Community 432 Medicine

12 Epidemiology of Viral Hepatitis

Objectives

At the end of the lecture students should be able:

1. Understand Classification of viral hepatitis.
2. Recognize the magnitude of viral hepatitis infections.
3. Understand modes of transmission of different serotypes.
4. Understand measures of prevention and control of different serotypes of viral hepatitis.

*Dr. Salwa said that the prevalence as percentage is not important but you should know what the highest affected group is.

*Some prevalence studies are not included in the team work, you can go back to it in the lecture for your knowledge.

Done By:
Arwa Almashaan

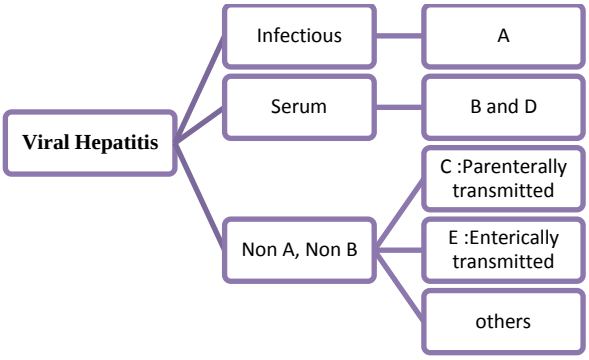
Reviewed By:
Rozan Murshid

Teams

جامعة الملك سعود
King Saud University

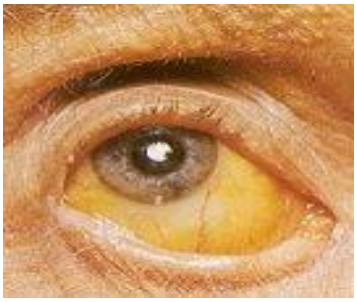
Viral Hepatitis

Classification &Historical Perspective



Hepatitis A:

Clinical presentation:



- Abrupt onset.
- Fever
- Malaise
- Anorexia
- Abdominal discomfort
- Jaundice

Epidemiology:

- More than 90% are asymptomatic
- Sero-prevalence increases with age.
- At **age 15, 95%** are seropositive.
- Case fatality rate (CFR)= 0.3%.
- If age > 40 years CFR=2%.

Notes:

Incubation period is the time between exposures to a pathogenic organism, a chemical or radiation, and when symptoms and signs are first apparent.

Period of communicability (Infective period): is the period during which an infected person can transmit a pathogen to a susceptible host.

Chain of infection:

- **Agent:** RNA virus
- **Reservoir:** Human (Clinical & subclinical cases)
- **Incubation period I.P. :** 15-45 days (median one month).
- **Period of communicability P.C.:** Last two weeks of I.P. + one week of illness.
- **Modes of transmission:** Fecal-oral route, Common source outbreaks, or Blood transfusion (rare).

Prevention and Control:

- **Good sanitation & personal hygiene:** "Careful hand washing"
- **Day- Care centers:** Hand washing after every diaper change and before eating.
- **Shellfish:** heat 85-90C for 4 minutes, or steam for 90 seconds.
- **Inactivated hepatitis A vaccine**
  - Schedule 2 doses after 6 months interval.

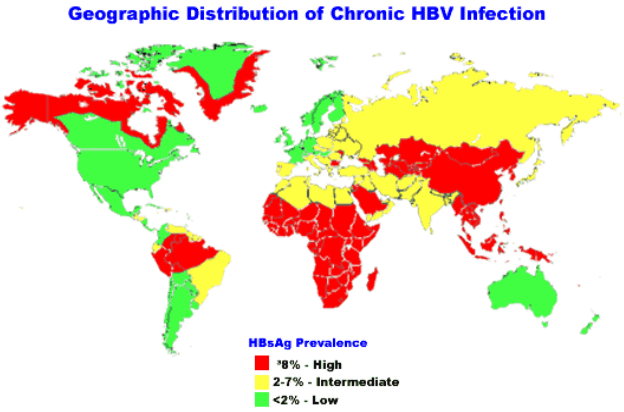
- Intramuscularly.
- Protection after one month.
- Lasting immunity at least 10 years.

- **Hepatitis A patient: Enteric precaution** for the Period of communicability
- It has **NO** chronicity.

Hepatitis B:

Clinical presentation:

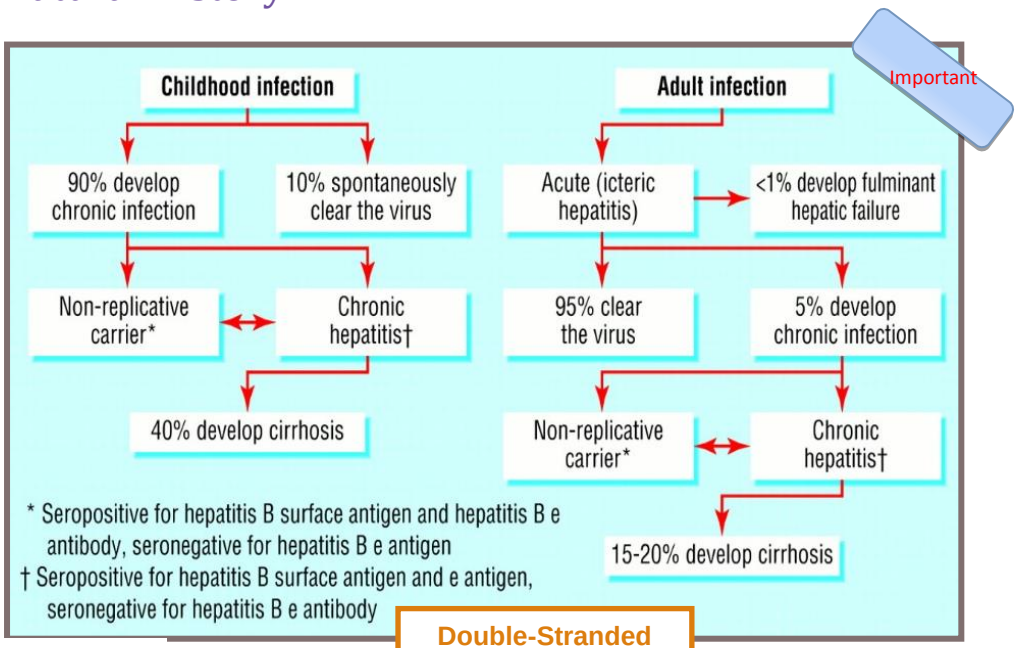
- Insidious onset.
- Anorexia.
- Abdominal discomfort.
- Nausea.
- Vomiting.
- Arthralgia.
- Jaundice.

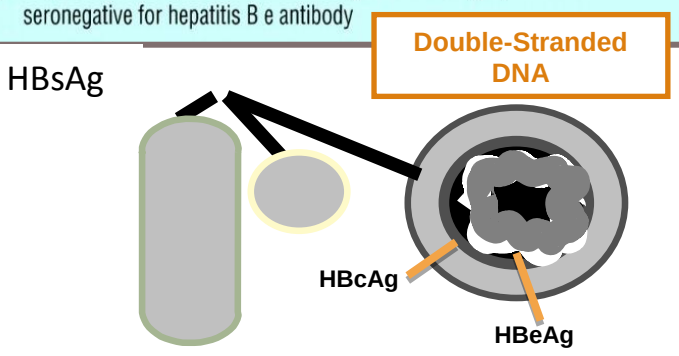


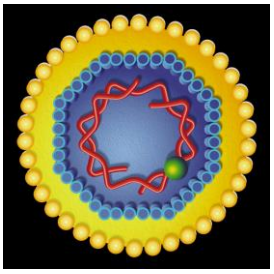
Epidemiology:

- More than 500,000 death/year
- 2 billion people infected
- 360 million CHB (Chronic hepatitis B)

Natural History:





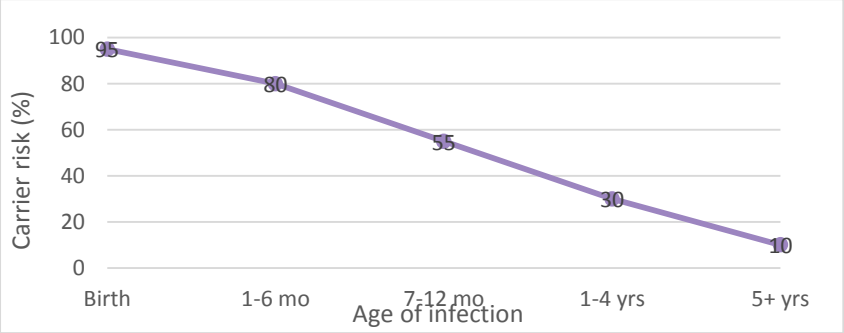


- The presence of **HBsAg** indicates **active infection or chronic carrier**.
- **Antibody to HBsAg**, from either **disease or vaccine**, indicates **immunity**.

Chain of infiction

- **Agent:** Double strand DNA. Serotypes adw, ayw, adr, ayr.
- **Reservior:** Human (case + carrier).
- **I.P.** 2-3 months.
- **P.C.** One week of I.P. + illness period + carriage.
- **Carriage depends on age at infection;**
  - <5 yrs, 30%-90% chronicity
  - >5 yrs, 2%-10% chronicity

Risk of Chronic HBV Carriage by Age of Infection



Notes:
Risk of chronicity decrease with increase in age.

Concentration of HBV in Various body fluid

- **High:** blood , serum , wound exudate
- **Moderate:** semen , vaginal fluid, saliva
- **Low/not detectable:** urine, feces, sweat, tears, breast milk

Mode of transmission:

Parenteral

Percutaneous and permucosal exposure to:

- infective body fluids
- Blood transfusion
- Organs transplants
- Sharing needles
- Hemodialysis
- Needle stick
- Tattooing
- Razors & toothbrushes.

Sexual

Perinatal (Vertical)

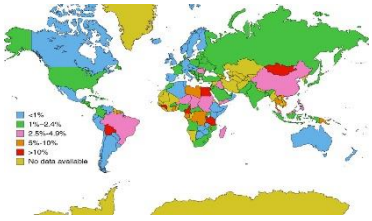
- Especially when HBs Ag carrier mothers are also HBe Ag positive.

Prevent and control

- **Hepatitis B Vaccine**
  - Subunit recombinant HBs Ag IM in the deltoid region.
  - 3 dose series, typical schedule 0, 1, 6 months - no maximum time between doses (no need to repeat missed doses or restart) 0 is the time of first vaccine regardless the age.
  - Wide scale **immunization of infants** (revise compulsory vaccination schedule).
- **Immunization of high risk persons.**
  - Hemodialysis patients.
  - Bleeding disorders.
  - Susceptible households.
  - Health care personnel.
- **Blood banks:**
  - Avoid donors from risky groups.
  - Education & history taking.
  - Testing for HBs Ag.
- **Discourage:**
  - Tattooing, Drug abuse,
  - Extramarital sexual relations.
- **Needle stick**
  - Single dose of HBIG (hepatitis B immune globulin) (24 hours).
  - Vaccine series.
- **Sexual exposure**
  - Single dose of HBIG (14 days) and
  - Vaccination.
- **Infants to HBsAg +ve mothers.**
  - 0.5 ml HBIG (IM) + First dose of the vaccine at time of berth.
  - 2nd & 3rd doses at 1 & 6 months later.
- **Health care personnel.**
  - Universal precautions

Hepatitis C

- 170 Million Hepatitis C virus (HCV) carriers
- 3-4 MM new cases / year
- The prevalence of HCV in some countries in Africa, the Eastern Mediterranean, South East Asia and Western Pacific is high compared to some countries in Europe and North America.



PREVALENCE OF ANTIBODY TO HCV TO SAUDI HIGH RISK GROUPS

High risk groups (Hemophilia, Thalassemia, Sickle cell anemia, STD) have a high prevalence of HCV infection. (They receive blood products contaminated with HCV)

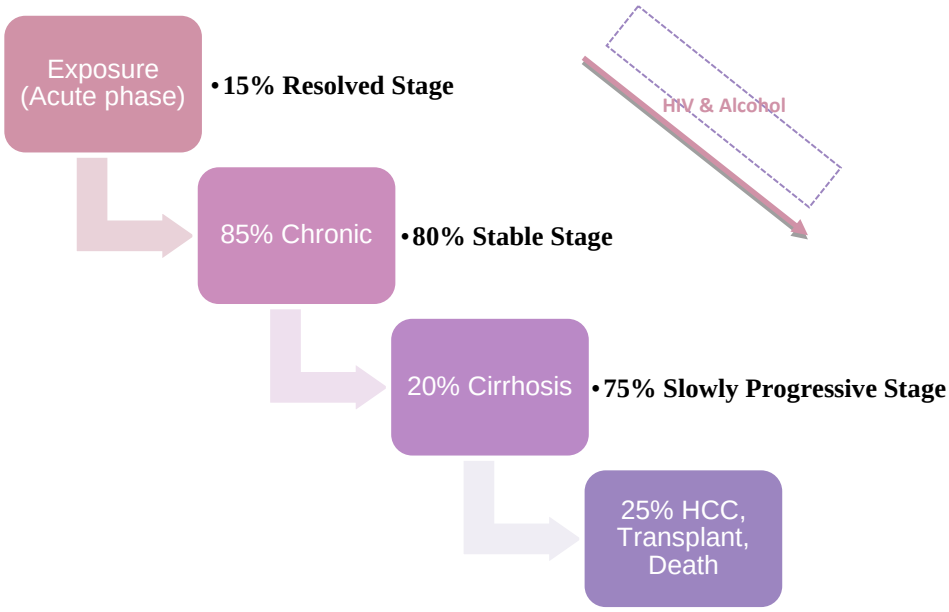
ANTI-HCV IN HAEMODYLYSIS PATIENTS IN SAUDI POPULATION

It's high in patient using hemodialysis because the machine could be contaminated.

Hepatitis C Virus Genotypes

- 11 (6 major) with many subtypes and quasispecies.
- The predominate genotype in **Saudi** is Genotype 4 (62.9%)
- Europe & America Genotype 1→ 75 (24.8) %
- Genotype 2 = 10.8 (7.4) % → Severe disease
- Genotype 3 = 5.8 (5.9) % → Severe disease
- Genotype 1 & 4 → **Poor response to therapy**

Natural History of HCV Infection



Notes: Natural history of HCV Infection

The natural history of hepatitis C evolves over the course of decades and can be considered to have three distinct stages.

The first is the stage, Resolution of recovery: This is seen in approximately 15% of patient with viremia and acute hepatitis followed by resolution of viremia with the persistence of antibody.

The second stage, Stable chronic course: patients have viremia and acute hepatitis with subsequent decrease in ALT. The patient may experience periodic elevations of liver enzymes and persistent viremia for several years. This is the most common stage and is seen in approximately 80% of the patients. During this stage it is believed that patients may experience the emergence of quasispecies and relative ineffectiveness of neutralizing antibodies.

The third stage, severe progression of the disease: occurs in approximately 20% of the patients. The patient will experience more persistent elevation of liver enzymes, persistent viremia, and a more rapid progression to cirrhosis and possibly even hepatocellular carcinoma.

HIV and alcohol should be considered as important *cofactors* in hepatitis C and the progression to cirrhosis. There is evidence to suggest a greater than 15 fold increase in the incidence of cirrhosis in **alcoholic** patients and a >5 fold increase with **HIV**.

Features of Hepatitis C Virus Infection

- **Incubation period:** Average 6-7 weeks, Range 2-26 weeks.
- **Acute illness (jaundice):** Mild (<20%)
- **Case fatality rate:** **Low**
- **Chronic infection:** 60%-85%
- **Chronic hepatitis:** 10%-70%
- **Cirrhosis:** <5%-20%

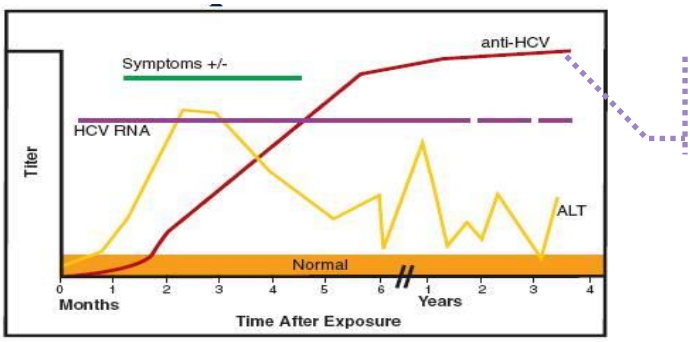
} **Age related**

- **Mortality from CLD:** 1%-5% CLD- Chronic Liver Disease

Chronic Hepatitis C Factors Promoting Progression or Severity

- Increased **alcohol** intake
- Age > 40 years at time of infection
- **HIV** co-infection
- Other
  - Male gender
  - Chronic HBV co-infection

Serologic Pattern of Acute HCV Infection with Progression to Chronic Infection:



It is not present in acute phase.

HCV Transmission Modes:

❖ **Important HCV Transmission Modes**

- Blood transfusion 1:100,000 in US
- IV drug abuse (80% infected in first year)

❖ **Un-common HCV Transmission Modes**

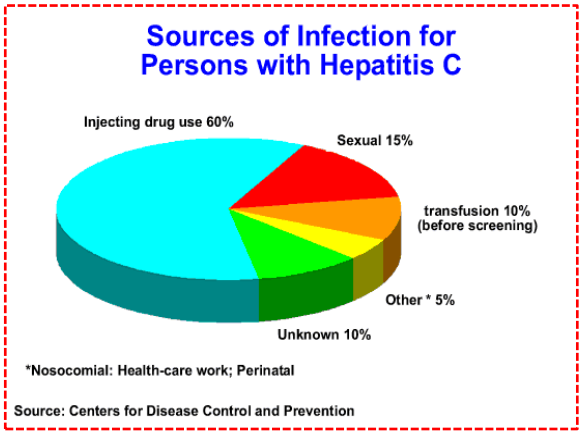
- Household transmission
- Vertical transmission mother – Child 1-5%
- Needle stick injury 3%

❖ **Other transmission issue**

- HCV **not** spread by kissing, hugging, sneezing, coughing, food or water, sharing eating utensils or drinking glasses, or casual contact.
- Do not exclude from work, school, play, childcare or other setting based on HCV infection status.

Perinatal Transmission of HCV	Sexual Transmission of HCV	Household Transmission of HCV
❖ Transmission only from women HCV-RNA positive at delivery • Average rate of infection 6% • Higher (17%) if woman co-infected with HIV • Role of viral titer unclear ❖ No association with • Delivery method • Breastfeeding ❖ Infected infants do well • Severe hepatitis is rare	Case-control, cross sectional studies • Infected partner, multiple partners, early sex, non-use of condoms, other STDs, sex with trauma, **Partner studies** • Low prevalence (1.5%) among long-term partners: infections might be due to common percutaneous exposures (e.g., drug use), BUT • Male to female transmission more efficient: more indicative of sexual transmission	• **Rare but not absent** • Could occur through percutaneous/mucosal exposures to blood: ▪ Contaminated equipment used for home therapies: IV therapy, injections ▪ Theoretically through **sharing** of contaminated personal articles (razors, toothbrushes)

Public Health Service Guidelines for Anti HCV-Positive Persons



Anti-HCV-positive persons Should:

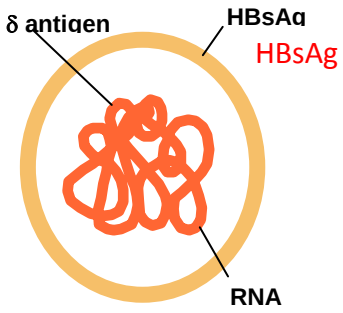
- Be considered potentially infectious
- Keep cuts and skin lesions covered
- Be informed of the potential for sexual transmission
- Be informed of the potential for perinatal transmission: no evidence to advise against pregnancy or breastfeeding

Anti-HCV-positive persons Should Not:

- Donate blood, organs, tissue, or semen
- Share household articles (e.g., toothbrushes, razors)

Hepatitis D

- HDV is a defective single-stranded RNA virus (delta Ag)
- It requires HBV for synthesis of envelope protein composed of HBsAg



Clinical Features

- **Coinfection with HBV**
  - severe acute disease
  - low risk of chronic infection
- **Superinfection on top of chronic HBV**
  - usually develop chronic HDV infection
  - high risk of severe chronic liver disease

Modes of Transmission

- **Percutanous exposures**
  - injecting drug use
- **Permucosal exposures**
  - sex contact

Prevention

- **HBV-HDV Coinfection:** Pre or postexposure prophylaxis to prevent HBV infection (HBIG and/or Hepatitis B vaccine)
- **HBV-HDV Superinfection:** Education to reduce risk behaviors among persons with chronic HBV infection

Hepatitis E

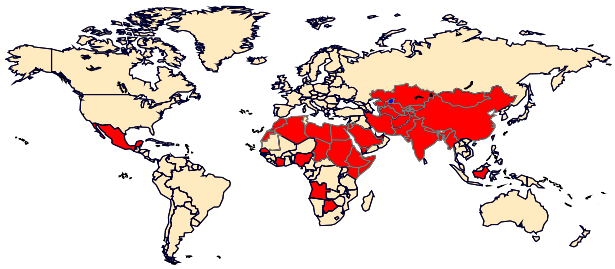
Clinical Feature

- **Incubation period**: Average 40 days/ Range 15-60 days
- **Case-fatality rate:** Overall, 1%-3% / Pregnant women, 15%-25%
- **Illness severity:** **Increased** with age
- **Chronic squeal:** None identified

Epidemiologic Features

- Most outbreaks associated with **fecal contaminated drinking water.**
- Minimal person-to-person transmission

Geographic Distribution of Hepatitis E



Outbreaks or Confirmed Infection in >25% of Sporadic Non-ABC Hepatitis, more in developing countries.

Summery

	HAV	HBV	HCV	HDV	HEV
Source of Virus	Feces	Blood / some body fluids	Blood / some body fluids	Blood / some body fluids	Feces
Route of Transmission	Fecal–oral	Percutaneous or permucosal	Percutaneous or permucosal	Percutaneous or permucosal	Fecal–oral
Chronic Infection	No	Yes	Yes	Yes	No
Prevention	• Pre / post exposure immunization • Hand hygiene • Total Ig	• Pre / post Exposure immunization • HBIg • Risk behavior modification	• Blood donor screening • Risk behavior modification	• Pre / post Exposure immunization with HBV vaccine • Risk behavior modification	• Access to clean drinking water • Hand hygiene
Vaccine	Yes	Yes	No	No	No

Ig: immunoglobulin; HBIg: hepatitis B immunoglobulin

431 collection

	HVA	HVB	HVC	HVD	HVE
Agent	**Picornvairus (RNA)**	Hepadnavirus **(double stranded DNA)**	Flaviviridae **(RNA)**	**RNA virus**	**RNA**
Reservoir	**Human**	**Human**	**Human**	**Human**	**Human**
Out let	**feces**	**Blood & its product , body fluid**	**Blood & its product , body fluid**	**Blood & its product , body fluid**	**Feces**
MOT	**Fecal –oral route**	**Pre-cutaneous/ pre-mucosal**	**Pre-cutaneous/ pre-mucosal**	**Pre-cutaneous/ pre-mucosal**	**Fecal –oral route**
IP	**45-15 days ≈ 1 month**	**2-3 months**	**6-7 weeks (range:2-26 week)**		**Average 40 days/ Range 15-60 days**
PC	**During the last 2nd half of IP+ one week of illness**	**One week of I.P. + illness period + carriage**			
Distribution IN KSA	**Intermediate to high → peak age of infection Late childhood/ young adults**	**High → more than 8 %**	**Intermediate→ 1.1 % -5%**	**LOw**	**High**

Childhood Immunization Schedule in Saudi Arabia January 2008

Age	Vaccine
At Birth	BCG, HepB
2 months	IPV (DTP, HepB, Hib)
4 months	OPV (DTP, Hep B, Hib)
6 months	OPV (DTP, HepB, Hib)
9 months	Measles (mono)
12 months	MMR, Varicella, OPV
18 months	OPV, DTP, Hib, Hep A
24 months	Hep A
4- 6 years	OPV, DTP, MMR, Varicella

If you find any Mistakes please contact me:

Roza1066@gmail.com

Community medicine team leader :

Rozan Murshid