

Introduction to Parasitology

Parasite: is an organism which adapted to live either in or on other organism “**Host**” which is usually bigger than the parasite.

Host: is an organism which carry the parasite.

Symbiosis: it is the relationship between two dissimilar organisms that are adapted to live together.

There are three types of symbiosis:

1. **Mutualism:** The relationship is beneficial for both the parasite and the host (i.e. there is close relationship between them). E.g. the protozoa in the digestive tract of termites and wood roaches.
2. **Commensalism:** This relationship is beneficial for the parasite and not harmful for the host. E.g. *Entamoeba coli*.
3. **Parasitism:** When the parasite is harmful for the parasite. E.g. *Entamoeba histolytica*, *Giardia lamblia*, *Ascaris lumbricoides*.

Ectoparasite: the parasite which live on or inside the skin and relationship is called infestation. E.g. Arthropodes.

Endoparasite: the parasite which live inside the body such as liver, spleen, blood etc. and the relationship is called infection.

Definitive host: which carry either the adult parasite or the sexual stages.

Intermediate host: which carry either the larval stage or the asexual stages.

Obligate parasites: Parasites that are entirely depend on their hosts.

Facultative parasites: Parasites that are capable for living either free in the environment or in or one a host.

Host specific: Parasite that have becomes dependent on a single species of host. E.g. *Plasmodium species* – man.

Toxoplasma gondii – number of hosts.

Host – parasite relationship

Host:

1. It is much larger than the parasite.
2. Obtains nutrient for both.
3. Susceptibility.
4. Immunological response.

Parasite:

1. Has a high reproductive ability.
2. Transmission and infection.
3. Pathogenic ability.

The outcome as follows:

1. Specificity (high or low).
2. Duration (short or long).
3. Interaction (Mechanical or molecular).

Vector: It is transmitter for the parasite. There are 2 types:

1. **Mechanical vector:** It is not essential.
2. **Biological vector:** It is essential due to some growth and development takes place inside it.

Reservoir host: It is an animal species on which the parasite depends on for survival in nature and it is serve as a source of infection for susceptible host including man.

Zoonosis: It is a term applied to diseases of animals when they transmitted to man.

Classification of animal parasite and vectors

It is the arrangement of all parasites and vectors into groups.*

It depends on the following criteria:

1. Type of the life cycle.
 2. Morphology and fine structures.
 3. Biochemical differences at species level.
- Four groups are of major importance in Medical Parasitology:
 1. Protozoa.
 2. Helminths
 3. Arthropods.
 4. Snails.
 - According to zoological classification every parasite has the following tree:

Phylum – subphylum – classes – orders – families – genus (genera) – species.
 - The interesting point is that those small animals have genetic properties transmitted for their generations.

Pathogenesis and symptomatology

Pathogens: parasite which cause an injury to their hosts.

Pathogenesis: It is the development of damage (pathological lesions).

Symptoms: They are the manifestation of pathological processes.

Carrier: an infected person but without showing external any signs and symptoms.

Outbreak: The distribution of a disease from a single source of infection.

Pathogenicity depends on:

1. Virulence of the agent.
2. Amount of inoculum.
3. The rapidity of multiplication within the host tissues.
4. Site of inoculation.
5. Single or repeated exposure.
6. Tolerance or natural resistance of the host.
7. Type of damage produced: mechanical, lytic, intoxication or allergic in nature.
8. Secondary bacterial contamination.

Mode of infection (portal of entry):The means by which the different infecting agents are transmitted from one host to another and also is the means via which the agent enter the human body.

Diagnosis

- 1) Detect the presence of eggs, larvae, protozoa, cysts, segments etc. in faeces, blood, sputum, urine or tissues.
- 2) Distinguish these stages from each other and from artifacts.
- 3) Establishing the role of this parasitic infection in causation of disease in a given case.

Treatment

- 1) Therapeutic treatment – to kill the parasite.
Chemoprophylaxis – to prevent the infection.
- 2) Supportive treatment or symptomatic treatment – to remove symptoms as in acute amoebic dysentery and severe hookworm disease.

- 3) **Suppressive treatment** – to suppress the infection and keep it under the control of human immune response such as chloroquine in malaria.
- 4) **Surgical treatment** – by surgical operation as in hydatid disease.

Epidemiology

It is a science concerned with factors that determine the prevalence of infection and the incidence of the disease in man, animals, reservoir hosts and vectors.

Epidemiologically, parasitic diseases grouped as follows:

- I. **Filth-borne or contaminative:**
e.g. intestinal protozoa, some intestinal helminth
- II. **Spoil or water-borneinfection:**
e.g. *Ascaris*, *Trichuris*, hookworms, blood flukes.
- III. **Food-borne infection:**
e.g. *Trichinella*, fish tapeworms, liver fluke.
- IV. **Arthropod-borne infection (as an essential intermediate host or vector):**
e.g. *Anopheles* – Malaria.
Tse tse flies – African trypanosomiasis.
- V. **Infestation by arthropods:**
e.g. Sarcoptic mange and louse infestation.
- VI. **Arthropods intoxication:**
e.g. Spiders or scorpions.

Control and prevention

- I. Individual level – treatment, education and hygiene.
- II. Community – water supply, sanitary disposal of human excreta, killing of inter-mediate arthropods and snails in addition to mass chemotherapy as in malaria and filarial.
- III. National and international aspects – by W.H.O.