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Prevalence of Thrombocytopenia Among Pregnant Women in Tripoli Region /Libya

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Abstract: Thrombocytopenia is the definition of a condition in which the number of platelets is less than 150,000 / ml, and this deficiency may be the result of a lack of platelet production in the bone marrow or an increase in their breakdown in the connective tissue. This condition is common in pregnant women, with a global prevalence of about 7%. This study aims to find out the prevalence of this condition among pregnant women in the Tripoli area. A cross-sectional study design was used to assess the prevalence of thrombocytopenia among pregnant women who have visited the obstetrical ward department of obstetrics and gynecology in Al jalaa Hospital, Tripoli from January to April 2021. 1700 pregnant women have been included in the study during their follow-up in Al jalaa hospital of gynecology and obstetrics at the time of the study. 2 milliliters of venous blood were collected under aseptic conditions and transferred into (EDTA) tubes. The complete blood cell counts were determined using a Sysmex analyzer. Sony computer CORE i7 was used, bivariable statistical analysis was carried on using Microsoft office excel to evaluate the effect of an independent variable over the dependent variable. Results shows that 18% of pregnant women were thrombocytopenic; this thrombocytopenia was increased with age, upon the classification and severity of thrombocytopenia 78.5% were mild, and 21.5% were moderate thrombocytopenic with no sever cases. *Conclusion:* It can be concluded that thrombocytopenia disorders in pregnancy are very common in the Tripoli region, the prevalence of thrombocytopenia increased with the increase in the gestational age to reach the maximum at the third trimester of gestation.

Keywords: Thrombocytopenia, Pregnant Women, Gynecology and Obstetrics Al Jalaa Hospital

1. Introduction

Platelets are small blood cells with several physiological purposes. Through their clotting activity and activation of the coagulation cascade, they are crucial to maintaining adequate blood volume in those with vascular injury. The initiation of this activity begins with tissue injury and results in the release and binding of several glycoproteins, growth factors, and clotting factors. The complexity of these processes allows for many pharmacologic targets, which provides several options when it comes to antithrombotic therapy [1].

The outer membrane of platelets is critical for its function in hemostasis. Several receptors expressed on its surface either constitutively or after activation allows for adhesion to endothelial surfaces as well as aggregation with other platelets. Inside the platelet, alpha granules and dense granules are present, which contain specific compounds that are critical for a variety of functions.[2, 3] Alpha granules are more numerous and contain compounds like P-selectin, GPIIb/IIIa, GPIb, von Willebrand factor (vWF), factors V, IX, and XIII, and others. Dense granules contain some of these compounds but are principally responsible for storing calcium, potassium, serotonin, and important nucleotides such as ATP and ADP [4].

Mature megakaryocytes form platelets. Megakaryocytes are large blood cells whose principal function is the production of platelets. When a megakaryocyte becomes mature, pseudomembrane blebs are extended and eventually break off of the membrane, forming platelets. Platelets, once formed, have an average lifespan of 7 to 10 days, at which point they are removed from the bloodstream [5].

Platelets maintain hemostasis by adhering to the vascular endothelium, aggregating with other platelets, and initiating the coagulation cascade, leading to the production of a fibrin mesh, which effectively prevents significant blood loss. Platelets are also crucial in inflammation, tissue growth, and the immune response. [6] These processes are under the mediation of the release of compounds from the alpha and dense granules, which include numerous growth factors as well as IgG and components of the complement system Platelets can become activated in response to exposed collagen, thrombin, ADP, or other compounds. In response to tissue injury, exposed collagen on the sub-endothelial surface can bind directly to either the platelet or to vWF. [7]

The vWF is a molecule that can bind to both collagen and the platelet, via the GPIb receptor on the platelet surface. As a result, vWF acts as a bridge, forming a complex of collagen, vWF, and platelet, which results in adhesion to the vascular surface. Also, exposed collagen can bind directly to the platelet by binding to the GPVI receptor. Binding to the GPIb and GPVI receptors causes activation of the platelet and beginning intracellular signaling cascades. These cascades result in the release of both alpha and dense granules, as well as activation of other enzymes, such as cyclooxygenase-1 (COX-1), which synthesizes thromboxane A2 (TXA). [8]

The release of alpha and dense granules is crucial for the recruitment of nearby platelets and further activation of the platelet. As a result of degranulation, ADP, TXA, serotonin, fibrinogen, and P-selectin are secreted into the plasma. ADP and TXA are especially important in the activation of platelets. Released ADP binds to P2Y and P2Y receptors on the platelet surface, further increasing signal transduction and activation in the platelet, while TXA binds to thromboxane prostanoid receptors, increasing activation of nearby platelets. Both of these are critical in the recruitment of other platelets to form a large platelet plug. Serotonin acts in a similar, but less potent, way on 5HT receptors [8, 9].

During activation, GPIIb/IIIa receptors are activated on the platelet's surface, entering a high-affinity state. GPIIb/IIIa receptors are responsible for binding to fibrinogen. Since two platelets may bind a molecule of fibrinogen, platelets begin cross-linking, forming a larger platelet plug. [10] Additionally, by activating the coagulation cascade with the release of clotting factors earlier during activation, the platelets cause an increased level of thrombin in the blood. Thrombin is a very potent platelet activator of platelets itself but also results in the cleavage of fibrinogen to fibrin. This conversion causes the formation of a stronger link between platelets, converting the soluble fibrinogen into an insoluble fibrin mesh [11, 12].

2. Materials and Methods

2.1. Subjects

This study was carried out from the beginning of January to the end of April 2021. 1700 pregnant women at different ages of gestation who were admitted to the gynecology and obstetrics department of Tripoli Al jalaa hospital were screened for the presence of thrombocytopenia.

2.2. Collection of Data

Women who visited the obstetrical ward department of obstetrics and gynecology in Al jalaa Hospital, Tripoli, Libya during the study period participated in the study. After obtaining written informed consent, Two milliliters of venous blood were collected under aseptic conditions and transferred in to ethylene diamine tetra acetic acid (EDTA) anticoagulant tubes by mixing for 5 minutes. The specimens were labeled with identification number of each study participant. The EDTA anticoagulant specimens were kept at room temperature until analysis was done for a maximum of 4 hours after specimen collection. The complete blood cell counts were determined using Sysmex analyzer (Sysmex Corporation, Bellport, NY, USA) which applies electric impedance principle (Sysmex user manual, 2002) following the manufacturer's instructions.

The reliability of the study findings was guaranteed by implementing quality control (QC) measures throughout the whole process of the laboratory work. All materials, equipment and procedures were adequately controlled. Appropriate volume of blood and anticoagulant was used to maintain the specimen's quality. Every day before the samples were investigated, control reagents with low, medium and high concentration were simultaneously investigated by the Sysmex machines to maintain the reagents quality.

2.3. Data Processing

Complete blood count (CBC) was the test used in this study to diagnose thrombocytopenia (platelets < 150x109/L). The data were entered, analyzed using the computer software (Microsoft office excel).

3. Results

3.1. The Incidence of Thrombocytopenia

312 thrombocytopenic pregnant women (18%) were observed in 1700 pregnant women admitted to Al jalaa hospital of gynecology and obstetrics at the time of study. (Figure 1)

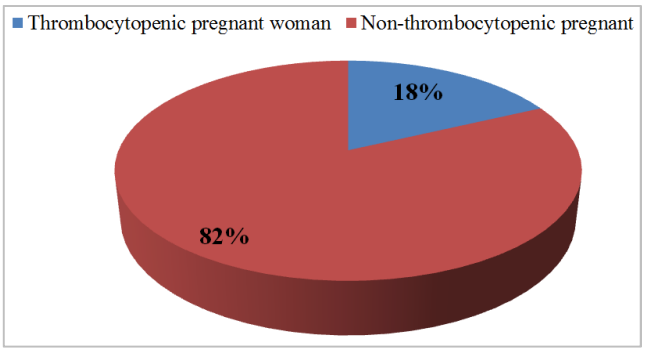

Figure 1. *Shows the results of total samples.*

3.2. The Relation Between Age and Incidence of Thrombocytopenia

Thrombocytopenia increased with increase of age where it raised from 23%(74 patients) in age groups 20-29 years old and then 31% (96 patients) in age group 30-39 Year old to reach maximum 46% (142 patients) in age group 40-49 years old. (Figure 2)

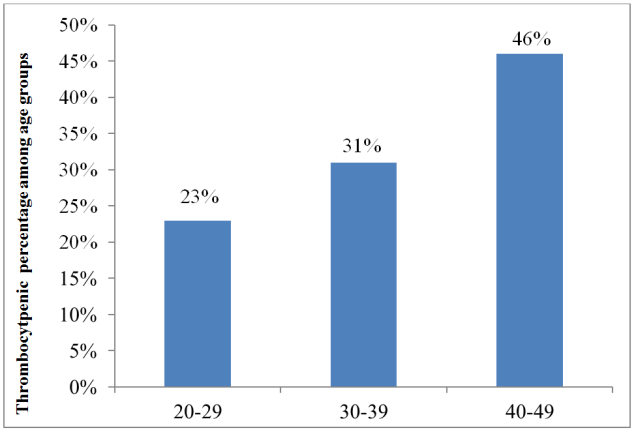

Figure 2. *The Relation between Age and Incidence of Thrombocytopenia.*

3.3. The Relation Between the Degrees of Thrombocytopenia and Age

(245 Patients) of patients had mild thrombocytopenia and (67 patients) of patients had moderate thrombocytopenia and no severe thrombocytopenia cases.

The incidence of mild thrombocytopenia was higher 42.4% in age group (40-49) Followed by 33.4% in age group (30-39). The incidence of moderate thrombocytopenia was higher 56.7% in age group (40-49) Followed by 22.5% in age group (20-29) (Table 1).

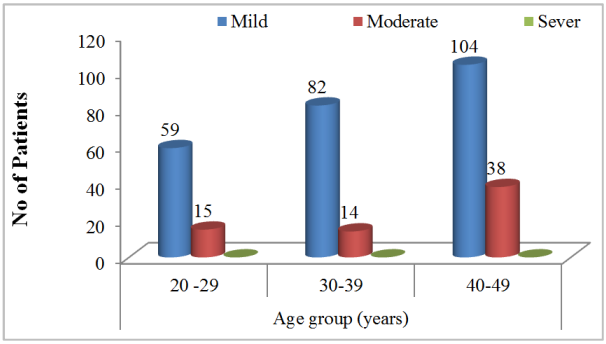

Figure 3. *The incidence of thrombocytopenia types.*

Table 1. *The incidence of thrombocytopenia types.*

Type of Thrombocytopenia	No of patients among age group (years)			
	20 -29	30-39	40-49	Total
Mild	59	82	104	245
Moderate	15	14	38	67

3.4. Stages of Pregnancy Associated Thrombocytopenia

The prevalence of thrombocytopenia increased with increase of the gestational age to reach maximum at the third trimester of gestation. (Table 1)

3.5. Relation Between Degree of Thrombocytopenia and Stages of Pregnancy

Table 2. *The relation between degree of thrombocytopenia and stages of pregnancy.*

Degree of thrombocytopenia	No of patients during gestational periods			
	First trimester	Second trimester	Third trimester	Total
Mild	8	25	212	245
Moderate	1	9	57	67
Sever	0	0	0	0
Total	9	34	269	312

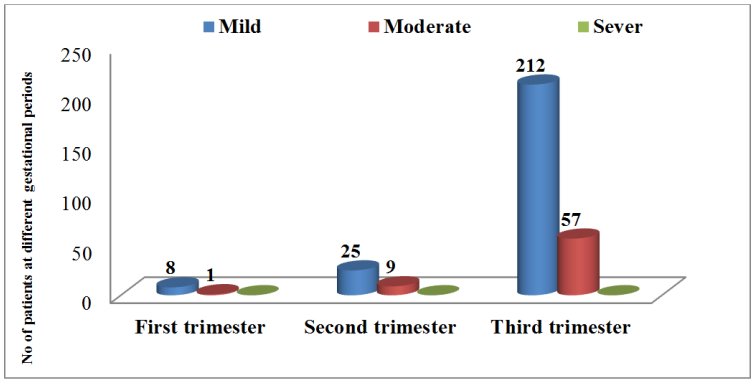

Figure 4. *The relation between degree of thrombocytopenia and stages of pregnancy.*

The prevalence of thrombocytopenia was 88.8% (8 patients) during first trimester with mild thrombocytopenia. 73.6% (25 patients) in second trimester with mild thrombocytopenia and 26.4% (9 patients) with moderate thrombocytopenia. 78.8% (212 patients) in third trimester with mild thrombocytopenia (Table 2).

3.6. The Incidence of Anemia in Thrombocytopenic Patients

This result indicates that 31% (96 patients) anemic pregnant women were observed in 312 thrombocytopenic pregnant women admitted to Al jalaa Hospital of gynecology and obstetrics at the time of study. (Figure 5)

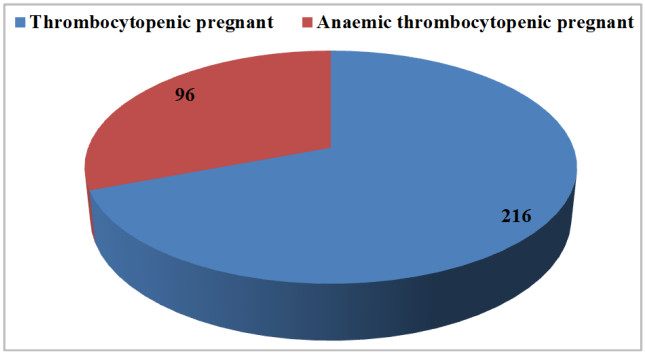

Figure 5. *Show the incidence of anemia in Thrombocytopenic patients.*

3.7. Degree of Anemia in Thrombocytopenic Patients

Data shows that 61.6% (59 Patients) of patients had mild anemia and 32.2% (31 patients) of patients had moderate anemia and 6.2% (6 patients) severe anemia cases (Table 3).

Table 3. *The degree of anemia incidence in thrombocytopenic patients.*

Degree of anemia	Number of patients	(%)
Mild	59	(61.6%)
Moderate	31	(32.2%)
Severe	6	(6.2%)
TOTAL	96	(100%)

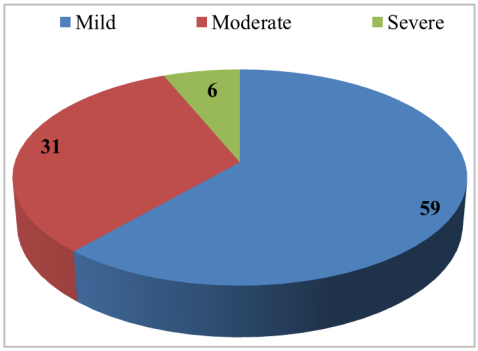

Figure 6. *The degrees of anemia in thrombocytopenic patients.*

3.8. Relation Between Degree of Anemia and Stages of Pregnancy in Thrombocytopenic Patients

The prevalence of anemia was 1.6% (1 patient) during first trimester with mild anemia, 3.2% (1 patient) with moderate anemia and 16.7% (1 patient) with severe anemia.

The prevalence of anemia was 28.8% (17 patients) during second trimester with mild anemia, 38.7% (12 patients) with moderate anemia and 66.6% (4 patients) with severe anemia. 69.6% (41 patients) in third trimester with mild anemia and 58.1% (18 patients) with moderate anemia, 16.7% (1 patient) with severe anemia (Table 4).

Table 4. *The relation between degree of anemia and stages of pregnancy in thrombocytopenic patients.*

Gestational trimester	Degree of Anemia		
	Mild	Moderate	severe
	Number of patients	Number of patients	Number of patients
First Trimester	1	1	1
Second Trimester	17	12	4
Third Trimester	41	18	1
Total Of Patients (%)	59	31	6

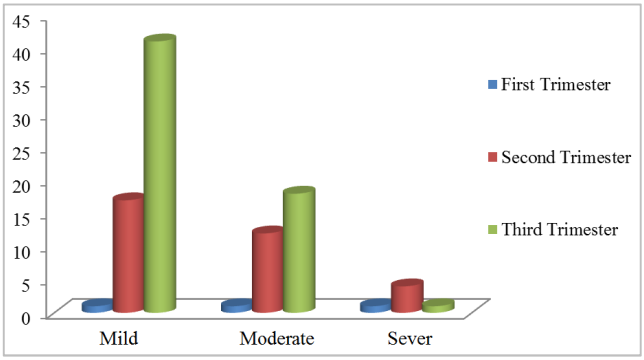

Figure 7. *The relation between degree of anemia and stages of pregnancy in thrombocytopenic patients.*

4. Discussion

There are many researches study the incidence [13-15] and cause of thrombocytopenia during pregnancy [16].

In the present study, the prevalence of thrombocytopenia disorder among pregnant women was 18% of pregnant women. This is in accordance with Olayemi and Akuffo, [17] who reported that the prevalence of thrombocytopenia in pregnant Ghanaian women was 15.3% compared with control. Verdy and Uzan, [18] found that 15% of pregnant women were thrombocytopenic in pregnant women.

Also, Boehlen et al. [13] Reported that the incidence of thrombocytopenia in pregnant women were 11.6% when they were studied the incidence of thrombocytopenia in pregnant women among 6770 pregnant women.

On the other hand, Mbanya et al. [15] found that the prevalence of thrombocytopenia was 8.9% in pregnant Cameroon women.

In Erbil City, Iraq, Shamoon et al., [19] reported that the prevalence of thrombocytopenia was 8% in pregnant women, with peak incidence during the third trimester.

Also, the overall incidence of thrombocytopenia in

pregnancy was 8%, but when patients with obstetric or medical conditions were excluded, the incidence dropped to 5.1% [20, 21].

In present study, Thrombocytopenia increased with increase of age, in similar studies, Mbanya et al., [15] recorded that thrombocytopenic pregnant women were aged from 15 to 40 years (mean: 25.35 ± 5.48), and Al-Kouatly et al., [16] found that the mean maternal age of thrombocytopenic pregnant women was 34.3 ± 5.4 years. Also, Parnas et al., [22] reported that pregnant women with thrombocytopenia were significantly older (30.7 ± 5.9 versus 28.7 ± 5.7; p = 0.001) compared with pregnant women without thrombocytopenia.

Lee [23] investigated the pregnancies of women with ITP and concluded that ITP tends to occur in younger women.

Likewise, Webert et al., [14] found that the median age of women with ITP at the time of delivery was 29 years.

In present study, the majority of cases are mild thrombocytopenia during pregnancy.

In Similar studies, Olayemi and Akuffo, [17] found that most cases of thrombocytopenia were mild (76%), only 4% of the women with thrombocytopenia had severe thrombocytopenia.

Memon, and Afsar, [24] recorded that 70% of thrombocytopenic patients had mild thrombocytopenia, and Mbanya et al., [15] found that 67% of women had mild, 30% moderate and 3% severe thrombocytopenia in Cameroon thrombocytopenic pregnant women which some physiological and benign occurs frequently in the third trimester.

This mild thrombocytopenia then called the "gestational" is ill elucidated: it is due to a dilution consistent with volume expansion plasma, increase of the platelets size, with signs of activation, and perhaps there is a consumption excessive and regeneration.

Overall, about 75% of cases of PLT changes are due to gestational thrombocytopenia, 15%–20% secondary to hypertensive disorders, 3%–4% due to an immune process, and the remaining 1%–2% comprises rare constitutional thrombocytopenias, infections, and malignancies [25].

Gestational thrombocytopenia does not have complications related to thrombocytopenia and babies do not have severe thrombocytopenia [26].

Mbanya et al., [15] found that the major factors associated with thrombocytopenia were anemia (29.8%), history of inter menstrual bleeding (25.7%), history of preeclampsia (23.3%), current hypertensive disorders (23.2%), malaria (22.3%), HIV infection (21.0%) and the absence of antimalaria prophylaxis (16.2%).

Shamoon et al., [19] reported that gestational thrombocytopenia was found to be the principal cause (73.8%); hypertensive disorders caused thrombocytopenia in 23% of cases and two cases (4%) were due to immune thrombocytopenic purpura.

The prevalence of moderate thrombocytopenia was increased with increase of the gestational age to reach maximum at the third trimester of gestation in the current study.

As in a previous report, moderate thrombocytopenia occurs generally in the third trimester of pregnancy, mainly due to hemodilution, but with little, if any relationship with the initial platelet counts [27].

The results indicated that 31% anemic pregnant women were observed in thrombocytopenic pregnant women.

This result run in agree with the result of Mbanya et al., [15] who reported that the major factor associated with thrombocytopenia was anemia (29.8%) among pregnant women in Cameroon.

5. Conclusion and Recommendations

It can be concluded that thrombocytopenia disorders in pregnancy are very common in Tripoli region.

The prevalence of thrombocytopenia increased with increase of the gestational age to reach maximum at the third trimester of gestation.

Women, with gestational thrombocytopenia should be having their complete blood test conducted during each pre-natal visit and monitored by the doctor.

Careful surveillance is required for these pregnancies in high-risk units for early detection and treatment of possible complications, in order to try to reduce maternal and neonatal morbidities.

Further prospective studies among these high risk populations with moderate to severe thrombocytopenia should investigate the efficacy of possible surveillance Programs.

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