

CRYPTOSPORIDIUM INFECTION IN UNDERNOURISHED CHILDREN WITH HIV/AIDS IN JOS, NIGERIA

E. B. Banwat, D.Z. Egah, E. S. Audu, *B. A. Onile and ** P. R. Datong

Department of Medical Microbiology, Jos University Teaching Hospital, Jos, *Department of Medical Microbiology and Parasitology, University of Ilorin Teaching Hospital, Ilorin And **Department of Paediatrics, Plateau Specialist Hospital, Jos, Nigeria

Reprint requests to: Dr. E.B. Banwat, Department of Medical Microbiology, Jos University Teaching Hospital, P. M. B. 2076, Jos, Plateau State, Nigeria

Abstract

Background: AIDS and Protein energy malnutrition (PEM) severely impair the immune system *Cryptosporidium* has over the last two decades emerged as a life threatening disease. The study attempts to determine the prevalence of *Cryptosporidium* infection in malnourished children with HIV/AIDS.

Method: Blood and stool samples of 52 HIV-seropositive children and another 52 HIV-sero-negative children aged 0-5 years were collected and screened for HIV and *Cryptosporidium* oocysts respectively. The sera were screened by double ELISA and the stool by the modified Ziehl-Neelsen method.

Results: Out of the 52 HIV-seropositive undernourished, under-five children, none (0%) excreted *Cryptosporidium* oocyst in their stools while 2 (3.8%) of the control group excreted the oocyst.

Conclusion: *Cryptosporidium* infection seems to be uncommon among undernourished under five children with HIV/AIDS in Jos.

Key words: Cryptosporidium, children, HIV/AIDS, undernutrition

Introduction

Protein energy malnutrition (PEM) and acquired immunodeficiency syndrome (AIDS) are important causes of acquired immune incompetence in African Children. ^{1,2} *Cryptosporidium*, a common enteric protozoan has since 1907 been known to parasitize a wide range of animals. ^{3,4} It has been widely reported as ubiquitous and significant enteropathogen of immuno-compromised patients. ⁴ Since 1983 cryptosporidiosis has emerged, along with AIDS, as a life threatening disease. ⁵ The synergistic impairment of the immune system when AIDS and PEM operate in concert is well known. ^{6,7} *Cryptosporidium* has a higher prevalence in young children. ⁸ These, coupled with the fact that, no such work has been done in our environment (to our knowledge), prompted us to look at the situation in undernourished children less than five years with HIV/AIDS in Jos.

Materials and Methods

Study area and population

This prospective study was hospital based. It involved 52 consecutive HIV sero-positive undernourished children aged 0-5 years. Another 52 consecutive HIV sero-negative undernourished children aged 0-5 years served as control. The study population was attending the paediatric services of the Jos University Teaching

Hospital, Plateau Specialist Hospital and Our Lady of Apostle (OLA) Hospital. All located in Jos metropolis. The study was over a period of 9 months.

The Wellcome party classification ⁹ was used to classify the malnutrition. Consent was obtained before recruitment into the study. Ethical clearance was given by the JUTH ethical committee. The details of personal and clinical information were obtained using a questionnaire.

Sample collection

Serum: Blood samples were collected aseptically by venipuncture of the cubital or femoral veins as the case may be. The area was cleaned using 70% isopropyl alcohol in water with 1% iodine for at least 1 minute and allowed to dry. With precautions to avoid touching and re-contamination, the needle was inserted and 4-5 mls of blood was obtained. This was then dispensed into clean plastic containers (Z-10 tubes). The blood was allowed to clot and serum separated by centrifuging at 1,800 rpm. The serum thus obtained was used for HIV serology by the ELISA method using Genelavia kits. Absorbance was read with EL_X80 micro-plate Reader (Bio-Tek instrument INC.USA). Another separate sample was obtained from seropositive patients and a re-run for HIV antibodies (double ELISA) was carried out. Ninety-Five percent (95%) sensitivity of the ELISA method had been documented from our center. ¹⁰

Stool: Whenever possible, stools were collected

into clean, wide mouthed, grease-free, screw capped and numbered glass containers, provided for each child. These were returned to the laboratory immediately. The stool samples were processed each day within 4hours of collection. Appearance and consistency were noted for each stool sample. The demonstration of *Cryptosporidium* oocyst was by microscopical examination of smears made after formol-ether concentration of stools and stained by the modified Ziehl-Neelsen (Z-N) technique as given by the WHO¹¹ and examined with the oil immersion objective of a light microscope. *Cryptosporidium* positive slides, which served as control, were obtained from Veterinary public Health department Ahmadu Bello University Zaria.

Results

The age and sex distribution of the 52 HIV sero-positive under-nourished, under five children shows that 61.5% were males and 38.5% were females (ratio M: F=1.6:1) mostly aged 0 to 20 months (Table 1.)

None of the 52 HIV sero-positive undernourished, under-five children excreted *Cryptosporidium* oocyst in their stools. Out of the 52 HIV sero-negative group 2 (3.8%) excreted *Cryptosporidium* oocyst in their stool. (Table 2). Both were females aged 12 and 17 months.

Table 1: Age and sex of undernourished, under-five children with HIV/AIDS in Jos

Age (months)	Sex		Total
	M	F	
0 – 10	12	8	20
11 – 20	16	8	24
21 – 30	4	0	4
31 – 40	0	4	4
41+	0	0	0
Total (%)	32 (61.5)	20 (38.5)	52 (100)

Table 2: HIV status and *Cryptosporidium* infection in undernourished under-five children in Jos

HIV status	Cryptosporidium oocyst in stool		Total
	Positive (%)	Negative (%)	
Negative	2 (3.8)	50 (96.2)	52
Positive	-	52 (100)	52

Discussion

Cryptosporidium is present in 1-3 % of immunocompetent patients with diarrhoea in industrialized countries and 7-10% in developing Countries.^{5,12-14} The prevalence is much higher in patients with HIV infection. In USA, Europe and

Asia, 8-30% excreted *Cryptosporidium* oocysts in various series.^{13,15,16} This figure is 15-50% in developing countries,^{17,18} making it one of the most common entero-pathogens.

The overall prevalence in this study is low (0% in HIV/AIDS patients and 3.8% in the control group) and contrasts with the above findings and other reports from Nigeria^{19, 20}. Although a similarly low prevalence had been reported in immunocompetent patients in Nigeria²¹ and elsewhere²². The variation of this finding with reports from the Industrialized countries could be due to; differences in the study population and their use of more sensitive diagnostic techniques e.g. Polymerase chain reaction, Fluorescent assay using monoclonal antibody etc. Also only single stool specimens were examined in this study and only 30% sensitivity of single stool specimen has been reported.²³

Geographical, social and ethnic differences could explain the variation of our findings with reports from Nigeria and other developing countries. For instance children recruited into this study were on absolute breast feeding, as all the Hospitals are baby friendly Hospitals. Wolfson²² recorded no case of cryptosporidiosis in infants and attributed it to the protective role of breast-milk. Moreover, this study was hospital based as opposed to other reports in Nigeria¹⁹, which were community based, where the intimacy with animals is common.

Although an incidental finding is not impossible, the low prevalence concurs with the declining number of cryptosporidiosis among HIV patients largely because of immune reconstitution with highly active anti-retroviral therapy.²⁴

In this report, *Cryptosporidium* infection seems to be uncommon among undernourished under five children with HIV/AIDS in Jos.

Acknowledgement

We are thankful to the management and staff of the medical microbiology departments of the Jos University Teaching Hospital, Plateau Specialist Hospital and Our Lady of Apostle Hospital, Jos

References

- Hendrickse RG. Child health in developing countries: an overview. In: Hendrickse RG, Barr DCD, Matthews TS (eds). Paediatrics in the tropics. Blackwell, Oxford. 1991; 7.
- Asindi AA. An overview of paediatric HIV/AIDS in Africa. Nigerian Journal of Paediatrics 1995; 22:51-56.
- Tyzzar EE. A sporozoan found in the peptic glands of the common mouse. Proc Soc ExpBiol Med 1907; 5:12-13.
- O'Donoghue PJ. *Cryptosporidium* and cryptosporidiosis in man and animals. Int J Parasitol 1995; 25:139-195.

5. Current WL, Garcia LS. Cryptosporidiosis. Clin Microbiol Rev 1991; 4:325-358.
 6. Chandra RK, Kumari S. Nutrition and immunity: an overview. J Nutr 1994; 124 (supp): 14335-14355.
 7. Fauci AS. The relation between HIV and the human immune system. Ann Intern Med 1991; 114:678-695.
 8. Saredi N, Bava J. Cryptosporidiosis in paediatric patients. Rev Inst Med Trop Sao Paulo 1998; 40: 197-200.
 9. Wellcome Working Party. Classification of infantile malnutrition. Lancet 1970; 11:302-303.
 10. Bello CSS, Egah DZ, Okwori EE et al. Sexually transmitted diseases (STD): six years experience in Jos University Teaching Hospital. Niger J Med 1997; 6: 83-86.
 11. Cheesbrough M. Medical laboratory manual for developing countries .1989; 225-260.
 12. Kuhls TL, Mosier DA, Crowford DL, Griffis J. Seroprevalence of Cryptosporidial antibodies during infancy, childhood and adolescence. Clin Infect Dis 1994; 18:731.
 13. Casemore DP. Epidemiological aspects of human Cryptosporidiosis. Epidemiol Infect 1990; 104:1.
 14. Jelinek T, Lotze M, Eichenlaub S et al. Prevalence of infection with Cryptosporidium parvum and Cyclospora cayetanensis among international travelers. Gut 1997; 41:801.
 15. Laughon BE, Druckman DA, Vernon A et al. Prevalence of enteric pathogens in homosexual men with and without acquired immunodeficiency syndrome. Gastroenterology 1988; 94:984.
 16. Moolasart P, Eampokalap B, Ratanasrithong M, Kanthasing P, Transupaswaskul S, Tanchanpon C. Cryptosporidiosis in HIV infected patients in Thailand. South East Asian J Trop Med Public Hlth 1995; 26:335-338.
 17. Tarimo DS, Killewo JZ, Minjas JN, Msamanga GI. Prevalence of intestinal parasites in adult patients with enteropathic AIDS in northeastern Tanzania. East Afr Med J 1996; 73:397.
 18. Conlon CP, Pinching AJ, Perera CU et al. HIV-related enteropathy in Zambia: a clinical, microbiological and histological study. Am J Trop Med Hyg 1990; 42:83.
 19. Nwabuisi C. Cryptosporidiosis among diarrhoea patients in Ilorin, Nigeria. Nigerian Medical Practitioner 1998; 35:39-41.
 20. Nkanginieme KEO, Chira FW, Oruamabo RS. Cryptosporidiosis in undernourished under five children with diarrhoea at the University of Port Harcourt Teaching Hospital in Nigeria. Niger Postgrad Med J 1996; 3:5-9.
 21. Oyerinde JPO, Odugbemi T, Benson RI, Alonge AA, Roberts JIK. Investigations of *Cryptosporidium* in relation to other intestinal parasites at the Lagos University Teaching, Lagos. West Afr J Med 1989; 8:264-269.
 22. Wolfson JS, Richter JM, Waldron MA, Weber DJ, McCarthy DM, Hopkin CC. Cryptosporidiosis in immunocompetent patients. N Engl J Med 1985; 212:1278.
 23. Blanshard C, Jackson AM, Shanson DC et al. Cryptosporidiosis in HIV-seropositive patients. QJM 1992; 85:813.
 24. Le Moing V, Bissuel F, Costagliola D et al. Decreased prevalence of cryptosporidiosis in HIV-infected patients concomitant to the widespread use of protease inhibitors (letter). AIDS 1998; 12: 1395.
-