

# Prevalence of Thrombocytopenia Among Pregnant Women in Tripoli Region, Libya

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**Abstract:** The aim of this study is to investigate the prevalence and the commonest degree of thrombocytopenia among pregnant women in Tripoli region, Libya. This is cross section study included pregnant women who were admitted to obstetrical ward department of obstetrics and gynecology in Al-gala Hospital, Tripoli, Libya. This study was carried out over a period of 5 month from February 2009 to June 2009 on 3520 pregnant women. 5 ml of venous blood specimens were take from each pregnant woman in K<sub>3</sub> EDTA (tubes for the haematological examinations. The analysis of haematological indices was done using automated hematological analyzer. The results showed that 17% of pregnant women were thrombocytopenic. Thrombocytopenia increased with increase of age pregnant women. 81% of patients had mild thrombocytopenia and 19% of patients had moderate thrombocytopenia were found in this study when compared with control group. The incidence of mild thrombocytopenia was 42.5% in age group (30 -39) Followed by 37.8% in age group (20-29). The prevalence of thrombocytopenia increased with increase of the gestational age to reach maximum at the third trimester of gestation. Association of onset of thrombocytopenia disorder with age distribution of patients in age group 20-29 years old were 2.7% during first trimester, 17.8% during second trimester and 79.5% during third trimester. In age group 30 – 39 years old were 3.2% during first trimester, 10.8% during second trimester and 86% during third trimester. In age group 40-49 years old were 46.7% during second trimester and 53.3 during third trimester. 37% of thrombocytopenic pregnant women were anaemic. Association of onset of anaemia disorder with age distribution of patients in age group 20-29 years old were 26.9% during second trimester and 73.1% during third trimester. In age group 30 – 39 years old were 14.3% during second trimester and 85.7% during third trimester. Data shows that 26% of patients had mild anaemia and 8.8% of patients had moderate anaemia and 1.8% severe anaemia cases were found in this study when compared with 62.9% non anaemic. It can be concluded that thrombocytopenia disorders in pregnancy are very common in Tripoli region. 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.

**Keywords:** Anaemia in Thrombocytopenic Patients, Pregnant Women, Trimesters of Pregnancy, Thrombocytopenia

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## 1. Introduction

Pregnancy is a state characterized by many physiological hematological changes, which may appear to be pathological in the non-pregnant state [1]. The hematologic system undergoes a series of adaptive changes in preparation for fetal hematopoiesis and wellbeing while also serving as a cushion against expected blood loss at delivery [2]. The platelets count is slightly lower in pregnant than in non pregnant women [3]. Most studies report an approximate

10% lower platelets level at term compared with at pre-pregnancy [4, 5]. Anemia is the most common hematological problem in pregnancy, followed by thrombocytopenia [6].

Thrombocytopenia is defined as a platelet count below  $150 \times 10^9/l$  [7], caused by accelerated platelet destruction or decreased production. It is a common finding during pregnancy [8] and occurs in approximately 7% of pregnant women [9, 10]. It is classified as mild with a platelet count of  $100-150 \times 10^9/l$ , moderate at  $50-100 \times 10^9/l$ , and severe with less than  $50 \times 10^9/l$  [11, 12]. The most common causes of thrombocytopenia in pregnancy are gestational or incidental

thrombocytopenia and thrombocytopenia associated with hypertensive disorders [13, 14]. Gestational thrombocytopenia is defined by a platelet count of no less than  $70 \times 10^9/L$ , especially during the third trimester [15], and the count returns to normal within 12 weeks of delivery [16]. Pathogenic mechanisms of thrombocytopenia include insufficient production, abnormal distribution, or excessive destruction of platelets. Excessive destruction can be caused by microangiopathy, hereditary platelet abnormalities, or immunologic mechanisms [17].

Few epidemiological studies on the prevalence of thrombocytopenia in pregnant women were done in a different part of Libya. Therefore, the aim of this study is to investigate the prevalence of thrombocytopenia at different trimesters of pregnancy in pregnant women who admitted to obstetrical ward department of obstetric and gynecology in Al-gala hospital, Tripoli, Libya.

## 2. Subjects and Methods

This is cross section study was included of pregnant women who were admitted to obstetrical ward department of obstetric and gynecology in Al-gala Hospital, Tripoli, Libya. This study was carried out over a period of 5 month from February 2009 to June 2009 on 3520 pregnant women. The study pregnant women were between the ages of 20 to 49 years. The patients were classified into 3 groups according to their age and gestational period. They were provided selected information about a current pregnancy and past medical history of thrombocytopenia, recurrent abortion, existence or non-existence of prenatal follow-ups, number of pregnancies, and number of deliveries. Pregnant women ages were recorded. Each woman underwent a thorough medical interview, clinical examination and complete blood count to diagnose thrombocytopenia (platelets  $< 150 \times 10^9/L$ ). A battery of tests were followed: HCV, HBV, and HIV screening, thick and thin blood films to identify blood parasites.

### 2.1. Blood Sampling

5ml Venous blood specimens were collected in  $K_3$  EDTA (ethylenediaminetetra-acetic acid) tubes (MEUS srl Piove Di SACCIO, Italy) from each pregnant woman for the haematological examinations.

### 2.2. Determination of Haematological Parameters

Blood platelets count (PT) was determined using an automated haematology analyzer sysmex (K- 4500) machine in Al-gala hospital of gynecology and obstetrics laboratory.

### 2.3. Statistical Analysis

Results were expressed as mean  $\pm$  SD, Data were analyzed by one way ANOVA (SPSS for windows, USA). The difference between means  $\pm$  SD were tested at  $P < 0.05$  using Duncan's multiple range test. In all statistical tests, the probability level of  $P < 0.05$  was considered significant.

## 3. Results

### 3.1. The Incidence of Thrombocytopenia

614 thrombocytopenic pregnant women (17%) were observed in 3,520 pregnant women admitted to Alglaa hospital of gynecology and obstetrics at the time of study (Table 1).

### 3.2. The Relation Between Age and Incidence of Thrombocytopenia

Thrombocytopenia increased with increase of age where it raised from 43% (264 patients) in age groups 20-29 years old to reach maximum 54.6% (335 patients) in age group 30-39 year and then declined in age group 40-49 years to 2.6% (Table 1).

### 3.3. Degree of Thrombocytopenia

81% (497 Patients) of patients had mild thrombocytopenia and 19% (117 patients) of patients had moderate thrombocytopenia and no severe thrombocytopenia cases were found in this study when compared with control group (Table 1).

### 3.4. The Relation Between the Degree of Thrombocytopenia and Age

The incidence of mild thrombocytopenia was higher 42.5% in age group (30-39) Followed by 37.8% in age group (20-29). However concerning moderate thrombocytopenia it followed the same trend as mild one being 12.1% in age group (30-39) and 5.2% in age group (20-29) (Table 1).

### 3.5. 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. Onset of thrombocytopenia were 2.9% (18 patients) during first trimester, 14.7% (90 patients) in second trimester and 82.4% (506 patients) in third trimester (Table 2).

Table 1. The degree of thrombocytopenia among different groups.

Type of Thrombocytopenia	Age group (years)	20 -29	30 - 39	40 - 49	Number of patients (%)
		Number of patients (%)	Number of patients (%)	Number of patients (%)	
Mild		232 (37.8)	261 (42.5)	4 (0.7)	497 (81)
Moderate		32 (5.2)	74 (12.1)	11 (1.7)	117 (19)
Total of patients (%)		264 (43)	335 (54.6)	15 (2.4)	614 (100)

### 3.6. Relation Between Degree of Thrombocytopenia and Stages of Pregnancy

The prevalence of thrombocytopenia were 2.9% (18 patients) during first trimester with mild thrombocytopenia. 9.5% (58 patients) in second trimester with mild

thrombocytopenia and 5.2% (32 patients) with moderate thrombocytopenia. 68.6% (421 patients) in third trimester with mild thrombocytopenia and 13.8% (85 patients) with moderate thrombocytopenia (Table 2).

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

Gestational trimesters	Categories of Thrombocytopenia		Number of patients (%)
	Mild	Moderate	
First trimester	18 (2.9)	0	18 (2.9)
Second trimester	58 (9.5)	32 (5.2)	90 (14.7)
Third trimester	421 (68.6)	85 (13.8)	506 (82.4)
Total of patients (%)	497 (81)	117 (19)	614 (100)

### 3.7. The Relation Between Age and Stages of Thrombocytopenia

Association of onset of thrombocytopenia disorder with age distribution of patients in age group 20-29 years old were 2.7% (7 patients) during first trimester, 17.8% (47 patients) during second trimester and 79.5% (210 patients) during

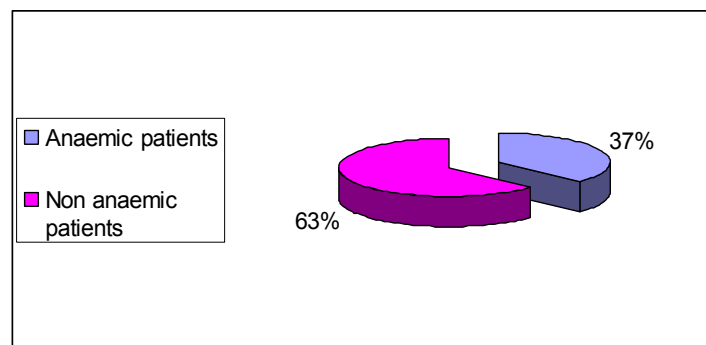
third trimester. In age group 30 – 39 years old were 3.2% (11 patients) during first trimester, 10.8% (36 patients) during second trimester and 86% (288 patients) during third trimester. In age group 40-49 years old were 46.7% (7 patients) during second trimester and 53.3% (8 patients) during third trimester (Table 3).

**Table 3.** The relation between age and stages of thrombocytopenia.

Gestational trimesters	Age group (years)	20 - 29	30 - 39	40 - 49	Number of patients (%)
		Number of patients (%)	Number of patients (%)	Number of patients (%)	
First trimester		7 (2.7)	11 (3.2)	0	18 (2.9)
Second trimester		47 (17.8)	36 (10.8)	7 (46.7)	90 (14.7)
Third trimester		210 (79.5)	288 (86)	8 (53.3)	506 (82.4)
Total of patients (%)		264 (43)	335 (54.6)	15 (2.4)	614 (100)

### 3.8. The Incidence of Anaemia in Thrombocytopenic Patients

This result indicates that 37% (228 patients) anaemic pregnant women were observed in 614 thrombocytopenic pregnant women admitted to Alglaa Hospital of gynecology and obstetrics at the time of study (Figure 1).



**Figure 1.** Show the incidence of anaemia in thrombocytopenic patients.

### 3.9. The Relation Between Age and Stages of Anaemia

Association of onset of anaemia disorder with age distribution of patients in age group 20-29 years old were 26.9% (29 patients) during second trimester and 73.1% (80 patients) during third trimester. In age group 30 – 39 years old were 14.3% (17 patients) during second trimester and 85.7% (102 patients) during third trimester (Table 4).

**Table 4.** The relation between age and stages of anaemia.

Gestational trimesters	Age group (years)	20 - 29	30 - 39	Number of patients (%)
		Number of patients (%)	Number of patients (%)	
Second trimester		29 (26.9)	17 (14.3)	46 (20.2)
Third trimester		80 (73.1)	102 (85.7)	182 (79.8)
Total of patients (%)		109 (47.8)	119 (52.2)	228 (100)

### 3.10. Degree of Anaemia in Thrombocytopenic Patients

Table 5. The degrees of anaemia in thrombopenic patients.

Degree of anaemia	Number of patients (%)
Mild	163 (26.5)
Moderate	54 (8.8)
Severe	11 (1.8)

Data shows that 26% (163 Patients) of patients had mild anaemia and 8.8% (54 patients) of patients had moderate anaemia and 1.8% (11 patients) severe anaemia cases were found in this study when compared with 62.9% (386 patients)

Table 6. The relation between degree of anaemia and stages of pregnancy in thrombocytopenic patients.

Categories of Thrombocytopenia	Mild	Moderate	Sever	Number of patients (%)
	Number of patients (%)	Number of patients (%)	Number of patients (%)	
Gestational trimesters				
Second trimester	20 (12.5)	21 (38.5)	11 (100)	52 (22.8)
Third trimester	143 (87.5)	33 (61.5)	0	176 (77.2)
Total of patients (%)	163 (71.5)	54 (23.7)	11 (4.8)	228 (100)

## 4. Discussion

Thrombocytopenia disorder is an abnormally low platelet count. The most common causes of thrombocytopenia were gestational thrombocytopenia [18-20], followed by thrombocytopenia associated with hypertensive disorders, ITP, and other diseases like aplastic anemia or acute leukemia. Because of the presence of maternal anti-platelet antibodies that can cross the placental barrier and enter the fetal circulation, recognition of ITP cases during pregnancy is important [21].

Pathogenic mechanisms include insufficient production, abnormal distribution, or excessive destruction of platelets [22, 23]. Excessive destruction can be caused by microangiopathy, hereditary platelet abnormalities, or immunologic mechanisms [17]. The decrease in platelet counts may be related to pregnancy-specific syndromes - such as preeclampsia, HELLP syndrome or acute fatty liver or to non-specific syndromes, like thrombotic microangiopathies, systemic lupus erythematosus, viral infections, primary and secondary bone marrow dysfunctions [19].

There are many researches study the incidence [7, 11, 24] and cause of thrombocytopenia during pregnancy [25]. In the present study, the prevalence of thrombocytopenia disorder among pregnant women were 17% of pregnant women. This in accordance with Olayemi and Akuffo, [26] who reported that the prevalence of thrombocytopenia in pregnant Ghanaian women was 15.3% compared with control. Verdy and Uzan, [27] found that 15% of pregnant women was thrombocytopenic in pregnant women. Also, Boehlen *et al.* [7] 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.* [24] found that the prevalence of thrombocytopenia was 8.9% in pregnant Cameroon women. In Erbil City, Iraq, Shamoon *et*

non anaemic (Table 5).

### 3.11. Relation Between Degree of Anaemia and Stages of Pregnancy in Thrombocytopenic Patients

The prevalence of anaemia were 12.5% (20 patients) during second trimester with mild anaemia, 38.5% (21 patients) with moderate anaemia and 100% (11 patients) with severe anaemia. 87.5% (143 patients) in third trimester with mild anaemia and 61.5% (33 patients) with moderate anaemia (Table 6).

*al.*, [28] 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% [29, 30].

The study thrombocytopenic pregnant women were between the ages of 20 to 49 years. Thrombocytopenia were increased with increase of age where it raised from 42.8% in age groups 20-29 years old and reach maximum 54.6% in age group 30-39 year and then declined in age group 40-49 years to 2.6%. In similar studies, Mbanya *et al.*, [24] recorded that thrombocytopenic pregnant women were aged from 15 to 40 years (mean:  $25.35 \pm 5.48$ ), and Al-Kouatly *et al.*, [25] found that the mean maternal age of thrombocytopenic pregnant women was  $34.3 \pm 5.4$  years. Also, Parnas *et al.*, [18] reported that pregnant women with thrombocytopenia were significantly older ( $30.7 \pm 5.9$  versus  $28.7 \pm 5.7$ ;  $p = 0.001$ ) compared with pregnant women without thrombocytopenia. Lee [31] investigated the pregnancies of women with ITP and concluded that ITP tends to occur in younger women. Likewise, Webert *et al.*, [11] 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. 81% of women with platelet counts  $129.4 \times 10^9/l$  had incidental thrombocytopenia, compared with only 19% of women with platelet counts  $88.4 \times 10^9/l$ . In Similar studies, Olayemi and Akuffo, [26] found that most cases of thrombocytopenia were mild (76%), only 4% of the women with thrombocytopenia had severe thrombocytopenia. Memon, and Afsar, [32] recorded that 70% of thrombocytopenic patients had mild thrombocytopenia, and Mbanya *et al.*, [24] 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 [33]. Gestational thrombocytopenia does not have complications related to thrombocytopenia and babies do not have severe thrombocytopenia [34]. Mbanya *et al.*, [24] found that the major factors associated with thrombocytopenia were anaemia (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%). Thrombocytopenia was not significantly associated with third-trimester bleeding or with a history of postpartum haemorrhage. Shamon *et al.*, [28] 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.

Association of onset of thrombocytopenia disorder with age distribution of patients in age group 20-29 years old were 1.1% during first trimester, 7.5% during second trimester and 34% during third trimester. In age group 30-39 years old were 1.8% during first trimester, 5.9% during second trimester and 47.1% during third trimester. In age group 40-49 years old were 1.3% during second trimester and 1.3% during third trimester. This results are in a gree with that reported by McCrae, *et al.*, [35].

The prevalence of moderate thrombocytopenia was increased with increase of the gestational age to reach maximum (13.8%) 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 count [19].

The results indicated that 37% anaemic pregnant women were observed in thrombocytopenic pregnant women. this result run in agree with the result of Mbanya *et al.*, [24] who reported that the major factor associated with thrombocytopenia was anaemia (29.8%) among pregnant women in Cameroon.

## 5. Conclusion

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

## References

- [1] Chandra S., Tripathi K., Mishra S., Amzarul M., and Vaish A. (2012). Physiological changes in hematological parameters during pregnancy. *Indian J. Hematol. Blood Transfus.*, 28 (3): 144–146.
- [2] Akinlaja O. (2016). Hematological changes in pregnancy - the preparation for intrapartum blood loss. *Obstet. Gynecol. Int. J.*, 4 (3): 00109.
- [3] Abbassi-Ghanavati M., Greer L. G., and Cunningham F. G. (2006). Pregnancy and laboratory studies: a reference table for clinicians. *Obstet. Gynecol.*, 114 (6): 1326–1331.
- [4] Boehlen F., Hohlfeld P., Extermann P., Perneger T. V., and de Moerloose P. (2000). Platelet count at term pregnancy: A reappraisal of the threshold. *Obstet. Gynecol.*, 95 (1): 29–33.
- [5] Jensen J. D., Wiedmeier S. E., Henry E., Silver R. M., and Christensen R. D. (2011). Linking maternal platelet counts with neonatal platelet counts and outcomes using the data repositories of a multihospital health care system. *Am. J. Perinatol.*, 28 (8): 597–604.
- [6] Stevens G., Finucane M., De-Regil L., Paciorek C., Flaxman S., Branca F. *et al.* (2013). Nutrition impact model study group (Anaemia). Global, regional, and national trends in haemoglobin concentration and prevalence of total and severe anaemia in children and pregnant and non-pregnant women for 1995–2011: A systematic analysis of population-representative data. *Lancet Glob Health.*, 1: 16–25.
- [7] Boehlen, F., Hohlfeld, P., Extermann, P., and de Moerloose, P. (1999). Maternal antiplatelet antibodies in predicting risk of neonatal thrombocytopenia. *Obstet. Gynecol.*, 93 (2): 169–173.
- [8] Cook, R. L., Miller, R. C., Katz, V. L., and Cefalo, R. C. (1991). Immune thrombocytopenic purpura in pregnancy: A reappraisal of management. *Obstet. Gynecol.*, 78: 578 – 583.
- [9] Sainio, S., Kekomaki, R., Riikonen, S., and Teramo, K. (2000). Maternal thrombocytopenia: a population based study. *Acta. Obstet. Gynecol. Scand.*, 79: 744–749.
- [10] McCrae KR. (2003). Thrombocytopenia in pregnancy: differential diagnosis, pathogenesis and management. *Blood Rev.*, 17: 7-14.
- [11] Webert, K. E., Mittal, R., Sigouin, C., Heddle, N. M., and Kelton, J. G. (2003). A retrospective 11-year analysis of obstetric patients with idiopathic thrombocytopenic purpura. *Blood*, 102 (13): 4306 - 4311.
- [12] Kam, P. C., Thompson, S. A., and Liew, A. C. (2004). Review article, thrombocytopenia in the parturient. *Anaesth.*, 59: 255–264.
- [13] Kwon, J. Y., Shin, J. C., Lee, J. W., Lee, J. K., Kim, S. P., and Rha, J. G. (2007). Predictors of idiopathic thrombocytopenic purpura in pregnant women presenting with thrombocytopenia. *Inter. J. Gynecol. Obstet.*, 96 (2): 85 – 88.
- [14] McCrae, K. R. (2007). Thrombocytopenia in pregnancy. *Platel.*, 2<sup>nd</sup>. Ed., pp. 925-942.

- [15] Cunningham, F. G., Gant, N. F., Leveno, K. J., Gilstrap, L. C., Hauth, J. C., and Wenstrom, K. D. (2001). Williams obstetrics, 1<sup>st</sup> ed. McGraw-Hill, Hematological disorders (Chapter 49), pp. 1307–1338.
- [16] Shehata, N., Burrows, R. F., and Kelton, J. G. (1999). Gestational thrombocytopenia. Clin. Obstet. Gynecol., 42: 327- 734.
- [17] Wise, R. P., Bonhoeffer, J., Beeler, J., Donato, H., Downie, P., Matthews, D., Pool V., Riise-Bergsaker, M., Tapiainen, T., and Varricchio, F. (2007). Thrombocytopenia: Case definition and guidelines for collection, analysis, and presentation of immunization safety data. Vaccine, 25: 5717–5724
- [18] Parnas, M., Sheiner, E., Burstein, E., Shoham-Vardi, I., Yermiahu, T., Levi, I., Holcberg, G., and Yerushalmi, R. (2006). Moderate to severe thrombocytopenia during pregnancy. Europ. J. Obstet. Gynecol. Reprod. Biol., 128: 163-168.
- [19] D'Angelo, A. (2007). 4A. 1 Thrombocytopenia in pregnancy. Thrombosis Res., 119 (1): S37-S38.
- [20] Lefkou, E., Hunt, B. J. (2008). Bleeding disorders in pregnancy. Obstet. Gynaecol. Reprod. Med., 18 (8): 217-223.
- [21] Burrows, R. F., Kelton, J. G. (1993). Fetal thrombocytopenia and its relation to maternal thrombocytopenia. N. Engl. J. Med., 329: 1463-1466.
- [22] Bussel, J., and Cines, D. (2000). Immune thrombocytopenic purpura, neonatal alloimmune thrombocytopenia and post-transfusion purpura. In: Hoffman, R., editor. Hematology basic principles and practice. Philadelphia, Pennsylvania: Churchill Livingstone. pp. 2096-2097.
- [23] Montgomery, R. R., and Scott, J. P. (2004). Platelet an blood vessel disorders. In: Behrman, R. E., Kliegman, R. M., and Jenson, H. B., editors. Nelson text book of pediatrics, 17<sup>th</sup> international edition. Philadelphia: Saunders. pp. 1670–1674.
- [24] Mbanya, D., Claude, T. T., Takoeta, E., Mbu, R., and Kaptue, L. (2007). Factors associated with thrombocytopenia among pregnant women in Cameroon. Santé Montrouge France, 17 (4): 213 - 217.
- [25] Al-Kouatly, H. B., Chasen, S. T., Kalish, R. B., and Chervenak, F. A. (2003). Causes of thrombocytopenia in triplet gestations. Amer. J. Obstet. Gynecol., 189 (1): 177-180.
- [26] Olayemi E., and Akuffo F. W. (2012). Gestational thrombocytopenia among pregnant Ghanaian women. Pan African Med. J., 12: 34.
- [27] Verdy, E., and Uzan, S. (1993). Groupe de travail sur les thrombopé'nies maternelles et foetales. Plaquettes en cours de grossesse. Etiologie et moyens du diagnostic d'une thrombopé'nie maternelle. In: le're Journée parisienne obste'rico-pe'diatrique. Paris: Doin, 49 - 53.
- [28] Shamooun R. P., Muhammed N. S., and Jaff M. S. (2009). Prevalence and etiological classification of thrombocytopenia among a group of pregnant women in Erbil City, Iraq. Turk J. Hematol., 26: 123-128.
- [29] Sullivan C. A., Martin J. N. Jr. (1995). Management of the obstetric patient with thrombocytopenia. Clin. Obstet. Gynecol., 38 (3): 521–534.
- [30] Akinbami A. A., Ajibola S. O., Rabiou K. A., Adewunmi A. A., Dosunmu A. O., Adediran A., Osunkalu V. O., Osikomaiya B. I., and Ismail K. A. (2013). Hematological profile of normal pregnant women in Lagos, Nigeria. Inter. J. Women Health, 5: 227- 232.
- [31] Lee, L. H. (2002). Idiopathic thrombocytopenia in pregnancy. Ann. Acad. Med. Singapore, 3: 335 – 339.
- [32] Memon AR, Afsar S. (2006). Thrombocytopenia in hospitalized malaria patients. Pak J Med Sci., 22: 141-143.
- [33] Burrows, R. F., and Kelton, J. G. (1990). Thrombocytopenia at delivery. A prospective survey of 6715 deliveries. Am. J. Obstet. Gynecol., 162: 731–734.
- [34] Ramsay M. (2010). Normal hematological changes during pregnancy and the puerperium. In: Pavord S, Hunt B (eds) The obstetric hematology manual. Cambridge University Press, Cambridge, pp: 1–11
- [35] McCrae, K. R., Samuels, P., and Schreiber, A. D. (1992). Pregnancy associated thrombocytopenia: Pathogenesis and management. Blood., 80: 2697- 2714.