Neonatal Hyperbilirubinemia

GROUP: B1

UNDERSUPERVISIOI

:

DR /NAGLAA FATHI

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Objectives:-

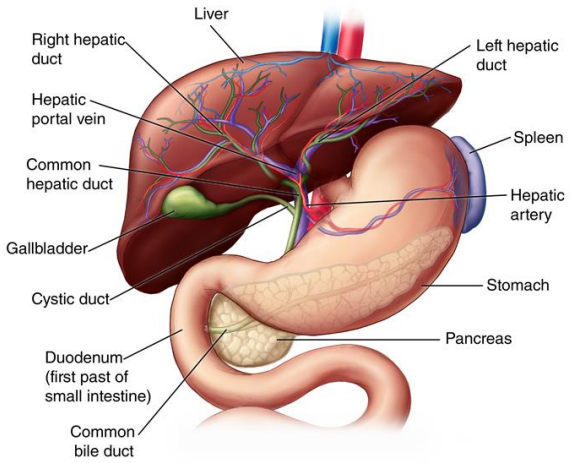
- **At the end of this presentation the student will able to :-**
- **Define Hyperbilirubinemia .**
- **List causes and clinical manifestation of Hyperbilirubinemia.**
- **Discuss pathophysiology of hyperbilirubinemia.**
- **Enumerate types of jaundice .**
- **Apply the management for the newborn baby.**
- **Illustrate prevention to hyperbilirubinemia .**
- **Explain Complication of hyperbilirubinemia.**

Outlines:-

- Definition of Hyperbilirubinemia.
- The Incidence of Neonatal jaundice.
- Types of bilirubin.
- Causes /Risk factors of Neonatal Hyperbilirubinemia.
- Pathophysiology of Hyperbilirubnemia.
- Clinical manifestations of Hyperbilirubnemia.
- Types of Neonatal Hyperbilirubnemia .
- Complications of Hyperbilirubnemia .
- Management of Hyperbilirubnemia:-
- Medical Management
- Nursing management

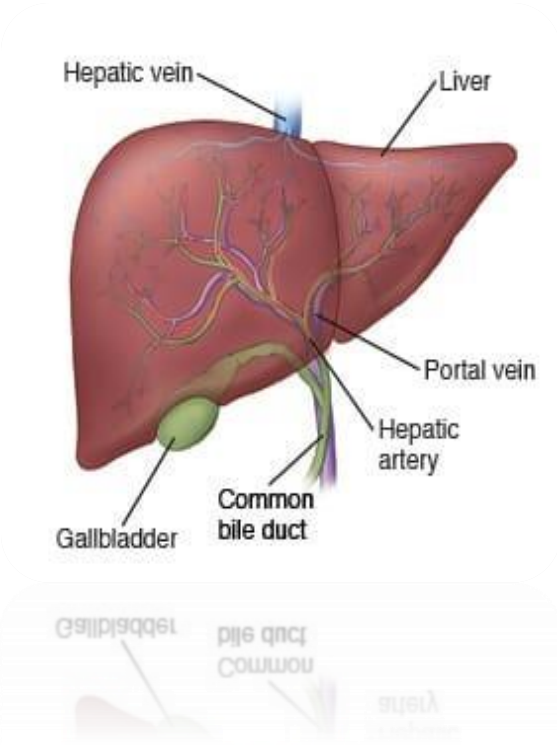
Anatomy of the liver:

- Lobes:
- Major: Left and right
- Minor: Caudate and quadrate
- Ducts:
- Common hepatic
- Cystic: from gallbladder
- Common bile: Joints pancreatic duct at hepatopancreatic ampulla.



physiology of liver:

- Removing metabolic waste products, hormones, drugs, and toxins
- Producing bile to aid in digestion
- Processing nutrients absorbed from the digestive tract
- Storing glycogen, certain vitamins, and minerals
- Maintaining normal blood sugar
- Synthesizing plasma proteins, albumin, and clotting factors
- Producing immune factors and removing bacteria
- Removing senescent red blood cells from the circulation
- Make bilirubin more soluble to excrete



Liver Functions

Removes potentially toxic byproducts of certain medications.

Prevents shortages of nutrients by storing vitamins, minerals and sugar.

Metabolizes, or breaks down, nutrients from food to produce energy, when needed.

Produces most proteins needed by the body.

Helps your body fight infection by removing bacteria from the blood.

Produces most of the substances that regulate blood clotting.

Produces bile, a compound needed to digest fat and to absorb vitamins A, D, E and K.

Definition :-

- **Hyperbilirubinemia: refers to an excessive level of accumulated bilirubin in the blood and is characterized by jaundice.**

- **Jaundice: is the yellowish discoloration of the skin , sclerae ,mucous membranes and it is clinically diagnosed in neonates if the total serum bilirubin is > 7 mg/dl..**

Incidence of neonatal jaundice:-

- **Full term:-** Approximately 60%
- **Pre term neonate:-** 80%
- Jaundice is the most frequent cause of admission after early discharge from the post natal ward .

- Normal range of bilirubin :-

Total bilirubin	**0.2: 1.2 mg/dl**
Direct bilirubin	0.2 : 0.4 mg/dl
Indirect bilirubin	0.4:0.8mg/dl

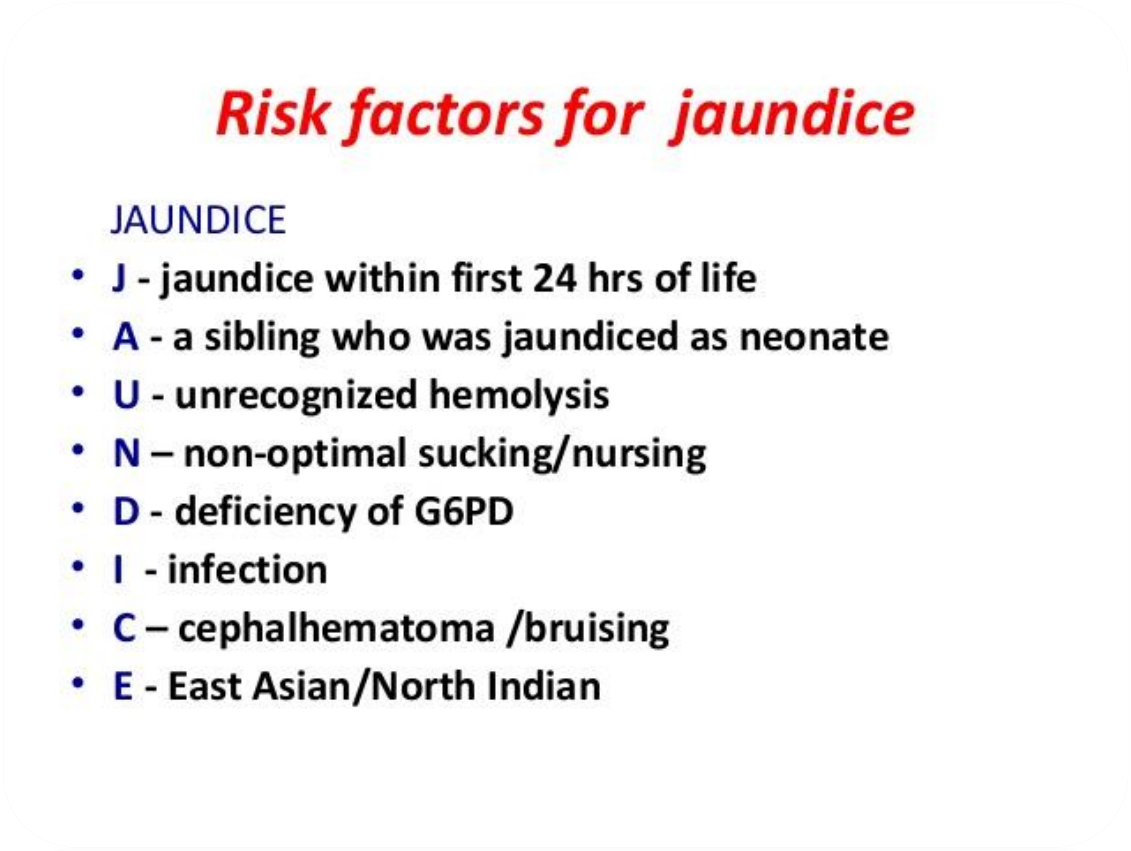
Types of bilirubin:-

Unconjugated bilirubin (indirect)	conjugated bilirubin (Direct)
❖ Bind to albumen	❖ Conjugated with glucoronic acid
❖ Fat soluble	❖ Water soluble
❖ Can cross blood brain barrier	❖ Excreted in urine and stool
❖ Toxic in high level to brain	❖ Not toxic

Causes of Neonatal jaundice:-

Early	Intermediate	Late
➢ Hemolytic causes:- • Rh isoimmunization • ABO incompatibility • G6PD Deficiency ➢ Congenital infection. ➢ Cephalhematoma.	➢ Physiological jaundice:- • Breast milk jaundice (In adequate intake) ➢ Sepsis ➢ Polycythemia ,bruising. ➢ Hemolysis.	➢ Conjugated (Dark urine, pale stools):- • Bile duct obstruction • Biliary atresia • Neonatal hepatitis ➢ Un conjugated: • Physiological • Breast milk jaundice • Infection • Hypothyroidism

Risk factors for jaundice:-



Pathophysiology:-

- **Jaundice occurs when the bilirubin production &clearance is disturbed by one or more of the following mechanisms :**

Excessive production of bilirubin (hemolytic diseases, polycythemia, extravagated blood, sepsis)

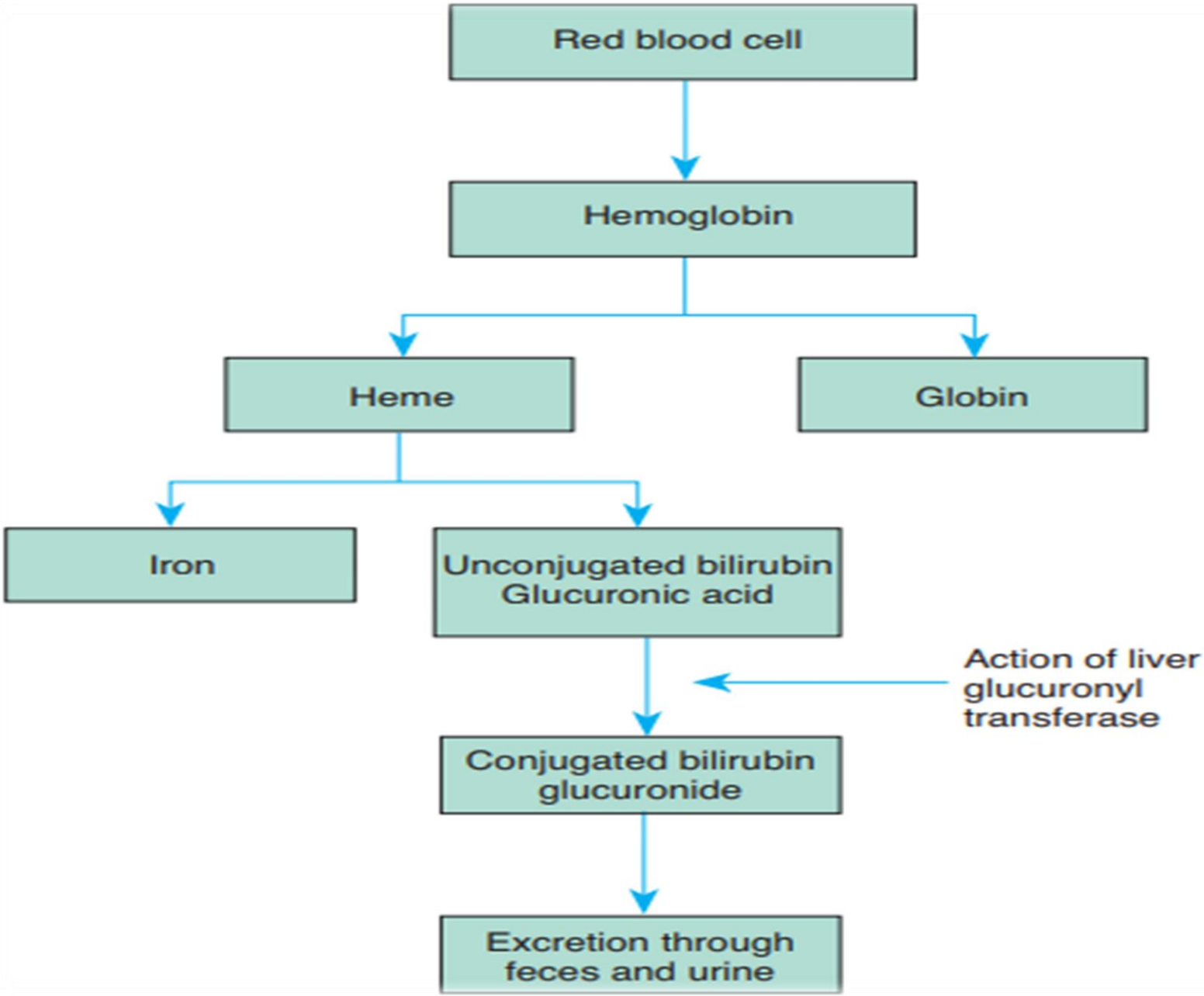
Reduced hepatic uptake .

Impaired conjugation .

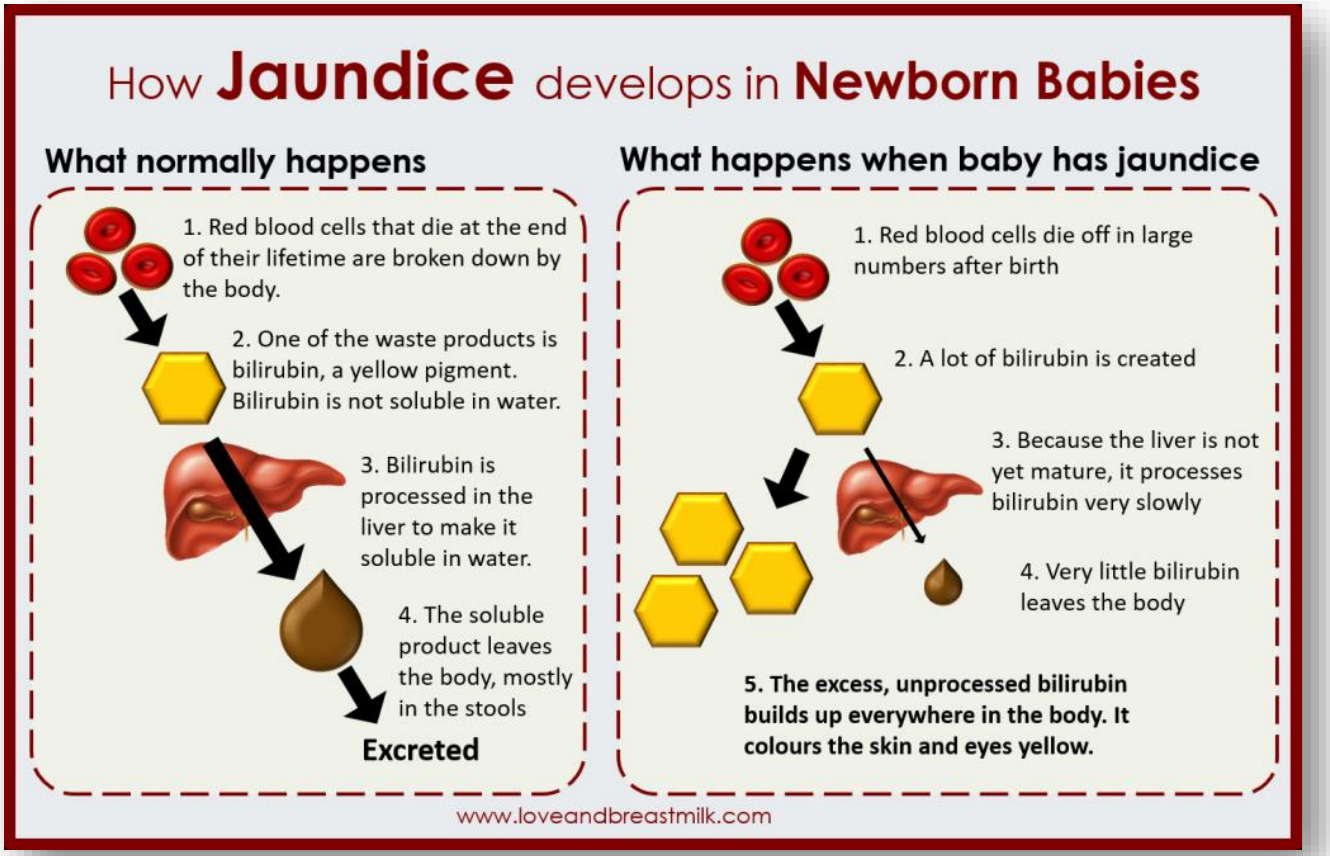
Decreased hepatocellular excretion

Impaired bile flow .

Increased enterohepatic circulation (bowel obstruction, delayed passage of meconium)


Red blood cell
Hemoglobin
Heme
Globin
Iron
Unconjugated bilirubin
Glucuronic acid
Action of liver
glucuronyl
transferase
Conjugated bilirubin
glucuronide
Excretion through
feces and urine

Pathophysiology (cont.):-



Types of Hyperbilirubinemia:-

- **Conjugated Hyperbilirubinemia:-**

Cholestasis

- **Unconjugated Hyperbilirubinemia:-**

Physiological jaundice

Pathological jaundice

Early onset breast feeding jaundice

Late onset breast milk jaundice

Types of Hyperbilirubinemia:-

	Physiologic Jaundice	Pathologic Jaundice
Cause	▪ Immature hepatic function ▪ Increase bilirubin load from RBC hemolysis	▪ Hemolytic diseases (ABO & Rh)Incompatibility,G6PD) ▪ Inability of liver to excrete excess of bilirubin
Onset	After 24 h (levels increase <5mg/dl)	During first 24h (levels increase >or =5mg/dl)
Peak	2^{nd} to 5^{th} day	variable
Duration	Declines on 5^{th} to 7^{th} day	Depends on severity
Therapy	▪ Increase frequency of feeding ▪ Evaluate stool pattern ▪ Monitor bilirubin level	▪ Monitor TSB(Total serum bilirubin) ▪ Phototherapy ▪ Intravenous immunoglobulin ▪ Exchange Transfusion

Types of Hyperbilirubinemia(cont.):-

	Breast feeding associated jaundice(Early onset)	Breast milk jaundice (late onset)
Cause	▪ Decreased milk intake ▪ Less frequent stooling	▪ Breast milk that prevent bilirubin conjugation
Onset	2^{nd} to 4^{th} day	5^{th} to 7^{th} day
Peak	3^{rd} to 5^{th} day	10^{th} to 15^{th} day
Duration	Variable	May remain jaundice for 3-12 week or more
Therapy	▪ Increase frequency of breast feeding ▪ Avoid supplements like water , formula	▪ Avoid supplement ▪ Increase frequency of breast feeding

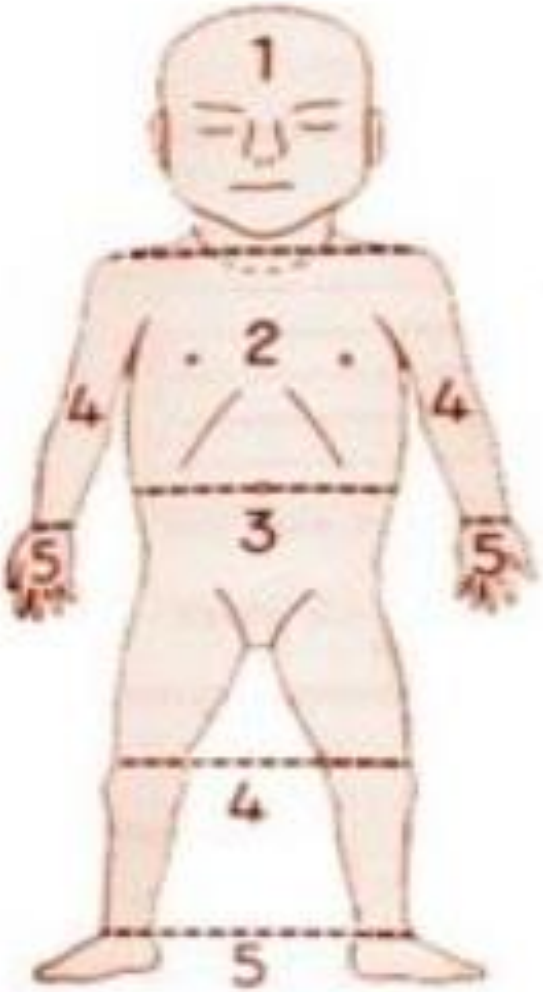
Diagnosis of Jaundice:-

Clinical Assessment

Clinical manifestations

Clinical assessment of jaundice:

Area of body	Bilirubin level/mg/dl
• Face	6
• Upper trunk	9
• Lower trunk &thighs	12
• Arms and lower legs	15
• Palms & Soles	>15

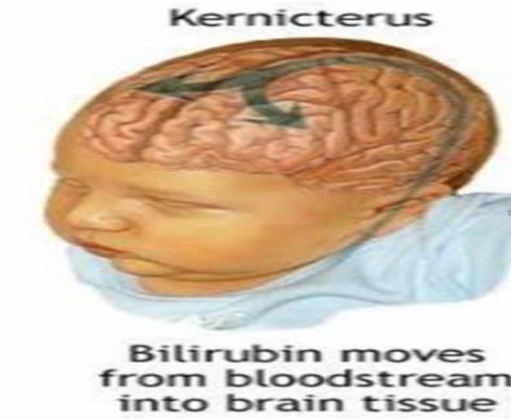


Clinical manifestations Of Jaundice :

- Yellow discoloration of the skin, mucous membranes and sclera of the eyes
- Poor sucking
- Poor feeding
- excessive sleepiness
- Light-colored stool
- Lethargy
- Changes in muscle tone
- High-pitched crying
- Fever
- Vomiting

Complications of jaundice(Kernicterus):-

- **Kernicterus:-** Is a neurological disorder occurs when the unconjugated serum bilirubin level exceeds than 20 mg/dl. In small, sick preterm infants, even a bilirubin level in a low range may cause Kernicterus.



- The term is also used to describe the clinical features encephalopathy.

Stages of kernicterus:-

- **Stage I: Early phase:**

  hypotonia, lethargy, high pitched cry and poor suckling.

- **Stage II: Intermediate phase :**

  hypertonia, irritability convulsion and fever.

- **Stage III: Advanced phase:**

  hypotonia replace hypertonia after 1 week shril cry ,apnea , convulsion, coma &death.

- **Stage IV: Chronic bilirubin encephalopathy :**

  Appears after the neonatal period. Long-term sequelae can include: spasticity quadriplegia, deafness, dental dysplasia and mental retardation.

Acute Encephalopathy:-

- **Definition :-**Is a syndrome of disturbed neurologic function in the earliest days of life in an infant born at or beyond 35 weeks of gestation .

- **Signs& symptoms:-**

Seizures

Reduce level of consciousness

Difficulty initiating and maintaining respiration

Depression of tone and reflexes

Management for Neonatal Jaundice:-

- Medical Management:-

Pharmacological:-

IVIG
Intravenous immune globulin

Nonpharmacological:-

Phototherapy

Exchange Transfusion

Nursing Management

Phototherapy:-

Definition:- consists of exposing the infant's skin to an appropriate light source. Light promotes bilirubin excretion by photoisomerization, which alters the structure of bilirubin to a soluble form (lumirubin).

Studies indicate that blue fluorescent light is more effective than white fluorescent in reducing bilirubin levels.

Types of Phototherapy:-

Conventional phototherapy:-

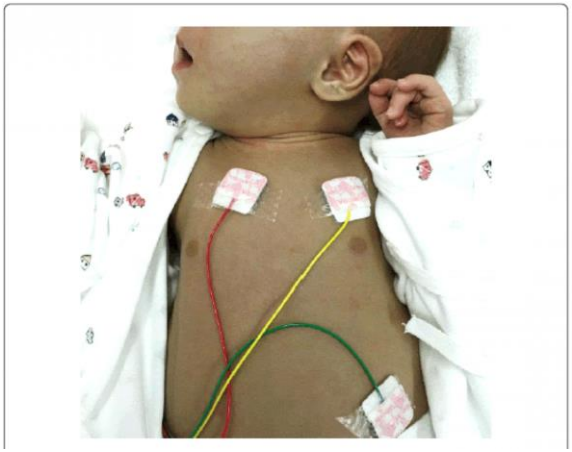
The most common way that phototherapy treats jaundice is by placing the infant under a special phototherapy lamp or in an infant warmer with phototherapy.

Fiber optic phototherapy :-

Biliblankets are another popular means of Administering phototherapy to infants with jaundice.

Side effects of phototherapy:-

- Hyperthermia or Hypothermia
- dehydration
- a Watery diarrhea
- Electrolyte imbalance
- Retinal damage
- Erythema
- Bronze baby syndrome (if used with direct Hyperbilirubinemia)
- Potential genetic mutations



Nursing care for neonate (Under phototherapy) :-

- Perform hand wash.
- Place baby naked in incubator.
- place the infant about 45 to 50 cm bellow the phototherapy light.
- Position phototherapy lamps or mattresses to provide the most complete skin exposure possible.
- Provide Eye Protection:
  - Opaque eye shields must be used during phototherapy to protect the infant's eyes from retinal damage.
  - Each shift, eyes are checked for evidence of discharge or excessive pressure on the lids.
  - Provide eye care using warm water, then apply eye drops or ointment

Nursing care For neonate (Under phototherapy) :-

- Provide gonad protection:
  - phototherapy can produce DNA strand breakage Cover the infant's eye and genital organs .
- Assess Skin Exposure.
- Proper Positioning:
  - The infant repositioned frequently (every 2 h).
- monitor vital signs every 2-4 hours.
- Maintain a neutral thermal environment

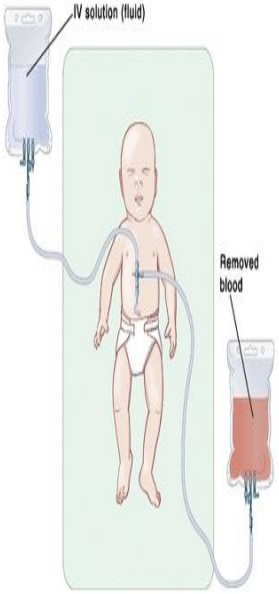
Nursing care for neonate (Under phototherapy) :-

Promoting elimination and Skin Integrity:

- Assess the infant's urine output is an important measure not only of hydration but also of elimination of bilirubin.
- Protective skin care is necessary to prevent perianal skin breakdown from watery stools.
- Do not apply any cream or oil to the exposed area of skin because they can cause skin burns during therapy.
- Examine the newborn's skin regularly for signs of developing pressure areas, bronzing, rash.

Measurement of bilirubin by :- Jaundice meter

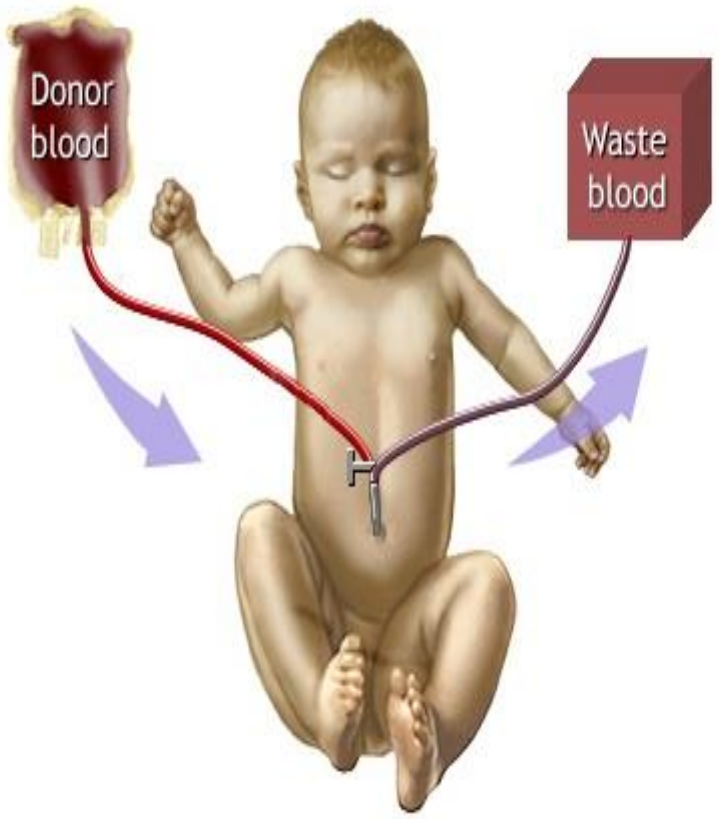
Exchange transfusion:-



- Exchange transfusion is indicated for a voiding bilirubin neurotoxicity when other therapeutic modalities have failed are not sufficient.
- Depending on the size of the infant .
- removing the blood and the other for infusing the replacement blood
  - The same volume of replacement blood is given at the same time and same rate .
- The exchange transfusion usually is performed through an umbilical venous catheter placed in the inferior vena cava or at confluence of the umbilical vein and the portal system.

Complication:-

- Air embolism
- Volume imbalance
- Arrhythmias
- Acidosis
- Respiratory distress
- Unexpected collapse
- Hyperkalemia
- Anemia/Polycythemia
- Hypocalcaemia
- Hypoglycemia
- Thrombocytopenia



Nursing management:-

Observations should be repeated at 15 minute intervals

- Temperature
- Heart rate
- Respiratory rate
- Blood pressure
- Oxygen saturations

Every 30 minutes check the glucose level

Monitored intake and output

Maintain adequate fluid intake

Monitoring Bilirubin Levels

Provide family support

pharmacology Therapy:-

- Intravenous Immunoglobulin (IVIG): is effective in reducing bilirubin levels in infants with Rh isoimmunization and ABO incompatibility .
- Studies have shown a decrease in hospital stay and duration of phototherapy when IVIG is administered either as single-dose or two-dose regimens in neonates with hemolytic disease .
- Healthy late-preterm and full-term infants with jaundice may also benefit from early initiation of feedings and frequent breastfeeding.
- These preventive measures are aimed at promoting increased intestinal motility, decreased enterohepatic shunting, and normal bacterial flora in the bowel to effectively enhance the excretion of unconjugated bilirubin

Pharmacology(cont.):-

- phenobarbital :-has centered primarily on the infant with hemolytic disease and is most effective when given to the mother several days before delivery.
- Action:- Phenobarbital promotes hepatic glucuronyl transferase synthesis which increases bilirubin conjugation and hepatic clearance of the pigment in bile and protein synthesis which may increase albumin for more bilirubin binding sites.
- The use of phenobarbital in either the antenatal or the postnatal period has not proved to be as effective as other treatments in reducing bilirubin.

Nursing care for Neonatal jaundice:-

• Diagnosis:	•Objective:	Nursing intervention:
• Risk for neonatal jaundice related to abnormal blood profile.	• Normal range bilirubin.	a) Initiate breastfeeding within first hour of life in delivery room. b) Encourage maternal rooming in. c) Assess skin for jaundice every 4 h or more often as condition requires. d) Monitor transcutaneous bilirubin levels per institution protocol or at least every 6-8 h. e) Weigh newborn every 24 hours. f) Maintain accurate record of urinary and stool output and assist parents in same.

Nursing care for Neonatal jaundice :-

• Nursing assessment	• Nursing intervention	• Objective
1. Impaired Skin Integrity related to jaundice or radiation.	Expected outcomes:Good skin integrity could be maintained.No injuries / lesions on the skin.Good tissue perfusion.Protect the skin and retain moisture and natural treatments. Intervention:Avoid wrinkles in the bed.Keep your skin to stay clean and dry.Mobilization of the patient every 2 hours.Monitor the existence of skin redness.Wash with soap and warm water.	good skin integrity / normal.

Nursing care for Neonatal jaundice :-

• Nursing assessment	• Nursing intervention	• Objective
Hyperthermia related to exposure to a hot environment.	Expected outcomes:Body temperature within normal range.Pulse and respiration within normal limits.There is no change in skin color. Intervention:Monitor the temperature as much as possible.Monitor skin color.Monitor blood pressure, pulse, and respiration.Monitor intake and output.	temperature in the normal range.
Fluid volume deficit related to inadequate fluid intake, phototherapy, and diarrhea.	Expected outcomes:Adequate fluid. Intervention:Record the number and quality of feces.Monitor the skin turgor.Monitor intake output.Give water between breastfeeding or giving a bottle.	adequate body fluids.

Nursing care for Neonatal jaundice :-

Nursing assessment	Nursing intervention	Objective
Knowledge Deficit related to the limitations of exposure.	Expected outcomes:The family said the understanding of the disease, condition, prognosis and treatment programs.Families are able to carry out the procedure described correctly.The family was able to explain again what is described nurse / other health team Iintervention:Describe the pathophysiology of the disease.Describe the signs and symptoms of the disease that usually appears in the right way.Describe the disease process in a proper way.Provide information on the patient's family about the conditions in an appropriate manner.	family got knowledge about the disease that affects children.

Prevention :-

Breast feeding:-

-Should be encourage for most women.

-8-12times /day for 1st several days.

-Avoid supplements in non dehydrate infant.

Parent education

Discharge Planning and Home Care.

Reference:-

- Adamkin DH, American Academy of Pediatrics, Committee on Fetus and Newborn: Postnatal glucose homeostasis in late-preterm and term infants, Pediatrics 127(3):575–579, 2011
- https://www.slideshare.net/mobile/sayedahmed90857/neonatal-jaundice-2017.
- https://www.healthline.com/health/newborn-jaundice.


Thank
you!!