Letter to Editor

Retrospective Analysis of Thalassemia Patients in Secondary Care Hospital: Ras Al Khaimah, United Arab Emirates

Sir,

Thalassemia, a genetic disorder, results in the production of abnormal hemoglobin (Hb). A mature Hb molecule is an oligomer composed of four subunits (monomers) two alpha-globin (α-globin) and two beta-globin (β-globin) polypeptides attached to a heme prosthetic group.[1] In alpha-thalassemia (α-thalassemia), there is a decrease in the making of α-globin chains, and this results in a reduced red cell (erythrocyte) Hb level. In beta-thalassemia (β-thalassemia), there is a decline in the production of β-globin chains leading to unpaired α-globin chains as a by-product, which, being unstable erythroid precursors, precipitate and result in injury to the membrane as well as the unfolding of the protein response leading to toxicity and death of the cells.[1] In Thalassemia major, the child inherits two defective globin genes (one each from a parent), while in Thalassemia minor, only one defective globin gene is inherited (from only one parent). Ineffective erythropoiesis is responsible for the typical symptoms of thalassemia. Classical symptoms of Thalassemia major include pallor, poor development, and abdominal enlargement in children and infants. Radiological evidence in these children and young adults includes thinning of the long bones with a "sun-ray appearance" and "dilation of the marrow cavities". The skull also develops a "hair-on-end" appearance due to an increase in the width in the diploic space. Some patients also have enlarged maxillary sinuses along with a tendency to have a maxillary overbite.[2]

Thalassemia has overwhelmed the healthcare systems in several regions, notably the Mediterranean, Middle East, and North Africa as well as parts of Central Asia, the Indian subcontinent, and South-East Asia. A historical presence of malaria, the role of which is emphasized by a case-control study in Liberia, showed evidence of protection of β-thalassemia heterozygotes from malaria.[3] This, along with a cultural practice of consanguineous marriages is assumed as some of the factors responsible for the endemic nature of α- and β-thalassemia in almost all Arab countries.[4]

Deoxyribonucleic acid (DNA) studies performed on Emirati newborn babies and adults in addition to 800 individuals of different nationalities selected at random revealed that "the frequency of β-globin gene defect including the β-thal, βs gene and abnormal hemoglobins is estimated at 8.5%." A majority of the mutations seen are of the severe β0-thalassemia variety.[5]

Thalassemia in the UAE has proved to be problematic due to a considerable number of homozygotes who require regular blood transfusions along with chelation therapy. Repeated blood transfusions can result in significant complications including iron overload, bone deformities, and cardiovascular illnesses.[6]

We performed a study that was cross-sectional and retrospective, and included only patients with Thalassemia, at the Thalassemia Centre affiliated to Ibrahim bin Hamad Obaidullah hospital, which was established in 2017. At the time of the study, it was providing treatment for 22 inpatients of various nationalities; both sex (7 males and 15 females).

Our work involved studying the medical records of these patients and identifying factors common among them. Using the "Wareed" electronic healthcare information system software, the medical records of the 22 patients were reviewed. The patients included were those suffering from Thalassemia Major. Those with Thalassemia Minor or other blood disorders were excluded.

There was no direct contact or effect on the participants of this study as it was a retrospective descriptive study. Information collected included demographics such as age, sex, marital status, and details about the condition such as type of thalassemia, average Hb levels, frequency of transfusion, amount and type of blood product received, and complications [Table 1].

The clinical data collected were reviewed and analyzed by descriptive statistics using Statistical Package for Social Sciences (SPSS) 26 and the Chi-square test.

Our study indicated that most patients continued to lead a normal life with marital status represented in the table below but when family history was elicited, a few of the patients reported that they had family members or parents who were carriers of thalassemia.

The patients under our study belonged to different nationalities and were not specific to any one location. We found that majority of those affected had the blood groups: O positive and A positive.

Based on their medical records, the medications which all the patients took regularly with slight dose variations include desferroxime 1500 mg OD, folic acid 5 mg, cholecalciferol 10,000 IU weekly, calcium carbonate 600 mg OD.

Our study showed a female predominance, and a significant number of factors were common amongst our patients which include a history of allergies, splenomegaly, secondary hemochromatosis, splenectomy, vitamin D deficiency, osteoporosis, heart diseases, and infections.

Table 1: Distribution of the various parameters assessed

Variable	Percent (%)
Allergy	
Yes	31.8
No	68.2
Total	100
Secondary Hemochromatosis	
Yes	72.7
No	27.3
Total	100
Splenectomy	
Yes	36.4
No	63.5
Total	100
Heart Diseases	
Yes	13.6
No	86.4
Total	100
Vitamin D Deficiency	
Yes	54.6
No	45.5
Total	100
Infections	
Yes	72.7
No	27.3
Total	100
Marital Status	
Single	77.3
Married	22.7
Total	100
Nationality	
Comoron	18.2
Omani	31.8
Pakistani	18.2
Bedoon	4.5
Emirati	4.5
Bangladeshi	9.1
Iraqi	9.1
Indian	4.5
Total	100
Blood Group	
A+	40.9
B+	13.6
O+	36.4
O+anti-K	4.5
B+anti-K	4.5
Total	100

A cumulative percent difference was noted between allergic reactions and secondary hemochromatosis. Possible reasoning for this may be because of the immune regulatory properties that iron and its binding proteins possess and any shift due to excess iron may have unfavorable physiological effects, which include a decrease in mitogen-stimulated and antibody-mediated phagocytosis by macrophages and monocytes, T-lymphocyte subsets alterations, and lymphocyte distribution modifications in various immune system compartments.[7] The abnormality in the T-cell regulatory function due to the iron overload is the most important cause in the occurrence of allergic diseases.[8]

A significant percentage of our patients underwent splenectomy and this is a matter of concern as the spleen is responsible for providing essential defense-related functions in our body by eliminating antigens and amalgamating opsonized antibodies, particularly immunoglobulin IgM and tuftsin. Splenectomy is linked with a widening mortality rate and susceptibility to severe infections particularly by organisms such as Streptococcus pneumonia, Haemophilus influenza type B, and Neisseria meningitidis. However, with the addition of vaccines against Streptococcus pneumoniae taken routinely and additional antibiotic prophylaxis, serious pneumococcal infections can be prevented for the next 2–4 years after the spleen removal.[9]

Another cumulative percent that was observed is the one between heart diseases and allergic reactions. During an allergic reaction, the heart is both the origin and target of chemical mediators and mast cells, that have a primary role in allergic reactions, are found abundantly in the human heart predominantly around the large coronary arteries adventitia and small intramural vessels. Allergens are among the variety of stimuli responsible for the activation of the mast cells in the heart. Patients known to have ischemic heart disease or/and dilated cardiomyopathies, have increased number and density of these cardiac mast cells and hence, may be considered as risk factors for an allergic reaction.[10]

Patients having secondary hemochromatosis have a direct relationship between their low levels of 25-OHD concentration and the extent of iron loading, which can be improved by venesection therapy. Although some patients having iron overload have been reported to have vitamin A, C, and E deficiencies, having an abnormality in the metabolism of vitamin D is not very well recognized as a hemochromatosis complication. A relationship being inversely proportional was found between serum 25(OH) D levels and the number of exchangeable iron stores found in the body.[11]

Although our study indicated, using percentage variations, a relationship between secondary hemochromatosis and splenomegaly as well as infections, we were unable to find resources supporting this significance.

As our study was a retrospective study that focused on understanding different factors in patients suffering from thalassemia in Ibrahim bin Hamad Obaidullah hospital, we found that the disease took an interesting turn amongst these patients. Due to the adequate blood transfusions that these patients received, they did not suffer from the typical complications of thalassemia, rather, their complaints were mostly due to the consequences of iron overload.

The molecular genotyping study can be a step forward in the management of thalassemia. There is also a need for effective, affordable, and accessible iron-chelating therapy that would ensure better compliance and a significant reduction of morbidity due to the complications of iron overload.

The identification and management of thalassemia in its early phase may contribute significantly to reducing the economic burden and complications in society. As the Middle East is among the regions, where thalassemia happens to be common, extensive genetic counseling to families and couples can help immensely in reducing the percentage of thalassemia in the region.

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Conflicts of interest

There are no conflicts of interest.

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