Public Health
Pharmacy college
4th stage
Lec 3
COMMUNICABLE DISEASES: INFECTIONS THROUGH SKIN AND MUCOUS MEMBRANES

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The infective agents

The agents include viruses, bacteria, fungi and arthropods.

PHYSICAL AND BIOLOGICAL CHARACTERISTICS

- Some of the agents that require direct person to person contact which do not survive long outside the human host and cannot become established in any part of the environment outside the human body, either in an alternate host or in an inanimate object such as soil or water.
- The sexually transmitted diseases such as gonorrhoea and syphilis are the best examples of this group; the usual mode of infection is therefore through intimate contact, mucous membrane to mucous membrane, or skin to skin.
- The infective agents that can survive in the environment for relatively longer periods may be spread indirectly through the contamination of soil and other inanimate objects.
- In most of these infections humans are the sole reservoir of infection, although some of the superficial fungal infections may be acquired from lower animals.

TRANSMISSION

- Infections transmitted through skin and mucous membranes may be divided into two groups:

❖**Infections transmitted through human contact (direct)**

Transmission requires direct human contact (person to person), or more intimate contact through kissing and sexual intercourse may be required, especially in the case of sexually transmitted diseases.

❖**Infections acquired from non-human sources (indirect contact)**

Indirect contact through the handling of contaminated objects such as toys, soiled clothing, bedding or dressings may be sufficient for the transmission of some infections. Infection is acquired from various non-human sources: (i) infected soil (hookworm); (ii) water (schistosomiasis); (iii) animal bites (rabies); or (iv) through wounds (tetanus).

Control of contact infections

1 -The infective agent

- Elimination of the reservoir by case finding, selective or mass treatment.

2 -The route of transmission

- Improvement of personal hygiene.
- Elimination of overcrowding.
- Avoidance of sexual promiscuity.

3- The host

- Specific immunization, e.g. tetanus.
- Chemotherapy and chemoprophylaxis.

INFECTIONS TRANSMITTED THROUGH HUMAN CONTACT/ VIRAL INFECTIONS

Chickenpox

- Chickenpox is an acute febrile illness with a characteristic skin rash.
- The incubation period is usually from 10 to 21 days.
- The aetiological agent is the varicella-zoster virus (VZV).



EPIDEMIOLOGY

- Chickenpox is a common infection all over the world.

Reservoir and transmission

- The reservoir of infection is exclusively human.
- Transmission is from person to person, either directly through contact with infectious secretions from the upper respiratory tract and through droplet infection or indirectly through contact with freshly soiled articles.
- The patient remains infectious 1–2 days before the rash appears and until all blisters have formed scabs.

Host factors

- Host factors play an important part in determining the clinical manifestations of this infection.
- In **most** cases, it is a mild, self-limiting disease.
- It tends to be more severe in adults than in children.
- The overall case fatality rate is low, but it is high in cases complicated with primary viral pneumonia.
- **Severe** infections may occur in **immunocompromised** patients.
- One attack of chickenpox **usually** confers lifelong immunity.

LABORATORY DIAGNOSIS

- The organism may be cultured or identified immunologically from the early skin lesions or from throat washings. Arising titre of antibodies in acute and convalescent sera is also diagnostic.

Control

- **Immunization** of high-risk groups.
- High-risk groups including **immunocompromised** persons may be **protected passively with varicella-zoster immunoglobulin** made from plasma of healthy volunteer blood donors with high levels of antibody to VZV.

Viral haemorrhagic fevers

- Several viral haemorrhagic fevers that affect animals and humans, caused by four distinct families of RNA viruses.
- These diseases affect multiple organ systems, damage the cardiovascular system, and reduce the body's ability to clot blood, which can lead to life-threatening hemorrhaging (bleeding).
- A common feature of these infections is that transmission requires intimate exposure to the patient or contact with blood or other bodily secretions.

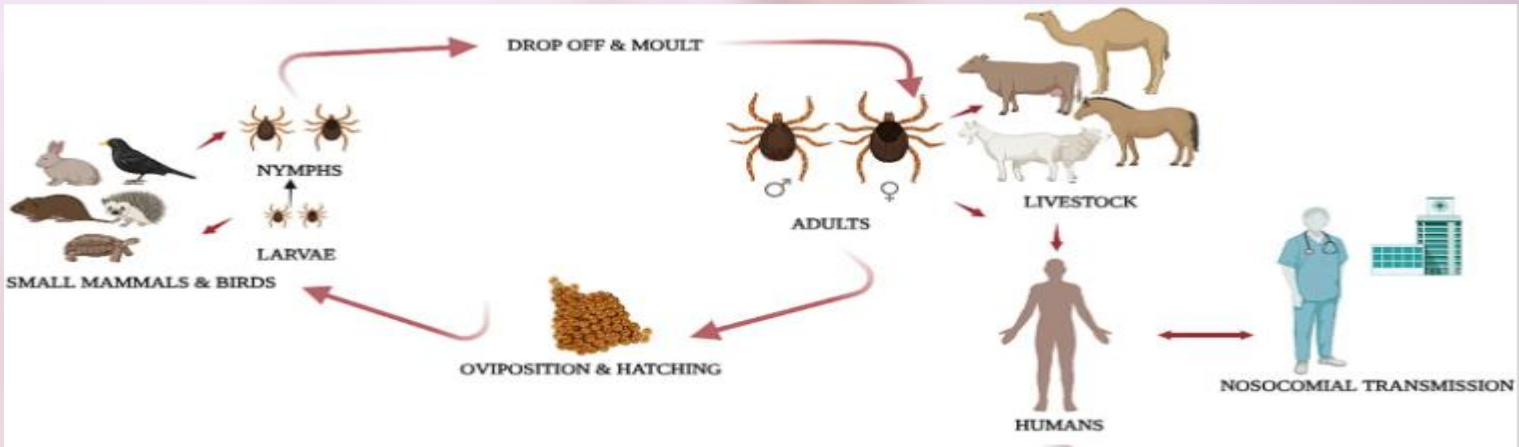
- **Risk factors for nosocomial or person to person spread are:**

■ Care of an infected individual.
■ Contact with infected needles.
■ Contact with blood or secretions.
■ Preparation of a body for burial.
■ Sexual contact.



Crimean-Congo Hemorrhagic Fever (CCHF)

- It is a significant public health concern and has been in Iraq since 1979. It is common in Middle East, Africa and Europe.
- The Primary Vector is the *Hyalomma* Ticks, the reservoir is Livestock, The most vulnerable groups are livestock breeders, veterinarians, farmers, and butchers.
- **Control**
- Banning animal slaughtering outside authorized, hygienic slaughterhouses.
- Restricting the illegal movement of livestock between governorates.
- Launching pesticide-spraying campaigns targeting ticks in rural farming communities.



SEXUALLY TRANSMITTED DISEASES

These are infections which are specifically transmitted during sexual intercourse. Although various other infections may be transmitted during sexual intercourse, the commonly recognized sexually transmitted diseases include:

1 -Viral and rickettsial infections

- AIDS (HIV).

2- Bacterial infections

- Gonorrhea infection (*Neisseria gonorrhoeae*).
- Sexually transmitted syphilis (*Treponema pallidum*).

3- Protozoal infections

- Trichomoniasis (*Trichomonas vaginalis*)

The infective agents share the characteristic of being delicate, being easily killed by drying or cooling below body temperature, and with the reservoir exclusively in man. Hence, transmission is mainly through direct close contact but rarely indirectly through fomites.

Transmission

Lesions are generally present on the genitalia, and the infective agents are also present in the secretions and discharges from the urethra and the vagina. Transmission occurs through:

- Genital contact.
- Extragenital sexual contact; kissing.
- Non-sexual transmission; mother to child transmission (MTCT) of HIV infection and syphilis, gonococcal ophthalmia neonatorum, or accidental contact as when doctors, dentists infected with syphilis.
- Blood and blood products; HIV infection.
- Indirect contact through fomites

HIV infections and acquired immune deficiency syndrome (AIDS)

The aetiological agents of the disease (AIDS) are strains of two related retroviruses, human immunodeficiency viruses HIV-1 and HIV-2.

Occurrence: Worldwide (high rates in Africa and other developing countries).

Reservoir: Humans

Transmission: Sexual contact, blood transfusion, contaminated needles, perinatal infection.

Control: Education, safe blood supplies, counselling of patients, specific chemotherapy.

The clinical spectrum of HIV infections

Stage	Disease	Clinical features
Initial	Acute infection	Mononucleosis-type illness Seroconversion
Intermediate	Asymptomatic infection AIDS-related complex (ARC)	None Fever, weight loss, persistent lymphadenopathy
Late	Full-blown AIDS	Opportunistic infections: ■ *Pneumocystis carinii pneumonia* ■ disseminated cytomegalovirus (CMV) infection ■ CNS toxoplasmosis ■ atypical mycobacterial infection ■ oesophageal candidiasis ■ cryptosporidium infection ■ herpes virus infection Secondary cancers: ■ Kaposi's sarcoma Neurological disease: ■ AIDS dementia complex

LABORATORY DIAGNOSIS

*Antibody antigen detection

Serological tests are widely used to detect antibodies; they are simple to perform, sensitive and specific at most stages of the infection, and relatively inexpensive. ELISA tests are commonly used for screening sera and more specific tests (e.g. Western blot technique).

***Blood cell count**

As infection progresses, there is a fall in the blood count of the CD4 lymphocytes from the normal level of about 800/mm3. When the CD4 count falls below 200/mm3, the patient becomes attack to tuberculosis and a variety of opportunistic infections.

PROTOZOAL INFECTION

Trichomoniasis

This is a chronic infection of the genital tract of both sexes. In the female it presents with vaginitis accompanied by profuse discharge; in the male, with urethritis.

The incubation period is from 1 to 3 weeks.

PARASITOLOGY

The causative agent is *Trichomonas vaginalis*, a protozoan flagellate.

LABORATORY DIAGNOSIS

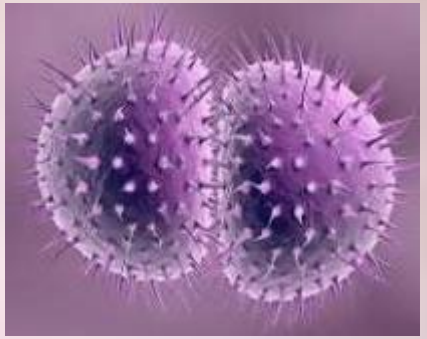
Microscopy of wet film preparation of vaginal or urethral discharge may show the motile organism. The organism can also be identified in stained smears.

Transmission: Sexual contact, indirect contact through fomites.

Control: As for other sexually transmitted diseases improvement in general hygiene.



BACTERIAL INFECTIONS



Gonorrhoea Infection

Bacteriology

Neisseria gonorrhoea is a Gram-negative diplococcus, with a characteristic bean shape. It dies rapidly outside the human body, being susceptible to drying and heat. The incubation period is usually between 2 and 5 days, but may be as long as 2 weeks.

Reservoir

The reservoir of infection is in **human** beings; the most important component is the female pool with asymptomatic infection.

Transmission: Sexual contact, rarely through fomites .Eye infection during delivery.

Control: As for other sexually transmitted diseases. Medical care to the eyes of newborn babies.

SEXUALLY TRANSMITTED SYPHILIS

- This is a chronic infection which is characterized clinically by a localized primary lesion, a generalized secondary eruption involving the skin and mucous membranes, and a later tertiary stage with involvement of skin, bone, abdominal viscera, cardiovascular and central nervous systems.
- The spirochaete ***Treponema pallidum*** is a thin organism, 1–15m long with tapering ends; there are about 5–20 spirals. Fresh preparations under darkground illumination show its characteristic motility. The organism is delicate, being rapidly killed by drying, high temperatures (50°C), disinfectants such as phenolic compounds, and by soap and water. It may survive in refrigerated blood for 3 days and may remain viable for several years if frozen below -78°C.

Reservoir: Humans

Transmission: Sexual contact, non-sexual contact, Transplacental.



Laboratory diagnosis.

***Dark-field microscopy.**

***Serological tests** They fall into two main groups:

Non-treponemal antigen: These tests are based on the presence of the antibody complex (reagin) in syphilitic infections. This complex may be detected by using a flocculation test, for example VDRL, slide test, Kahn test.

Treponemal antigen tests: These include the *Treponema pallidum* immobilization test (TPI), fluorescent treponemal antibody (FTA) and the reiter protein complement-fixation test (RPCFT).

Control: Education Control of sexual promiscuity Early detection and treatment of infected persons, including serological screening.

Chlamydial infections

Chlamydia trachomatis bacteria with the different serotypes A,B,C,D,K produced spectrum of clinically distinct diseases. They include lymphogranuloma venereum trachoma and inclusion conjunctivitis (TRIC) agents and also the strains involved in various genital tract infections. *Chlamydia trachomatis* only grows in the epithelial cells found in the conjunctiva, cervix, urethra, the respiratory and gastrointestinal tracts and the rectal mucosa. This is reflected in the spectrum of diseases that they cause.



Reservoir: Humans

Transmission: Contact, fomites, mechanically by flies.

The common mode of transmission is mechanical from eye to eye by contaminated fingers, cloths, bed clothes and flies.

Control: 'SAFE' strategy: **S**urgery, **A**ntibiotics(azithromycin, tetracyline),**F**ace Washing and **E**nvironmental measures(increase access to clean water, improve sanitation, and promote health education to eliminate disease altogether).

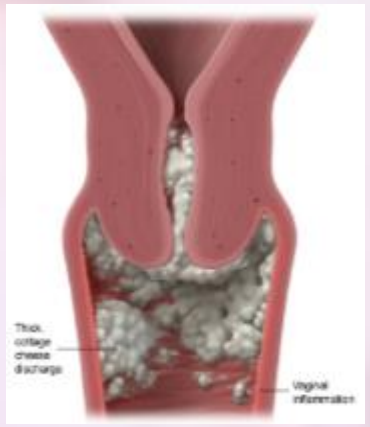
FUNGAL INFECTIONS

A wide variety of fungi infect skin, hair and nails, without deeper penetration of the host tissues.

Candidiasis

This is a mycotic infection which usually affects the following sites:

- Oral cavity (thrush).
- Female genitalia (vulvovaginitis).
- Moist skin folds (dermatitis).
- Nails (chronic paronychia).



MYCOLOGY

Candida albicans is the main pathogenic organism producing these lesions; rarely, other organisms such as *Saccharomyces* may produce a similar oral lesion.

Reservoir: Humans

Transmission: Contact, parturition.

Control: Careful use of broad-spectrum antibiotics.

VIRAL INFECTIONS

Rabies

- It is a viral infection which produces fatal encephalitis in man.
- Endemic in most parts of the world.



Organism: *Rabies virus*

Reservoir: Wild animals and pets.

Transmission: Bite of infected animals. Air-borne in restricted.

Control: Immunization of pet dogs, control of stray dogs. Passive and active immunization after exposure. Prophylactic immunization of high-risk groups.

INFECTIONS ACQUIRED FROM NON-HUMAN SOURCE

Non-human sources of infection through skin and mucous membranes include:

- Soil (tetanus, hookworm).
- Water (schistosomiasis, leptospirosis).
- Contact with animals or their products (anthrax).
- Animal bites (rabies).

The causative agents include viruses, bacteria and helminths.

BACTERIAL INFECTIONS

Tetanus

This is an acute disease characterized by an increase in muscle tone, with spasms, fever and a high fatality rate in untreated cases. Usually the hypertonia and the spasms are generalized, but in some mild cases the muscle rigidity may be confined to a local area (e.g. a limb) .



Organism: *Clostridium tetani*

Reservoir: Humans

Transmission: Through wounds including the umbilicus in newborn babies.

Control: Cleaning of wounds Clean delivery and management of the umbilical cord. Penicillin prophylaxis. Passive immunization (antitetanus serum). Active immunization (tetanus toxoid).



Anthrax

This is an acute infection which may present as a localized necrotic lesion of the skin (malignant pustule) .



Organism: *Bacillus anthracis*

Reservoir: Farm animals

Transmission: Contact with infected animals or their products; inhalation; ingestion.

LABORATORY DIAGNOSIS

A smear of the skin lesion may show typical organisms as chains of large, Gram-positive rods. The organism can be isolated from skin, sputum or blood, by culture on blood agar.



Control: Isolation of sick animals. Careful disposal of infected carcasses. Disinfection of skins and hair. Protective clothing (e.g. gloves).


Thank
You