Introduction to Medical Microbiology

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Course: Medical Microbiology (MA 212)

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Week 1

Outline

- What is Medical microbiology
- Goals in studying Medical microbiology
- Definitions of Terms
- Source of Agents of infection
- Modes of transmission

Objectives

- To gain a comprehensive understanding about the basic concept of Medical microbiology and definitions of some important terms.

What is Medical microbiology?

- Is a science of studying micro organisms that are associated with human disease.
- Is the study of parasites, fungi, bacteria, and viruses that are the agents of infectious disease in humans.
- Deals with microorganisms such as pathogenic bacteria, viruses, fungi and parasites which are medically important and cause human diseases.

Goals of studying medical microbiology

- Save humanity and improve public health.

- Control infectious and contagious diseases by diagnosis and treatment and keep people safe and healthy.

- Understand infectious diseases etiology to avoid outbreaks and put emergency management.

- Prevention and stop spreading infectious diseases causative pathogens.

- In 1676, Anton van Leeuwenhoek observed bacteria and other microorganisms, using a single-lens microscope of his own design.

- In 1796, Edward Jenner developed a method using cowpox to successfully immunize a child against smallpox. The same principles are used for developing vaccines today.

- Following on from this, in 1857 Louis Pasteur also designed vaccines against several diseases such as anthrax, fowl cholera and rabies as well as pasteurization for food preservation.

- In 1867 Joseph Lister is considered to be the father of **antiseptic surgery**. By sterilizing the instruments with diluted carbolic acid and using it to clean wounds, post-operative infections were reduced, making surgery safer for patients.

- In the years between 1876 and 1884 Robert Koch provided much insight into infectious diseases. He was one of the first scientists to focus on the isolation of bacteria in **pure culture.** This gave rise to the **germ theory**, a certain microorganism being responsible for a certain disease.

- In 1929 Alexander Fleming developed one of the most commonly used antibiotic substances both at the time and now:**penicillin** .

Definitions of Terms:

✓ Pathology:

- The study of diseases and the abnormalities induced by an infection.

✓ Pathogenesis:

- The events of disease development producing the pathology.

✓ Pathogenic microorganism

- Is a microbe that can cause pathology.

✓ Disease:

- Refers to the existence of pathology, either infectious, or non-infectious disease.

✓ Infection:

- The invasion and growth of germs in the body.

✓ Infectious disease:

- Is a disease caused by a pathogenic microorganism due to its virulence factors.

✓ Contagious disease:

- Is a type of infectious diseases that transmits from infected person to the healthy without need for carrier.

✓ Virulence:

- The abilities of a microbe to produce disease in a host, like presence of capsule.

✓ Immunity:

- The degree of resistance of the host against the invading microbe.

✓ Etiology:

- The study of disease occurrence, causes, development, modes of transmission and prevention.

✓ Epidemiology:

- Is the study of diseases and public health conditions in a defined population and usually needs statistical analysis.

✓ Outbreak:

- Is the occurrence of infectious disease in excess of what would normally be expected in a defined community.

✓ Pandemic:

- Is a global disease outbreak spread across a large region.

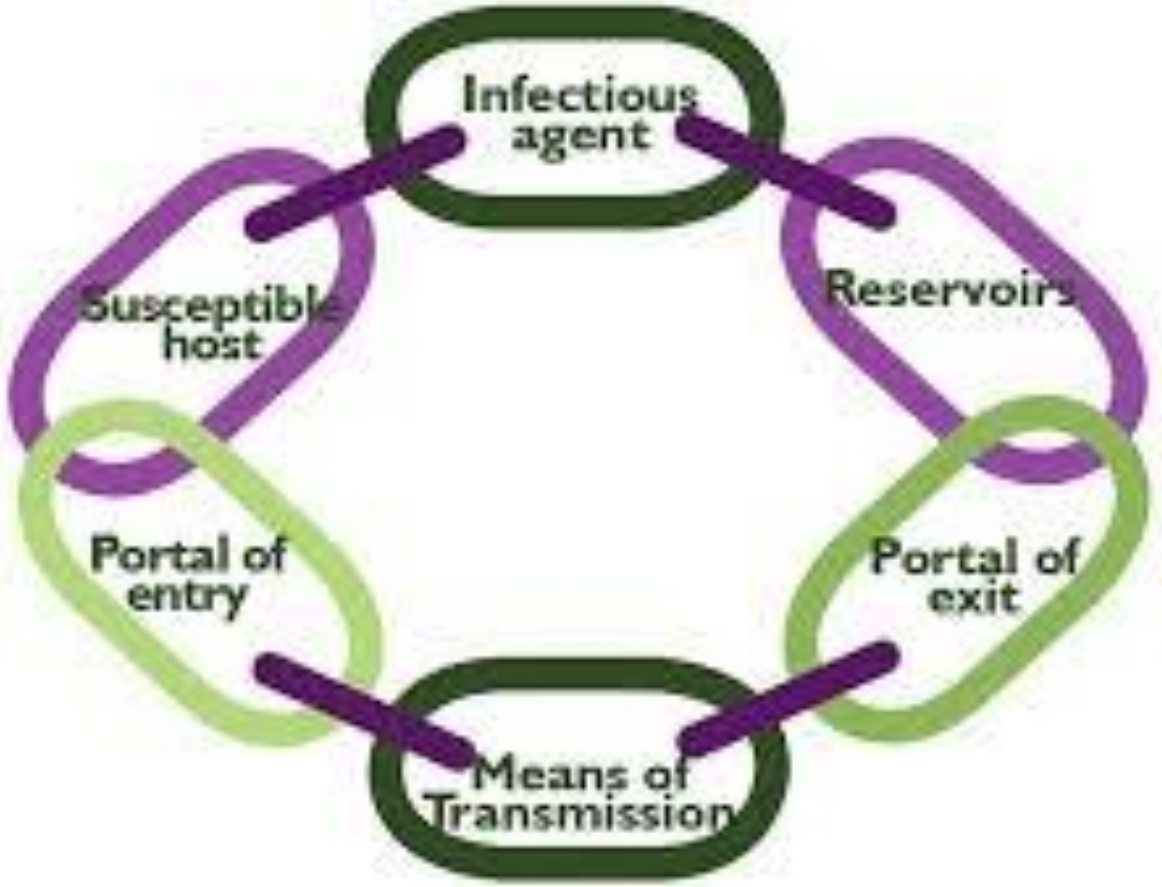
✓ Endemic:

- An endemic disease is one that is consistently present in a particular geographic area or population.

- ✓ Epidemic:

  - An epidemic refers to a sudden and widespread increase in the number of cases of a disease within a specific geographic area or population.

- Epidemiology: Chain of Infection:



❖ Source of Agents:

- Include two sources:

❖ Endogenous source:

- When the microbe is normally found in human body and form an infection due to suppression of the immune system.

❖ Exogenous source:

- Pathogenic microbes came from outside human body, carrier like mosquitoes or ticks.

❖ Modes of transmission:

1. Direct modes:
   - Contact mode
   - Droplet spread
2. Indirect modes of transmission:
   - Airborne transmission
   - Vectors or carrier
3. Multiple mode of transmission

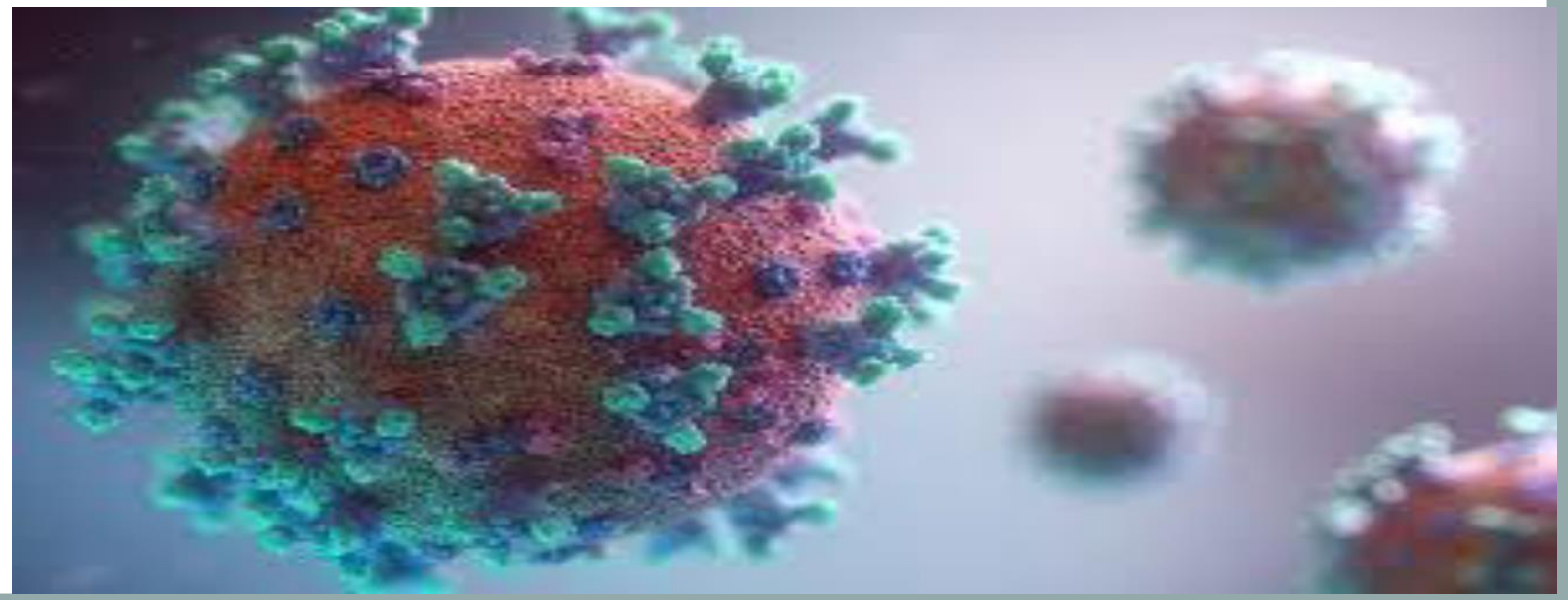
❖ Portal of entry:

1. Mouth; Ingestion.
2. Nose; Inhalation
3. Mucous membranes, adhesion
4. Contact
5. Anal Transmission
6. Vaginal Transmission
7. Placental and colostral Transmission
8. Blood

There are four classes of organisms:

1-Viruses:

- Their size < 0.3 microns in diameter, they are totally dependent on infected cells for replication. They cause intracellular infection.



2-Bacteria:

- Usually measure about one micron or more, multiply by binary fission, and they can cause intercellular or extracellular infection.

3-Fungi, these can be of two varieties:

a. Yeasts: Are unicellular organisms measuring (2-20) microns.

b. Molds: Are large multicellular organisms.

4-Parasites: These can be of two classes:

a. Protozoa: These are unicellular organisms that vary in size, some are very small (about 3 microns) and can cause intercellular infection. Others are large (80 microns) and cause extracellular infection.

b. Helminthes: These are multicellular and can reach several meters in lengths.

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Thanks