

## Microsporidiosis among children with malignant diseases in Basrah, Iraq

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### ABSTRACT

**Objective:** To estimate the prevalence of microsporidiosis among children with malignant diseases.

**Methodology:** Stool samples were collected from 58 children (37 males and 21 females) with malignant diseases and 107 apparently healthy children (55 males and 52 females). Direct smear method was done for all stool samples to detect the intestinal parasites. Fecal smears were prepared and stained by Trichrome stain method for the recovery of *Microsporidium* spores.

**Results:** The results showed that acute lymphocytic leukemia (ALL) was the most prevalent (55.2%) malignant disease among the studied patients. The highest rate of *Microsporidium* infection among the 12 types of malignant diseases was found in patients with Hodgkin and non-hodgkin lymphoma (83.3%). Prevalence of various species of intestinal parasites (including *Microsporidium*) was 48.3%. The highest rate of parasitic infections was observed in patients with ALL (34.4%). No *Microsporidium* spores were observed in stool samples of the control group. The clinical symptoms among patients included weight loss (77.6%), fever (29.3%) and diarrhea (27.6%).

**Conclusion:** *Microsporidium* and other intestinal parasites should be considered among the patients with malignant diseases in order to minimize their symptoms.

**KEY WORDS:** Malignant diseases, Microsporidiosis among children, Parasitic infections, Malignancies.

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### INTRODUCTION

Microsporidiosis is an emerging disease in immunocompetent hosts as well as immunocompromised patients.<sup>1,2</sup> *Microsporidium*

species are protozoan parasites which cause sporadic cases characterized by symptoms such as diarrhea, cornea ulcer and myositis that are generally self limiting among immunocompetent individuals.<sup>3</sup> Microsporidiosis has been reported in 2-70% of HIV infected patients with chronic diarrhea.<sup>4-6</sup> The disease may spread from the gut to the upper respiratory tract and kidneys.<sup>7</sup>

Even the epidemiology of *Microsporidium* has been reported in Argentina, Australia, Brazil, Canada, Czech Republic, France, Germany, China, Italy, Japan, New Zealand, Spain, Sri Lanka, Switzerland, Thailand, Uganda, USA, Zambia, Sweden, Botswana and Holland at various rates of infections among different groups of people<sup>8</sup>, but no previous studies have been found in the literature regarding the prevalence of this opportunistic parasite in Iraq. Therefore, the aim of this study was to estimate

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the prevalence of microsporidiosis among children with malignant diseases.

## METHODOLOGY

**Subjects:** Forty eight patients with recently diagnosed malignancies according to a comprehensive diagnostic work up from typing of leukemia and staging for other malignancies who were admitted to Maternal and Child Hospital, Basrah, Iraq were included in this study. Their ages ranged from 8 months to 15 years with a mean age of  $6.4 \pm 3.1$  years. There were 37 males and 21 females. One hundred and seven apparently healthy children were involved in the study to serve as a control group. Their ages ranged from 9 months to 15 years with a mean of  $7.1 \pm 3.3$  years. There were 55 males and 52 females. This study was approved by the ethical committee of the College of Medicine, University of Basrah, Iraq.

**Stool examination:** Direct smear method was carried out for the stool samples which were collected from all patients and control group to identify the diagnostic stages of the parasites other than *Microsporidium*.<sup>9</sup> Fecal smears were prepared and stained by Trichrome stain modified method for detection of *Microsporidium*.<sup>2,10</sup>

**Statistical Analysis:** Chi-squared ( $X^2$ ) test was used. Differences were recorded as significant whenever the probability (P) was less than 0.05.

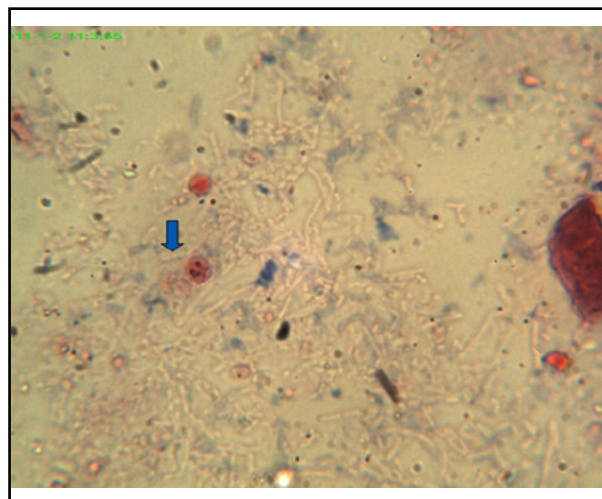


Fig.1: Microsporidium spores in a fecal sample. (X100).

## RESULTS

The spores stained pink with distinct clear vacuole. The characteristic feature of microsporidial spores is presence of stained portions as dark bands (Fig.1). The results showed that acute lymphocytic leukemia (ALL) was the most prevalent (55.2%) malignant disease among the patients of age group between 4-8 years (Table-I). The highest rate of *Microsporidium* infection among the 12 types of malignant diseases was found in patients with Hodgkin and non-hodgkin lymphoma (83.3%) (Table II). However, the frequency of *Microsporidium*

Table-I: Types of malignant diseases among examined children in relation to age and sex.

Type of malignant cases	Age				Sex		Total	
	< 4	4-8	9-13	14-16	Male	Female	No.	%
Leukemia								
1. ALL	11	15	5	1	19	13	32	55.2
2. AML		1	0	1	1	1	2	3.5
Lymphoma								
1. HL	-	2	-	-	2	-	2	3.4
2. NHL	-	3	1	-	3	1	4	6.9
Neuroblastoma	2	3	-	-	3	2	5	8.6
Retinoblastoma	-	-	1	-	1	-	1	1.7
Rhabdomyosarcoma	-	-	-	1	1	-	1	1.7
Ewing's sarcoma	-	1	1	-	2	-	2	3.4
Wilm's tumor	-	1	-	-	1	-	1	1.7
Histiocytosis	-	1	-	-	1	-	1	1.7
Hepatoblastoma	1	-	-	-	-	1	1	1.7
Lymphoblastic lymphoma	-	4	1	-	3	2	5	8.6
Total	15	30	10	3	37	21	58	100

ALL = Acute lymphocytic leukemia; AML = Acute myelocytic leukemia;  
HL = Hodgkin lymphoma; NHL = Non-Hodgkin lymphoma.

Table-II: Parasitic and Microsporidium infections among different types of malignant diseases in the examined children.

Malignant Disease	No. examined	Parasitic infections No. (%)	Microsporidium infection No. (%)
Leukemia			
1. ALL	32	11 (34.4)	1 (3.1)
2. AML	3	2 (66.7)	0
Lymphoma			
1. HL	2	2 (100)	2 (100)
2. NHL	4	4 (100)	3 (75.0)
Neuroblastoma	5	3 (60.0)	0
Retinoblastoma	1	1(100)	0
Rhabdomyosarcoma	1	0	0
Ewing's sarcoma	2	2 (100)	0
Wilm's tumor	1	1(100)	0
Histiocytosis	1	0	0
Hepatoblastoma	1	1 (100)	0
Lymphoblastic lymphoma	5	2(40.0)	0
Total	58	28 (49.5)*	6 (10.3)**
Control group	107	13 (12.15) *	0**

\*  $\chi^2 = 63.000$ ;  $P < 0.01$ . \*\*  $\chi^2 = 8.34$ ;  $P < 0.01$ .

infection was (3.1%) among ALL patients. The overall positivity of microsporidiosis in malignant patients was 6(10.3%) (Table-II).

Prevalence of various species of intestinal parasites (including *Microsporidium*) was 48.3%. The highest rate of parasitic infections was observed in patients with ALL (34.4%) (Table- II). Males in both patients and control groups have higher parasitic infections than females (Table-III). No *Microsporidium* spores have been observed in stools of the control group. The clinical symptoms among studied patients included weight loss (77.6%), fever (29.3%) and diarrhea (27.6%) (Table-IV).

## DISCUSSION

Leukemia was the most common type of malignancy reported in this study. Males were more affected than females with no clear reason. Similar observations were recorded in different studies.<sup>11,12</sup>

*Microsporidium* was found in 10.3% in various types of malignancies. Most of these cases were reported in Hodgkin and non-hodgkin lymphoma rather than other types of malignancy. These results indicate that the patients with immune defects either by the disease itself or by cytotoxic drugs or both are at the risk of microsporidiosis.<sup>13</sup> Accordingly, the prevalence of the parasites reported by several

Table-III: Distribution of parasitic infections among 58 patients according to sex.

Parasites	Patients		Control	
	Male	Female	Male	Female
Single infection:	15	7	5	3
Giardia lamblia.	3	5	3	1
Blastocystis hominis.	3	1	2	2
Entamoeba histolytica.	5	1	-	-
Microsporidium	4	-	-	-
Mixed infection:	3	3	-	-
Microsporidium & B.hominis.	-	1	-	-
Microsporidium & G.lamblia	1	-	-	-
G.lamblia & B.hominis..	2	2	-	-
Total (%)	18 (31.0)	20 (34.5)	5 (4.7)	3 (2.8)

Table-IV: Clinical symptoms among studied children.

Symptoms	No. (%)
Weight loss	45 (77.6)
Fever	17 (29.3)
Diarrhoea	16 (27.6)
Abdominal pain	10 (17.2)
Vomiting	9 (15.5)
No symptoms	0

researchers among HIV-patients was at a range of 6.5% - 42% in different parts of the world.<sup>14-17</sup> In general, the variation in the prevalence of parasitic infections including *Microsporidium* infection can be related to the characteristics of the regions worked on, the subject chosen, nutritional status, other infection and method used.

The results showed that weight loss, fever and diarrhea were important clinical symptoms among studied patients. A clear association between the presence of *Microsporidium* and diarrhea was established by many workers among HIV-infected patients.<sup>6,17-19</sup>

In conclusion, *Microsporidium* and other intestinal parasites should be considered among children with malignant diseases in order to minimize their suffering.

## REFERENCES

1. Raynaud L, Delbac F, Broussolle V, Rabodonirina M, Veronique G, Wallon M, et al. Identification of *Encephalitozoon intestinalis* in travelers with chronic diarrhea by specific PCR amplification. J Clin Microbiol 1998;36:37-40.

2. Deloul AM. Color Atlas of Parasitology. Vol 2. Format Utile, France, 1999: 34-63.
3. Karaman U, Daldal N, Atambay M, Colak C. The epidemiology of microsporidias in humans (Malatya sample). *Turkish J Med Sci* 2009;39(2):281-288.
4. Brasil P, de Lima DB, de Paiva DD, Lobo MS, Sodre FC, Silva SP, et al. Microsporidiosis in HIV-infected patients with chronic diarrhea in Rio De Janeiro, Brazil. *Rev Inst Med Top S Paulo* 2000;42:299-304.
5. Tumwine JK, Kekitinwa A, Nabukeera N, Akiyoshi DE, Buckholt MA, Tzipori S. Enterocytozoon bienewsi among children with diarrhea attending Mulago Hospital in Uganda. *Am J Med Hyg* 2002;67:299-303.
6. Centers of Diseases Control and prevention. Guidelines for prevention and treatment of opportunistic infections in HIV-infected adults and adolescents. *MMWR* 2009;58(10):3-59.
7. Sancak B, Akyon Y. Microsporidia: General characteristics, infection and laboratory diagnosis. *Micrbiol Bult* 2005;39:513-522.
8. Weber R, Bryan RT, Schwartz DA, Owen RL. Human microsporidial infections. *Clin Microbiol Rev* 1994;7:426-431.
9. John DT, Petri WA. Markell and Voge's Medical Parasitology. 9<sup>th</sup> Ed. Saunders, Elsevier, St. Louis, Missouri, 2006: 393-415.
10. Weber R, Bryan RT, Owen RL, Wilcox CM, Govelkin L, Visvesvara GS. Improved light microscopical detection of microsporidia spores in stools and duodenal aspirates. *New Eng J Med* 1992;326:161-166.
11. Lee GR, Foerster J, Lukens J, Paraskevas F, Greer JP, Rodgers GM. Wintrobe's Clinical Haematology. 10<sup>th</sup> Ed. Philadelphia: Lippincott Williams & Wilkins, 1998: 2241-2271.
12. Kliegman RM, Behrman RE, Jenson HB, Stanton BF. Nelson's Textbook of Pediatrics. 18<sup>th</sup> Ed. Philadelphia, London: WB Saunders Co, 2007: 594-599.
13. Rubin P, Williams JP. Clinical Oncology. 8<sup>th</sup> Ed. Philadelphia, London: WB Saunders Co, 2001: 32-46.
14. Bretagne S, Foulet F, Alkassoum W, Fleury-Feith J, Develoux M. Prevalence of Enterocytozoon bienewsi spores in the stool of AIDS patients and African children not infected by HIV. *Bull Soci Pathol Exot* 1993;86:351-357.
15. Field AS, Hing MC, Milliken ST, Marriott DJ. Microsporidia in the small intestine of HIV-infected patients. A new diagnostic technique and a new species. *Med J Australia* 1993;15:390-394.
16. Kumar SS, Ananthan S, Joyee AG. Detection of Enterocytozoon bienewsi (microsporidia) by polymerase chain reaction (PCR) using species-specific primer in stool samples of HIV patients. *Indian J Med Res* 2005;121:215-219.
17. Garcia LS, Shimizu RY, Bruckner DA. Detection of microsporidial spores in fecal specimens from patients diagnosed with cryptosporidiosis. *J Clin Microbiol* 1994;32:1739-1741.
18. Muller A, Bialek R, Kamper A, Fatkenheuer G, Salzberger B, Franzen C. Detection of microsporidia in travelers with diarrhea. *J Clin Microbiol* 2001;39:1630-1632.
19. Contreas CN, Berlin OG, Ash LR, Pruthi JS. Therapy for human gastrointestinal microsporidiosis. *Am J Trop Med Hyg* 2000;63(3-4):121-127.