**COCCIDIA (SPOROZOA)**

Coccidia are members of the class sporozoa, Phylum Apicomplexa. Apical complex is present at some stage and consists of elements visible with electron microscope. The life cycle is characterized by an alternation of generations, i.e. sexual (gametogony) and asexual (schizogony) reproduction and most members of the group also share alternative hosts. The locomotion of a mature organism is by body : flexion, gliding, or undulation of longitudinal ridges. The genus Plasmodium that are the causes of malaria is the prototype of this class.

**1.** ***Plasmodium* species– causes malaria.**

**2. *Toxoplasma gondii* – causes toxoplasmosis.**

**3. *Cyclospora cayetanensis* – causes cyclosporiasis.**

**4. *Isospora belli* – causes coccidiosis(Isosporiasis).**

**5. Sarcocystis species.**

**6. *Cryptosporidium parvum*** – causes **cryptosporidiosis**.

The Coccidia are a group of organisms which parasitize the epithelial cells of the intestinal tract. This group includes: 1. Cryptosporidium parvum, 2. Cyclospora cayetanensis and 3. Isospora belli. Most of the coccidian infections in man are zoonoses (having the potential to infect animals or arise from animals). In immunocompetent individuals, they usually produce mild, self-limiting infections.

***Cryptosporidium parvum*** ………………..1

The main symptom of which is diarrhea. It is most severe in immunocompromized patients, e.g., those with AIDS. The organism is acquired by faecal-oral transmission of Oocysts from either human or animal sources. The oocysts excyst in the small intestine, where the trophozoite (and other forms) attach to the gut wall. Invasion does not occur. The **jejunum** is the site most heavily infested. The **pathogenesis** of the diarrhea is **un**known; **no toxin** has been identified. Cryptosporidium causes diarrhea worldwide, for large outbreaks of diarrhea caused by Cryptosporidium are attributed to inadequate purification of drinking water. The disease in immunocompromized patients presents primarily as a watery, non-bloody diarrhea causing large fluid loss. **Symptoms** persist for long periods in immunocompromized patients, whereas self-limited in immunocompetent individuals. Although immunocompromized patients usually do not die of cryptosporidiosis, the fluid loss and malnutrition are severely debilitating. **Diagnosis** is made by finding oocysts in fecal smears when using a modified Kinyoum acid–fast stain. Serological tests are **not** available. There is **no** effective drug therapy.



Figure : life cycle of Cryptosporidium species.

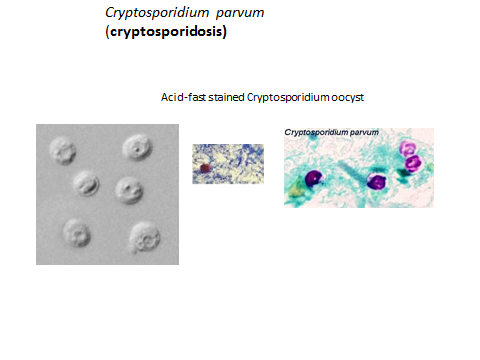




Figure : Acid-fast stained Cryptosporidium oocyst.



Fig.:Oocysts of *Cryptosporidium parvum*(lower left) stained red with Ziehl-Neelsen stain.

***Cyclospora cayetanensis* …………………2**

*Cyclospora cayetanensis*, a coccidian protozoan, has been described in association with diarrheal illness in various countries, in particular Nepal, Pakistan and India.Infection results in a disease with non-specific symptoms. Quite often the disease is the cause of unexplained summer diarrheal illness and similar illness following travel to tropical areas.

Is an intestinal protozoan that causes watery diarrhea in both immunocompetent and immunocompomised individuals. It is classified as a member of the Coccidian; the organism is acquired by fecal – oral transmission, especially via contaminated water supplies. There is no evidence for an animal reservoir. The diarrhea can be prolonged and relapsing, especially in immunocompromized patients. Infection occurs worldwide.

**Life Cycle and Morphology**

The life cycle of this organism is unknown, however environmental data suggest that *Cyclospora*, like *Cryptosporidium* species, is a water-borne parasite. The oocysts of *C. cayetanensis* are spherical, measuring 8-10µm in diameter and the mature oocyst contains 2 sporocysts. Oocysts of *Cyclospora cayetanensis*, are twice as large in comparison with *C. parvum* and are not sporulated (do not contain sporocysts - upon excretion).

When freshly passed in stools, the oocyst is not infective (thus, direct fecal-oral transmission cannot occur; this differentiates *Cyclospora* from another important coccidian parasite, *Cryptosporidium*).  In the environment , sporulation occurs after days or weeks at temperatures between 22°C to 32°C, resulting in division of the sporont into two sporocysts, each containing two elongate sporozoites .  Fresh produce and water can serve as vehicles for transmission and the sporulated oocysts are ingested (in contaminated food or water) .  The oocysts excyst in the gastrointestinal tract, freeing the sporozoites which invade the epithelial cells of the small intestine .  Inside the cells they undergo asexual multiplication and sexual development to mature into oocysts, which will be shed in stools .  The potential mechanisms of contamination of food and water are still under investigation.

**Clinical Disease**

Patients from whose stools the organism has been isolated have reported nausea, vomiting, weight loss and explosive watery diarrhea. Flatulence and bloatedness, nausea and vomiting, myalgia, low-grade fever, and fatigue are associated symptoms. The site of infection is the small bowel. The disease is usually self-limiting to three to four days but untreated infections can last from several days to a month or longer, and may follow a relapsing course. Some infections are asymptomatic.

**Laboratory Diagnosis**

The oocysts of *C. cayetanensis* are spherical as can be seen in formol-ether concentrated stool samples by light microscopy. They are refractile spheres which exhibit blue autofluorescence under ultraviolet light.

The oocysts are variably acid-fast when stained by the modified Ziehl-Neelsen method. Some cysts are acid-fast whereas others appear as round holes against a green background. They do not stain well with phenol-auramine.

The diagnosis is made microscopically by observing the spherical oocysts in a modified acid-fast stain of a stool sample. There are no serologic tests.??

The treatment of choice is trimethoprim-sulfamethoxazole.



Fig.:Oocyst of *Cyclospora cayetanensis* (upper right)stained red with Ziehl-Neelsen stain.



Figure : Oocyst of *cyclospora cayetanensis*