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PLATELET INDICES IN LADIES WITH NORMAL PREGNANCY IN RED SEA STATE

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ABSTRACT

Background: Platelets indices, mean platelets volume (MPV), platelets distribution width (PDW) and platelets large cell ratio (P-LCR). **Materials and method:** This is prospective cross-sectional study is done to investigate platelets indices in uncomplicated pregnant women of varying age group (test 15-43y, control 18-50y) and tribes in Red sea state. The study included 98 females with normal pregnancy And 18 females used as normal controls; all females in the study were randomly selected. **Justification:** Thrombocytopenia are common in pregnant women. Platelet indices can be used as useful marker for predicting bleeding manifestation. Platelet indices can be used to indicate platelet activation and indirectly about the marrow activity. **Objectives:** To investigate the platelet indices in women with uncomplicated pregnancy in red sea state. **Result:** The study clearly indicates that there are no difference in the platelets indices parameters in the group included in the study 9% of participants were thrombocytopenic and 91% were normal MPV (1% low, 98% normal and 1% high) PDW (1%low, 90% normal and 9% high) PLCR (1%low, 98% normal_1% high). **Conclusion:** The study includes platelets count, mean platelets volume, platelets distribution width, and platelets large cell ratio in normal pregnant women in red sea state. And can used for comparison in nutritional status and other medical issue.

KEYWORDS

Platelets indices and uncomplicated pregnancy.

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INTRODUCTION

Gestational thrombocytopenia, also known as incidental thrombocytopenia of pregnancy, is the commonest cause of thrombocytopenia in pregnancy occurring in approximately 75% of cases. It is a diagnosis of exclusion, no confirmatory tests are available. It generally causes mild thrombocytopenia with the majority of cases having platelet counts of 130 to 150 x 109/L. Most experts

consider this diagnosis unlikely if the platelet count falls below 70 x 10^9/L[1].

Complete blood count (CBC) tests with automated hematology analyzers are one of the most commonly ordered tests in clinical laboratories. Modern hematology analyzers in routine diagnostic use, which measure platelet indices (PIs), use impedance counting or optical light scatter counting techniques. The measurement principle influences the results, and the results from different analyzers are not comparable.

Platelet count in the blood can be rapidly measured using an automated hematologic analyzer. Platelet indices are biomarkers of platelet activation. They allow extensive clinical investigations focusing on the diagnostic and prognostic values in a variety of settings without bringing extra costs. Among these platelet indices, plateletcrit (PCT), mean platelet volume (MPV), and platelet distribution width (PDW) are a group of platelet parameters determined together in automatic CBC profiles; they are related to platelets' morphology and proliferation kinetics.

Platelet indices

The volume of platelets in the bloodstream is heterogeneous, and their structures and metabolic functions differ. Typically, the average mean cell volume is 7.2–11.7 fL in healthy subjects. In MPV, the analyser-calculated measure of thrombocyte volume is determined directly by analyzing the platelet distribution curve, which is calculated from a log transformation of the platelet volume distribution curve, to yield a geometric mean for this parameter in impedance technology systems. In some optical systems, MPV is the mode of the measured platelet volume. MPV is determined in the progenitor cell, the bone marrow megakaryocyte. The platelet volume is found to be associated with cytokines (thrombopoietin, interleukin-6 and interleukin-3) that regulate megakaryocyte ploidy and platelet number and result in the production of larger platelets. When platelet production is decreased, young platelets become bigger and more active, and MPV levels increase. Increased MPV indicates increased

platelet diameter, which can be used as a marker of production rate and platelet activation. During activation, platelets' shapes change from biconcave discs to spherical, and a pronounced pseudopod formation occurs that leads to MPV increase during platelet activation.

PDW is an indicator of volume variability in platelets size and is increased in the presence of platelet Anisocytosis. PDW is a distribution curve of platelets measured at the level of 20% relative height in a platelet-size distribution curve, with a total curve height of 100%. The PDW reported varies markedly, with reference intervals ranging from 8.3 to 56.6%. PDW directly measures variability in platelet size, changes with platelet activation, and reflects the heterogeneity in platelet morphology. Under physiological conditions, there is a direct relationship between MPV and PDW; both usually change in the same direction. Meanwhile, there are conflicting reports in the literature about the relationship between platelet volume and numbers, which suggests that they are affected by different mechanisms.

PCT is the volume occupied by platelets in the blood as a percentage and calculated according to the formula PCT = platelet count × MPV / 10,000. Under physiological conditions, the amount of platelets in the blood is maintained in an equilibrium state by regeneration and elimination. The normal range for PCT is 0.22–0.24%. In healthy subjects, platelet mass is closely regulated to keep it constant, while MPV is inversely related to platelet counts. Genetic and acquired factors, such as race, age, smoking status, alcohol consumption, and physical activity, modify blood platelet count and MPV.

Platelet larger cell ratio (P-LCR) is an indicator of circulating larger platelets (> 12 fL), which is presented as percentage. The normal percentage range is 15–35%. It has also been used to monitor platelet activity.

Mean platelet component (MPC) is a measure of mean refractive index of the platelets by modified two-angle light scatter and it is useful in determining changes in the status of platelet

activation. Platelet component distribution width (PCDW) and mean platelet mass (MPM) are new platelet activation parameters measured by the Siemens Advia 120 haematology analyser.

Immature platelet fraction (IPF) indicates the percentage of immature platelets, as a percentage of the total platelet population measured in the reticulocyte/optical platelet channel of the haematology analyser by flow cytometry, in which dye penetrates the cell membrane, staining the RNA in the cytoplasm of immature (or reticulated) platelets on the Sysmex XE-2100 analyser (Sysmex Corporation, Kobe, Japan). The IPF percentage increases as production of platelets increases, and low values indicate suppressed Thrombopoiesis.

The clinical significance, reference values and usefulness of some of these parameters are still under investigation.

Platelet indices as diagnostic and prognostic markers

Simultaneous measurement of all of the platelet indices will provide us a valid instrument for measuring disease severity and an insight into the potential etiology that resulted in platelets' indices changes. Platelet volume heterogeneity occurs during its production and increases MPV and PDW comparatively, suggesting that bone marrow produces platelets and rapidly releases them into circulation. A simultaneous reduction of platelet count and PCT indicates that platelets have been excessively consumed.

Platelets play an important role in inflammation, and recently, several additional functions for platelets in the process of inflammation were defined. A substantial number of studies have demonstrated crucial roles for platelets in the pathogenesis of various inflammatory clinical conditions where inflammation is important. Numerous research groups have found a relationship between the changes in platelet indices and the activation of the coagulation system, severe infection, trauma, systemic inflammatory reaction syndrome, and thrombotic diseases. Platelet indices have been shown to have diagnostic value in certain inflammatory diseases, such as inflammatory bowel diseases, rheumatoid arthritis, ankylosing spondylitis, ulcerative colitis, and atherosclerosis.

MPV acts as a negative or positive acute phase reactant in different inflammatory conditions. High MPV levels are associated with high-grade inflammation owing to the presence of the large platelets in circulation. MPV might decrease in high-grade inflammation due to the consumption and sequestration of these large platelets in the vascular segments of the inflammatory region. Low MPV is associated with low-grade inflammation, like rheumatoid arthritis and attacks of familial Mediterranean fever. MPV decreases and increases in acute and chronic disorders, respectively.

MPV shows the activity of disease in systemic inflammation, acute pancreatitis, unstable angina, and myocardial infarction. MPV can be a modifiable marker in identifying patients with active ankylosing spondylitis and rheumatoid arthritis, which is thought to be due to increased consumption of platelets in the inflammation area and MPV increases with therapy in these patients.

Sepsis is another example of obvious interaction between the immune and hemostatic system. Since these systems are closely linked, septic patients are observed to have low platelet count due to production of many cytokines, endothelial damage and bone marrow suppression. In patients with septic shock, the rise in MPV, and to a lesser extent an increase in P-LCR and PDW, indicates a worse prognosis.

In the emergency department, surgeons frequently use CBC to determine inflammatory pathologies and as part of routine preoperative assessment. Platelet indices especially MPV, may be a simple way to provide valuable information during routine blood counts without increasing the cost of diagnosis or differentiating non-traumatic abdominal surgery patients.

To date, there has been no published meta-analysis of the potential use of PIs in emergency non-traumatic abdominal surgery. In addition, there has been only one published meta-analysis of the value of MPV as a predictor of cardiovascular risk, by Chu *et al.* This review aimed to summarize current

scientific knowledge of the potential role of PIs as a diagnostic and prognostic marker in emergency non-traumatic abdominal surgery patients, especially those with acute appendicitis, acute cholecystitis and acute mesenteric ischemia[2].

Black women had significantly higher platelet counts than did white women (P less than 0.025). Latin-American women were between the other two groups. No differences were noted among men[3].

The effect of aging is much bigger than those of sex and ethnicity, but also the latter variables may be clinically relevant when combined with age-related variation[4].

Justification
Thrombocytopenia are common in pregnant women. Platelet indices can be used as useful marker for predicting bleeding manifestation. Platelet indices can be used to indicate platelet activation and indirectly about the marrow activity.

Objectives
To investigate the platelet indices in women with uncomplicated pregnancy in red sea state.

MATERIAL AND METHODS
Study population and study area
All uncomplicated pregnant women in Port Sudan state are subjected to be study population of research.

Sample size
98 sample of pregnancies, 18 sample control.

Study sample
Ninety eight uncomplicated pregnant women selected obtained by using simple random method. Eighteen non pregnant women randomly selected to the control.

Study design
This is a non-interventional cross-sectional descriptive study .it is a part of a study focusing the determination of platelet count and platelet indices among uncomplicated pregnant women.

Study duration
This study is carried out during the period from the (1 of March 2015) to the (1 of May 2015).

Data analysis
The platelet count and platelet indices are statistically analyzed by the SPSS facilities.

Ethical consideration
Every participant were informed about the goal of the study and all of them were consent to be involved in the study.

RESULT
The study clearly indicates that there are no difference in the platelets indices parameters in the group included in the study 9% of participants were thrombocytopenic and 91% were normal MPV (1% low, 98% normal and 1% high) PDW (1% low, 90% normal and 9% high) PLCR (1% low, 98% normal_1% high).

CONCLUSION
The study includes platelets count, mean platelets volume, platelets distribution width, and platelets large cell ratio in normal pregnant women in red sea state. And can used for comparison in nutritional status and other medical issue.

RECOMMENDATION
- Other studies are required with large sample size.
- Increase the number of test done by adding reticulated platelets.
- Platelets function must be done.

CONFLICT OF INTEREST
We declare that we have no conflict of interest.

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