicated are milk, poultry, beef, pork, mushrooms, cheese, shellfish, eggs, improperly treated water supplies, pasta and vegetables [2]. Undercooked poultry and cross contamination during kitchen handling of poultry meat is considered to be one of the main sources for sporadic *Campylobacter* infections [2, 3]. The disease in 90% of cases is caused by *C. jejuni* but in its pathogenesis may also participate other genera such as *C. coli, C. lari* and *C. upsaliensis* [4]. 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 [4, 5].

During slaughter and processing intestinal contents can contaminate the surface of poultry 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 [6, 7]. Several epidemiological studies demonstrated high prevalence's of *Campylobacter* in poultry, ranging from 40% to 100% [8]. *Campylobacter* prevalence of up to 100% has been reported on dressed poultry carcasses [9, 10].

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 chicken, quail, turkey and ostrich meat in Ghom and Yazd, Iran.

MATERIALS AND METHODS

Samples: December 2009 to December 2010, 171 samples of chicken (n=70), quail (n=50), turkey (n=34) and ostrich (n=17) meat for sale in retail outlets in Ghom and Yazd,

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Iran, were analyzed for presence of *Campylobacter*. 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% N2, 10% CO2, 5% O2), 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 [11, 12].

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 [10].

Table 1 show the prevalence of *Campylobacter* spp. isolated from chicken, quail, turkey and ostrich meat in Ghom and Yazed, Iran. A total, 95 of 171 meat samples (55.5%) were found to be contaminated with *Campylobacter*. The highest prevalence of *Campylobacter* spp. was found in chicken meat (75.7%), followed by quail meat (54%), turkey (32.4%) and ostrich meat (23.5%). There were significant different ($p<0.05$) in the level of contamination with *Campylobacter* between different meat samples. There were significant differences ($P < 0.05$) in the level of contamination with *Campylobacter* between different meat samples; however, no significant differences ($P > 0.05$) were found between chicken meat and quail meat in both cities. No significant differences in the prevalence rates ($P > 0.05$) were observed between meat samples isolated in Ghom and Yazd.

Many papers have reported on the level of contamination with *Campylobacter* spp. in retail chicken and turkey meat in worldwide [2, 7, 8, 13-18] and rare studies have been reported on prevalence of *Campylobacter* on meat and commercial products of quail and ostrich.

The prevalence of *Campylobacter* spp. in chicken meat samples was high (75.7%). Other studies have also demonstrated high prevalence in chicken [15, 16, 19].

In the present study, 32.4% of retail turkey meat samples were *Campylobacter*-positive. These findings are comparable with those reported from Whyte *et al.* (2004) in Ireland (37.5%) [12], Rahimi and Tajbakhsh (2008) in Iran (27.4%) [18], Alter *et al.* (2005) in Germany (25.6%) [13].

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 [18]. In another study conducted in USA 19 *Campylobacter* isolate was recovered from 191 ostrich meat samples [20]. *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 [6].

Table 1: Prevalence of *Campylobacter* spp. isolated from chicken, quail, turkey and ostrich meat in Ghom and Yazd, Iran

Meat sample	No. of samples	*Campylobacter* spp. positive	*C. jejuni*	*C. coli*
Chicken	70	53 (75.7%)	52 (98.1%)	1 (1.9%)
Quail	50	27 (54.0%)	25 (92.6%)	2 (7.4%)
Turkey	34	11 (32.4%)	10 (90.1%)	1 (9.9%)
Ostrich	17	4 (23.5%)	4 (100%)	0 (0.0%)
Total	171	95 (55.5%)	91 (95.8%)	4 (4.2%)

*Results expressed as the number of *Campylobacter*-positive samples / number of samples analyzed (%)

Table 2: Prevalence of *Campylobacter* strains isolated from chicken, quail, turkey and ostrich meat in different seasons in Ghom and Yazd, Iran

	Meat sample				
Season	Chicken (%)	Quail (%)	Turkey (%)	Ostrich (%)	Total (%)
Spring	26/30 (86.7)	11/14 (78.6)	4/11 (36.4)	3/7 (42.9)	44/62 (71.0)
Summer	17/19 (89.5)	12/15 (80.0)[a]	4/8 (50.0)[a]	2/8 (25.0)[a]	18/31 (58.1)[a]
Fall	4/10 (40.0)	11/20 (55.0)[a]	4/12 (33.3)[b]	1/8 (12.5)[a]	16/40 (40.0)[b]
Winter	7/11 (63.6)	5/15 (33.3)[a]	1/10 (10.0)[b]	0/8 (0.0)[a]	6/33 (18.2)[b]

Results expressed as the number of Campylobacter-positive samples / number of samples analyzed (%)

[a, b]Values in the same column with different superscript letters are significantly different ($P < 0.05$)

Campylobacter isolates were identified into the species level by conventional cultural method based on the colonial appearance, microscopic examination and biochemical tests. Of the 94-positive samples of poultry meat, 91 (95.8%) isolated were identified as *C. jejuni* while the remaining 4 isolates (4.2%) were identified as *C. coli* (Table 1). The present findings are in close agreement with data from other countries [10, 19, 21, 22].

The seasonal percentages of positive meat samples are shown in Table 2. The results of table shows a seasonal pattern in the *Campylobacter* contamination detection rate of poultry meat, with highest detection rates in summer (77.5%) and the lowest in winter (25.6%). These results are in agreement with data from other studies [18, 23, 24, 25]. However, in a study conducted by Stern and Line (1992), the season of year was not revealed [26]. The increase in the number of positive samples in similar for those observed for farm-raised poultries in cages and on floors [23] during the warmer months. In many cases, *Campylobacter* could not be detected during the winter months, as is described in subsequent studies [23].

In conclusion, the prevalence of *Campylobacter* spp. in poultry meat marketed in Ghom and Yazd, Iran was found to be high, therefore there is a possible risk of the human to such microorganism especially from consumption of undercooked or post-cooking contaminated poultry products.

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