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Acute Communicable Disease Control  
Special Studies Report 1999

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**CAMPYLOBACTER: RESISTANCE TO QUINOLONES IN LOS ANGELES COUNTY**

**BACKGROUND**

California has the highest incidence of *Campylobacter* in the United States. Of particular concern is the increase in resistance to quinolone antibiotics, such as ciprofloxacin, which has been seen in several countries such as Greece, Spain, Taiwan, and the United States.<sup>1-5</sup>

A cross-sectional study was designed to determine the prevalence of ciprofloxacin resistant *Campylobacter* isolates in Los Angeles County (LAC). Because use of quinolones in poultry has been correlated with *Campylobacter* resistance,<sup>4,5</sup> a random sample of chickens from LAC markets were tested for ciprofloxacin-resistant *Campylobacter* spp.

**METHODS**

Between May 1 and October 31, 1998, a total of 484 *Campylobacter* cases were reported to Acute Communicable Disease Control (ACDC) of LAC. Of these, 192 (40%) had *Campylobacter* isolates submitted. Thirty-seven isolates were excluded from the study because they belonged to non-LAC residents, were submitted outside the study period, or had incomplete demographic information. Blood and stool specimens were also submitted to the LAC Public Health Laboratory (PHL) from three County Hospitals (Harbor-UCLA, LAC-University of Southern California, and Olive View), LAC Public Health Centers, and Kaiser Permanente between May 1 and October 31, 1998. Speciation and antibiotic susceptibility were determined for three antibiotics: ciprofloxacin, erythromycin, and tetracycline. Susceptibility testing was done for ciprofloxacin using the gradient diffusion minimum inhibitory concentration (MIC) method (E test). E test method breakpoints of  $\leq 1$  mcg/ml,  $>1$  mcg/ml and  $<4$  mcg/ml, and  $\geq 4$  mcg/ml were termed "susceptible," "intermediate," and "resistant," respectively.

A telephone survey was simultaneously conducted to determine the exposure of the cases to foreign travel, pets, antibiotics, predisposing conditions, and consumption of undercooked chicken.

To determine the level of *Campylobacter* resistance to ciprofloxacin in poultry, thirty-one chickens were purchased randomly from local markets.

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**RESULTS**

Of the 155 cases included in the study, 92 (59%) were male and 63 (41%) were female. The median age was 22 years (Table 1). Most of the cases (115 or 74%) were Hispanic (Table 2). Kaiser Permanente reported most of the cases (54%), while County Hospitals reported 39% of the cases, and 7% were reported from Health Centers.

**Table 1. Gender and Age Comparison of Study Cases and Reported Cases**

	Number of study cases (%)	Number of reported cases (%)
Female	63 (41)	143 (30)
Male	92 (59)	186 (38)
Total	155 (100)	484 (100)*
Median age	22	28

\*Missing or unknown values led to only 329 values for gender.

**Table 2. Race/Ethnicity Comparison of Study Cases and Reported Cases**

Race/ethnicity	Number of study cases (%)	Number of reported cases (%)
African American	7 (4)	10 (3)
Asian	4 (3)	32 (10)
Hispanic	115 (74)	141 (43)
White	26 (17)	134 (40)
Other	3 (2)	12 (4)
Total	155 (100)	484 (100)*

\*Missing or unknown values led to only 329 values for gender.

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*Campylobacter* species were identified in 152 (98%) stool or blood specimens. The most commonly isolated species was *C. jejuni* (92.2%, n=149), followed by *C. upsaliensis* (5.5%, n=8), *C. coli* (1.6%, n=2), and *C. fetus* (0.8%, n=1).

Only five cases had isolates resistant to ciprofloxacin (Table 3). The median age of these cases was 5 years; four (80%) were children between the age of 1 and 7 years; four (80%) were Latino. None of the resistant cases had a history of foreign travel or exposure to a pet with ciprofloxacin-resistant *Campylobacter*. Only two (40%) cases with resistant isolates had eaten chicken in the seven days prior to illness.

Thirty-one whole chickens were randomly sampled from various LAC markets. Twenty-one (68%) chickens provided isolates, all of which were susceptible to ciprofloxacin.

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**Table 3. *Campylobacter* antibiotic susceptibility results**

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Antibiotic susceptibility	Antibiotic		
	Ciprofloxacin	Erythromycin	Tetracycline
Susceptible	150 (97)	81 (52)	103 (66)
Intermediate	0 (0)	74 (47)	1 (1)
Resistant	5 (3)	0 (0)	141 (43)

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## CONCLUSIONS

There were limitations to this study:

1. In some cases, there was up to a month lag time between the onset of illness and the time of the interview. This may have caused recall bias, and diluted the correlation between some of the factors and *Campylobacter* resistance.
2. The study sample may not represent all LAC cases, but rather the population who visit the submitting hospitals and Health Centers.
3. The chickens which were purchased for the resistance study were a small sample, and may not have been representative of the entire poultry supply in the LAC area.

The results of our study suggest the following conclusions:

- *Campylobacter* resistance to ciprofloxacin is very low in LAC.
- *Campylobacter* resistance may not be correlated with foreign travel, pet exposure, or poultry consumption.
- The most commonly isolated species was *C. jejuni*, while *C. upsaliensis* was isolated in 5.5% of the cases.

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## REFERENCES

1. Samonis G, Maraki S, Christidou A, et al. Bacterial pathogens associated with diarrhea on the island of Crete. *Eur J Epidemiol* 1997;13:831-6.
2. Pigrau C, Bartolome R, Almirante B, et al. Bacteremia due to *Campylobacter* species: clinical findings and antimicrobial susceptibility patterns. *Clin Infect Dis* 1997; 25:1414-20.
3. Li CC, Chiu CH, Wu JL, et al. Antimicrobial susceptibilities of *Campylobacter jejuni* and *coli* by using E-test in Taiwan. *Scand J Infect Dis* 1998;30:39-42.
4. Smith KE, Besser JM, Hedberg CW, et al. Quinolone-resistant *Campylobacter jejuni* infections in Minnesota, 1992-1998. *N Engl J of Med*, 1999;340:1525-32.
5. Piddock LJ. Quinolone resistance and *Campylobacter* spp. *J Antimicrob Chemother* 1995; 36:891-98.