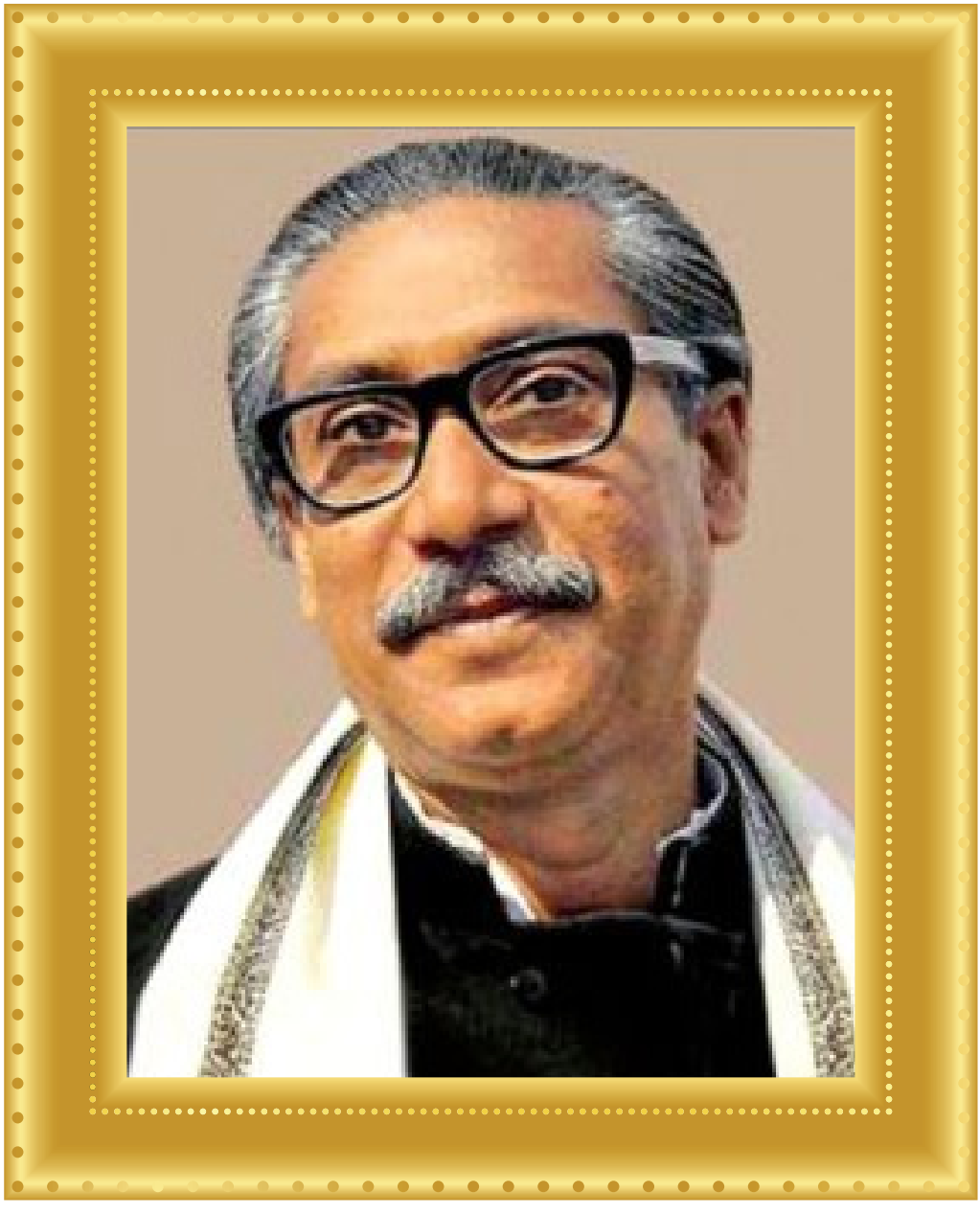
National Guidelines on Thalassaemia Management for Physician

Safe Blood Transfusion &
Thalassaemia Management
Hospital Services Management
Directorate General of
Health Services



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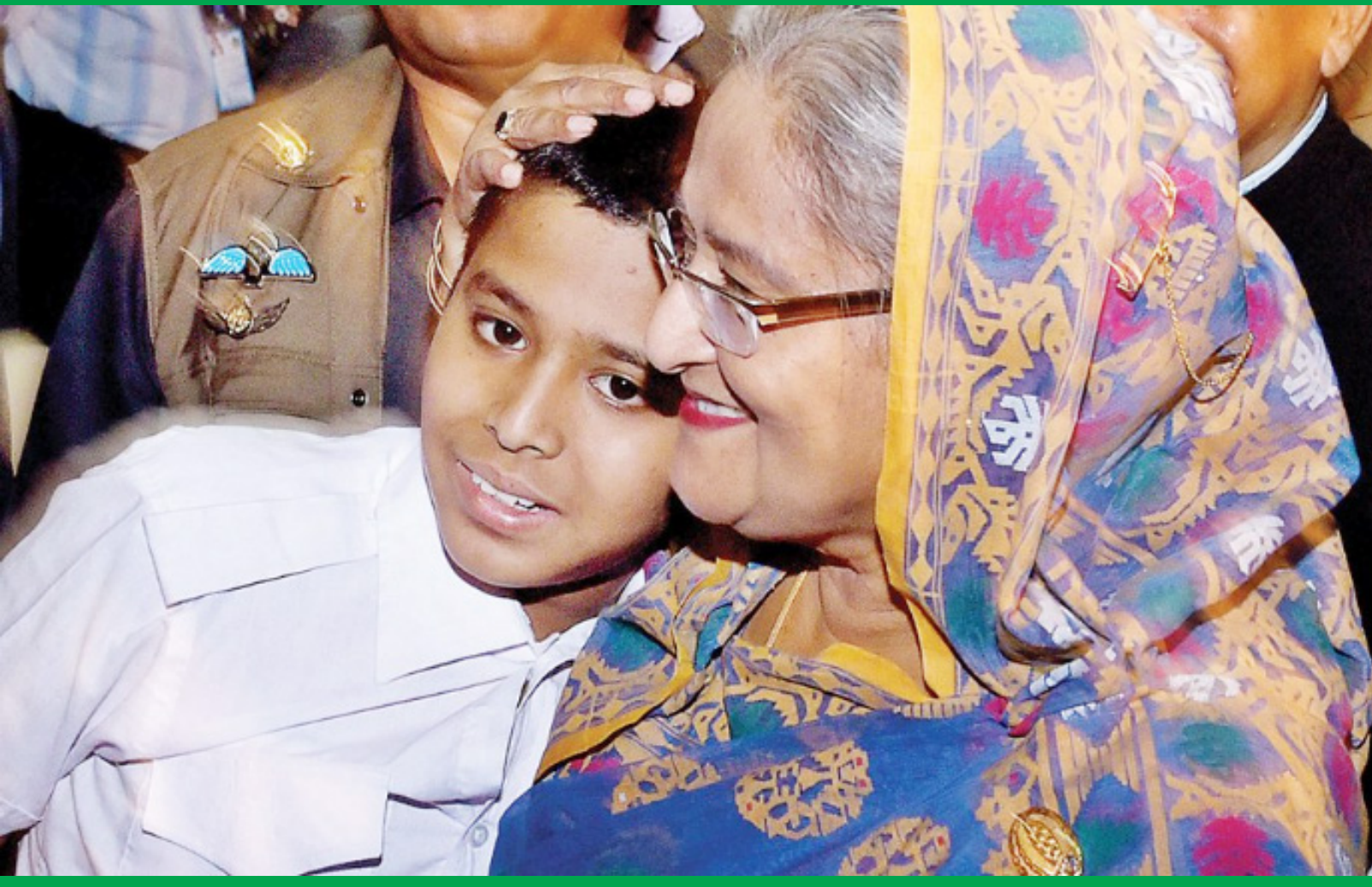

মাননীয় প্রধানমন্ত্রী শেখ হাসিনা

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Developed by

Safe Blood Transfusion & Thalassaemia Management
Hospital Services Management
Directorate General of Health Services

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Director General
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Mohakhali, Dhaka

Message

Thalassaemia is a hereditary blood disease. Hemoglobin is a very important component of blood. The oxygen we carry with the breath, the function of hemoglobin is to carry it all over the body. The disease causes defects in the production of hemoglobin particles, which transport oxygen in the blood. Hemoglobin is made up of two alpha proteins and two beta proteins. If the production of these proteins decreases in the body, then the hemoglobin production in the body also decreases and Thalassaemia occurs. Alpha and beta proteins are made from genes. The synthesis of the two groups of hemoglobin chains is largely genetically controlled.

Thalassaemia occurs when someone inherits a faulty gene from their parents. Thus Thalassaemia is a hereditary disease. This can also lead to anemia. People with Thalassaemia usually begin with oxygen depletion and anemia from the blood to the limbs as a result of anemia.

Government of Bangladesh has declared to eradicate Thalassaemia from Bangladesh by the year 2028. To achieve this goal many steps has been taken. Eight centre will be established very soon through-out the country for the Thalassaemia patients. Two DNA lab will be run very soon for genetical analysis of these patients, one in Dhaka and another in Chottogram. Thalassaemia patient will get blood , transfusion set, leukodeplated filter, iron chelating agents free of cost.

According to a survey published by the World Health Organization, Bangladesh is one of the most successful countries in South Asia in achieving public health development as well as MDG (Millennium Development Goals). In line with the dynamic world, Bangladesh has taken a variety of programs in building a healthy nation. In addition, the government is committed to achieving the Vision-2021 and Sustainable Development Goals, especially meeting health indicators and achieving goals.

I am sure this guidelineswill contribute very effectively to the treatment of Thalassaemia in our physicians.

Professor Dr. Abul Kalam Azad

Line Director
Hospital Services Management
Directorate General of Health Services
Mohakhali, Dhaka

Message

About 5,000 people are born with Thalassaemia every year in our country. That is more than 20 children are being born every day. To save those children, they have to take blood transfusion regularly. Red blood cell is not sufficiently formed in the body of the effected patient and the blood cells break down quickly. The ultimate result is severe anemia. Children are diagnosed with Thalassaemia, usually one to two years after birth. Expert says that raising awareness is the only way to prevent the disease.

Thalassaemia is a mild epidemic disease in Bangladesh. It is a hereditary blood disease. Blood does not produce enough hemoglobin in the body of a patient with Thalassaemia. Patients with Thalassaemia need to take 2-3 bags of blood every month for survival. Thalassaemia sufferers die within 3-5 years if left untreated.

When both parents are Thalassaemic then the child is born with Thalassaemia. And there is no risk if the father or mother is a gene carrier. So it is important to have a blood test before marriage. Carrier can be identified by blood tests from the school age. If two carriers do not marry & carriers refrain from having children, then it is possible to prevent Thalassaemia.

Present Government of our country has been trying, heart and soul, to ease the sufferings of Thalassaemic patients. This guidelines will definitely enrich the knowledge of the physician and they will be benefitted if they apply it properly.

Dr. Satyakam Chakraborty

Deputy Program Manager
Safe Blood Transfusion & Thalassaemia Management
Hospital Services Management
DGHS

Editorial

Thalassaemia is a hereditary disease, the main feature of which is low hemoglobin in the blood. Hereditary means that the disease is unsafe throughout life. A child infected with the disease has to rely on the blood of others to cope with hemoglobin deficiency. About 3-5% of people in the country carry thalassaemia genes.

It is reported that 3% of the total blood collected is spent on thalassaemia patients. The family suffering from thalassaemia faces a complex human and financial condition for various complications related to blood collection and intake. But not everyone who carries the thalassaemia gene is dependent on the blood of others. Generally, genes are responsible for every single pair of traits in the human body. One of these pairs comes from the body of the mother; another comes from the body of the father. If any of the two genes are healthy, the symptoms do not appear. This means that when both couples carry the diseased gene and unfortunately the diseased gene of both enters the body of the two children, the child is born as thalassaemia patient. That is, the only effective way to prevent thalassaemia is by not marrying sick genes or carriers.

So, I hope this guideline will effective for prevent thalassaemia in our country.

Dr. Shabyasachi Nath

CONTENTS

1. INTRODUCTION:

1.1 History: The word 'Thalassaemia' is a Greek term from Thalassa, which means "the sea", and Emia, which means "related to blood". It relates mainly with Patients discovered in all the Mediterranean countries.

In 1925 two American pediatricians **Cooley** and **Lee** described a disease, named Cooley's anaemia, in children of Italian and Greek immigrants, today known as Thalassaemia major or **Mediterranean anaemia**.

1.2 Background: There is no well precise validated data available about the prevalence of Thalassaemia and related hemoglobin disorders in Bangladesh. It's presumed from multiple studies that around 3% and 4% of Bangladeshi population are carrier of β Thalassaemia and Hb E respectively. As inheritance of Thalassaemia follow Mendelian pattern, having those percentage of carrier in community, following random marriage, mathematically calculated that roughly 33/10,000 baby born would have β/β Thalassaemia or Hb E/β Thalassaemia, which are main types of Thalassaemia in Bangladesh. There are few other hemoglobin disorders like Hb E diseases have been reported formally or informally which are clinically and hematologically may be dissimilar to β Thalassaemia. Most of the β Thalassaemia major and a large fraction of Hb E/β Thalassaemia patient would die within 1st few decades of life without regular blood transfusion, iron chelation and other supportive treatment. So, transfusion and other modalities of treatment are needed for their normal growth and development. Considering those facts Thalassaemia is a major paediatric health problem of Bangladesh to be addressed properly to ensure adequate treatment of patients and minimize the birth of thalassemic child by preventive measures to the extent of public concern.

1.3 Rationale: The inherited haemoglobin disorders are the commonest diseases attributable to single defective genes. They fall into two main groups: the structural haemoglobin variants; Sickle Cell Disease (SCD) & Hemoglobin E variant and the Thalassaemias which are caused by defective globin production. Carrier numbers of >270 million and more than three hundred thousand children born each year with one of the Thalassaemia syndromes or one of the structural haemoglobin variants have been estimated (WHO 1989, 1994). The extremely high frequency of the Thalassaemia disorders compared with other monogenic diseases reflects natural selection and widespread practice of consanguineous marriage. For these reasons the Thalassaemias are most frequent in Bangladesh. These facts have challenged health professionals and policy-makers of the country in providing equitable access to quality services for the prevention and treatment of Thalassaemia. The epidemiological data available mainly in Bangladesh underestimate the future health burden resulting from inherited Thalassaemia disorders. For effective addressing the control of these disorders in Bangladesh require considerable work, financial backing and certainly political commitment. Programmes to reduce the number of seriously affected individuals the approaches like:

1. Population screening and counseling programs established to aware people about the risks of having affected children.

2. Population screening or screening in prenatal clinics where if a woman is carrier the partner is screened and if positive, following counseling they are offered a prenatal diagnosis and option to termination of affected fetuses.

Successful prenatal diagnosis programs established in the Mediterranean region resulting in a major reduction in newborns with severe forms of Thalassaemias are now available in Bangladesh and several other countries such as China, India, Iran, Lebanon, Pakistan, Singapore and Thailand. Whatever are the results of the screening programmers they require a proper education of the population about the nature of inherited Thalassaemia disorders. Beside prevention, a main objective is to offer optimum care about management. Ensuring healthy life and promoting wellbeing for all at all ages is essential to sustainable development. Significant strides have been made in increasing life expectancy and reducing some of common killers associated with child and maternal mortality. However, many more efforts are needed to be addressed many different persistent and emerging health issues. For this reason there is an urgent need to bridge a wide gap until every patient in Bangladesh has equal access to quality medical care. An essential means of doing so is through global collaboration on Thalassaemia disorders, enabling all countries to benefit from each other's experience. The instruments required to support such policies include:

- Epidemiological information and surveillance.
- National guidelines for the diagnosis and management of thalassaemia
- Educational program for health professionals, patients, parents.

The need for management guidelines for Thalassaemias is clear; ensuring access to such guidelines, careful application and implementation should help arriving at early diagnosis, to allow prompt and effective management, early prediction of risk to ensure preventive measures to save unnecessary health care costs.

1.4 Definition: Thalassaemia is an inherited disorder of haemogolobin characterized by reduced rate of production of globin chain of haemoglobin. It is caused by defect in the gene controlling the production of globin chain of haemoglobin. It is manifested mainly by the features of anaemia resulting from premature destruction of red blood cells.

Patients may have additional clinical features due to complications resulting from increased production of red cells and/or damage to various organs due to increased iron deposition.

2. PATHOPHYSIOLOGY:

The basic pathophysiological mechanism of Thalassaemia is imbalance between α group of globin such as α and ζ (zeta) globin and β group of globin such as ε, γ, δ and β globin chains.

Formation of normal stable hemoglobin molecules requires 2 pair of globin chains. One pair of α globin with one pair of β globin chains produce Hb A which is the main fraction of hemoglobin in adult. Same way one pair of α with one pair of δ globin chains produce Hb A2 and one pair of α with one pair of γ globin chains produce Hb F or fetal hemoglobin. Hb A2 normally and consistently present in small amount (2.2 to 3.3%) in normal adult. Hb F is the majority hemoglobin in fetus and decline to <0.5% in adult life. In Thalassaemia a particular globin chain is reduced such as reduced β globin chain in β Thalassaemia causing imbalance between α and β globin chains. Excess unbound α globin, due to lack of β globin, remain as free α globin chains which precipitate in red cell membrane making red cell vulnerable to oxidative damage. Similar consequence follows in all non-α Thalassaemia. However, just opposite thing, the precipitation of β globin chains happens in α Thalassaemia. This pathophysiologal mechanism leads to both exramedullary (hemolysis) and intramedullary (ineffective erythropoesis inside bone marrow) destruction of red blood cells and their precursors. Ineffective erythropoiesis and hemolysis are responsible for clinical features of Thalassaemia e.g. anemia, splenomegally, bone deformity etc.

3. TYPES OF THALASSAEMIA:

3.1 Genotypic classification:

α-thalassemia

NO. OF GENES PRESENT	GENOTYPE	CLINICAL CLASSIFICATION
4 genes	αα/αα	Normal
3 genes	αα/- α	Silent carrier
2 genes	- α/- α or αα/- -	α thalassemia trait
1 gene	-α/- -	Hb H Ds
0 genes	- -/- -	Hb Barts / Hydrops fetalis

CLASSIFICATION OF β THALASSEMIA

CLASSIFICATION	GENOTYPE	CLINICAL SEVERITY
β thal minor/trait	β/β+, β/β0	Silent
β thal intermedia	β+ /β+, β+/β0	Moderate
β thal major	β0/ β0	Severe

Phenotyic classification:

- Thalassaemia major, e.g. β Thalassaemia major, severe Hb E/β Thalassaemia, Hb Bart's etc.
- Thalassaemia intermedia, e.g. β Thalassaemia intermedia, milder and moderate forms of Hb E/β Thalassaemia, Hb H disease etc.
- Thalassaemia minor, e.g. β Thalassaemia trait, α Thalassaemia trait, δβThalassaemia trait, Hb Lepore etc

Practical phenotypic classification for the purpose of treatment especially transfusion: Best can be expressed by flow diagram given bellow.

4. CLINICAL FEATURES & DIAGNOSIS:

4.1 Clinical feature:

Features of Thalassaemia major

- Usually present within 2 years of age.
- Failure to thrive
- Repeated infection
- Pallor
- Splenomegaly (and hepatomegaly if not transfused sufficiently)
- May have clinically evidenced jaundice
- Regular transfusion required before 2 year of age for normal growth and development
- Bony expansion causing frontal bossing, malar prominence etc along with growth retardation revealed in childhood if not transfused sufficiently.

Features of Thalassaemia intermedia

Very diverse spectrum of expression, severity may ranges from minor to major.

Usually transfusion independent.

Mild to moderate pallor after 4 to 6 years of life.

Pallor, splenomegaly etc become clinically evident after 2 year of age

Some patient presented with complications of iron over load.

Some patient may present with features of extramedullary hemopoiesis

Growth retardation, bone deformity, hepatomegaly only seen in more severe form of poorly treated or untreated Thalassaemia intermedia.

4.2 Diagnosis of Thalassaemia:

Clinical suspicion on the basis of clinical features

- Pallor/anemia
- Splenomegaly
- Failure to thrive and/or recurrent infection (in <2 year children)
- ± Variable degree of bony change (frontal bossing ± malar prominence ± depressed nasal bridge) and/or growth retardation (in cases of untreated or poorly treated older children and adolescent

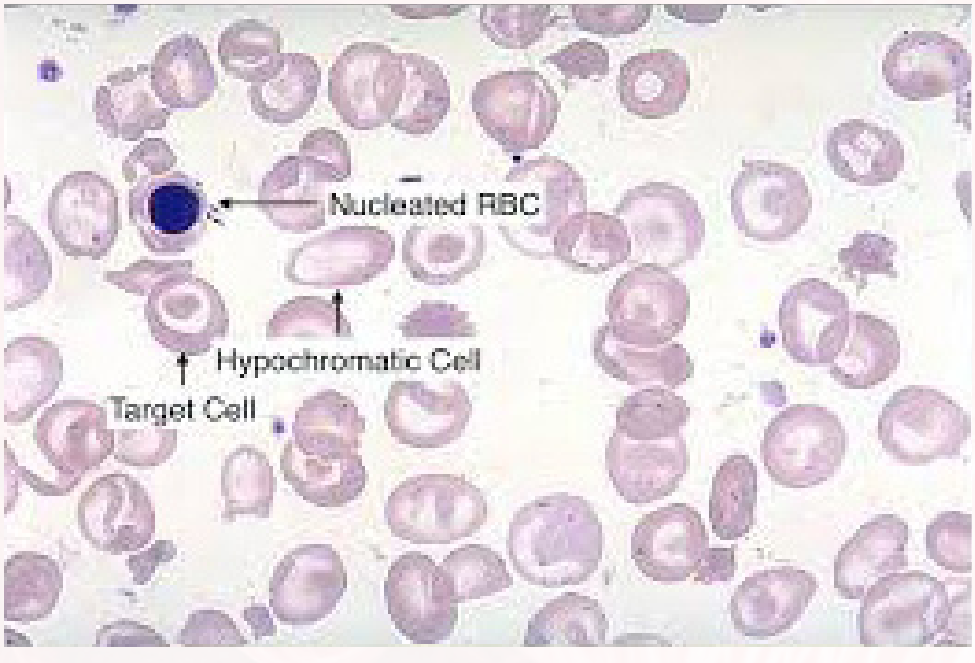
CBC:

Hb <9.5 g/dl (9.5 to 11 g/dl with high degree of suspicion from clinical feature and PBF to be referred to expert/hematologist)

- MCV < 75 fl
- MCH < 27 pg

Peripheral blood film:

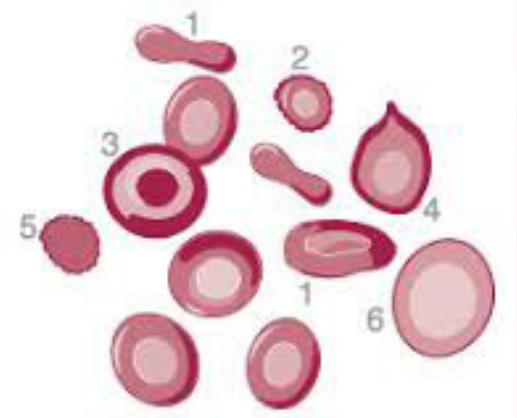
- Marked anisopoikilocytosis (variation in shape and size) (Photomicrograph)
- Target cells
- Nucleated RBCs
- Schistocytes



NESTROFT (Naked Eye Single Tube Red Cell Osmotic Fragility Test) - This test is simple, cheap, easy to perform and effective in detecting Beta thalassaemia trait.

Principle

Normally, red cells put in saline solution begin to lyse at a saline concentration of 0.4-0.5% and lysis is complete at 0.32%. However, in beta thalssemia trait, due to alteration in osmotic resistance of the affected RBC's due to volume/surface area ratio changes, lysis begins at a saline concentration between 0.4-0.35% and it may not be completed even at 0.1% solution. NESTROFT is done at a saline concentration of 0.36%.



Poikilocytic red cells (elliptocytes[1], schistocytes[2], target cells[3], tear drop[4], spherocytes[5] & hypochromic[6]) usually present in Thalassemia Major.

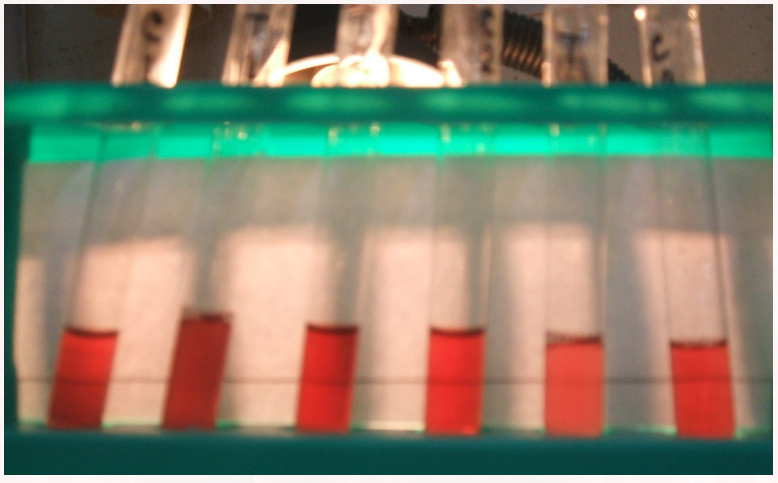
Material

0.36% buffered saline (BS) prepared by diluting 36ml of 1% buffered saline with 64ml of distilled water (DW) to make 100 ml (Test Reagent).

Procedure of the test

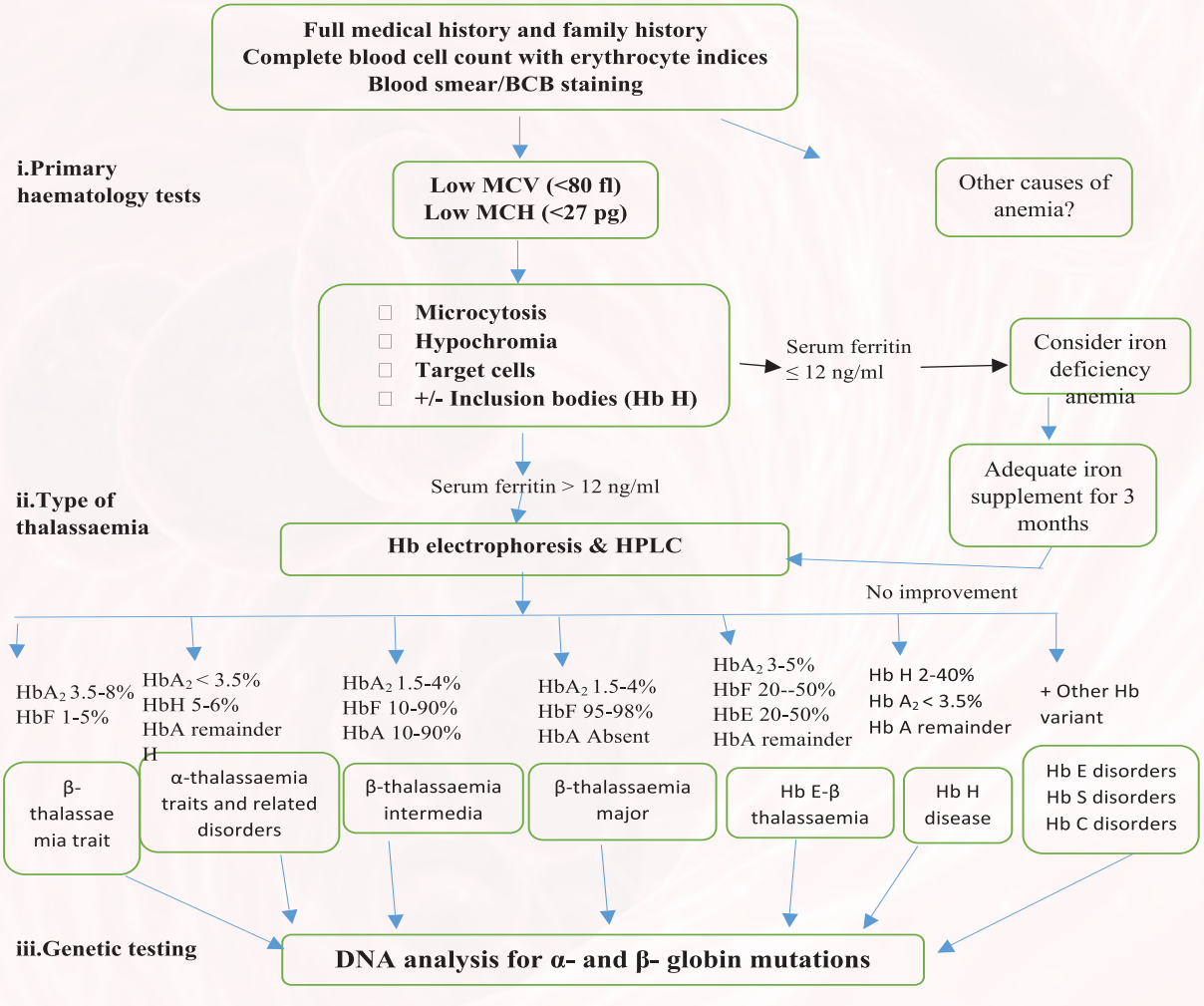
Two test tubes labelled as BS (2ml) and DW (2ml) were taken and a drop of blood was added to each of the tubes, which were then left undisturbed for half an hour at room temperature. Following this, contents of both tubes were gently shaken and held against a white paper on which a thin black line was drawn. The line was clearly visible through DW tube and if it was the same in BS tube; it was considered negative, otherwise test result was interpreted as positives. The tubes were left undisturbed for 3 hours. At the end of 3 hours, the DW tube was seen to be homogeneously pink with no sediments. In the BS tube the negative test showed similar findings as DW tube where as in a positive case, a clear supernatant and a sediment at bottom was observed. HbA2 estimation was done by electrophoresis. The observations collected from the NESTROFT test and the Hb electrophoresis in both the sub-groups was recorded. By means of statistical analysis, an attempt was made to validate a correlation between NESTROFT positive samples and HbA2 levels in those cases.

NESTROFT Test	Positive	No Haemolysis of RBC Therefore, line is not clearly seen	Decreased Osmotic fragility test	Suspected β (Beta) Thalassaemia-a trait Confirmed by Hb electro/ HPLC
NESTROFT Test	Negative	Haemolysis of RBC occurs Therefore, line is clearly seen	Normal Osmotic fragility test	Normal person



Capillary hemoglobin electrophoresis (to be able to differentiate Hb E from Hb A2): With clinical feature, CBC and PBF, phenotypic diagnosis of symptomatic Thalassaemia is likely to be certain. Electrophoresis will identify the genotype of the Thalassaemia and further confirm the diagnosis.

Flow chart for Thalassaemia diagnosis:



5. MANAGEMENT OF THALASSAEMIA:

Management includes:

- ♦ Blood Transfusion
- ♦ Iron Chelation
- ♦ Pharmacological agents for induction of Hb F
- ♦ Splenectomy
- ♦ Bone marrow transplantation (Stem Cell Therapy)
- ♦ Treatment of Complications
- ♦ Psychosocial support

- ▪ Before going to initiate blood transfusion patients should be categorized as; whether:

- Non-transfusion dependent
- Transfusion dependent

Management of Non-transfusion dependent patients (NTDT):

- ◇ Beta Thalassaemia intermedia
- ◇ Mild /moderate hemoglobin E-beta Thalassaemia
- ◇ Alpha Thalassaemia intermedia(Hemoglobin H disease)
- ◇ Hemoglobin E disease
- ◇ Beta Thalassaemia trait
- ◇ Hemoglobin E trait.
- ◇ Alpha Thalassaemia carrier

These patients can survive and maintain their normal life & daily activities at the hemoglobin level of 6-7 gram/dl. These category of patients usually require no blood transfusion.

Occasional blood transfusion needed during stress, infection, surgery, pregnancy, on growth failure, skeletal deformity & huge organomegaly.

So, following parameters of these patients should be followed up:

- ▪ Hemoglobin level
- ▪ Anthropometry
- ▪ Increasing skeletal deformity & organomegaly
- ▪ Development of complications like leg ulcer, coagulopathy, pulmonary hypertension & evidences of EMH e,g, cord compression.

Also, to be monitored:

O Serum Ferritin yearly

O T2 MRI yearly (after age of 10 years)

O Endocrine function tests.

Treatment:

> Folic Acid & Vitamin supplementation

> Fetal hemoglobin inducer like Hydroxyurea,5-Azacytadine, Thaladomide

> Iron chelation (S. Ferritin >800 ng/ml or LIC >5 mg/gram dry weight of liver or >10 years) preferably by Deferasirox. Deferipon or Desferrioxamine can also be given.

Management of transfusion dependent Thalassaemia:

♦ Blood Transfusion:

Indications- Hemoglobin level < 8.0 gm /dl.

Before initiation of regular blood transfusion extended blood grouping genotyping to be done.

Product-

- Packed red cell preferably leuco-depleted RBC through Leuco-Filter.
- Washed red cell in case of NHTR.
- Genotype matched washed red cell in case of Allo-immunization

Volume to be transfused:

- 15-20 ml/kg/day over 3 hours.
- In case of impending HF & severe anemia (Hb-<5 gm/dl)-5-10 ml/kg/day slowly under coverage of Frusemide.

■ **Iron Chelation:**

Indication-

- S. Ferritin > 1000 ng/ml
- After 10-20 Blood Transfusion
- LIC >5 -7 mg/gm dry weight of liver

> Inj. Desferrioxamine- 40-50 mg/kg/day S/c infusion over 8-10 hours 5-6 days/week

> Vitamin C 250 mg to be taken orally at the start of infusion.

> Deferipon- 75 mg/kg/day orally in 2-3 divided doses. (after 6 years of age)

> CBC should be done before & later on monthly to monitor cytopenia, if any then temporarily stop the drug.

- Deferasirox-30-40 mg/kg/day orally dissolving in plane water/orange juice 30 minutes before BF.

SGPT & serum creatinine should be done before & later on monthly.

*ICA should be continued by monitoring S. Ferritin level 3 monthly.

- **Pharmacological agents (Hemoglobin F Inducers):**

Hydroxyurea- Starting dose 10 mg/kg/day orally with 3-4 mg /kg/day increment monthly up to 20 mg/kg/day by monitoring CBC monthly

5-Azacytedine can also be given.

6. COMPLICATIONS AND MANAGEMENT OF COMPLICATIONS:

Complications of Thalassaemia major and their treatment:

The life of patients with Thalassaemia has improved both in duration and in quality in industrialized countries. Complications are still common and include heart disease (heart failure and arrhythmias), chronic liver diseases, which can evolve in cirrhosis and, rarely, in hepatocellular carcinoma, endocrine problems (hypogonadism, hypothyroidism, diabetes, hypoparathyroidism), stunted growth, osteoporosis, thrombophilia and pseudoxanthoma elasticum.

Complications:

Heart

- Cardiac problems are frequent during the patients' life, and heart failure and arrhythmias are responsible for over 70% of all deaths.

Management

- Continuous treatment with deferasirox for 2 years at a high dose has been shown to remove iron from the heart in patients with mild, moderate and severe cardiac siderosis.
- In patients with severe myocardial siderosis and impaired left ventricular function, combined chelation therapy with subcutaneous DFO and oral deferiprone is indicated.

Liver

Liver disease is frequent in patients with Thalassaemia, both because the organ is a major site of iron deposition and because of the high prevalence of blood-transmitted infections with hepatotropic viruses. Overall, 0.3–5.7% of Thalassaemia patients are hepatitis B surface antigen-positive. The prevalence of chronic hepatitis B virus (HBV) infection is higher in Asia and Southeast Asia, whereas HCV chronic infection is common in all countries of the world*.

Liver iron overload is a cause of fibrosis and cirrhosis, especially when associated with HCV infection.

Cirrhosis is a risk factor for the development of hepatocellular carcinoma (HCC) and is a major cause of liver failure.

Management

- The standard of care for the treatment of chronic HCV infection and compensated cirrhosis is the combination of a pegylated interferon and ribavirin
- Pegylated interferon or nucleoside/ nucleotide (NUCs) drugs is indicated in hepatitis B 'e' antigen (HBeAg)-positive.

Endocrine complications

Iron overload secondary to chronic blood transfusion is the main cause of endocrine complications. Iron deposition and structural damage to the pancreas, the pituitary, parathyroid, thyroid and adrenal glands and to the gonads have been demonstrated histologically.

Hypogonadism

Hypogonadism is the most frequent endocrine complication in patients with Thalassaemia major. The clinical picture of hypo- gonadism ranges from total absence of sexual development to arrested puberty, with pubertal development generally at Tanner stage 3, primary amenorrhea in females and testicular volume of less than 6–8 ml in males.

The prevalence of post-pubertal hypogonadism is lower in males than in females.

Management

- In patients with pubertal hypogonadism, early hormone replacement therapy is recommended.

Hypothyroidism

Hypothyroidism is the second most common endocrine disorder.

Management

- Early stages of abnormal thyroid function can be reversed to normal by means of intensive chelation therapy with DFO alone or in combination with deferiprone.
- In patients with subclinical hypothyroidism, therapy should be given for TSH levels greater than 10 U/ml or when symptoms are present
- In overt primary hypothyroidism, replacement treatment should be given with increasing doses of l-thyroxine.

Hypoparathyroidism

Hypoparathyroidism has been reported to affect 3–20% of patients.

Management

Oral vitamin D and a daily calcium supplement should be given.

Diabetes

Is an infrequent complication which may required treatment with Insulin and/or hypoglycemic agents.

Growth problems

Stunted growth is common in Thalassaemia patients.

Contributing factors

Many factors have been implicated to short stature; including chronic anemia, hypersplenism and folate deficiency.

Chronic liver disease, zinc deficiency, undernutrition and psychosocial stress are nonendocrine additional factors that can contribute to stunted growth.

Management

Replacement therapy with growth factor may be needed

Osteoporosis

- Fractures often secondary to mild or moderate trauma.
- Osteopenia

Management

- Calcium and vitamin D supplements.
- Bisphosphonates.

Eyes & ears

- Retinal pigmentary changes
- Cataract
- abnormal electroretinographic potentials

Management

- Oral iron chelators

Pseudoxanthoma elasticum

Pseudoxanthoma elasticum (PXE) has been reported to be one of the complications of Thalassaemia

Management

A magnesium carbonate- containing phosphate binder.

Thromboembolic complications

Increased risk of venous and arterial thrombosis.

Management

- Platelet anti-aggregating agents for patients with thrombocytosis.
- Low-molecular-weight heparin followed by long-term oral anticoagulants is recommended for patients with a history of thrombosis and in all patients before surgery and during pregnancy

Infections

Bacterial infections represent the second most common cause of death in Thalassaemia major and a main cause of morbidity.

Predisposing factors include splenectomy, iron overload and the use of DFO

Ferrophilic organisms such as Yersinia and Klebsiella are common pathogens.

Recommended chemoprophylaxis: for the prevention of post splenectomy infections include Antibiotic prophylaxis with penicillin, amoxicillin or erythromycin for the first 2 years after surgery and for children until age 165years, as well as early antibiotic treatment for fever and malaise.

Vaccinations : Immunization against S. pneumoniae, H. influenzae and meningococcal disease is also recommended.

Gallstones

If stones are present at the time of splenectomy, cholecystectomy should be performed at the same time.

Complication due to Extramedullary erythropoiesis

- Paraparesis and
- cauda equina syndrome

Management

- Chelation
- Maintenance of Hb level
- Hydroxyurea
- Surgery is limited to selected cases.

7. NUTRITION:

Nutritional deficiencies are common in Thalassaemia, due to hemolytic anemia, increased nutritional requirements, and morbidities such as iron overload. Dietary iron restriction has long been the focus of nutrition intervention in Thalassaemia patients. Several studies that were conducted on nutritional status of Thalassaemia patients revealed the fact that Thalassaemia patients have reduced intake of many essential nutrients including vitamin A, D, E, K, folate, calcium and magnesium. Moreover, different studies also demonstrated decreased circulating essential nutrients and the prevalence of much co-morbidity with nutritional linkages in patients with Thalassaemia. So, optimizing dietary intake through nutrient dense foods and appropriate use of supplementation where necessary may improve overall health of the Thalassaemia patients.

Patients need to be evaluated annually by anthropometry by the care giver regarding adequate dietary intake of calcium, vitamin D, folate, trace minerals (copper, zinc, and selenium) and antioxidant vitamins (E and C).

1. For non-transfused Thalassaemia patients (NTDT): a moderately low-iron diet is encouraged—that is, avoiding only iron-fortified cereals and other products and excessive consumption of liver and red meat. Take at least one glass of milk daily as it helps to prevent osteoporosis; and Drink black tea without sugar immediately after meals to reduce iron absorption from food.

It is difficult to avoid taking non-meat iron because it is present in most foods. Non-meat iron is present in eggs, cereals, vegetables, fruits roots (potatoes, parsnips), beans and lentils. However, diet can be modified by taking more of the foods which decrease and less of the foods which increase the amount of iron absorbed into our body. The foods which decrease its absorption are: (i) Cereals; and (ii) Dairy products. The foods which increase its absorption are: Fruit and vegetables rich in Vitamin C, meat, fish, and poultry. So, Vitamin C which is present in fruits, such as lemon, guava, orange and orange juice should be taken separately, rather than with main meal as these are good sources of antioxidants which are very much necessary for Thalassaemia patients.

2. For regularly transfused patients on chelating therapy, a low-iron diet is unnecessary and may decrease the quality of life for some patients.

3. There are some nutrients that Thalassaemia patients need in greater amounts

i) Folic acid: For all Thalassaemia major and intermediary patients' regular folate supplementation is recommended;

ii) Zinc: Regarding zinc it is an essential nutrient that has been shown to be particularly beneficial to immune status, bone health and growth in Thalassaemia.

iii) Vitamin D: In several studies Vitamin D insufficiency is reported in the majority of Thalassaemia patients in the USA and elsewhere. The risk of vitamin D deficiency increases with age, and older Thalassaemia patients have significantly worse vitamin D status compared with age-matched healthy controls. So,

(a) If vitamin D level is less than 20ng/ml then regular/daily vitamin D supplement (1000 IU/d) or a high dose infrequent vitamin D supplement (50,000 IU dose every 3-4 weeks at time of transfusion) is recommended.

iv) Vitamin E: Several studies demonstrated that Vitamin E values are depressed in Thalassaemia owing to increased consumption of this vitamin as thassemia patients are at increased risk of oxidative stress. Vitamin E is therefore often suggested for Thalassaemia patients specially who has secondary hemochromatosis.

v) Vitamin C: Thalassaemia major patients are allowed only minimum levels of vitamin C daily because it liberates iron into the blood stream.

8. COUNSELING:

Counseling should be provided in two segments:

- General Counseling
- Genetic Counseling

General Counseling:

General counseling should include brief discussion about disease process, nature & course of disease, mode of inheritance, basic principle of treatment including dietary advices, outcome of the disease with optimum, inadequate & without treatment and complications.

It should be advised to do Hemoglobin electrophoresis of all the family members and relatives as it is a hereditary disease.

Genetic Counseling:

Following points to be emphasized:

- Thalassaemia is a hereditary disease.
- It is transmitted to the sibs from their parents there by generation to generation through gene.
- Thalassaemia patients and carriers should not marry a person of his/her generation (blood-relative).
- If both the life-partners is carrier of Thalassaemia then there is possibility of born of Thalassaemia affected baby(Patient).
- So, Thalassaemia patients and carriers should know the carrier status of future life-partner by doing Hemoglobin Electrophoresis whether he/she is a carrier of Thalassaemia or not. If so, it is better to avoid selecting that future life-partner.
- If both husband and wife are carrier of Thalassaemia then Pre-Natal diagnosis of the fetus to be done by DNA analysis around 10th to 15th week of pregnancy to know whether that fetus is a Thalasemia patient or not. If patient, then the parents may be counseled regarding continuation or not to continuation of that pregnancy on consideration of future fate of the affected fetus.

9. FINANCIAL AND PSYCHOSOCIAL SUPPORT:

- Financial support should be given to Thalasaaemic patients by government and non-government organizations.
- Psychological and social support should be given by family members, relatives, neighbors and teachers from family, school and society like letting them to play with other children, allowing them to go to school etc.

10. PREVENTION OF THALASSAEMIA:

Thalassaemia is a preventable disease. Creating awareness, population screening, avoiding marriage between carriers, genetic counseling and preventing birth of affected fetus by prenatal diagnosis can eliminate Thalassaemia from our country. Many countries in the world had controlled Thalassaemia by mandatory carrier screening. The high risk couples should be identified at the primary health care level and be referred to a regional/ tertiary, well equipped center for proper management.

A. Creating awareness

- Creating awareness about Thalassaemia to the general population, government and medical communities by holding seminars, workshops and writing articles in the daily newspapers, broadcasting in television and radio is of prime importance.
- The government must also take steps to create awareness among the rural populations by involving thana health complexes and other different local organizations through different activities like seminars, symposium, publications etc.

B. Population screening

(i) Screening High Risk Family Members

The family members of couple having Thalassaemia child are the high risk group. After proper counseling they should be screened for carrier status.

a) Screening method:

The most feasible screening can be done by RBC indices through CBC test. The MCH & MCV parameters will be carefully looked out in CBC report of an individual.

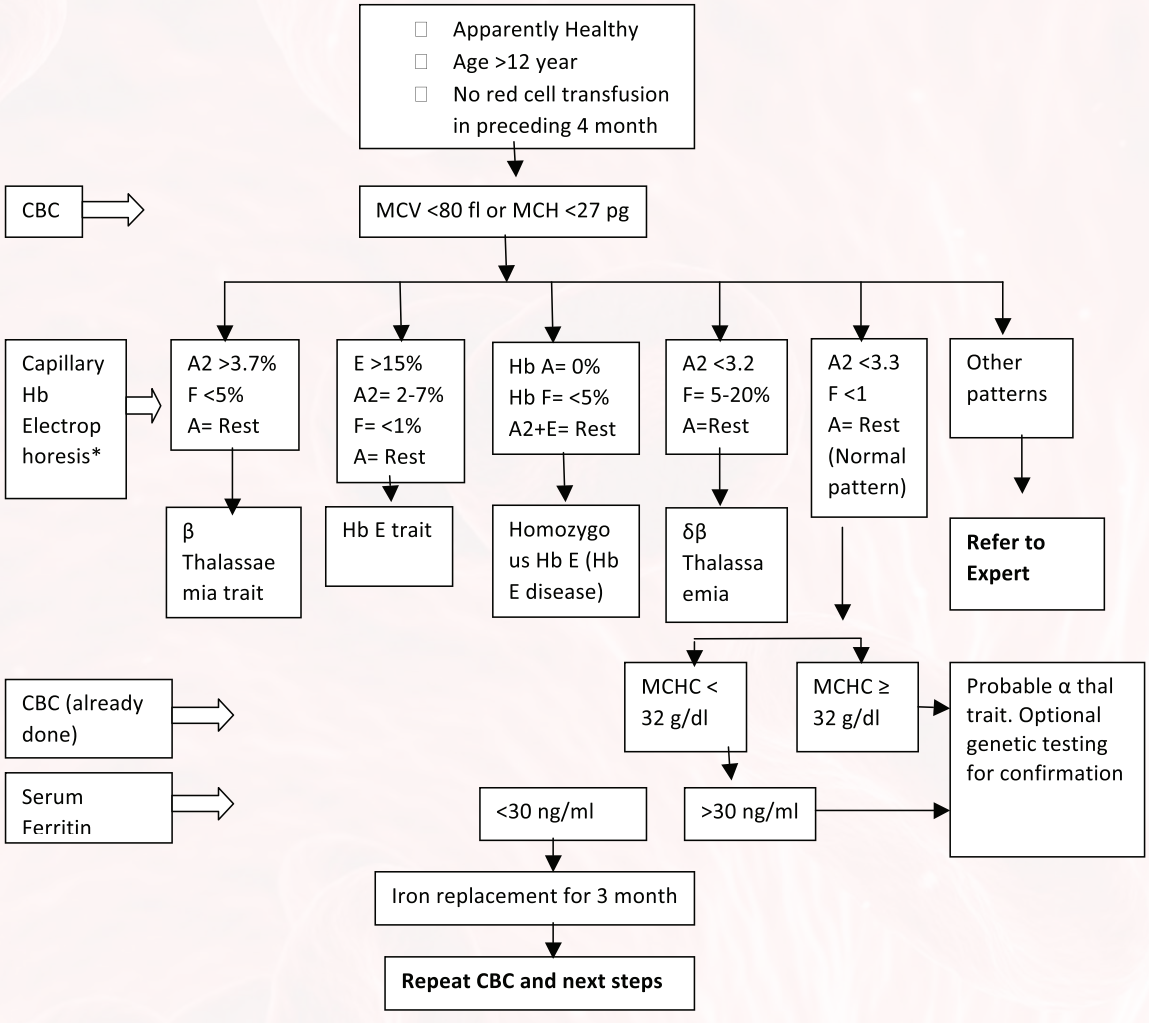
- With or without anemia, When the CBC report of an adult person will show MCV is ≤ 80 fL or MCH ≤ 27 pg, it indicates to be Thalassaemia carrier or iron deficiency anemia or others causes of microcytic anaemia.
- They should be offered Hb Electrophoresis test to confirm Thalassaemia trait/carrier or not.

If the Hb Electrophoresis report is normal, they should be treated with Iron for 2 weeks to see the response.

b) Carrier detection:

Identification of asymptomatic carrier:

i) Beta Thalassaemia trait, ii) Hemoglobin E trait and iii) Homozygous hemoglobin E (Hb E disease. Flow chart using routine CBC, Electrophoresis (and serum ferritin optional) is given.



*To be able to differentiate HbA2 from HbE.

(ii) Child bearing potential group screening:

- As the prevalence of Thalassaemia carrier is high in our country, the future parents in the general people should be screened for detection of carrier status.
- It can be started from school, college, university or community level.

(iii) Premarital Screening:

Before marriage, the bride grooms should be screened to detect carrier status. Marriage between two carriers should be discouraged.

♣ Screening of pregnant mothers at first visit:

- All pregnant mothers should be routinely screened out to find out carrier status of Thalassaemia.
- If the pregnant lady is detected as a carrier, her husband should be screened out immediately.

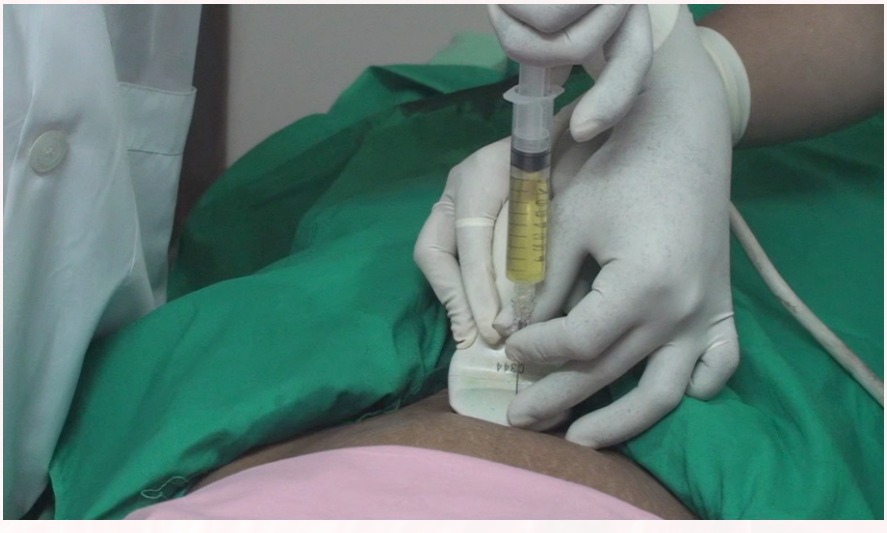
- If both husband and wife are detected as carriers, only then they should be offered prenatal diagnosis after proper counseling.

a) Pre-natal diagnosis (diagnosis before birth)**:**

Genetic analysis from Amniotic fluid (by amniocentesis) and Chorionic villus (by chorionic villus sampling) is the mainstay of prenatal diagnosis of Thalassaemia.

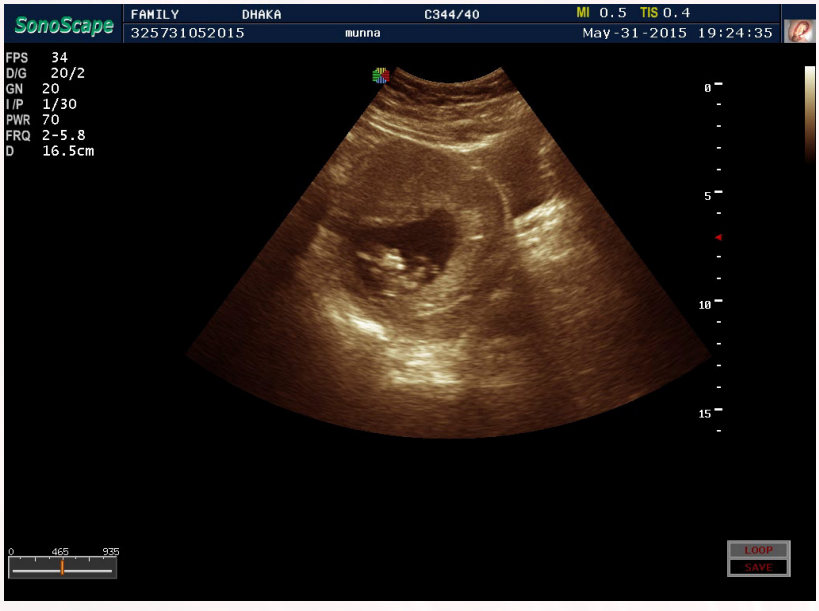
b) Amniocentesis:

- Amniocentesis is the process of collecting amniotic fluid from the womb under the guidance of real-time ultrasound.
- It is done at 15 to 18 weeks of pregnancy when the size of the fetus is about 1.5 to 2 inches.

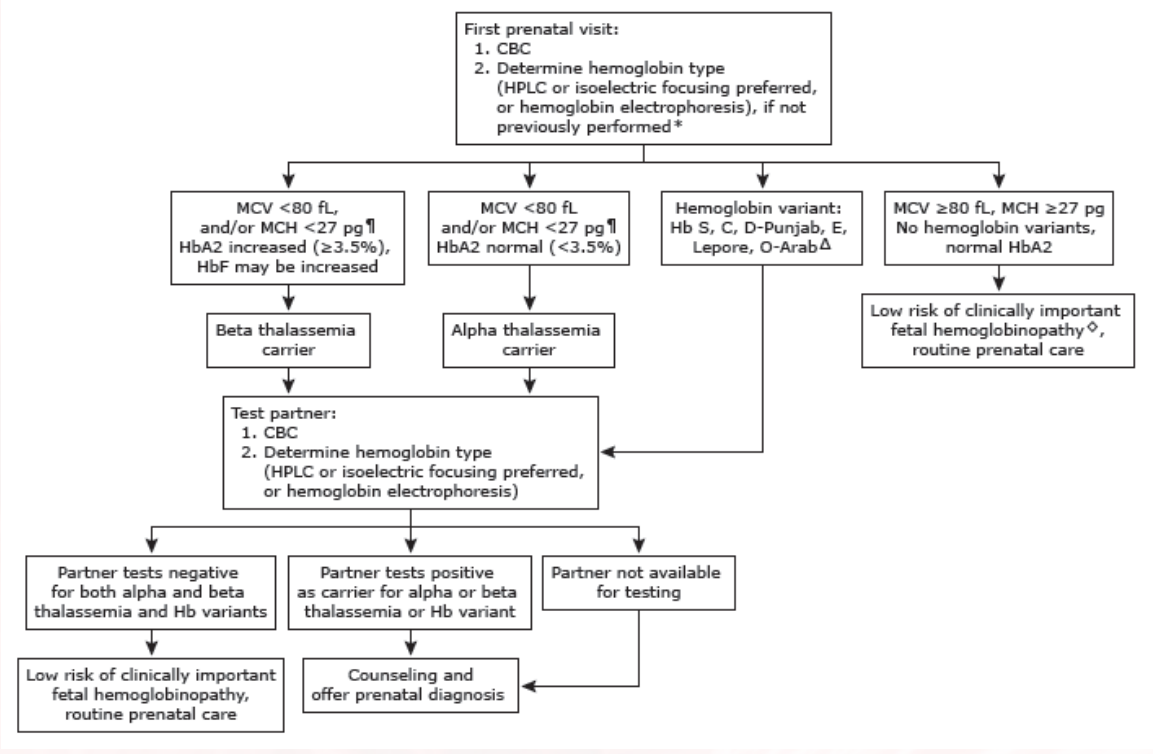


c) Chorionic Villus Sampling (CVS):

- Chorionic villus sampling is the process of collecting placental tissue from the womb.
- It is done at 11 to 14 weeks of pregnancy, earlier than amniocentesis. At this stage the size of the fetus is about 1 to 1.5 inch.
- There is only 0.5 to 1% risk of abortion in amniocentesis or Chorionic Villus sampling procedures.
- Both the amniotic fluid and chorionic villi collected in those procedures along with parent's blood are sent to laboratory for genetic analysis. It takes 1 to 2 weeks to get the result.
- When the result is that the fetus is affected by Thalassaemia major, the physician counsel the parents to take the decision to continue or discontinue the pregnancy according to social, religious and legal issue.



Flowchart for prenatal diagnosis:



C. Genetic Counseling

Genetic counseling plays the most important part in Thalassaemia prevention program. Genetic counseling offered to couple when both are carrier of Thalassaemia or already have a child with Thalassaemia. They are counseled about the future pregnancy, risk of having affected children, available prenatal diagnosis, cost, result and consequences.

Definition of Genetic Counseling

- Genetic counseling is the communication process of providing information and support to individuals and families with a diagnosis and/or risk of occurrence of an inherited disorder.
- Genetic counseling is an integral and necessary component of comprehensive care for patients and parents affected by all forms of Thalassaemia disease and trait.

For successful genetic counselling:

- A correct diagnosis is necessary
- Explanation of the nature and prognosis of the disorder and treatment available and where to find it.
- Estimation of genetic risk for parents and family members.
- Communication of genetic risks and options for avoiding them including the chances of parents and other family members passing the disorder on to their children.
- The options for avoiding further affected children must also be addressed, including technique of prenatal diagnosis and associated problems.
- Supporting the individual or couple in making the decision that is right for them is also part of counseling.

When Genetic counseling is needed:

- At diagnosis and during adolescence
- prior to and after any genetic testing
- prior to pregnancy and/or as early in pregnancy as possible
- Annual follow-ups are needed to reinforce teaching.
- If you and your partner both have Thalassaemia trait, for each pregnancy, there is a:
  - ♦ 25% chance that the child will have Thalassaemia disease
  - ♦ 25% chance that the child will have normal hemoglobin
  - ♦ 50% chance that the child will have Thalassaemia trait

D. Prevention of Birth of new Thalassaemia baby

- Prenatal diagnosis is a hope of T halassaemia carrier couple to confirm a healthy baby before birth.
- Birth of new Thalassaemia major babies can be prevented by terminating the affected fetuses confirming by prenatal diagnosis.

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Annexure: 1

Patient Record Book:

প্রগ্রেস রিপোর্ট

তারিখ: সরবরাহকৃত রক্ত ও পরিমান

উচ্চতা- সেমি, ওজন- কেজি, মাথার পরিধি- রক্ত পরিসঞ্চালন নোট:

বুদ্ধি বিকাশ (I Q test) - দন্ত-

General Test:

CBC:

Coombs (Indirect): Coombs (Direct):

HLA typing:

Iron and Toxicity Test:

S.Ferritin: TIBC:

Liver Function Test:

G/E

AST: ALT: HBV:

HCV: HIV: Syphilis: Chelating agent:

S. Bilirubin: Total Albumin:

Malaria Parasite: রক্ত পরিসঞ্চালনজনিত তাৎক্ষণিক পার্শ্বপ্রতিক্রিয়া ও চিকিৎসা:

Spleen: G/E

Heart: G/E

Endocrine Test:

Ionized Calcium: Fasting Glucose:

FSH: Estradiol: পরবর্তী ভিজিটের তারিখ

শিশু রোগীর সাথে কথোপকথন

স্নেহের খোকা/ খুকু/ সোনামনি/ নাম

আমি ডাঃ ... .

কেমন আছ তুমি?

.. ..

আমি তোমার সাথে কথা বলতে চাই।

তোমার কি করতে ভাল লাগে?

.. ..

তোমার মত শিশুদের ছোটবেলা থেকে একটি অসুখ হতে পারে যার নাম 'থ্যালাসেমিয়া'। এটি রক্তের একটি অসুখ যার কারণে শারীরিক কিছু অসুবিধা হয়।

তোমার কি বেশীরভাগ সময় খারাপ লাগে?

.. ..

অনেক সময় দূর্বল লাগতে পারে, যার কারণ শরীরে রক্ত কমে যাওয়া (রক্তশূণ্যতা)। কিন্তু তোমার যেসব খেলা ভাল লাগে সেগুলি তুমি খেলতে পার। খোলমেলা পরিবেশে, রোদে হাটাঁ তোমার জন্য উপকারী।

তোমার অসুখের জন্য তোমার পড়াশুনা, বন্ধুদের সাথে সময় কাটানো, গান করা, বই পড়াসহ অন্যান্য ভাললাগার কাজগুলি তুমি করতে পার। তোমাকে নিয়মিত পুষ্টিকর খাবার, ফলমূল, দুধ ইত্যাদি খেতে হবে। কিছু খাবার যার মধ্যে আয়রনের পরিমাণ বেশী সেসব যেমনঃ কলিজা, কলা না খাওয়া ভাল। চা খেলে এ রোগে কিছু সুবিধা পাওয়া যায়। তোমার চিনি ছাড়া চা ও বিস্কুট খেতে হবে। অনেক সময় তোমার এ অসুখের জন্য নিয়মিত রক্ত নেয়া লাগতে পারে এবং সেই সাথে কিছু ঔষধ নিয়মিত সেবন করতে হবে।

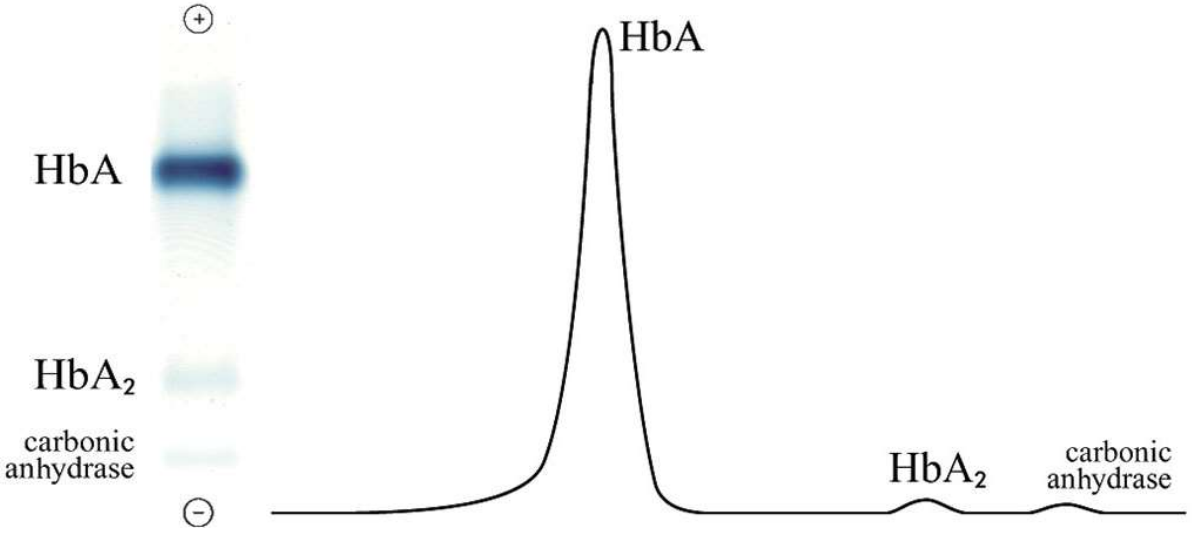
সরকারী চিকিৎসাসেবাগুলি যেগুলো তোমার হাতের কাছে রয়েছে সেখান থেকে (যেমনঃ উপজেলা স্বাস্থ্য কমপ্লেক্স, জেলা হাসপাতাল, মেডিকেল কলেজ ও হাসপাতাল) তুমি চিকিৎসাসেবা পেতে পারো। কোনো বিশেষ চিকিৎসা সেবা (অপারেশন, বোন ম্যারো ট্রান্সপ্লানটেশন, ইত্যাদি) আমরা তোমার ও পরিবারের সাথে আলোচনা করে সিদ্ধান্ত নিব।

আমি যে বিষয়গুলি উল্লেখ করলাম সেগুলি মেনে চললে তুমি অন্য শিশুদের মত স্বাভাবিকভাবে জীবন যাপন করতে পারবে। আমি তোমার সুস্থ ও সুন্দর ভবিষ্যৎ কামনা করি।

ধন্যবাদ

Hb electrophoresis

Hb	NORMAL	MAJOR	MINOR	INTERMEDIATE
Hb F	<1%	90-98%	1-5 %	Variable
Hb A	97%	Absent	90-95%	Variable
Hb A2	1-3%	Variable	3.5-7%	>3.5%



Normal Hb electrophoresis


Hello!
I love
Hello Kitty


সাংবাদিক সম্মেলন


স্বাস্থ্য ও পরিবার কল্যাণ মন্ত্রণালয়
সাংবাদিক সম্মেলন
বঙ্গবন্ধু শেখ মুজিবুর রহমান-এর স্বদেশ প্রত্যাবর্তন দিবস ২০১৮ উপলক্ষে
থ্যালাসেমিয়া সচেতনতা কার্যক্রম


Workshop on Finalization of Draft National Guideline for Thalassaemia Management
Venue : Conference Room, Co-Ordination & Support Center, DGHS, Mohakhali, Dhaka
Stakeholders


Workshop
on
Management of Thalassemia
"Living with Thalassaemia- Chelation Therapy"
Venue : Conference Room, National Asthma Center
National Institute of Diseases of The Chest and Hospital , Mohakhali, Dhaka
Date : 8th May, 2013
Chief Guest : Md. Muslim Chowdhury, Secretary, Ministry of Finance
Special Guest : Prof. Dr. Abul Kalam Azad, Director General, DGHS
Chair Person: Dr. Nur Mohammad, Line Director, NCDC, DGHS
Organized by: Non-Communicable Disease Control, DGHS
SBT & TM
ideSHi


স্বাস্থ্য ও পরিবার কল্যাণ মন্ত্রণালয়
স্বাস্থ্য অধিদপ্তর
মহাখালী, ঢাকা-১২১২
বিশ্ব থ্যালাসিমিয়া দিবস-২০১৮
LIVE
টেলি-কনফারেন্স ও ফেইসবুক লাইভ
থ্যালাসিমিয়া বিষয়ক আলোচনা ও প্রশ্নোত্তর পর্ব
৯মে, ২০১৮
NCDC


থ্যালাসেমিয়া সচেতনতা কার্যক্রম
সাল দুই হাজার আঠাশে
থ্যালাসেমিয়া থাকবে না বাংলাদেশে


Workshop on
Management of Thalassaemia


Government of the People's Republic of Bangladesh
Directorate General of Health Services
Mohakhali, Dhaka-1212.
Workshop on
Resources Person


Seminar on


Closing Ceremony of
International Workshop on Thalassaemia
12 13


30 Tablets
Desirox-500
Tablets
Desirox-500


Deferoxamine
Mesylate
for Injection, USP
2 grams per vial
For subcutaneous, intramuscular or intravenous use.
Single Use Only
Deferoxamine
Mesylate
for Injection, USP
500 mg per vial

Cooperation by

Non Communicable Disease Control (NCDC), DGHS
Management Information System (MIS), DGHS
Primary Health Care, DGHS
Coordination and Support Center, DGHS
Bangladesh Thelassaemia Foundation
Bangladesh Thalassaemia Samity
Lab One Foundation of Thalassaemia (LOFT)
Pally Baul Samaj Unnayan Sangstha
Medicine Club
Sandhani
Platform
Unicef
icddr,b
Save the Children
Asian Association of Transfusion Medicine (AATM)
Bangladesh Paediatric Association
Bangladesh Society of Medicine
Obstetrical and Gynaecological Society of Bangladesh
Blood Transfusion Society of Bangladesh
Institute for Developing Science & Health Initiatives

Disclaimer: The Guidelines is developed by Safe Blood Transfusion & Thalassaemia Management, Hospital Services Management, Directorate General of Health Services, Mohakhali, Dhaka.

স্বাস্থ্য ও পরিবার কল্যাণ মন্ত্রণালয়