

Hello everyone, my name is Mithali Halarnkar and today I will be dealing with a module named "Life history of *Taenia solium* from the unit four Phylum Platyhelminthes.

Let's look at the outline. First we will be dealing with the introduction structure of *Taenia solium*, life history of *Taenia solium* and then we will deal with the disease and its treatment. After watching this video students will be able to learn the structure of *Taenia solium*, understand the life history of *Taenia solium* and discuss the symptoms and the treatment of the disease caused by them.

Let's go ahead with the introduction of *Taenia solium* is an organism which is commonly known as pork tapeworm or the tapeworm. It is referred to as a pork tapeworm because it is found in the meat of a pig. This organism is cosmopolitan in distribution and normally found in a pork eating population. This is an endoparasite which means it is found in the inside (intestine) body of the human being. It is digenetic in nature and includes two hosts for completion of its life cycle. These hosts are given names as the primary host and secondary host depending on, in which organism *Taenia solium* completes its sexual reproduction. As it completes sexual reproduction in humans it is called the primary host. Development of larval stages are carried out in the secondary host, which is pig.

Let's look at the structure of tapeworm. Tapeworm as it belongs to the Phylum Platyhelminthes, it has a dorsoventrally flattened body and its body is long narrow and ribbon like in nature. The size of this organism ranges from three to five meters and can grow up to eight meters. It is white gray yellow or cream in color and the body is pseudo segmented.

Let's look at the diagram of this organism. The body of this organism is divided into three regions. One - the head - which is also referred to as the scolex. Then we have a neck region and the third part of the body is referred to as strobila.

The head region consists of a part which is at the interior most tip of the organism which is called rostellum, rostellum is surrounded by the two rows of hooks, which is followed by four suckers present on the lateral side of the body of the organism. The hooks and the suckers are the parasitic adaptations, and these help the organism to attach to the body or the intestine of the host.

Second region is the neck. Neck is a rapidly proliferating region and it gives rise to the new segments. Third region of the body of *Taenia solium* is the strobila. Strobila consists of the proglottids. Proglottids are nothing but the pseudo-segments of this organism. They have three different types of proglottids: immature proglottids where the sexual organs are not developed, mature proglottids where the sexual organs are developed. A gravid proglottid is where the proglottid or the segments is entirely filled with the uterus with the oncospheres or the developing embryos.

Life history of *Taenia solium* includes seven stages. Stage one is copulation and fertilization. When we are starting with the life history let's consider that the tapeworm is already inside the human intestine and it is in the adult form. During the copulation and fertilization phase the organism will undergo sexual reproduction. Sexual reproduction is the fusion of the sperms and ovum in the same proglottid or between the different proglottids. This occurs because the testis matures before the ovaries in the *Taenia solium*.

Second stage in the development is the capsule formation. Once the zygote has been developed by the fusion of the male and female gamete. It gets surrounded by the yolk cell and the zygote and the yolk cell gets enclosed in a thin shell which is called a capsule. This capsule gets passed into the uterus via vagina of the organism. Passage of the capsule is facilitated by the secretion of the Mehlis

gland. The third phase is the formation of the fertilized egg. The zygote which is formed, along with the capsule gets enclosed in the hard and very resistant shell this is called a fertilized egg.

Fourth stage in the life history is the development which is further divided into two phases one where there is the cleavage or the cell division and the zygote develops into the morula which is a 16 cell stage in the development of the embryo. During this phase the yolk cells which are present around the developing zygote provide nutrition to the developing embryo. The second phase in the development is the formation of the hexacanth larva and the oncosphere. Since the morula is formed, it further divides and forms the embryo proper which later develops six hooks and develops into a larval stage which is called as the hexacanth larva. Let's look at the structure of the hexacanth larva. As the name suggests the hexacanth larva has the six hooks and it also possesses a penetration gland, which is present in between the hooks. These larvae get surrounded by the two membranes and along with this two membrane hexacanth larva and the embryo. These develop a shell and together it is called the onchosphere. So the onchosphere contains hexacanth larva along with its two membranes, and the shell.

These onchospheres starts developing inside the uterus of the *Taenia solium* and as the onchospheres gets develops inside the uterus of the organism, uterus branches into seven to thirteen branches and fills the entire proglottid. This proglottid is called a gravid proglottid and when the uterus starts branching off the remaining organs which are present in the proglottid starts disappearing. On an average in a gravid proglottid it contains around thirty thousand to forty thousand onchospheres this gravid proglottid can be eliminated from the body of the *Taenia solium* and it passes outside the body of the organism through the fecal matter.

Fifth stage in the infection of the life history of *Taenia solium* is the infection of the secondary host in the case of this tapeworm. We have pig as a secondary host. The pig gets infected with the *Taenia solium* when it starts feeding on the fecal matter of the human beings in which the onchospheres are present. Once the oncospheres are ingested inside the body of the pig with the help of the digestive juices the membranes are dissolved and the hexacanth larva enters the body of the organism. It enters into the blood system and it is carried around throughout the body of the host and eventually it gets deposited in the striated muscle. In the striated muscle this hexacanth larva develops into a bladder worm or the cysticercus larva which is a pea-shaped cyst, which can normally be seen. These cysticercus larva can be observed in the pork which is infested with the tapeworm and it looks like a white spot in the pork which is also called as a mealy pork.

Sixth stage in the development is the development of the bladder worm or cysticercus larva in the tissue of the host organism. It develops a fluid filled central cavity surrounded by the two layers. The inner layer of fluid filled cavity invaginates into the cavity and it thickens. This thickened layer later develops two rows of hooks, four suckers and a rostellum and this is called the proscolex. The development of the cysticercus larva is stopped till here and the further development only occurs inside the body of the primary host.

The seventh stage in the life history of the *Taenia solium* is the infection to the primary host where the primary host gets infected with the cysticercus larva. When man eats improperly or uncooked mealy pork, cysticercus larva gets incorporated inside the primary host. The proscolex everts out and gets attached to the intestinal walls of the host. In 10 to 12 weeks the parasite attains the full adult form and forms a gravid proglottid hence the cycle is complete. Also remember that inside the human intestine only one tape form gets established. This is the full life history of the *Taenia solium*.

*Taenia solium* causes a disease which is called as a taeniasis and it damages the intestinal organs. The symptoms of this disease are nausea, abdominal pain, nervous disorder, acute weakness and anemia. Infection is fatal in case of the cysticercosis which is when cysticercus larva or bladder worm enters into the brain tissue. This causes blindness and can even cause a brain necrosis. The drugs like the camoquin, quinacrine, carbon tetrachloride, antiphon, dichlorophen can be used for the extermination of this parasite. The scolex is detached from the human intestine only through the surgery. As we all say, prevention is better than cure the proper cooking, sterilization of the night soil and personal hygiene helps as a preventive measure.

References for this video is the zoology for the degree student by varma and agarwal and invertebrate zoology from P. S. Verma and E. L. Jordan

Thank you.