ACUTE VIRAL HEPATITIS
DEFINITION

• An inflammatory disease of the Liver which is usually associated with complete clinical and histological recovery within a period of 4-6 weeks
CAUSES

Hepatotropic viruses
- Hepatitis A
- Hepatitis B
- Hepatitis C
- Hepatitis D, and
- Hepatitis E viruses

As a component of multisystem disease
- Herpes simplex virus (HSV)
- Cytomegalovirus (CMV)
- Epstein-Barr virus (EBV)
- Varicella-zoster virus,
- HIV,
- Rubella,
- Adenoviruses
- Enteroviruses,
- Parvovirus B19, and
- Arboviruses
HEPATOTROPIC VIRUS

- Heterogeneous group of infectious agents that cause similar acute clinical illness.
- Usually the acute phase causes no or mild clinical disease.
- Morbidity is related to rare cases of acute liver failure (ALF) triggered in susceptible patients and to the chronic disease state and complications (hepatitis B, C, and D) can cause.
## FEATURES OF HEPATOTROPIC VIRUS

<table>
<thead>
<tr>
<th>VIROLOGY</th>
<th>HAV RNA</th>
<th>HBV DNA</th>
<th>HCV RNA</th>
<th>HDV RNA</th>
<th>HEV RNA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Incubation (days)</td>
<td>15-19</td>
<td>60-180</td>
<td>14-160</td>
<td>21-42</td>
<td>21-63</td>
</tr>
<tr>
<td>Transmission</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Parenteral</td>
<td>Rare</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Fecal-oral</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Sexual</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Perinatal</td>
<td>No</td>
<td>Yes</td>
<td>Rare</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Chronic infection</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Fulminant disease</td>
<td>Rare</td>
<td>Yes</td>
<td>Rare</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>
PATHOGENESIS

• Direct cytopathic and an immune-mediated injury involving entire liver.
• Necrosis is usually most marked in the centri lobular areas.
• An acute mixed inflammatory infiltrate predominates in the portal areas but also affects the lobules.
• Bile duct proliferation
• Diffuse Kupffer cell hyperplasia is noticeable in the sinusoids
HEPATITIS A INFECTION

- Spherical, non enveloped Entero virus of Picorna viridea family
- Endemic in India and in most developing countries.
- According to WHO about 10-50 persons per 1,00,000 are infected annually and in India
- 50-75 percent of acute sporadic hepatitis in children is due to HAV
• HAV is highly contagious
• Faeco-oral route either due to consumption of contaminated food or water.
• The mean incubation period for HAV is ≈ 3 wk.
• Fecal excretion of the virus starts late in the incubation period, reaches its peak just before the onset of symptoms, and resolves by 2 wk after the onset of jaundice in older subjects.
• Infants-longer duration of excretion
CLINICAL MANIFESTATION

- Acute hepatitis - yellowish discoloration of face, body, sclera, nails, urine
- Nausea, vomiting, low grade fever
- Enlargement of regional lymph nodes and spleen
- Excellent prognosis
DIAGNOSIS

• Serum Bilirubin – increased, direct fraction
• SGOT/SGPT- ↑ upto 20 times, but does not correlate with degree of hepatic injury
• Prothrombin time- important predictor for severe infection.
• Antibodies to HAV(IgM)-detected at the onset of symptoms, remain positive upto 4-6 months
• Stool PCR-viral particles (not routinely done)
DIAGNOSIS
COMPLICATIONS

• Acute Liver failure-Rare
  Risk factors for ALF- Adolescents, Adults, immunocompromised & children with chronic liver disease

• Prolonged cholestatic syndrome-resolves without any sequelae
EXTRA HEPATIC COMPLICATIONS

• Aplastic anemia, Neutropenia
• Rarely-. Acute pancreatitis, myocarditis, nephritis, arthritis, vasculitis, and cryoglobulinemia from circulating immune complexes
PREVENTION

• General measures to improve hygiene
• Hand washing
• Clean drinking water & hygienic preparation of food
• Boiling for 5 min - kills the virus
• Sanitation
Active immunization

• IAP recommends-two doses 6 months apart after 1 year of age
• Mandatory- risk groups
• Immunocompromised
• Chronic liver disease
• Contacts of infected persons within 10 days
PASSIVE IMMUNIZATION

• Immunoglobulin - 0.02 ml/kg
• within two weeks after exposure to HAV.

Indicated for

• Newborns of HAV infected mothers
• Children with chronic liver disease who are exposed to HAV.
• The protection is immediate, effective but temporary
HEPATITIS B INFECTION

• Global communicable disease

• Global prevalence is divided into 3 zones based on the carrier state

  low zone : < 2%
  intermediate zone : 2-7%
  high zone : > 7%

India comes under intermediate zone (3-5%)
• Double stranded DNA hepAdna virus

• Dane particle - VIRION- 42 nm

• 3 antigens

  HBs Ag (surface Ag)

  HBc Ag (core Ag)

  HBe Ag (nucleocapsid antigen)
PATHOGENESIS

• Causes injury mostly by immune-mediated processes
• The severity of hepatocyte injury reflects the degree of the immune response
• The first step in the process of **acute hepatitis** is infection of hepatocytes by HBV, resulting in expression of viral antigens on the cell surface.
• The most important of these viral antigens- the nucleocapsid antigens HBcAg and HBeAg.
PATHOGENESIS

• These antigens, in combination with class I major histocompatibility (MHC) proteins, make the cell a target for cytotoxic T-cell lysis
ROUTES OF TRANSMISSION

• HBV present in blood and body fluids (saliva, breast milk, nasopharyngeal secretions) of infected persons

• Blood and blood products

• Contact with infected and body fluids through scratches, cuts, bites or rashes

• (infective dose extremely minute—just 0.00001 ml)

• Sexual activity

• Vertical transmission
VERTICAL TRANSMISSION

• Perinatal transmission from HBs Ag carrier mothers to their infants is the most important route of transmission of hepatitis B in children

• Risk is greatest if mother is also HBeAg+ ve upto 90%
CLINICAL MANIFESTATIONS

• Incubation period - 6 weeks -6 months

• Course may be acute, chronic or fulminant

Acute hepatitis

Symptoms similar to hepatitis A fever, vomiting, jaundice, anorexia etc
EXTRA HEPATIC MANIFESTATIONS

- Arthralgia
- Rash
- Papular acrodermatitis
- Gianotti-crosti syndrome
- Polyarteritis
- Glomerular Nephritis
- Aplastic anemia
NATURAL HISTORY OF HBV INFECTION

• Carrier state – risk of chronicity inversely proportionate to the age of acquisition of the illness
  - adults: 10%
  - children: 20%
  - newborns: 90%

Chronic hepatitis

• Sub acute hepatic failure

• Cirrhosis

• Hepato cellular carcinoma
NATURAL HISTORY OF HBV INFECTION

Acute Hepatitis B → 1-5% → Fulminant hepatitis

Recovery Rate:
- Neonates 5%
- 1-5 yr old 70%
- > 5 yr old 95%

Persistent Infection →
- Develop immunity
- Carrier
- Chronic hepatitis
- Cirrhosis/HCC

Death/OLT
• Routine screening for HBV infection requires assay of ≥3 serologic markers –
• HBsAg, anti-HBc, anti-HBs.
HBs Ag

- First serologic marker of infection to appear
- Found in almost all infected persons
- Rise closely coincides with the onset of symptoms.
- Persistence of HBsAg beyond 6 mo- defines the chronic infection state
- During Recovery from Acute infection- HBsAg level wanes before symptoms
HBeAg & Anti-HBe antibody

• Hbe Ag- marker of active viral replication
• Anti-Hbe —
• Marks improvement and is a goal of therapy in chronically infected patients
Anti HBc Ab

• Both anti-HBs and anti-HBc are detected in persons with resolved infection.

• Persons immunized - only Anti HBs AB is present
SEROLOGIC MARKERS
TREATMENT

• Acute hepatitis-
• Only symptomatic and supportive
• Monitor for liver failure and extrahepatic morbidities
TREATMENT — CHRONIC HEPATITIS

• GOAL-
  • Reduce viral replication-undetectable viral DNA
• Indicated for those children with immune active form of infection with undergoing inflammation and fibrosis putting the child in risk of Cirrhosis

• DRUGS
  • Interferon-α-2b (IFN-α2b)
  • Lamivudine
  • Adefovir
PREVENTION

- **Active immunization**
- Universal immunization
- Zero dose for newborns
- 3 doses
- 0,1m,6m
- 0,6 w,10w
- 6w,10w,14 w

- **Passive Immunization**
- HB IG
- Those who are exposed to HBV+ blood
- Babies born to HB + mothers
- Within 12 hrs of birth
- 0.5 ml IM
HEPATITIS C INFECTION

• Blood borne infection

• **Acute HCV** - mild and insidious in onset

• ALF rarely occurs

• **Chronic HCV** infection - HCV is the most likely to cause chronic infection which is clinically silent until a complication develops.

• Extrahepatic manifestations - (adults) cutaneous vasculitis, peripheral neuropathy, cerebralitis, membranoproliferative glomerulonephritis, and nephrotic syndrome. Antibodies to smooth muscle, antinuclear antibodies, and low thyroid hormone levels may also be present.
NATURAL HISTORY OF HCV INFECTION
PREVENTION

No vaccines
HEPATITIS D INFECTION

- HDV can cause an infection at the same time as the initial HBV infection *(co-infection)*, or HDV can infect a person who is already infected with HBV *(super-infection)*.
CLINICAL FEATURES

• In **co-infection**- acute hepatitis, which is much more severe than Hep B alone
• But the risk of developing chronic hepatitis is low.
• In **super-infection**- acute illness is rare and chronic hepatitis is common.
• The risk of ALF is highest in super-infection.
• Hepatitis D should be considered in any child who experiences ALF.
• Treatment-symptomatic

• No vaccines available
HEPATITIS E INFECTION

• RNA virus, nonenveloped sphere shape with spikes and is similar in structure to the calicivirus.

• The clinical illness associated with HEV infection is similar to that of HAV but is often more severe.

• **NO** chronic illness does not occur but decompensation of pre-existing CLD.

• Major pathogen in pregnant women, and causes ALF with a high fatality incidence.
• No definite treatment
• Supportive measures
• No vaccines
Thank You