Volume 2 • Issue 1 • 2020

Opinion Article

Archives of Nutrition and Public Health

Amoebiasis: an Important Foodborne Disease of Global Public Health Concern

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Received: January 24, 2020; **Published:** February 14, 2020

Abstract

Foodborne diseases remain a significant challenge for food safety and public health throughout the world. These diseases occur in sporadic as well as in epidemic form resulting in high morbidity and also mortality. Amoebiasis, caused by protozoan parasite *Entamoeba histolytica* is still seen as a neglected disease. Globally, about 50 million cases of invasive *E. histolytica infections* occur each year, resulting in as many as 100,000 deaths. The disease is endemic in many countries including India. The prevalence of amoebiasis varies from 2% to 67% in India. The source of infection is exogenous, and transmission occurs through faecal-oral route. Symptoms can range from mild diarrhea to severe dysentery. Extraintestinal amoebiasis can occur when the protozoa spreads to other organs. Demonstration of parasite in the stool is considered the mainstay of diagnosis. Disease is most frequently observed in people who are living in the tropics with poor sanitation. Metronidazole is widely used as a therapeutic agent. Early treatment with metronidazole followed by paromomycin usually results in a clinical cure. In untreated patients, amoebic infections carry very high morbidity and mortality. Education of public on personal hygiene, environmental sanitation, washing and treatment of raw vegetables and fruits with vinegar, and boiling of water is very essential, especially in endemic developing nations to prevent the disease.

Keywords: *Amoebiasis; Entamoeba histolytica; Foodborne; Protozoa; Public health*

Introduction

Foodborne diseases, caused by diverse etiologies, are important from public health as well as economic point of view. These diseases are widely prevalent in developing and developed nations of the world including India. The exact data on the incidence of foodborne diseases is not easily available. In USA, the annual burden of foodborne diseases is estimated to cause 47.8 million cases, resulting in 127,839 hospitalizations and 3037 deaths (CDC, 2011). It is mentioned that infants, young children, the elderly, and the immunocompromised persons are particularly vulnerable to foodborne infections (Pal, 2014). There are many protozoan diseases, such as giardiasis, cryptosporidiosis, toxoplasmosis, sarcocystosis, amoebiasis, and balantidiasis, which are transmitted through the ingestion of contaminated foods and water (Pal, 2007; Pal and Boru, 2010; Pal et al., 2016; Pal et al., 2017). Among these, amoebiasis (amoebiosis, amoebic dysentery, amoebic enteritis) is an important foodborne protozoan disease that is primarily caused by Entamoeba histolytica (Pal, 2007). However, other species, such as Entamoeba moshkovskii and Entamoeba dispar are very rarely found to be associated with disease (Parija and Khainar 2007). The disease is responsible for approximately 50 million cases and 100,000 deaths worldwide

annually (Walsh, 1986). In addition to humans, infection due to *Entamoeba histolytica* has also been recorded in ape, cat, dog, langur, macaque, monkey, pig, and rat (Pal, 2007). The author had demonstrated protozoa in the faecal samples of the monkey, dog, and man (Pal, 2007). In India, the prevalence of amoebiasis varies from 2% to 67% (Sehgal and Devi, 2010). The epidemiological studies identified that eating of unwashed raw vegetables and fruits is an important risk factor of amoebiasis (Pal, 2014). The disease is worldwide in distribution but is more commonly observed in areas with poor sanitation, mainly in the tropical countries (Pal 2014). Amoebic liver abscess is ten times more frequently noticed in males as compared to females and usually affects between 18 and 50 years of age (Haque *et al*., 2003). The present communication describes the growing importance of amoebiasis as a foodborne disease of global public health concern.

Transmission

Infection is acquired from the ingestion of contaminated food and water with cysts of *Entamoeba histolytica*. The eating of unwashed raw vegetables and fruits can cause infection. Food handlers may also transmit the infection by soiled hands. Mechanical transfer of protozoa occurs through flies and cockroaches (Pal, 2007).

Clinical spectrum

Entamoeba histolytica infection is asymptomatic in about 90 % of the cases. Among those 10% with clinical amebiasis the onset is generally subacute for 7 to 21 days (Aristizabal *et al*., 1991; Petri, 1996). Clinical symptoms in the affected persons include diarrhea, dysentery, abdominal pain, fever, chills, weight loss, besides amoebic granuloma in large intestine, abscesses in the liver, lung, and brain following haemtogenous dissemination, and ulceration of the skin in perianal region (Pal, 2007). Fever and weight loss are observed in less than 40% of patients (Aristizabal *et al*., 1991; Petri, 1996). Acute fulminant colitis is an unusual complication of intestinal amoebiasis (Pal, 2014; Dogra et al., 2017).

Diagnosis

Laboratory diagnosis is imperative to establish an unequivocal diagnosis of disease. Microscopic demonstration of cysts or trophozoites of *Entamoeba histolytica* in freshly voided stool, cultivation of fresh stool, aspirates or tissue biopsies on diaphasic coagulated egg slant overlaid with Locker's solution containing serum, examination of smears obtained by proctoscopy, radiography of liver to detect abscesses in the liver, and immunological tests such as counter immunoelectrophoresis (CIEP),enzyme linked immunosorbent assay (ELISA) and indirect hemagglutination (IH) may help in diagnosis of amoebiasis (Pal, 2007). The indirect hemagglutination test is most sensitive immunological technique, and gives positive results in up to 90% of patients with intestinal disease (Pal, 2014). Early *E. histolytica* infection can be diagnosed by stool and serum antigen detection assays (Pal, 2014).

Treatment

The asymptomatic infection is usually resolves within 12 months. A number of drugs, such as metronidazole, secnidazole, ornidazole, tinidazole, iodoquinolol, diiodohydroxyquin, and dioxanide furoate, paromycin are tried for the treatment of *Entamoeba histolytica* infection (Haque *et al*., 2003; Pal, 2007; Pal, 2014; Gardiner *et al*., 2015). Haque and co-authors (203) reported that noninvasive colitis may be treated with only paromycin, to eradicate the intraluminal cysts. However, invasive and extra intestinal amoebiasis should be treated with metronidazole (Haque *et al*., 2003). If the patient develops fulminant amoebic colitis, it is emphasized to include broad-spectrum antibiotics to the treatment to avoid the risk of bacterial translocation (Gardiner *et al*., 2015). It is important to mention that after a 10-day course of metranidazole, paromycin should be administered to prevent relapse of infection (Gardiner *et al*., 2015). It is advised that asymptomatic infections must be treated in order to prevent the spread of infection.

Prevention and control

Currently, no vaccine is available to immunize the susceptible population. Therefore, the control of disease depends on certain measures, such as protection of food and water from faecal contamination, proper cleaning of fruits and vegetables before consumption, sanitary disposal of human stools, provision of potable water to the community, prohibition on the use of night soil as manure in vegetable field, periodic examination of food handlers, treatment of asymptomatic carriers, thorough washing of hands with soap and water after toilet and before eating of food, and health education of public about the source of infection, importance of personal hygiene, and risks involved in eating of unclean raw fruits, uncooked vegetables, and drinking of unwholesome water (Pal,2007; Pal, 2014).

Conclusion

Foodborne diseases present a growing public health problem in both developing as well as and developed countries of the world. Globally, amoebiasis is recognized as a common intestinal protozoan infection due to *Entamoeba histolytica* with high morbidity and mortality. Presently, there is no vaccine is available for amoebiasis. Hence, sincere attempts should be directed to develop a

safe, potent, and cheap vaccine that can be used to immunize the susceptible population in endemic regions. It is advised to evaluate the efficacy of herbal drugs that can be safely administered for the treatment of amoebiasis.

Acknowledgements

The author is highly grateful to Prof. Dr. R. K. Narayan for critical editing of the manuscript and Anubha for rendering computer help.

Conflict of interest: Nil

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