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Original Research Article

Clinicohematological profile of hemolytic anaemia among pregnant women attending at Tertiary Care Teaching Hospital

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Abstract

Introduction: Anaemia in pregnancy is emerging as one of the most important causes of maternal complications, morbidity and offspring mortality in almost all the developing countries of the world including India. Haemolytic anaemia is the anaemia which results from increased rate of red cell destruction. The haemolytic anaemia resulting from intra corpuscular defects are predominantly hereditary in nature. ***Material and Methods:*** This is a prospective and descriptive study was carried out on pregnant women with hemolytic anaemias conducted in the Department of Pathology at Tertiary care Teaching Hospital. Inclusion Criteria: Antenatal women (age 18 to 40 years) and Irrespective of gestational age and parity. Anaemias due to other causes (nutritional, blood loss, microangiopathic hemolytic anaemia, acquired hemolysis) were excluded. Hematological parameters were studied using an automated blood cell counter. ***Result:*** In our study, 31 women (44.2%) out of 70 persons were within 21-30 year and least were 12 women (17.1%). Of whom 38 were detected to have hemolytic anaemias, 19 had Beta-Thalassemia; 11 had Sickle cell anaemia, 2 had Haemoglobin E Trait. The frequency of Mild to severe anaemia was recorded to be 27.2% to 36.3% sickle cell anaemia, 10.5% to be 39.4% haemolytic anaemia, 47.3% to be 15.7% (β -thalassemia trait), and 100% severe (Haemoglobin E Trait) in pregnant women. ***Conclusion:*** Successful outcome in pregnancies complicated with hemolytic anaemias can be achieved with prompt diagnosis, patient education, screening, genetic counselling and prenatal diagnostic testing of foetus and management in a tertiary care hospital by a multidisciplinary approach.

Keywords: Pregnant women, Hemolytic anemias, Beta thalassemia, Sickle cell anemia.

INTRODUCTION

Anaemia in pregnancy is emerging as one of the most important causes of maternal complications, morbidity and offspring mortality in almost all the developing countries of the world including India. [1] Patients suffering from sickle cell disease are generally anemic, and are susceptible to infections. Untreated infections cause aggravation of severity of the sickle cell disease, subsequently, leading to death. [2] Infants affected with the disease may present with dactylitis, fever and overwhelming sepsis, chronic hemolytic anemia, jaundice, episodic vascular occlusive crises, hyposplenism, periodic splenic sequestration (which can be life threatening in a small child) and bone marrow sepsis. [3]

Haemolytic anaemia is the anaemia which results from increased rate of red cell destruction. These anaemia are a heterozygous group of disorders which can be broadly classified as those due to intra corpuscular defects in the RBC and those due to extra corpuscular defects [4]. The haemolytic anaemia resulting from intra corpuscular defects are predominantly hereditary in nature. [5] These defects in the RBCs could be in the haemoglobin molecule (e.g., thalassaemia, sickle cell anaemia), in the red cell membrane (e.g., hereditary spherocytosis, hereditary elliptocytosis) and in the red cell enzymes (e.g., G6PD deficiency and pyruvate kinase deficiency). [6] These hereditary haemolytic anaemia are a cause of significant morbidity and mortality worldwide, placing a large burden on the patients, their families and ultimately on the communities. They can be prevented by population screening, genetic counselling and prenatal diagnosis [7].

The WHO has estimated that, globally 1.62 billion people are anemic with the highest prevalence of anemia (47.4%) among preschool aged children, of these 293 million children, 89 million live in India while prevalence of anemia among school children is 25.4%. [8] Iron deficiency anemia affects 30% of the world population. [9] The prevalence of anemia among children under 5 years of age is estimated to be about 20% in industrialized countries and 39% in non-

industrialized countries. [10] Anemia is a leading cause of morbidity and mortality worldwide. In India, the national program for prevention and control of anemia focuses on pregnant women and young children less than 5 years. [11]

Hemoglobin - the red pigment of red blood cells transports oxygen to different parts of the body. Any defect in hemoglobin structure leads to adverse functional properties of the red cells. Inadequate availability of oxygen to fetus also leads to abortion, miscarriage or stillbirth. [12] The primary purpose of hemoglobinopathies screening in pregnant women is to identify the mothers and fetuses vulnerable to hemolytic anemia due to sickle cell disease and other abnormal hemoglobin variants for which early intervention has been shown to markedly reduce morbidity and mortality. The present study attempts to reveal the clinical and hematological profile of patients with different types of hemolytic anemia admitted in a tertiary care hospital.

MATERIAL AND METHODS:

This is a prospective and descriptive study was carried out on pregnant women with hemolytic anaemias conducted in the Department of Pathology at Tertiary care Teaching Hospital.

Inclusion Criteria: Antenatal women (age 18 to 40 years) and Irrespective of gestational age and parity.

Exclusion Criteria: Anaemias due to other causes (nutritional, blood loss, microangiopathic hemolytic anaemia, acquired hemolysis) were excluded.

Peripheral Smear: Peripheral smear was done by slide method. A drop of blood was placed in the centre 1-2cm from one end. Another slide was used as a spreader, holding the same in 30-45◦ near the drop of blood. The spreader was moved backwards so that it makes contact with the drop of blood. The spreader was then moved forward rapidly over the slide. A thin peripheral blood film was prepared. It was dried and then stained using Leishman‘s stain. Then distilled water is poured over the stained film to dilute the amount of stain. The slide is washed after 1-2 minutes, dried and examined under oil immersion lens of the microscope.

Hematological parameters were studied using an automated blood cell counter.

The sickling test was performed by using freshly prepared 2% sodium metabisulphite solution as a reducing agent for the absence or presence of sickle cell hemoglobin. Routine hemoglobin (Hb) lysate electrophoresis was carried out on cellulose acetate membrane in Tris-EDTA-borate buffer at pH 8.9 and quantification of hemoglobin A_2 fraction was done by elution method. The value of more than 3.5% of hemoglobin A_2 fraction of adult haemoglobin was taken as cut off point for determining the β-thalassemia trait; and more than 10% of A_2 as hemoglobin E. Estimation of fetal hemoglobin was carried out as described by Weatherall.

The diagnosis of sickle cell/ β-thalassemia was based on findings of hemoglobin A, F, S and A_2 on electrophoresis under acidic and alkaline media, elevated Hb A_2 levels (>3.5%), and family study. Anemia was defined as per the World Health Organization (WHO) Report Guidelines.

Antenatal and labour records were reviewed. Demographic variables like maternal age, parity, booking status, consanguinity, cause of haemolytic anaemia and time of diagnosis were noted. The primary outcome measures studied were - the severity of anaemia at booking defined as per Indian Council for Medical Research criteria (mild as Hb of 10.9 – 10 g/dl; moderate as Hb of 7-9.9g/dl; severe as Hb of 4-6.9g/dl; very severe as Hb < 4g/dl) [7], the obstetric and the medical complications, transfusion of blood and blood products and the mode of delivery. The secondary outcome measures studied were – neonatal outcomes, need for ICU admission and duration of hospital stay.

Statistical Analysis

Data are compiled in Excel Sheet and presented as descriptive statistics, including means and percentage.

RESULT

In table 1, 31 women (44.2%) out of 70 persons were within 21-30 year and least were 12 women (17.1%).

Table 1: Distribution of age group of participants

Age (Year)	Frequency	Percentage
18-20	12	17.1
21-30	31	44.2
31-40	27	38.5
Total	70	100

Table 2: Prevalence of hemoglobinopathies in pregnant women

Parameters	Frequency	Percentage
Sickle cell Anaemia	11	15.7
Hemolytic anaemia	38	54.2
Haemoglobin E Trait	2	2.8
β-Thalassemia trait	19	27.1
Total	70	100

In table 2, of whom 38 were detected to have hemolytic anaemias, 19 had Beta-Thalassemia; 11 had Sickle cell anaemia, 2 had Haemoglobin E Trait.

Table 3: Severity of anaemia

Parameters	Mild n (%)	Moderate n (%)	Severe n (%)	Total
Sickle cell Anaemia	3 (27.2)	4 (36.3)	4 (36.3)	11 (100)
Hemolytic anaemia	4 (10.5)	19 (50)	15 (39.4)	38 (100)
Haemoglobin E Trait	0 ()	0 ()	2 (100)	2 (100)
β-Thalassemia trait	9 (47.3)	7 (36.8)	3 (15.7)	19 (100)

In table 3, the frequency of Mild to severe anaemia was recorded to be 27.2% to 36.3% sickle cell anaemia, 10.5% to be 39.4% haemolytic anaemia, 47.3% to be 15.7% (β -thalassemia trait), and 100% severe (Haemoglobin E Trait) in pregnant women.

DISCUSSION

Anemia is one of the leading causes of maternal and perinatal deaths in pregnancy and puerperium. Hemolysis is one of the rare causes of severe anemia in pregnancy worldwide [13]. A rare entity called idiopathic hemolytic anemia has been described in pregnancy. The pathogenesis of this anemia is still not known; also the condition is not homogenous [14].

Hereditary hemolytic anemia, nutritional deficiencies (iron-folic acid deficiency, vitamin B12, protein energy malnutrition, etc.), parasitic infections (malaria) and parasitic infestations (worms) play a major role in determining the pregnancy outcome in both under-developed and developing countries of the world. Among the hereditary hemolytic disorders: β-thalassemia syndrome, sickle cell disease, and G6PD enzyme deficiency, are the significant contributors to anemia in pregnant women in tropical and subtropical countries including the India. [15]

So far, a few hypotheses have been proposed to explain the mechanism of destruction, one of which is malaria, which is negated in our case [16]. Splenomegaly in our patient may explain reduced RBC survival, but absence of splenectomy and improvement following steroids and delivery in our patient explain that this organ does not play an important part in the pathogenesis of this disease. Sometimes an immune hemolytic anemia occurs in few patients in whom concentration of antibody on the red cell is below the level for the detection by usual anti-globulin test. It is postulated that properties of antibody along with the sensitivity of reticuloendothelial system accounts for hemolytic anemia occurring at low concentration of antibody, and this mechanism might explain its response to glucocorticoids despite being Coomb's negative [17].

Most of the cases usually present in the third trimester and improved with delivery and recurrence in subsequent pregnancies. However, in our case her first pregnancy was unremarkable. The anemia is usually severe, even life-threatening to the mother and fetus [18]. Whether pregnancy has any role to play in the etiology remains unclear; however, the fact that this patient improved at the end of her pregnancy cannot be denied. The mechanism of the increased red-cell destruction is obscure. The failure to demonstrate either auto-agglutinins or hemolysins in the circulating blood indicates that abnormal antibody formation is not a factor [19].

To embark on the diagnosis of idiopathic hemolytic anemia, it is essential to rule out other causes of non-immune hemolytic anemia, which include broad etiologies such as congenital, mechanical, toxic agents, medications, infection, PNH, lymphoproliferative disorder, etc. [20]. Extensive investigations were carried out to determine the cause of hemolysis in our case, but these proved unfruitful.

The two most common causes of anemia during pregnancy and the puerperium are iron deficiency and acute blood loss. Other causes include inflammation, malignancy, megaloblastic anemia, and acquired hemolytic anemia. In our case, acute blood loss, megaloblastic anemia, and malignant diseases were unlikely. Blood tests showed an increase of reticulocytes and LDH levels and a decrease of the haptoglobin level. As a result, an acquired hemolytic disease was suspected because the patient had no history of hemolytic anemia. [21]

CONCLUSION

Successful outcome in pregnancies complicated with hemolytic anaemias can be achieved with prompt diagnosis, patient education, screening, genetic counselling and prenatal diagnostic testing of

foetus and management in a tertiary care hospital by a multidisciplinary approach.

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