

RESEARCH ARTICLE

## Intestinal parasitic infections in leukemic patients with diarrhea

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### ABSTRACT

**Objectives:** Leukemic patients are at increased risk of severe infections with parasites. Moreover, intestinal parasites can lead to severe diarrhea in patients with immunosuppression. The purpose of this study is to decide intestinal parasitic infections and clinical aspects in leukemic patients.

**Methods:** Analysis was done of all leukemic patients hospitalized between January 2007 and October 2015 retrospectively.

**Results:** Ninety-one patients were evaluated. Intestinal parasites were diagnosed in nine (9.9%) patient. Cryptosporidium was the most frequently identified parasite, recovered from six specimens (6.6%), while Blastocystis (n=3) and Entamoeba (n=1) accounted for 3.3% and 1.1%, respectively. Cryptosporidium spp. and E. histolytica were detected together in one patient. Duration of diarrhea in patients with and without parasite were 16.1±9.3 and 7.9±2.9days, respectively (P=0.037). Abdominal cramps in patients with and without parasite were present in seven (77.8%) and 20 (24.4%) patients, respectively (P=0.002). In contrast, vomiting in patient with and without parasite were present in five (55.6%) and 81 (98.8%) patients, respectively (P<0.0005).

**Conclusion:** Parasitic infections should be considered for differential diagnosis in leukemic patients with diarrhea. *J Microbiol Infect Dis 2017; 7(2): 63-66*

**Keywords:** Intestinal Diseases, Leukemia, Parasitic, Diarrhea

### INTRODUCTION

Immunosuppression caused by malignancy, transplantation, human immunodeficiency virus / acquired immunodeficiency syndrome (HIV/AIDS) and use of corticosteroid is known to increase the patient's risk of opportunistic infections [1-3]. Severe clinical syndromes caused by bacteria, viruses, fungal and opportunistic parasites can be seen in these groups [4]. Chemotherapy is one of the major cause of immunosuppression associated with neutropenia. There is a direct correlation between the intensity of chemotherapy and incidence of infection. The reduction in the number of T cell leads the increased risk for opportunistic infections and severe pathogenicity [1, 3, 5]. Diarrhea due to bacterial, viral, parasitic infections and even side effects of chemotherapy, is the most frequently symptom

in patient with suppressed immune system [4, 6]. Diarrhea might be linked to chemotherapy or radiotherapy [4]. However, types of leukemia are heavy progressive disease in adult patients. Parasitic causes of diarrhea may be overlooked in adult patients with leukemia. In this study, it was aimed to investigate the diarrhea caused by intestinal parasites in patients with leukemia.

### METHODS

Leukemic patients who had diarrhea and followed by Department of Adult Hematology of our setting between January 2007 and October 2015 were included in this study. Age, gender, Number of stools per day, cramps, fever, nausea, vomiting, tenesmus, fecal leukocytes, the presence of blood and mucus in the stool, systemic fever, neutropenia and assets of deep neutropenia were recorded retrospectively.

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Stool samples were delivered to Parasitology laboratory to examine for intestinal parasites. Macroscopic examination of stool specimens for mucus and existence of blood were followed by microscopic screening in fresh and stained preparations with iodine and trichrome. Modified formalin-ethyl acetate sedimentation method has been also applied to all samples and stained with Modified Kinyoun, acid fast Trichrome and Modified Trichrome afterwards [7,8]. Stained smears were examined for leukocytes, erythrocytes, trophozoites, cysts, oocysts and eggs at x20, x40, x100 magnification [8, 9].

### Statistical Analysis

The average standard deviation was used for qualitative data, and the number with percentage was used for categorical data. Kolmogorov-Smirnov was used for parametric and nonparametric separation of continuous data. The differences of average and standard deviation between groups were investigated by Student's t and Mann-Whitney test. Cross tables with Pearson chi-square or Fisher exact test was applied for the discussion of categorical data. In all tests, "P value<0.05" was selected for significance.

### RESULTS

Ninety-one patients of leukemia have been included to this study who suffered from

gastrointestinal symptoms and applied to department of adult hematology between January 2007 and October 2015. Thirty-five (38.5%) of the patients were female and the mean age was 45.5±15.5 years (range, 18–77 years). The mean duration of diarrhea was recorded as 13 ± 8.1 days (range, 5–30 days) and mean number of the stools per day was 6.9 ± 3.4 (range, 4–15). The mean neutrophil rate was 2.9 ± 9.7 × 10<sup>3</sup>/mm<sup>3</sup>. Parasitic agent was detected in nine (9.57%) of 91 patients. The most common detected parasite was *Cryptosporidium spp.* (6.4%, n=6), meanwhile *Blastocystis spp.* (3.2%, n=3) and *Entamoeba histolytica* trophozoites (1.1%, n=1) were also diagnosed among fecal specimens. *Cryptosporidium spp.* and *E. histolytica* were detected together in the same specimen.

The comparison of patients with parasitic infection and without parasite in terms of gender, age, number of stool frequency and duration of diarrhea is illustrated in Table 1.

There was no significant difference between parasitic diarrhea and type of leukemia, bone marrow transplant. Being on transplantation had no relation between parasitic etiology and there was no significant difference among the types of leukemia on parasitic etiology (both p values >0.05). (Table 2)

Table 1. Comparison of gender, age, number of daily defecation and duration of diarrhea in patients.

Variables	Non parasitic (82)	Parasitic(9)	P value
Female/male	33 / 49	2 / 7	0.474
Age (year)	45.4 ± 15.6	50.9 ± 15.5	0.272
Number of daily defecation	5.8 ± 3.3	8.2 ± 3.1	0.109
Duration of diarrhea (day)	7.9 ± 2.9	16.1 ± 9.3	<b>0.037</b>

Values are expressed as mean ± SD or number of patients

Table 2. Type and features of leukemia.

Leukemia characteristics	N (%)	Non parasitic (82)	Parasitic (9)	P value
Myelocytic leukemia	61 (67.0)	57 (69.5)	4 (44.4)	0.150
Lymphocytic leukemia	30 (33.0)	25 (30.5)	5 (55.6)	
Acute leukemia	75 (82.4)	68 (82.9)	7 (77.8)	0.656
Chronic leukemia	16 (17.6)	14 (17.1)	2 (22.2)	
Myeloid-acute	55 (60.4)	51 (62.2)	4 (44.4)	0.474
Myeloid-chronic	6 (6.6)	6 (7.3)	0 (0.0)	1.0
Lymphoid-acute	20 (22.0)	17 (20.7)	3 (33.3)	0.406
Lymphoid-chronic	10 (11.0)	8 (9.8)	2 (22.2)	0.257
Bone marrow transplantation	43 (47.3)	40 (48.8)	3 (33.3)	0.491*

Values are expressed as number of patients

Table 3. Comparison of blood and leukocyte in stool samples, neutropenia and bone marrow transplantation.

Variables	Non parasitic (82)	Parasitic (9)	P value
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Erythrocyte in stool	17 (20)	0 (0)	0.02
Leukocyte in stool			
No	16 (18.8)	7 (77.8)	0.001
Yes	69 (81.2)	2 (22.2)	
Neutropenia	48 (56.5)	5 (55.6)	1.0
Deep neutropenia	27 (32.9)	4 (44.4)	0.484
Bone marrow transplantation	40 (48.8)	3 (33.3)	0.491

Values are expressed as number of patients

The comparison of patients with detected parasite and without parasite in terms of presence of blood and leukocyte in stool, presence of neutropenia and being bone marrow transplantation was illustrated in Table 3. Systemic fever in patients with and without parasite were present in five (55.6%) and 77(93.9%) patients, respectively (P=0.005).

Abdominal cramps were detected in seven (77.8%), vomiting in five (55.6%) patients with parasite nevertheless abdominal cramps were detected in 20 (24.4%) and vomiting in 81(98.8%) patients without parasite (P values of cramp and vomiting were 0.002 and <0.0005, respectively). Bloody stools was not observed in patients with parasite but observed in 17 patients without parasite (P=0.02).

## DISCUSSION

Intestinal parasites were detected in approximately ten percent of leukemia patients with diarrhea in this study. *Cryptosporidium* spp. and *Blastocystis* spp. were most frequently isolated intestinal parasites among our cases. The rate of fecal leukocyte was significantly higher in patients with non-parasitic diarrhea. In contrast, diarrhea duration was significantly longer in patients with parasitic diarrhea.

Turkey provides a wide range, suitable areas in terms of the climate and geographical conditions likewise socio-economic conditions for parasitic infection [10]. In a study for investigating the regional prevalence in our country, the rate of intestinal parasites has been found as 10-34% in the Marmara region, 54-94% in the Black Sea region, 12-40% in the Aegean region, 55-80% in the Mediterranean region, 50-75% in Central Anatolia, 60-94% in the East and 64-96% in the South-eastern Anatolia [11].

In the recent years, systemic parasitic infections have been mostly observed the result of the increasing number of immune system disease

that is affected such as AIDS, and immunosuppressive therapy in the developed countries. The importance of parasitic infections has been increased that create serious clinical conditions in immunocompromised patients [12-15].

In the studies, it has been reported that the ratio of the parasites detection in immunocompromised patients with diarrhea were 40-70%. In Brazil, a research carried out on 200 patients with AIDS demonstrated a parasite ratio of 47% [16]. The studies of Martin et al. have established the percentage of 69.5% parasite in 14 children with hematological malignancies that aged between 1-15 years [17]. In a study, parasites were encountered in stool samples in patients with hematologic malignancy and HIV 32.4% and 9% respectively. *E. histolytica* had been detected most frequently (9.91%) as a pathogenic parasite. *Cryptosporidium* spp (3.6%), *S. stercoralis* (3.6%), *Microsporidia* spp (1.8%). had been reported as opportunistic parasites[18]

In the study that is researched in Turkey, *Cryptosporidium* spp. was reported as 17% of patients with diarrhea who received a chemotherapy treatment. In Izmir, 50 children with hematopoietic system malignancies and 92 healthy children were examined in terms of intestinal parasites. Parasitic infections have been observed more frequently in patients with malignancy [19]. The *Cryptosporidium* spp. is the most common parasitic factor that causes self-limiting diarrhea with duration of 10-15 days in immunocompetent patients. It also accounts for losing 15-liter fluid in immunosuppressed people and 5-liter fluid loss in a 14-month-old child [6]. In this study, the stool samples of 91 leukemia patients that have diarrhea were precisely examined and our results have been found compatible with many other studies.

This study has some limitations. *Clostridium difficile* or other bacterial and viral infections were not examined for. It could be possible that these agents co-existed as causes of diarrhea.

The studies have been shown that opportunistic parasitic infections are the most common cause of the secondary infection in patients with suppressed immune system. Therefore, opportunistic parasitic infections should be considered for differential diagnosis in immune suppressed patients and investigations should be made accordingly.

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