

A *Campylobacter jejuni* outbreak investigation in Crete, Greece: indications for waterborne spread

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INTRODUCTION

Campylobacter jejuni and *Campylobacter coli* are the most common causes of campylobacteriosis in humans [1,2], the former one being recognized as a leading cause of bacterial foodborne disease in many developed countries [3]. Although *Campylobacter* outbreaks are relatively rare [2, 4], waterborne outbreaks have occurred worldwide in many developed countries [5-7]. An outbreak of campylobacteriosis occurred in western Crete around of the town of Chania in late May to early June 2009.

PURPOSE

To identify risk factors for *C. jejuni* infection in the context of the outbreak in Crete.

METHODS

Two analytical studies were conducted in parallel: a case-control and a case-crossover study. Fifty cases were included in the two studies and 124 controls with respiratory track symptoms, frequency matched for age, were recruited in the case-control study. The case definition was the same for both studies: **Cases** were defined as *individuals aged 0-14 years old that visited the Emergency Department of the Chania General Hospital (CGH) between 27 May 2009 and 24 June 2009 with gastroenteritis symptoms and who had a C. jejuni positive stool culture*. In the case-control study, **controls** were defined as *individuals who visited the Emergency Department of CGH between 1 January 2009 and 31 May 2009 with respiratory track symptoms*.

In the case-crossover study, the exposure at various risk factors was examined at two different time intervals:

(a): the 10 days preceding symptom onset for each case; **(b):** spring 2009.

The questionnaires were completed via telephone interviews with the children's parents in July 2009. STATA v11.0 was used for data analysis. Stool cultures, PFGE and MLST subtyping in human samples and PFGE in chicken samples were conducted. Water quality tests were run in the outbreak area.

CONCLUSIONS

Although there are indications that tap water quality was poor during and exactly before the outbreak, no *Campylobacter* was found in any of the environmental samples. However, there is strong epidemiological evidence that tap water was the vehicle of the outbreak.

RESULTS

Sixty confirmed cases were identified at C.G.H. between 1 May and 24 June 2009. For 54 of the cases, the exact date of sample acquisition was known (**Figure 1**). The most commonly reported symptoms were diarrhoea (100%), fever (58.3%) and bloody stool (58.3%).

Case-control study. Thirty-seven cases and 79 controls responded. The median age of cases and controls was 2 years. Sex distribution did not differ between cases and controls.

Table 1:

Risk factors for acquisition of a *C. jejuni* infection in the greater Chania area, May - June 2009

Risk Factor	Cases		Controls		OR	95% CI
	N	%	N	%		
Water supply system - Municipal (town of Chania) – ref: other supply system	4	10.8	27	34.2	0.23	0.06-0.77
Consumption of bottled water at home	4	11.1	35	44.3	0.16	0.04-0.51
Use of tap water filter at home	0	0	15	19.2	0.00	0.00-0.47
Use of dishwasher for child's utensils	9	45	36	87.8	0.11	0.03-0.48
Consumption of concentrated milk	21	58.3	33	42.3	1.91	0.80-4.61

In the multivariable analysis, the town water supplier (OR: 0.17, 95% C.I.: 0.05-0.57) and drinking tap water (OR: 4.39, 95% C.I.: 1.30-14.8) were statistically significant.

Case-crossover study revealed no risk factors.

The strains from patients' samples were identical but different from that of the chicken sample.

No *Campylobacter* was found in any water sample.

Table 2:

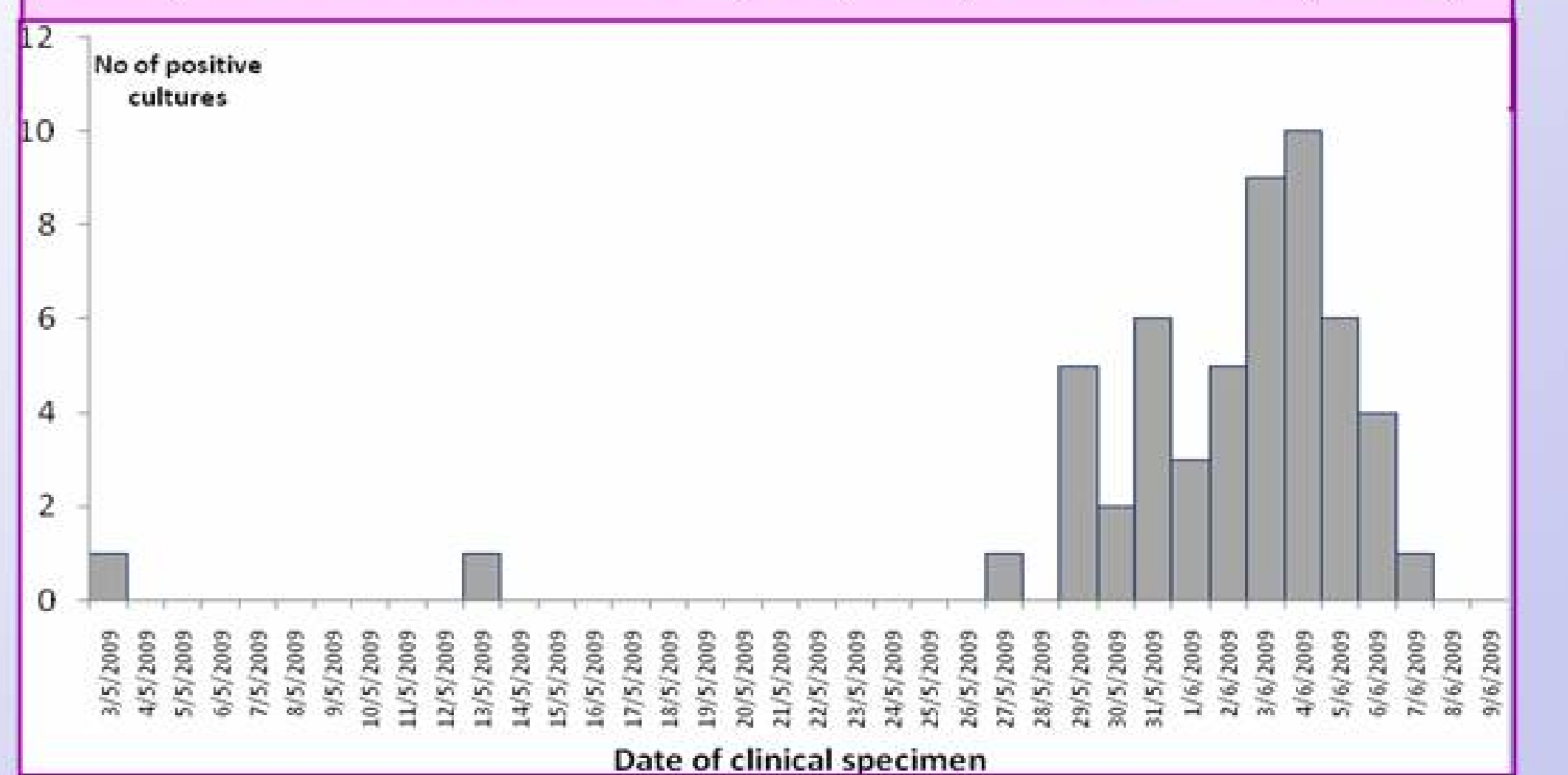
Risk factors for acquisition of a *C. jejuni* infection in the greater Chania area, stratified by tap water supplier May - June 2009

Risk Factor*	Crude OR (95% CI)
Consumption of tap water at home	3.11 (0.86-14.05)
Consumption of bottled water	0.15 (0.04-0.54)
Use of tap water filter at home	0.00 (0-0.53)
Use of dishwasher for child's utensils	0.16 (0.03-0.75)
Consumption of concentrated milk	2.68 (0.98-7.37)
Consumption of milk types that need to be diluted with water	3.05 (0.99-10.49)

*for the rural areas only

Figure 1:

Positive *Campylobacter jejuni* stool cultures by date of visit, Chania General Hospital, May-June 2009 (n=54)



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