Original Article

Diarrhea due to *Cryptosporidium parvum* in immunocompromised and immunocompetent patients in Khartoum State

Musa HA[1], Salim GA[2], Ismael AA[3], Elfadil, A[4], Kafi Sk[5]

Abstract

Objective: The objective of this study is to search for Cryptosporidium parvum in Sudanese immunocompromised and immunocompetent patients presenting with diarrhea.

Methods: Two hundred and thirteen stool specimens were collected from different groups of patients presenting with diarrhea and healthy control (immunocompromised: 78; immunocompetent: 90; Control: 45).

The immunocompromised group included 25 HIV positive patients, 27 tuberculosis patients, 11 patients with renal failure and 15 patients receiving immunosuppressive chemotherapy. Antigen ELISA was performed to detect the presence of the parasite in stool.

Positive specimens were examined by the modified ZN stain to look for the oocyst of C.parvum.

Result: Seventy one of the immunocompromised patients (91.0%), twenty nine of immunocompetent patients (32.2 %) and ten of the control group (22.2%) were found to be positive for C.parvum. A significant difference was noticed between the immunocompromised patients and the other groups ($P<0.05$). Among the immunocompromised patients, the highest percentage of positive results (96.1%) was in the HIV patients. The percentage of positive results within the tuberculosis, renal failure and immunosuppressive patients were 92.6%, 83.3% and 86.6% respectively.

Conclusion: The significant detection of C. parvum among the different groups of immunocompromised should raise the awareness of the clinicians towards this parasite as an important cause of diarrhea in such groups of patients.

Key words: chemotherapy, C. parvum, tuberculosis, renal failure.

Cryptosporidium parvum **(***C.parvum)* is reported as an opportunistic parasite that can also cause infection in immunocompetent individuals especially children[1].

Serological studies using ELISA showed that *C.parvum* infection is more common in developing countries (50-60%) than in developed countries (25-30%)[2].

Infection by *C. parvum* is more common in immunocompromised patients[3].

1. Department of Microbiology. Faculty of Medicine. The National Ribat University.
2. Department of parasitology. Faculty of Medical Laboratory Science. The National Ribat University.
3. Department of parasitology. Faculty of Vet. Medicine. Sudan University of Science and Technology.
4. Department of Microbiology. Faculty of Medicine. Juba University.
5. Department of Microbiology. Faculty of Medical Laboratory Science. The National Ribat University. Correspondence: E-mail: hasanaziz 15@yahoo.com

Development of symptoms rather slows after an incubation period of 2-12 days. In immunocmpetent persons infection is usually limited to the small intestine while in severely immunodifficien patients the biliary tract may be involved[4]. It was reported that 24% of the immunocompromised patients with diarrhea in developing areas were suffering from Cryptosporidiosis[5]. Large scale surveillance for *C. parvum* is meager and diarrhea due to *C.parvum* may be misdiagnosed due to other more common organisms [6]. *C. parvum* may cause asymptomatic or symptomatic acute infection of the digestive system in immunocompetent patients but it can cause life threatening infection in immunocompromised patients[7]. In Sudan, data regarding *C.parvum* infections are lacking. Diagnosis of *C.parvum* infection will increase the awareness of the clinician and the community about the disease and hence help

its control especially among the immunocompromised patients. The main objective of this study is to assess the presence of this parasite among different types of patients presenting with diarrhea as well as its presence in controls using parasitological and ELISA techniques.

Material and Methods:

A total number of 213, various age groups and sexes were screened for the presence of *C.parvum* during the period May 2009-February 2010.

The study was carried out at different sites of Khartoum, Omdurman and Khartoum North including specialized hospitals for immunocompromised patients, clinical centers for education and centers for immigrants and refugees. Seventy eight of the total number were immunocompromised patients of different categories (HIV positive: 25, Tuberculosis patients: 27, renal failure: 11 and patients under immunosuppressive chemotherapy: 15). Ninety immunocompetent patients presenting with diarrhea only without any other underlying disease were also screened for the presence of the parasite. Forty five healthy individuals were included as a control group. The specimens collected were faecal samples. Enzyme linked immunosorbant assay, based on the piroplas antigen was used to determine the presence of *C.parvum* oocyst antigen in the faecal specimens (DRG Instruments GmbH, Germany Fraienbergstr. 18, D-35039 Marburg).

Formal-ether was used to concentrate the parasite and then stained with Modified Ziel Neelsen staining technique to visualize the oocyst from ELISA positive specimens (Fig 1)[8]. The results of the three groups were statistically analyzed using the SPSS computer program.

Results:

Seventy one out of the78 immunocompromised patients presenting with diarrhea were found to be infected by *C. parvum* (91.0%). Ten of the 45 healthy controls were found to be positive for *C. parvum* oocyst (22.2%). A significant difference was noticed between the immunocompromised patients and the healthy controls ($P<0.05$). Twenty nine of the 90 immunocompetent patients presenting with diarrhea were positive for *C. parvum* (32.2%).

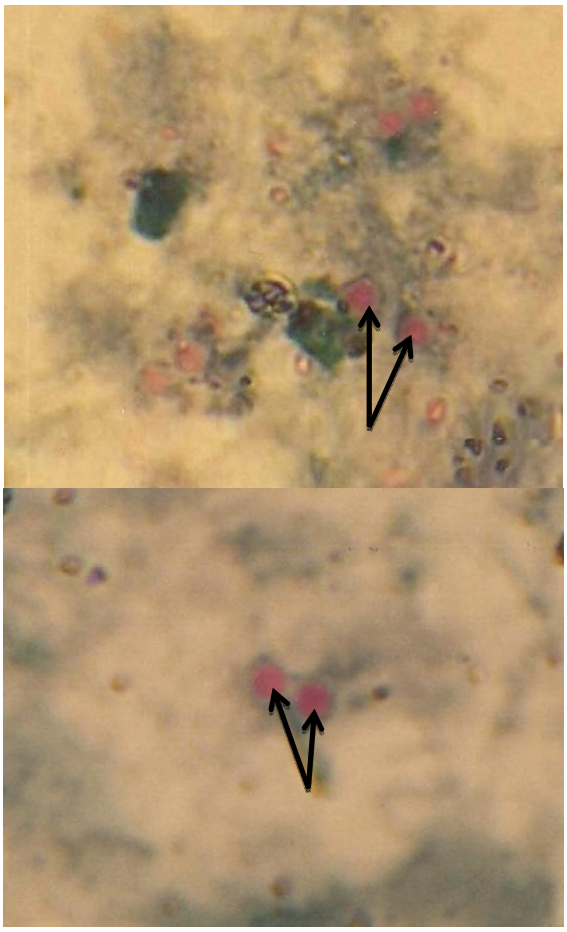

Fig 1: Ziehl Neelsen stained film of *C.parvum* oocysts

No significant difference between the immunocompetent patients and the healthy controls ($P>0.05$).

Twenty four of the HIV patients were positive for *C. parvum* (96.0%). The percentages of the positive *C. parvum* in the groups of tuberculosis, renal failure and immunosupperessed patients were 92.5%, 88.3% and 86.6% respectively (fig 2).

Discussion:

During the past decade *C. parvum* has been recognized worldwide as a human pathogen causing a self-limiting infection in

immunocompetent patients and a debilitating infection in immunocompromised patients[9], [10]. This recognition is related to the use of more sensitive techniques for the detection of the parasite[11], [12], [13].

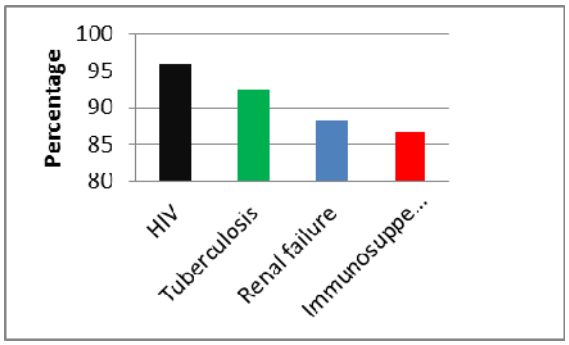

Fig. 2: A histogram showing the prevalence of *Cryptosporidium parvum* in different immunocompromised groups.

In the present study, the prevalence of *C. parvum* in immunocompromised, immunocompetent and control group has been evaluated. It was found that the highest percentage of infection by the parasite in the immunocompromised was in the HIV positive patients (96.0%). Similar results were reported by Taherkhani *et al*[14]. The finding of the parasite in 22.2% of the control group confirms the fact that the parasite can cause asymptomatic infection. On the other hand the highly significant percentage of the parasite in the immunocompromised patients proves its opportunistic character. It has been reported that this parasite was responsible for some of the severe cases of diarrhea in immunosuppressed individuals and can cause life threatening infection in HIV patients[15], [16]. In a study of intestinal parasitism in rural and urban areas of north central Nigeria, it was found that there was increased incidence of patients with prolonged diarrhea due to *C. parvum* infection[17].

Conclusion:

The detection of *C. parvum* in the immunocompromised Sudanese patients presenting with diarrhea in this study should increase the clinical vigilance with regard to the inclusion of this parasite in the routine screening for intestinal parasite especially in such group of patients.

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