Infectious Diseases

Introduction

V.Bodnar

The purpose of practical course of infectious pathology is

learning main nosological forms including questions of:

- *etiology*,
- *epidemiology*,
- *pathogenesis*,
- *clinic,*
- *prevention*

Infectious Diseases

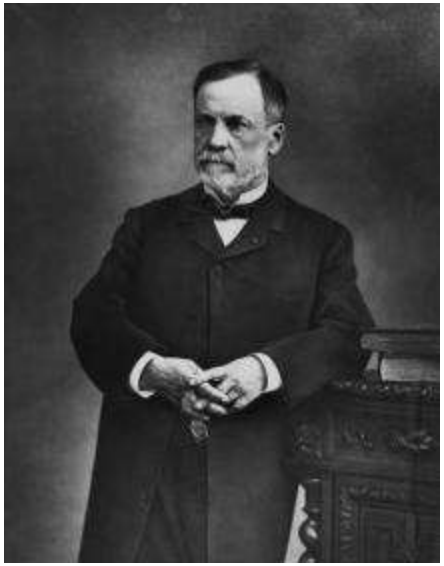
- a group of diseases which are caused by bacteria, viruses, protozoa, etc.

  A common trait for the majority of infectious diseases is

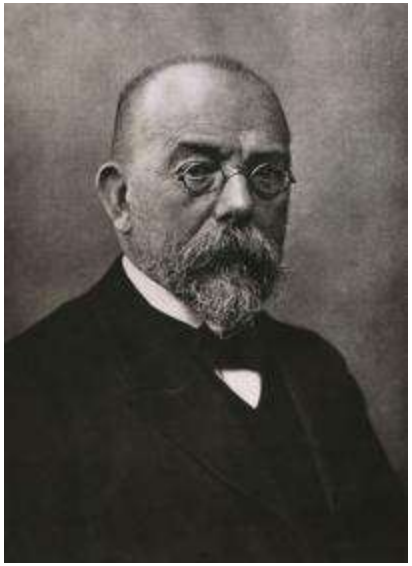
- the possibility of transmitting them from one infected patient to a healthy person in certain conditions and sometimes there arise conditions for mass epidemic spreading.

History of Infectious Diseases

- **plague pandemic in 527—565 A. D.** led to the fall of the Eastern Roman Empire
- **plague pandemic in the 14th century**, known as "Black or Great Death" took away nearly 1/4 of European population
- Great progress was achieved in the 16th century when **infectious diseases were recognized to have a contagious nature.** This was due to *Geralamo Fracastori*
- **"The classical doctrine"** of infectious diseases, the cell theory of *Rudolf Virchow*, predominated in the 19th century.
- The names of the scientists who made their contribution to the development and study of infectious diseases became prominent in the history of medicine: *L. Pasteur, R. Koch, J. Bordet, C. Nicolle, G. Ramon, D. Samoylovich, N. Pirogov, I. Mechnikov, A. Bezredka, O. L.Gromaskevsky, etc.*



L. Pasteur



R. Koch

Common clinical peculiarities of modern infectious diseases

- less severe clinical manifestations
- rarity or decrease of malignant forms (dysentery, scarlet fever, etc)
- more frequent cases of mild forms
- growth of the amount of atypical forms (scarlet fever, whooping cough, dysentery, etc)
- reduction of complication cases

Changes in the epidemic process

- the age structure of the disease
- periodicity and season
- spreading activity reduction in epidemic districts (locations)

Infection process

- interaction of the pathogenic microorganism with the human organism which occurs under the influence of the environment

Clinical manifestations of infection

- **clinically manifest infection**:
  typical or atypical course
  mild, moderate, severe
- **asymptomatic**
  subclinical (inapparent) and latent carriage
- **acute or chronic** *(according to the duration)*
- **autoinfection** (endogenic infection)

- **autoinfection** (endogenic infection)
- **superinfection**
- **mixed infection (**bacterial-fungal, viral-bacterial, viral-viral, etc)
- **atypical forms**

Classification of Infectious Diseases

(proposed by Gromashevsky)

- intestinal infections;
- respiratory infections;
- blood infections;
- skin infections.

Intestinal infections

- Intestinal infections are characterized by location of the causative agents in the intestine and their distribution in the environment with excrements. If the causative agent circulates in the blood (typhoid fever, paratyphoid A and B, leptospirosis, viral hepatitis, brucellosis, etc.), it can also be withdrawn through various organs of the body, e. g. the kidneys, lungs, the mammary glands

Respiratory infections

- This group includes diseases whose causative agents parasitize on the respiratory mucosa and are liberated into the environment with droplets of sputum during sneezing, cough, loud talks, or noisy respiration.
- People get infected when the microbes contained in sputum get on the mucosa of the upper airways. If the causative agent is unstable in the environment, a person can only be infected by close contact with the sick or carrier (pertussis)

Blood infections

- The diseases of this group are transmitted by blood-sucking insects, such as fleas, mosquitoes, ticks, etc., which bite people and introduce the pathogenic agent into the blood.
- Tick-borne encephalitis, Japanese B encephalitis and some other infections are characterized by natural nidality which is due to specific geographic, climatic, soil and other conditions of infection transmission. The morbidity is the highest during the warm season which coincides with the maximum activity of the transmitters - ticks, mosquitoes, etc

Skin infections

- The diseases of this group occur as a result of contamination of the skin or mucosa with the pathogenic microorganisms. They can remain at the portal of infection (tetanus, dermatomycoses), or affect the skin, enter the body and be carried to various organs and tissues with the circulating blood (erysipelas, anthrax).
- The transmitting factors can include bed linen, clothes, plates and dishes and other utensils, that can be contaminated with mucus, pus or scales. Pathogenic microorganisms causing venereal diseases, rabies, AIDS, and some other diseases are transmitted without the agency of the environmental objects. Wound infections are characterized by damage to the skin as a result of injury (tetanus, erysipelas).

Periods of Infectious Disease Course

- ***incubation (latent)***
- ***prodromal (precursor)***
- ***full development***
- ***convalescence***

Incubation (latent) period

- **Incubation period** begins from the moment of entry of the causative agent into the body and ends with the appearance of the first signs of the disease. In each **infection** it has a certain duration which may change de-pending on the individual peculiarities of body reactivity and, to some extent, on the dose of the infectious agent.

Prodromal (precursor) period

- **The precursor period (prodromal period)** is observed in all infectious diseases. It is characterized by nonspecific signs of the disease.

The period of full development

- **The period of full development** of the disease is manifested by maximally marked causative agent activity, different physiological dysfunctions, development of pathoanatomical changes in organs. Protective reactions of the body are increased in this period. At first, nonspecific reactions are mobilized, they are neurohumoral, inflammatory, phagocytic activity of leukocytes, production of lysosyme, complement, properdin and interferon in viral infections. Later, specific immune response takes place and specific immunoglobulins are formed. Clinically this period of the disease is characterized by a complex of symptoms characteristic for each infectious disease that appear and follow in a definite sequence.

Period of convalescence

- During **the period of convalescence** there is a renewal of normal functions of the body and its homeostasis. This period may last for a long time. There is adynamia, quick mental and physical tiredness, lability of the cardiovascular system, etc. This period is marked by the body instability, frequently there is a state of sensitization with leniency to paraallergic changes as to different allergens.

Epidemic process

- source of infection
- mode of transmission
- susceptibility of the human body

Source of infection

- **patients with clinically marked forms of infection** like measles, chicken pox (when there is no carriage), whooping-cough, diphtheria, in general all the infectious diseases; also the **patients with attenuated and atypical forms of infectious disease**: virus and bacteria earners.
- **carriage** may have different immunological essence. There may be an ***early carriage*** (in incubation period), ***convalescent carriage*** when after recovery the patient still carries the causative agent due to disturbance in the immune processes
- **animals**

Mode of transmission

- **droplet route**
- **fecal-oral route**
  - *alimentary*
  - *contact*
  - *water*
- **direct entry of the causative agent into blood**
- **mixed mode**

Susceptibility of the human body

- *Susceptibility of population* depends on many factors connected with peculiarities of macro- and microorganism.
- Susceptibility is defined by the index of susceptibility or contagion, that is correlation of the number of the all people with those in contact

Specific immunity

- ***active immunity***
- ***passive immunity***

Active immunity

- ***active immunity*** is formed after the disease is over or after the other form of the infectious process as well as after immunization with vaccines (*active natural* and *active artificial* immunity)

Passive immunity

- newborn gets his passive immunity from the mother via placenta (*passive natural immunity*)
- passive immunity may be formed artificially by the introduction of γ-globulin, antitoxic serum (*passive artificial immunity*)

Prevention of the infectious diseases

- nonspecific
- specific

Nonspecific prevention

- ***The non-specific prevention*** includes measures directed at the improvement of general resistance of the organism: rational nutrition, physical training, ect. General prevention measures include the sanitary-hygienic habits to children, conducting sanitary educational work.
- Elaborated complex of emergency measures has been worked out for detecting an infectious patient. These measures are directed at the four stages of the infectious process: a) isolation of the patient; b) measures concerning the people in contact; c) desinfection; d) report to the sanitary-epidemiologic authorities.

Specific prevention

- *Specific prevention* is the most effective way to influence the epidemic process. It is aimed at the 3rd stage of the epidemic process, that is the organism, the increase of insusceptibility to definite antigens.
- In this respect a planned active immunization is the most effective

The main attention is drawn to the following questions:

- stability and duration of immunity after vaccination
- possibility of side effects (immediate and remote)
- quality of vaccines