International Journal of Environmental Sciences
ISSN: 2229-7359
Vol. 11 No. 23s, 2025
https://theaspd.com/index.php

Assessing Pregnancy Outcomes in Women with Mild B-Thalassemia: A Study on Maternal and Fetal Health

Preeti Jaiswal[1*], Divya[2], Bibha Kumari[3], Satish Prajapati[4], Chetna Vashishth[5]
[1*]PG Tutor, Department of Obstetrics and Gynecological Nursing, Faculty of Nursing, SGT University, Gurugram, Haryana, India.
[2]PG Tutor, Department of Medical Surgical Nursing, Faculty of Nursing, SGT University, Gurugram, Haryana, India.
[3]Assistant Professor, Department of Obstetrics and Gynecological Nursing, Teerthanker Mahaveer college of Nursing, TMU University, Moradabad, UP, India.
[4]Assistant Professor, Department of Community Health Nursing, Teerthanker Mahaveer college of Nursing, TMU University, Moradabad, UP, India.
[5]PG Tutor, Department of Obstetrics and Gynecological Nursing, Teerthanker Mahaveer College of Nursing, TMU University, Moradabad, UP, India.
Corresponding Author: Preeti Jaiswal, PG Tutor, Department of Obstetrics and Gynecological Nursing, Faculty of Nursing SGT University, Gurugram, Haryana, India. @jaiswalpreeti962@gmail.com

Abstract:
Background: *Pregnancy-related physiological changes exacerbate the severity of anemia and are linked to a higher risk of preterm birth, low birth weight, and fetal growth limitation.*
Aim: *Finding out how pregnant women with mild β-thalassemia fared was the goal of this study.*
Material & Methods: *Fifty women in all who came to the RV Hospital consultation clinic for prenatal care visits were screened one after the other and participated in the current cross-sectional study in Gurugram, India. From May 20 2023 to February 10, 2024, the patients were monitored for pregnancy outcomes until delivery.*
Result: *A history of infant death was present in about 14.0% of the patients. Anemia (18.0%) and a history of preeclampsia (16.0%) were the most common clinical characteristics. 14.3% of the patients' neonates were admitted to the neonatal intensive care unit (NICU), whereas the majority of patients (80.0%) had tried a normal vaginal delivery. Due to a low Apgar score, just one newborn passed away five minutes after delivery. According to the study, newborns admitted to the NICU had lower Apgar scores after one and five minutes than the group that was not admitted (5.71 and 6.71 vs. 7.24 and 9.29, respectively). Mothers of newborns admitted to the NICU were more likely to have had a caesarean section (C/S) (71.4%; P = 0.001), had a history of preeclampsia (57.1%; P = 0.005), and had a greater incidence of having a previous dead infant (42.9%; P = 0.031).*
Conclusion: *The current study indicates that the prevalence of clinical problems was higher among β-thalassemia newborns admitted to the NICU than among those who were not.*
Keywords: *Mild β-Thalassemia, Prenatal care, Apgar scores, NICU.*

1. INTRODUCTION

A diverse collection of autosomal recessive genetic illnesses is known as thalassemia. These manifest as anemia and microcytosis due to the reduced or nonexistent synthesis of globin chains. The two primary types of thalassemia are α-thalassemia and β-thalassemia[1]. These are hemoglobinopathies, which are distinguished by a reduction in the normal globin peptide chains' synthesis. The population determines thalassemia's prevalence and severity. Depending on the pace of β-chain formation, thalassemia minor causes varying degrees of the disease. It usually manifests as moderate asymptomatic anemia, with hemoglobin (Hb) in both sexes being 1-2 g/dL below normal.[2] α-thalassemia is thought to be the most hereditary hemoglobin disease. Reduced or inhibited α-globin chain synthesis is its defining feature.[3] The only treatment for thalassemia mild during pregnancy is folic acid. A blood transfusion is required if severe anemia develops during pregnancy. Low mean cell volume, low mean corpuscular Hb, raised HbA2, normal or elevated HbF, and mild anemia (HbA level 1 or 2 g below normal range) are characteristics of thalassemia as a heterozygote. Women with thalassemia minor who are pregnant experience more severe anemia. The latter part of the second trimester and the first part of the third trimester are when it occurs most frequently. [4,5]

Pregnancy-related physiological changes make anemia more severe. A higher risk of fetal growth restriction, low birth weight, and preterm birth has also been linked to it.[6,7,8] Studies on the pregnancy outcomes of women with β-thalassemia minor are scarce.[9] Special attention must be given to women with

thalassemia syndromes because they have the potential to worsen the condition of both the mother and the newborn.

In comparison to their counterparts who had chorionic villus sampling (CVS), Maruotti et al. discovered that pregnant women with β-thalassemia who underwent CVS had a considerably greater preeclampsia rate. As a result, they postulated that a lower maternal hemoglobin level guards against preeclampsia.[10] Nevertheless, more investigation is needed to look at the preeclampsia outcome in pregnant women with thalassemia disorders. As a result, screening these individuals for the potential problems listed above is crucial. Pregnancy outcomes in women with mild β-thalassemia were the focus of this investigation.

2. MATERIAL & METHODS

Study Design and Sampling Methods

Following ethical approval from the local department, participants were recruited for the study and monitored until birth. A specialized tertiary facility for general medical disorders affecting adult populations in this area, RV Hospital is where the patients were chosen. Patients were enrolled and monitored for health issues on a monthly basis. Every prenatal appointment included medical evaluations, including checks on vital signs, hemoglobin levels, and overall health. Every two weeks for the last three months, the patients were seen. Unless there was a reason for C/S, all patients were left to give birth naturally because serum folate was not accessible until the moment of delivery. Between May 20, 2023, and February 10, 2024, the data was gathered.

Inclusion and Exclusion Criteria

The study included all patients, regardless of their general and social characteristics, who were 18 years of age or older and had been diagnosed with β-thalassemia minor prior to delivery and were pregnant at term. Patients with a history of infertility, recurrent pregnancies before 24 weeks of gestation, fetal structural or chromosomal abnormalities during pregnancy (such as a history of neural tube defect), β-thalassemia major or preterm pregnancy, or other related hematological conditions, such as sickle cell anemia, β-thalassemia major, or a family history of thalassemia, were not allowed to participate in the study.[11]

Diagnosis and Measures

Patients were asked about their age, blood transfusion history, number of prior pregnancies, antepartum hemorrhage (APH), postpartum hemorrhage (PPH), mother and father blood types, and Apgar scores at 1 and 5 minutes.

When Hb was less than 10 mg/dl, anemia was diagnosed. In the first trimester, the complete blood count (CBC) and standard Hb electrophoresis criteria were used to diagnose thalassemia. The level of HbA2 elevation (≥3.5%) identified by column chromatography and electrophoresis was utilized to diagnose β-thalassemia. Patients who experienced a significant decline in hemoglobin levels (less than 7 mg/dl) received a blood transfusion. Additionally, patients received at least a 5 mg daily oral folate supplement in accordance with the American College of Obstetricians and Gynecologists' guidelines.[12] In this investigation, pregnancy outcomes such as infant death, admission to the neonatal intensive care unit (NICU), and Apgar scores in the first and fifth minutes were taken into account.

At enrollment, a CBC, a hepatitis B test, and a urine analysis were performed on the patients. As part of the hospital-based guidelines, ultrasonography was also performed to look for maternal or fetal indications. Maternal data and newborn outcomes were examined by the researchers. Preterm birth in this study was defined as a live birth that occurred before 37 weeks of gestation. A birth weight below 10% of the normal growth curve was considered fetal intrauterine growth restriction (IUGR), and a birth weight greater than 90% of the normal growth curve was considered macrosomia. After 24 weeks of gestation, stillbirth was defined as death in utero.[11]

Statistical Analysis

The study's descriptive goals were displayed using either the frequency distribution and standard deviation or the frequency distribution and percentage. Frequency and percentage were used to display the neonatal outcome, NICU admission, and prevalence of current medical issues. Using either Fisher's exact test or an independent t-test, the relationship between mothers' complications and NICU admission was investigated. The significance threshold for the difference was set at $P < 0.05$. Statistical Package for the Social Sciences version 24:00 (SPSS 24; IBM Corp; IBM) was used to conduct the statistical computations.

3. RESULT

Of the fifty pregnant patients with β-thalassemia minor included in this study, their mean age was 31.14 ± 8.02 years, and they ranged in age from 18 to 46. A history of baby death was present in 14.0 of them, and the mean values for gravida, para, and abortion were 3.54 ± 2.07, 1.98 ± 1.81, and 0.44 ± 0.73, respectively. According to blood group, O+ blood groups made up the majority of patients and their spouses (56.0% and 66.0%, respectively) [Table 1]. In this study, the patients who took part were not smokers. Additionally, by
the conclusion of delivery, there were no maternal deaths, preterm births, or stillbirths.

Table 1. General Information of the Parents

Patient's Characteristics	**Frequency Distribution**
Age (year), mean,SD	31.14, 8.02
Range (years)	18-46
GPA (range)	
G;(1-9)	3.54 ,2.07
P;(0-6)	1.98, 1.81
A;(0-3)	0.44, 0.73
History of baby death	
Yes	7(14.0%)
No	43(86.0%)
Mother Blood Group	
A+	9 (18.0%)
A-	2 (4.0%)
B+	1(2%)
AB+	5 (10%)
O+	28 (56%)
O-	5 (10%)
Father Blood Group	
A+	7 (14.0%)
A-	2 (4.0%)
AB+	2 (4.0%)
O+	33 (66.0%)
O-	6 (12%)

In [Table 2], the patients' clinical profiles are displayed. Anemia was the most common clinical issue among patients (18.0%), according to the table. Preeclampsia history (16.0%) and blood transfusion history (6.0%) were next in line. Two percent of the patients had APH, and four percent had PPH.

Table 2. Clinical Profile of the Mothers

Patient's Characteristics	**Frequency Distribution**
Gestational Diabetes	2 (4.0%)
History of Preeclampsia	8 (16.0%)
Blood Transfusion History	3 (6.0%)
APH	1 (2.0%)
PPH	2 (4.0%)
Anemia	9 (18.0%)

Compared to 20.0% for C/S, the majority of patients (80.0%) had a normal vaginal delivery. Just one newborn (2.0%) passed away after five minutes of delivery as a result of a low Apgar score, and 14.3% were admitted to the NICU. After one minute, the Apgar values were 6.88 ± 1.21, and after five minutes, they were 8.92 ± 1.06 [Table 3].

Table 3. Delivery Mode and Neonates' Outcomes

Patient's Characteristics	**Frequency Distribution**
Delivery Mode	

Caesarion Section Normal Vaginal Delivery	10 (20.0%) 40 (80.0%)
Neonates' outcome Death Live	 1 (2.0%) 49 (98.0%)
NICU Admission Yes No	 7 (14.0%) 42 (86.0%)
Apgar Score, Mean+SD After 1 min (range:0-8) After 5 min (range:8-10)	 6.88+1.21 8.92+1.06

Newborns admitted to the NICU had lower Apgar scores after 1 and 5 minutes (5.71 and 6.71, respectively) than those not admitted to the NICU (7.24 and 9.29, respectively), according to the correlation of patient characteristics with NICU admission. The NICU admission rate was also greater (42.9%) for patients who had previously lost a baby than for the nonadmitted NICU group (7.1%; P = 0.031). P = 0.005 indicates that the prevalence of NICU was higher among patients with a history of preeclampsia (57.1%) than among the nonadmitted NICU group (39.0%). Additionally, the likelihood of NICU admission was higher for individuals who had undergone C/S (71.4%; P = 0.0001) [Table 4].

Table 4 .Association of Mothers' Complications with Admission of Neonates to Neonate Intensive Care Unit

Patient's Characteristics	NICU Admitted (n=7)	Not admitted in NICU (n=42)	P(two-sided)
Age	32.14	30.98	0.795*
G	4.57	3.49	0.381*
P	2.86	1.86	0.360*
Apgar 1 min	5.71	7.24	<0.0001*
Apgar 5 min	6.71	9.29	<0.0001*
Previous dead baby Yes No	 3 4	 3 39	0.031**
GDM Yes No	 1 6	 1 41	0.268**
History of PET Yes No	 4 3	 3 39	0.005**
Blood Transfusion Yes No	 1 6	 1 41	0.268**
PPH Yes No	 0 7	 2 40	1.00**
Anemia Yes No	 2 5	 7 35	0.598**
Delivery Mode Caesarion Section Normal Vaginal Delivery	 5 2	 4 38	0.001**

4. DISCUSSION

Newborn mortality was 2.0%, and the prevalence of NICU hospitalization was 14.3%, according to the current study. This study is comparable to a retrospective case-control study conducted in Iran by Amooee et al.[2], which comprised 510 β-thalassemia minor patients and 512 healthy controls. Both groups' patients

were matched for gestational age, age, and number of prior pregnancies. Oligohydramnios and C/S are significantly more common in patients with β-thalassemia minor, according to the authors' findings. They did not discover any significant differences between the two study groups in terms of preeclampsia, gestational diabetes mellitus, IUGR, or Apgar scores in the first and fifth minutes.

Ten minutes after delivery, only one newborn (2.0%) perished, according to the current study. According to Amooee et al. [2], there were five (1%) stillbirths in the control group and seven (1.4%) in the case group. Other issues were reported by their study groups. In 3.1% of cases and 1.5% of controls, perinatal problems such IUGR were noted. Similar to our research, the cases had a higher chance of giving birth to their babies via caesarean section (38.3%) than the controls (26.5%; P = 0.001). We discovered that the likelihood of a C/S delivery was higher for patients whose neonates were admitted to the NICU.

They did not, however, discover any appreciable differences between the two study groups in the NICU. In contrast to Amooee et al. [2], who showed no significant difference in Apgar scores between the first and fifth minutes, we discovered that patients whose neonates were admitted to the NICU had lower Apgar scores during the first and fifth minutes. A retrospective case-control study on singleton women was conducted by Hanprasertpong et al. [11] to compare the pregnancy outcomes of women with and without thalassemia trait. In Thailand, they enrolled 739 thalassemia patients and 799 normal-pregnancy participants in the trial. Maternal difficulties such as gestational diabetes, premature birth, antepartum and postpartum hemorrhage, and neonatal abnormalities such as macrosomia, IUGR, stillbirth, NICU admission, and Apgar scores in the first and fifth minutes did not differ significantly from one another. Nevertheless, with a risk rate of 1.73, the incidence of preeclampsia was considerably greater in cases than in controls. In line with the current findings, we discovered that patients who had previously had preeclampsia had a higher likelihood of having their newborns admitted to the NICU than women who had not.

Pregnancy may not be the sole reason for a neonate's admission to the intensive care unit (NICU); there are other risk factors as well, including respiratory issues, hypoglycemia, and jaundice. [13]

5. CONCLUSION

The current study indicates that moms of newborns with β-thalassemia minor who were hospitalized to the NICU were more likely to have clinical problems than women who were not.

Acknowledgement: We extend our gratitude to each and every participant who provided a sample for the research.

Author's contribution: The study design, data collection and analysis, data interpretation, paper drafting, and critical revision were all equally contributed to by all authors.

Funding: External funding has not been received for this project.

Conflict of interest: The authors declare that there are no conflicts of interest.

Informed Consent: Informed Consent was obtained from the participants.

Data and materials availability: Upon justifiable request, the corresponding author will make all of the data sets gathered during this investigation available.

6. REFERENCES

[1] Palis J. Thalassemia Pediatric Clinical Advisor. 2007 United States; Philadelphia Publisher: MOSBY Elsevier:558

[2] Amooee S, Samsami A, Jahanbakhsh J, Karimi M. The pregnancy outcome in patients with minor β-thalassemia Iran J Reprod Med. 2011;9:9–14

[3] Petrakos G, Andriopoulos P, Tsironi M. Pregnancy in women with thalassemia: Challenges and solutions Int J Womens Health. 2016;8:441–51

[4] Hillman R, Ault K. Hematology in Clinical Practice. Macrocytic Anemias Interamericana. 2002 New York McGraw-Hill

[5] Chiang O, Garfunkel LC Pediatric Clinical Advisor: Instant Diagnosis and Treatment. 2007 United States; Philadelphia; Publisher MOSBY Elsevier

[6] Tongsong T, Srisupundit K, Luewan S. Outcomes of pregnancies affected by hemoglobin H disease Int J Gynaecol Obstet. 2009;104:206–8

[7] Luewan S, Srisupundit K, Tongsong T. Outcomes of pregnancies complicated by beta-thalassemia/hemoglobin E disease Int J Gynaecol Obstet. 2009;104:203–5

[8] Nassar AH, Naja M, Cesaretti C, Eprassi B, Cappellini MD, Taher A, et al Pregnancy outcome in patients with beta-thalassemia intermedia at two tertiary care centers, in beirut and milan Haematologica. 2008;93:1586–7

[9] Jans SM, de Jonge A, Lagro-Janssen AL. Maternal and perinatal outcomes amongst haemoglobinopathy carriers: A systematic review Int J Clin Pract. 2010;64:1688–98

[10] Maruotti GM, Agangi A, Martinelli P. Chorionic villus sampling and the thalassemia trait: Which relationship with pre-eclampsia? BJOG. 2011;118:764–5
[11] Hanprasertpong T, Kor-anantakul O, Leetanaporn R, Suntharasaj T, Suwanrath C, Pruksanusak N, et al Pregnancy outcomes amongst thalassemia traits Arch Gynecol Obstet. 2013;288:1051–4
[12] American College of Obstetricians and Gynecologists. . Nutrition During Pregnancy. American College of Obstetricians and Gynecologists. Ch. 17 Report, ACOG; Online Report. 2017:319
[13] Al-Wassia H, Saber M. Admission of term infants to the neonatal intensive care unit in a Saudi tertiary teaching hospital: Cumulative incidence and risk factors Ann Saudi Med. 2017;37:420–4