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The Significance of Opportunistic Parasitosis and Blastocystosis in Patients with Gastric Cancer: a Study with Control Group

Mide Kanserli Hastalarda Blastocystosis ve Fırsatçı Parazitozların Önemi: Kontrol Gruplu Bir Çalışma

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ABSTRACT

Objective: The aim of this study was to determine the prevalence of opportunistic parasites and *Blastocystis* spp. in patients with gastric cancer (CA) and to determine the significance of these parasite.

Methods: The patient group and the control group were composed of 100 people each. The stool samples were examined under the microscope for intestinal parasites with the native-Lugol method. Then, samples were multiplied by formol-ethyl acetate method and stained with modified acid-fast method.

Results: Intestinal parasite positivity was indicated in 14% of the gastric CA, and 2% of the healthy individuals (p=0.001). *Blastocystis* spp. (p=0.009) was identified in 11%, *Cryptosporidium* spp. was identified in 4%, *G. intestinalis* was identified in 2%, and *C. cayetanensis* was identified in 1% of the patient group. There were significant differences between the intestinal parasite positivity (p=0.012), abundant *Blastocystis* spp. positivity (p=0.041) and all *Blastocystis* spp. positivity (p=0.037) in patient and control groups. Most of the patients who were positive for parasites had diarrhea.

Conclusion: Based findings, it was concluded that it would be beneficial to evaluate gastric CA patients, especially those with diarrhea, for intestinal parasites.

Keywords: Gastric cancer, *Blastocystis* spp., opportunistic parasites, prevalence

ÖZ

Amaç: Bu çalışmanın amacı, mide kanserli (KA) hastalarda fırsatçı parazitler ve *Blastocystis* spp. görülme sıklığını belirleyerek bu parazitlerin önemini ortaya çıkarmaktır.

Yöntemler: Hasta grubu ve kontrol grubu 100'er kişiden oluşturuldu. Dışkı örnekleri, nativ-Lugol yöntemi ile intestinal parazitler yönünden mikroskop altında incelendi. Daha sonra örnekler formol-etil asetat yöntemi ile çoklaştırıldı ve modifiye asit-fast yöntemi ile boyandı.

Bulgular: Mide KA'lı hastaların %14'ünde ve sağlıklı bireylerin %2'sinde intestinal parazit pozitifliği saptandı (p=0,001). Hasta grubunun %11'inde *Blastocystis* spp. (p=0,009), %4'ünde *Cryptosporidium* spp., %2'sinde *G. intestinalis* ve %1'inde *C. cayetanensis* saptandı. Hasta ve kontrol grupları arasında intestinal parazit pozitifliği (p=0,012), *Blastocystis* spp. pozitifliği (p=0,037) ve bol *Blastocystis* spp. pozitifliği (p=0,041) yönünden anlamlı farklılıklar vardı. Parazit pozitif olan hastaların çoğunda ishal vardı.

Sonuç: Bulgulara dayalı olarak, özellikle ishalli mide KA hastalarının bağırsak parazitleri açısından değerlendirilmesinin faydalı olacağı kanaatine varıldı.

Anahtar kelimeler: Mide kanseri, *Blastocystis* spp., fırsatçı parazitler, prevalans

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Türkiye PARAZİTOLOJİ Dergisi

INTRODUCTION

Gastric cancer (CA), which is usually diagnosed at an advanced stage, is one of the most common types of CA and has a poor prognosis (1). Gastric CA usually begins after the age of 40 and peaks in the 70s. In the literature, the rate of CA is between 0.5-4% (2). Although there is no information about the frequency of intestinal parasites in patients with gastric cancer, it is known that the risk of some parasitic infections increases with the decrease in the number of CD4 lymphocytes in the peripheral blood of the host. The most common parasites in such patients are Giardia intestinalis and *Cryptosporidium* spp., *Isospora belli* and Cyclospora *cayetanensis*. In recent years, *Blastocystis* spp. have been reported as pathogens occurring in immunocompromised hosts (3).

Blastocystis spp., the agent of blastocystosis, is an anaerobic protozoan that settles in the intestines. The agent, in addition to having a cosmopolitan distribution, is the most common intestinal protozoan in human stool samples. The fact that it causes serious infections in immunocompromised patients such as CA and acquired immune deficiency syndrome pa tients, is resistant to treatment, and is likely to be associated with colon CA and irritable bowel syndrome has made the parasite and the infection it causes more recognized (4).

Opportunistic infections are observed in immunocompromised patients and are usually induced by infectious agents that do not cause diseases in healthy individuals. An inhibited or compromised immune system could lead to an increase in pathogenic effects of parasites that are particularly affected by cellular immune response and the development of clinical manifestations that could cause death. Agents such as *Cryptosporidium* spp. and *C. cayetanensis* are among common pathogenic enteric protozoans that lead to diseases in immunocompromised individuals. Such parasites cause severe, chronic and life-threatening diarrhea, and malnutrition due to prolonged diarrhea (5-8).

The aim of this study was to determine the prevalence of opportunistic parasites and *Blastocystis* spp. in patients with gastric CA and to determine the significance of these parasite infections.

METHODS

"Van Yüzüncü Yıl University, Faculty of Medicine, Non-Invasive Clinical Research Ethics Committee" approval was obtained before the study. The study was conducted at Van Yüzüncü Yıl University Medical Center, Parasitology Laboratory between 2017 and 2018. The patient and control group stool samples were examined under the microscope for intestinal parasites with the native-Lugol method. If the number of *Blastocystis* spp. forms in each microscope field was 5 or more, "abundant *Blastocystis* spp." was considered (9). Then, samples were multiplied by formol-ethyl acetate method and stained with modified acid-fast method to determine the parasites such as *Cryptosporidium* spp., and *C. cayetanensis*. The age and gender of the patients were recorded.

Statistical Analysis

Z-test was employed for the comparison of percentages. Descriptive studied variable (characteristic) statistics are presented with mean, standard deviation, minimum (min) and maximum (max) values. Statistical significance level was accepted as 5% and statistical analysis was conducted on MINITAB (version 14) software.

RESULTS

Thirteen subjects in the patient group were 50 years old or younger, 87 were 51 or older. Out of the 100 patients [age: 61.84±10.55; min-max: 26-85], 40 were female and 60 were male. In the control group 35 out of 100 subjects (age: 55.03±14.06; min.-max.: 23-79) were 50 years old or younger, 65 were 51 or older and 50 were female and 50 were male.

Intestinal parasite positivity was indicated in 14% (age: 66.50±13.52; min.-max.: 39-85) of the 100 gastric CA patients that were included in the patient group, and 2% of the 100 healthy controls (p=0.001). *Blastocystis* spp. was identified in 11% (p=0.009), *Cryptosporidium* spp. was identified in 4%, *G. intestinalis* was identified in 2%, and *C. cayetanensis* was identified in 1% of the patient group (Figure 1) (Table 1). Three of the four *Cryptosporidium* spp. positive patients, two of the four abundant *Blastocystis* spp. positive patients, one of two *G. intestinalis* positive patients, and one *C. cayetanensis* positive patient had diarrhea. There were significant differences between the intestinal parasite positivity (p=0.012), abundant *Blastocystis* spp. positivity (p=0.041) and all *Blastocystis* spp. positivity (p=0.037) in the patient and control groups aged 51 years and older.

There was no significant difference between the patient and control groups based on age (Table 1). Intestinal parasite positivity was higher in 51 years old or older patients with gastric CA. A statistical significance was found between the age groups in terms of the positivity of abundant *Blastocystis* spp. (p=0.005) (Table 1). There was no statistically significant difference between the male (11.7%) and the female (17.5%) in terms of the frequency of parasites.

DISCUSSION

Intestinal parasite infections exhibit an asymptomatic clinical prognosis in certain cases, while they lead to diarrhea, abdominal pain, loss of appetite and several other symptoms and even life-threatening severe infections in any immunocompromised individual (5,10).

Several studies have been conducted to investigate the prevalence of intestinal parasites in CA patients; however, none were conducted with only gastric CA patients.

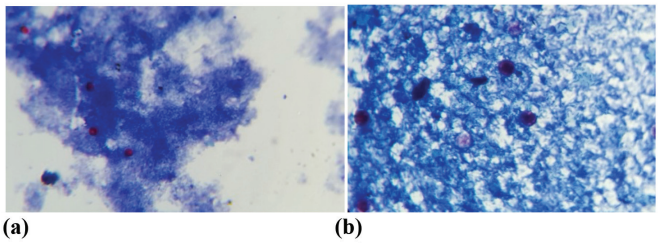
Al-Qobati et al. (11) evaluated intestinal parasitosis in 206 CA patients, who were under chemotherapy, and identified parasites in 63.1% of the patients. In the study, *C. parvum* was indicated in 30.1%, *G. intestinalis* was indicated in 18%, *C. cayetanensis* was indicated in 5.3%, *Blastocystis* spp. was indicated in 4.9%. Furthermore, it was reported that there was no statistically significant correlation between the prevalence of intestinal parasitosis based on patient age or gender, and most positive patients had diarrhea.

In a study that investigated the prevalence of intestinal parasites in CA patients under chemotherapy in Brazil, 73 patient stool samples were analyzed, and intestinal parasite positivity was identified in 61.6% of the patients. The authors identified *G. intestinalis* (26.6%), *Cryptosporidium* spp. (13.3%) in the patients.

Table 1. Parasite positivity in the patient and control groups by age groups

Parasites	Total (n=100)		≤50 age (n=13)		≥51 age (n=87)	
	n	%	n	%	n	%
Patient group						
Cryptosporidium spp.	4	4	1	7.7	3	3.4
C. cayetanensis	1	1	--	--	1	1.1
G. intestinalis	2	2	--	--	2	2.3
Abundant *Blastocystis* spp. (5≤)	4	**4*** (p=0.005)	--	--	4	**4.6**** (p=0.041)
Blastocystis spp. 4≥	7	7	1	7.7	6	6.9
Blastocystis spp. (4≥ and 5≤)	11	**11**** (p=0.009)	1	7.7	10	**11.5**** (p=0.037)
Chilomastix mesnilii	1	1	--	--	1	1.1
Total	14	**14**** (p=0.001)	2	15.4	12	**13.8**** (p=0.012)
Control group						
	n=100		n=35		n=65	
Blastocystis spp.	2	2	--	--	2	3.1
Total	2	2	--	--	2	3.1

N: Total number of patients, n: Number of the positive cases, *Statistically significant difference in comparison of age groups
**Statistically significant difference in comparison of patient and control groups



(a) (b)

Figure 1. *Cryptosporidium* spp. **(a)** and *C. cayetanensis* (b) oocysts in modified acid-fast staining (original; x100)

They emphasized that fecal parasitological diagnosis and specific staining methods were necessary to indicate intestinal parasites in CA patients (12).

In a study conducted by Sulzyc-Bielicka et al. (13) on 108 patients with colorectal CA and 125 controls, *Cryptosporidium* spp. was determined in 14 patients (13%) and in 5 (4%) controls. There was no statistically significant difference between *Cryptosporidium* spp. infection and neoplastic tumor localization based on gender, age, neoplasm progression stage, neoplasm differentiation degree, or spleen flexion.

In a study conducted on 49 CA patients, including 41 acute lymphoblastic leukemia patients with severe diarrhea and 8 Hodgkin lymphoma patients, *C. parvum* was identified in 16 patients and *C. cayetanensis* was identified in in 6 patients (14).

In a study conducted by Sulżyc-Bielicka et al. (15) on 107 patients with colorectal CA and 124 controls, *Blastocystis* spp. was determined in 13 patients (12.1%) and in 3 (2.4%) controls. In a study conducted by Mülayim et al. (16), *Blastocystis* spp. was identified in 29 (14.4%) of 201 CA patients. In a study conducted by Öner et al. (17), *Blastocystis* spp. was identified in 46 (48.9%) of 94 CA patients. In a study conducted by Ali et al. (18) on 100 patients with colorectal CA and 100 controls, *Blastocystis* spp. was identified in 52% and 42% of CA and non-CA individuals, respectively.

In the present study, the gastric CA patient group findings were compared with the control group and intestinal parasites were identified in 14% of the 100 gastric CA patients and 2% of 100 healthy individuals in the control group (p=0.003). In the patient group, *Blastocystis* spp. was the most prevalent parasite (p=0.009), and *Cryptosporidium* spp. was determined in four, *G. intestinalis* was determined in two, and *C. cayetanensis* was determined in one gastric CA patients, and it was noted that these patients generally suffered diarrhea.

Patients with gastric CA may be more susceptible to parasite infections due to deterioration of gastric wall and enzyme activity, and reduced resistance due to CA treatment. The present study findings were consistent with this fact. Thus, a statistically significant difference was determined between the parasite positivity of the gastric CA patients and that of the healthy control group in the study. It was determined that the patients with *Cryptosporidium* spp., *C. cayetensis*, *G. intestinalis* and abundant *Blastocystis* spp. positivity had diarrhea. Based on these findings, it was concluded that it would be beneficial to evaluate gastric CA patients, especially those with diarrhea, for intestinal parasites.

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*** Ethics**

Informed Consent: Written informed consent was obtained from the patient who participated in this study.

Peer-review: Externally peer-reviewed.

*** Author Contributions**

Concept: A.G., Z.T.C.; Design A.G., Z.T.C.; Supervision: Z.T.C., H.Y.; Resource: A.G.; Materials: A.G.; Data Collection and/or Processing: A.G., S.A.; Analysis and/or Interpretation: A.G., Z.T.C., H.Y., S.A.; Literature Search: A.G., S.A.; Writing: A.G., Z.T.C.; Critical Reviews: Z.T.C.

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