CRYPTOSPORIDIUM SPECIE AS A CAUSATIVE AGENT OF DIARRHOEA IN UNIVERSITY OF MAIDUGURI TEACHING HOSPITAL,MAIDUGURI

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ABSTRACT

Background: *Cryptosporidium* specie is an enteric, coccidian parasite that is associated with diarrheal diseases in children and immunocompromised patients; and it is responsible for high mortality particularly in developing countries.

Objectives: To determine the prevalence of *Cryptosporidium* oocyst in diarrheic patients seen at the University of Maiduguri Teaching Hospital.

Result: Two hundred and sixty-five (265) diarrheic faecal specimens were received and examined for *Cryptosporidium* oocyst using the Modified Zeihl-Neelsen staining technique. 60 (22.7%) faecal specimens were positive for the oocyst, frequency of occurrence of the oocyst were high among retroviral and malnourished patients; and featured prominently in the adult age groups compared to the children age group.

Conclusion: Though the prevalence level of 22.7% is low, it however reveals the association of *Cryptosporidium* species with diarrhoea in this environment and the need for its awareness and inclusion in the routine laboratory request; particularly in diarrheic cases of the malnourished and immunocompromised patients.

Keywords: *Cryptosporidium spp*, diarrhoea, Maiduguri.

INTRODUCTION

Cryptosporidium specie was first described in mice in 1907 [1], and recent findings have associated cryptosporidiosis with diarrheal diseases in human, particularly in children and immunocompromised individuals [2-5]. It is an apicomplexan parasite that infects the microvillus border of the gastrointestinal epithelium of humans [5]. *C.parvum* is the most common specie with wide clinical presentations. However, Pathogenicity of infection depends on type of the species, age of the individual and immune status of the host [5].

Pattern of cryptosporidiosis associated with diarrheal disease varies with geographical location [5-8]. In developing countries, infection occurs more in children < 5 years with peak occurrence of infection in children < 2 years [9-11], in contrast to developed countries, infection in adults is due to food or water-borne route [4].

Cryptosporidium parvum infect human via the oocyst in the environment through several transmission routes, major being person-person and zoonotic means by close contact with domestic animals [12, 13]. Cryptosporidiosis in HIV/AIDS patients differs markedly in reported findings with prevalence ranging between 0 – 100% [14-16]. However, the variation in prevalence could be associated with difference in study population, geographical location, and study design, sensitivity of laboratory technique and stage of the disease [14].

In immunocompromised states such as AIDS, incidence and severity of infection increases as the CD_4 lymphocyte cell count fall [14.] The prevalence in malnourished children is up to 50% and sometime co-exists with other enteric parasite [14, 15].

The increase in the frequency of malnourished and immunocompromised cases presented in our hospital, clinical management against possible development of opportunistic infection due to cryptosporidiosis is important. Thus approach depends on adequate knowledge on the epidemiology of cryptosporidiosis in diarrheal diseases in this environment.

The study examined the prevalence of Cryptosporidiosis in diarrheal cases seen in the hospital.

MATERIALS AND METHODS

The study was conducted in the Parasitology laboratory of University of Maiduguri Teaching Hospital (UMTH); between January-December, 2009. Diarrheic stool samples from the General Out Patient Department and the various wards were collected and examined for *Cryptosporidium* oocyst. Clinical conditions associated with diarrheal disease included: retroviral disease/immunosuppression, abdominal discomfort, malnutrition and other clinical conditions; which included leukemia, anaemia and fever. Documented information on the patient included the age, sex, and clinical details. A total of 265 faecal specimens were received and examined during the duration of the study. In processing the faecal smear for examination, three smears were made per patient, allowed to air-dry and stained by modified Zeihl-Neelsen technique. The dry faecal smear was fixed in methanol for 2 minutes then flooded with carbol-fuchsin and

allowed to stain for 15 minutes; washed in water and decolourized with 1% acid-alcohol for 15 seconds and counterstained with malachite green for 30 seconds and washed in water then allowed to dry on a draining rack and examined under the microscope using X100 oil immersion objective[1].

RESULTS

Of the diarrheic faecal specimens received and examined for *Cryptosporidium* oocyst; 140 (52.8%) were males and 125 (47.2%) were females, with mean age of 35.1 $\pm$ 16.23 years. Sixty (22.6%) faecal specimens showed positive *Cryptosporidium* oocyst. The distribution of oocyst in accordance with the clinical details of the patient as shown in Table 1 showed high occurrence of oocyst in faecal specimens of patients with retroviral disease 30 (35.3%) and malnutrition, 10 (40%). Abdominal discomfort and other symptoms contributed 15 (11.1%) and 5 (25%) respectively.

The occurrence of *Cryptosporidium* oocyst in accordance with age group as shown in Table II was predominant among the adult age group compared to children. Positive oocysts were recorded among males (35) than females (25).

Table 1: **Clinical conditions associated with diarrheal cases.**

Clinical conditions		*Cryptosporidium* oocyst	
	Number of faecal specimens Examined	Positive	Negative
Retroviral disease	85 (32.1%)	30	55
Malnutrition	25(9.4%)	10	15
Abdominal discomfort	135 (50.9%)	15	12
Others	20(7.5%)	5	15
Total	**265(100%)**	**60(22.6%)**	**205(77.4%)**

Table II: Distribution of *Cryptosporidium* oocyst in accordance with age group.

Age group	Number Examined	Positive	Negative
0-5 years	15	5	10
6-12	15	-	15
13-18	10	5	5
19-30	45	15	30
31-50	145	25	120
>50	35	10	2 5
TOTAL	**265**	**60**	**205**

DISCUSSION

Cryptosporidiosis has assumed a major public health status, because of its association with diarrheal disease in children and immunocompromised patients, particularly retroviral patients [2, 3,6,8,14,16]. The clinical significance is the probability of opportunistic infection development that is common in malnourished and retroviral disease patients, due to defective immune system. Gastroenteritis is a single major cause of mortality in developing countries among children less than 5 years old, and retroviral disease patients. Factors implicated in the mode of transmission of *Cryptosporidium* like, contaminated water, person-to-person and contact with domestic animals are present in the locality. However, information on cryptosporidiosis in this environment is relatively limited.

The prevalence of cryptosporidiosis in this study was 22.6%. This level is relatively low compared with other studies [6-9, 14-16], which ranged between 30-60% in developed countries attributable to water and food-borne route [17, 18, 19] and up to 95% in tropical and other developing countries [7, 8, 10]. The difference in the prevalence of infection as observed in our study is believed to be dependent on several factors that influenced pathogenicity which are studied population, age, sex, geographical location, stage and severity of disease [5]. Similarly, geographical location influence prevalence in the shedding of *Cryptosporidium* oocyst, which is high in temperate region [20]. Perhaps, the duration of the study and numbers of faecal specimens received and analyzed could be contributory factors to the prevalence level.

In Ghana, Adjei *et al* [21] reported prevalence of 27.8% and 15.6% of cryptosporidiosis in children with and without diarrhoea respectively. In our study, prevalence of cryptosporidiosis in children was 20%; this pattern invariably revealed that other etiologic agents like viral and bacterial could still co-exist in the establishment of diarrhoea. In retroviral disease cases, the prevalence level is dependent on CD_4 cell count, haematocrit level and to a larger extent, degree of weight loss [14].

A higher prevalence among the age groups 13-30 years found in this study may be due to the fact that this is the age group that is mostly infected by Human immunodeficiency Virus and also because of the habits of indiscriminate eating of foods and drinks that are produced unhygienically and hawked on the streets uncovered. The younger ages are being protected by the mothers, while the older ones are more aware of personal hygiene.

In conclusion, the prevalence of 22.6% is relatively low; however, it reveals the association of cryptosporidiosis with diarrheal cases. With easy to perform modified ZN staining technique, request for cryptosporidium examination could be included as routine laboratory test, particularly for malnourished children and retroviral cases presenting with diarrhoea.

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