



A review for Cryptosporidiosis among Immunocompromised Patients in Iraq

Authors

Nadham K. Mahdi, M.Sc., Ph.D.

Department of Microbiology, College of Medicine, University of Basrah, Basrah, Iraq

Corresponding Author

Prof. Nadham K. Mahdi

Central Post Office-42001, P. O. Box 1565, Ashar, Basrah, Iraq

Email: nadhammahdi@yahoo.com

Abstract

The prevalence of intestinal cryptosporidiosis among immunocompromised Iraqi patients including malignancy, receiving corticosteroid drugs, sicklers or protein-malnutrition is reviewed. The prevalence is also reviewed in relation to age and sex. Cryptosporidiosis is quite common in Iraq and it is considered as a public health problem among immunocompromised individuals. The combination between formalin-ether sedimentation plus modified cold Ziehl-Neelsen stain methods has been regarded with high sensitivity and specificity. The highest isolation rate for Cryptosporidium oocysts was observed during rainy winter season.

Keywords: *Cryptosporidiosis, Immunocompromised patients, Iraq, Sickle-cell anemia, Protein malnutrition.*

Introduction

Cryptosporidiosis is an emerging zoonotic disease which leads to intestinal and extra-intestinal diseases in both humans and animals. The major factor controlling the susceptibility to and severity of cryptosporidiosis appears to be the immune status of the host⁽¹⁾. Those with great risk of infection including the immunocompromised patients^(2,3). They are including AIDS patients and those with various malignant, cytotoxic drugs receivers, prolonged corticosteroid therapy, the drugs used to prevent organ transplant rejection⁽⁴⁾, those with chronic diseases and persons who have congenital immunodeficiencies^(4,5).

Cryptosporidiosis in those patients is characterized by debilitating, chronic, often cholera-like diarrhea associated with severe

abdominal colic⁽⁶⁾, loss of more than 10% of body weight and dehydration⁽⁶⁾. Since *Cryptosporidium* is an opportunistic parasite, this review to determine the rate of cryptosporidiosis among immunocompromised patients including malignancy, receiving corticosteroid drugs, sicklers or protein-malnourished in Iraq.

Results

The prevalence of intestinal cryptosporidiosis is reviewed according to the types of immunosuppression.

Oocysts were found to be excreted is 5 out of 50 patients (10%) with different malignant diseases during 1998 in Basrah, Iraq⁽⁷⁾ (Table 1). Most patients with cryptosporidiosis complain from abdominal cramping (90%), water diarrhea (60%)

and weight loss (70%). The associated symptoms were fever (40%) and vomiting (30%). The highest rate of infection was found (20%) among children of <6 years of age. The male-female ratio was 2:3.

Cryptosporidium oocysts were found to be excreted by 10 (9%) patients and 1 (0.93%) of the control group (8) (Table 1). The highest rate of infection was noticed among patients with Hodgkin lymphoma (36.36%). However, other rates of infection were ranged from 6.25% among patients with acute lymphocytic leukemia to 20% among patients with neuroblastoma⁽⁸⁾.

In Baghdad, Al-Warid *et al.*,⁽⁹⁾ have discovered that the prevalence of cryptosporidiosis was 76.66% among patients with lymphohematopoietic malignant diseases in comparison to 15.06% among healthy control group (Table 1). The highest rate was detected among patients with

chronic lymphocytic leukemia (100%) and multiple myeloma (100%).

The only work which has been done in Basrah, Iraq and other Mediterranean region has recorded that 5% were found to be excreting *Cryptosporidium* oocysts among sickler patients⁽¹⁰⁾ (Table 1).

In a case-control study, which involved 194 malnourished children below 5 years of age was done during 2001⁽¹¹⁾. About 84% have marasmus, 8.24% marasmun-kwashiorkor, 6.18% kwashiorkor and 1.55% underweight. Cryptosporidiosis was found in 6.85% of children below 5 years with increased frequency among malnourished children with diarrhoea 14.89% compared to 11% in malnourished children without diarrhoea. Only 2% were noticed among well-nourished children with diarrhoea while no case has been recorded in well-nourished children without diarrhoea (Table 1).

Table 1 Prevalence of cryptosporidiosis among patients receiving corticosteroids or with malignant diseases or sickle disease or protein malnutrition

Reference	No. Examined	Characteristic for population	Prevalence (%)
I) <u>Groups of people receiving corticosteroids</u>			
Ali & Mahdi, (7).	5	Males & females from Basrah receiving corticosteroids. Age Ages ranged 5.5-54 years. <u>Mixed</u>	100
<u>Infection was mainly found with <i>Blastocystishominis</i>.</u>			
Ali, (18).	60	Males & females from Basrah receiving corticosteroids. Ages ranged <6-65 years.	10
<u>Patients complain was abdominal cramp, watery diarrhea and weight Loss.</u>			
II) <u>Groups of people with malignancy</u>			
Ali & Mahdi, (7).	5	Males & females from Basrah with malignant disease. Ages ranged 16.5-55 years.	100
Ali, (18).	50	Males & females from Southern Iraq with malignant disease. Ages ranged <6-65 years.	8
Al-Mkhtar & Al-Sherefat, (19).	107	Patients from Mosul (Northern Iraq) with malignant disease during 2002-2003.	18.37
Mahdi <i>et al.</i> , (8).	101	Males & females children with malignant disease. Ages ranged <4-16 years, In Southern Iraq. <u>Male to female ratio is 1.5:1.0. The</u>	9.9

highest rate of infection (36.3%) was observed in cases of Hodgkin lymphoma.

Al-Waridet <i>et al.</i> , (9).	30	Males & females from Baghdad (Mid Iraq) with malignant disease. Mean age 42.2 years. The	76.7
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highest rates (100%) of infection were observed in chronic lymphoblastic leukemia and multiple myeloma.

Abdul-Husein, (25)	106	Males & females from Basrah, Southern Iraq with malignant diseases. Ages 2 months – 14 years.	
1. Before chemotherapy: Acid-fast stain		8.2 ELIZA	12.3
2. During chemotherapy: Acid-fast stain		14.2 ELIZA	31.1

III) Group of sicklers

Ali, 1998 (18).	40	Males & females from Basrah with sickle disease. Ages ranged <6-46 years.	5
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IV Group of malnourished children

Mahdi <i>et al.</i> , (11).	194	Malnourished children <5 years Old in Southern Iraq without diarrhea or with diarrhea.	25.89 11 14.89
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Discussion

The infection rate for cryptosporidiosis differ from one country to another and even from one area to another according to the sample size, diagnostic methods, availability of facilities and expertise. The source of infection was unknown⁽⁷⁾. None had direct contact with farm animals, nor contact with domestic pets. A zoonotic origin is possible with transmission via food, milk or water because their rural type of resident. Nosocomial mode of transmission may act as a possible additional route in the studied patients.

It has been indicated that phagocytic activity, level of IgM, IgA, IgG and CD3, CD4 cells numbers were lower in patients than in control group while higher in case of C3, C4, CD8 and CD19 (8). The immunodeficiency can be caused by either the disease itself or the cytotoxic drugs or both of them.

The variation in the prevalence could be explained by the interaction with malnutrition⁽¹²⁾, chemotherapy⁽¹³⁾, other infections and animal contacts⁽¹⁴⁾. That would give a good indication for the relation of cryptosporidiosis and immunological status of the individuals just like opportunistic parasites. Sickle cells anemia comprises a group of genetic diseases resulting from homozygosity of hemoglobin S (HbS), double heterozygosity of HbS and other abnormal hemoglobins and the presence of HbS in association with various types of thalassaemias⁽¹⁵⁾. It is relatively common in Iraq specially in the southern part. So, cryptosporidiosis among sicklers can be considered as the main cause of morbidity and mortality among those patients. The mechanisms contributing in the increased vulnerability to infection are splenic dysfunction, decreased IgM levels and defective alternative complement pathway⁽¹⁶⁾. Some sickle cells cause blockage of

the vessels supplying blood to an organ, leading to hypoxia of the organ and resultant cell death and progressive scarring. Also inadequate levels of C_{3b} lead to deficient opsonic activity and inefficient phagocytosis⁽¹⁷⁾.

Mahdi *et al.*,⁽¹¹⁾ have indicated that depressed cellular immunity characterised by decrease in total lymphocytes (particularly T-lymphocytes) was found among malnourished children either with or without diarrhoea. While humoral immunity (IgG, IgM, IgA) was significantly elevated among malnourished children with or without diarrhoea in comparison to well-nourished children. C₃ and C₄ were increased in malnourished children without diarrhoea with significant difference in C₄ only. While they were decreased in malnourished children with diarrhoea, with significant difference in C₃. In addition, Phagocytic activity showed a significant decrease in malnourished children with or without diarrhoea compared to well-nourished children⁽¹¹⁾.

Stool examination

Even different methods were used but the combination between formalin-ether sedimentation plus modified cold Ziehl-Neelsen stain methods used by Ali & Mahdi⁽⁷⁾ study have been regarded with high sensitivity and specificity due to oocyst concentration and differentiation them from other artifacts. In addition, this combination is cheap, rapid and easy to perform. That may give a strong suggestion to use this combination protocol as a routine diagnostic tool for patients with watery diarrheal symptom⁽¹⁸⁾. The prevalence would be higher if more than one stool sample from participants were examined due to intermittent shedding nature of the oocysts⁽⁶⁾. While Al-Mukhtar & Al-Sherefat⁽¹⁹⁾ study reported that modified direct iodine stain method is the best technique for diagnosis of *Cryptosporidium* oocyst.

Seasonal Variation

The only report available is by Ali (18) in which he stated that the highest isolation rate for *Cryptosporidium* oocysts was observed during

winter season, 1998 (24.44%) similar to the seasonal pattern in Central America, India and Kuwait^(20,21). In contrast, data from Massachusetts⁽²²⁾, Australia⁽²³⁾ and Guatemala⁽²⁴⁾ have noticed that the infection occurs in summer higher than in winter.

Conclusions

Cryptosporidiosis should be considered in differential diagnosis of undiagnosed chronic diarrhea in order to reach at the proper treatment. Management of complications, including infections, will reduce the suffering often faced by those patients and consequently improving the quality of life for them.

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