

**ABSTRACT**

Blastocystosis is symptomatic infection caused by the protozoal parasite *Blastocystis*, which resides in the intestinal tract of its hosts and it is one of the most common parasites reported in humans. It's prevalence ranges between (30 - 50%) of the population in developing countries. This genus has a worldwide distribution and often the most commonly reported human intestinal protozoan in children and adults, even infect infants.

**Keywords:** *Blastocystis, hominis, Blastocystosis, parasitology*.

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Received at 10/1/2019  
Accepted at 18/6/2019

**INTRODUCTION**

Physicians have produced conflicting reports regarding whether *Blastocystis* causes disease in humans, these reports resulted in a brief debate in medical journals in the early 1990s between some physicians in the US who believed that this parasite was harmless, but others believed it could cause disease, and the medical condition caused by infection with *Blastocystis* is called blastocystosis (1). Children and the elderly appear to

be highly susceptible to *Blastocystis* (2), while other researchers have suggested that people between 30 and 50 years of age are most prone to being infected by this parasite (3).

**Morphology of *Blastocystis hominis***

Culture studies of this parasite have identified several main forms, as well as a recently confirmed cyst stage (4), as shown in figure (1).

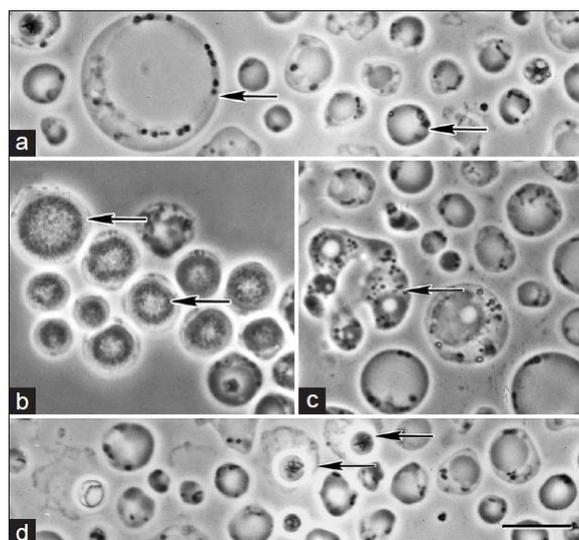


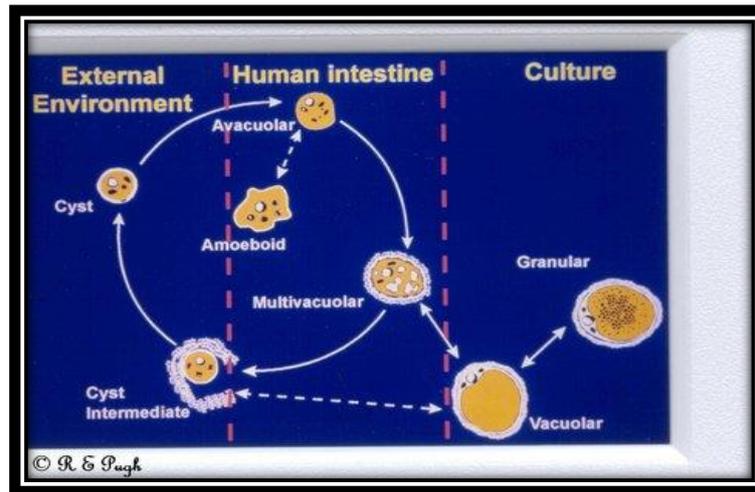
Figure (1): (a) Vacuolar forms of *Blastocystis* having a large centrally placed vacuole showing extensive variation in size (arrows), (b) Granular forms with distinct granules filling the central body, (c) Amoeboid form with characteristic pseudopodia, (d) Cyst forms, the smaller size about 10 μm, and the characteristic cyst wall surrounded by loose irregular outer coat.

The cyst form provide protection to the parasite during adverse conditions and are

found to remain viable for up to 1 month at 25°C even on exposure to air. It is proven to be the transmissible infective forms, which on entering a suitable host develop into vacuolar forms (5).

**Life Cycle of *Blastocystis hominis***

Numerous conflicting life cycles have been proposed (6), and these discrepancies are due largely to the belief that *Blastocystis* exhibits multiple reproductive processes as shown in figure (2).



**Figure (2): Life cycle of *Blastocystis hominis*.**

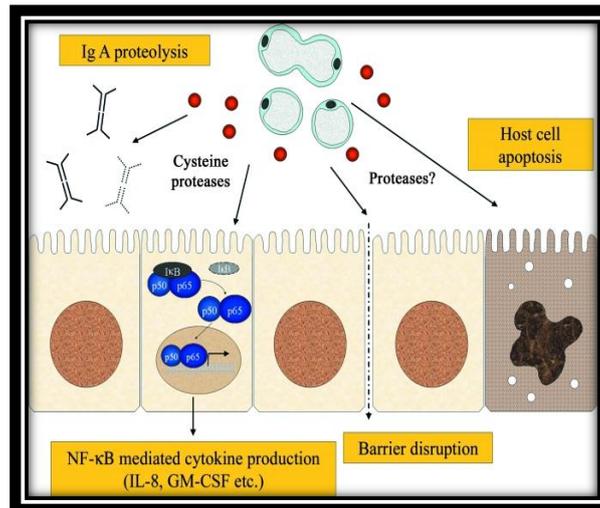
#### **Transmission of *Blastocystis hominis***

Fecal-oral transmission is the most accepted pathway of transmission<sup>(8)</sup>. Studies have revealed that suitable hosts could contract *Blastocystis* infection by drinking untreated water or eating raw aquatic plants contaminated with cysts<sup>(9)</sup>, recent studies demonstrate that unclean hands can serve as fomites for transmission of cysts from infected individuals on direct contact or from contaminated soil<sup>(10)</sup>.

#### **Pathogenesis of *Blastocystis Hominis***

Current *in vitro* studies support a pathogenic role for *Blastocystis*. Parasite secretory components, such as cysteine proteases, may exert a variety of detrimental effects on host cells, resulting in cytopathic effects, barrier compromise, and the production of pro inflammatory cytokines<sup>(11)</sup>, as shown by Kevin<sup>(12)</sup> in figure<sup>(3)</sup>. Secretion of proteases and other

hydrolytic enzymes by *Blastocystis* have been identified by polyacrylamide gel electrophoresis and attributed to be responsible for the pathogenesis of gastrointestinal symptoms<sup>(13)</sup>. *Blastocystis* culture lysates have been found to produce cytoskeletal alterations and induce apoptosis in epithelial cells, which results in increased permeability<sup>(14)</sup>. Cysteine proteases secreted by the organism are known to stimulate the intestinal mucosal cell to produce interleukin-8<sup>(15)</sup>. These mechanisms are suggested to be responsible for the fluid loss and intestinal inflammation in affected individuals. Puthia *et al.*, have observed the ability of a cysteine protease to cleave human secretory immunoglobulin A thereby helping in immune evasion and promoting parasite survival *in vivo*<sup>(16)</sup>.



**Figure (3): Mechanisms of causing pathogenesis by *Blastocystis*.**

### Signs and symptoms

The most usual complaint of blastocystosis patients is the intense of abdominal discomfort accompanied by pain, and constipation is common, discomfort, anorexia, bloating, cramps, alternating diarrhea, watery diarrhea, mucus diarrhea, vomiting, dehydration, sleeplessness, nausea, weight loss,

inability to work, lassitude, dizziness, flatus, purities (17), chronic urticaria (18) as shown in figure (4), ulcerative colitis (19), development of iron deficiency anemia (20). It has been found that this parasite play an important role in the etiology of irritable bowel syndrome (IBS) (21).



**Figure (4):**Chronic urticaria caused by *Blastocystis hominis*.

### Treatment

There are numbers of antimicrobial agents have been used to treat *Blastocystis* infection. This includes metronidazole, nitazoxanide, trimethoprim-sulfamethoxazole (TMP-SMX), paramomycin, iodoquinol, ketoconazole, secnidazole, emetine, tinidazole, and the probiotic *Saccharomyces boulardii* (22).

Table (1): Antimicrobials reported as useful in the treatment of *Blastocystis* infection.

Drug	Dose
Metronidazole	
Adult dose	750 mg thrice daily for 10 days; or 500 mg thrice daily for 10 days; or 1.5 g daily for 7 days
Pediatric dose	15 mg/kg twice daily for 10 days
TMP-SMX	
Adult dose	2 double strength tablets daily for 7 days (320 mg TMP: 1600 mg SMX)
Pediatric dose	6 mg/kg TMP daily for 7 days
Nitazoxanide	
Adult dose	500 mg twice daily for 3 days
Pediatric dose	100-200 mg twice daily for 3 days
Paromomycin	
Adult dose	25 mg/kg thrice daily for 10 days; 500 mg thrice daily for 7 days
Pediatric dose	650 mg thrice daily for 10-20 days
Ketoconazole	200 mg daily for 14 days
Tinidazole	
Adult dose	2 g daily for 5 days
Pediatric dose (<40 kg body weight)	50 mg/kg/day for 5 days
<i>S. bouvardii</i>	250 mg twice daily for 10 days

TMP-SMX: Trimethoprim-sulfamethoxazole, *S. bouvardii*: *Saccharomyces bouvardii*

### Public Health and Prevention Strategies

Due to the uncertain infective nature and transmission pathways of the parasite, there are no widespread public health or prevention strategies directly aimed at *Blastocystis hominis*. CDC does list the followings, however, as potentially useful preventative and control measures (23), including hand wash with soap and water before handling food and after using the toilet. If employed in a child-care center, also wash after each diaper change even if gloves were used, avoid potentially infected water and food, wash and peel all raw fruits and vegetables, avoid untreated water in countries with less established water-safety.

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