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Study the effect of pregnant on some Hematological parameters for some paints at Libyan hospitals

[1]AMAL MOHAMMED EL-MAHDI ESSA , [2]HAMAD.M.ADRESS.HASAN And [2] SALEM.A.MAHMOUD
hamad.dr@omu.edu.ly & drhamadmhasan85@yahoo.com

ABSTRACT
According to many studies which concluded that the effect of pregnancy is one of the main sources of many diseases affect the mother and child during pregnancy and after childbirth, and their direct impact on the health of the mother and fetus during pregnancy may lead in many cases to miscarriage due to the effect of the essential elements present in the blood of the pregnant woman. This study was designed to estimate the hematological parameters as ***CBC :*** *RBC , WBC , HGB , HCT , PLT addition to Calcium , Fasting Blood Glucose and Vitamin D in some blood samples of Pregnant women and non- pregnant women collected from EL-Beida city during 2022-2023. This study was carried out on (Total Samples Number of 80),forty blood samples of pregnant women and forty blood samples of non- pregnant samples as control. Some of statistical calculations as Mean , SD , Coefvar, Minimum , Maximum , correlations and p- value. were used. The obtained results can summarized as following : CBC for pregnant women samples were ranged as following* ***:*** *RBC : (3 - 4.83* ***10^6/µL****) , WBC : (3.8 - 13.6* ***10^3/µL****) , HGB* ***:*** *(4.8-13.6* ***g/dL****) , HCT : (22.6 - 41.2%) , and PLT : contents were ranged between (111 – 299* ***10^3/µl****) . On the other hand the parameters in the blood of non-pregnant women blood samples ,:RBC : (3.92 - 5.36) ,WBC : (4.5 - 10.9) , HGB : (10.5 - 15.1) , HCT : (33.3 - 44.3) and PLT : (188 - 394) . Generally the results of study recorded wide variance of the hematology parameters of the selected samples between the pregnant and non- pregnant blood samples. The statistical analysis showed positive correlations between the hematology and their date indicated the effect of the pregnant on these values, also positive correlations were obtained between vitamin D and Calcium in most samples which mainly attributed to the relationship between them and efficiency the pregnant on their values.*

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I. Introduction

Hematological parameters are among the most commonly requested laboratory tests that assist health care professionals to make a suitable evidence-based diagnoses and therapeutic judgments for their patients. These tests are valuable in diagnosing anemia, certain cancers, infection, acute hemorrhagic states, allergies, and immunodeficiency. Moreover, the tests are also important for monitoring of side effects of certain drugs, response to treatment, and determining the effects of chemotherapy and radiation therapy on blood cell production and recruitment of eligible participants for clinical trials including vaccines **(Fiseha *et al* ., 2022).**

Anemia is defined as decreased hemoglobin or red cells mass and is the most common hematological disorder seen in pregnancy. Anemia during pregnancy can lead to morbidity and mortality in mother as well as fetus. Fetuses are at risk of preterm deliveries, low birth weights, morbidity and perinatal mortality due to the impairment of oxygen delivery to placenta and fetus. Throughout normal pregnancy, blood volume expands by an average of 50% compared with the no pregnant state. This rapid expansion of blood volume starts in the first trimester , Plasma volume increases more than does red cell mass, which produces hemodilution and a declining hemoglobin concentration during the first half of pregnancy. This is known as the physiologic anemia of pregnancy, Microcytic hypochromic Anemia resulting from iron deficiency is the most frequent form of Anemia followed by foliate deficiency and combined iron and foliate deficiency **(Sharma *et a l*., 2020)**

One of the most significant hematological changes for pregnant woman is physiologic anemia due to independent and uneven variations of plasmatic volume (+ 40%) and corpuscular volume (+15%) ,The phenomenon of hemodilution further contributes to a reduction in the rate of hematocrit (HCT) and hemoglobin (HGB), resulting in a false anemia. For pregnant woman, Also in white blood cells (WBC) pregnancy is associated with leukocytosis, primarily related to increased circulation of neutrophils. The neutrophil count begins to increase in the second month of pregnancy and plateaus in the second or third trimester, at which time the total white blood cell counts range from 9,000 to 15,000 cells/microliter, Platelet counts are slightly lower during pregnancy due to accelerated destruction leading to younger, larger platelets. **(Bakrim *et al*.,2018).**

The hemoglobin concentration, hematocrit and red cell count fall during pregnancy because the expansion of the plasma volume is greater than that of the red cell mass The expansion in red cell mass is proportionally smaller than that in plasma volume during the first trimester, leading to a 10% decrease in hematocrit. During the second trimester, the gap between the rates of plasma volume and red cell mass expansion becomes greater producing a further reduction in hematocrit, The hematocrit changes little over the third trimester; the hemoglobin concentration also falls because of this haemodilution. Plasma volume expansion and lowered hemoglobin concentration are physiologic response to pregnancy According to the World Health Organization (WHO), anemia in pregnancy is a state in which the total circulating hemoglobin concentration is less than 11g/dl or packed cell volume (PCV) less than 0.33L/L **(Eldo *et al* ., 2020).** The main aim of this study can be summarizing in the following points: To know the prevalence of Anemia in pregnancy. To assess different hematological parameters for anemia in pregnant and non-pregnant women. To classify the morphologic types of anemia in pregnant females in order to differentiate physiological from pathological anemia of pregnancy based on these hematological parameters.

II. Experimental Part:

Sampling :

The study was conducted from January 2022 to January 2023 at El-beida city **(Libya)** , A total of eighty blood samples from female were enrolled in this study with different ages between 18-42 years. Forty samples of pregnant women, and forty samples for non- pregnant women . Blood samples with drawn from veins into blood tubes. Complete Blood Count (CBC) was measured before and then the serum was separated from the cells by centrifugation at 3000 rpm for few minutes. The enrolled subjects did not have any serious health problem .The clinical data, medical history and other relevant information were collected from subjects by personal interview.

Preparation and Validation of sample analysis:

Standardization, calibration of the instrument, and processing of the samples were done according to the manufacturer's instructions. The machine automatically dilutes whole-blood sample of 50 ml in the CBC/Differential mode.

Blood sampling: In our study, we followed the standard protocol of taking and the preparation of blood samples to minimize the interpersonal variability. For every pregnant woman, the blood samples were withdrawn from the antecubital vein, in system BD Vacutainer® tubes (13×75 mm) of 5ml containing an anticoagulant the K3-EDTA. The CBC test was performed the same day within 2 hours of collection.

Excluded samples from the study:

Those with multiple pregnancies, those whose pregnancy started as multiple and then continued as a singleton, conceiving with in vitro fertilization, diagnosed as aborts incipient. a history of recurrent pregnancy loss or cervical insufficiency. The samples which have history of cervical leep or ionization procedures, congenital uterine anomalies or uterine pathologies that disrupt the shape of the endometrial cavity, such as fibroids or polyps. The samples of Diagnosed thrombophilia or using oral or parenteral anticoagulants and those who become pregnant while using an intrauterine device as a birth control method. The samples have patients who smoke or consume alcohol, with diabetes mellitus, adrenal gland, thyroid and parathyroid gland or liver disease, kidney dysfunction. oncological, infectious or hematological disease, rheumatologic or autoimmune disease, hyperlipidemia, atherosclerotic coronary artery disease and patients who received blood transfusion.The samples of intravenous iron replacement, or steroid use for any reason within the past year were also excluded from the stud and We excluded all the situations which could affect the CBC parameters. It is necessary to note, nevertheless, that our conditions of study did not exclude patients presenting an iron deficiency and\or affected by thalassemia/hemoglobin diseases. The samples of women diagnosed with diabetes prior to their pregnancy (type 1 or 2 diabetes mellitus.

Complete blood count (CBC) analysis:

By Using Purple Tube which contains EDTA and the tube is filled with one ml of EDTA for every 2 ml of blood or 2 ml of EDTA for every 5 ml of blood and is used in CBC analyzes. This tube often contains sodium EDTA. This tube is mixed completely after blood collection, but it is mixed gently and quietly until it is Distribute the anticoagulant completely to the components of the tube from the blood.

Complete blood count was measured by (Nihon Kohden) and mix sample by(Roll Mixer).Complete blood count provided white blood cells count (WBC), red cells count (RBC), platelets count (PCT), measurement of hematocrit (HCT), Hemoglobin (Hb),vitamin D by(Cobas e 411) , calcium and fasting blood glucose by (GBA 1000 and Semar-S 1000).

III. Results and Discussion

The Hematological Parameters Results:

The results of the hematology parameters which recorded in this study are given in Table (1) for (pregnant samples), the obtained data showed that the contents of some CBC values in the pregnant samples blood samples were ranged as following **:** RBC : (3-4.83) , WBC : (3.8-13.6) , HGB **:** (4.8-13.6) , HCT(22.6-41.2) ,and PLT (111-299). On the other hand the parameters in the blood of non -pregnant samples blood samples are given in Table (2) ,were ranged as following: RBC : (3.92-5.36) , WBC : (4.5-10.9) , HGB : (10.5-15.1) , HCT : (33.3-44.3) and PLT : (188-394), respectively .

The increases of some blood parameters appear of non -pregnant samples are to be the as result of both increasing of erythropoiesis, which is secondary to the hypoxic stimulus, and the decreased in plasma volume that occurs at high altitude. The variations, diet, ethnic background, method and instrument used for analysis play role in the variations . The results also recorded that the lower RBC account, HCT ,HGB,PLT in pregnant than non-pregnant samples comparing with normal pregnancy, also there is an increase in erythropoietic activity but at the same time an increase in plasma volume of 40% to 50% over the non-pregnant state. This increase in plasma volume is more as compared to red cell mass leading to ‘‘hemodilution” which creates a sort of artificial anemia called the “physiological anemia of pregnancy”.**(Fiseha *et al* ., 2022).**

It was reported that the anemia is globally prevalent and the most common type of Anemia of pregnancy. Also 63% of subjects with Anemia had microcytic hypochromic anemia indicative of iron deficiency anemia. and 21.2% subjects with early stages of iron deficiency. In the present study microcytic hypochromic and normocytic hypochromic picture together constituted more than half of the morphologic types of Anemia indicating iron deficiency being the cause in half of pregnant study group. These findings indicate that the Iron deficiency Anemia is the leading cause of anemia but there were other causes as well such as physiologic Anemia of pregnancy (normocytic normochromic) and macrocytic Anemia.

(Sharma et al ., 2020). Obeagu *et al* ., 2021) determined and compared one hundred (100) pregnant women and one hundred (100) non-pregnant women samples. The results of study recorded wide variations in CBC results.

(Patel &Balanchivadze ., 2021) stated that Hematologic changes in pregnancy are common and can potentially lead to maternal and fetal morbidity. Various hematologic manifestations seen in pregnant women. Iron deficiency anemia (IDA) is the most common cause of anemia in pregnancy. Physiologically, the state of pregnancy results in increased iron demand. Iron deficiency is important to diagnose and treat early for better maternal and fetal outcomes. An algorithmic approach is used for the repletion of iron storage, starting with oral elemental iron daily and escalating to intravenous iron if necessary. Foliate and coalmine are necessary elements for deoxyribonucleic acid (DNA) synthesis, fetal growth, and maternal tissue development, and deficiency in these elements can be a cause for anemia in pregnancy. cause major complications in pregnancy include Von Will brand Disease (VWD) .

(Ahenkorah *et al* ,. 2018) Found Anemia in pregnancy may not only be associated with maternal morbidity and mortality but can also be detrimental to the fetus. A definitive diagnosis of anemia is a pre-requisite to unraveling possible cause(s), to allow appropriate treatment intervention. It is hypothesized that measured hemoglobin (HGB), complemented by biochemical and other hematological parameters would enhance anemia diagnosis.

Figures (1-10) showed the contents of blood parameters in the studied samples. The statically analysis showed positive correlation of the most parameters of blood samples for both pregnant and non- pregnant samples ,The contents of hematological blood samples and their distributions between the pregnant blood samples were .The results of statically analysis showed positive correlation between the hematological parameters of both pregnant and non-pregnant blood samples , The results of correlation analysis showed positive correlation between the hematology parameters indicating the effect of their values together. The distinctive statistical analysis showed wide variations between the hematology parameters of both pregnant and no pregnant samples.

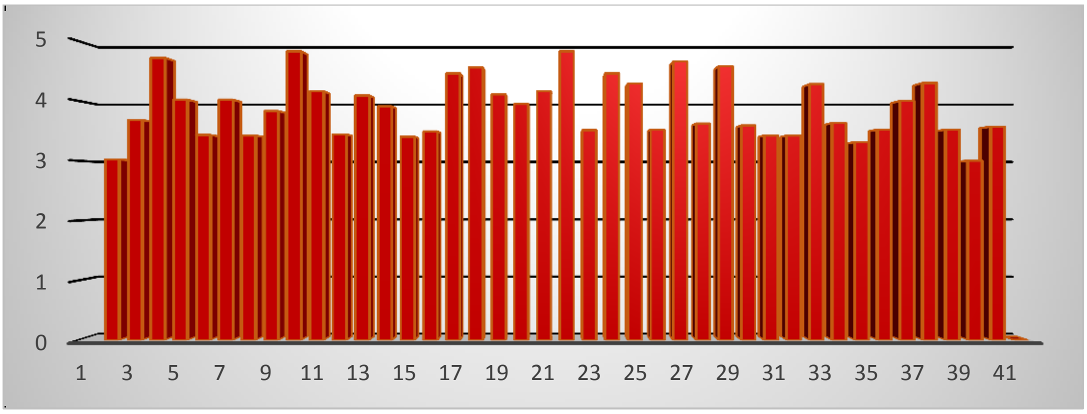

Figure (1): The contents of RBC of pregnant samples.

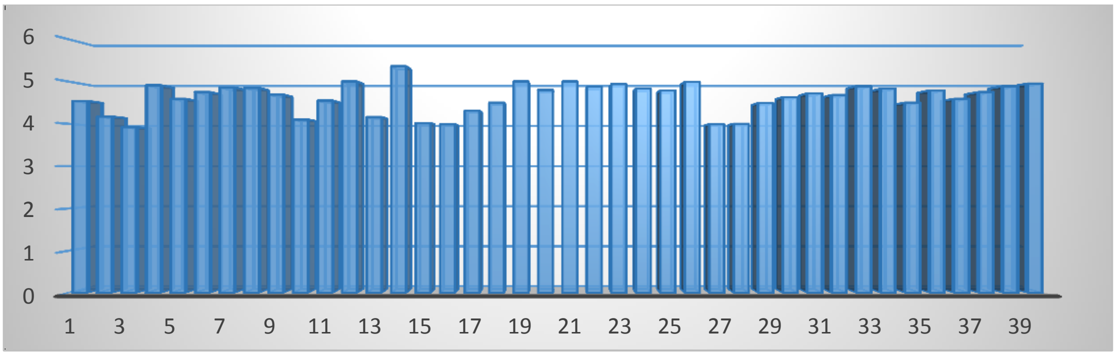

Figure (2) : The contents of RBC of non - pregnant samples.

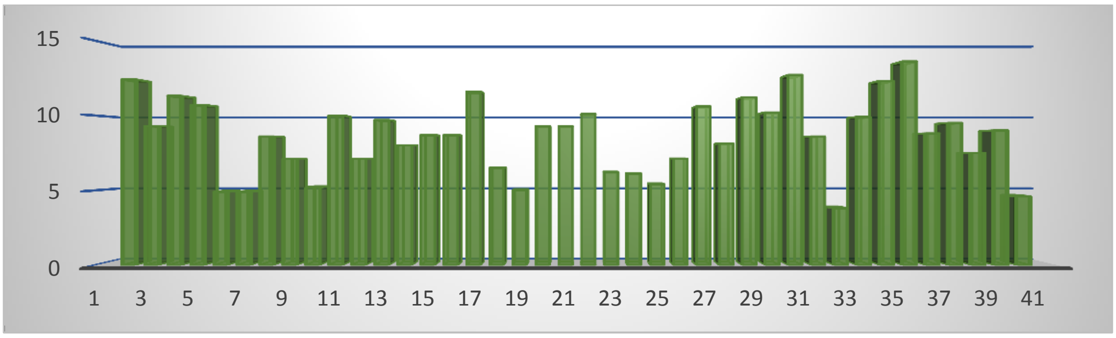

Figure (3) : The contents of WBC of pregnant samples.

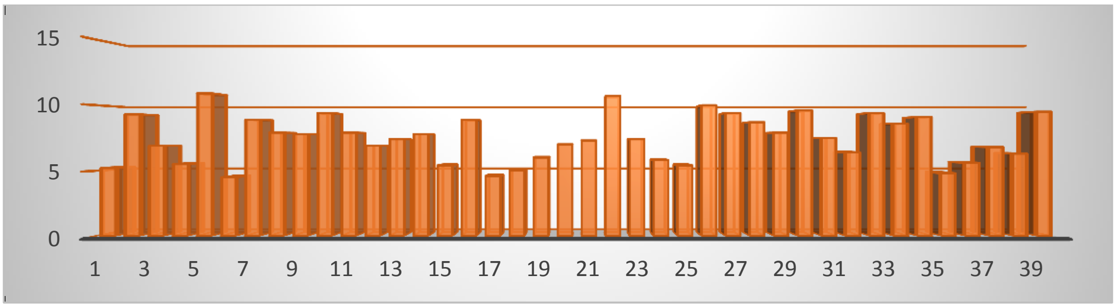

Figure (4) : The contents of WBC of non - pregnant samples.

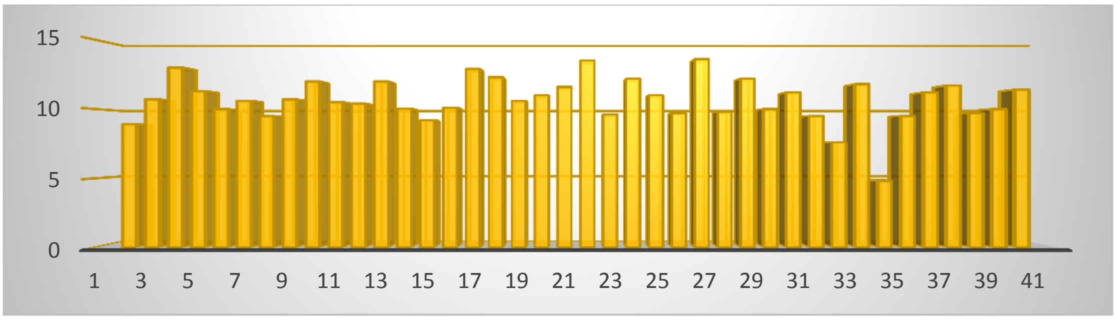

Figure (5) : The contents of HGB of pregnant samples.

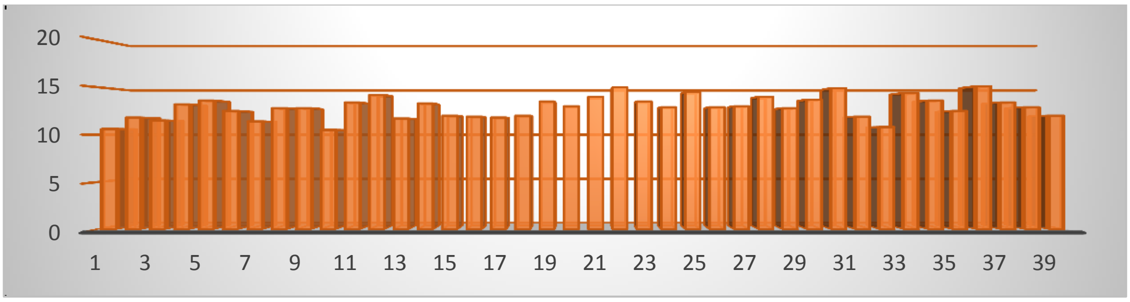

Figure (6) : The contents of HGB of non - pregnant samples.

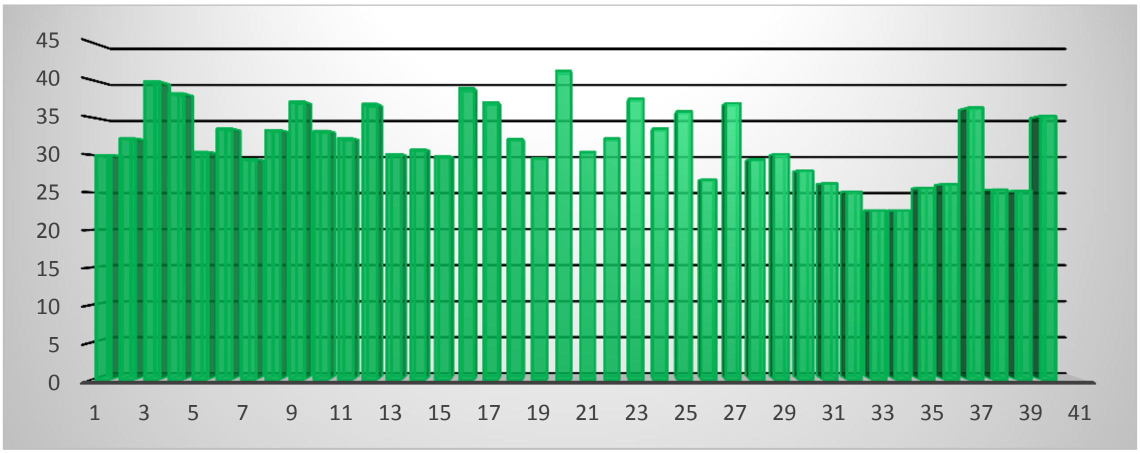

Figure (7) : The contents of HCT of pregnant samples.

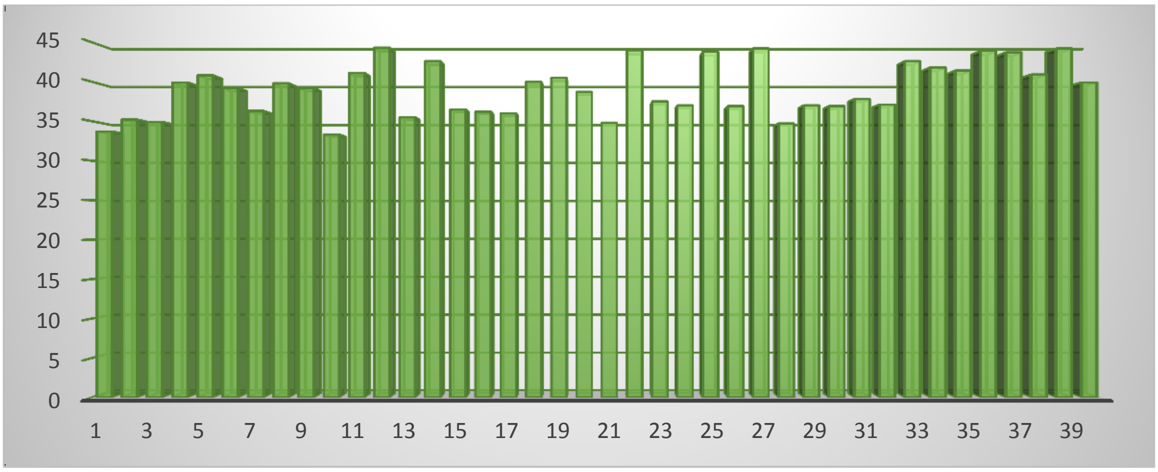

Figure (8) : The contents of HCT of non - pregnant samples.

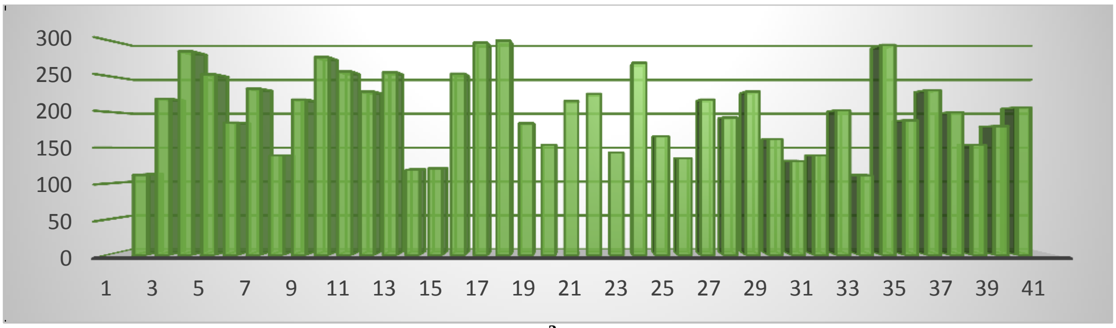

Figure (9) : The PLT 10^3 / L for pregnant samples

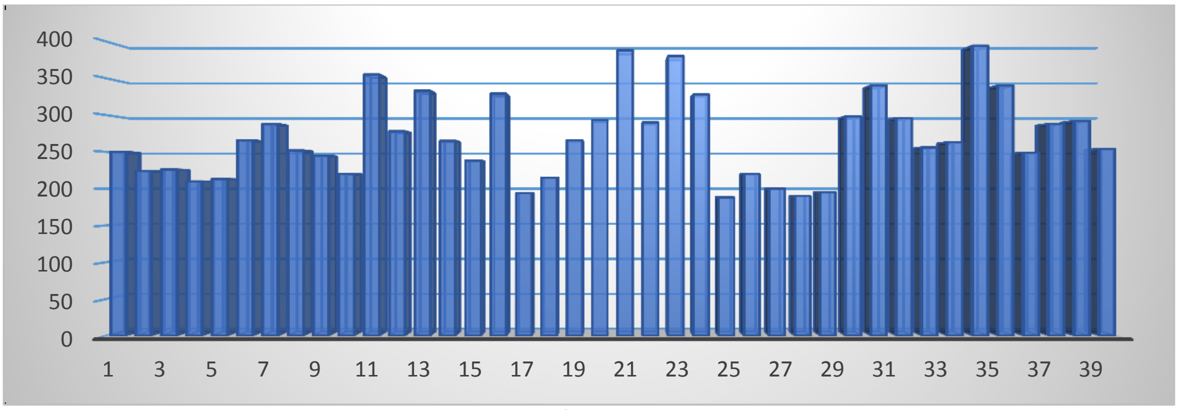

Figure (10) : The PLT 10^3 / L for non-pregnant samples

The Results of Mean, Standard Deviation, & Coefficient of Variation: The results of distributive statistical analysis showed the following : For the Coefficient of Variation of Pregnant samples were less dispersion ,RBC , HCT , HGB , PLT , WBC . the same observation was recorded for Non Pregnant samples less dispersion RBC , HCT , HGB , PLT , WBC. The Standard Deviation Dispersion for pregnant samples showed different values , the variations between the contents of hematology parameters followed the order of : RBC < HGB < WBC < HCT < PLT .On the other side the Dispersion for Non pregnant samples was followed the order of : RBC <WBC < HGB< HCT < PLT The values of RBC & HGB closed to the Mean Values (Low Standard Deviation). The values of WBC,HCT & PLT are Scattered From Mean Values (High Standard Deviation). For the Average values the results recorded the following data for the Pregnant Samples RBC: (3.893) , WBC:(8.591) , HGB: (10.608) , HCT: (31.655) , PLT (201.60). On the other side the Non Pregnant Samples showed average values of hematology parameters as following: RBC: (4.630) , WBC:(7.485) , HGB: (12.883) , HCT: (39.095) , PLT (270.23). Non pregnant samples are more Homogenous and less dispersion Than Pregnant Samples.

IV. Conclusion:

The obtained results showed wide variations between the pregnant and non – pregnant blood hematology parameters .

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