



Research Article

Maternal and Neonatal Outcomes of Gestational Thrombocytopenia in Pregnant Women from Kirkuk City, Iraq: A Case-Control Study

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Abstract

Background: Thrombocytopenia is the most common hematological disorder in pregnant women, second only to anemia. A platelet count of less than $150 \times 10^9/L$ is regarded as low. It is the most common cause of thrombocytopenia during pregnancy when the platelet count does not fall below $70 \times 10^9/L$. **Methods:** A case-control study was carried out in the department of obstetrics and gynecology at Azadi Teaching Hospital, Kirkuk, Iraq. Two hundred pregnant women were enrolled in the study; they were divided into 100 cases and 100 controls. All participants were in labor at the time of admission. The cases were pregnant women with gestational thrombocytopenia, while the controls were pregnant women with normal platelet count. A platelet count was performed for all participants using the Swelab Alfa Plus system. **Results:** mean gestational age and platelet count were significantly lower in patients than controls, while there was no statistically significant difference in age or parity between the study groups. Preterm labor, postpartum hemorrhage (PPH), intrauterine fetal growth restriction (IUGR), and intrapartum fetal distress were significantly higher in the patients than in the controls, and the mean APGAR score at 5 minutes was significantly lower in the patients compared to the controls. **Conclusions:** Pregnant women with gestational thrombocytopenia may be at higher risk of preterm labor, postpartum hemorrhage, IUGR, intrapartum fetal distress and a low neonatal APGAR score.

Keywords: Maternal outcomes, Neonatal outcomes, Pregnant women, Thrombocytopenia.

تأثير نقص اللويحات أثناء الحمل على الأمهات والأطفال حديثي الولادة لدى النساء الحوامل من مدينة كركوك، العراق: دراسة الحالات والشواهد

الخلاصة

الخلفية: يعتبر نقص الصفيحات السبب الثاني الأكثر شيوعاً لاضطرابات الدم أثناء الحمل بعد فقر الدم. الهدف: التحقيق في نتائج الأمهات أو حديثي الولادة لدى النساء الحوامل المصابات بنقص الصفيحات أثناء الحمل. الطريقة: أجريت دراسة الحالات والشواهد في قسم أمراض النساء والتوليد في مستشفى آزادي التعليمي، كركوك، العراق. تم تسجيل مائتي امرأة حامل في الدراسة. تم تقسيمها إلى 100 حالة و 100 ضابطة. كان جميع المشاركين في المخاض وقت القبول. كانت الحالات من النساء الحوامل المصابات بنقص الصفيحات الحملية، في حين كانت المجموعة الضابطة امرأة حامل مع عدد طبيعي من الصفيحات الدموية. تم إجراء عدد الصفيحات الدموية لجميع المشاركين. تم قياس عدد الصفيحات الدموية باستخدام نظام Swelab Alfa Plus. النتائج: كان متوسط عمر الحمل وعدد الصفيحات الدموية أقل بكثير في المرضى من الضوابط، في حين لم يكن هناك فرق ذو دلالة إحصائية في العمر أو التكافؤ بين مجموعتي الدراسة. كان المخاض المبكر، ونزيف ما بعد الولادة، وتقييد نمو الجنين داخل الرحم، والضاقة الجنينية أثناء الولادة أعلى بكثير في المرضى مقارنة بالمجموعة الضابطة، وكان متوسط درجة APGAR في 5 دقائق أقل بكثير في المرضى مقارنة بالشواهد. الاستنتاجات: قد تكون النساء الحوامل المصابات بنقص الصفيحات الحملية أكثر عرضة لخطر المخاض المبكر، ونزيف ما بعد الولادة، و IUGR، والضاقة الجنينية أثناء الولادة، وانخفاض درجة APGAR لحديثي الولادة.

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INTRODUCTION

Thrombocytopenia is considered the second most common cause of hematological disorders during pregnancy after anemia [1]. Thrombocytopenia, characterized by a decrease in platelet count, affects 5–10% of women during pregnancy and in the immediate postpartum period [2,3]. Specifically, thrombocytopenia is defined as having a platelet count below 150,000/ μ L [4]. Platelet counts of 100,000 to 150,000/ μ L are classified as mild thrombocytopenia, while counts of 50,000 to 100,000/ μ L fall into the category of moderate thrombocytopenia. Severe thrombocytopenia is identified when platelet counts fall below 50,000/ μ L [5,6]. Among the various causes of thrombocytopenia during pregnancy, gestational thrombocytopenia emerges as the most prevalent, accounting for approximately three-quarters of all cases [2]. Gestational thrombocytopenia is characterized by a benign reduction in the platelet count [7]. A platelet count of 50,000/L or less during pregnancy will require further evaluation to exclude the presence of gestational thrombocytopenia as a cause of the low platelet count during pregnancy. This will raise the requirement for additional investigations to diagnose alternative causes. This diagnosis is of exclusion and usually occurs after the second half of the pregnancy, especially in the third trimester, in the absence of a previous history of low platelet counts outside the pregnancy. In addition, the diagnosis of gestational thrombocytopenia will be confirmed when the platelet count returns to normal after the end of the puerperium [8]. Although the underlying pathophysiological mechanism for the occurrence of gestational thrombocytopenia is not fully understood yet, it may be attributed to the physiological changes that are associated with pregnancy, such as expanded plasma volume and platelet consumption in the placenta [9]. Different studies have evaluated the effect of maternal medical disorders on the occurrence of pregnancy complications. For example, maternal infections during pregnancy are associated with increased risks of postpartum hemorrhage (PPH), low APGAR scores, pulmonary embolism, low birth weight, and early neonate mortality [10]. Usually, pregnancy thrombocytopenia is not associated with maternal or fetal adverse outcomes. However, monitoring platelet count at a regular interval remains the most important aspect in the management of these cases [11]. This study seeks to elucidate which maternal or neonatal complications are more likely to occur in pregnant women with gestational thrombocytopenia.

METHODS

This case-control study was conducted in the Obstetrics and Gynecology department at Azadi Teaching Hospital, Kirkuk City, Iraq, spanning from May 1, 2022, to May 30, 2023. The study involved 200 pregnant women, categorized into 100 cases and 100 controls.

Ethical considerations

Ethical considerations were diligently observed in accordance with the Helsinki Declaration. Informed consent was obtained from all pregnant women, and approval was secured from the Ethical Committee in the University of Kirkuk, College of Medicine, Issue No.33.

Study design and patient selection

All participants were in their third trimester of pregnancy and were admitted to the labor and delivery unit at Azadi Teaching Hospital due to uterine contractions. They were in active labor. The cases comprised pregnant women diagnosed with gestational thrombocytopenia by a hematologist, while the control group consisted of pregnant women with normal platelet counts. Gestational thrombocytopenia was defined as a platelet count below $150 \times 10^9/L$. Inclusion criteria encompassed singleton pregnancy and maternal age ranging from 20 to 40 years, with a gestational age exceeding 28 weeks. Exclusion criteria encompassed hypertensive disorders of pregnancy, connective tissue diseases, immune thrombocytopenic purpura, maternal liver or renal diseases, drug-induced thrombocytopenia, disseminated intravascular coagulopathy, maternal sepsis, infection, malignancies such as leukemia or lymphoma, von Willebrand disease, cholestasis of pregnancy, multiple pregnancies, fetal anomalies, and fetal death.

Data collection and outcome measurements

Data collection was performed at the admission of pregnant women to the labor room, either directly by the researcher or by accessing their medical records through a structured questionnaire. Maternal age, parity, and gestational age were recorded for all participants. Gestational age was determined based on the last menstrual period for women with a regular menstrual cycle, while for those with an unreliable cycle, gestational age was assessed using ultrasounds performed in the late first or early second trimester. Singleton pregnancies were confirmed through ultrasounds conducted in the third trimester. Obstetrical outcomes, including preterm labor, meconium-stained liquor, intrauterine growth restriction, antenatal fetal distress, intrapartum fetal distress, postpartum hemorrhage, puerperal sepsis, and the occurrence of deep venous thrombosis or pulmonary embolism during the puerperium, were assessed by obstetricians. Neonatal outcomes, such as APGAR score at 5 minutes, admission to the neonatal care unit, birth asphyxia, and early neonatal death, were evaluated by neonatologists. The APGAR score was categorized as normal (≥ 7), intermediate (4-6), or low (< 4). Platelet counts were obtained from all participants. A 2 ml blood sample was collected from each patient in Biozek EDTA K3 tubes,

followed by mixing for 5 minutes using a KJMR-II roll mixer. Platelet counts were measured using the Swelab Alfa Plus system, an automated hematology analyzer that relies on impedance for cell counts. The normal platelet count range was established between 150 and 400x10⁹/L.

Statistical analysis

Data analysis was done using SPSS version 26. For descriptive statistics, we reported the mean, standard deviation, and range for continuous variables, while categorical data were summarized with frequencies and percentages. To compare continuous variables, we employed a two-tailed independent *t*-test. The association between categorical variables was assessed using the chi-square test, with the Fisher exact test used when expected frequencies were less than 5. Statistical significance was considered at a *p*-value <0.05.

RESULTS

In this study, it was observed that the mean gestational age (GA) and platelet count were significantly lower (*p*<0.05) in the case group when compared to the control group. However, no statistically significant differences (*P*>0.05) were found in maternal age or parity between the two groups, as detailed in Table 1.

Table 1: Comparison between study groups by general characteristics

| General characteristics | Study groups | | <i>p</i> |
|--------------------------------------|------------------|------------------|----------|
| | Patients (n=100) | Controls (n=100) | |
| Age (Year) | 29.79±5.7 | 28.79±5.2 | 0.197 |
| Parity | 2.42±1.8 | 2.12±1.8 | 0.251 |
| Gestational age (week) | 36.42±3.6 | 37.89±3.1 | 0.002 |
| Platelet count (x10 ⁹ /L) | 91.29±11.2 | 283.21±68.4 | 0.001 |

Values were presented as mean±SD.

Regarding maternal and neonatal outcomes of gestational thrombocytopenia, when examining maternal and neonatal outcomes in gestational thrombocytopenia, several noteworthy findings emerged. In the case group, the prevalence of preterm labor, postpartum hemorrhage (PPH), intrauterine growth restriction, and intrapartum fetal distress was significantly higher compared to the control group, with percentages of 26% versus 10% (*p*=0.003), 13% versus 5% (*p*=0.048), 11% versus 2% (*p*=0.009) and 12% versus 3% (*p*= 0.015), respectively. Furthermore, the mean APGAR score at 5 minutes was significantly lower in the case group than in the controls (*p*=0.046). However, there were no significant differences observed in other maternal outcomes, such as deep venous thrombosis, pulmonary embolism, and puerperal sepsis. Similarly, for other outcomes that may affect neonatal morbidity and mortality, such as fetal distress during pregnancy, meconium-stained liquor, birth asphyxia,

neonatal admission to the neonatal intensive care unit, and neonatal death, no significant differences were detected (Table 2).

Table 2: Comparison between study groups by maternal and neonatal complications

| Complication | Study Groups | | Total (n=200) | <i>P</i> |
|----------------------------|-------------------|-------------------|---------------|----------|
| | Patients (n= 100) | Controls (n= 100) | | |
| <i>Maternal outcome</i> | | | | |
| Preterm labour | 26(26.0) | 10(10.0) | 36(18.0) | 0.003 |
| PPH | 13(13.0) | 5(5.0) | 18(9.0) | 0.048 |
| DVT / PE | 3(3.0) | 3(3.0) | 6(3.0) | 0.999 |
| Puerperal sepsis | 5 (5.0) | 2(2.0) | 7(3.5) | 0.248 |
| <i>Neonatal outcome</i> | | | | |
| Meconium-stained liquor | 10(10.0) | 8(8.0) | 18(9.0) | 0.621 |
| IUGR | 11(11.0) | 2(2.0) | 13(6.5) | 0.009 |
| Antenatal fetal distress | 8(8.0) | 5(5.0) | 13(6.5) | 0.39 |
| Intrapartum fetal distress | 12(12.0) | 3(3.0) | 15(7.5) | 0.015 |
| NICU admission | 18(18.0) | 10(10.0) | 28(14.0) | 0.103 |
| Birth asphyxia | 6(6.0) | 4(4.0) | 10(5.0) | 0.516 |
| Neonatal death | 8(8.0) | 6(6.0) | 14(7.0) | 0.579 |
| APGAR score at 5 min. | 7.41±2.1 | 7.94±1.6 | | 0.046 |

Values are presented as mean±SD, numbers and percentages. PPH: postpartum hemorrhage, DVT: deep venous thrombosis, PE: pulmonary embolism, NICU: neonatal intensive care unit.

DISCUSSION

Gestational thrombocytopenia (GT) is a commonly encountered condition during pregnancy, representing approximately 75% of all pregnancy-related thrombocytopenic cases, typically manifesting in the third trimester [12]. In our study, we saw that the case group had significantly lower mean gestational age (GA) and platelet count compared to the control group (*p*<0.05). However, there were no statistically significant differences in the maternal age and parity (*p*>0.05). Similarly, the Kim *et al.* study reported significantly lower mean platelet counts during the third trimester of pregnancy but no significant associations in GA, maternal age, or parity [13]. A study by Muhammed *et al.* found that the incidence of GT significantly decreased during pregnancy compared to the postpartum period [14]. Variations in study outcomes may be attributed to factors such as sample size, study design, or the presence of pregnancy-related complications or comorbid conditions. Platelet counts often exhibit a gradual reduction starting in the second trimester due to hemodilution related to increased plasma volume during pregnancy and an accelerated rate of platelet clearance [15]. Platelets and anti-thrombin III levels may drop a lot in some women during pregnancy, which could be a sign of conditions like HELLP syndrome (hemolysis, elevated liver enzymes, and low platelets) or acute fatty liver disease [16]. Additionally, thromboxane-A2 concentration tends to increase significantly during the second and third trimesters,

leading to increased thrombus formation, platelet destruction, and the development of thrombocytopenia [17]. In our study, the case group exhibited a significantly higher prevalence of postpartum hemorrhage (PPH), preterm labor, intrauterine growth restriction and intrapartum fetal distress compared to the control group ($p < 0.05$). Furthermore, the mean APGAR score at 5 minutes was significantly lower in the case group ($p = 0.046$). The results of this study agree with those of the study by Borhany *et al.*, which said that GT was a generally harmless cause of low platelets during pregnancy, but that 10% of cases led to PPH and 2% to abortion or preterm labor [18]. Elvei-Gaparovi and colleagues reported different results, with 2% of cases experiencing PPH and 2% experiencing placental abruption and a higher infection rate in the study group. They also observed a higher rate of neonatal intensive care unit (NICU) admission, IUGR and low-weight neonates and a significant effect on 1-minute neonatal APGAR scores [12]. However, Kim *et al.* reported a more favorable result without significant PPH cases and a higher rate of full-term deliveries [13]. Similarly, Yousef *et al.* found no increased blood loss during labor in women with GT, and their infants exhibited normal platelet counts, high APGAR scores, normal birth weights, and no mortality cases [19]. Another study by Zutshi *et al.* noted that bleeding complications or hematomas were not significantly associated with the degree of platelet count reduction. Around 3% of neonates in their study had thrombocytopenia but did not experience related complications [20]. A study done by Taş revealed that fetal growth restriction, a low neonatal APGAR score, and preterm birth were higher in pregnant women with GT, particularly those with platelet counts equal to or less than $70 \times 10^9/L$ [21]. Differences in these findings may be attributed to various statistical factors, such as the number of enrolled patients, or to the presence of other comorbid conditions affecting platelets, including sepsis, birth asphyxia, intrauterine hypoxia, congenital infections, or disseminated intravascular coagulation. In a prospective cohort study involving 756 pregnant women diagnosed with gestational thrombocytopenia, only one infant was later found to have congenital marrow dysfunction [5]. Another study, involving 730 pregnant women diagnosed with gestational thrombocytopenia, reported no observed neonatal bleeding complications [22]. In conclusion, pregnant women with gestational thrombocytopenia tend to have a lower gestational age and lower Apgar scores at 5 minutes. They also exhibit a higher risk of postpartum hemorrhage, intrauterine growth restriction, and intrapartum fetal distress. While gestational thrombocytopenia is generally mild and does not adversely affect both the mother and the fetus, marked thrombocytopenia associated with medical diseases can have serious maternal and fetal complications, necessitating specific monitoring and appropriate interference [23]. When platelet counts fall between 50,000 and 80,000/L, the possibility of immune

thrombocytopenic purpura cannot be excluded. In the case of GT, steroids may not yield therapeutic benefits, and the lack of a response can serve as an additional diagnostic criterion [16].

Conclusion

Pregnant women with gestational thrombocytopenia may be at higher risk of preterm labour, postpartum hemorrhage, IUGR, intrapartum fetal distress and low neonatal APGAR score.

Conflict of interests

No conflict of interest was declared by the authors

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Data sharing statement

Supplementary data can be shared with the corresponding author upon reasonable request.

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