

## SHORT REPORT

# The impact of sporadic campylobacter and salmonella infection on health and health related behaviour: a case control study

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## SUMMARY

The aim of the work was to explore the impact on general and psychological health of those with a proven bacterial gastrointestinal infection and to compare this with controls from whom no bacterial pathogen was identified. A case control study was conducted using an interviewer-administered questionnaire. Thirty-nine cases from whose faeces salmonella or campylobacter had been cultured were compared with matched controls. Reported gastrointestinal symptoms, general health and self-reported hygiene practices were compared. At the time of acute illness the General Household Questionnaire suggested similar levels of morbidity, though by follow up the controls were substantially more likely to be distressed. Cases were more likely to have changed their food preparation practices, to avoid certain eating places and to have been given advice about food preparation. In this small study a positive diagnosis of salmonella or campylobacter seems to have had a reassuring effect when compared with those for whom no diagnosis was made.

Although mortality from infectious disease is now rare in the United Kingdom, certain infections continue to generate anxiety in both those affected by the disease and in the community at large.

There is little published on the impact of infection on psychological morbidity and health related behaviour other than in the area of sexually transmitted diseases [1] and onychomycosis [2]. In particular, for common bacterial gastrointestinal infections (salmonella and campylobacter) the clinical features are well described but the impact on wider health and health related behaviour is not clear.

The aim of our study was to determine the impact of two bacteriologically proven gastrointestinal infections on psychological health and health related behaviour. We conducted a matched case-control

study using an interviewer-administered questionnaire, involving patients of all ages in a general practice community setting. All potential subjects had had a faecal specimen sent to the Stoke Public Health Laboratory for bacterial culture, and the register of specimen request forms represented the sampling frame for the study. Stoke Public Health Laboratory serves a population of half a million people and is the major point of referral for such specimens in the district.

A case was defined as a person with salmonella or campylobacter infection diagnosed by the laboratory between February and April 1998. Controls were identified from the same laboratory register. They were people who had had a faecal sample submitted for microbiological examination and with an accompanying request form which suggested infection, but from which no pathogenic bacteria were cultured (routine microbiological examination includes sal-

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Table 1. Relationship between microbiologically confirmed gastrointestinal infection and general health, psychological health and health related behaviour (a) 10 days post-confirmation (b) 2 months post-confirmation, in a matched case-control analysis of patients with gastrointestinal symptoms presenting to general practice

Characteristic	Time <sup>a</sup>	No. (%) of concordant pairs		No. (%) of discordant pairs		OR <sup>c</sup> (95% CI)
		Case/control positive <sup>b</sup>	Case/control negative <sup>b</sup>	Case positive/control negative	Case negative/control positive	
<b>Symptoms and implications</b>						
● Two or more physical symptoms <sup>d</sup> in past month	Baseline	39 (100)	0 (0.0)	0 (0.0)	0 (0.0)	—
	Follow-up	6 (16.7)	16 (44.4)	5 (13.9)	9 (25.0)	0.56 (0.15 to 1.85)
● Patients had time off work/school due to symptoms	Base line	11 (57.9)	1 (5.3)	5 (26.3)	2 (10.5)	2.50 (0.41 to 26.3)
	Follow-up	0 (0.0)	16 (84.2)	2 (10.5)	1 (5.3)	2.00 (0.10 to 119)
<b>Help and advice</b>						
● GP consultation for physical symptoms	Baseline	25 (64.1)	1 (2.6)	6 (15.4)	7 (17.9)	0.86 (0.24 to 2.98)
	Follow-up	0 (0.0)	26 (72.2)	2 (5.6)	8 (22.2)	0.25 (0.03 to 1.25)
● Hospitalisation due to illness	Baseline	4 (10.3)	19 (48.7)	5 (12.8)	11 (28.2)	0.46 (0.12 to 1.42)
	Follow-up	0 (0.0)	34 (94.4)	1 (2.8)	1 (2.8)	1.00 (0.01 to 78.1)
● Patients received advice from health professionals	Baseline***	1 (2.6)	14 (35.9)	20 (51.3)	4 (10.3)	5.00 (1.67 to 20.1)
	Follow-up	—	—	—	—	—
● Patients gave advice to family and/or friends	Baseline	0 (0.0)	33 (84.6)	5 (12.8)	1 (2.6)	5.00 (0.56 to 236)
	Follow-up	—	—	—	—	—
<b>Health precautions since illness</b>						
● Change in food preparation <sup>e</sup>	Baseline**	1 (2.6)	20 (51.3)	14 (35.9)	4 (10.3)	3.50 (1.10 to 14.6)
	Follow-up	1 (2.8)	19 (52.8)	9 (25.0)	7 (19.4)	1.29 (0.43 to 4.06)
● Stopped eating certain foods	Baseline	3 (7.7)	17 (43.6)	11 (28.2)	8 (20.5)	1.38 (0.50 to 3.94)
	Follow-up	0 (0.0)	26 (72.2)	8 (22.2)	2 (5.6)	4.00 (0.80 to 38.7)
● Patients avoid certain eating places	Baseline***	0 (0.0)	23 (59.0)	14 (35.9)	2 (5.1)	7.00 (1.61 to 63.3)
	Follow-up*	3 (8.3)	22 (61.1)	9 (25.0)	2 (5.6)	4.50 (0.93 to 42.7)
● Change in hygiene practice <sup>f</sup>	Baseline	1 (2.6)	22 (56.4)	9 (25.0)	7 (17.9)	1.29 (0.43 to 4.06)
	Follow-up	1 (2.8)	24 (66.7)	6 (16.7)	5 (13.9)	1.20 (0.31 to 4.97)
<b>Psychological status</b>						
● Psychological distress (GHQ score $\geq 3$ ) <sup>g</sup>	Baseline	15 (39.5)	8 (21.1)	7 (18.4)	8 (21.1)	0.88 (0.27 to 2.76)
	Follow-up*	1 (2.8)	27 (75.0)	1 (2.8)	7 (19.4)	0.14 (0.00 to 1.11)

<sup>a</sup> At baseline there were 39 pairs of responders. At follow-up there were 36 pairs of responders; <sup>b</sup> Positive indicates that the patient had the corresponding characteristic; negative indicates that they did not; <sup>c</sup> Mantel-Haenszel estimate of the odds ratio for the association between the characteristic and the presence of salmonella/campylobacter infection [4]; <sup>d</sup> Symptoms: nausea; vomiting; stomach pains; diarrhoea; blood in motions; <sup>e</sup> Includes changes in household cooking personnel and/or care taken in preparing food; <sup>f</sup> Based on changes in washing-up style and/or toilet hygiene and/or use of cleaning products; <sup>g</sup> Psychological distress was defined by a GHQ total score of 3 or more [5]; \*  $p < 0.01$ ; \*\*  $p < 0.05$ ; \*\*\*  $p < 0.01$  derived by McNemar's test using the Binomial distribution for small samples.

monella, campylobacter, shigella, *Escherichia coli* O157 and cryptosporidium). Controls were not selected if the form indicated chronic disease (e.g. ulcerative colitis or malignancy). Controls were age matched to cases to within 5 years for cases aged 10 years or over and to within 2.5 years for cases aged under 10 years.

Each case and control was sent a letter of introduction including a request for consent to interview. The nurse researcher then conducted a telephone interview using a standard questionnaire. For child cases, parents or guardians of the child were interviewed. The questionnaire included: details of symptoms of acute illness; whether time was taken off school or work; advice given and by whom; details of food preparation; a section on hygiene practices in the home; and the 12-item general health questionnaire (GHQ-12). The GHQ is a well-validated instrument for identifying possible anxiety and depression in community based samples [3]. The questionnaire was administered at least 10 days after the laboratory report had been authorized in order to give the general practitioner opportunity to communicate the results to the patient. A follow-up questionnaire was administered, also by telephone, 2 months after the initial (baseline) questionnaire to assess changes in both symptoms and health-related behaviour in the period following the acute illness.

At baseline, there were a total of 39 cases and 39 matched controls. The sample groups were similar in terms of gender: 21 male cases (54%) and 20 male controls (51%). Each group had a mean age of 34 years, with a range of 1–62 years (cases) and to 58 years (controls). The study included 8 children (age < 18 years); 4 in each group. At follow-up there were 36 case-control pairs.

The results of the study are presented in Table 1 for each case-control pair, classified according to their concordance or discordance for each of the variables studied.

Significantly more cases had received advice on food preparation and hygiene practices by the time of the baseline interview. This is not surprising in that all cases of salmonella infection and some cases of campylobacter infection are contacted by the environmental health officers so that advice about food hygiene can be given to the patient. Similarly, the difference in reported changes in food preparation at baseline are likely to have resulted following advice given to cases by both environmental health officers and general practitioners. This difference did not persist at follow-up.

Avoidance by cases of certain food premises is clearly demonstrated at the time of initial interview. This still persisted as a clear difference between cases and controls at 2 months after the illness.

At follow-up cases were no more likely than controls to have persistent physical symptoms, or to have taken time off work. Although the proportion of subjects with psychological distress was similar at baseline in cases and controls, the controls were substantially more likely to be distressed by the time of follow-up and to have recently consulted their doctor. There are a number of possible explanations for this. Controls may have had persisting gastrointestinal disease although the proportion reporting continued symptoms at follow up was not substantially higher than among cases. Controls may have had non-infective chronic diseases not indicated on the laboratory request form. It is however likely that the commonest cause of disease in controls was a virus [6]. A positive diagnosis of salmonella or campylobacter, although in media terms potentially alarming for the individual patient, seems to have had a reassuring effect when compared to those for whom no diagnosis was given.

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