

***Cryptosporidium* as a common cause of childhood diarrhoea in Italy**

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(Accepted 13 January 1989)

SUMMARY

Cryptosporidium oocysts were observed in the stools of 9 (7.2%) of 124 Italian children with diarrhoea, examined during the period 1 January-31 December 1984. In two children, the parasite was associated with other enteric pathogens. The duration of diarrhoea was 2-30 days, with a median of 6 days. In all cases the infection was self limiting. The mean age of the *Cryptosporidium*-positive children was 34 months, and all cases occurred in the warm season. *Cryptosporidium* was found to be the third most common enteric pathogen after rotavirus and *Salmonella* spp.

Cryptosporidium is an intestinal protozoan which has emerged as a cause of chronic diarrhoea in persons with immunodeficiency, particularly in patients with acquired immunodeficiency syndrome (Soave & Armstrong, 1986). Recent reports have also indicated that *Cryptosporidium* may be a relatively common cause of acute diarrhoea in immunocompetent individuals (Wolfson *et al.* 1985). Children seem to be more affected than adults (Lopez-Brea, Garcia-Picazo & Del Rey, 1986; Bogaerts *et al.* 1984; May Nguyen, 1987; Freidank & Kist, 1987) and a marked geographical variation in the prevalence of cryptosporidiosis has been reported, the detection rate in children with diarrhoea ranging from 1.4% in England (Baxby & Hart, 1986) to 12.9% in Ghana (Addy & Aikins-Bekoe, 1986).

The aim of our study was to determine the prevalence of *Cryptosporidium* in sporadic cases of childhood diarrhoea in Italy.

Patients consisted of 124 diarrhoeal children, less than 9 years old (mean age: 22 months, range 1-108), consecutively admitted to Brescia (Northern Italy) and Orvieto (Central Italy) hospitals both as in-patients (79 children) and out-patients (45 children), during the period 1 January-31 December 1984. Diarrhoea was defined as either an increase in the frequency of stools or a change in their consistency, as determined by the parents of children. Patients were enrolled in the study irrespective of duration of diarrhoea or previous antibiotic treatment.

Table 1. Age specific prevalence of *Cryptosporidium* in Italian children with diarrhoea

Age (months)	No. of patients	No. (%) positive for <i>Cryptosporidium</i>
0-12	48	2 (4.2)
13-24	32	4 (12.5)
25-36	15	1 (6.7)
> 36	29	2 (6.9)
Total	124	9 (7.2)

Table 2. Enteric pathogens detected in 124 children with diarrhoea

Pathogen	Number of cases	%
Rotavirus	24	19.3
<i>Salmonella</i> spp.	21	16.9
<i>Cryptosporidium</i>	9	7.2
<i>Campylobacter jejuni</i>	2	1.6
<i>Giardia lamblia</i>	2	1.6
<i>Shigella sonnei</i>	1	0.8

Clinical details were ascertained from hospital case records and, in the case of out-patients, from questionnaires completed by their parents. Another 41 children, matched for age and without gastrointestinal symptoms, were enrolled as a control group.

Stool samples were examined for *Cryptosporidium* oocysts with a modified Ziehl-Neelsen stain (Garcia *et al.* 1983). Stained preparations were observed for about 10 min under oil immersion at a magnification of $\times 1000$. Oocysts were identified as spherical red bodies 3-6 μm in diameter, with evidence of more deeply stained internal structure.

Cryptosporidium oocysts were detected in 10 of 165 children examined. Among diarrhoeal children, 9 of 124 (7.2%) were *Cryptosporidium* positive (Table 1), compared with 2.4% of children (1 of 41) without diarrhoea. The difference was not significant. All cases could be regarded as index cases, no apparent connections having been found among these patients. The mean age of children positive for the parasite was 34 months (range 3-106) and the peak prevalence (12.5%) was in the age group 12-24 months (Table 1). The incidence of cryptosporidiosis among patients with diarrhoea in the two towns considered in the study was similar: 5 positive children out of 68 examined in Brescia (7.3%) and 4 out of 56 (7.1%) in Orvieto. *Cryptosporidium* was found to be the third most common enteric pathogen after rotavirus and *Salmonella* species (Table 2). All cases of cryptosporidiosis occurred in the warm season, between May and October.

None of the children positive for the parasite exhibited signs of immunodeficiency or had received immunosuppressive drugs. Two patients were also infected by other enteropathogens, *Salmonella* spp. and rotavirus plus *Giardia lamblia*, respectively. In the seven patients harbouring *Cryptosporidium* as a single pathogen, the clinical manifestation of diarrhoea varied from mild to severe (Table 3); hospitalization was necessary for three patients, and one needed intravenous rehydration. In two children, the diarrhoea was associated with vomiting, and in

Table 3. Clinical features of children excreting *Cryptosporidium* oocysts

No.	Patient Sex/Age (months)	Status	Days of diarrhoea	Abdominal pains	Vomiting	Fever	Rehydration
1	M/3	In-patient	3	+	—	—	—
2	M/10	Out-patient	30	—	—	—	—
3*	F/22	Out-patient	5	+	+	+	Oral
4	F/22	Out-patient	6	—	—	—	Oral
5	F/24	In-patient	2	+	+	+	—
6	M/24	Out-patient	7	—	—	—	Oral
7	M/34	Out-patient	5	+	—	+	Oral
8*	F/60	In-patient	4	+	+	+	—
9	M/108	In-patient	7	+	+	+	Parenteral

* Other enteric pathogens: *Salmonella* spp. (patient 3), *Giardia lamblia* and rotavirus (patient 8).

four with severe abdominal pain. The faeces were watery and mucous in all the seven children, and five of them produced more than five stools per day. The duration of diarrhoea was 2–30 days, with a median of 6 days. In all cases the infection was self-limited.

These results confirm that *Cryptosporidium* may cause disease in otherwise healthy persons and indicate this parasite to be a common cause of diarrhoea in Italian children. The 7.2% rate of incidence in both the towns considered is greater than those previously reported in other European countries: from 1.4% (Liverpool) up to 6.8% (Bristol) in England (Hunt *et al.* 1984; Baxby & Hart, 1986), 1.6% in West Germany (Freidank & Kist, 1987), 4.3% in Ireland (Corbett-Feeney, 1987), 5.0% in Spain (Lopez-Brea, Garcia-Picazo & Del Rey, 1986), 5.5% in Switzerland (Mai Nguyen, 1987). However, it remains lower than those reported for tropical developing countries such as Ghana (12.9%), Rwanda (10.4%) and Venezuela (10.8%) (Bogaerts *et al.* 1984; Addy & Aikins-Bekoe, 1986; Perez-Schael *et al.* 1985).

The observation of *Cryptosporidium* oocysts in the stools of 1 out of 41 children without diarrhoea is in agreement with the findings of Lopez-Brea and coworkers (1986) who found 5 carriers of the parasite among 176 asymptomatic children in Madrid. Asymptomatic carriage of *Cryptosporidium* has been recently reported also for severely immunocompromised patients (Zar, Geiseler & Brown, 1985; Martino *et al.* 1988) and may well contribute to the spread of this infection, particularly in schools and other communities. In conclusion, our study indicates that *Cryptosporidium* is a common enteric pathogen involved in childhood diarrhoea in Italy and suggests the opportunity of routine examination for oocysts of the stools from diarrhoeal children.

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