

## **Campylobacter enteritis in general practice**

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### **SUMMARY**

The incidence and clinical features of campylobacter enteritis were studied in a defined general practice population over a period of three years. Specimens of faeces were cultured from a representative sample of patients suffering from acute enteritis. Of 168 patients submitting a specimen to the laboratory 34 (20.2%) were positive for thermophilic *Campylobacter* species. The projected campylobacter infection rate varied from 5.4% per annum in infancy to 0.3% per annum in the 5- to 14-year-olds with a mean of 1.1% per annum for the whole study population.

During the same period campylobacters were isolated from 484 (14.9%) of 3250 patients suffering from acute enteritis whose general practitioners had sent faecal specimens to the laboratory, confirming the importance of this organism in the aetiology of acute enteritis in the community.

### **INTRODUCTION**

Since the introduction of a selective medium for the isolation of thermophilic *Campylobacter* species from stools these organisms have frequently been shown to cause acute diarrhoeal illness (Skirrow, 1977; Butzler & Skirrow, 1979). Clinical studies have been made on patients in hospital (Lambert *et al.* 1979; Pai *et al.* 1979; Karmali & Fleming, 1979), but studies in defined populations have not been reported. We describe here a study of acute diarrhoeal disease in a defined general practice population under the clinical care of a single observer. Faeces were examined bacteriologically from a representative sample of these patients and from all patients with diarrhoea referred by other general practitioners in the laboratory catchment area during the same period.

## MATERIALS AND METHODS

*Population at risk, case finding and sampling**Defined population*

The population was enumerated by age and sex from the record cards of patients registered with one of us (E.J.C.K.), in an average urban practice which had no excess of young or old patients. The estimated population at risk during the period of observation was 2796; this was the average of the numbers of patients registered on 1 January in the years 1979, 1980 and 1981 after exclusion of those who had left the practice. The mean population registered with the Family Practitioner Committee on these dates was 3032.

From 1 January 1978 to 31 December 1980 all patients complaining of acute diarrhoea were recorded by date, age and sex. Diarrhoea was defined as the passage of three or more liquid stools during a period of at least 48 h. A representative sample of these patients were selected for special study having regard to age, sex, type and severity of illness. By this means about one in two patients were selected for special study. Those judged likely to be unco-operative or upset by further investigation or who were suffering from chronic disease which might have modified the course of the illness were excluded. Every effort was made to obtain a representative sample of all groups and types of illness. Those selected for special study were asked to submit a specimen of faeces to the laboratory. A standard record card was used to record daily clinical details including temperatures and the presence of abdominal pain, diarrhoea, nausea, vomiting and respiratory infection. The duration of diarrhoea and abdominal pain was established by follow-up consultations. Annual rates were corrected for the observer's holiday periods totalling 45 days per year during which observations were not made.

Similar records of acute diarrhoeal infections had been made by the same observer in the same practice in 1967 and 1968. These were compared with the more recent results.

*Unselected patients*

From January 1978 to December 1980 the pathogens isolated from faecal specimens sent to the laboratory by other general practitioners from patients with diarrhoea were recorded; a note was made of the patients' age and whether or not they had recently travelled abroad. The results were analysed for age and seasonal distribution of campylobacter infection.

*Laboratory methods*

The selective technique described by Skirrow (1977) was used to isolate campylobacters. Faeces samples were also cultured for salmonella and shigella and wet films examined for parasites and cellular exudate.

Table 1. Consultation rates for acute enteritis in the defined population: age distribution of patients

Age group (years)	Consultation rates per 100 per annum*					Statistics from general practice†
	1967	1968	1978	1979	1980	
0-4	20.1	23.0	15.9	24.8	19.7	18.58
5-14	6.7	2.5	2.7	4.3	5.2	4.68
15-24	5.3	4.6	6.1	10.2	7.0	5.38
25-44	4.2	2.3	3.7	7.0	4.3	4.41
45-64	4.3	3.5	3.7	3.7	3.3	3.24
65+	3.1	3.0	4.8	2.8	7.4	7.25
All ages	5.3	4.1	4.7	6.2	5.8	5.25
No. of weeks observed	37	42	45	45	45	
No. at risk	2856	2960	2874	2881	2633	

\* Corrected for periods of non-observation during holidays.

† Report (1979).

## RESULTS

### Defined population

**Consultation rates for diarrhoeal diseases.** In all 405 patients complaining of diarrhoea were seen during the study period, and 207 (51%) were selected for special study; of these 192 (93%) were seen within the first seven days of illness and 168 (81%) submitted specimens for laboratory tests.

Consultation rates for acute diarrhoeal disease are shown in Table 1, which also includes data from a national survey of morbidity in general practice (Report, 1979) for comparison. The rates for all age groups only varied between 4.1 and 6.2/100 per annum, suggesting that the incidence of disease and the rate of recourse to the general practitioner had changed little over this 12-year period. Analysis by age showed that the rates fell from a high level in infancy to a fairly uniform level in all other age groups. The male/female ratios were not significantly different.

**Culture results.** Specimens of faeces were cultured from 168 patients; 34 (20.2%) were positive for campylobacter, 6 (3.6%) for salmonella and 1 (0.6%) for shigella. Two individuals and a third patient outside the study period experienced two separate campylobacter infections at intervals of 4, 11 and 18 months respectively. In two of these patients the second infection was found to have been due to a different biotype from that causing the first infection. Age-specific isolation rates of campylobacters from patients with diarrhoea did not vary significantly but were lowest in the 5- to 14-year-old group (Table 2). As the isolation rates were fairly uniform by age, the projected campylobacter rate followed the total rates for acute enteritis shown in Table 1, falling from about 5% in infancy to 0.3-2% in the older groups. The overall rate of 1.1% per annum points to a high incidence of infection in this population.

Table 2. *Enteritis and campylobacter isolations in the study period 1978/79/80*

Age group (years)	No. at risk*	Total no. of consultations for enteritis	Consultation rates for enteritis (% per annum)†	No. of patients from whom faeces were tested	No. of patients from whom campylobacter isolated	Campylobacter positive (%)	Projected rate of campylobacter infection per 100 study population per annum
0-4	118	62	20.2	26	7	26.9	5.4
5-14	298	31	4.0	12	1	8.3	0.3
15-24	356	76	8.2	32	8	25.0	2.0
25-44	771	101	5.0	49	10	20.4	1.0
45-64	757	71	3.6	29	3	10.3	0.4
65+	496	64	5.0	20	5	25.0	1.2
Totals	2796	405	5.6	168	34	20.2	1.1

\* Mean of total on 1 January 1979, 1980 and 1981.

† Rates corrected for holiday periods when no observations were made.

Table 3. Seasonal distribution of campylobacter enteritis in unselected patients

Month	Number of faeces*	Number (%)†
January	192	28 (14.6)
February	189	31 (16.4)
March	238	24 (10.1)
April	185	19 (10.3)
May	211	28 (13.3)
June	277	71 (25.6)
July	315	54 (17.1)
August	364	57 (15.7)
September	384	45 (11.7)
October	336	46 (13.7)
November	329	42 (12.8)
December	230	39 (17.0)

\* Totals for three study years.

† Monthly totals:  $\chi^2 = 63.9$ ,  $P < 0.001$ . Percentage positive:  $\chi^2 = 33.5$ ,  $P < 0.001$ .

### Unselected group of patients

Specimens of faeces were tested from 3250 patients suffering from diarrhoea in the community. Of these 484 (14.9%) yielded campylobacters, 67 (2.1%) salmonellas, 35 (1.1%) shigellas and 18 (0.5%) *Giardia lamblia*. Of 548 patients who had recently returned from abroad, 64 (11.7%) were positive for campylobacters compared with 420/2702 (15.5%) of those who had not been abroad. The isolation rate of other pathogens, salmonella, shigella and giardia, was higher in the group who had recently travelled abroad (8.8%) compared with those who had not (2.7%).

The seasonal distribution of campylobacter infection (Table 3) showed significant variation ( $P < 0.001$ ) with the greatest frequency in June, July and August. The proportion of faecal samples yielding campylobacter also varied seasonally ( $P < 0.001$ ) with the highest proportion in June.

The age-specific campylobacter isolation rates are shown in Table 4. The rate was lowest in the under-five-year olds. In older patients the rate remained remarkably constant at around 18%, falling to about 13% in those aged 55 years or older.

### Clinical picture of patients with campylobacter infection

This is based on the cases seen in the period July 1977 to December 1980 during which the cases were selected on the criteria stated above.

There was a considerable variation in the severity and course of the illness. Abdominal pain, sometimes severe, and diarrhoea up to about fourteen days duration were seen in the more severe infections. Patients were often febrile for only a short period, but nausea and vomiting were either absent or slight. Local or general abdominal tenderness was found in 21 of 39 patients and it was sometimes localized to the area of abdominal pain experienced by the patient. Blood was occasionally seen in the stools. Two patients were admitted to hospital

Table 4. *Age distribution of campylobacter enteritis in the unselected group of patients*

Age (years)	Number of faeces samples	Number (%) campylobacter-positive
< 1	121	7 (5.8)
1-4	392	36 (9.2)
5-14	298	49 (16.4)
15-24	391	77 (19.7)
25-34	466	92 (19.7)
35-44	402	74 (18.4)
45-54	322	61 (18.9)
55-64	284	44 (15.5)
65+	229	26 (11.4)
Not known	345	18
	3250	484 (14.9)

Table 5. *Symptoms and signs in acute enteritis: patients from the defined population*

	Campylobacter infections	Control group* with diarrhoea	Significance†
Diarrhoea	39/39	39/39	—
Nausea	18/39	31/39	$P < 0.01$
Vomiting	5/39	20/39	$P < 0.01$
Abdominal pain	36/39	33/39	N.S.
Abdominal tenderness	21/39	22/39	N.S.
Fever ( $\geq 37.5$ °C)	21/39	7/39	$P < 0.01$
Respiratory infection	5/39	6/39	N.S.
Blood seen in stools	3/39	1/39	N.S.
Red cells present (microscopically)	5/38	1/38	N.S.
Pus cells present (microscopically)	12/38	2/38	$P < 0.01$

\* Patients from whose stools pathogens were not isolated matched for age but not sex.

†  $\chi^2$  test used except for respiratory infection, for cases where blood was seen in the stools and microscopy, when Fisher's exact test was used.

with fever and tenderness in the right iliac fossa in one case, and dehydration in the other.

Milder illnesses showed some of these features, but they were generally indistinguishable from illnesses in which no pathogens were found in the stools. Table 5 compares the clinical features in the campylobacter group and an age-matched group of patients with diarrhoeal illness from whom no faecal pathogen had been isolated. Significant differences were observed for nausea and vomiting which were commoner in the control group, and for fever and microscopically detectable pus

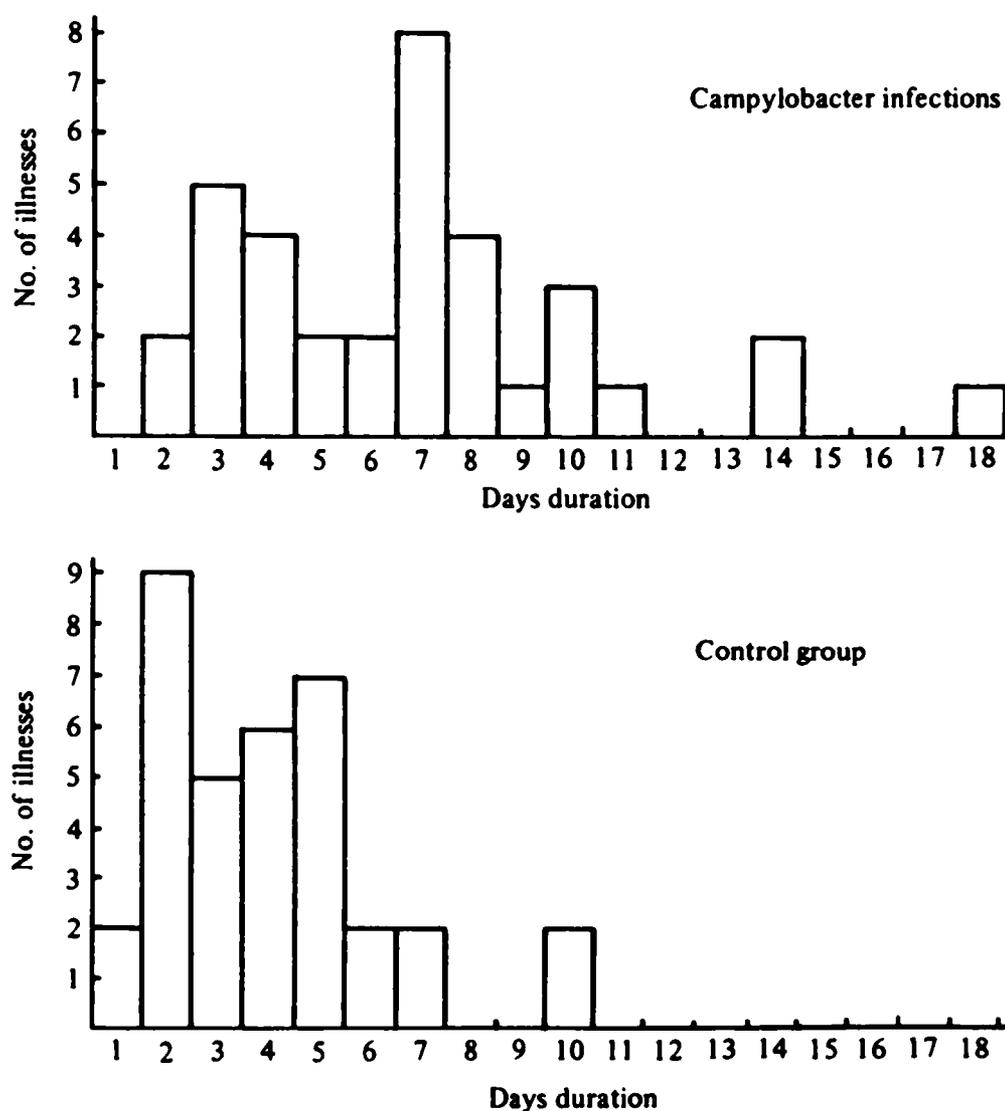


Fig. 1. Duration of diarrhoea in patients with campylobacter enteritis and an age-matched control group with negative stools.

cells in the faeces which were commoner in the campylobacter group, but not for the presence of blood-stained stools, or microscopically detectable blood cells in the wet films. The duration of diarrhoea was significantly longer ( $P < 0.001$ ) in the campylobacter infections (mean 6.9 days) than those with no pathogen (mean 4.0 days) (Fig. 1).

#### DISCUSSION

The consultation rate for enteritis in our practice was similar both in size and age distribution to that of the national survey of morbidity in general practice (Table 1) and to those of Fry (1979) and Hodgkin (1978). It was much lower (by between ten- and twenty-fold) than the incidence of enteritis in the community recorded in volunteer studies (Hodges *et al.* 1956; Monto & Koopman, 1980). It is likely, therefore, that only a small proportion of these illnesses caused the patient to consult their doctor.

About 20% of enteritis cases in our defined general practice population were associated with campylobacter infection, and this is a higher proportion than has

usually been found. The lower rate of 14.9% in our unselected group of patients was similar to Skirrow's findings in Hereford and Worcester and had a similar age distribution (Butzler & Skirrow, 1979). This may be because laboratory investigations are requested less frequently in short mild illnesses such as we have described for some campylobacter infections and more frequently in cases with prolonged diarrhoea or with other features causing anxiety to the patient or doctor. Our results from the defined general practice population are therefore likely to be more representative than those from unselected patients.

We found a consistently high consultation rate for enteritis in infancy. The average rate during the three study years was 20.2%, which is similar to other published estimates of 18.6% (Report, 1979), 16% (Fry, 1979) and 24% (Hodgkin, 1978). The high projected rate of campylobacter infection in infancy was based on a small sample, but if the campylobacter isolation rates found in the larger unselected group of patients are applied to the national consultation rates (Report, 1979) a similar pattern emerges. This calculation suggests a peak of 1.5% per annum campylobacter infection in infancy followed by a fall to 0.8% per annum in the 5- to 14-year-olds with a second peak of 1.1% per annum in the 15- to 24-year-olds. The high rate of campylobacter infection found in infants may therefore not be simply a result of more frequent sampling as has been suggested by Butzler & Skirrow (1979).

In the defined group a mild illness with abdominal pain and diarrhoea lasting for only two to four days was observed in 11 of 35 patients with campylobacter infection. The severe cases described from hospital practice (Lambert *et al.* 1979; Pai *et al.* 1979; Karmali & Fleming, 1979), therefore show only a small portion of the spectrum of illness caused by these organisms.

Campylobacter isolation rates in patients who acquired diarrhoea in this country and abroad were similar, which suggests that the infection is a worldwide phenomenon. This is in contrast to the isolation rates found for other pathogens, which were more commonly acquired abroad.

The infections in our practice seemed to be sporadic during the period of study, with no marked outbreak within households or in the community. The percentage of other members of the family falling ill with diarrhoea was low both in campylobacter infection and in non-specific infection. Although three of our patients had second attacks of campylobacter infections, and in two patients different strains were implicated, we know little about the duration of immunity after infection or the mode of transmission of these organisms. Effective preventive measures against this common and sometimes serious infection must await new knowledge about its epidemiology and natural history.

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