Blastocystis Hominis Infection Pathogenic or Commensal: Short Review

Sonu Kumari Agrawal
Department of Microbiology, AIIMS, New Delhi, India

Abstract: Blastocystis is anaerobic, unicellular protozoan resides in intestinal tract of human as well as other hosts. Despite the various observations over the year, the classification of Blastocystis Species still controversial and it is difficult to define its taxonomical status. There are variations in morphological forms of Blastocystis hominis but three major forms commonly noted: vacuolar, granular, ameboid. The pathogenicity of Blastocystis is still matter of debate. A number of studies have shown the pathogenic potential of this organism. Hence, in this review, we will discuss classification, morphology, lifecycle, pathogenicity, Clinical features, Diagnosis and treatment of Blastocystis.

Keywords: Blastocystis hominis, protozoa, commensal, pathogen

1. INTRODUCTION

Blastocystis is anaerobic, unicellular protozoan resides in intestinal tract of human as well as other hosts. It was considered as fungus before, now it has been classified to a protozoa. The pathogenicity of the organism is still doubtful and is the subject of debate. Hence, in this review, we will discuss classification, morphology, lifecycle, pathogenicity, Clinical features, Diagnosis and treatment of Blastocystis.

2. CLASSIFICATION

Despite the various observations over the year, the classification of Blastocystis Species still controversial and it is difficult to define its taxonomical status. It was Alexeieff and Brumpt, who proposed that Blastocystis is saprophytic yeast of the intestinal tract. The genus name “Blastocystis” was proposed by Alexeieff and term “hominis” was proposed by Brumpt because it was isolated from human faeces. Later, Zierdt et.al gave an evidence that organism was not fungus and on the basis of morphological properties : presence of one or more nuclei, Golgi apparatus, endoplasmic reticulum, mitochondria like organelles and physiological properties such as failure to grow on fungal medium resistant to antifungal and antibacterial and sensitive to antiprotozoal drugs, he classified the organism as a Protists. Small-subunit rRNA molecular sequencing techniques provided an evidence that Blastocystis hominis is not related to fungi and sporozoans. Later on Jiang et.al, reclassified the organism into the class Blastocystea, the order Blastocystida, the family Blastocystidae, the genus Blastocystis and type species hominis. Designation of the organism to species level is still not adequately resolved. Further studies are required for morphological and molecular data to resolved the issues.

3. MORPHOLOGY

There are variations in morphological forms of Blastocystis hominis but three major forms commonly noted: vacuolar, granular, ameboid. In addition other forms such as multivacuolar, avacuolar and cysts forms have also been described.

Vacuolar form:
It is most predominant and typical form used for diagnosis of Blastocystis hominis. In this morphological form size ranging from 2 to 200 µm in diameter. This form consist of large central vacuole with thin peripheral rim. This peripheral rim contains one or more than one nuclei.
mount examination Blastocystis hominis appear as central empty space hence it is known as vacuolar form. Later on it was found that these vacuoles are membrane bound bodies hence it is also known as central body containing granular material. These central body act as storage organelle and plays a role in apoptosis of organism. Vacuolar form undergo encystations to form cysts.

Granular form:
This form is morphologically similar to vacuolar form except that central vacuole contains granules. Granular forms are larger than vacuolar form with size vary from 10 to 60 µm in diameter. There are three types of granules have been described in literature – lipid, metabolic and reproductive granules. The lipid granules are present in cytoplasm and act as storage granules. The metabolic granules are involved in metabolic pathways and reproductive granules play role in schizogony.

Ameboid form
The ameboid form is rarely reported. The central vacuole is absent in this form. They are 10 µm in diameter, irregular in shape. Because of their small they often get confused with neutrophils and macrophages. They have pseudopods but are non-motile.

Cyst form
The cyst forms are smaller in diameter (3 to 6 µm) as compare to vacuolar and granular form. They are spherical and surrounded by multilayered thick wall. The cyst contain nuclei vary from 1 to 4. The cyst are thought to protect the parasite under adverse conditions.

Mode of Transmission and Life Cycle
It is mainly transmitted thorough faeco-oral route. Some of the studies have shown that ingestion drinking water, raw vegetables or fruits and unclean hands contaminated with cysts can serve as transmission of Blastocystis infections. After ingestion of cysts, it undergoes excystation to differentiate into vacuolar form in large intestine. Then, vacuolar forms can differentiate into other forms such as multi-vacuolar, avacuolar and amoeboïd. In the lumen of intestine vacuolar forms encyst to cysts which are passed in the stools. Binary fission is most accepted mode of reproduction in vacuolar forms in this organisms.

Pathogenicity
The pathogenicity of Blastocystis is still matter of debate. A number of studies have shown the pathogenic potential of this organism. Due to absence of proper animal model exact pathogenic mechanism is not known. The most convincing result to explain pathogenicity is relation of virulence
with subtype pathogenicity (ST). Subtype 1, 2, 3, 4, 6 have been reported from symptomatic patients. The most common subtype is ST 3. The most studied morphological form is amoeboid in pathogenic members. Subtype alone does not explain the pathogenicity. Hydrolytic enzymes and proteases secreted by Blastocystis lead to secretion of interleukin-8 by activating the gut mucosa, responsible for gastrointestinal symptoms. However, the factors responsible for extraintestinal symptoms are not yet known. More genomic studies are required to confirm the pathogenicity of Blastocystis.

Clinical Features

The person can present with no symptoms or with intestinal and extra-intestinal symptoms.

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<tr>
<th>Asymptomatic</th>
<th>Intestinal</th>
<th>Extra-intestinal</th>
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<td>Some of studies have found</td>
<td>Abdominal pain, diarrhea, nausea, rectal bleeding, hepatomegaly, splenomegaly.</td>
<td>Joint pain, swelling, arthritis.</td>
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<td>Vacuolar forms in stool of asymptomatic patients.</td>
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Laboratory Diagnosis

Blastocystis shows polymorphism and vacuolar, granular, ameboid, cyst, all forms can be identified in faecal sample. Concentration techniques are not useful in case of Blastocystis infection due to disruption of morphology of organism. Multiple stool samples should be examined to enhance the detection rate of parasites. Microscopy is most widely used method of examination. In wet mount unstained or stained with iodine examination organisms are round approximately 2 to >200 μm in diameter having large central vacuole surrounded by one or multiple nuclei. Other staining methods such as Trichrome, Giemsa, Gram and Wright’s have been found to succeed. Electron microscopy is not generally required for routine diagnosis but useful to confirm the atypical morphological forms of parasites. Culture methods are more sensitive than direct smear examination. Culture media such as Drbohlav egg medium, modified Dulbecco’s medium + 10% horse serum, minimal essential medium (MEM) + 10% horse serum, Diamond's trypticase serum monophasic media have shown successful cultivation of organisms anaerobically at 37°C. Blastocystis infections can be detected by serological techniques such as ELISA (Enzyme linked immunosorbent assay and IFA (Immunofluoroscent assay) but these immunological techniques are not use in routine diagnosis. Studies have found that successful use of Polymerase chain reaction (PCR) for diagnosis of Blastocystis infections.

Treatment

The need to treat Blastocystis infections is still controversial. It is thought that infection is self limited and intervention may not be warranted. However, some believe that treatment is required in debilitating cases. Antiprotozoal drugs mainly metronidazole or iodoquinol are recommended for management infections. Dose of metronidazole is 250 to 750 mg three times per day for 5 to 10 days and iodoquinol is 300 mg three times per day for 10 days is recommended for treatment of infections.

4. CONCLUSION

The role of Blastocystis (unicellular protozoan parasite) is still matter of debate. Due to lack of suitable animal model exact virulence factors are not known so, more studies are required to explain the pathogenic role of Blastocystis in human diseases.

REFERENCES

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