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Prevalence of *Campylobacter* spp. in Chicken from Retail Markets in Nakhon Pathom Province

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ABSTRACT

Campylobacter is a major food-borne pathogen, causing gastroenteritis characterized by watery and/or bloody diarrhea in humans. In general, poultry and poultry products are source of *Campylobacter* contamination. Information concerning prevalence of *Campylobacter* is useful for a strategic planning to reduce the contamination into the food chain. The aim of this study was to investigate the prevalence of chicken *Campylobacter* from retail markets in Nakhon Pathom province, Thailand. A total of 119 chicken samples, 71 chicken meat and 48 gizzards, were examined for the presence of *Campylobacter* spp. The result showed that 61.34% of the samples were contaminated with *Campylobacter* spp., of which 59.15% and 64.58% were found in chicken meat and gizzards, respectively. From the total of 73 positive samples, 94.52% were *C. jejuni* and 5.48% were *C. coli*. The result showed a high prevalence of *Campylobacter* spp. in chicken from the retail markets. Therefore, consumption and safe handling of raw chicken meat from retail market needed to be emphasized for control of this zoonotic enteric pathogen from poultry to human.

Key words: *Campylobacter*, chicken, prevalence, retail market

INTRODUCTION

Campylobacter is gram-negative, curve, S-shaped or spiral shaped bacilli having one or two flagella at the poles and is highly motile (Christensen *et al*., 2001). *Campylobacter* grows between 30.5°C and 45°C with the optimum temperature of 42°C. Optimum growth is established at 10% carbon dioxide, 5-6% oxygen, and 85% nitrogen (FSAI, 2002). The typical symptoms of human illness include muscular pain, headache, fever, abdominal pain, nausea and watery or bloody diarrhea. Campylobacteriosis is associated with Guillain-Barre′ syndrome (GBS) and reactive arthritis. The GBS is defined as a clinical entity that is characterized by rapidly symmetrical limb weakness, loss of tendon reflexes, absent sensory signs, and autonomic dysfunctions (Hahn, 1998; Lake *et al*., 2003). In one study, *Campylobacter jejuni* (*C. jejuni*), *C. coli* and *C. lari* caused about 90% of human campylobacteriosis (Stern and Line, 2000).

Campylobacter is the leading cause of enteric zoonotic infections in developing as well as in developed countries. Despite the countries with adequate public health surveillance, the incidence is still increasing (WHO, 2000). The majority of *Campylobacter* infections is sporadic

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and the organism is detected in several foods from animal origins, water, and household pets. Epidemiological studies have showed that consumption or handling of poultry meats should be considered as major risk factor for human infection with *C. jejuni* or *C. coli* (FSAI, 2002). The most consistent risk factor in the United States, New Zealand and Europe has been the consumption or contact with raw or undercooked poultry meat, accounting for 10% to 50% of cases (Tauxe, 2000). In Thailand, an etiologic study of acute bacterial dysentery from 623 cases in children aged one month to twelve years showed that 28% of bacterial pathogens isolated from the cases were *Campylobacter* positive (80% *C. jejuni*, 20% *C. coli*) (Bodhidatta *et al*., 2002). In May 1998, an observational study among 169 U.S. military personnel deployed to Thailand with acute diarrhea revealed that *C. jejuni* and *C. coli* were detected in 23 (13.6%) of the patients (Sanders *et al*., 2002).

Like most developing countries, Thailand has limited national reports on surveillance of this organism. There are only a few researches in the prevalence of *Campylobacter* in foods from animal origins especially in poultry meat. Therefore, the objective of this study was to determine the prevalence of chicken *Campylobacter* in Nakhon Pathom retail markets. The obtained results would provide baseline data of this pathogen as regional and national reference. This information was also essential to control *Campylobacter* in animals and to prevent transmission to human.

MATERIALS AND METHODS

Chicken samples

During November 2002 to May 2003, 119 fresh chicken samples (71 chicken meat and 48 gizzards) were randomly sampled from 21 retail outlets and supermarkets in Nakhon Pathom province. Samples were transported to the laboratory of the Department of Veterinary Public Health, Faculty of Veterinary Medicine, Kasetsart University, Kamphaengsaen campus in an ice-box and the microbiological tests were carried out on the same day.

Isolation and identification of *Campylobacter*

Isolation and identification of *Campylobacter* spp. were based on the method described by the Public Health Laboratory Service (PHLS) Board (PHLS, 1999). Briefly, 25 g of chicken meat or gizzards was aseptically removed using sterile scissors and forceps. Samples were placed in 225 ml of Preston broth [Nutrient broth No.2 (Oxoid, CM 67, Basingstoke, England) composed of Lab-Lemco meat extract 10 g/l, peptone 10 g/l and sodium chloride 5 g/l; 5% (v/v) lysed horse blood (Preparation according to Hunt *et al*., 2001); *Campylobacter* growth supplement (Oxoid, SR232) composed of sodium pyruvate 0.25 g/l, sodium metabisulphite 0.25 g/l and ferrous sulphate 0.25 g/l; modified Preston *Campylobacter* selective supplement (Oxoid, SR0204) composed of polymyxin B 5000 i.u./l, trimethoprim 10 mg/l, rifampicin 10 mg/l and amphotericin B 10 mg/l]. The samples in Preston broth were homogenized in plastic bags and kept for 60 s in a stomacher (Bag Mixer 400®, Interscience, St. Nom, France). The bags were incubated microaerophilically for 24 h at 42°C in anaerobic jars with gas-generating kits (Anaerocult® C, Merck, Darmstadt, Germany). The culture was streaked onto Preston agar plate comprising Nutrient broth No.2, agar 12g/l (Merck), 5% (v/v) lysed horse blood and modified Preston *Campylobacter* selective supplement. The inoculated plates were incubated at 42°C for 48h in microaerophilic environment.

For identification of *Campylobacter* in each positive agar plate, one typical *Campylobacter* colony was subcultured for determination of Gram staining, oxidase and catalase activity, hippurate and indoxyl acetate

hydrolysis, hydrogen sulphide production and susceptibility to nalidixic acid and cephalothin (PHLS, 1999). The *Campylobacter* isolates were differentiated according to PHLS Board (PHLS, 1999) as shown in Table 1.

RESULTS AND DISCUSSION

The prevalence of *Campylobacter* spp. in chicken meat collected from retail markets in Nakhon Pathom province is shown in Table 2.

Overall results showed that *Campylobacter* spp. were isolated from 73 (61.34%) out of 119 samples, 69 (57.98%) were *C. jejuni* and 4 (3.36%) were *C. coli*. The other species of *Campylobacter* were not isolated in both chicken meat and gizzards. Similar to the other studies, *C. jejuni* is predominantly associated with poultry and *C. coli* is predominantly found in pigs (Christensen *et al*., 2001). *Campylobacter* spp. were found at similar percentages between chicken meat and gizzards. The high occurrence of *Campylobacter* found in chicken meat is similar to the reports published in the Taiwan, USA, and Wales (Shih, 2000; Zhao *et al*., 2001; Meldrum *et al*., 2004). The high prevalence in the current study might be due to cross contamination between chicken carcasses during boning and packaging, particularly in small retail markets where all parts of chicken were sold on the same place. However, *Campylobacter* isolated from raw poultry reported in other studies ranged from 28.5%, 45.8%, 45.9% to 49.5% in Belgium (Uyttendaele *et al*., 1999), Japan (Ono and Yamamoto, 1999), Germany (Atanassova and Ring, 1999) and Spain (Dominguez *et al*., 2002), respectively. Variations in the prevalence of *Campylobacter* isolated from chicken in many studies may be resulted from differences in sampling techniques, season and laboratory methodologies (Whyte *et al*., 2004).

Table 1 Differentiation of *C. jejuni*, *C. coli* and *C. lari.*

Characteristic	*C. jejuni*	*C. coli*	*C. lari*
Growth at 42°C	+	+	+
Catalase	+	+	+
Oxidase	+	+	+
Hippurate hydrolysis	+	-	-
H_2S production	+	-	-
Indoxyl acetate hydrolysis	+	+	-
Antibiotic susceptibility*			
Nalidixic acid 30 μg**	S	S	R
Cephalothin 30 μg	R	R	R

* S = Sensitive and R = Resistant.

** Nalidixic acid resistance had emerged among the strains of *C. jejuni*, consequently susceptibility to nalidixic acid is now a less reliable characteristic of this species

Table 2 Prevalence of *Campylobacter* spp. in chicken meat and gizzards from retail markets in Nakon Pathom province during November 2002 to May 2003.

Samples	Prevalence (%)			
	n	*C. coli*	*C. jejuni*	*Campylobacter* spp.
Chicken meat	71	4.23	54.93	59.15
Gizzards	48	2.08	62.50	64.58
Total	119	3.36	57.98	61.34

It was suggested that source of contamination in chicken meat with *Campylobacter* was from cross contamination between carcasses at poultry slaughter houses. *Campylobacter* from the gut content would contaminate with other carcasses (Stern and Line, 2000). The intestinal content of poultry can harbour more than 10^7 cfu *Campylobacter* spp/g of cecal matter; however, this number of organism usually does not cause disease in poultry (Stern *et al*., 1995). Infection of *Campylobacter* at farm level may be caused by horizontal transmission from infected living animal to the flock (Shanker *et al*., 1990).

CONCLUSION

Our results showed a high prevalence of *Campylobacter* spp. in chicken meat and gizzards sampled from the retail markets in Nakhon Pathom province, meaning that chickens might provide a high risk for human campylobacteriosis. The contaminated chickens are the entry point for introduction of *Campylobacter* to food preparation areas. Cross contamination from raw to cooked chicken may occur and may be the source of human infection. This result would be useful for regional and national reference for planning the control of zoonotic enteric pathogens transmitted from poultry to human.

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