**Serum bilirubin.**

**Bilirubin** is a break down product of hemoglobin. About 75% of bilirubin derived from Hb during the process of destroying senescent RBC in spleen and liver. Bilirubin also derived from turnover of other heme containing proteins ex) myoglobin, catalase, cytochromes.

The bilirubin molecule from the spleen is slightly soluble in water (unconjugated bilirubin).

The insoluble bilirubin must be transported from the spleen to the liver by way of blood stream. Free bilirubin is solubilizing by formation of complex with albumin.

In the liver the bilirubin –albumin complex dissociated and bilirubin actively transport into the liver cell and conjugated with glucuronic acid, The result is bilirubin glucuronide (water soluble )also known as conjugated bilirubin (direct bilirubin),most of conjugated bilirubin is excreted from the liver cells into bile ducts.

The bacteria flora in the colon reduces bilirubin to urobilinogen and urobilin, Urobilinogen responsible for brown color in feces. Urobilin responsible for yellow color of urine.

Small amount of conjugated bilirubin re-enter the blood from the liver cells (enterohepatic circulation).

**Jaundice**

Is a condition of impaired heme catabolism, is a yellow colouration of conjunctivae, mucous membrane and skin due to increased bilirubin level. Jaundice is visible when serum bilirubin exceeds 2.4 mg/dl.

Classification of jaundice:

1. **Hemolytic or pre-hepatic jaundice**

In this, there is increase the breakdown of Hb, so the liver is unable to conjugate all the increased bilirubin formed.

* This condition results in elevated the level of unconjugated bilirubin

1. **Hepatocellular or Hepatic jaundice.**

In this, there is disease of the parenchymal cells of the liver. This may be divided into 3 groups, although there may be over lappings.

1. Condition in which there is defective conjugation.

There may be a reduction in the number of functioning liver cells, e.g in chronic hepatitis, in this all liver functions are impaired or there may be a specific defect in the conjugation process, e.g in Gilbert,s syndrome, Grigle-najjar syndrome.

1. Condition such as viral hepatitis and toxic jaundice.
2. Cholestatic jaundice.

* Hepatitis and cirrhosis impaired the ability of hepatic UDP-glucoronic transferase to conjugate bilirubin.
* In hepatic jaundice both conjugated and unconjugated bilirubin increase.

1. **Obstructive or Post hepatic jaundice**

in this, there is obstruction to the flow of bile in the extrahepatic ducts, e.g. due to gallstones, carcinoma of head of pancreas, enlarged lymph glands pressing on bile duct, etc.

* In obstructive jaundice conjugated bilirubin increase.

**Bile pigment in urine / Bilirubinuria**

Bilirubin is found in the urine in Obstructive jaundice due to various causes and in (cholestasis). Conjugated bilirubin can pass through the glomerular filter.

Bilirubin is not present in urine in most cases of Hemolytic jaundice, as unconjugated bilirubin is carried in plasma attached to albumin, hence it cannot pass through the glomerular.

**Bile pigment in faeces**

Bilirubin is not normally present in faeces since bacteria in the intestine reduce it to urobilinogen.

**Faecal Urobilinogen**

Normal quantity of urobilinogen excreted in the faeces per day is from 50-250 mg. since urobilinogen is formed in the intestine by the reduction of bilirubin, the amount of faecel urobilinogen depends primarily on the amount of bilirubin entering the intestine.

Faecel urobilinogen is increased in Hemolytic jaundice, in which **dark-coloured faeces** is passed.

Faecel urobilinogen is decreased or absent if there is obstruction to the flow of bile in obstructive, in which **clay- coloured faeces** is passed. complete degree of obstruction is found in tumours, whereas obstruction due to gallstones is intermittent.

**Urine Urobilinogen**

Normally there are mere traces of urobilinogen in the urine. Average is 0.64 mg, maximum normal 4 mg/24 hours

**In Hemolytic jaundice**: increase production of bilirubin leads to increased production of urobilinogen which appears in urine in large amounts.

**In Obstructive jaunice**: in case of complete obstruction, no urobilinogen is found in the urine. Since bilirubin is unable to get into the intestine to form it.