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Gastrointestinal Diseases

Ingestion of pathogens can cause many different infection pathogens entry through the gastro-intestinal treat some of these cause diarrheal diseases (e.g.salmonilla and shigella spp.) whilst others pass through the instestinal tract to cause disease in other organs (e.g. poliomyelitis, vira hepatitis) the pathogens include viruses, bacteria, protozo and helminthes , they are acquired by the fecal-oral route ,from foecally-contaminnated food, fluids or fingers for an infection to occur; the pathogen must be ingested in sufficient numbers or possess attributes to elud the host defenses of the host defenses of the uppergastrointes tract and reach the intestine .., they remain localized and cause disease as aresult of multiplication and /or toxin production, or they may invade through the intestinal mucose to reach the lymph ties or the blood stream.

* Food poisoning: infection associated with consumption of contaminated food .. tru food poisoning occurs after consumption of food containing toxins, which may be chemical (e.g. heavy metals) or bacterial in origin (e.g. from clostridium botulinum or staphylococcus aureus). The bacteria multiply and produce toxin with in contaminated food. The organisms may be destroyed during food preparation, but the toxin is unaffected, consumed and acts with in hours the pathogen may be (campylobacter, salmonella).

*Diarrheal diseases: Diarrheal diseases as a group remain a major cause of death developing countries especially in preschool children .., the main agents are :

- Eteroviruses ..eg rotovirus
- Escherichia coli
  a. Enterotoxigenic E.coli (ETEC)
  b. Localized- adherent E.coli (LA-EC)
  c. Diffuse-adherent E.coli(DA-EC)
  d. Entoro invasive E.coli(EIEC)
  e. Entero haemorrhagic E.coli (EHEC)
- Campylabacter spp
- Shigella
- Vobrio cholera
- Salmonella (Non-typhoid)
- Entamoeba histolytica
- Giardia lamblia
- Cryptosporidium

*Viral infection : The most common viral infection transmitted through the gastrp- intestinal tract are..

1. rotaviruses

2. Poliomyelitis

3. Viral hepatitis

Viruses to be the commonest causes of gastroenteritis in infants and young children, viral gasteroenteritis is not distinguishable clinically from other types of gasteronteritis .. the virus is isolated from speciments of faeces, throat swabs, or from nosophryngeal washing.

Rotaviruses: morphologically characteristic viruses with agenome consisting of 11 separata segment of double-stand RNA.rephicating rotovims causes diarrhea by damaging transport mechanisms in the gut. The incubation period 1-4 days after virus replication in intestinal epithelial cells there is an acute onset of vomiting which is sometimes projectle,and diarrhea the replicatiny lead to loos of water, salt and glucose causes diarrhea. Infection is commonest in children under two years of age. IgA antibodies in colostrums give protection during the first six months of life, older children are less susceptible, nearly all of them having developed antibodies, but occasional infections occur in adult rotavirus particles can be seen in fecal samples by electron microsopy and can be detected by ELISA or radioimmunoassy (RIA method) (fluid and salt replacement can be life- saving in rotovirus diarrhea)

Rotaviruses are ribonucleic acid (RNA) viruses that are contained within a protein capsule. Rotavirus strains are classified based on the outer layer proteins VP7 (G type) and VP4 (P type). Although there are at least 15 G types and 28 P types, only 10 G and 11 P types have been identified in humans.

Rotavirus is highly contagious. Transmission by the faecal-oral route is most frequent, although respiratory transmission may also occur. Rotavirus infections in humans cause gastroenteritis that usually lasts from three to eight days. Rotavirus gastroenteritis is characterised by mild fever with severe diarrhea, vomiting, stomach cramps, and can lead to dehydration. Nearly all children will have at least one episode of rotavirus gastroenteritis before reaching five years of age.

There are two rotavirus vaccines authorised for used, Rotarix® and RotaTeq® the vaccine is over 85% effective at protecting against severe rotavirus gastroenteritis in the first two years of life. The effectiveness of the vaccine in protecting against any rotavirus infection varies between the serotypes listed. Vaccines should be stored in the original packaging at +2°C to +8°C and protected from light. All vaccines are sensitive to some extent to heat or cold.

Schedule for Rotarix® ● First dose of 1.5 ml of Rotarix® vaccine at two months (approximately eight weeks) of age. ● Second dose of 1.5 ml at least four weeks after the first dose.

Poliomyelitis (polio) is a highly infectious viral disease, which mainly affects young children. The virus is transmitted by person-to-person spread mainly through the faecal-oral route or, less frequently, by a common vehicle (e.g. contaminated water or food) and multiplies in the intestine, from where it can invade the nervous system and can cause paralysis.

Initial symptoms of polio include fever, fatigue, headache, vomiting, stiffness in the neck, and pain in the limbs. In a small proportion of cases, the disease causes paralysis, which is often permanent. There is no cure for polio, it can only be prevented by immunization.

There are three types of polio infections:

- **Sub-clinical**: Approximately 95 percent of polio cases are sub-clinical, and patients may not experience any symptoms. This form of polio does not affect the central nervous system (the brain and spinal cord).
- **Non-paralytic**: This form, which does affect the central nervous system, produces only mild symptoms and does not result in paralysis.
- **Paralytic**: This is the rarest and most serious form of polio, which produces full or partial paralysis in the patient. There are three types of paralytic polio: spinal polio (affects the spine), bulbar polio (affects the brainstem), and bulb spinal polio (affects the spine and brainstem).

  Post-polio syndrome is a complication that can occur after a person has caught and recovered from poliovirus. Symptoms of the syndrome can appear up to 35 years after the polio infection.

Sub-Clinical Polio

If patients do have symptoms, they usually last for 72 hours or less and may include:

- headache
- sore, red throat
- slight fever
- vomiting
- general discomfort

Non-Paralytic Polio

The symptoms of non paralytic polio may last for a couple of days to a week or two and includes

- fever
- sore throat in the absence of upper respiratory infection
- headache
- vomiting
- fatigue
- abnormal reflexes
- problems swallowing and/or breathing
- back and neck pain and stiffness, particularly neck stiffness with forward flexion of the neck
- arm and leg pain or stiffness
- muscle tenderness and spasms

Paralytic Polio

People with paralytic polio experience the symptoms associated with non-paralytic polio first. Soon after, the following symptoms appear:

- loss of reflexes
- severe spasms and muscle pain
- loose and floppy limbs, sometimes on just one side of the body, this is due to the weakness which results from the involvement of the spine
- sudden paralysis (temporary or permanent)
- deformed limbs (especially the hips, ankles, and feet due to prolonged weakenss and the lack of appropriate orthopedic bracing

Full paralysis can eventually develop, but it is rare. Only about one percent of all polio cases will result in a person being permanently paralyzed. Of those patients who experience paralysis, five to 10 percent will die when the paralysis attacks the muscles that control breathing.

Post-Polio Syndrome

The symptoms of post-polio syndrome are:

- continuing muscle and joint weakness
- muscle pain that gets worse
- becoming easily exhausted or fatigued
- muscle wasting, also called muscle atrophy
- trouble breathing and/or swallowing
- sleep related breathing problems (sleep apnea)
- becoming easily cold or
- new onset of weakness in previously uninvolved muscles

*Viral hepatitis: There are six types of viral hepatitis A and E which are transmitted by faeco-oral route, and B,C,D,G which are blood-borne infection

Viral hepatitis **A (HAV).. the disease is characterized by loss of appetite, Jaundice, enlargement of the liver and raised levels of liver enzymes the incubation period varies from 15-40 day with an average of around 20 days.

Young adult

- tropical and subtropics
- predisposing
  a. gnility& public health sanitation
  b. sewage

c. disposal
d. population density

Glucose-6- phosphate deficiency- ahigh frequency of G6PD-deficieny has been found among patient with hepatitis ….(LIgM antibodies demonstration..)

** Viral hepatitis **E(**HEV) India

Like HAV,HEV causes malaise, anorexia, Jaundice and liver enzyme serum elevation – clinical manifestation occur in persons 25-40 years of age- no vaccine

Hepatitis **B(HBV) blood and blood products –transmi causes long –incubation hepatitis, it also gives rise to one of 10 most common cancers, heptocellular carcinome ther is evidence that HBV is the aetiological agent in up to 80% of cases…. Vaccination

** Hepatitis **C(**HCV) incubation period 8 weeks chronic infection is generally asymptomatic at first, later alarge proportion of cases progress to cirrhosis of liver and some to hepatocellular carcinoma . Egypt-Yeman .(No vaccine)

** Hepatitis **delta**(HDV) (D)in compete virus incapable of independent repplication, which can exist in the presence of HBV, it gives rise to a more seur from of hepatitis

- Eastern Mediterranean
- Middle east
- North Africa
- Amazon

Vaccination by (HEV) vaccine

** Hepatitis **G** (HGV) HGV has similar role to HCV

Viral Gastroenteritis

- Signs and symptoms
  - Similar to bacterial gastroenteritis
  - Abdominal pain, cramping, diarrhea, nausea, vomiting
- Pathogens and pathogenesis
  - Caused by caliciviruses, astroviruses, and rotoviruses
- Epidemiology
  - More cases occur in winter
- Diagnosis, treatment, and prevention
  - Serological test distinguishes between viruses
  - Treatment is based on fluid and electrolytes replacement
  - Vaccine for rotavirus exists

Viral Hepatitis

- Signs and symptoms
  - Jaundice, abdominal pain, fatigue, nausea, vomiting, appetite loss
  - Symptoms may occur years after initial infection
  - Host immune responses are responsible for much of the liver damage seen with hepatitis
- Pathogen and pathogenesis
  - *Hepatovirus* Hepatitis A virus (HAV)
  - *Orthohepadnavirus* Hepatitis B virus (HBV)
  - *Hepacivirus* Hepatitis C virus (HCV)
  - *Deltavirus* Hepatitis delta virus (HDV)
  - *Hepevirus* Hepatitis E virus (HEV)

Viral Hepatitis

- Diagnosis
  - Initial diagnosis includes observation of jaundice, enlarged liver, or fluid in the abdomen
  - Serological testing can identify viral antigens
  - HBV is diagnosed by presence of viral proteins in body fluids
- Treatment
  - Supportive care for symptoms
- Prevention
  - Avoiding exposure by practicing good hygiene and protected sex or abstinence
  - Vaccines are available against HAV and HBV

About Hepatitis

- A & E: ingestion (fecal-oral)
  B, C, D (delta): parenteral (blood and fluid borne)

- Jaundice, fatigue, abdominal pain, low appetite, nausea, diarrhea (B joint pain)(C dark urine)(D&E vomiting & dark urine)
- Incubation period ranges (depending on type): 7 – 100 days

Hepatitis A Jaundice

Giardia- Example Protozoan Disease of the Intestinal Tract

Cryptosporidiosis

- Signs and symptoms
  - Severe watery diarrhea
  - Life-threatening complications can occur
- Pathogen and pathogenesis
  - Caused by *Cryptosporidium parvum*
  - Pathogenicity of *C. parvum* unclear
- Epidemiology
  - Infection results from drinking contaminated water
- Diagnosis, treatment, and prevention
  - Treated with fluid and electrolytes replacement
  - Prevented with proper hygiene

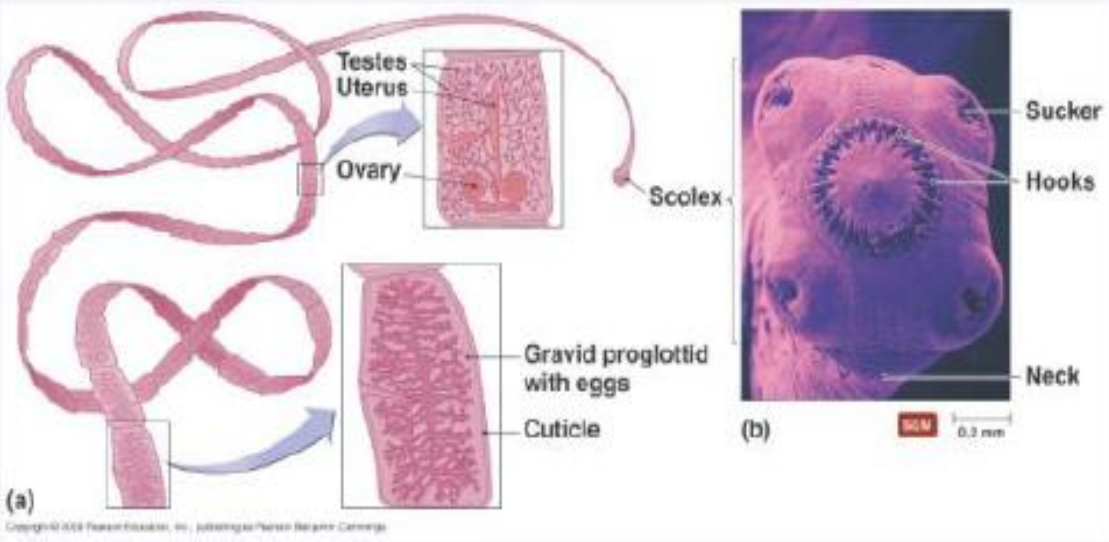
Amebiasis

- Signs and Symptoms
  - **Luminal amebiasis** – asymptomatic
  - **Invasive amebic dysentary** – symptoms include severe diarrhea,colitis, appendicitis
  - **Invasive extraintestinal amebiasis** – necrotic lesions in the liver, lungs, spleen, kidneys, or brain
- Pathogen, virulence factors, and pathogenesis
  - Caused by *Entamoeba histolytica*
  - Trophozoites in the peritoneal cavity or blood cause symptoms
  - Difference in severity due to virulence factors

Helminthic Infestations of the Intestinal Tract

- Helminths are macroscopic, multicellular worms
- Helminths can infest the GI tract as non-disease-causing parasites
  - Tapeworm is the common name for a cestode
    - Flat, segmented, parasitic helminth
    - Tapeworms exist as intestinal parasites that lack their own digestive systems

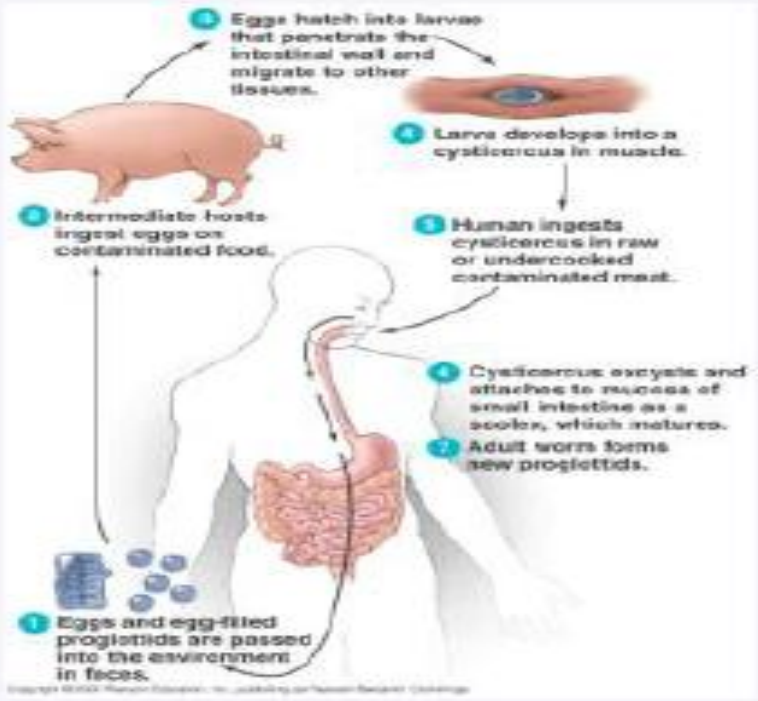
Tapeworm – close up



Tapeworm (*Taenia sp.* --cestode) Infestations

- Signs and symptoms
  - Usually asymptomatic
  - Rarely, nausea, abdominal pain, weight loss, and diarrhea occur
- Pathogens
  - *Taenia saginata* – beef tapeworm
  - *Taenia solium* – pork tapeworm
    - *Taenia* life cycle divided between a primary and intermediate host

Taenia solium Life Cycle



Tapeworm Infestations (cont.)

- Epidemiology
  - Highest incidence in regions of inadequate sewage treatment and where humans live in close contact with livestock
- Diagnosis, treatment, and prevention
  - Diagnosed by presence of proglottids in fecal sample
  - Treated with niclosamide or praziquantel
  - Prevention relies on thorough cooking of meats

Pinworm Infestations

- Pinworms are nematodes
  - Long, thin, unsegmented, cylindrical helminth
- Signs and symptoms
  - Asymptomatic infections result in one-third of the cases
  - Symptomatic infection includes perianal itching, irritability, decreased appetite
    - Itching results from the presence of eggs deposited in the perianal region at night by female pinworms
- Pathogen
  - *Enterobius vermicularis*

– Diagnosis, treatment, and prevention

- Diagnosis made based on identification of eggs microscopically or presence of adult pinworms
- Treatment with pyrantel pamoate or mebendazole
- Prevention requires strict personal hygiene

Amebiasis

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- Pathogen, virulence factors, and pathogenesis
  - Caused by *Entamoeba histolytica*
  - Trophozoites in the peritoneal cavity or blood cause symptoms
  - Difference in severity due to virulence factors