

***Cryptosporidium* infections in humans with gastroenteritis in Zaria, Nigeria**

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(Accepted 14 December 1987)

SUMMARY

The stool samples of 75 patients with gastroenteritis and/or loose and watery faeces at three hospitals and one clinic in Zaria were examined for *Cryptosporidium*. The stool samples were concentrated by the formol-ether method and stained with safranin-methylene blue. Sixteen (21%) samples were positive. The rate of detection was higher among females (27%) than males (17%) and among adults (29%) than children (8%). The study confirmed the presence and possible significance of *Cryptosporidium*, which is a known zoonotic protozoan, in the aetiology of human gastroenteritis in Zaria, Nigeria.

INTRODUCTION

Cryptosporidium is a protozoan enteropathogen which is one of the most common causes of gastroenteritis and diarrhoea in several animal species, especially calves, lambs and man (Tsipori, 1983; Current, 1985). The agent is an important cause of diarrhoeal illness world-wide especially in children. It is important in immunocompetent but more especially in immunocompromised persons and a cause of severe diarrhoea in patients with acquired immune-deficiency syndrome (AIDS) (Hart, Baxby & Blundell, 1984; Bogaerts *et al.* 1984; Current, 1985; Robinson *et al.* 1986).

Zoonotic transmission may account for most human infections especially for persons living or working in close contact with potential animal reservoirs but man-to-man transmission may also be common. Also food, water and other sources may play a role in the transmission of oocysts (Current, 1985; Baxby, Hart & Blundell, 1985; Robinson *et al.* 1986).

In many studies among human population in different parts of the world, *Cryptosporidium* has been found as the most common and significant cause of diarrhoeal illness (Current, 1985). This has been confirmed by studies in the African countries of Rwanda (Bogaerts *et al.* 1984), Liberia (Hojlyng *et al.* 1984) and the Sudan (Robinson *et al.* 1986).

There does not seem to be a documented study on the occurrence of cryptosporidium infections in humans in Nigeria, but enteric infections in livestock have been found to be common in Ile-Ife (Ayeni, Olubunmi & Abe, 1985). This study was conducted to determine the occurrence of *Cryptosporidium* in diarrhoeic patients attending three hospitals and one clinic in Zaria, Nigeria.

MATERIALS AND METHODS

The study was conducted between August 1986 and February 1987. Samples were collected on a weekly basis from three hospitals and a University clinic. The specimens were selected from 840 stool samples that were submitted for routine bacteriological and parasitological examinations. Only those stool specimens that were loose or watery and those from patients with diagnosis of gastroenteritis or diarrhoea were selected for study. Altogether a total of 75 specimens were studied. The colour and consistency of each faeces were noted.

The stool samples were concentrated by the formol-ether method, stained with 1% safranin and counterstained with 1% methylene blue (Baxby, Blundell & Hart, 1984). Briefly, about 1 g of faeces was mixed in 10 ml of formol saline in a universal bottle and sieved through gauze into a centrifuge tube. One millilitre of diethyl ether was added to the filtrate and thoroughly mixed. This was centrifuged at 5000 rev./min for 10 min, the supernatant was decanted and a smear was made from the sediment and air-dried. The smear was fixed for 3–5 min with 3% hydrochloric acid-methanol, flooded with 1% aqueous safranin and heated with a bunsen flame from beneath for 1 min. It was washed with water, counter-stained with 1% methylene blue for 1 min, washed again with water and air-dried. The slides were examined microscopically using a $\times 40$ objective. The oocysts stained bright orange within a halo. Positive slides and faeces provided by Drs Bruce Anderson of the University of Idaho, USA and Liisa Jokipii of Institutum Serobacteriologicum Universitatis, Helsinki served as controls throughout the study.

Table 1. *Detection of Cryptosporidium oocysts in the faeces of patients attending four hospitals in Zaria, Nigeria*

Hospital	No. patients	No. positive	%positive
Ahmadu Bello University	Total, 35	4	11
Teaching Hospital,	Male, 23	1	4
Tudun Wada	Female, 12	3	25
A.B.U. Main Campus	Total, 13	4	31
Clinic, Samaru	Male, 2	2	100
	Female, 11	2	18
Government General	Total, 6	1	17
Hospital, Zaria City	Male, 6	1	17
	Female, 0	0	0
St Luke's Hospital,	Total, 21	6	29
Wusasa	Male, 11	3	27
	Female, 10	3	30
All hospitals	Total 75	16*	21
	Male, 42	7	17
	Female, 33	9	27

* One patient, an adult female, was not attending any of the hospitals and had chronic diarrhoea; *Cryptosporidium* was detected in her faeces weekly for 3 weeks.

Table 2. Age, sex and occupation of, and major symptoms shown by patients positive for *Cryptosporidium*

Sample no.	Age (yrs)	Sex	Occupation	Diagnosis or complaint and nature of faeces
TZ 252	Adult	F	Teacher	Ulcer, dyspepsia; and brownish loose faeces
TZ 305	16	F	Housewife	Anaemia in pregnancy; brown loose faeces
TZ 242	60	F	Housewife	Enteritis; yellowish loose faeces
TZ 240	55	M	Hospitalized	Gastroenteritis; watery, greenish faeces
WH 179	25	F	Housewife	Diarrhoea; greenish watery faeces
WH 200	50	F	Housewife	Intestinal parasites; brownish loose faeces
WH 244	1	M	None	Gastroenteritis; yellow watery faeces
WH 228	2	M	None	Abdominal pain; greenish mucoid watery faeces
WH 168	35	M	Farmer	Diarrhoea; very watery black faeces
WH 230	35	F	Housewife	Dysentery; mucoid and bloody faeces
SZ 340	29	M	Student	Abdominal pain; yellowish mucoid faeces
SZ 226	30	F	Housewife	Antenatal clinics; yellowish loose faeces
SZ 321	26	F	Housewife	Antenatal clinic; yellowish loose faeces
SZ 235	23	M	Student	Medical examination; brownish watery faeces
ZC 100	30	M	Civil servant	Black loose faeces
RK	30	F	Clerical staff	Diarrhoea; greenish foamy watery faeces

RESULTS

A total of 75 patients with diarrhoea or watery faeces was examined. They included 42 males and 33 females; 49 adults and 26 children below the age of 14 years. Sixteen (21%) stool samples were positive for *Cryptosporidium*, 9 of these were from females and 7 from males; 14 from adults and 2 from children. Table 1 gives the rate of detection from the various hospitals and Table 2 the characteristics of the patients that yielded positive results. The of detection was higher among females (27%) than males (17%) and also among adults (29%) than children (8%).

DISCUSSION

This study has revealed the presence of *Cryptosporidium* infection among patients with gastroenteritis or diarrhoea in Zaria. The percentage detection (21%) among such patients may indicate the organism to be a significant

pathogen in patients with diarrhoea. The rate of detection of *Cryptosporidium* obtained in this study is higher than 6.1% reported among children with gastroenteritis in the Sudan (Robinson *et al.* 1986), 6.1% in Bangladesh (Shahid *et al.* 1985), 7.9% reported from Liberia (Hojlyng *et al.* 1984) and 3.0% and 10.4% among children and adults respectively in Rwanda (Bogaerts *et al.* 1984). In Liverpool, UK, Canada and Australia, detection rates of 1.4%, 1.2% and 4.1% respectively have been reported (Hart, Baxby & Blundell, 1984; Ratnam *et al.* 1985; Tzipori *et al.* 1983).

Although there is no available previous report on the detection of *Cryptosporidium* in humans in Nigeria, the presence of oocysts among 32.6%, 4.2%, 12.0% and 7.6% of pigs, goats, sheep and cattle respectively has been reported in Ile-Ife (Ayeni, Olubunmi & Abe, 1985). *Cryptosporidium* is an important cause of diarrhoeal illness in man world-wide and young children usually have a higher prevalence than adults (Current, 1985). In the present study, however, there was higher prevalence among adults. This may, in part, be due to the few cases investigated and the lower number of children included in the study. Moreover the children that were positive for *Cryptosporidium* were aged 1 and 2 years respectively.

The findings in this study are in agreement with previous studies with regard to the higher proportion of cryptosporidial gastroenteritis in the tropics. The reason for this is unknown (Robinson *et al.* 1986). In this study, *Cryptosporidium* was detected more commonly in watery faeces. The colour of the faeces that were positive included greenish (4), brownish (4), yellowish (5) black (2) and bloody-mucoid (1). In previous studies *Cryptosporidium* was seen in either greenish and watery faeces (Robinson *et al.* 1986) or water stools (Bogaerts *et al.* 1984). It would appear therefore that colour and consistency of faeces cannot be used to exclude the presence of *Cryptosporidium*.

Although this study has confirmed the presence and possible importance of *Cryptosporidium* in the aetiology of human gastroenteritis in Zaria, there is need for more studies which should include seasonality, non-diarrhoeic control cases and simultaneous investigation of the role of other agents.

We are grateful to Mr Martin Mgbegha for Laboratory assistance and Mrs R. A. Abdulkadir for typing the manuscript. The study was funded by a grant from Ahmadu Bello University Board of Research.

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