ENTEROPATHOGENS ISOLATED FROM STOOL SAMPLES OF ONCOLOGY PATIENTS WITH OR WITHOUT DIARRHEA

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ABSTRACT

• ***Objective:*** *The aim of this study was to evaluate the enteric pathogens from patients hospitalized in Gaziantep University Oncology Hospital between May and December 2007. For this purpose stool samples were collected from 115 patients (aged between 2-81 years) with or without diarrhea. As the control group, stool samples from 104 patients from the same age range who were hospitalized in various clinics without oncologic background were analyzed.*

• ***Material and Method:*** *Native preparations of all stool samples before and after formol-ethyl-acetate concentration were evaluated. All stool samples were stained with iodine, trichrome, and modified Erlich-Ziehl-Nielsen method. For bacterial or fungal evaluation, stool samples were cultured onto selective media, and for detecting the presence of rotavirus rapid antigen test was performed.*

• ***Results:*** *Diarrhea was seen in 53 (46.1%) of oncology patients. It was found that 42 (79.2%) of these patients were infected by more than one infectious agent. Candida species (69.0%) were the most commonly isolated microorganisms both in cases with and without diarrhea. In the control group, out of 104 patients 46 (44.2%) had diarrhea. In this group, 19 patients had various enteric pathogens in their stool samples, being E. histolytica/dispar the most commonly isolated parasite. In cases without diarrhea, Entamoeba coli more frequent.*

• ***Conclusion:*** *Existence rate of Candida spp. in adult and pediatric patient groups was found to be higher than that of the control group. Pediatric patient group was found be more sensitive to G. lamblia infections.*

• ***Key Words:*** *Oncology patients, diarrhea, enteropathogens.*

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ÖZET

İSHAL ŞİKAYETİ OLAN VE OLMAYAN ONKOLOJİ HASTALARININ GAİTA ÖRNEKLERİNDEN İZOLE EDİLEN ENTEROPATOJENLER

• **Amaç:** Bu çalışmada, Mayıs-Aralık 2007 tarihleri arasında Gaziantep Üniversitesi Onkoloji Hastanesi'nde yatmakta olan hastalarda saptanan enterik patojenlerin değerlendirilmesi amaçlanmıştır. Bu amaçla 2-81 yaşları arasında bulunan, ishali olan ve olmayan 115 hastanın dışkı örnekleri toplanmıştır. Kontrol grubu olarak, aynı yaş grubunda farklı kliniklerde yatmakta olan, onkolojik tanısı olmayan 104 hastanın dışkı örnekleri incelenmiştir.

• **Materyal ve Metod:** Bütün dışkı örneklerinin formoletil asetat konsantrasyon işlemi öncesi ve sonrası nativ preparasyonları değerlendirilmiştir. Yine bütün dışkıların iyot, trikrom ve modifiye Erlich Ziehl Nielsen boyalı preparasyonları yapılmıştır. Bakteriyel ve fungal açıdan değerlendirmek için, dışkı örneklerinin selektif besiyerlerinde kültürleri yapılmış ve Rotavirüs varlığı da hızlı antijen tanı testi ile saptanmıştır.

• **Bulgular:** Onkoloji hastalarının 53'ünde (%46,1) ishal saptanmıştır. Bu hastaların 42'sinin (%79,2) bir veya birden fazla etkenle infekte oldukları tespit edilmiştir. İshali olan ve olmayan her iki hasta grubunda da en yaygın olarak izole edilen mikroorganizma Candida species (%69,0) olmuştur. Kontrol grubu olarak değerlendirilen 104 hastanın 46'sında (%44,2) ishal saptanmıştır. Bu gruptaki 19 hastanın dışkı örneklerinde en yaygın izole edilen parazit olarak *E. histolytica*/dispar, olmak üzere çeşitli enteropatojenler saptanmıştır. İshali olmayan vakalarda ise en sıklıkla *Entamoeba coli* gözlenmiştir.

• **Sonuç:** Erişkin ve pediatrik hasta grubunda Candida spp. saptanma oranının kontrol grubundan daha yüksek olduğu bulunmuştur. Pediatrik hasta grubunun *G. lamblia* infeksiyonlarına daha duyarlı oldukları tespit edilmiştir.

• **Anahtar Kelimeler:** Onkoloji hastaları, ishal, enteropatojenler. **Nobel Med 2009; 5(Ek 1): 10-16**

INTRODUCTION

Diarrhea is as an important issue in individuals with suppressed immune system. Cytotoxic therapies aiming to treat primary diseases in patients with cancer enables the invasion of microorganisms by causing the impairment of the gastrointestinal system mucosa, on the other hand they develop a tendency to infections by causing the weakening of humoral and cellular immunity.[1] It induces necrosis after local radiotherapy, impairs epithelial integrity and tissue vascularization and consequently delays wound healing.

It may lead to visceral complications such as pneumonia, esophagitis, and enteritis. Although diarrhea is a frequent complication of cytotoxic chemotherapy, its true incidence, risk factors and clinical course have not been investigated prospectively. Multifactorial ethyologies such as conventional gastrointestinal pathogens i.e.(*Shigella serovars, Salmonella serovars, Yersinia enterocolitica*), Campylobacter species (sp.), *Entamoeba histolytica, Giardia intestinalis*), suppression of normal intestinal flora and overgrowth of certain organisms (i.e. *Clostridium difficile*) as well as noninfectious causes such as mucositis and bowel ischemia.[2] Immunocompromised patients are at risk of developing serious fungal infections. The source of this infection often is the gastrointestinal tract. Administration of broadspectrum antimicrobial agents to these patients increases their risk of candidal infections by increasing the frequency and magnitude of gastrointestinal tract colonization by Candida spp.[3] Patients with some type of immunocompromised condition and those submitted to immunosuppressive therapy have an increased probability of acquiring parasitic infections, generally with a high degree of severity.[4] Parasitic infections that lead to autolimited diarrhea in immunocompetent patients may cause profuse diarrhea in immunocompromised individuals, generally accompanied by loss of weight, anorexia, malabsorption syndrome and in some cases fever and abdominal pain. In children with malignant tumors intestinal parasitic infections may follow a severe course, which is fatal in some cases.[5] In such patients, parasites such as *Cryptosporidium parvum*, *Enterocytozoon bieneusi*, *Encephalytozoon intestinalis* and *Strongyloides stercoralis* may disseminate to other organs such as the bronchia, bile and liver ducts by producing symptomatology specific to the organ affected.[6] In this study we planned to investigate the potential enteropathogens in adult and pediatric patients with or without diarrhea hospitalized in the oncology service of our hospital and to compare these results with the findings received from the control group patients without any oncological disease.

MATERIAL and METHOD

The aim of this study was to evaluate the enteric pathogens from patients hospitalized in Gaziantep University Oncology Hospital between May and December 2007. For this purpose stool samples were collected from→

Table 1: Distribution of enteropathogens detected in patient and control groups with diarrhea

Enteropathogen	No of enteropathogens in the patient group		No of enteropathogens in the control group	
	with diarrhea n= 42 (%)	without diarrhea n=22 (%)	with diarrhea n=19 (%)	without diarrhea n=4 (%)
Candida spp.	29 (69.0)	18 (81.8)	4 (21.1)	-
Giardia lamblia	15 (35.7)	-	5 (26.3)	-
Entamoeba histolytica/dispar	9 (21.4)	-	6 (31.6)	-
Entamoeba coli	4 (9.5)	3 (13.6)	-	3 (75)
Enterococcus spp.	4 (9.5)	-	-	-
Enterobacter cloaca	3 (7.1)	-	2 (10.5)	-
Rotavirus	3 (7.1)	-	2 (10.5)	-
A. lumbricoides	2 (4.8)	3 (13.6)	-	-
Providencia rettgeri	1 (2.4)	-	-	-
Blastocytis hominis	1 (2.4)	-	-	-
Criptosporidium spp.	1 (2.4)	-	-	-
Hymenolopis nana	-	2 (9.1)	-	-
Taenia saginata	-	-	-	1 (25)

115 patients (aged between 2-81 years with or without diarrhea. There were 59 (51.3%) males and 56 (48.7%) females, 67 of which were between 17-81 years, and 48 were between 2-16 years of age. Fifty-three (46.1%) of these patients had diarrhea and 62 (53.9%) had no complaints of diarrhea. In the adult group 21 (31.3%) had lymphoproliferative malignancies and 46 (68.7%) has solid tumors. Out of 48 pediatric patients 28 (58.3%) had lymphoproliferative malignancies and 20 (41.7%) had solid tumors. 95 (82.6%) patients were receiving chemotherapy and 20 (17.4%) were receiving radiotherapy during the study. As a control group, stool samples from 104 patients of the same age range who were hospitalized in various clinics without oncologic background were analyzed. Of 104 patients in the control group 50 (48%) were male and 54 (51.9%) were female. The ages of 53 patients ranged between 17-81 years, and 51 patients were between 2 and 16 years of age. Forty-six (44.2%) of these patients had diarrhea, whereas 58 (55%) did not have diarrhea.

The data on age, gender, type of disease and the presence or absence of diarrhea were recorded. Diarrhea was defined as an abnormal increase in stool liquidity and more than 3 bowel movements per day. At least three stool samples of each patient were analyzed. Stool samples were collected in plastic containers, sent to the laboratory and processed within 30 minutes. Stool specimens were collected at the onset of diarrhea and studied as regards consistency, color, and presence of mucus. After collecting direct and modified formalin-ethyl-acetate concentrated stool specimens, samples were examined by light microscopy for the presence of ova and parasites using Lugol's iodine and 0.85% NaCl solutions. All samples were also stained with trichrome stain for the presence of Entamoeba histolytica and Giardia lamblia, and also with modified acid-fast stain for the presence of Cryptosporidium spp., İsospora belli and Cyclospora cayatenensis.

In the laboratory, these samples were plated onto eosine-methylene-blue (EMB) agar, 5% sheep blood agar and Salmonella-Shigella agar (SS). Approximately 1 g of the sample was inoculated into 10 ml of selenite F broth. The EMB and 5% blood agar were incubated for 18 to 24 h at 35°C. The selenite F broth was subcultured onto EMB agar after 18 to 24 h of incubation. In addition to conventional methods, VITEK 2 (bio-Merieux, St. Louis, MO, ABD) automated system was used for identification of microorganisms in these media, Quantitative cultures were carried out for Candida spp.; 0.1 ml of the 1/10 diluted stool sample was inoculated onto Sabouraud's Dextrose agar (SDA) and incubated at room temperature for 24-48 h. Candida growth on culture was considered significant if the culture yielded ≥105 colonies.[7] All stool samples were analyzed for rotaviruses. The RIDA QUICK Rotavirus immunochromatographic fast assay (R-Biopharm AG, Darmstadt, Germany) for the antigen detection of Rotavirus in stool was performed according to the instructions of the manufacturer.

Statistical analysis

Results were analyzed using Chi-square test. Statistical analysis were performed with Epi Info (version 3.4.3), and values of $p<0.05$ were considered to indicate statistical significance.

RESULTS

There were 115 patients in the study group, who were hospitalized in the department of Oncology in Gaziantep University Hospital between May and December 2007. One or more enteropathogens were detected in 42 (79.2%) of 53 patients with diarrhea and in 22 (35.5%) of 62 patients without diarrhea.

As the control group, stool samples were collected from 104 patients in our study. In this group, only one enteropathogen was detected in 19 (41.3%) of 46 patients with diarrhea and in 4 (6.9%) of 58 patients without diarrhea. The distribution of the entero-pathogens detected in patient and control groups is shown in Table 1.

When compared with control group the detection rates of enteropathogens found in patient groups with and without diarrhea were detected more than those of the controls ($p<0.05$, $p=0.0001$, $\chi^2=14.9$ and $p=0.0014$,→

Table 2: Distribution of the detected enteropathogens in adult and pediatric patient and control groups

Enteropathogen	Adult patients		Adult controls		Pediatric patients		Pediatric controls	
	with diarrhea n=18 (%)	without diarrhea n=9 (%)	with diarrhea n=10 (%)	without diarrhea n=3 (%)	with diarrhea n=23 (%)	without diarrhea n= 13 (%)	with diarrhea n=10 (%)	without diarrhea n=1 (%)
Candida spp.	17(94.4)	6(66.7)	2(20)	-	12(52.2)	12(48)	3(30)	-
Giardia lamblia	2(11.1)	-	2(20)	-	13(56.2)	-	3(30)	-
Entamoeba histolytica/dispar	5(27.8)	-	4(40)	-	4(17.4)	-	2(20)	-
Entamoeba coli	-	3(33.3)	-	2(66.7)	4(17.4)	-	-	1(100)
Enterococcus spp.	2(11.1)	-	-	-	2(8.7)	-	-	-
Enterobacter cloaca	3(16.7)	-	1(10)	-	-	-	1(10)	-
Rotavirus	2(11.1)	-	1(10)	-	1(4.3)	-	1(10)	-
A. lumbricoides	-	2(22.2)	-	-	2(8.7)	1(4)	-	-
Providencia rettgeri	1(5.6)	-	-	-	-	-	-	-
Blastocytis hominis	1(5.6)	-	-	-	-	-	-	-
Criptosporidium spp.	-	-	-	-	1(4.3)		-	-
Hymenolopis nana	-	-	-	-	-	2(8)	-	-
Taenia saginata	-	-	-	1(33.3)	-	-	-	-

χ^2=14.4). Also when enteropathogens found in patient groups with and without diarrhea were compared with those of control groups, detection rates of Candida spp. and *G. lamblia* (p=0.0000, χ^2=23.4 and p=0.0311, χ^2=4.6) in the group with diarrhea and isolation rates of Candida spp. in the group without diarrhea were observed to be statistically significantly high (p=0.0000, χ^2=19.8), (p<0.05).

In Table 2 the distribution of the enteropathogens detected in the adult and pediatric patient and control groups is displayed.

In 18 (60%) of 30 patients with adult diarrhea and in 9 (24.3%) of 37 patients without adult diarrhea one or more than one enteropathogen was detected. Only one enteropathogen was detected in 10 (40%) of 25 control group patients with diarrhea and 3 (10.7%) of 28 control group patients without diarrhea. In all 23 patients with pediatric diarrhea and in 13 (52%) of 25 patients without diarrhea one or more than one enteropathogen were detected. Only one enteropathogen was detected in 10 (47.6%) of 21 control group patients with diarrhea and 1 (3.3%) of 30 control group patients without diarrhea.

In patient groups with and without diarrhea, detection rates of enteropathogen were found to be statistically significant in pediatric patients than adult patients (p=0.0005, χ^2=11.8 and p=0.025, χ^2=4.9)(p<0.05). When the prevalence rates of Candida spp. and *G. lamblia* in adult and pediatric patient groups with and without diarrhea were compared, no significant difference with respect to Candida was detected (p>0.05, p=0.7446, χ^2=0.11) in both groups with diarrhea; however, the prevalence rate of *G. lamblia* was found to be significantly high (p<0.05, p=0.0000, χ^2=15.9) in the pediatric group in comparison to the adult group. Isolation rate of Candida spp. in the group without diarrhea was found to be significantly higher (p<0.05, p=0.0068, χ^2=7.3) in the pediatric patients than adult patients.

When Candida spp. isolation rates between adult and pediatric patient groups with and without diarrhea and control groups were evaluated, the rate was found significantly higher in the patient group than the control group (p<0.05, adult p=0.0001, χ^2=14.2 and p=0.0253, χ^2=5.0; pediatric p=0.0080, χ^2=7.01 and p=0.0000, χ^2=18.4); however, when the rates of *G. lamblia* were compared, no significant difference was detected in the adult group with diarrhea (p>0.05, p=0.8496, χ^2=0.04) and significant difference was detected in the pediatric patient group with diarrhea compared to the control group (p<0.05, p=0.0036, χ^2=8.46).The presence of enteropathogens isolated from the adult patient and control groups were displayed with number of patients in Table 3. Enteropathogens isolated from the pediatric patients and control groups were displayed together with number of patients in Table 4. Erythrocyte and leukocyte were detected in 3 adult patients during the direct microscopic examination of their stool samples. *E. histolytica*/dispar was isolated from two and Candida spp. was isolated from one of the adult patients. *G. lamblia* and *E. histolytica*/dispar were isolated from the first, Entamoeba coli were isolated from the second and Candida spp. wasisolated from the third of 3 pediatric patients. E. histolytica/dispar was isolated→

Table 3: The presence and number of enteropathogens detected in the adult patient and control groups.

Number of enteropathogens isolated from the adult patients with diarrhea	Number of enteropathogens isolated from the adult control group patients with diarrhea
E. histolytica/dispar+Candida spp. (5)	E. histolytica (4)
E. cloacae+Candida spp. (3)	G. lamblia (2)
G. lamblia+Candida spp. (2)	Candida spp.(2)
Enterococcus spp.+Candida spp. (2)	Rotavirus (1)
Candida spp. (2)	E. cloacae (1)
Rotavirus+Candida spp. (2)	Normal enteric flora (15)
Providenciya rettgeri+Candida spp. (1)	
Blastocytis hominis (1)	
Normal enteric flora (12)	
Total (30)	Total (25)
Number of enteropathogens isolated from the adult patients without diarrhea	**Number of enteropathogens isolated from the adult control group patients without diarrhea**
Candida spp. (4)	Entamoeba coli (2)
Entamoeba coli (3)	T. saginata (1)
A. lumbricoides+Candida spp. (2)	
Normal enteric flora (28)	Normal enteric flora (25)
Total (37)	Total (28)

from one of the 4 adult patients in the control group who had erythrocyte in their stool samples. Rotavirus was detected in one stool sample from the pediatric control group which was also positive for leukocyte.

DISCUSSION

Although infections are very important causes of morbidity for patients with cancer, they are also the major causes of mortality in patients especially with hematological malignancies. Virtually all cytotoxic drugs used in the treatment of malignant diseases have a deleterious effect on the proliferation of normal hematopoietic progenitor cells. Therefore, after destruction of the mitotic pool and depletion of the marrow pool reserve, granulocytopenia ensues. Likewise, therapeutic radiation can induce a clinically relevant granulocytopenia, depending on the dose rate, total dose given, and irradiated area of the body. Total body irradiation, as used in hematopoietic stem cell transplant procedures, is the most obvious illustration of the possible negative impact of irradiation. Granulocytopenia or a treatment-related decrease in the granulocyte count is probably the most important primary risk factor for infection.[8]

The aim of our study was to investigate the potential enteropathogens in the adult and pediatric patient groups with or without diarrhea receiving either chemotherapy or radiotherapy due to lympho-proliferative malignancy or solid tumor. When the rates of detection of enteropathogens in patient and control groups with or without diarrhea are compared, the rates were detected to be significantly higher in the oncology patients than those of the control group ($p<0.05$).

The most isolated enteropathogens in the patient group with diarrhea was Candida spp. (n=29) followed by *G. lamblia* (n=15) and *E. histolytica*/dispar (n=9). In the control group with diarrhea the most frequently isolated enteropathogens was *E. histolytica*/dispar (n=6) followed by *G. lamblia* (n=5) and Candida spp. (n=4).

In the patient group without diarrhea Candida spp. (n=18) was the most isolated enteropathogen. No Candida was detected in the control group without diarrhea. When the factors found in the adult and pediatric patient groups with or without diarrhea were compared with those of the control groups, the rates of coexistence of Candida spp. and *G. lamblia* in the group with diarrhea and the rates of existence of Candida spp. in the group without diarrhea were detected to be significantly higher than those of the control group ($p<0.05$).

Candida is the most common fungal pathogen in immune compromised patients. Gastrointestinal candidiasis is seen in patients who have undergone major gastric or abdominal surgery and in those with neoplastic disease. The organism can pass through the intestinal wall and spread from a gastrointestinal focus.[9] Detection of Candida spp. especially in the group without diarrhea shows that Candidas are colonized at higher rates in the gastrointestinal system of those patients. Candida species form a ubiquitous genus of yeast present throughout the environment. They are part of the normal flora in the alimentary tract and on mucocutaneous membranes.[10] Nevertheless, several reports have suggested that it may cause diarrhea.[11-13]

The parasite *Giardia lamblia* affects both immuno-competent individuals and immunocompromised patients, particularly those with common variable or congenital hypogammaglobulinaemia and those in advanced states of AIDS with prolonged diarrhea.[14-15]

Detection of *E. histolytica*/dispar in our study was not different both in patient and control groups. Botero et al.[6] most frequently detected *E. histolytica*/dispar followed by *G. lamblia* among the opportunistic intestinal parasites in their study on immunocom promised patients. Numerous studies from various countries have shown that intestinal parasites are important problems in patients with immunodeficiency .[16-18]

In our study Candida spp. (n=17) was detected most frequently followed by *E. histolytica*/dispar (n=5) and→

Enterobacter cloacae respectively in the adult patient group with diarrhea. *G. lamblia*, Enterococcus spp. and Rotavirus followed these with the same frequency. *Blastocytis hominis*, isolated especially from immune suppressive patients, was detected in one patient.

While Candida spp. (n=6) was mostly isolated in the adult patient group without diarrhea, it was not detected in the control group. *B. hominis* which leads to serious infections in the immunosuppressed cases and shows resistance to therapy, has connection with colon cancer and irritable colon syndrome, and may lead to tourist diarrhea.[19-21] *B. hominis* was reported to lead to persistent or recurrent diarrhea in immunosuppressed cases especially in AIDS.[22]

In a study of Arslan et al.[23] where they investigated the factors of diarrhea in organ recipient patients; They revealed the cause of diarrhea in 43 patients (82.6%).

Infectious etiologies accounted for 33 out of the 43 episodes (76.7%) in which a specific cause was determined: *Giardia lamblia* in 9, *Cryptosporidium parvum* in 7, cytomegalovirus in 6, *Clostridium difficile* in 3, *Campylobacter jejuni* in 2, *Shigella sonnei* in 2, *Salmonella enteridids* in 1, rotavirus in 1, *Entamoeba histolytica* in 1, and *Blastocytis hominis* in 1. In some investigations no significant difference was observed in the frequency of immunosuppressed cases; however, these cases were reported to give symptoms more frequently than immunocompetent individuals.[24-26]

We found no statistically significant difference in the incidence of *B. hominis* in the immunosuppressed patients compared with the control group.

In our study the most frequently and second frequently detected pathogens in the pediatric patients with diarrhea were *G. lamblia* (n=13) and Candida spp. (n=12) respectively, followed by *E. histolytica*/dispar and *Entamoeba coli*. Predisposition to giardiasis has been documented in patients with common variable immunodeficiency and in children with X-linked agammaglobulinemia.[15]

Aksoy et al.[27] observed quite a significant giardiasis rate in children with malignity in a study in which they examined intestinal parasites in children. Martinez Perez et al.[28] found *G. intestinalis* to be the most commonly seen parasite in children with a malignancy aged between 1 and 15 years, with an incidence of 28.7%.

In pediatric group, Cryptosporidium which is especially detected in immunosuppressive children, was also detected. Candida spp. (n=12) was the most commonly detected parasite in the pediatric patient group without diarrhea, however detection of *H. nana* in two cases in this group was evaluated as important. Cryptosporidiosis is one of the infections leading to diarrhea, especially in developing countries and in immunosuppressed cases mainly in AIDS. Tanyüksel et al.[29] detected %17 Cryptosporidium in a study carried out in our country to investigate the prevalence of cryptosporidiosis in chemotherapy receiving cases with diarrhea. Again in a study in our country, a mean of 25.9% cryptosporidiosis was determined in three patient groups comprised by cases of hemodialysis, kidney transplantation, and pediatric oncology and 19.1% cryptosporidiosis was found in chronic renal impairments.[24-26, 30]

Table 4: The presence and number of enteropathogens detected in the pediatric patient and control groups

Enteropathogens (n) isolated from the pediatric patients with diarrhea	**Enteropathogens (n) isolated from the pediatric control group with diarrhea**
G. lamblia (7)	G. lamblia (3)
G. lamblia+Candida spp. (3)	Candida spp. (3)
G. lamblia+Entemoeba coli+Candida spp. (1)	E. histolytica/dispar (2)
E. histolytica/dispar+G. lamblia (1)	Rotavirus (1)
G.lamblia+A. lumbricoides+Candida spp. (1)	E. cloacae (1)
E. histolytica/dispar+A. lumbricoides+Candida spp. (1)	Normal enteric flora (11)
Entamoeba coli+Candida spp. (3)	
Rotavirus+Candida spp. (1)	
Enterococcus spp.+Criptosporidium spp.(1)	
E. histolytica/dispar (2)	
Enterococcus spp.+Candida spp. (1)	
Candida spp. (1)	
Normal enteric flora (0)	
Total (23)	Total (21)
Enteropathogens (n) isolated from the pediatric patients without diarrhea	**Enteropathogens (n) isolated from the pediatric control group without diarrhea**
Candida spp. (10)	Entamoeba coli (1)
A. lumbricoides+Candida spp. (1)	Normal enteric flora (29)
H. nana+Candida spp. (1)	
H. nana (1)	
Normal enteric flora (12)	
Total (25)	Total (30)

The basic approach in establishing treatment strategies for hematology-oncology patients is to keep the patient alive for a long period of time. Infectious complications are the expected occurrences in addition to serious sequels due to cytotoxic treatment.

The importance of infections in these patients is that infections may require the variation in the dose and program of the anti-neoplastic treatment which hampers the success of treatment. Thus the protection of patients is very important.→

CONCLUSION

In conclusion, consistent with literature our pediatric patient group was observed to be more sensitive to intestinal pathogens than the adult patient group.

Existence rate of Candida spp. in adult and pediatric patient groups was found to be higher than that of the control group. Pediatric patient group was found be more sensitive to *G. lamblia* infections. One of the attractive indicators of our results was that the patient group with diarrhea was infected with more than one enteropathogen, but in the control group were found to be infected by a single enteropathogen.

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