بسم الله الرحمن الرحيم
MEDICAL PARASITOLOGY

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Introduction
Objectives

1. Types of parasites.
2. Types of hosts.
3. Host-parasite relationship.
5. Zoonosis.
6. Classification of Medical Parasitology.
7. General characters of parasites.
• **Medical Parasitology:** is the study of parasites of man and their medical consequences.

• **Parasites:** are organisms which live on or within its host (infestation & infection), for nourishment and physical protection.

• **Host:** is an organism harbouring a parasite.
Types of parasites

1. Ectoparasite: lives on the surface or within the superficial tissue of the host (e.g. *Pediculus, mites*).
2. **Endoparasite**: lives within the host, (e.g. Hookworms).

3. **Temporary or intermittent parasite**: visits the host from time to time for food (e.g. soft ticks).
4. Permanent or obligate parasite: depends completely upon its host for its entire life (e.g. *Plasmodium, Enterobius*).

5. Accidental parasites: free living organisms which enter the human body by mistake (e.g. larvae of house flies).
6. Facultative parasite: can exist in a free living or parasitic state under unfavorable environmental conditions (e.g. *Strongyloides*).
7. **Specific parasite**: affects only one species of host (e.g. *Enterobius*).

8. **Coprozoic or spurious parasites**: foreign parasites or stages of non human parasites which have been swallowed and pass to feces without causing infection (e.g. *Fasciola*).
Types of hosts

1. Definitive host (D.H.): harbors the adult stage or sexually mature forms of the parasite e.g. man for *Taenia saginata*.

2. Intermediate host (I.H.): harbors the larval stages or asexually mature forms of the parasite e.g. man for *Plasmodium*.

3. Reservoir host (R.H.): carries the adult stage of parasite, and acts as a continuous source for human infection e.g. cats for *Heterophyes*. 
4. **Amplifier host**: is an I.H. in which asexual multiplication takes place (e.g. snail ist I.H.).

5. **Paratenic host (transport host)**: in which the parasite doesn't undergo any multiplication or developmental changes (e.g. fish 2nd I.H.).

6. **Vector**: is an arthropod which transmits the parasites from one host to another (e.g. fleas transmit *Pasteurella* from rodents to man).
**Host-parasite relationship**

- **Symbiosis**: more or less permanent association of two organisms of different species.

- This relationship occurs in 4 forms:
  
  a. **Parasitism**: one of the two organisms benefits, on the expense of the other, that suffers from such association (*Schistosoma*).

  b. **Commensalism**: the parasite benefits without harming the host (*non-pathogenic ameoba*).
c. Mutualism: the relationship is beneficial to both associates (flagellates in the intestine of ants that feed on wood).

d. Phoresis: in which the phoront is usually the smaller organism and is mechanically transmitted by the other which is usually large (e.g. *Dientameoba fragils* on *Entrobius* egg).
Pathogenesis of parasitic infection

a) Pathogenic parasite: causes definite pathological lesions (*Ancylostoma*).

b) Non-pathogenic (commensal) parasite: derives food and protection from host without causing pathological lesions (*Entamoeba coli*).

c) Opportunistic parasite: causes mild disease in immunologically healthy individuals, and severe pathological lesions in immuno-deficient hosts (*Cryptosporidium*).
Diseases and infections in which the causative agents are transmitted from animals to man.

- **Anthroponosis:** parasitic infection is found in man alone as in trichomononiasis and entrobiasis.

- **Zooanthroponosis:** parasitic infections mainly affect man and animals become infected in life cycle of parasite as in taeniasis.

- **Anthropozoonosis:** parasitic infection is mainly in animal and may be acquired by man as in trichinosis.
Classification of zoonotic diseases:

1) According to the source of infection:

A-Feral or sylvatic zoonosis: source of infection is a wild animal. Humans become infected when population move to infected area or become exposed during hunting as in African trypanosomiasis.

B-Domestic zoonosis: these parasites transmitted from man own domestic animals as in hydatidosis.
2) According to the method of transmission:

A- **Direct zoonosis:** infection is directly transmitted from the vertebrate R.H. to man as in trichinosis.

B- **Saprozoonosis:** infection is transmitted via a non-development site as soil and water as in visceral larva migrans (VLM) and *Fasciola*. 
C-Metazoonosis: infection is transmitted from the animal R.H. to man via an arthropod as in leishmaniasis and trypanosomiasis.
Classification of Medical Parasitology

I. Helminthology (helminths):

1- Platyhelminths (flat worms)
   - Class: Trematoda (Flat Worms or Flukes).
   - Class: Cestoda (Tape worms).

2- Nemathelminths (round worms)
   - Class: Nematoda (Round worms).

II. Protozology (protozoa).

III. Arthropods.
1. **Trematodes**: Un-segmented, leaf-shaped, and hermaphrodite (except schistosomes), *e.g.* *Fasciola*.

2. **Cestodes**: Long, segmented, tape-like and hermaphrodite, *e.g.* *Taenia saginata*.

3. **Nematodes**: Elongated, cylindrical with pointed ends and unisexual, *e.g.* *Ascaris*.

4. **Protozoa**: Unicellular microscopic parasites, *e.g.* *Giardia intestinalis*.
Medical Helminthology
Platyhelminthes (flat worms)

Class: Trematoda (Flukes)

General characters:

1) Adults are leaf like, pear shaped or elongated worms, flattened dorsoventrally.

2) Bilaterally symmetrical except schistosomes.

3) Size: varies, some are large fleshy (Fasciola) others are just visible by naked eye (Heterophyes).
4) Covered with protective cuticle that may be smooth, spiny or tuberculated.

5) No body cavity, all organs are embedded in loose connective tissue cells.

6) Suckers: for attachment, usually 2 in number, in some there are 3 (Heterophyes heterophyes).
7) **Digestive system:**

- Starts by the mouth opening, found at the bottom of the oral sucker.

- The mouth leads to a pharynx, then a short oesophagus which bifurcates into two long intestinal caeca.

- Caeca end blindly with no anus.
8) **Excretory system**

- Starts by a definite number of excretory cells called *(flame cells).*

- Waste products pass from the cell → excretory tubules → excretory duct → excretory bladder → excretory pore at the posterior end of the fluke.
9) **Nervous system:** consists of a ring of nerve ganglion around the pharynx, from which nerve fibers arise.

10) **Respiration and nutrition:**

- Adult flukes are anaerobic.

- They feed on biliary secretion, intestinal contents, tissue juices or blood according to their habitat.
11) Genital (reproductive system):

-Nearly all trematodes are hermaphroditic with exception (schistosomes).

- **The male reproductive organs** consist of two or more testes.

- **The female genital organs** consist of a single ovary situated in front of the two testes.
Genital system

- common genital pore
- cirrus organ
- cirrus sac
- seminal vesicle
- uterus
- ejaculatory duct
- vas deferens
- ootype
- Laurer’s canal
- seminal receptacle
- ovary
- vitelline ducts
- shell gland
- testis
Life cycle of trematodes:

- Eggs of trematodes should reach water in order to develop.

- Alternation of generations in the life cycle of trematodes:
  
  • Asexual cycle in the soft tissues of snail I.H., begins by miracidium and ends by cercaria stage, passing through sporocyst and redia stages (except for Schistosoma).

  • Sexual stage in tissue of D.H.
Trematode parasites (flukes) include:

• Hepatic or liver flukes:
  - *Fasciola gigantica* - *Fasciola hepatica*
  - *Opisthorchis viverrini*

• Intestinal flukes:
  - *Heterophyes heterophyes*

• Lung flukes:
  - *Paragonimus westermani*

• Blood flukes:
  - *Schistosoma haematobium, mansoni, japonicum* and *intercalatum.*
THANK YOU