THALASSEMIA

INTRODUCTION

A blood disorder involving lower than normal amounts of an oxygen carrying protein. Thalassemias are inherited blood disorders characterised by decreased Haemoglobin production. Thalassemias are also called as Mediterranean anemia.

SYMPTOMS

Anemia
Feeling tired
Pallor
Enlarged spleen
Yellowish skin

TYPES

- Alpha thalassemia
- Beta thalassemia

ALPHA THALASSEMIA

Alpha thalassemia is a genetic disorder involving a deficiency in alpha globin chains of Haemoglobin which is the oxygen carrying protein in RBC. Normally, Haemoglobin is made up of 4 globin chains each bound to heme group.
There are 4 types of globin chains; Alpha, beta, gamma, Delta chains. In which alpha thalassemia is a defective condition in alpha chains of Haemoglobin. Mainly defective in Haemoglobin A found in large fractions of Haemoglobin in blood.

ETIOLOGY

Normally, alpha chains synthesis are controlled by four alpha genes on chromosome 16. In alpha thalassemia, there is defective factor in alpha genes on chromosome 16. Main cause is genetic inheritance
Caused by mutations in genes (involves Gene deletion), Which is a autosomal recessive disorder.
Alpha thalassemia may occur due to;
Defect in 1 alpha gene
Defect in 2 alpha genes
Defect in 3 alpha genes
Defect in 4 alpha genes

PATHOGENESIS

Defect in 1 alpha gene:

There is defect in 1 alpha gene. It is called as silent carrier, because they don't have any symptoms but can pass a gene to children. Also called as alpha thalassemia triat.

Defect in 2 alpha genes

There in defect in 2 alpha genes. It is called as alpha thalassemia minor. They have mild symptoms.

Defect in 3 alpha genes

There is a defect in 3 alpha genes It is called as Haemoglobin H (HbH). It occurs due to excess beta chain when less alpha chain production. Excess beta chain leads to precipitation molecules in RBC. Due to precipitation molecules it produces Haemoglobin H (HbH). HbH leads to destruction of RBC in Bone marrow which is called as intramedullary haemolysis. Destruction of RBC by macrophages in spleen called as extravascular haemolysis. Due to hypoxia, there is over production of RBC in liver and spleen that leads to hepatosplenomegaly.

Defect in 4 alpha genes

There is a complete deletion of 4 alpha genes. It is called as Hb Bart's hydrops fetalis. This develops some complications in fetal life. Total reduced RBC leads to severe hypoxia, this severe hypoxia causes; High output cardiac failure Hepatosplenomegaly which leads to edema called as Hydrops fetalis.

SYMPTOMS

Anemia
Pallor
Shortness of breath
Hepatosplenomegaly
Skeletal deformities.

DIAGNOSIS

Blood test

Decreased Haemoglobin
Decreased MCV
Decreased MCH
Blood smear
Microcytic
Hypochromic
Golf ball like RBC (precipitated HbH molecules).
Haemoglobin electrophoresis
Increased HbH in case of alpha thalassemia

TREATMENT

Blood transfusions in severe cases
Intrauterine transfusions in Hb Bart's hydrops fetalis

BETA THALASSEMIA

Beta Thalassemia is a genetic disorder involving there is a deficiency in production of beta globin chains of Haemoglobin which are oxygen carrying protein in RBC. Beta Thalassemia is most commonly found in

Mediterranean and African population. In beta Thalassemia, there is a partial or complete beta globin chain deficiency due to point mutations on chromosome 11. It is a autosomal recessive Disease.

ETIOLOGY

Beta Thalassemia minor- 1 mutated gene
Beta Thalassemia intermedia- 2 mutated genes and less production of beta globin chains
Beta Thalassemia major- 2 mutated genes and no production of beta globin chains.

PATHOGENESIS

In beta Thalassemia, due to less production of beta globin chains there is a intracellular accumulation of alpha globin chains. This leads to: intramedullary haemolysis of RBC in bone marrow.
Extra vascular Haemolysis in spleen by macrophages.
Haemolysis leads to hypoxia which causes increased production of RBC in bone marrow.
Haemolysis cause direct entry of heme into plasma as a free heme.
Heme gets recycled to product of iron and bilirubin.
When this process takes place continuously, increased amount of iron leads to secondary haemochromatosis.
Increased bilirubin level leads to hyperbilirubinemia causes jaundice.

SYMPTOMS

Beta thalassemia minor is asymptomatic.
Beta thalassemia major: it doesn't show any symptoms in first 3-6 months. It develops later.
Symptoms are:
Anemia
Hepatosplenomegaly
Jaundice
Swollen abdomen
Chipmunk facies
Pallor
Shortness of breath

COMPLICATIONS

Arrythmias
Pericarditis
Cirrhosis
Diabetes mellitus
Hypothyroidism

DIAGNOSIS

Decreased Haemoglobin level
Decreased MCV
Increased RDW
Microcytic

Hypochromic