

Characteristic Profiles of Parasitic and Fungal Infections in Acute Diarrhea

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ABSTRACT

Background: Diarrhea has been widely encountered in developing countries, including Indonesia. This study aimed to investigate the incidence of parasites and fungal infections, which also constitutes the etiologies of acute diarrhea.

Method: A cross-sectional study was performed involving 93 patients. Patients with chief complaint of acute diarrhea were recruited at five hospitals in Jakarta, Indonesia during the period of November 2008 until May 2009. Acute diarrhea was defined as passing watery or soft stools with frequency of more than three times per day, weighted more 200 g per day, and occurred in less than 15 days duration. They were asked to collect their stool to the laboratory for further parasites and fungal detection.

Results: This study showed that 41 out of 93 patients (44.09%) were found to be infected with parasites or fungi. The most common microorganism found was *Candida albicans* in 18 (19.35%) patients. Other parasites encountered in the stool samples were *Blastocystis hominis*, *Entamoeba histolytica*, *Entamoeba coli*, *Giardia lamblia*. The presenting clinical symptoms of the patients were fever (44.87%), bloating (41.03%), nausea (39.74%), oliguria (39.74%), cephalgia (35.90%), vomiting (24.36%), and tenesmus (19.23%).

Conclusion: The incidence of parasitic and fungal infections in patients with acute diarrhea constitutes nearly half of all cases of infection-caused diarrhea. The most commonly encountered microorganism is *Candida albicans*.

Keywords: parasites, fungi, acute diarrhea

ABSTRAK

Latar belakang: Diare merupakan penyakit yang umum dijumpai di negara-negara berkembang, termasuk Indonesia. Penelitian ini bertujuan mengetahui tingkat insidensi infeksi parasit dan jamur sebagai salah satu penyebab diare akut.

Metode: Desain penelitian potong lintang dilakukan pada 93 pasien. Subjek penelitian adalah pasien yang datang dengan keluhan utama diare akut yang berasal dari lima rumah sakit di Jakarta pada bulan November 2008 sampai Mei 2009. Diare akut didefinisikan sebagai keadaan buang air besar dengan konsistensi tinja yang lunak atau encer, dengan frekuensi lebih dari 3 kali per hari, dan dengan massa tinja lebih dari 200 gram per hari, serta berlangsung kurang dari 15 hari. Tinja dikumpulkan dan diperiksa lebih lanjut di laboratorium untuk mendeteksi adanya penemuan parasit dan jamur.

Hasil: Dari 93 pasien dengan diare akut ditemukan 41 (44,09%) pasien terinfeksi jamur atau parasit. Mikroorganisme yang paling sering ditemukan adalah *Candida albicans* sebanyak 18 (19,35%) pasien. Parasit lain yang ditemukan pada sampel tinja yaitu *Blastocystis hominis*, *Entamoeba histolytica*, *Entamoeba coli*, dan *Giardia lamblia*. Gejala klinis yang ditemukan pada pasien meliputi demam (44,87%), kembung (41,03%), mual (39,74%), buang air kecil lebih sedikit dari biasanya (39,74%), nyeri kepala (35,90%), muntah (24,36%), dan tenesmus (19,23%).

Kesimpulan: Tingkat insidensi diare akut yang disebabkan parasit dan jamur mencapai hampir setengahnya dari tingkat kejadian diare karena infeksi. Parasit dan jamur yang paling sering ditemukan adalah *Candida albicans*.

Kata kunci: parasit, jamur, diare akut

INTRODUCTION

Acute diarrhea is frequently encountered in developing countries like in Indonesia.¹ In the world, acute diarrhea is one of the major causes of high morbidity and mortality.^{2,3} In United States, it is estimated that every year 99 million adult population experiencing acute diarrhea or gastroenteritis symptoms, which resulted in 8 million doctor visits and more than 250,000 hospitalizations each year (1.5% of whole hospital admissions for adult patients).³ Acute diarrhea remains associated with substantial morbidity, mortality and costs.⁴ In Indonesia, the most common cause of acute diarrhea in adults is infection.⁴ In contrast, maldigestion-malabsorption played a major causation role in developed countries.⁵ The existence of parasites or fungi in acute diarrhea still yield less attention than the more frequently-encountered bacteria. Several studies in developing countries reported that *Escherichia coli* pathogen still persists as the most common etiology of acute diarrhea.⁶

In special conditions, such as immunocompromised patients, the manifestations of acute diarrhea due to parasites and fungal infections are often severe, incapacitating the quality of life, and resulting in intricate complications.³ Recently, the increasing microorganism detected in immunocompromised patients is human immunodeficiency virus (HIV).⁷

The diagnosis of parasitic and fungal infections is often suspected when the patients have already experienced rehydration failure and resistance against antibiotics treatment or antidiarrheal agents.^{8,9} This study aimed to determine incidence of parasitic and fungal infections and the relative frequency of acute diarrheal symptoms in percentages.

METHOD

A cross-sectional study was performed involving 93 patients. We analyzed data from patients with acute diarrhea who had been treated at five hospitals in Jakarta, i.e. the Cipto Mangunkusumo Hospital, Abdi Waluyo Hospital, Tarakan Hospital, Koja Hospital, and Pluit Hospital from November 2008 until May 2009. Acute diarrhea was defined as diarrhea that last less than 15 days.⁹ Diarrhea is a bowel movement of watery

or soft stools with frequency of more than 3 times per day.¹⁰ The stool samples were collected to be examined for detecting parasites and fungi in laboratories.

Parasite is defined as microorganism which absorb food and sheltered on or in other organisms while contributing nothing to the survival of its host, e.g., protozoa, worms, etc.¹¹ Fungus is defined as organism which lack chlorophyll, feed and sheltered in the intestine of other organisms, e.g., *Candida spp*, *Aspergillus*, etc.¹²

RESULTS

The study unveiled the incidence of bacteria, viruses, fungus, and parasites infections in percentage and when summed up together, it resulted in 76.34% (71 out of 93 acute diarrhea cases). Among others, the parasites and fungus infections accounted for 41 (44%) cases (Figure 1). Parasitic or fungal infections were observed to occur isolated or concurrently with the bacteria or viruses.

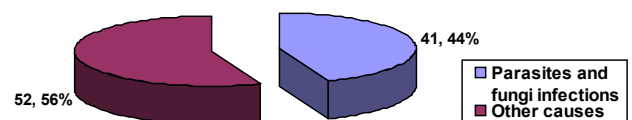


Figure 1. Proportions of parasitic and fungal diarrhea in percentages

Among other parasites and fungi that caused diarrhea, *Candida albicans* was the most commonly detected. It was found in 18 (19.35%) cases. Other organisms were *Blastocystis hominis*, *Entamoeba histolytica*, *Entamoeba coli*, and *Giardia lamblia* (Table 1).

Table 1. Relative frequency and proportions of detected parasites and fungi

Organisms	n (%)
None	52 (55.91)
<i>Entamoeba coli</i>	2 (2.15)
<i>Entamoeba histolytica</i>	7 (7.53)
<i>Giardia lamblia</i>	1 (1.08)
<i>Blastocystis hominis</i>	13 (13.98)
<i>Candida albicans</i>	18 (19.35)
Total	93 (100)

Fever was the most common clinical complaint in patients with diarrhea due to parasites and fungi (44.87%). Other symptoms were nausea, vomiting, bloating, oliguria, tenesmus, and cephalgia (Table 2).

Table 2. Distribution and prevalence rate of presenting symptoms in patients with acute diarrhea

Symptoms	n (%)
Fever	35 (44.87)
Bloating	32 (41.03)
Nausea	31 (39.74)
Oliguria	31 (39.74)
Cephalgia	28 (35.90)
Vomiting	19 (24.36)
Tenesmus	15 (19.23)

DISCUSSION

In this study, infections linger as the most common etiology for acute diarrhea (76.34%). Our finding is in accordance with the results in other developing countries.^{1,4-6,8} The cumulative incidence of parasitic and fungal infections in the study was 44%. It is also in conformity with similar studies in other developing countries.^{1,4-6,8} Other studies reported the overall prevalence of intestinal parasitic infection ranged from 19% to 49%, consists of protozoal infections (11.5%) and soil-transmitted helminthic infections (8.1%).¹³

A patient with diarrhea might be infected with up to 100 subtypes of parasitic worms in the intestines. *Entamoeba histolytica*, *Giardia lamblia*, and *Cryptosporidium* species are the common enteric protozoal parasites that are generally believed to be associated with diarrhea.^{14,15} Parasites are frequently found in food, drinking water, even in the air.^{1,4} However, transmission of these diarrhea-causing pathogens is predictably through fecal-oral pathway.² Risk factors for transmission of these organisms were improper disposal of excretions and improper cleanliness of washing hands, especially after defecation or before food preparation, poor food hygiene, inadequate food storages, food exposure to flies, and contaminated drinking water.³

This study discovered that the etiologies were as follows, i.e. *Candida albicans*, *Blastocystis hominis*, *Entamoeba histolytica*, *Entamoeba coli* and *Giardia lamblia*. The result is similar with other studies which noted the frequently-observed organisms as *Giardia lamblia*, *Entamoeba histolytica*, *Entamoeba dispar*, *Cryptosporidium spp*, *Cyclospora cayetanensis*, *Isospora belli*, *Microsporidia*, *Enterocytozoon bienersi*, *Encephalitozoon intestinal*, *Blastocystis hominis*, *Ascaris lumbricoides*, hookworm, *Strongyloides stercoralis*, *Taenia spp.*, *Trichuris trichiura*, *Enterobius*

vermicularis, and *Shistosomamansoni*.^{4,13,16-19} In case-control studies, microscopic examination has been used for making the diagnosis. However, microscopic diagnosis has several limitations due to its inability to distinguish *Entamoeba histolytica* from the morphologically similar and prevalent non-pathogenic parasites, *Entamoeba dispar* and *Entamoeba moshkovskii*.²⁰⁻²⁵

Fathy, in his study, reported that *Blastocystis hominis* infection rate was higher in food handlers (35.5%).¹⁷ Ojurongbe et al showed that the acquired prevalence percentages of intestinal parasites in patients with acute diarrhea in Osogbo, Nigeria as follows, i.e. *Cryptosporidium spp* (54.2%), *Ascaris lumbricoides* (59.4%), hookworms (5.2%), *Entamoeba histolytica* (3.1%), *Strongyloides stercoralis* (1%) and *Taenia spp.* (1%).¹⁸ Moreover, they discovered significant association between *Cryptosporidium* infection and CD4+ count ($p = 0.0001$).¹⁸ Chalmers reported cryptosporidiosis prevalence of 1.2% over 3,030 *Cryptosporidium spp.*-positive fecal samples, which occurred across all age groups.²⁶ Sejdini et al, found the following parasites in patients with acute diarrhea, i.e., *Giardia duodenale* (10.9%), hookworms (5.6%), *Ascaris lumbricoides* (1.9%), *Trichuris trichiura* (0.6%), *Cryptosporidium spp* (0.3%) and *Entamoeba histolytica/Entamoeba dispar* (0.3%).¹³

Giardia sp infections or called giardiasis often lead to clinical symptoms of acute diarrhea which may last for 1-2 weeks or longer period resulting in chronic diarrhea. Giardiasis is frequently detected in Indonesia, United States, and other countries worldwide. *Giardia sp* is one of protozoan parasites that may cause diarrhea. Giardiasis causes diarrhea by imposing damage to the small intestine, causing malabsorption, maldigestion and hypersecretion of chloride, as well as accelerating intestinal transit.^{11,27,28}

Parasitic infection in human intestines could manifest in diverse array of clinical features. Generally, patients who are infected by parasites tend to become weak and malnourished.¹ Several studies have unveiled some host factors that may contribute to the severity of the disease including age, personal hygiene, gastric acidity, other gastrointestinal barriers, intestinal motility, intestinal microflora, immunity, and intestinal receptors.³ Most of the parasites, such as protozoa, produce prostaglandin that causes sodium and chloride loss in the body. Such mechanism has been reported to have an important role in inciting diarrhea.^{16,29}

In this study, we observed that clinical symptoms found in acute diarrhea were fever, bloating, nausea,

oliguria, cephalgia, vomiting, and tenesmus. Our result may be slightly different compared to other literatures, which demonstrated that other than diarrhea, the frequently-encountered symptoms are abdominal cramps, abdominal pain, nausea, fever and blood in the stool.⁴ Another study asserted that 68.5% of *Blastocystis hominis*-infected patients were experiencing apparent clinical symptoms that frequently manifested as abdominal pain (66.2%) and flatulence (43.2%).¹⁷ The other study also asseverated that the prevalence of *Blastocystis hominis* infection ranged from 10 to 16.7% in patients with irritable bowel syndrome (IBS) who experienced symptomatic abdominal pain, diarrhea, or constipation.³⁰

CONCLUSION

The incidence of parasitic and fungal infections in patients with acute diarrhea constitutes nearly half of all cases of infection-caused diarrhea. The most common microorganism observed is *Candida albicans*.

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