

Original Article

# Analytical Study of Thrombocytopenia in Pregnant Women in Tishreen University Hospital (Causes, Complications, Management)

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**Abstract** - The aims of this study are to determine the prevalence of thrombocytopenia during pregnancy, in addition to evaluating the etiologies and the outcomes of thrombocytopenia.

A prospective cohort study was conducted on 894 pregnant women. They are selected from the Department of Obstetrics and Gynecology, Tishreen University Hospital in Lattakia-Syria, between November 2020 and November 2021. Blood samples were taken, and a complete blood count CBC was performed to detect the presence of thrombocytopenia.

Results of the 894 women enrolled in the study, 75(8.4%) had thrombocytopenia. Benign gestational thrombocytopenia represented the most frequent cause of thrombocytopenia (80%), followed by immune thrombocytopenia (10.7%) and pre-eclampsia (4%). Other causes were rare, which consisted of disseminated intravascular coagulation (2.7%), Antiphospholipid syndrome (1.3%), and multiple myeloma (1.3%). The most frequent complications of thrombocytopenia were antepartum hemorrhage (8%), premature delivery (8%), and the rate of complications was the least in women with benign gestational thrombocytopenia than other etiologies. A cut of 80.000 of platelets yielded a sensitivity of 90% and specificity of 87.3% in predicting the final outcome, in which the rate of complications was higher in women with platelet count <80.000.

**Keywords** - Thrombocytopenia, Pregnancy, Prevalence, Complications.

## I. INTRODUCTION

Thrombocytopenia is defined as a platelet count below the lower limit of the normal range (<150.000/ $\mu$ L) or below the 2.5th percentile for pregnant women [1]. It is classified as mild(100.000-150.000/ $\mu$ L), moderate(50.000-100.000/ $\mu$ L), and severe (<50.000/ $\mu$ L). Thrombocytopenia is encountered

in 7-12% of all pregnancies, and it is the second most common hematologic abnormality after anemia in pregnancy. [2,3]

When only platelet counts below (100.000 / $\mu$ L) were considered, the prevalence of thrombocytopenia was similar, around 1%.[24,25]

Thrombocytopenia during pregnancy may result from hemodilution [4,22,23], increased consumption of platelet, and increase of thromboxane A2 that lead to increased platelet aggregation [4,14].

Studies of platelet count variation during pregnancy were generally performed on a limited number of pregnancies and showed either a decrease or no change of the platelet count [17,18,19,20,21].

The most common causes of thrombocytopenia in pregnancy are gestational thrombocytopenia (74%), pre-eclampsia (21%), immune thrombocytopenia purpura (4%). In addition to other less common causes of thrombocytopenia such as pseudo thrombocytopenia, microangiopathies, medications, viral illness, and disseminated intravascular coagulation. [5,6]

Although most cases of thrombocytopenia in pregnancy are mild without adverse outcomes for either the mother or the fetus, occasionally, the low platelet count may be associated with significant morbidity and can have serious maternal-fetal consequences, which requires specific monitoring and appropriate management. [7]

It was found that the mean platelet counts were significantly higher in healthy nonpregnant women than in pregnant women and the authors also found that in healthy pregnant women, a platelet count over (115.000/ $\mu$ L) late in pregnancy does not require further investigation during pregnancy and may be considered a safe threshold. [11,15]



Management of thrombocytopenia during pregnancy may be challenging because there are many etiologies, some related directly to pregnancy and some unrelated [8]. It is important to detect etiologies as accurately as possible due to the fact that management strategies vary for disorders that are similar clinically. It is necessary to be managed by a team that includes obstetricians, haematologists, anesthesiologists, and paediatricians [9,10].

Moderate to severe maternal thrombocytopenia indicates severe primary disease and is associated with perinatal complications, including preterm delivery, placental abruption, higher rates of low Apgar scores, intrauterine growth restriction (IUGR), and stillbirths [16].

Therefore, the objectives of the study were to 1- determine the prevalence of thrombocytopenia in pregnant women. 2- an assessment of the potential causes of thrombocytopenia and the resulting complications. 3- detecting the predictive value of platelet count associated with complications.

**II. PATIENTS AND METHODS**

This is a Prospective cohort study of a group of pregnant women attending the Department of Obstetrics and Gynecology at Tishreen University Hospital in Lattakia-Syria during a one-year period (November 2020- November 2021). The inclusion criteria were: pregnant women at different ages of gestation with platelet count <150.000/ $\mu$ L. The exclusion criteria were: - women with thrombocytopenia before pregnancy and presence of previous blood disorders; complete medical history together with the physical examination was done. Complete blood count(CBC) was performed on admission for all pregnant women to assess

platelet count. After confirmation of thrombocytopenia, the following investigations were performed to determine the etiology: peripheral smear examination, which remains the main diagnostic procedure; liver function tests (bilirubin, transaminases, and alkaline phosphatase), C-reactive protein(CRP), lactate dehydrogenase (LDH), coagulation screen represented by prothrombin time(PT) and activated thromboplastin time aPTT, autoimmune disease screening, virology screen for hepatitis B virus (HBV), and hepatitis C (HCV).

**A. Ethical Consideration**

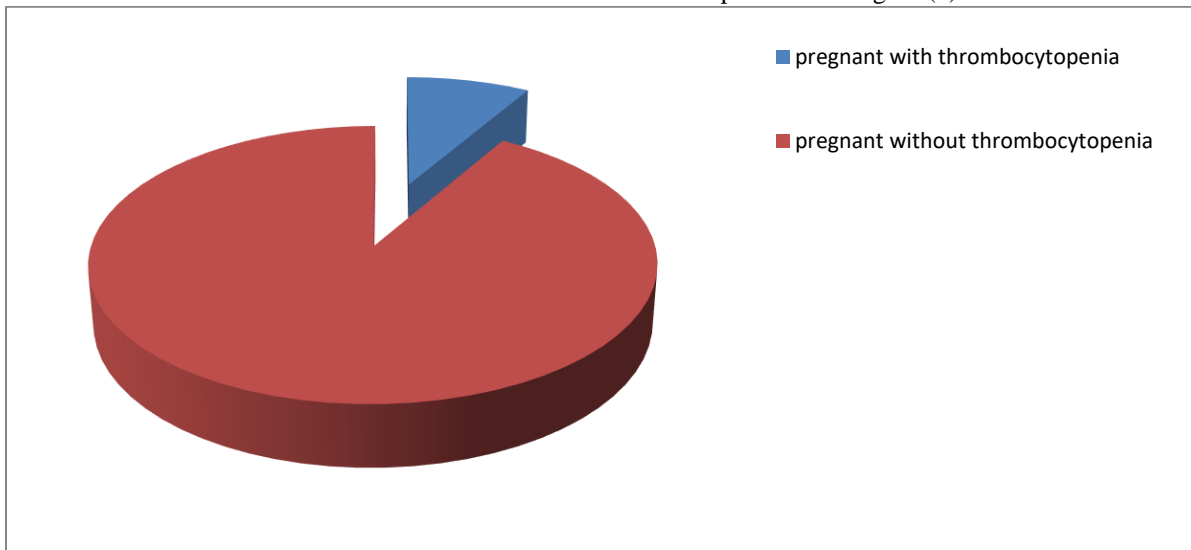
All patients were provided with complete and clear informed consent after the discussion about the study. This study was performed in accordance with the Declaration of Helsinki.

**B. Statistical Analysis**

Statistical analysis was performed by using IBM SPSS version 20. Basic Descriptive statistics included means, standard deviations(SD), Frequency and percentages. Differences among different groups were examined using the chi-square test or Fisher exact test .One way Anova was used to compare between the groups. The receiver operating characteristics(ROC) curve was constructed, and the area under the curve(AUC) was established to assess the ability of the peak platelet in predicting outcome. P-value <0.05 was considered statistically significant.

**III. RESULTS**

The study included a group of 894 pregnant women who fulfilled the criteria of the study. As shown in table (1), age ranged from 19 to 34 years, with the mean age, was 26.3 $\pm$ 3.5 years. Thrombocytopenia was occurred in 75 cases (8.4%), which represented in figure (1).



**Fig. 1 Prevalence of thrombocytopenia in the study population**

The most frequent cause of thrombocytopenia was benign gestational thrombocytopenia (80%), followed by immune thrombocytopenia (10.7%), pre-eclampsia (4%), disseminated intravascular coagulation (2.7%), Antiphospholipid syndrome (1.3%), and multiple myeloma (1.3%).

**Table 1. Demographic characteristics of the study population**

Variable	Result
Age (years)	19-34 (26.3±3.5)
<b>Etiology of thrombocytopenia</b>	
Benign gestational thrombocytopenia(BGT)	60(80%)
Immune thrombocytopenia(ITP)	8(10.7%)
Pre -eclampsia (HELLP syndrome)	3(4%)
Disseminated intravascular coagulation(DIC)	2(2.7%)
Antiphospholipid syndrome(APS)	1(1.3%)
Multiple myeloma(MM)	1(1.3%)

Gestational age was significantly lower in women with DIC ( $20.5 \pm 6.4$ ) and ITP ( $23.8 \pm 3.5$ ) than in women with APS (28), HELLP ( $30 \pm 2.9$ ), BGT( $30.3 \pm 3$ ), and MM(30),  $p < 0.001$ . There was a statistically significant difference in the count of platelet according to the etiology of thrombocytopenia, in which platelet levels were higher in BGT in comparison with the other causes of thrombocytopenia( $p < 0.001$ ).

**Table 2. Demographic characteristic of the study sample according to the etiologies of thrombocytopenia**

Variable	BGT	ITP	HELLP	DIC	APS	MM	P-value
Age(years)	$25.6 \pm 3.7$	$27.8 \pm 2.1$	$30.1 \pm 1.5$	$30.5 \pm 0.7$	24	34	0.004
Gestational age (Weeks)	$30.3 \pm 3$	$23.8 \pm 3.5$	$30 \pm 2.9$	$20.5 \pm 6.4$	28	30	<0.001
Platelet count (1000/mm3)	$97.4 \pm 19.6$	$39.2 \pm 20.3$	$41.4 \pm 9.1$	$38.5 \pm 37.5$	22	99	<0.001

The most frequent maternal complications were antepartum hemorrhage (8%), followed by postpartum hemorrhage (4%), abortion (4%), termination of pregnancy (4%), maternal mortality (2.7%), and oligohydramnios (1.3%).

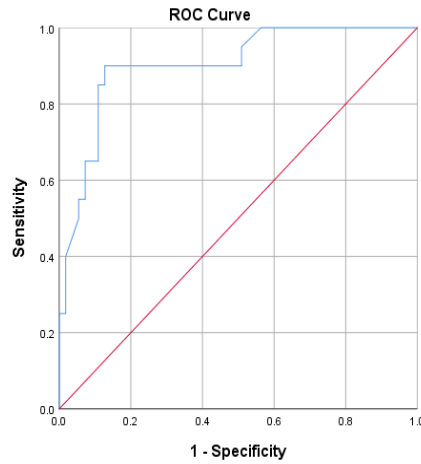
The most frequent fetal complications were premature delivery (8%), followed by intrauterine fetal death (6.7%), intrauterine growth restriction (4%), thrombocytopenia in the fetus (2.7%), and cyanotic congenital heart defect (1.3%).

The rate of complications was lower in women with BGT than in other etiologies.

**Table 3. Distribution of the study sample according to the complications**

Complication	Total 75	BGT 60	ITP 8	HELLP 3	DIC 2	APS 1	MM 1
Cyanotic congenital heart defect	1(1.3%)		1(12.5%)				
Antepartum hemorrhage	6(8%)	2(3.3%)	2(25%)		2(100%)		
Postpartum hemorrhage	3(4%)	2(3.3%)	1(12.5%)				
Maternal mortality	2(2.7%)			1(33.3%)	1(50%)		
Abortion	3(4%)		1(12.5%)	1(33.3%)		1(100%)	
Intra-uterine fetal death	5(6.7%)			2(66.7%)	2(100%)	1(100%)	
Premature delivery	6(8%)	3(5%)	1(12.5%)	1(33.3%)			1(100%)
Oligohydramnios	1(1.3%)	1(1.7%)					
Intrauterine growth restriction(IUGR)	3(4%)	1(1.7%)	1(12.5%)	1(33.3%)			
Termination of pregnancy	3(4%)		1(12.5%)	1(33.3%)		1(100%)	
Thrombocytopenia in fetus	2(2.7%)		2(12.5%)				

As shown below in figure (2), Receiver –operating characteristic curves yielded an AUC of 0.90[95% CI 0.82-0.98, p:0.001] for maternal platelet count in predicting outcomes. A cut off of platelet 80.000 predicted complications with a sensitivity and specificity of 90% and 87.3%, respectively.



**Fig. 2 Receiver operating curve of platelet count: AUC 0.90[0.82-0.98]**

Patients were divided according to the cut off value of platelet into two groups:  $\leq 80.000$  (25 cases:33.3%), and  $>80.000$  (50 cases:66.7%). As shown below in table (4), all the maternal and fetal complications except oligohydramnios were significantly more frequently in patients with platelet count  $\leq 80.000$ .

**Table 4. Distribution of the complications according to the platelet count**

Variable	$\leq 80.000$	$>80.000$	P -value
Cyanotic congenital heart defect	1(4%)	0(0%)	0.07
Antepartum hemorrhage	6(24%)	0(0%)	<0.001
Postpartum hemorrhage	3(12%)	0(0%)	0.01
Maternal mortality	2(8%)	0(0%)	0.04
Abortion	3(12%)	0(0%)	0.01
Intra-uterine fetal death	5(20%)	0(0%)	<0.001
Premature delivery	5(20%)	1(2%)	0.007
Oligohydramnios	0(0%)	1(2%)	0.4
Intrauterine growth restriction(IUGR)	3(12%)	0(0%)	0.01
Termination of pregnancy	3(12%)	0(0%)	0.01
Thrombocytopenia in fetus	2(8%)	0(0%)	0.04
Any complication	18(72%)	2(4%)	<0.001

As shown in table (5), pregnant women with the presence of complications were significantly older, with lower gestational age, and the level of platelet was lower.

**Table 5. Demographic characteristic of the study population according to the presence of complications**

Variable	Complication		P-value
	Present	Absent	
Age(years)	28.2±3.7	25.6±3.3	0.004
Gestational age (Weeks)	27.2±4.8	30±3.3	0.005
Platelet count (1000/mm3)	54.4±27.2	98±21.6	0.001

#### IV. DISCUSSION

The current study of 894 pregnant women shows that the prevalence of thrombocytopenia was 8.4%, and the cause was benign gestational thrombocytopenia in the majority of cases, followed by immune thrombocytopenia and pre-eclampsia. Other causes formed approximately 6%.

Antepartum hemorrhage and premature delivery were the most frequent complications. It is also demonstrated that platelet levels carry important prognostic information in pregnant women regarding their outcomes, in which the cutoff value of platelet 80.000 was a significant independent predictor for the progression of complications. Decreased levels of platelet correlated significantly with a higher rate of occurrence of complications in pregnant women.

There are many supposed etiologies that can explain the association between pregnancy and the development of thrombocytopenia. The results of the current study are consistent with the previous studies that found that platelet value played a predictive role in the progression of maternal and fetal complications.

Boehlen et al. (2000) showed that the prevalence of thrombocytopenia during pregnancy was 11.6%. Maternal and fetal complications were more frequent in women with Thrombocytopenia compared to those with a normal count of the platelet. The cutoff value of platelet 115.000 was a significant independent predictor for the progression of complications [11].

Wang et al. (2017) demonstrated that benign gestational thrombocytopenia was the most frequent cause of thrombocytopenia (60%), followed by immune thrombocytopenia (28.2%) and pre-eclampsia (11.8%). The rate of hemorrhagic complication was lower in women with benign gestational thrombocytopenia compared with other groups [12].

Khadra et al. (2020) found that the prevalence of thrombocytopenia in pregnancy was 7.2%. Benign gestational thrombocytopenia represented the most frequent cause (78.5%), followed by pre-eclampsia (7.4%), medications (7.23%), immune thrombocytopenia (1.9%), and Antiphospholipid syndrome (0.84%) [13].

In summary, we emphasize the importance of monitoring platelet count during pregnancy, especially in the presence of the prior history of thrombocytopenia during pregnancy, and taking protective measurements for mother and fetus.

#### V. CONCLUSION

Detection of low platelet count in pregnancy should initiate a clear diagnostic pathway to elucidate the etiology and develop the plan of the management.

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