Parasitic heliminths

Introduction

A parasite is an organism that lives on or in a host & gets its food from its host.
Parasites can also be classified as:

Ectoparasite: Ectoparasites inhabit only the body surface of the host without penetrating the tissue.Lice, ticks are examples of ectoparasites .

Endoparasite: A parasite, which lives within the body of the host and is said to cause an infection is called an endoparasite helminthic parasites causing human disease are endoparasites
Endoparasites can further be classified as:
Accidental parasites: Parasites, which infect an unusual host are known as accidental parasites.*Echinococcus granulosus* infects man accidentally, giving rise to hydatid cysts.
Aberrant parasites: Parasites, which infect a host where they cannot develop further are known as aberrant or wandering parasites, e.g. *Toxocaracanis*(dog roundworm) infecting humans.
Free-living parasite: It refers to nonparasitic stages of active existence, which live independent of the host, e.g. cystic stage of *Naegleriafloweri* .

- Host: isan organism that harbors a parasite, typically providing nutrition and shelter
- Definitive host/primary host : is a host in which the parasite reaches maturity and, if possible, reproduces sexually
- Intermediate host/a secondary host: is a host that harbors the parasite only for a short transition period, during some developmental stage is completed can(harbour a pathogen with no ill).
- Reservoir host:
  an animal (or species) that is infected by a parasite, and which serves as asource of infection for humans or another species.
- Paratenic host or Transport host.In whom the parasite does not undergo any development but remains alive and infected to another host.its like bridge between intermediate host and definitive host, not necessary to the completion of the parasite's life cycle.
- Unusual or incidental host

The presence of the parasite in non –orginal intermediate host this considered dead end to parasites because it does not allow transmissionto the definitive hostpreventing the parasite from completing its development

Humans are dead-end hosts for Echinococcus canine tapeworms. the immature Echinococcus - humans are not usually eaten by dogs, foxes etc., and although it causes serious disease - is unable to infect the primary host

- Helminths :are morphologically similarorganisims, worm like parasites multicellular eukaryotic invertebrates with tube like or flattened bodies bilaterally symmetrical consisting of members of the following
- (Nematoda; roundworms)
- Platyhelminthes (flatworms):
  1-Cestoda (tapeworms)
  2-Trematoda (flukes):

Roundworms (Nematodes)	**Tapeworms (Cestodes)**	**Flukes (Trematodes)**
adults are cylindrical like unsegmented	adults are elongated,tape like segmented	adult flukes are leaf-shaped, unsegmented
bisexual	Hermaphroditic	Hermaphroditic except for blood flukes: bisexual
Head without hooks and suckers	Head with hooks and suckers	Head without hooks but with oral and ventral suckers
Digestive canal complete with anus	Digestive canal absent	Digestive canal incomplete without anus
Body cavity present	Body cavity absent	Body cavity absent
they inhabit intestinal &extraintestinal sites	inhabit the intestinal lumen, larval forms inhabit extraintestinal tissues	Inhabit liver ,lung blood

Life Cycle of Parasites

Simple life cycle:is a direct life cycle, When a parasite requires only singlenhost to complete its development, it is called as direct life cycle, e.g. *Entamoeba histolytica*requires only a human host to complete its life cycle.
Complex life cycle:indirect life cycles, When a parasite requires 2 or more species of host to complete its development, the life cycle is called as indirect life cycle, e.g. malarial parasite requires both human host and mosquito to complete itslife cycle.

- **Redia**:A larvae of certain trematodes that is produced within the sporo cyst and that can give rise toadditional rediae or to cercariae
- **Cercaria**: the final free living stage of a tematode parasite has a tail
- **Metacercaria**: the encysted tailless form.

- **Autoinfection**: is the development of small infective larvae in the gut of the host. These autoinfective larvae penetrate the wall of the lower ileum or colon or the skin of the perianal region, enter the circulation again, travel to the lungs, and then to the small intestine, thus repeating the cycle. Autoinfection makes strongyloidiasis due to *S. stercoralis* an infection with several unusual features
- **Reinfection :**A second infection that follows recovery from a previous infection by the same causative agent such as *Enterobiousvermicularis*.

Transmission of parasitic helminthes:

1-Faecal-oral:transmission of eggs or larvae passed in the feces of one host & ingested with food/water by another (e.g. ingestion of Trichuris eggs leads directly to gut infections in humans, while the ingestion of Ascaris eggs and Strongyloides larvae leads to a pulmonary migration phase before gut infection in humans).

2-Transdermal

Entry through skin is another important mode of transmission. Hookworm infection is acquired, when the larvae enter the skin of persons walking barefooted on contaminated soil. Schistosomiasis is acquired when the cercarial larvae in waterpenetrate the skin

3-Vector transmission

Vector can be biological or mechanical vectors**,**the term biological vector refers to a vector, which not only assists in the transfer of parasites but the

parasites undergo development or multiplication in their body as well. They are alsocalled as **true vectors**. Example of true vectors are:

a- Mosquito— filariasis
b- Onchocerca microfilariae ingested by blackflies and injected into new human hosts
c- Schistosoma eggs release miracidia to infect snails where they multiply and form cercariae which are released to infect new hosts).

Whilethe term mechanical vector refers to a vector, which assists in the transfer of parasitic form between hosts but is not essential in the life cycle of the parasite. Example of Mechanical vectors is housefly—amoebiasis

Type of specimens usually examined to establish a diagnosis:

€ Stool:type of parasites found in stool speciemens is
1-eggs of cestodes,trematodes and nematodes.
2-larva of *Strongyloidesstercoralis*
3-Adult worm of *Taeniasolium,Taeniasaginata ,Diphyllobothriumlatum Ascarislumbricoides,Enterobiusvermicularis,Trichinella spiralis*

€ Blood:Parasites Found in Peripheral Blood Film .
Wuchereriabancrofti, Brugiamalayi and Loa loa.

€ Urineparasites found in urine are eggs of*Schistosoma haemtobium and* Microfilaria of *Wuchereriabancrofti*
€ Sputum:The eggs of *P. westermani*are commonly demonstrated in the sputum specimen. Occasionally, larval stages of *S. stercoralis*and *A. lumbricoides*may also be found in sputum.

€ Cerebrospinal fluid (CSF)Some protozoa like *Trypanosoma. brucei, Naegleria, Acanthamoeba,Balamuthia*, and *Angiostrongylus*can be demonstrated inthe CSF.

€ Tissue and aspiratesThe larvae of *Trichinella*and eggs of *Schistosoma* can be demonstrated in the muscle biopsy specimens.

€ Genital specimens:Eggs of *E. vermicularis*are found in anal swabs.