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A Comphrensive Review on Amoebiasis

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Abstract:- With its wide range of dissemination, Entamoeba histolytica poses a serious threat in practically any nation where there is a regular barrier between human waste, food, and water sources. Except E. histolytica, at least eight distinct amoebas are thought to be commensals in the human intestinal lumen. As the second biggest cause of death from parasitic disease globally, the parasite poses a serious threat to public health in most regions of the world and has reemerged in several previously inactive locations. The majority of E. histolytica infections have very minor or no symptoms, however, colitis and liver abscesses brought on by amoebic infections are the most common clinical manifestations. Typically, a laboratory's diagnosis of amoebiasis is based on a microscope.

Keywords:- *Amoebiasis, Parasite, E. Histolytica, Amoebic Dysentery.*

I. INTRODUCTION

➢ *Amebiasis:*

Amebiasis or amoebic dysentery is a parasitic intestinal infection caused by any of the amoebas of the Entamoeba group. It belongs to microorganisms (shigella) a protozoan parasite. It may be asymptomatic or present with abdominal pain, diarrhea, or dysentery. If the parasite reaches the bloodstream, it can spread through the body and end up in the liver, causing amoebic liver abscesses. Liver abscesses can occur without previous diarrhea. Diagnosis is typically by stool examination using a microscope. An increased WBC count may be present. The most accurate test is specific antibodies in the blood [1]. Prevention of amoebiasis is by improved sanitation. Two treatment options are possible, depending on the location. Amoebiasis in tissue is treated with metronidazole, tinidazole, nitazoxanide, dehydroemetine, or chloroquine. A luminal infection is treated with diloxanide furoate or iodoquinoline[2]. Effective treatment may require a combination of medications. Infections without symptoms require treatment, but infected individuals can spread the parasite to others.

➢ *Pathophysiology:*

The motile trophozoites feed on bacteria and tissue reproduce,and colonize the lumen and the mucosa of the large intestine and sometimes tissues and organs.Pathogenesis of *E. histolytica* is multifactorial, since the virulent molecules of theparasite, as well as the host's immune response, play an important role in the pathogenesisof the disease, causing damage to tissues that facilitate entry to systemic sites[3]. The destructive mechanisms of *E. histolytica* include contact with target cells, cytolysis, phagocytosis, and the degradation of ingested cells. After contact with trophozoites in the epithelium, the cells increase the paracellular permeability produced by the opening of the TJ junctions and the distortion of the microvilli.*Entamoeba histolytica* usually lodges in the intestine and in about 90 percent of cases, it generates an asymptomatic infection; however, it is not clear why a minority of individuals infected with *E. histolytica* activate a pathogenic phenotype[4] .E. *histolytica* infection has been demonstrated.

➢ *Epidemology:*

The prevalence of amebic colitis and liver abscesses is significantly higher in underdeveloped countries compared to developed ones like the United States. As a cause of protozoan mortality, E. histolytica infection is arguably second only to malaria. According to the most accurate estimate, there are 40–50 million instances of amebic colitis and liver abscesses worldwide each year, with 40,000–110,000 fatalities [4].

Asia, Africa, and Central and South America are home to the majority of amebic illnesses.For instance, the national serosurvey conducted in Mexico in 1987–1988 showed an 8.4% seropositivity for E. histolytica. An estimated 1 million instances of amebiasis and 1216 fatalities from E. histolytica infections were reported in Mexico during the year of the serosurvey [5]. Fecal-oral spread is the reason behind the high rate of sickness in poor nations. Amoebiasis is caused by poor sanitation and unhygienic. It doesn't have a proper medication for cure.

➢ *Etiology:*

Entamoeba histolytica, the protozoan parasite that causes amebiasis, is a serious global health risk, especially in areas with inadequate sanitation and hygiene standards. Its origin must be understood to prevent, diagnose, and treat this viral disease.

The genus Entamoeba contains the single-celled bacterium Entamoeba histolytica, which is the cause of amebiasis[6]. There are two primary stages that it can take:

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the invasive trophozoite stage and the infectious cyst stage. Because of its resistance to the environment, the cyst stage enables the parasite to thrive outside of the host in hostile environments such as polluted food or water supplies. Cysts that are consumed go from the stomach into the intestines, where they expel their cysts and release trophozoites. After that, trophozoites proliferate in the large intestine, invading and damaging tissue to produce the telltale signs and symptoms of amebiasis. The parasite's life cycle may be completed by some trophozoites encyst and being expelled in faces.

Ingestion of tainted food or water-carrying parasite cysts is the main method of transmission of Entamoeba histolytica[7]. The disease is made easier to spread by elements like shoddy living conditions, inadequate water treatment, and crowded housing. The risk of transmission is increased in areas where amebiasis is endemic, especially among people with poor access to sanitary facilities and clean water.

Several risk factors raise the possibility of contracting amebiasis. People who eat tainted food or drink contaminated water are also more vulnerable, as are those who reside in locations with inadequate sanitary facilities. To avoid infection, travelers visiting areas where amebiasis is endemic should also take precautions[8]. In addition, several variables, such as genetic predisposition, impaired immune systems (as in HIV/AIDS patients), and malnourishment, may make a person more susceptible to the illness.

The symptoms of amebiasis can range greatly in severity, from asymptomatic colonization to a serious invasive illness. Frequent signs and symptoms include fever, cramps, diarrhoea (which could be bloody), and abdominal pain[9]. In extreme circumstances, the parasite may spread to other organs, including the liver, where it may cause abscesses and other potentially fatal consequences. Stool microscopy, clinical assessment, and, occasionally, molecular testing to identify the parasite or its DNA are used in the diagnosis process[10].

Improving sanitation and hygiene standards, such as having access to clean water, disposing of waste properly, and taking precautions with food safety, are the main goals of amebiasis prevention. Controlling the disease's spread requires public health initiatives focused on increasing awareness, improving hygiene education, and putting in place efficient sanitation infrastructure[11]. In addition, visitors to areas where the disease is endemic should exercise caution by limiting their water intake to bottled or boiling water and avoiding undercooked or uncooked food.

II. GENETICS

Despite the fact that research on amebiasis genetics is still underway, it is important to comprehend both the clinical consequences and susceptibility to the disease. Not everyone exposed to Entamoeba histolytica experiences symptoms of illness, despite the parasite being the main cause of amebiasis[12]. Variability in disease appearance and severity can be attributed to genetic variables pertaining to both the parasite and the host.

Amebiasis susceptibility is influenced by host genetics; certain people are more likely to contract the infection or experience severe clinical consequences. Research has revealed genetic variations linked to a higher chance of contracting amebiasis. For instance, differences in the genes encoding Toll-like receptors and cytokines, which are involved in immune response pathways, have been linked to altering the host's sensitivity to Entamoeba histolytica infection[13]. The capacity of the host to regulate parasite invasion and dissemination may potentially be impacted by polymorphisms in genes linked to innate immune recognition and mucosal barrier function.

Moreover, differences in virulence and pathogenicity of Entamoeba histolytica are a result of their genetic diversity. Extensive genetic variation exists within the parasite population, as shown by genome sequencing research, with different genotypes displaying varying virulence and clinical consequences. Entamoeba histolytica strains can cause asymptomatic colonization in certain cases, but other strains are more skilled at penetrating host tissues and causing serious illness. Determining the parasite's genetic diversity is essential to understanding its pathophysiology, epidemiology, and dynamics of transmission.

Environmental factors are important in determining the epidemiology of amebiasis, in addition to host genetics. Living in congested conditions, with poor sanitation and limited access to clean water, increases the risk of contracting Entamoeba histolytica cysts, especially in settings with limited resources. Socioeconomic variables that limit access to healthcare services and preventive measures, like poverty and lack of education, further increase the burden of the disease.

Additionally, genetics research has shed light on the molecular processes that underlie the pathophysiology of amebiasis. Entamoeba histolytica secretes a variety of virulence factors that aid in tissue invasion, immune evasion, and host cell manipulation. These factors include lectins, cysteine proteases, and lipids[14]. Through their interactions with host cell receptors and signaling pathways, these virulence factors cause tissue damage, inflammation, and amebiasis-specific clinical signs.

Additionally, developments in genetic technologies have made it possible to identify possible targets for medications and vaccines intended to treat and prevent amebiasis. The goal of targeted medication discovery is to minimize side effects and drug resistance while creating new treatments that interfere with vital parasite processes. To stop the invasion and spread of the parasite, vaccine research efforts are concentrated on eliciting protective immune responses against Entamoeba histolytica, either by targeting surface antigens or by generating mucosal immunity.

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In overall, environmental variables, parasite virulence features, and host susceptibility factors interact intricately in the genetics of amebiasis. Research on genetics has yielded important information about the disease's pathophysiology and possible targets for treatment and vaccine development. To understand the causes behind amebiasis and create practical preventative and control measures, more study in this area is necessary.

III. CLINICAL FEATURES

The protozoan parasite Entamoeba histolytica is the source of amebiasis, a parasitic infection that can range in severity from asymptomatic colonization to a potentially fatal condition. Many people with mild cases of Entamoeba histolytica infection continue to be asymptomatic carriers, secretly excreting cysts in their stool[15]. On the other hand, a wide range of significant clinical manifestations may appear in those who have symptoms.

One of the most common manifestations of amebiasis is acute amebic dysentery, which is typified by symptoms like cramping, stomach pain, and bloody diarrhea. Mucus may also accompany the passage of stool, and patients frequently suffer urgency and tenesmus. Although fever is widespread, it usually has a mild grade. Affected people's quality of life may be negatively impacted by this acute stage of the infection, which can be upsetting and incapacitating.

Certain people may occasionally have non-dysentery-related chronic symptoms that last for weeks or months. Weight loss, stomach discomfort, and sporadic diarrhea are common signs of these conditions. The beginning of chronic amebiasis might be subtle and may not necessarily require rapid medical attention, which can cause delays in diagnosis and treatment.

But amebiasis can be more serious than only gastrointestinal problems. Even though it is less frequent, Entamoeba histolytica invasions of organs other than the intestines can result in extraintestinal amebiasis[16]. The liver is the most commonly involved extraintestinal location, leading to amebic liver abscess. Fever, hepatomegaly, jaundice, and abdominal pain in the right upper quadrant can all be signs of a liver abscess. Severe liver abscesses may burst, resulting in pleural effusion or peritonitis. Moreover, the parasite can spread to other organs including the skin, brain, or lungs, resulting in granulomas or localized abscesses that can cause a range of symptoms depending on the organ that is impacted.

Amebiasis complications can be extremely serious and even fatal. Sepsis, peritonitis, and intestinal perforation are possible side effects of advanced or untreated illness[17]. These side effects emphasize how crucial it is to identify amebiasis early and treat it quickly in order to reduce morbidity and mortality.

Furthermore, the therapy of amebiasis is further complicated by the possibility of recurring infection. Even those who have received prior treatment for amebiasis are nevertheless vulnerable to reinfection, especially in areas where the disease is still being transmitted[18]. Inadequate treatment, ongoing exposure to tainted food or water, or variables impacting host immunity can all lead to recurrence.

Amebiasis diagnosis is based on a combination of laboratory testing and clinical assessment. A standard diagnostic method for Entamoeba histolytica cysts or trophozoites is microscopic inspection of stool samples; in some circumstances, molecular testing or serological assays may be added. Antimicrobial medication is used in the treatment of amebiasis in order to eradicate the parasite and supportive measures are used to control symptoms and consequences.

When summed up, amebiasis is a complex illness with a wide range of clinical manifestations[19]. A patient's amebiasis can vary greatly in its clinical course, from asymptomatic carriage to serious extraintestinal consequences. The morbidity and death linked to this parasite infection must be reduced by early detection, precise diagnosis, and timely treatment. Enhancing sanitation, hygiene habits, and access to clean water are also essential for stopping Entamoeba histolytica from spreading and lowering the incidence of amebiasis worldwide.

IV. DIAGNOSIS

It's critical to treat amebiasis as soon as possible to stop the illness from spreading and reduce the chance of consequences. Finding the cause of amebiasis requires a complete medical history and physical examination. The medical professional will inquire about symptoms that are frequently connected to the infection, such as diarrhea, abdominal pain, and weight loss, during this examination. Inquiries concerning recent travel to regions where amebiasis is more prevalent as well as any risk factors for the infection may also be made. Stool samples are the most widely used diagnostic test for amebiasis[20].

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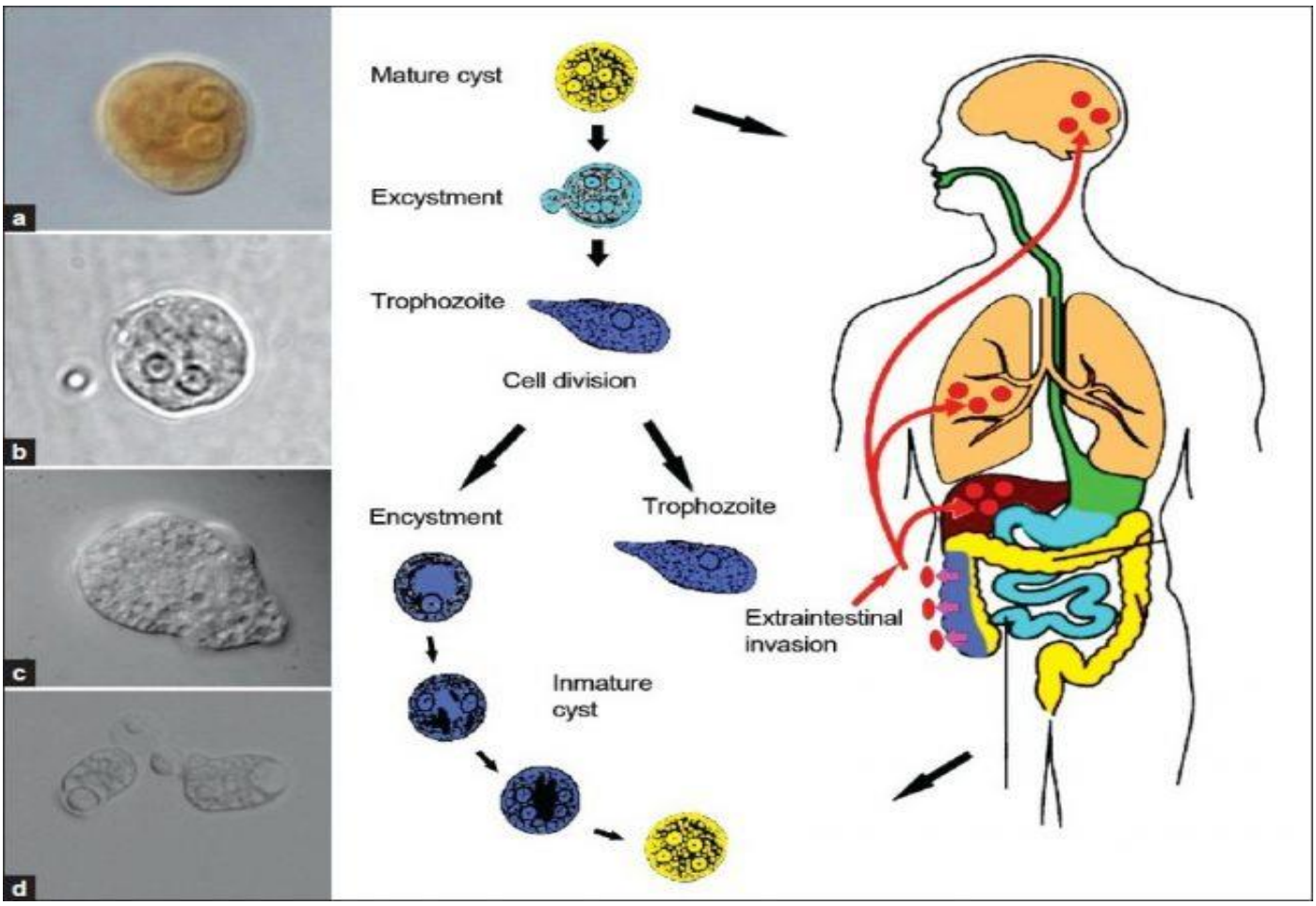

Fig 1 Amebiasis Disease Formation

➢ *Treatment:*

Since the symptoms of amebiasis often resemble those of other digestive system infections, like dysentery, a proper diagnosis is frequently not made until the illness has progressed. It is essential to identify and treat amebiasis as soon as possible in order to stop the infection from spreading and reduce the chance of consequences[16]. In rare circumstances, amebiasis can result in major side effects such intestinal or liver abscesses, which can be fatal if left untreated.

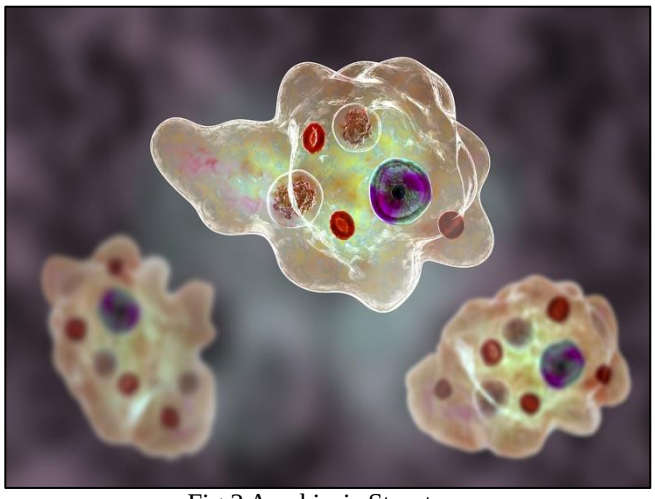

Fig 2 Amebiasis Structure

➢ *Home Remedies for Amebiasis:*

Amebiasis is an infection caused by the parasite E. histolyticaand is most commonly found in developing countries with poor sanitation conditions. While it is important to seek medical treatment for amebiasis, there are also several home remedies that can help to alleviate the symptoms and speed up the recovery process[17].

- Garlic: Garlic has antimicrobial properties that can help kill the parasite causing amebiasis. Crush 2-3 cloves of garlic and mix with a glass of water. Drink this mixture 2-3 times a day.
- Ginger: Ginger has anti-inflammatory and anti-parasitic properties, making it effective in treating amebiasis. Simply add 1-2 inches of fresh ginger to a cup of boiling water and let it steep for 10 minutes. Drink this tea 2-3 times a day.
- Aloe Vera: Aloe vera has antimicrobial and anti-inflammatory properties, making it an effective home remedy for amebiasis. Mix 1 tablespoon of aloe vera juice with 1 glass of water and drink 2-3 times a day[18],[19].
- Turmeric: Turmeric has antimicrobial properties that can help kill the parasite causing amebiasis. Mix 1 teaspoon of turmeric with a glass of warm milk and drink twice a day.

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- Papaya: Papaya contains an enzyme called papain that helps break down proteins and has been found to be effective in treating amebiasis. Eat 1-2 slices of ripe papaya daily, or take papaya supplements as directed by a healthcare professional.
- Yogurt: Yogurt contains beneficial bacteria that can helprestore the balance of bacteria in the gut and prevent the growth of the parasite causing amebiasis. Eat plain, unsweetened yogurt daily.
- Fennel seeds: Fennel seeds have antimicrobial and anti-inflammatory properties, making them effective in treating amebiasis. Drink fennel seed tea 2-3 times a day. Simply boil 1 teaspoon of fennel seeds in a cup of water for 10 minutes, strain, and drink.
- Lemon: Lemon is high in vitamin C, which has been shown to have antimicrobial properties. Mix 1 tablespoon of lemon juice with a glass of warm water and drink 2-3 times a Day.

V. CONCLUSION

In conclusion, amebiasis which is brought on by the protozoan parasite Entamoeba histolytica poses a serious threat to international health, especially in areas with inadequate hygiene and sanitation standards. A broad spectrum of clinical signs, ranging from asymptomatic colonization to severe diarrhoea or extraintestinal consequences including liver abscesses, might be indicative of the disease[20]. To stop the infection from spreading further and to lower the morbidity and fatality rate linked to it, early detection through stool examination and timely treatment with antimicrobial drugs are essential. The main goals of prevention measures are to increase access to clean water, sanitation, and hygiene as well as to educate and raise public understanding of food safety procedures. A number of natural remedies, including yogurt, fennel seeds, garlic, ginger, aloe vera, turmeric, papaya, and lemon, can help reduce symptoms and promote healing even though medical care is still necessary.These treatments, however, shouldn't take the place of expert medical counsel and care.Overall, to effectively stop the spread of amebiasis and lessen its effects on world health, a comprehensive strategy including both medical interventions and public health initiatives is required.

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