Araştırma Makalesi (Research Article)

Üniversite Hastanesi Acil Servisine Başvuran Akut Gastroenteritli Hastalarda Parazitik Ajanların Analizi

An Analysıs of Parasıtıc Agents In Patıents Wıth Acute Gastroenterıtıs Admıtted to A Unıversıty Hospıtal Emergency Department

Hakan HAKKOYMAZ[1], Selcuk NAZIK[2], Ali Ihsan KILCI[1], Ozlem GULER[1], Murat TEPE[2], Fatih Nazmi YAMAN[3]

[1] Kahramanmaraş Sütçü İmam University School of Medicine, Department of Emergency Medicine, Kahramanmaras, Turkey

[2] Kilis State Hospital, Department of Emergency Medicine, Kahramanmaras, Turkey

[3] İstanbul Medipol University Hospital, Department of Emergency Medicine, Istanbul,Turkey

Özet

Amaç: Akut gastroenterit, ishal ile karakterize bir hastalıktır. Bu hastalıkta virüs, bakteri ve parazit en yaygın faktörlerdir. Bu çalışmada, acil servise (AS) başvuran gastroenteritli hastalarda intestinal parazitlerinin çeşitliliğini değerlendirmeyi amaçladık.

Gereç ve Yöntemler: Bu tanımlayıcı ve kesitsel çalışmada, Kasım 2014 - Kasım 2017 tarihleri arasında hastanemiz acil servisine başvuran akut gastroenteritli (ICD: K52.9) toplam 4177 hasta kaydı retrospektif olarak değerlendirildi.

Bulgular: Olguların % 45,9'u (n = 188) erkek, % 54,1'i (n = 222) kadın cinsiyette idi. Paraziter ishalin en sık nedeni E. histolytica (% 85.2) idi. Çalışmaya alınan 410 hastanın% 34,6'sında (n = 142) mikroskopik incelemede lökosit vardı. Lökositli hastaların% 62,7'sinin (n = 89) mikroskopik incelemesinde de parazitler görülmüştür. Dışkı örneğinde parazit ve lökosit birlikteliği değerlendirildiğinde, dışkı örneğinde parazit bulunan hastalarda lökositlerin varlığı anlamlı olarak daha yüksekti (p <0.001). Dışkı örneğindeki parazit ve eritrosit birlikteliği birlikte değerlendirildiğinde, dışkı örneğindeki parazit bulunan hastalarda eritrosit varlığı anlamlı olarak daha yüksek bulundu (p <0.001).

Sonuç: E. histolytica, bölgemizde ve tüm dünyada önemli bir halk sağlığı sorunudur. Bu sorunun kanalizasyon ve altyapı çalışmaları ve içme ve kullanma suyunun temizliği ile azaltılacağına inanıyoruz.

Anahtar Sözcükler: Akut gastroenterit, Parazit, Acil servis

Abstract

Objective: Acute gastroenteritis is a disease characterized by diarrhea. In this disease, virus, bacteria and parasite are the most common factors. In this study, we aimed to evaluate the diversity of intestinal parasites in patients with gastroenteritis who applied to the Emergency Department (ED).

Material and Methods: In this descriptive and cross-sectional study, a total of 4177 records of patients with acute gastroenteritis (ICD: K52.9) who were admitted to the ED of our hospital between November 2014 and November 2017 were evaluated retrospectively. A total 410 stool samples for intestinal parasites using the standard parasitological methods were examined.

Results: 45.9% of the cases (n=188) were male and 54.1% (n=222) were female. The most common cause of parasitic diarrhea was E. histolytica (85.2%). Of the 410 patients included in the study, 34.6% (n = 142) had leukocytes in the microscopic examination. The microscopic examination of 62.7% (n = 89) of patients with leukocytes also showed parasites. Evaluating the coexistence of parasites and leukocytes together in the stool sample the presence of leukocytes was significantly higher in patients with parasites in the stool sample (p <0.001). When the coexistence of parasites and erythrocytes in the stool sample were evaluated together, the presence of erythrocytes was significantly higher in patients with parasites in the stool sample (p <0.001).

Conclusion: *E. histolytica* is an important public health problem in our region and all over the world. We believe that this problem will be reduced by sewage and infrastructure works and by improvement in sanitation of drinking and utility water.

Keywords: Acute gastroenteritis, Parasite, Emergency Department

Yazışma Adresi: Hakan HAKKOYMAZ, Kahramanmaraş Sütçü İmam Üniversitesi Tıp fakültesi Acil Tıp Ana Bilim dalı, Kahramanmaraş, Türkiye

Telefon: +90 538 401 67 72, Mail: hhkkymz@gmail.com

ORCID No (Sırasıyla): 0000-0002-8568-8283, 0000-0003-0587-0104, 0000-0003-0029-3942, 0000-0002-1444-7730, 0000-0002-0397-2804, 0000-0003-1555-4658

Geliş tarihi: 13.09.2020

Kabul tarihi: 05 10 2020

DOI: 10.17517/ksutfd.794362

INTRODUCTION

Acute gastroenteritis is a disease characterized by diarrhea that occurs with or without vomiting (1). Among cases presenting to the Emergency Department (ED) in summer and autumn, there is an increase in gastroenteritis cases caused by water and food. In these cases, virus, bacteria and parasite are the most common factors (2).

Entamoeba histolytica, Giardia intestinalis and Cryptosporidium parvum are the most common causes of intestinal parasites in all age groups (3). Although there are several studies on the incidence of these factors in our country, there are differences according to the regions. Although gastroenteritis cases, like other diseases in the world, show epidemiological differences, in underdeveloped countries it is observed more frequently in children under the age of five, in the elderly and in women (4).Underlying factors of intestinal parasitic infections in our country are the temperate climate, the inadequate level of economic conditions and education as well as lack of infrastructure and the fact, that people do not have enough information about parasitic diseases (5).

According to the World Health Organization (WHO), approximately two billion cases of gastroenteritis occur annually and approximately 2.2 million people die annually due to gastroenteritis (6). In recent years, the mortality rate associated with gastroenteritis decreases in developing countries. The most important reasons cited for this are personal hygiene, developments of sanitization measures and improvements in water supply.

Intestinal parasites can usually be seen with typical symptoms such as abdominal pain, nausea and vomiting, and may also be accompanied by atypical complaints such as weight loss, joint pain, anemia, itching in the anus and irritability. This situation has a negative effect on the physical and mental health of the patient and leads to a loss of labor force and adversely affects the economy of the country.

In this study, we aimed to evaluate the diversity of intestinal parasites in patients with acute gastroenteritis who applied to the ED of our hospital, seasonal distribution of cases, and the average charges of patients to the health system.

MATERIAL AND METHODS

Study design

In this descriptive and cross-sectional study, a total of 4177 records of patients with acute gastroenteritis (ICD: K52.9) who were admitted to the ED of our hospital between November 2014 and November 2017 were evaluated retrospectively. Ethics committee approval was obtained from ethics committee of Kahramanmaraş Sütçü Imam University for the study. (20.12.2017; Session No. 2017/21; Decision No. 01), and the study was conducted in accordance with the principles of the Declaration of Helsinki.

Demographic data such as age, gender, clinical outcome (admission / discharge), patient cost as well as parasitic agents, presence of erythrocyte and leukocytes in the stool specimens, white blood cell (WBC) count and serum creatinine value was recorded. Patients with incomplete file information and demographic data despite a preliminary diagnosis of acute gastroenteritis as well as patients without stool microscopy request or stool microscopy examination were excluded from the study. A total of 234943 patients admitted to the hospital ED at the specified dates, of which 4147 were due to acute gastroenteritis (1.77% of total admissions). Of these, 410 patients who met the inclusion criteria were included in the study (9.8% of total acute gastroenteritis admissions).

Parasitological examination

A total of 410 patients (222 female, 188 male) were included. Fresh stool samples collected from patients with acute gastroenteritis, and then referred to the Parasitology Laboratory of the Health Research and Training Hospital of Kahramanmaraş University within 30 min. Firstly all samples viewed macroscopically and then The samples were examined by native-Lugol, sedimentation and flotation methods for diagnosis of intestinal helminths, protozoa and erythrocytes. Modified acid-fast staining methods and spot tests were also applied to suspicious stools. From each stool sample, smear and slides were prepared and analysed microscopically (magnification, × 100–400) (7). Results were entered in the laboratory information system.

Statistical Analysis

SPSS 22.0 package program was used for statistical evaluation of the data obtained from the study (SPSS Inc., Chicago, Illinois, USA). While continuous data were summarized as mean and standard deviation, categorical data were summarized in terms of numbers and percentages. Student t test was used to compare continuous variables in independent groups. For the comparison between groups, Chi-square (χ^2) test was used to evaluate two categorically independent groups. Statistical significance was taken as $p < 0.05$.

RESULTS

The mean age of the patients was 43.8±17.6 years. Demographic data of the patients are summarized in **Table 1**.

Of the 410 patients included in the study, 34.6% (n = 142) had leukocytes in the microscopic examination. The microscopic examination of 62.7% (n = 89) of patients with leukocytes also showed parasites. Evaluating the coexistence of parasites and leukocytes together in the stool sample the presence of leukocytes was significantly higher in patients with parasites in the stool sample ($p < 0.001$).

In 16.1% of the patients (n = 66), erythrocytes were present in the stool sample. In 77.3% (n = 51) of the patients with erythrocyte in the stool microscopy, parasites were also observed. When the coexistence of parasites and erythrocytes in the stool sample were evaluated together, the presence of erythrocytes was significantly higher in patients with parasites in the stool sample ($p < 0.001$).

Table 1. Demographic data of patients presenting to the Emergency Department due to gastroenteritis.

	n	%
Admission Years		
2015	179	43.7
2016	137	33.4
2017	94	22.9
Gender		
Male	188	45.9
Female	222	54.1
The presence of parasite agents in stool specimens		
Positive	140	34.1
Negative	270	65.9
Parasite agents		
Entamoeba histolytica	119	85.2
Giardia intestinalis	5	3.6
Ascaris lumbrocoides	4	2.8
Blastocystis hominis	4	2.8
Cryptosporidium parvum	4	2.8
Trichuris trichiura	4	2.8

n: number, %: percentage

The results of parasitic agents and comparison of leukocyte / erythrocyte coexistence in stool microscopy are summarized in **Table 2**.

The WBC value of patients was 9.6±4.7 109/L and the serum creatinine value was 0.88±0.55 mg/dL. In patients with parasites in their stool microscopy, WBC was9.88±5.07109/L, whereas in patients with no parasites WBC was9.50±4.64 109/L; there was no statistically significant difference between the groups (p=0.458). The serum creatinine value was 0.85±0.37 mg/dL in patients with parasites and 0.89±0.62 mg/dL in patients with no parasites. There was no statistically significant difference between the groups (p=0.402). The relationship of serum creatinine and WBC levels with parasitic agents is summarized in **Table 3**.

The seasonal occurrence of gastroenteritis cases were most observed in summer (31%). This was followed by winter (24.6%), spring (24.1%) and autumn (20.3%). The highest prevalence of E. histolytica, the most common cause of gastroenteritis due to parasites, was in summer and the lowest in spring. The seasonal relationship of gastroenteritis cases and parasitic agents is summarized in **Figure 1**.

The charges to the Social Security Institution (SSI) of 410 patients who applied for gastroenteritis was 30849,66 USD ($)and the average charge per person was 75,24 $. It was observed that no statistically significant difference was found between parasitic coexistence in the microbiologic examination and cost distribution (p=0.375).

While 10.5% (n= 3) of the patients presenting with gastroenteritis were hospitalized in the related clinics, 89.5% (n=367) of the patients were discharged from the ED. None of the patients died. 34.9% (n=15) of the hospitalized patients were ≥65 years old (geriatric) and 65.1% (n=28) were <65 years (non-geriatric).14.6% (n=60) of the patients were geriatric patients and it was determined that 25% (n=15) of these patients were admitted to the related clinics. The rate of hos-

Table 2. Comparison of parasitic agents and leukocyte / erythrocyte coexistence in stool microscopy.

	E. histolytica		G. intestinalis		A. lumbrocoides		Other*		Total	
	n	%	n	%	n	%	n	%	n	%
Leukocyte										
Positive	83	93.3	3	3.4	1	1.1	2	2.2	89	100.0
Negative	36	70.6	2	3.9	3	5.9	10	19.6	51	100.0
Total	119	85.2	5	3.6	4	2.8	12	8.4	140	100.0
Erythrocyte										
Positive	48	94.1	3	5.9	0	0.0	0	0.0	51	100.0
Negative	71	79.8	2	2.2	4	4.5	12	13.5	89	100.0
Total	119	85.2	5	3.6	4	2.8	12	8.4	140	100.0

n: number, %: percentage, * *C. parvum, B. hominis, T. trichiura,*

Table 3. The relationship of serum creatinine and WBC levels with parasitic agents.

	E. histolytica Mean±SD	***G. intestinalis*** Mean±SD	***A. lumbrocoides*** Mean±SD	**Other*** Mean±SD	p
WBC 10^9/L	9.89±5.25	8.83±2.69	11.12±4.56	9.80±4.44	0.458
Creatinine mg/dL	0.86±0.38	0.86±0.30	0.69±0.11	0.84±0.38	0.402

* *C. parvum, B. hominis, T. trichiura,* WBC: White Blood Cells, SD: Standard deviation

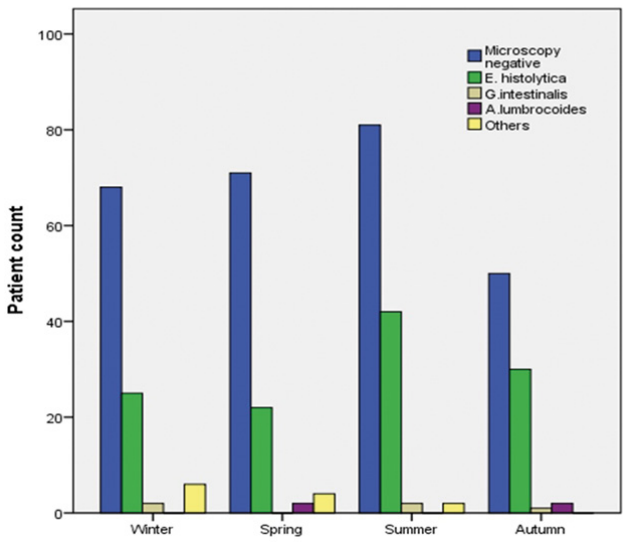

Figure 1. The seasonal relationship of gastroenteritis cases and their parasitic agents.

pitalization in the non-geriatric group was 8% (n=28). When the hospitalization rates of the age groups were examined, it was found that this rate was significantly higher in the geriatric group compared to the non-geriatric group (p<0.001).

DISCUSSION

Gastroenteritis is common worldwide and it is more common in geriatric and pediatric age groups. Although gastroenteritis cases are an important cause of mortality in low- and middle-income countries, gastroenteritis-related mortality accounts for 4% globally.

Infectious and non-infectious agents can be seen in gastroenteritis. Infectious agents are viruses, bacteria, fungi and parasites and among these agents, especially parasites are an important cause in our country. In a study conducted in our country, 17.2% of the cases presenting with gastroenteritis had parasites as causative agents (8). In another study, parasitic agents were found to be 26% (9). In the study conducted by Emiroglu et al. (10), this rate was found to be 36.5%. In our study, this rate is higher than the data in the literature and is found similar to the study of Emiroglu et al. The main reason for the high result of our study is considered to be the lack of attention to the rules of personal hygiene and sanitation as well as the reason of inadequate infrastructure works in our city.

In a study conducted by Sonmez et al., the months when parasitic gastroenteritis factors were observed in the foreground, were indicated in the months of spring and summer (11). In another study, it was stated that parasitic agents were observed most frequently in July (12).In another study, autumn months were defined as the months where most of the parasitic agents were observed (13). In our study, gastroenteritis and parasitic agents were observed to be seen commonly in summer. This situation has been associated with an increased gastric pH due to excess fluid consumption in summer because of the high temperature in the area of this study (latitude-longitude: 37, 6003 - 36, 8397).

Fluid-electrolyte disorder associated with gastroenteritis is frequently seen below the age of five and ≥ 65 years. In these age groups, patients may need to be hospitalized due to complications as a reason of dehydration and electrolyte imbalance. In a study conducted in patients aged 15 years or older who presented to the ED due to gastroenteritis, the hospitalization rate was observed to be 7.6% (14). In the United States, the annual rate of hospitalization was reported to be 2.4% (15). In our study, this rate was found to be 10.5% and 34.9% of the patients were in the geriatric age group. Although the rate of geriatric patients seems to be low among patients with total hospitalization, this rate was statistically significant in the geriatric patient group compared to the non-geriatric age group. This shows that age is an important factor in hospitalizations. The decrease in immune condition and high sensitivity to fluid-electrolyte loss is thought to be the main reason of hospitalization in geriatric patients.

In the stool microscopy examination of patients with gastroenteritis it may appear directly parasites as well as cells such as erythrocyte and leukocytes. The presence of leukocytes in the stool shows the presence of mucosal inflammation. Bozdemir et al. evaluated the patients with gastroenteritis who presented to the ED and they observed that 50.5% of patients had leukocytes and 14.2% of them had erythrocytes in their stool samples (14).In a point prevalence study in patients with acute gastroenteritis, patients with pathologic findings in direct microscopy were included in the study and in the stool samples of these patients 93.7% of them had leukocytes and 37.5% of them had erythrocytes (16).In another study, 20% of patients with positive Amoeba antigen had leukocytes and 5% had erythrocytes whereas in patients with positive Giardia antigen it was observed that 6% had leukocytes and 6% had erythrocytes (17).In our study, the number of leukocytes and erythrocytes were found to be higher in the stool samples especially in the parasitic group. This situation explains, that as a result of the invasion of parasitic pathogens into the intestinal wall, blood elements are mixed into the intestinal contents.

In the study by Celik et al., (18) 6.2% G. intestinalis and 2.8% E. histolytica were found among gastroenteritis agents. In another study, 8% G. intestinalis, 6% E. histolytica, 2% Blastocystis hominis were determined as parasitic agents (9). In a study conducted in El Salvador, 6% E. histolytica and 3% B. hominis were detected (19).In our study, E. histolytica was the most common pathogen and was much higher than all of these studies. We believe that this situation is due to the lack of infrastructure and sewerage in our region as well as a reason of the lack of personal hygiene conditions.

In parasitic gastroenteritis cases, changes in systemic laboratory findings may be seen due to invasion and inflammation in the intestinal wall. In a study, WBC and serum creatinine levels were found to be statistically significantly higher in the gastroenteritis group than in the healthy group. (p

values respectively: 0.001, 0.033) (20). In a study comparing laboratory parameters between bacterial, viral and parasitic gastroenteritis there was no statistically significant difference between WBC and serum creatinine values between the groups (p values respectively: 0.380, 0.593) (13). In our study, WBC and creatinine levels of the patients with gastroenteritis were not significantly high. The reason for this was thought to be related to early admittance to hospital.

In the literature, there are not enough studies investigating the costs of gastroenteritis. However, the total cost of gastroenteritis to SSI in our study was calculated as 30849,66 $. When labor force loss and other factors related to gastroenteritis cases are added to this situation, it is inevitable that the cost will increase.

As a result, the parasitic gastroenteritis factors continue to be important. This situation leads to an increase in hospitalization rate and loss of labor force, and also plays an important role in health expenditures. The results of the current study showed that E. histolytica is an important public health problem, in our region. We believe that this problem will be reduced by sewage and infrastructure works and by improvement in sanitation of drinking and utility water.

Conflict of Interest and Financial Status: Our study has not been financed by an institution and institution. In this study, there is no conflict of interest among the authors on any subject.

Research Contribution Rate Statement Summary: The authors declare that, they have contributed equally to the manuscript.

REFERENCES

1. NICE. NICE Clinical Knowledge Summaries: Gastroenteritis. 2015. URL: http://cks.nice.org.uk/ gastroenteritis (accessed 1 November 2015).
2. Leder K. Intestinal Protozoa: Giardia, Amebiasis, Cyclospora, Blastocystis hominis, Dientamoeba fragilis, and Cryptosporidium parvum. In: Shwartz E (ed). Tropical Diseases in Travelers. Singapore: Wiley-Blackwell; 2009. p.294-302.
3. Uyar Y, Taylan Ozkan A. Antigen detection methods in diagnosis of amebiasis, giardiasis and cryptosporidiosis. Turkiye Parazitol Derg 2009; 33:140-50.
4. Pogge TW. Human rights and global health: a Research program. Metaphilosophy 2005;36:182–209.
5. Değirmenci A, Sevil N, Güneş K, Yolasiğmaz A, Turgay N. Distribution of intestinal parasites detected in the parasitology laboratory of the Ege University Medical School Hospital, in 2005. Turkiye Parazitol Derg 2007; 31:133-5.
6. WHO: Water-related diseases. Geneva (Switzerland): WHO, 2016. URL: https://www.who.int/water_sanitation_health/diseases risks/diseases/diarrhoea/en/
7. Garcia LS, Arrowood M, Kokoskin E, Paltridge GP, Pillai DR, Procop GW, et al. Laboratory diagnosis of parasites from the gastrointestinal tract. Clin Microbiol Rev 2018;31:20-40.
8. Kuk S, Erensoy A, Keleştimur N. Results of Parasitological Examination of Stools in the Parasitology Laboratory of the Firat University Firat Medical Central inside the last year. Fırat Tıp Dergisi 2006;11:113-115.
9. Eren ŞH, Oğuztürk H. Prevalance of Intestinal Protozoa in Diarrheic Patients. Cumhuriyet Üniversitesi Tıp Fakültesi Dergisi 2005;27:11-14.
10. Emiroğlu HH, Kösecik M, Altunay H, Oğuz S, Öztürk M, Nazlıgül Y. Incidence of amebiasis with diarrhea in Şırnak Province. Klimik Dergisi 1999; 12:79-81.
11. Sönmez TG, Çalışkan Ş, Willke A. Distribution of Intestinal Parasites among Patients Who Presented at the Parasitology Laboratory of the Kocaeli University School of Medicine Hospital. Turkiye Parazitol Derg 2008; 32:126-129.
12. Usluca S, Yalçin G, Over L, Tuncay S, Sahin S, Inceboz T, Aksoy U. The distribution of intestinal parasites detected in the Dokuz Eylul University Medical Faculty Hospital between 2003 and 2004. Turkiye Parazitol Derg 2006;30:308-12.
13. Göncü, S. Çocuklardaki akut gastroenteritte akut faz belirteçlerinin ayırıcı tanıdaki rolü (Tıpta Uzmanlık Tezi). Selçuk Üniversitesi, Konya. (2015).
14. Bozdemir MN, Kuk S, Yıldız M, Ateşçelik M, Baştürk M, Kılıçaslan İ. Evaluation of the Patients who Presented Emergengy Department Complaining of Diarrhea. Fırat Tıp Dergisi 2007; 12:118-120.
15. Guerrant RL, Gilder TV, Steiner TS et al. Practice guidelines for the management of infectious diarrhea. Clin Infect Dis 2001;32:331-351.
16. Koçak Tufan Z, Altun Ş, Bulut C, Kınıklı S, Demiröz AP. Protozoal Antigen Positivity in Diarrheal Patients Admitted to Emergency Service: A Point Prevalence Study. Mikrobiyol Bul 2011;45: 765-767.
17. Akyar I, Gültekin M. Five year surveillance of Entamoeba histolytica and Giardia antigen of stool samples by ELISA method. Turkiye Parazitol Derg 2012;36:12-6.
18. Çelik T, Bayındır Y, Tevfik M, Daldal N. İnönü Üniversitesi Tıp Fakültesi Turgut Özal Tıp Merkezi Parazitoloji Laboratuvarına başvuran hastalarda bağırsak parazitlerinin dağılımı. Turkiye Parazitol Derg 2000; 24: 380-383.
19. Reinthaler FF, Linck G, Klem G, Mascher F, Sixl W. Intestinal parasites in children with diarrhea in El Salvador. Geogr Med. 1988;18:175-80.
20. Çelik T, Güler E, Berksoy EA, Sorguç Y, Arslan N. Mean Platelet Volume in Children with Acute Gastroenteritis Caused by Entamoeba histolytica. Turkiye Parazitol Derg 2015;39:205-8.