بسم الله الرحمن الرحيم

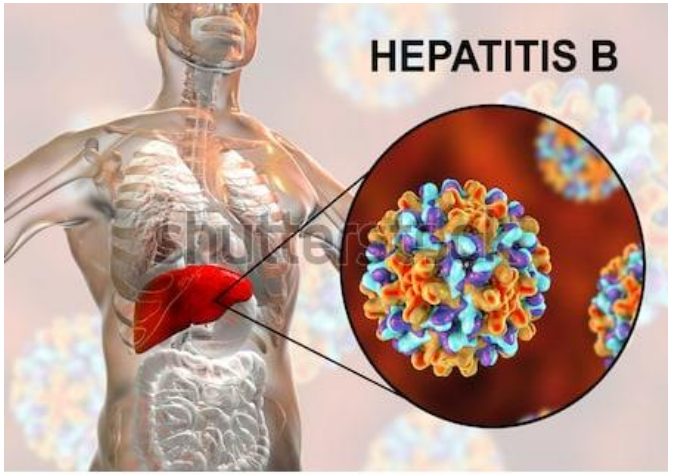
السلام عليكم ورحمة الله وبركاته

Viral Hepatitis 2

~~HAV.~~

HBV, HCV. HDV HEV and HGV

22-12-2024



HEPATITIS B

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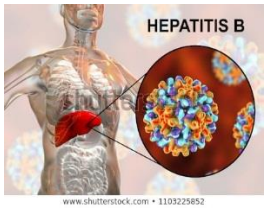
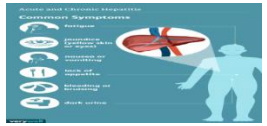
22 Dec.. 2024

HEPATITIS B



- **Hepatitis B (formerly known as "serum" hepatitis**
- Hepatitis B is a global public health threat and the world's most common serious liver infection.
  - It is up to **100 times more** infectious than the **HIV/AIDS virus**.
  - It also is the primary cause of liver cancer (**hepatocellular carcinoma (HCC)**), which is the **second-leading cause of cancer deaths** in the world.
- **However, it can be prevented by currently available safe and effective vaccine.**
- **Clinically it is** characterized **by variety of outcomes**.
  - Usually, it is an **acute** i**nfection**, which may be either
    - **Subclinical** or **Symptomatic**.
- Roughly 70 %of an acute HBV infection have symptoms



❖ **Chronic HBV infection.**

- around 5% of adults,
- 30 % of children, and roughly
- 95% of early childhood and infants exposed at birth

will not clear the virus and will develop a chronic HBV infection

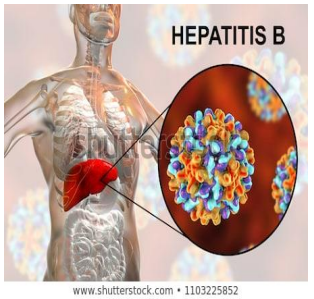
- ❖ In approximately 5 to 15 % of cases, HBV infection fails
- ❖ to resolve and become persistent carriers of the virus

- **Persistent** HBV infection may cause **progressive liver disease** including **chronic active hepatitis** and **HCC**.

❑ HBV can **form a dangerous alliance with Delta Virus** and

❖ produce a **new form of virulent hepatitis** which is considered to be a widespread threat for much of the world.

Geographical Distribution



- **Hepatitis B is** a **major global** health problem, and
  - the most **serious type of viral hepatitis**.
- **More than 2 Billion people WW have evidence(one out of three people) of past or current HBV infection** and
- Approximately **1.5 million** people become newly infected **each year**
- Almost **300 million** people are **chronically infected**
- Approximately **10%** of infected individuals **are diagnosed**
- Approximately **two people** die **each minute** from hepatitis B
- **HBV is the leading cause of liver cirrhosis** & **HCC** WW .
  - **Between 5-15 % of adults, and**
  - **up to 95 %of infants infected**

with HBV become carriers

. **Among these,**

25%, in the long term, develop serious liver disease

Cont. …Geographical Distribution

- Hepatitis B is Endemic throughout the world, especially in
  - Tropical& Developing countries &also in some regions of Europe
- Its prevalence varies from country to country and depends upon
- a complex mix of Behavioural, Environmental and Host Factors
  - **Eastern Mediterranean Region Sixty million** people are infected
  - **South-East Asia Region, 18 million**
  - **Region of the Americas 5 million**
  - **In general it is lowest in countries or areas with high standards of living.**
  - **HBV infection is a global problem, with 66 %of all the world's population living in areas where there are high levels of infection**
- **Based on HBsAg carrier rates, countries categorized into 3groups**

I. **High Endemicity (≥ 8 %),**
II. **Intermediate (2-8 %), and**
III. **Low Endemicity (< 2 %).**

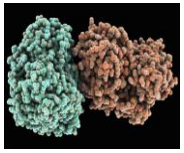
- **Hepatitis B is endemic in China and other parts of Asia**
- **In these regions most people become infected in childhood**
- **and 8-10% of the adult population are chronically infected.**
- **In the Middle East an estimated 2-5% of the general population is chronically infected.**
- **In Western Europe and North America <1% population is infected**

In Jordan The national prevalence of HBV is estimated to be around 2.4% (2017)and has declined from **9.9% (**1985) in the pre-vaccination era.

Epidemiological determinants

Agent factors

HBVis highly contagious has three distinct antigens stimulating the production of three corresponding Abs



1. **Surface Ag "Australia Ag"{HBsAg) surface Abs(anti-HBs**
2. **Core Ag {HBcAg), core Abs (anti-HBc)**and
3. **"e" Ag (HBeAg). "e" Abs (anti-HBe).**

These Abs and their Ags constitute very useful markers of HBV infection
Pts with HBV infection are expected to have one or more HBV markers

(b) Reservoir of Infection :

- **Man is the only reservoir of infection ;either carriers or cases.**
- continued infection is due to the **large number** of **the carriers**
- **The Persistent Carrier** state has been **defined** as the **presence of**
- **HBsAg (with or without concurrent HBeAg) for more than 6 Mths**

(c) Infective Material:

- **Contaminated blood is the main source of infection,**
- **body secretions** such as **saliva, vaginal secretions** and **semen of infected** persons.

(e) Period of Communicability :

- **HBV is present** in the **blood during the**
  - **incubation period (for a month before jaundice) & acute phase of the disease**
- **Period of communicability** is usually **several months**
  - {occasionally **years in chronic carriers**) **or**
  - **until disappearance** of **HBsAg** and **appearance of surface Abs**

d) Resistance :

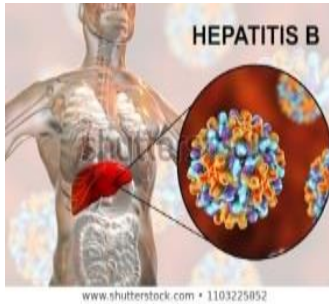
❑HBV is **quite stable** and **capable of surviving for at least 7 days on environmental' surfaces.** It is an **important occupational hazard for HCWs**

- ❖ **It can** be **readily destroyed by sodium hypochlorite,**
- ❖ by **heat sterilization** in an **autoclave for 30 -60 minutes**

Host factors

(a)AGE :

- ❑ The outcomes of **HBV infection are age dependent**.
- ❑ **Acute HBV** occurs in approximately
  - ➢ **1 %of** perinatal,
  - ➢ **10 %of early childhood (1-5 years of age)** and
  - ➢ **30 %of late (> 5 years age)** HBV infections.
- ❖ **Mortality from fulminant HB is approximately 70 %**
- ❑ **The development of Chronic HBV infection is inversely related to age** and **occurs in approximately**
  - ✓ **95 % of persons infected perinatally,**
  - ✓ in **30 % infected in childhood (<6 years of age)**
  - ✓ in **5 % infected a≥ 6 years of age**



(b) High-risk Groups :

- Certain groups carry higher risks.
  - Health care workers and Laboratory personnel

Annual incidence of HBV infection in surgeons is estimated to be 50 times greater than that in the general population, and more than twice that of other physicians.

- Recipients of blood transfusions,
- Homosexuals, Prostitutes, Percutaneous drug abusers,
- Infants of HBV carrier mothers,
- Recipients of solid organ transplants and
- Immunocompromised Patients
- Hepatitis B and HIV Infection: About 1% HBV
- pts (2.7 million) are also infected with HIV.

Serological screening & vaccination of high-risk groups is highly recommended

- HIV markedly increases the risk of developing HBV-associated liver cirrhosis &HCC mortality rate increases among HIV-+ve due to HBV co infection

DIAGNOSIS

- ***These Abs and their Ags constitute very useful markers of HBV infection.***
- ***Pts with HBV infection are expected to have one or more HBV markers.***

They can be **used to distinguish acute** and **chronic** infections.

- **Laboratory diagnosis of HBV infection focuses on the**
- **detection of the (HBs Ag)**.

❑ **Acute HBV infection**

is **characterized by the presence** of **HBsAg and IgM** antibody to the, **HBcAg**. **During the initial phase of infection**, patients are also **seropositive** for **HBeAg.**

- **HBeAg** is a **marker of high levels of replication** of the virus.
- The presence of **HBeAg indicates** that the **patient's blood and body fluids** are **HIGHLY INFECTIOUS**.

❑ **Chronic infection** is characterized by the

❑ persistence of **HBsAg for at least 6 months (with or without HBeAg)**.

❑ **Persistence of HBs Ag** is the **principal marker of risk for**

❑ **Developing chronic liver** disease and **liver cancer (HCC) later in life.**

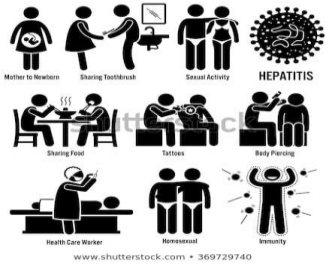
There are three distinct antigen antibody systems that relate to HBV infection and a variety of circulating makers that are useful in diagnosis. Interpretation of common serological patterns is as shown in Table below

Common serologic patterns in hepatitis B virus infection and their interpretation

HBsAg	Anti-HBs	Anti-HBc	HBeAg	Anti-HBe	Interpretation
+	-	IgM	+	-	Acute hepatitis B
+	-	IgG[1]	+	-	Chronic hepatitis B with active viral replication
+	-	IgG	-	+	Chronic hepatitis B with low viral replication
+	+	IgG	+ or -	+ or -	Chronic hepatitis B with heterotypic anti-HBs (about 10% of cases)
-	-	IgM	+ or -	-	Acute hepatitis B
-	+	IgG	-	+ or -	Recovery from hepatitis B (immunity)
-	+	-	-	-	Vaccination (immunity)
-	-	IgG	-	-	False-positive, less commonly, infection in remote past

Low levels of IgM anti-HBc may also be detected.

Modes Of Transmission



a. *Parenteral route*

- Hepatitis B is **a blood-borne infection**.
- **It is transmitted by infected Bl and Bl. Products, through** ***transfusions, dialysis, contaminated syringes*** *and* ***needles pricks of skin, handling of infected blood, accidental inoculation of minute quantities of blood*** *such as during* ***surgical*** *and* ***dental procedures, immunization, tattooing, ear piercing, nose piercing, circumcision, acupuncture,*** *etc* .
- **also occur** through the **reuse of needles and syringes particularly** among **persons who inject drugs**
- **Accidental percutaneous inoculations** by **shared razors &tooth brushes**

b. *Perinatal transmission*

- Spread of infection from **HBV carrier mothers to their babies**
- **In highly endemic** areas,
- **HBV** is **most commonly** spread from **mother to child** at birth (**perinatal transmission**), **or through horizontal transmission** especially from an

- **through horizontal transmission** especially from an infected child to an uninfected **child during the first 5 years of life.**
- **The development** of **chronic infection is very common** in
- **infants infected** from their mothers **or** before the age **of 5 years appears to be an important factor for the high prevalence of HBV infection in some regions**, particularly China and Southeast Asia
- **Majority** of children **born to HBeAg+Ve mothers** become **chronically** infected.

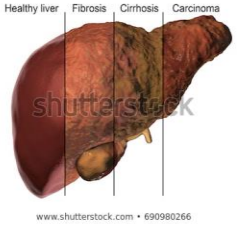
The mechanism of perinatal infection is uncertain.

Although HBV can infect the foetus in utero, this rarely happens

- and **most infections appear** to **occur at birth,** as a result of a
  - **leak of maternal blood into the baby's circulation**, or
  - **ingestion** or **accidental inoculation of blood** .
- **Infection of the baby is usually anicteric and is recognized by**
  - **The appearance of surface antigen(HBsAg) between**
  - **60-120 days after birth**

c. Sexual transmission

- **ample evidence** for the spread of infection by sexual route. **particularly male homosexuals, are at very high risk of infection with HBV.**
- **Heterosexual** persons with **multiple sex partners** or
- ✓contact with **sex workers**



d. Other routes

- **horizontal transmission**: Transmission from **child-to-child, is responsible for a majority of HBV infections and carriers i**n parts of the world other than Asia.
- **In addition**, infection can occur during **medical, surgical and dental procedures**, **tattooing,** or through the use of razors and similar objects that are contaminated with infected blood.
- **HBV is an important occupational hazard for HCWs**
- In short, **transmission occurs in a wide variety of epidemiological settings**. **It can spread** either from **carriers** or during **the incubation period**, **illness** or early **convalescence.**

Who is at risk for chronic disease?

- **The probability of HBV to becomes chronic depends** upon **the age at which a person becomes infected**.
- **Children <6 years** of age who become HBV infected are the **most likely to develop chronic infections**.

In **infants and children**:

- **80–95%** of infants infected during **the first year of** life **develop chronic HBV**
- **30–50%** of children infected **before the age of 6 years develop chronic HBV**

In adults:

- **<5%** who are infected as **adults** will **develop chronic infection and**
- **20–30%** of **chronically infected adults will develop cirrhosis and/or liver cancer**

Prevention and Containment

- **SINCE THERE IS NO SPECIFIC TREATMENT,**
- **Prevention has been the major aim in managing HBV.**
- **HBV is preventable with currently available safe&effective vaccines.**
- **The following measures are available : .**

a. Hepatitis B Vaccine

- ✓ **The recombinant hepatitis B vaccine was introduced in 1986.**
- ✓ **The active substance in hepatitis B vaccine is HBsAg**
- ✓ The vaccine is **95% effective** in **preventing** infection and
- ✓ **prevent** the development of **chronic disease** and **HCC** due to HBV.
- ❖ **Adults dose of 10-20 micrograms initially** and **again at 1 and 6 months**.(0 ,1, 6 month)
- ❖ **Children age <10 years half of the adult dose at the same time intervals.** **Deltoid muscle** is preferred for injection
- ❖ **For infants & children under 2 years, anterolateral aspect of thigh is used.**

- HB vaccine **does not interfere** with immune response to any other vaccine & vice-versa.
- **The birth** dose of HB vaccine can be **given safely** together with BCG
  - However, the vaccines should be **given at different sites**
- **The recommended schedule for vaccination categorized into those**

Schedules with a birth-dose

In countries with a **high perinatal HBV infection, specifically** where the prevalence of **chronic** HBV infection in the **general population is >8%**

First dose of HB vaccine should be given **within 24 hrs after birth** to prevent perinatal

- **WHO** recommends that **all infants should** receive their **first dose** of vaccine as soon as **possible after birth,** preferably **within 24 hours**. **Birth (first) dose and** followed by
  - **2nd , 3rd or 4th doses** to complete the primary series.
  - **usually given with other routine infant vaccines**

minimum recommended interval

- ❖ minimum recommended interval between the doses
- ❖ is four weeks
- ❑ WHO does not recommend a booster dose of HB vaccine.
- ❑ Protection lasts at least 20 years, and is possibly life-long
- ❑ The low incidence of chronic HBV infection in children under
- ❑ 5 years of age at present can be attributed to the widespread use of HB vaccine

low or intermediate endemicity. (*Immunization in adults*)

- ❑ In those settings Routine pre-exposure vaccination should be
- ❖ considered for groups of adults high-risk groups They include:
- ➢ People who frequently require blood or blood products, *dialysis patients, recipients of solid organ transplantations*;
- ➢ People in prisons; who inject drugs;
- ➢ household and sexual contacts of people with chronic HBV infection; People with multiple sexual partners
- ➢ Healthcare workers and others who may be exposed to blood and blood products through their work; and

travellers who

- Healthcare workers and others who may be exposed to
- blood and blood products through their work; and
- travellers who have not completed their HB vaccination
- series,before leaving for endemic areas

❖ All children and adolescents younger than 18 years-old and

❖ not previously vaccinated should receive the vaccine if they live in countries where there is low or intermediate endemicity

Hepatitis B immunoglobulin (HBIG)

❖ For immediate protection, HBIG is used for those acutely

❖ exposed to HBsAg-positive blood, for example

(a) surgeons, nurses or laboratory workers

(b) New born infants of carrier mothers

(c) sexual contacts of acute hepatitis B patients, and

(d) patients who need protection against HBV infection after liver transplantation.

❖ The HBIG should be given as soon as possible after an accidental inoculation (ideally within 6 hours and preferably not later than 48 hours)

At the same time the victim's blood is drawn for **HBsAg testing**

Cont. …Hepatitis B immunoglobulin (HBIG)

- At the same time the victim's blood is drawn for **HBsAg testing**.
- If **the test is negative, vaccination should be started**
- **immediately** and a full course given.
- **If the test is positive no further action is needed**
- **Recommended dose is 0.05 to 0.07 ml/kg of body weight.**
- **Two doses should be given 30 days apart .**
- **HBIG provides short-term passive protection approximately 3 months.**

Passive-active immunization .

- **The administration of HBIG and HB vaccine is more efficacious than HBIG alone.**
- **HBIG does not interfere with the antibody response to the HB vaccine**
- **This combined procedure is ideal, both for**
- **prophylaxis of persons accidentally exposed to blood known to contain HBV , and**
- **prevention of the carrier state in the new-born babies of** carrier mothers.

HBIG (0.05-0.07 ml/kg)

d. Other Measures

- screening of all donated blood and blood components,
- and those positive for HBsAg should be rejected.
- Voluntary blood donation should be encouraged because purchased blood has shown a higher risk of post-transfusion hepatitis .
- Safe injection practices,
  - Furthermore, safer sex practices, including minimizing the number of partners and using barrier protective measures
- Health personnel should be alerted to the importance of adequate sterilization of all instruments and to the practice of simple hygienic measures.
- HB Carriers should be told not to share razors or tooth brushes and use barrier methods of contraception; they should not donate blood


Thank You