

# **Acute intestinal infection**

**Dysentery, Salmonellosis,  
Intestinal Colli Infection**

# Dysentery (Shigellosis)

***Dysentery* is an infectious disease, accompanied by lesion of mucous membrane in the large bowel, especially its distal part**

# Etiology

- *Pathogens* of dysentery is Shigella, Gram-negative
- Only the pathogen of species of *Grigoriev-Shiga Sh. dysenteriae* produces an *exotoxin*, other pathogens produce *endotoxins*.
- Dysentery pathogens of various species have *different stability* in the environment. *Sh. dysenteriae* have the least stability
- *Sh. Sonnei* are the most stable. Dysentery brought about by *Sh. Sonnei* is most spread these last years while *Sh. Flexneri* takes the second place

# Epidemiology

- The *source* of infection is patients with acute dysentery and bacilli-carriers
- The *mechanism of infection* transference is fecal-oral
- The *factors* of transference are food and water, flies. Water *route* of infection spreading is most typical for Sh.Flexneri, milk - Sh.Sonnei



# Epidemiology

- *Morbidity* in 1-year-old children is the lowest, and it is the highest among the children from 2 to 7 years of age
- *Immunity* in dysentery is typospecific

# Pathogenesis

- The *portal* of entry is gastro-intestinal tract
- On getting into the stomach, the pathogens *perish* partially due to the influence of proteolytic enzymes and hydrochloric acid in the gastric juice
- Remaining pathogens get into the small intestine and then they get into the *large intestine* where they reproduce

# Pathogenesis

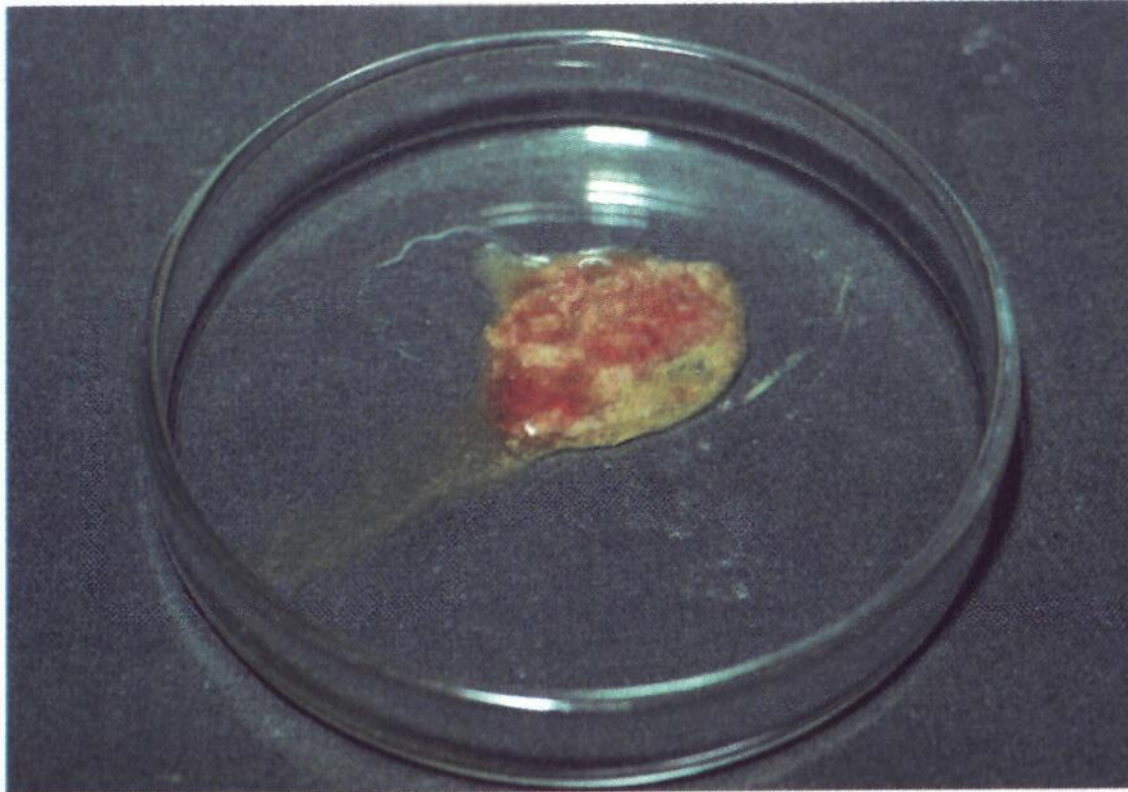
- The *Shigellae* have a *selective ability* to adhesion (sticking) to colonocytes of the large bowel
- *Endotoxin* is the leading factor - common toxic influence on the vascular and nervous systems of the body and its vegetative centers

# Clinical manifestations

- The *incubation period* varies from several hours to 7 days
- The child becomes restless, loses appetite, complains of headache and abdominal pain
- In this period the children *complain* of abdominal painful cramps in defecation, drawing *pain on the side of the sigmoid colon* and anus



- In the first hours after the onset of disease stool has *stercoral character*, but by the end of the day or the second day of the disease stercoral masses disappear completely, stools become *poor and contain turbid mucus and blood* only



# Clinical manifestations

- *Tenesmus* is a typical sign of dysentery. Tenesmus appears due to the simultaneous spasms of the sigmoid colon and anal sphincters. In frequent tenesmus the rectum mucous membrane *prolapse* may result
- Symptoms of *toxemia, pallor and dryness of the skin* are found
- On *abdominal palpation*, tenderness and hardening are found over the sigmoid colon
- Moderate leukocytosis, neutrophilia with the change to the left, insignificant increase of ESR shows in *the blood*

# Clinical type classification

*Clinical type classification* of dysentery is based on the signs, which have been proposed by

A. A. Koltupin (type, severity, course)

- *Typical and atypical forms* are distinguished.
- In *typical* forms colitic syndrome is present constantly
- Obliterated, dyspeptic, subclinical, hypertoxic forms are referred to the *atypical* forms

# Typical forms

of dysentery are divided into

- *mild*
- *moderate*
- *severe*

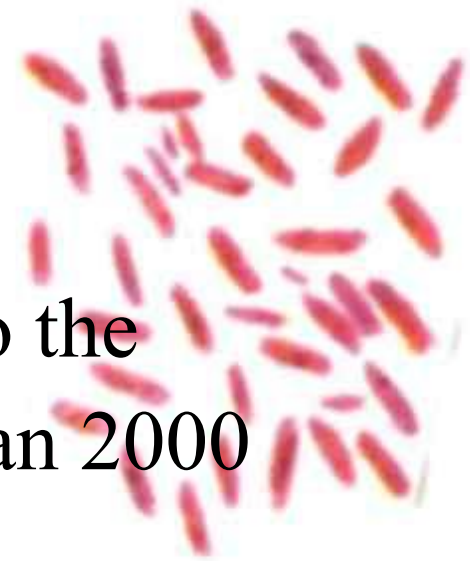
of *toxemia symptoms*: fever, convulsion syndrome, mental confusion, headache, weakness and *local alterations from* gastrointestinal tract

# 1-year-old babies has peculiarities

- *Colitic syndrome* is not well expressed. Stools have enterocolitic or dyspeptic character
- *Toxemia* at the early age is accompanied by high fever, recurrent vomiting
- If frequent enterocolitic stools are present, *dehydration* with hemodynamic disorders may occur
- *Complications* can bring about rectum mucous membrane prolapse
- As a *secondary infection*, otitis, pneumonia, stomatitis, infection of the urinary tract may occur

# Salmonellosis

## Etiology



- ***Pathogens*** of salmonellosis belong to the *Salmonella* genus. There are more than 2000 serologic types of *Salmonellae*
- The ***Salmonellae groups*** are discerned due to the structure of O-antigen (A, B, C, D, *E* and others)
- The disease in 80-90 % of the cases is connected: ***S.typhimurium, S.Heidelberg, S. anatum. S. derby, S.panama, S.enteritidis***
- Pathogens have high ***stability*** in the environment

# Epidemiology

- Salmonellosis is *anthropsoonosis*
- The *general source* of infection is various animals
- Besides, recently the sick people and bacilli carriers *present the main epidemiological danger*
- The *general route* of infection transference is alimentary; food
- In babies, *the contact route* is the main one
- Within the last years, *morbidity* of 1-year-old babies has considerably increased, particularly due to *nosocomial* (hospital) infection

# Pathogenesis

- In *per oral infection* is destructed intensively in the stomach and small intestine
- At this time a lot of *endotoxin* is released
- Due to the influence of endotoxins the *toxic signs* of the disease appear
- *Penetrates* into the mesenteric lymph nodes and enterocytes into blood, and causing *bacteriemia (typhus-like form, septic form)*
- Salmonellae and their toxins *influence the nervous system*
- Vomiting and diarrhea cause *dehydration*



# Clinical manifestations

- The *incubative period* has duration from 2-3 hours (in the *alimentary*) to 5-7 days (in the *contact*)

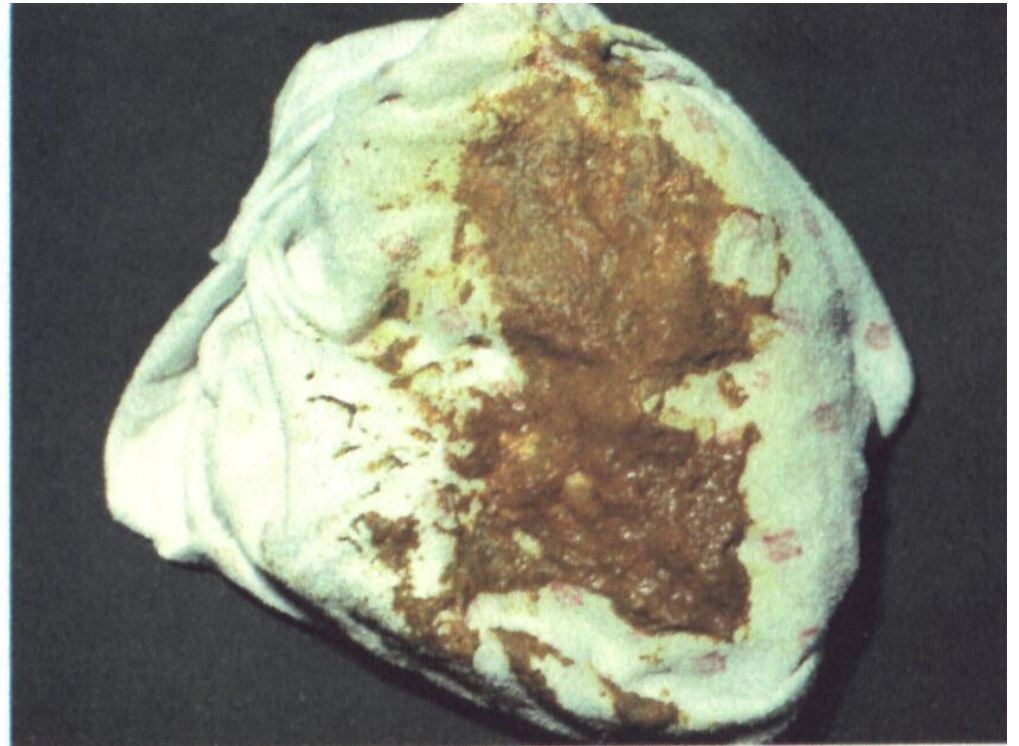
## *Classification*

- **Localization form**
  - gastrointestinal,
  - flu-like,
  - effaced
  - asymptomatic
- **Generalization form:**
  - typhus-like,
  - septic
- *Acute* (up to 1 month), *protracted* (1-3 months)
- *Mild, moderate and severe* forms

# Gastrointestinal form

- *Has the course* of gastritis, enteritis, colitis, gastroenteritis, enterocolitis, gastro-enterocolitis
- The disease has an *acute onset* with fever and chills.
- Nausea and recurrent *vomiting* appear.
- *Abdominal pain* and diarrhea appear rapidly *stools* become more frequent up to 3-5 times daily.
- The *tongue* is dry and coated. Besides, headache, general malaise and weakness appear.
- *Duration* of the disease is 5-7 days.

- *Stools* are watery, contain small admixture of mucus.



# Typhus-like form of salmonellosis

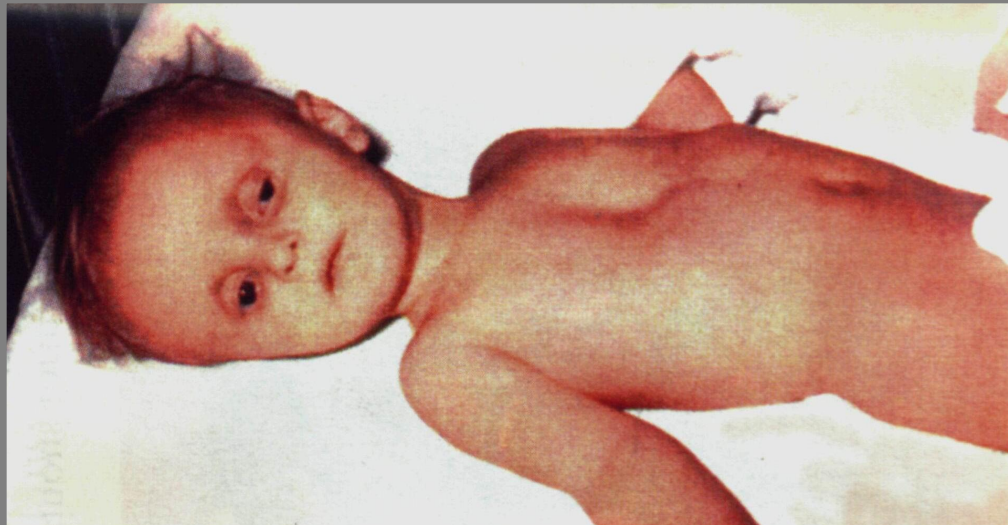
Clinically it may resemble abdominal **typhoid** or **paratyphoid**:

- duration of fever is 1-2 weeks,
- *toxemia* (headache, myalgia, arthralgia, anorexia),
- *enlarged spleen*, roseolous or erythematous *rash*,
- *cardiovascular system disorders* (bradycardia or tachycardia),
- *gastrointestinal disorders* (vomiting, diarrhea, abdominal distention).



# Septic forms of salmonellosis

- frequent in *neonates and infants* younger than 6 months of age.
- Septic forms are frequently accompanied by *local lesions* (meningitis, osteomyelitis, subcutaneous abscesses, arthritis, pyelonephritis).
- The diseases can have a very *severe course* with metabolic disorders of all forms, especially electrolyte dysbalance



# Diagnosis

- *Is based* on its clinical manifestations, the epidemiological history and bacteriological test results
- Clinical diagnosis of *dysentery* - typical signs of distal colitis are present.
- Stools is the *material for bacteriological tests*
- Blood, stools, urine, vomiting mass, gastric water, pus from the inflammatory foci is the material -bacteriological tests in *salmonellosis*
- Material for bacteriological tests should be taken *before the antimicrobial therapy* is started

# Treatment

- *Diet* - recommended to reduce the volume of food in acute period of the disease. Breast milk is optimal nutrition
- The *volume* must correspond to the age norm by the 5th-7th day after the onset of the disease
- *Enzymatic therapy* is administered in the reparation stage in a course from 2 to 4 weeks

# Etiotropic therapy

- Antibiotics (ampicillin - 100 mg/kg, ceftriaxon – 50-75 mg/kg) should be administered *in severe forms of dysentery and salmonellosis*, and the children younger than 2 years of age.
- *Furasolidone* in dosage of 8-10 mg/kg, *nevigramon* in dosage of 60 mg/kg, *bactrim* in dosage of 60 mg/kg may be given
- *In 1-year-old babies* and in generalized' forms of salmonellosis - *cephalosporin* (ceftazidime, ceftriaxone in the dosage of 100 mg/kg)..
- Dysenteric and salmonellic bacteriophages may be used to



# Prophylaxis

- *Bacteriological examination* is made in all the patients after 2 days when the antibacterial therapy is finished
- If epidemic *outbreaks appear*, all contact persons should be examined bacteriologically singly

# Intestinal Coli Infection (Escherichiosis)

*Escherichiosis* is an acute intestinal infection caused by *E. coli*, which mainly affect 1-year-old babies

# Etiology

- *E. coli* are Gram-negative pathogens
- **Classification includes** enterohemorrhagic *E. coli* (EHEC), enterotoxigenic *E. coli* (ETEC), enteroinvasive *E. coli* (EIEC), enteropathogenic *E. coli* (EPEC).
- The ***EPEC* group** of *E. coli* contains about 30 serotypes: O-111; O-55; O-25; O-44; O-119. They cause the **disease** in 1-year-old babies and have antigens similar to ***Salmonellae***

# Etiology

- The *EIEC group* of *E. coli* contains 13 serotypes: O-124; O-151; O-144 and others. Their antigenic structure is similar to that of *Shigellae*. EIEC group cause the diseases in children and adults. The disease is similar to *dysentery clinically*
- The *ETEC group* of *E. coli* contains the pathogens which produce enterotoxin similar to *cholero-gen* by its effect. Enterotoxin causes considerable production of liquid into the lumen of the small bowel. These diseases have likeness with the mild form of *cholera*

# Epidemiology

- Escherichiosis of the *first group* is found all year round. *1-year-old babies* get ill most frequently. The *source* of infection is sick human, sometimes the source of infection is a bacillus carrier
- Infection is caused by *contact and alimentary route*
- In *EIEC escherichiosis* infection is transmitted by alimentary route. The disease frequently occurs in *summer and autumn*
- *ETEC eschcrichiosis* is found among older children and adults. The main *routes* of infection are food and water

# Pathogenesis

- *E. coli* **enter** the child's body through the mouth and then **get into** the lumen of the gastrointestinal tract.
- The pathogens reproduce in the **small bowel**.
- They produce **enterotoxins**, remaining on the surface of the mucous membrane.
- Epithelium of the small intestine **is affected**, and inflammatory changes appear.
- Besides **enterotoxins**, **endotoxins** are liberated due to the pathogen destruction

# Clinical manifestations

*EPEC eschrichiosis* occurs in 1-year-old babies.

- The *incubative period* is from 3 to 8 days.
- The disease has an abrupt *onset* - temperature increases, weakness and anorexia
- *Stools* occur frequently, they are watery, yellow or orange. If such stools occur five to seven times daily, dehydration may occur.
- *Toxemia* is manifested by restlessness, recurrent regurgitation and vomiting.
- The signs of *escherichiosis in 1-year-old babies* are neurotoxicosis and toxicosis with dehydration

# Neurotoxicosis

- occurs rarely in the first days of the disease due to toxemia
- is characterized  
hyperthermia, recurrent vomiting, acute restlessness, mental confusion, tonic convulsions, occipital muscular stiffness, tachycardia, toxic breathing, protrusion of cranial fontanel





# Toxicosis with dehydration

- *manifested* by the signs of lesions, cardiovascular, electrolyte disorders.

There are *isotonic, salt deficient, water deficient* types of dehydration.

- *Water deficit* manifests itself by thirst, restlessness and excitement. The skin and mucous membranes are dry. Muscle tone is decreased, hurried breathing, low diuresis.

# Dehydration

- The patient eyes fall in (*"sun glasses"* symptom)
- The *skin* of the hands may have a characteristic appearance resembling wrinkled *"washer woman hands"*



# Dehydration

- *Fever*, if present, is low grade, or the patient may develop hypothermia
- The *mucous membranes* are dry.
- The *voice* becomes hoarse, weak and even soundless.
- The *pulse* is weak, blood pressure is low.
- *Diuresis* decreases down to anuria.

# Treatment

- Syndrome consists of a *complex of measures*:  
dietary regimen, etiologic and pathogenetic therapy.
- The patient *should be given to drink* by small portions in 2-3 teaspoons every 10-15 minutes  
peroral rehydration (Regidron, Oralit, ORS-200)
- *Vomiting is not a contraindication* for giving liquid orally, the quantity of liquid should be reduced but it should be administered

# Version of calculating the daily fluid intake (according to Velitishchev):

- The existing water deficiency in the patient (*loss of body weight*).
- *Replacement of the daily loss of fluids* through skin and breathing by 30 ml per kg per day and by 10 ml per kg per day if there is an increase of the body temperature per 1 °C.
- If there is a *continuous loss due to vomiting and diarrhea* fluids should be rated at 20-30 ml per kg per day.

# Correlation of glucose and saline solution

determined by the *dehydration type*

- in *isotonic* type of dehydration a 5-10 % glucose solution and saline solutions are administered in *correlation 1:1*,
- in *water-deficient dehydration* (1:2-1 :3) of 5-10 % glucose solution may be given
- in *salt-deficient dehydration* the correlation between saline and glucose solution is 2:1 -3:1.