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# Effect of Beta Thalassemia Trait in Pregnancy

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## Abstract

A cross-sectional, observational study was conducted to determine the effects of beta thalassemia trait in pregnancy. A total of 150 pregnant women diagnosed with beta thalassemia trait in Bangladesh Navy Ship (BNS) Patenga Hospital, at Chattogram, Bangladesh, having regular antenatal care and delivery, between January and December of 2022, were included in the study. Thalassemia status was diagnosed by Hb-electrophoresis. Most of the patients belonged to the age group 19-35 years. 30.46% of women had normal hematocrit level. During pregnancy women suffered from severe anemia (14%) and mild anemia (55.33%) (P<0.001). Blood transfusion needed during 1st trimester (1.3%), 2nd trimester (4.6%), 3rd trimester (8%) and at postpartum period (9.3%) (P>0.05). Most of the women (76.66%) delivered babies at her 36-39 weeks of gestational age,18.67% delivered at or after 40 weeks of gestation and 4.67% delivered baby before 36 weeks (P<0.05). 66.67% had normal vaginal delivery, while 33.33% underwent Caesarean section operation due to several complications. Observed obstetric complications were: pregnancy induced hypertension (6.6%), gestational diabetes (4%), oligohydramnios (11.33%, premature rupture membrane (3.3%), preterm labor (8.66%), and placental abruption (1.33%). Adverse fetal outcomes observed were: prematurity (4.6%), intrauterine growth retardation (5.33%), still birth (0.6%), and fetal asphyxia (3.33%). Neonatal admission at NICU was needed in 2(1.33%) cases.

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**Keywords:** Thalassemia, β-thalassemia trait, pregnancy

## Introduction

Thalassemia is among the most common genetic disorders in the world; an estimated 1.5% of the total world population has β-thalassemia.[1] Carrier frequency varies from 3 to 17% in different populations.[2] It affects hemoglobin production and is highly prevalent in Southeast Asia.[3] Thalassemia minor results in a variable degree of disease but depending on the rate of β-chain production, usually presents as asymptomatic anemia of mild degree.[4] Women with beta - thalassemia trait have some limitations in production of beta globin chain and are associated with subtle hematologic disorders such as small size of red blood cell (mean corpuscular volume) and decreased hemoglobin level (mean corpuscular hemoglobin).[5,6] The impaired beta globin production causes insufficient oxygen transport and supply to placental bed and fetus due to limited hemoglobin-oxygen bindings. Usually, women who are carrier of β thalassemia minor appear perfectly healthy, other than a mild anemia leading to misdiagnosis as iron deficiency anemia.[7] According to several studies, pregnant women with thalassemia traits are at risk of adverse pregnancy outcomes including preterm

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labor, intrauterine growth restrictions and low birth weight.[8-12] And women suffered serious obstetric complications like gestational hypertension, gestational diabetes and placental abruption.[13] These women must be monitored closely for worsening anemia and the development of pregnancy associated complications.[14] Due to high prevalence of β-thalassemia trait in Southeast Asia, our study is aims to determine the adverse effects of β-thalassemia trait in pregnancy, which will help health care providers to take special care of pregnant women.

## Methods

This cross-sectional, observational study of pregnant women with beta thalassemia trait who attended in Bangladesh Navy Ship (BNS) Patenga Hospital at Chattogram, Bangladesh, for regular antenatal care and delivery, between January and December of 2022. Data was collected using a semi-structured questionnaire. Thalassemia status was reconfirmed by Hb-electrophoresis. This study included 150 cases of beta thalassemia trait pregnant women with singleton pregnancy at any gestational age who attended the obstetric outpatient department for routine checkup or admitted into the hospital for delivery. At the first visit, gestational age was established by clinical examination and ultrasonography. The Hemoglobin level was assessed. At mid-trimester, fetal anomaly scan by ultrasonography was done. Maternal records were reviewed to collect data, including maternal age, parity, gestational age, obstetric complications such as anemia, gestational diabetes, pregnancy induce hypertension, placental abruption, intrauterine growth retardation. Mode of delivery (vaginal delivery or caesarean section) was recorded, and neonatal records were reviewed for birth weight, preterm birth, birth asphyxia or low Apgar scores, low birth weight and small for gestational age.

All the data were double-checked, compiled, and sorted properly. Appropriate statistical analysis was done using computer-based SPSS (Statistical Package for Social Science) software version 26.0, for windows. Dara was expressed in frequency and percentages in tabulated and graph forms. This study was approved by the Ethical Review Committee of the Bangladesh Naval Ship (BNS) Patenga Hospital, Chattogram, Bangladesh.

## Results

A total 150 pregnant women with beta thalassemia trait were recruited in this study. 84.66% women age was between 18 to 35 years and 15.34% women were >35 years of age (P>0.05). 67 women were primigravida (44.67%), while 79(52.67%) were 2nd to 4th Gravida and only 4 women were 5th gravida or more (2.66%) (P>0.05) (Table-I).

**Table-I:** Maternal age and parity (n=150)

| Variables | Frequency | Percentage | P value |
|---|---|---|---|
| **Age range** | | | |
| 18-35 years | 127 | 84.66 | 0.208 |
| >35 years | 23 | 15.34 | |
| **Gravida** | | | |
| Primigravida | 67 | 44.67 | 0.109 |
| 2nd to 4th Gravida | 79 | 52.67 | |
| 5th Gravida or more | 4 | 2.66 | |

30.46% of women had normal hematocrit level. During pregnancy women suffered from severe anemia (14%) and mild anemia (55.33%) (P<0.001) (Fig. 1) Blood transfusion needed during 1st trimester (1.3%), 2nd trimester (4.6%),

3rd trimester (8%) and at postpartum period (9.3%) (P>0.05) (Table-II). Most of the women (76.66%) delivered babies at her 36-39 weeks of gestational age,18.67% delivered at or after 40 weeks of gestation and 4.67% delivered baby before 36 weeks (P<0.05). 66.67% had normal vaginal delivery, while 33.33% underwent Caesarean section operation due to several complications (Table-III).

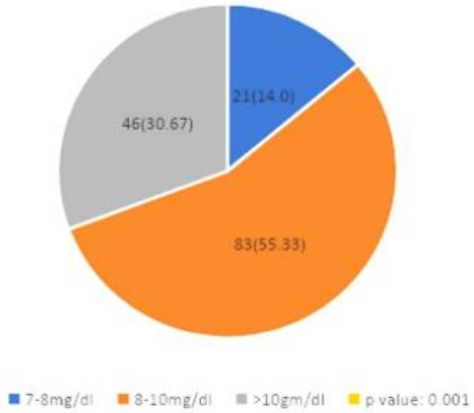


**Fig.1:** Pie chart showing maternal hemoglobin level (n=150)

**Table-II:** Blood transfusion during pregnancy and postpartum period (n=150)

| Gestational age | Frequency | Percentage | P value |
|---|---|---|---|
| 1st Trimester | 2 | 1.3 | 0.209 |
| 2nd Trimester | 7 | 4.6 | |
| 3rd Trimester | 12 | 8 | |
| Postpartum | 14 | 9.3 | |

**Table-III:** Time and mode of delivery (n=150)

| Variables | Frequency | Percentage | P value |
|---|---|---|---|
| **Gestational age** | | | |
| <36 weeks | 7 | 4.67 | 0.05 |
| 36-39weeks | 115 | 76.67 | |
| ≥40 weeks | 28 | 18.66 | |
| **Mode of Delivery** | | | |
| Normal vaginal delivery | 100 | 66.67 | 0.409 |
| Caesarean Section | 50 | 33.33 | |

Obstetric complications due to maternal anemia were: pregnancy induced hypertension (6.6%), gestational diabetes (4%), oligohydramnios (11.33%, premature rupture membrane (3.3%), preterm labor (8.66%), and placental abruption (1.33%) (Table-IV). Birth weight of the babies were as follows: 4 kg or more in 2%, 2.5kg–4kg in 81.33% cases, while low birth weight (<2.5kg) were observed in 16.66% of cases (Table-V).

**Table-IV:** Obstetric complications associated with beta thalassemia trait (n=150)

| Risk Factors | Frequency | Percentage | P value |
|---|---|---|---|
| Pregnancy induce Hypertension | 10 | 6.6 | 0.017 |
| Gestational Diabetes | 6 | 4 | 0.098 |
| Oligohydramnios | 17 | 11.33 | 0.301 |
| Premature Rupture Membrane | 5 | 3.3 | 0.209 |
| Preterm Labor | 7 | 4.6 | 0.205 |
| Placental Abruption | 2 | 1.33 | 0.109 |

**Table-V:** Birth weight of babies (n=150)

| Birth Weight | Frequency | Percentage | P value |
|---|---|---|---|
| <2500gm | 25 | 16.66 | 0.209 |
| 2.5Kg – 4kg | 121 | 81.33 | |
| >4kg | 3 | 2 | |

Adverse fetal outcomes observed were: prematurity (4.6%), intrauterine growth retardation (5.33%), still birth (0.6%), and fetal asphyxia (3.33%). Neonatal admission at NICU was needed in 2(1.33%) cases (Fig. 2).

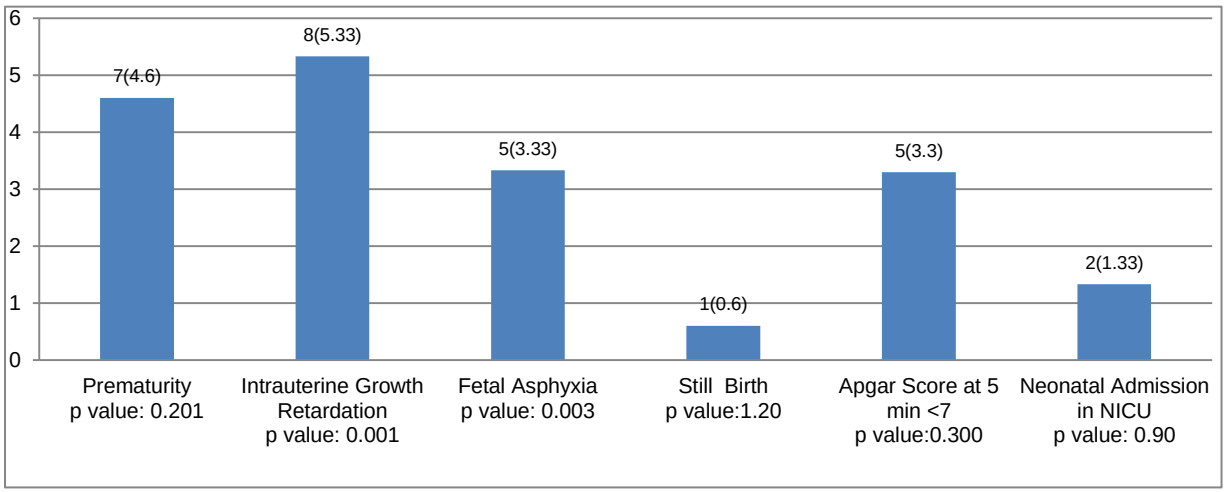


**Fig. 2:** Bar graph showing fetal outcomes (n=150)

## Discussion

This study included 150 pregnant women with β-thalassemia trait. Generally, thalassemia traits are asymptomatic or causes mild microcytic hypochromic amaemia.[15,16] A previous study suggested that non-anemic beta thalassemia trait does not significantly increase risk of common maternal complications,[11] which is similar to our findings. However, we observed that anemia became worse among pregnant women with beta thalassemia trait especially in 2nd and 3rd trimester, which is similar to other studies.[17,18] Thalassemia has been associated with an increase incidence of obstetric complications.[19] We observed obstetric complications like pregnancy induced hypertension (6.6%), gestational diabetes (4%), oligohydramnios (11.33%, premature rupture membrane (3.3%), preterm labor (8.66%), and placental abruption (1.33%), which are almost similar to the study done by Amooee *et al.*[9] However, the effects of thalassemia minor on pregnancy outcomes, especially GDM, are currently inconsistent. Maternal anemia during pregnancy might lead to fetal hypoxia and predisposing the to IUGR.[19,20]

Since chronic maternal anemia can lead to a state of hypoxia, itself leading to fetal growth restriction and preterm birth, some authors have tried to maintain hemoglobin levels higher than 10 gm/dl.[19,21] Thus, it was suggested that hemoglobin concentration should be maintained above 10gm/dl.[22] Although the constant demand for hemoglobin from developing fetuses may necessitate initiating maternal transfusions, or increasing their frequency in women already requiring them, the benefits of frequent transfusions (e.g., the prevention of growth restriction) should be weighed against their drawbacks. In our study, blood transfusion needed most at post-partum period (in 9.3% of women) due to previous anemic state, which became worse at normal blood loss during delivery.

All studies investigating pregnancy outcome of women with β thalassemia minor found higher rate of cesarean delivery;[23,24] which are pretty similar to our study result. Besides, a previous study showed that the risk of pregnancy induced

hypertension is significantly higher in the thalassemia trait,[25] which is almost similar to our study finding.

## Conclusion

Generally, thalassemia traits are asymptomatic or cause mild microcytic hypochromic anemia. Physiologic changes during pregnancy may worsen the severity of anemia in pregnant women who are already affected by β-thalassemia trait that significantly causes adverse pregnancy outcome. Much more attention should be focused on maternal iron and hemoglobin levels during antenatal care and pregnancy management to prevent further maternal and fetal complications. Besides, β-thalassemia trait is an inherited autosomal recessive condition; therefore, screening, counseling, and prenatal diagnosis are important components of prenatal care for those women.

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