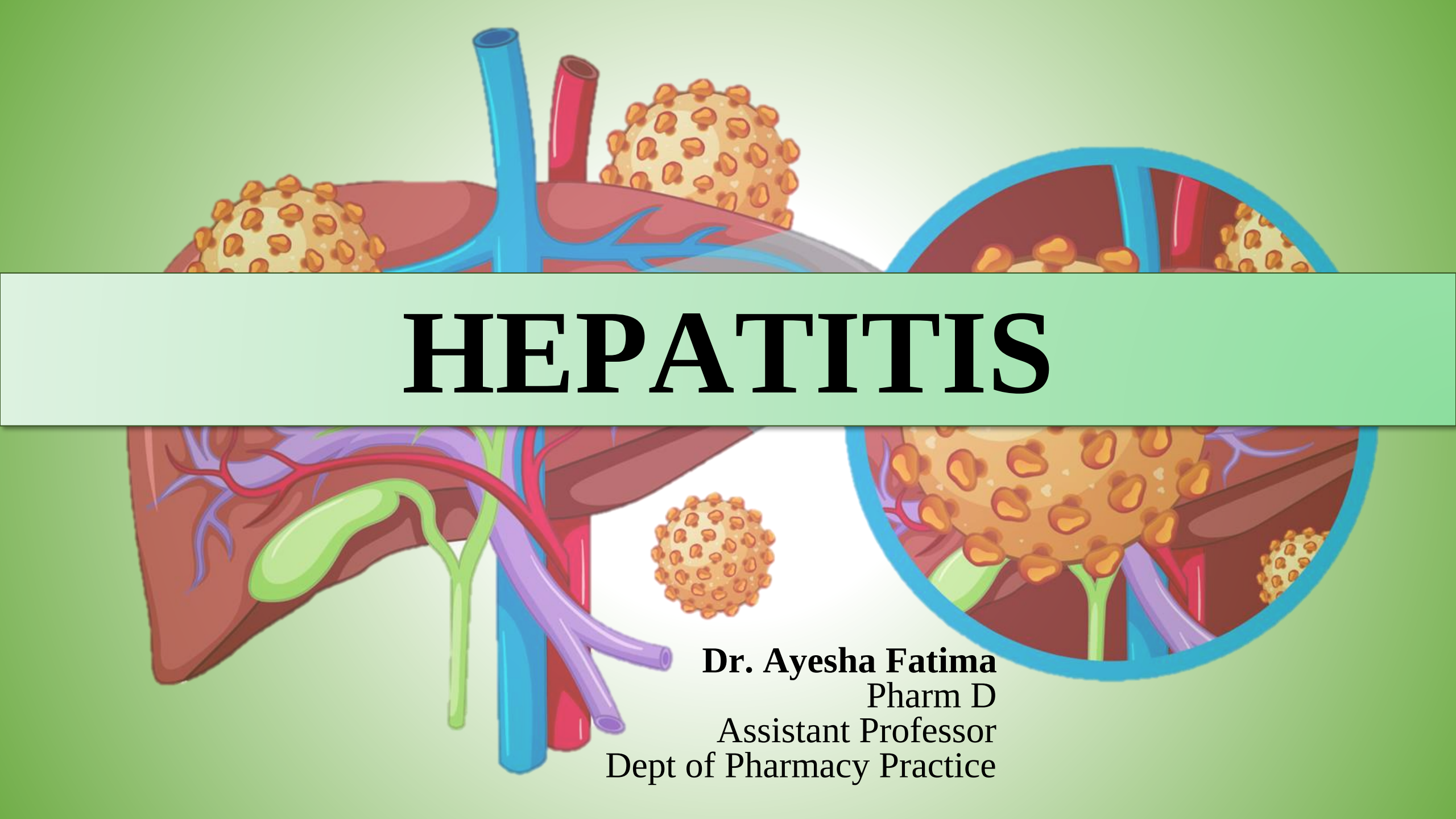


An anatomical illustration of the liver and gallbladder. The liver is shown in a reddish-brown color with a network of blue and red blood vessels. A green gallbladder is visible below the liver. Several orange, spherical viral particles with a textured surface are shown, some on the liver's surface and others inside a circular inset that provides a magnified view of the liver tissue and viral particles. The word "HEPATITIS" is written in large, bold, black capital letters across a light green horizontal band in the center of the image.

HEPATITIS

Dr. Ayesha Fatima
Pharm D
Assistant Professor
Dept of Pharmacy Practice

- Hepatitis is defined as inflammation of the liver caused by various strains of hepatitis virus infection (e.g., Hepatitis A, Hepatitis B, Hepatitis C, Hepatitis D, and Hepatitis E), or medications (e.g., Methyldopa or Isoniazid), or due to immunologic abnormalities (e.g., autoimmune hepatitis).
- Hepatitis can occur as an acute or chronic disease.
- Chronic disease is generally considered any disease or infection persisting for six months or longer.
- Hepatitis may be self-limiting (healing on its own) or can progress into fibrosis (scarring) and cirrhosis.
- Hepatitis may occur with limited or no symptoms, but it often can lead to jaundice, anorexia (poor appetite), and malaise.

Acute Hepatitis: Illness with a clear date of onset, commonly presenting with jaundice or serum aminotransferase levels $> 2.5\times$ **the upper limit of normal (35–40 IU/L)**.

- Common causes include viral hepatitis (A, B, E), drug-induced liver injury (e.g., paracetamol overdose), alcohol, and herbal/OTC misuse.
- Symptoms often include sudden fatigue, nausea, vomiting, dark urine, pale stools, and right upper-quadrant pain.
- Red-flag symptoms such as confusion, severe jaundice, or bleeding require immediate referral due to risk of acute liver failure.
- Pharmacist roles include educating patients to avoid hepatotoxic drugs, promoting hydration, rest, and symptom monitoring.
- Reinforce preventive measures: hand hygiene, safe food handling (HAV/HEV), and avoiding sharing personal items (HBV/HCV).
- Advise timely follow-up and liver function tests as directed by clinicians.

Chronic Hepatitis: Inflammatory liver condition with hepatocellular injury **persisting for ≥ 6 months** after acute onset.

- Common causes include chronic HBV, chronic HCV, autoimmune hepatitis, NAFLD/NASH, and chronic alcohol intake.
- Patients may be asymptomatic or have nonspecific symptoms like fatigue and mild abdominal discomfort.
- Long-term complications include cirrhosis, hepatocellular carcinoma, and portal hypertension.
- Pharmacists should support medication adherence (e.g., antivirals), identify drug interactions, and counsel on avoiding alcohol and unnecessary supplements.
- Encourage vaccinations (HAV, HBV) and healthy lifestyle measures such as weight control and balanced diet.
- Educate patients on signs of decompensation (ascites, edema, GI bleeding, confusion) requiring urgent referral.
- Reinforce the need for routine monitoring: LFTs, ultrasound, and AFP testing every 6 months for chronic viral hepatitis.

Drug-Induced Hepatitis

Category	Details
Common Hepatotoxic Drugs	• Amitriptyline • Amiodarone • Hormonal contraceptives • Ibuprofen • Isoniazid • Rifampicin • Pyrazinamide • Methotrexate • Methyldopa • Phenytoin • Valproic acid
Clinical Features (Symptoms & Signs)	• Can be acute or chronic • Fever • Rash • Arthralgia (joint pain) • Nausea/vomiting • Jaundice • Abdominal pain/discomfort • Lymphadenopathy • Hepatomegaly • Eosinophilia • Elevated liver tests: ↑ AST, ↑ ALT, ↑ ALP, ↑ bilirubin
Diagnosis	• Diagnosis of exclusion (rule out viral, autoimmune, alcohol causes) • Symptoms mimic viral hepatitis • Based on drug history and timing of onset • Compare patient findings with known patterns of hepatotoxicity • Pattern and severity depend on drug and stage of injury
Management	• Immediate discontinuation of offending drug • Supportive care (monitoring, hydration, symptom control) • Monitor LFTs and bilirubin regularly • Manage complications if present • Avoid re-exposure to the same drug

Viral Etiologies

Table 19.6 Features of various types of hepatitis viruses.

	FEATURE	HEPATITIS A	HEPATITIS B	HEPATITIS C	HEPATITIS D	HEPATITIS E
1.	<i>Agent</i>	HAV	HBV	HCV	HDV	HEV
2.	<i>Year identified</i>	1973	1965	1989	1977	1980
3.	<i>Viral particle</i>	27 nm	42 nm	30-60 nm	35-37 nm	32-34 nm
4.	<i>Genome</i>	RNA, ss, linear	DNA, ss/ds	RNA, ss, linear circular	RNA, ss, circular	RNA, ss, linear
5.	<i>Morphology</i>	Icosahedral non-enveloped	Double-shelled, enveloped	Enveloped	Enveloped, replication defective	Icosahedral, non-enveloped
6.	<i>Spread</i>	Faeco-oral	Parenteral, close contact	Parenteral, close contact	Parenteral, close contact	Water-borne
7.	<i>Incubation period</i>	15-45 days	30-180 days	20-90 days	30-50 days (In superinfection)	15-60 days
8.	<i>Antigen(s)</i>	HAV	HBsAg HBcAg HBeAg HBxAg	HCV RNA C 100-3 C 33c NS5	HBsAg HDV	HEV
9.	<i>Antibodies</i>	anti-HAV	anti-HBs anti-HBc anti-HBe	anti-HCV	anti-HBs anti-HDV	anti-HEV
10.	<i>Severity</i>	Mild	Occasionally severe	Moderate	Occasionally severe	Mild
11.	<i>Chronic hepatitis</i>	None	Occasional	Common	Common	None
12.	<i>Carrier state</i>	None	<1%	<1%	1-10%	Unknown
13.	<i>Hepatocellular carcinoma</i>	No	+	+	±	None
14.	<i>Prognosis</i>	Excellent	Worse with age	Moderate	Acute good; chronic poor	Good

(ss= single-stranded; ss/ds= partially single-stranded partially double-stranded)

Etiopathogenesis of Viral Hepatitis

Type of Hepatitis	Causative Virus	Transmission Route	Incubation Period	Key Clinical / Laboratory Features
Hepatitis A	HAV	Faeco-oral	15–45 days	- Asymptomatic in $\sim\frac{1}{3}$ patients - Acute onset after ~ 1 month $\uparrow$ AST, ALT, bilirubin (resolve in 4–6 months)
Hepatitis B	HBV	Parenteral, intimate/sexual contact	30–180 days	- Acute hepatitis; fulminant in $<1\%$ - Very high $\uparrow$ AST/ALT (>100-fold), $\uparrow$ bilirubin (~ 20-fold)
Hepatitis C	HCV	Parenteral, close contact	20–90 days	$\uparrow$ AST, ALT, bilirubin, but less marked than HBV

Type of Hepatitis	Causative Virus	Transmission Route	Incubation Period	Key Clinical / Laboratory Features
Hepatitis D	HDV	Parenteral, close contact	30–50 days	• Co-infection or superinfection with HBV • Worsens disease severity
Hepatitis E	HEV	Water-borne	20–90 days	• More severe in pregnant women • Usually self-limiting
Hepatitis G	HGV	Percutaneous	14–35 days	• Often asymptomatic • Mild liver enzyme elevation

Clinical Presentations

Type	Onset	Key Symptoms	Special Notes
Hepatitis A	Abrupt, sudden	Fever, nausea, anorexia, diarrhea, fatigue, malaise, abdominal pain, dark urine, jaundice	Children often asymptomatic; adults usually symptomatic with jaundice
Hepatitis B & C (Acute)	Slow, insidious	Flu-like symptoms: fatigue, malaise, weakness, anorexia, nausea, vomiting, RUQ pain → then dark urine & jaundice	Symptoms start ~1 week before jaundice; persist for weeks
Chronic Hepatitis (B or C)	Gradual, long-term	Fatigue, weakness, malaise, RUQ discomfort, nausea, anorexia, muscle/joint pain	With cirrhosis → ascites, jaundice, weight loss, muscle wasting, hepatic encephalopathy, varices; may have arthritis or urticaria

Diagnosis

Type of Hepatitis	Key Diagnostic Tests	Interpretation / Notes
Hepatitis A (HAV)	• Serum IgM anti-HAV • Serum IgG anti-HAV (later)	• IgM anti-HAV = confirms acute HAV infection • IgG anti-HAV appears later and indicates past infection & lifelong immunity • Cannot diagnose based on symptoms alone
Hepatitis B (HBV)	• HBsAg (Hepatitis B surface antigen) • Anti-HBs (antibody to HBsAg) • IgM anti-HBc (IgM antibody to core antigen)	• HBsAg detectable 30–60 days after exposure → indicates active infection • Anti-HBs → indicates recovery or immunity • IgM anti-HBc → marker of acute HBV infection; persists ~6 months
Hepatitis C (HCV)	• Anti-HCV antibodies • HCV RNA (PCR)	• Anti-HCV detectable in 4–8 weeks (depends on assay) • HCV RNA confirms active infection • 15% of anti-HCV positive patients may be HCV RNA negative → indicates resolved infection

Treatment

Non-pharmacological therapy:

- Alcohol consumption accelerates progression to cirrhosis and end-stage liver disease.
- Patients must be counseled to stop alcohol completely.
- Silymarin (milk thistle): decrease complications and hasten recovery from hepatitis
 - Some studies show reduced complications and faster recovery.
 - Evidence is limited; not fully established.
- Herbal therapies for HCV:
 - Studied extensively, but only a few show mild benefit.
 - Results are inconclusive due to poor study design.

Hepatitis A

Pre-Exposure Prophylaxis

- Hepatitis A vaccine recommended for:
 - Persons ≥ 2 years of age.
 - Travelers to endemic/high-risk areas.
- Vaccine is inactivated and given intramuscularly (deltoid muscle).
- Protection develops in ~4 weeks.
- Immunity lasts at least 20 years.

Post-Exposure Prophylaxis

- Immune globulin recommended for:
 - Close/sexual contact with infected persons.
 - Individuals sharing narcotic drugs.
- Must be administered within 2 weeks of exposure.
- Not useful if given after 2 weeks.

Hepatitis B

Pre-Exposure Prophylaxis

- Hepatitis B vaccine series recommended for high-risk groups:
 - Infants born to HBV-infected mothers
 - Children from high-prevalence regions
 - People sharing IV drugs
 - Healthcare/public safety workers
 - Hemodialysis patients
- Vaccine is recombinant, containing noninfectious HBsAg.
- Given as 3 IM injections:
 - 1st dose → 2nd at 1 month → 3rd at 6 months.
- Injection sites:
 - Adults/children: deltoid muscle
 - Infants/neonates: anterolateral thigh
- Buttock injection should be avoided (poor immune response).

Post-Exposure Prophylaxis

- HBIG (Hepatitis B Immune Globulin):
 - Provides passive short-term immunity.
 - Dose: 0.06 mL/kg IM for adults and children.
 - Administer as soon as possible after exposure.
 - Inject into deltoid or anteroposterior thigh.
- Because protection is short-term, HBV vaccine series or booster must also be given.

Chronic Hepatitis B

Drug	Mechanism of Action	Dose / Regimen	Common Adverse Effects / Notes
Interferon α -2b	Antiviral + immune-stimulatory	HBsAg-positive: 5 million IU SC daily or 10 million IU SC 3×/week for 16 weeks HBsAg-negative: same dose for 12 months	Flu-like symptoms (fever, fatigue, headache, myalgia), photosensitivity → use sunscreen, give at bedtime to improve tolerability
Lamivudine	Nucleoside analog; irreversible reverse transcriptase inhibitor	100 mg orally daily	Headache, malaise, fatigue, nausea, vomiting, diarrhea, neuropathy, cough, musculoskeletal pain; high risk of viral mutation/resistance; dose adjustment in renal insufficiency

Chronic Hepatitis B

Drug	Mechanism of Action	Dose / Regimen	Common Adverse Effects / Notes
Adefovir	Acyclic nucleotide analog; inhibits HBV replication	10 mg orally daily	Nausea, vomiting, diarrhea, dyspepsia, headache, weakness, rash, pruritus
Entecavir	Guanosine nucleoside analog; selective HBV inhibitor	0.5 mg orally daily (treatment-naïve) 1 mg orally daily (lamivudine-resistant)	Well tolerated; fewer side effects than lamivudine or adefovir

Hepatitis C

Initial Treatment (Untreated Patients)

- For Genotype 1:
 - Peginterferon (α -2a or α -2b) + Ribavirin (1000–1200 mg/day)
 - Superior to conventional interferon + ribavirin.
 - Produces high Sustained Viral Response (SVR).
- For Genotype 2 or 3:
 - Interferon (conventional or pegylated) + Ribavirin (800 mg/day)
 - Achieves high SVR in most patients.

Safety Notes & Side Effects

- Ribavirin is highly teratogenic and embryotoxic:
 - Contraindicated in pregnant women.
 - Contraindicated in men whose female partners are pregnant.
- Major side effects of therapy:
 - Flu-like symptoms: headache, fever, fatigue, myalgia, nausea
 - Hematologic: anemia, leukopenia, thrombocytopenia
 - Psychiatric: depression

Patient Counseling in Hepatitis

- ***Knowledge about the disease and transmission:*** Patient must be provided information about Hepatitis disease and also made aware of strategies to be implemented to reduce its transmission to others.
- ***Fluid intake:*** Plenty of fluid must be taken by the patients, as less intake of fluid may lead to dehydration.
- ***Diet:*** Avoid a fatty and oil-rich diet as digestion is improper during the disease condition. Also, avoid intake of protein protein-rich diet as it may lead to accumulation of proteins, which may lead to complications like hepatic encephalopathy.
- ***Alcohol consumption:*** The development of end-stage liver disease and cirrhosis can be hastened in patients by ethanol consumption. Thus, it is very important to counsel patients about discontinuation of alcohol consumption.
- ***Risk reduction plans:*** Risk Reduction Plans are the tools to initiate discussions with patients about risk behaviors and are a sample of strategies that may reduce the risk. Avoiding Injecting Drug Use (IDU), illegal sexual contacts, tattooing/body piercing, and alcohol reduction are the risk reduction strategies to prevent exposure to infection.
- ***Avoidance of hepatotoxic and nephrotoxic drugs:*** Hepatotoxic drugs like acetaminophen should be avoided as they may cause liver toxicity and also the drugs used for the treatment of hepatitis, like anti-viral drugs, must be used with caution in patients with kidney damage, as they may lead to nephrotoxicity.