Epidemiology of Hepatitis B

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Introduction

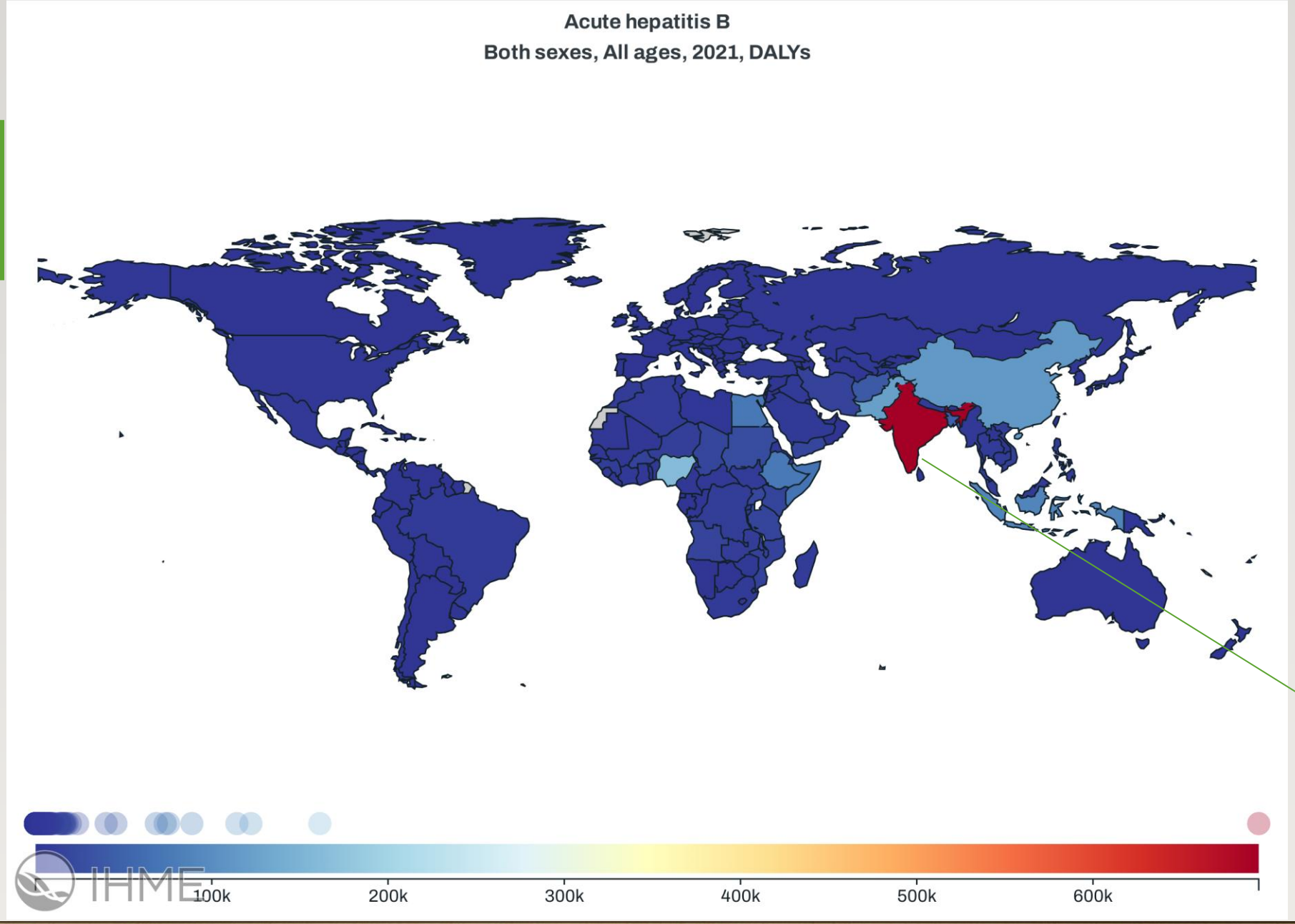
- “Here’s a puzzle for you:
  In a rural district in India, 3% of the population is infected with Hepatitis B. In a neighboring urban area, the prevalence is only 1%. However, the vaccination rate in the urban area is lower than in the rural area.
- **How do we explain this paradox?**
- What epidemiological factors might be at play here — **transmission routes, risk behaviors, health-seeking patterns?**

Introduction

- Hepatitis B (Serum Hepatitis B) is an acute systemic infection with major pathology in the liver caused by Hepatitis B Virus
- HBV infection can be either acute or chronic &
- may range from asymptomatic or mild disease to severe or rarely fulminant hepatitis.

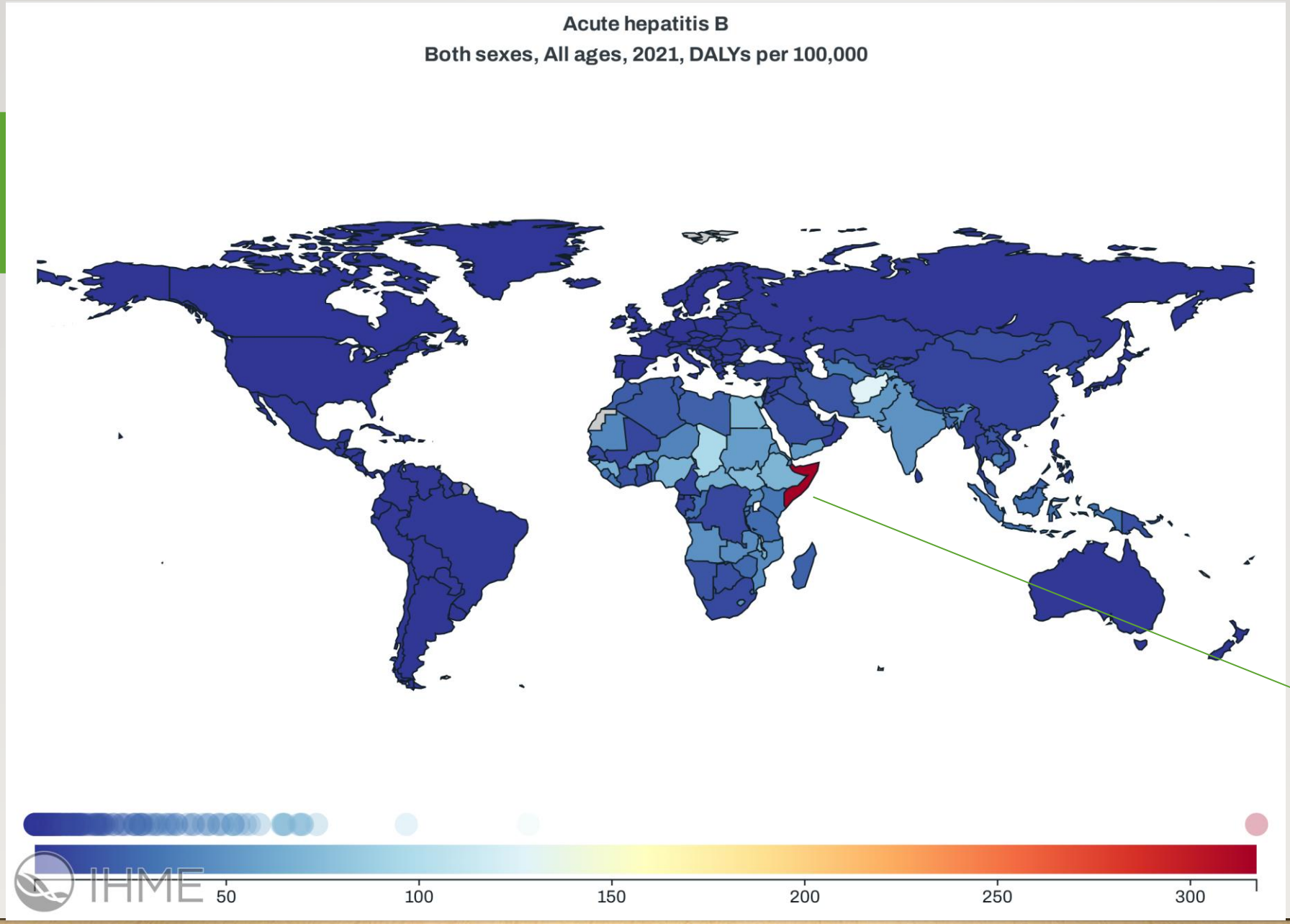
Problem statement

- Hepatitis B is endemic through out the world especially in tropical and developing countries and also some regions of Europe.
- Its prevalence is lowest in countries with high standards of living



Global distribution of number of DALYS because of Hepatitis B

High in India



Global distribution of rate of DALYS per 1lakh population because of Hepatitis B

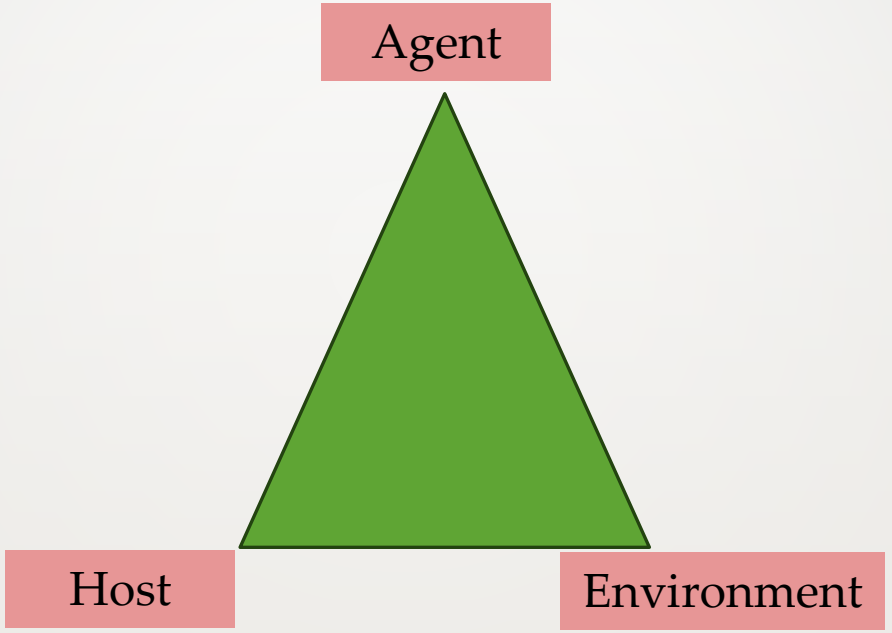
High in Sudan

Problem statement

- HBV infection is a global problem
- Endemicity of HBsAg categorized into four groups

HBsAg Prevalence	Category
>8 %	Highly endemic areas
5 to 7%	High intermediate
2 to 4%	Low intermediate
<2 %	Low endemic areas

Epidemiological triad



Agent Factors

- Hepatitis B Virus is a complex 42 nm, double shelled DNA virus originally known as Dane particle
- It occurs in 3 different morphological forms.

Morphological form	Specific feature
1. Small Spherical particles with 22nm diameter	Constitute bulk in serum, stimulate production of surface antibodies, Non infectious
2. Tubules of varying length and diameter	Non infectious
3. Dane particle	Infectious particle

Agent Factors

- Man is the only reservoir of infection
- Spread either from carriers or cases
- **Infective material:** Contaminated blood or saliva or vaginal secretions or semen
- Virus can survive at least 7 days on environmental surfaces
- **Communicability period:** Virus is present in the blood during incubation period and acute phase of disease. Period of communicability is several months to years until disappearance of HbsAg and appearance of surface antibody.

Host Factors

- Most of HBV infections acquired in infancy
- Infections acquired in early ages more likely to be chronic.
- The risk of chronic infection remains high until 5 years of age
- Surgeons, Health care and laboratory personnel, recipients of blood transfusion, prostitutes, homosexuals, injectable drug users, infants of HBV carrier mothers, recipients of solid organ transplants, immunocompromised patients are other high risk groups

Host factors

- Hepatitis B has 3 distinct antigens and produce 3 corresponding antibodies
- Surface antigen/ Australia antigen – HBsAg – anti HBs
- Core antigen – HBcAg – anti HBc
- e antigen – HBeAg – anti HBe
- These antigens and antibodies will act as biomarkers of HBV infection
- Patients HBV infection have one or more HBV markers

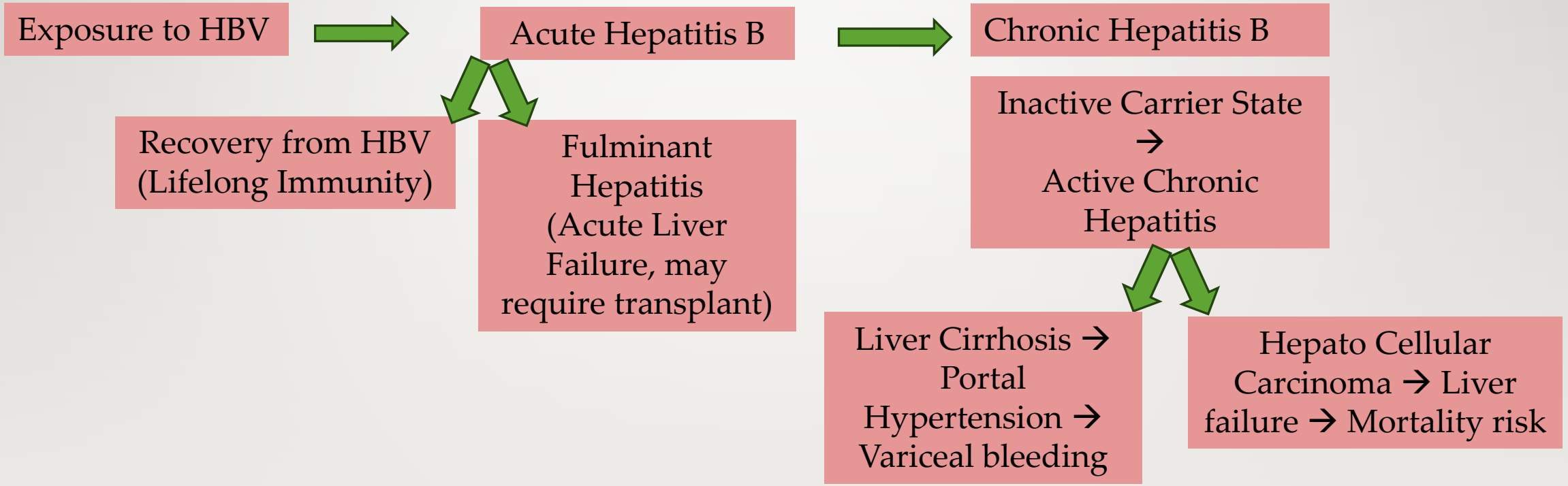
Environmental factors

- Poor infection control in healthcare settings
- Unregulated blood transfusion services
- Lack of safe disposal of sharps and waste
- Home births without sterile techniques
- Occupational hazards
- Unhygienic procedures like traditional tattooing, ear piercing, nose piercing, ritual circumcision, acupuncture
- Shared razors or tooth brushes

Modes of Transmission

- Parenteral route
- Perinatal transmission
- Sexual transmission
- Other routes Ex: Child to Child horizontal transmission while playing together through physical contact with skin conditions such as cuts or grazes.
- Incubation period ranges from 30 to 180 days with an average of 75 days.
- Lower doses of virus infection result often in longer incubation period

Clinical Progression



Diagnosis

- Acute Hepatitis B – HBsAg, HBeAg, Anti-HBc(IgM)
- Chronic Hepatitis B with active replication - HBsAg, HBeAg, Anti-HBc(IgG)
- Chronic Hepatitis B with lowviral replication - HBsAg, Anti-HBc(IgG), Anti-HBe
- Chronic Hepatitis B with Heterotypic HBsAg- HBsAg, HBeAg, Anti-HBs, Anti-HBc(IgG), Anti-HBe
- Recovery from Hepatitis B - Anti-HBs, Anti-HBc(IgG)
- Vaccination - Anti-HBs
- False positives - Anti-HBc(IgG)

Treatment for Acute Hepatitis B

- There is no specific treatment for acute hepatitis B
- Care is aimed at maintaining comfort and adequate nutritional balance, including replacement of fluids lost from vomiting and diarrhoea

Treatment for Chronic Hepatitis B

- Treatment can slowdown the progression of cirrhosis and reduce incidence of liver cancer
- WHO recommends the use of oral treatments – tenofovir or entecavir
- One pill per day through out life
- They have less side effects and rarely lead to drug resistance
- Treatment using interferon injections is costly and less feasible in developing countries

Prevention

- **Hepatitis B Vaccine** - In countries with >90% infant vaccination coverage, **HBV prevalence dropped from ~10% to <1%**. For adults at 0, 1& 6 months. For children under 1 year 6, 10, 14 weeks as part of pentavalent vaccine.
- **Hepatitis B immunoglobulins** – For immediate protection for those accidentally exposed – should be given within 6 to 48 hours – two doses should be given 30 days apart
- **Passive – Active immunization** – Combination of Hepatitis B vaccine and HBIG
- **Other measures** like screening of blood donors and high risk people

Prevention

PRIMARY PREVENTION

Vaccination
Recombinant HBV vaccine, Including birth dose

Safe Injection Prac-tices Use aut-disabled syringes

Blood Safety
Mandatory screening of blood

Safe Sex Practices
Condom use, public education

Safe Tattooing, Piercing, Surgery
Use sterilized, dispos-able instruments

Antenatal Screening
Test all pregnant women for HBsAg

Prevention

SECONDARY PREVENTION

Screening Programs
Test high-risk groups for HBsAg

Post-Exposure Prophylaxis
HBIG + HBV vaccine within 24 hours

TERTIARY PREVENTION

Regular Monitoring of Chronic Cases
Monitor ALT, HBV DNA, liver function

Lifestyle Modifications
Avoid alcohol, hepatotoxic drugs

Antiviral Therapy
Entecavir, Tenofovir for chronic HBV

Liver Transplantation
For end-stage liver disease or acute failure

WHO 5Cs

- WHO proposed 5C principles for all models of Hepatitis in all settings
    - Consent
    - Confidentiality
    - Correct test results
    - Counselling
    - Connection – Linkage to prevention, treatment and care services
- This means hepatitis testing for diagnosis must be voluntary

Thank You