Hello students, today we are going to have a look at the Parasitology paper.

ZOC110. Under this, we are going to have a look at the second unit, parasitic protists.

We are also going to have a look at, amongst the parasitic protists *Giardia lamblia*.

We are going to study the morphology and lifecycle of *Giardia lamblia*.

In this module we are going to have a look at the morphology of *Giardia lamblia*

and life cycle of *Giardia lamblia*.

At the end of this discussion, the learner will be able to describe the morphology of

Giardia lamblia, also will be able to elaborate the lifecycle of *Giardia lamblia*.

Anthony van Leeuwenhoek a Dutch trader, described *Giardia lamblia* in 1681.

This protozoan was initially named *Cercomonas intestinalis* by Lambl in 1859.

In 1915 Styles renamed it at *Giardia lamblia* in the honor of Professor A. Giard of Paris

and Dr. F. Lambl of Prague.

Giardia duodenalis is considered by many as the correct taxonomic name for this

parasitic protozoan.

Giardia lamblia is also known as *Giardia duodenalis* or *Giardia intestinalis a*s it resides

in the duodenum or the jejunum of the intestine of the human host.

It is a flagellated parasitic microorganism that colonizes and reproduces in the small

intestine of the human host.It causes the disease ‘Giardiasis’.

This parasitic protozoan attaches to the epithelium by a ventral adhesive disc or sucker.

It reproduces via binary fission.

This exists in two forms, the vegetative trophozoite form and the cystic form.

Let us have a look at the morphology of the trophozoite of *Giardia lamblia*.

The trophozoite resides in the small intestine of the human host. At times it may invade the common bile duct.

The structure of *Giardia lamblia* Trophozoite is pear shaped or like a tear drop,rounded anteriorly and posteriorly pointed.

The size is 12 to 15 microns in length, and it's 5 to 9 microns in width.

The surface varies, dorsal surface being convex in nature and ventral surface being concave in nature. The ventral surface based sucking disk to adhere to surface of the intestinal cell. It occupies almost entire anterior half of the body. It's a bilaterally symmetrical form which is having two nuclei, one on each side of the Axostyle,

Actually two axostyles are running along the midline,and there are two parabasal bodies which are lying posterior to the sucking disc.

Four pairs of flagella are an important character of the trophozoite.

Two are anterior, two are posterior, two are ventral and two are caudal in position.

This is an actively moving and feeding stage of the parasite.

Let us have a look at, now, the next stage that is, the Cyst of *Giardia lamblia*.

The **Cyst** is ovoid in shape 8 to 12 micrometer in length, 7 to 10 micrometer in width.

It has a thick cyst wall which is made up of hyaline.

Four nuclei are present. Either they will be clustered at one end or they are present in

pairs at opposite ends.

The axostyle runs diagonally through the cyst. Flagella shorten and are retracted within the cyst and they provide internal support.

The cyst is formed as the trophozoite becomes dehydrated when they pass through the large intestine.

The cyst remains viable, that is, it retains its capacity to infect. In the external environment it remains viable usually in water for many months. It remains viable in the soil also.

As a cyst matures, the internal structures are doubled. Cytoplasm divides during **Excystation**. Normally Excystation occurs in the duodenum of the host.

A young cyst has two nuclei and a mature cyst has four nuclei.

Let us quickly have a look at the life cycle of *Giardia lamblia*.

The infection occurs by the ingestion of cysts in contaminated water, food or by the faeco- oral route.

That is hands and fomites contribute. The cyst once enters the host system, then will pass through the mouth, oesophagus and stomach and in the small intestine that is the duodenal part, each cyst produces two trophozoites by excystation, so the the cyst will discard its wall.It will, because the cyst wall weakens by virtue of the gastric acidity that is being provided by the intestinal environment.

The trophozoite, as are the feeding stage, they feed by Pinocytosis and they absorb

nutrients from the host. The Giardia trophozoite multiply by longitudinal binary fission remaining in the lumen of the proximal small intestine.

Here they can be either free or attached to the mucosa by a ventral sucking disc.

As the environment in the intestine tends to become unfavorable, the trophozoite will start moving towards the colon. There they transform to form cyst.

So here now the trophozoite will have a condensation of its cytoplasm.

The Flagella will be retracted in the axoneme. If you remember, we have seen that there are around 4 pairs of flagella. All these will be retracted in the axoneme and cyst wall will be secreted.

This process is called as **Encystation**. The cysts are infectious and when they are passed in the stool, or shortly afterward, also, they retain their capability to infect.

Person to person transmission is possible.

The cysts are hardy and can survive several months in cold water and soil and are viable. Two lakh cysts may be present in one gram of feces.

Both cysts and trophozoites can be found in the feces.

But the cyst is the infective stage, whereas the trophozoites die and disintegrate outside the human body and are not infectious.

These are the references that I have used for this particular topic and the website.

CDC website also which I have referred for the detailed explanation.

Thank you so much.