Research Article

Platelets Count, Indices And Fibrinogen Level In Patients With Preeclampsia Compared To Normal Pregnant Women

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Abstract

Background: Preeclampsia (PE) is a pregnancy specific syndrome that affects 6–8% of pregnancies worldwide. The specific pathogenesis of preeclampsia remains incompletely elucidated. Many tests have attempted to establish the diagnosis of preeclampsia as early as possible, often even before the patients develop arterial hypertension.

Objective: This study aims to identify whether the platelet indices and fibrinogen level are significantly affected by preeclampsia compared to normal pregnancy

Patients and methods : This retrospective case-control study was done in AL-Batool Teaching Hospital-Department of Obstetrics and Gynecology, from the 1st of September 2014 to 30th of September 2015 , 75 woman who fulfill the inclusion criteria were included in the study , they were divided into two groups 25 pregnant woman with preeclampsia & 50 normal pregnant woman as control group(were all normotensive pregnant woman with single intrauterine gestation and the obstetric history is uneventful) .

Results: Systolic, diastolic & MAP were highly different between the control & the patient groups. Regarding fibrinogen level it was lower in the patients with preeclampsia. Platelet count was also reduced in preeclamptic patients. While all platelet indices were higher in the patient group compared to the control group.

Conclusion: Platelet indices and fibrinogen level can be used in predicting preeclampsia.

Key words: Preeclampsia, Platelet indices, Fibrinogen levels.

INTRODUCTION

Preeclampsia (PE) is a pregnancy specific syndrome that affects 6–8% of pregnancies worldwide. PE is recognized by hypertension (blood pressure ≥140/90 mmHg), proteinuria (≥0.3 g/d), proteinuria, and other symptoms which may be started from 20weeks of gestation and last for 6 weeks postpartum.(1) Recently, the American College of Obstetricians and Gynecologists has declared that proteinuria is not required for the diagnosis of preeclampsia. PE still a leading cause of maternal morbidity and mortality as it can affect virtually every organ system. Clinical signs appear in the second half of pregnancy, but pathogenic mechanisms initially arise much earlier.(2)

There are three major groups of hematological changes that occur in preeclamptic pregnancy: A) platelet dysfunction and thrombocytopenia. Up to 50% of preeclampsias associate with thrombocytopenia which is generally proportional to the severity and may predatee clinical manifestations B) Alterations of hemoglobin and erythrocytic parameters: most frequently – hemoconcentration manifested with increased hematocrit – due to increased endothelial permeability,(3) C) Changing related to coagulation, normal pregnancy is a procoagulant status and that this

tendency is increasing with increase gestational age which result in decreasing the amount of blood lost during labour.[4] In pregnancies complicated by preeclampsia, the coagulation cascade is generally activated preeclampsia being by itself a highly thrombotic and procoagulant state, which result in platelet activation and consumption, leading to thrombin formation, promoting of fibrin formation and destruction.[5,6] In spite of these changes, in most cases of preeclampsia the coagulation anomalies do not have major clinical significance.[7]

Many tests have been attempted to establish the diagnosis of preeclampsia as early aspossible, often even before the patient present arterial hypertension.[8] Tests reported for the early diagnosis of hypertensive disorders are Doppler ultrasound assessment of maternal and foetal circulation, uric acid concentration, the supine pressure test, the angiotensin test, microalbuminuria, plasma fibronectin concentration, plasma antithrombin activity, calciuria, prothrombin time, platelet count, fibrinogen levels, APTT and other tests, all of which are of debatable efficacy and practicality.[7,8]

Platelet aggregation is increased with gestation while platelets count is reduced. In women with PE and/ or IUGR, there is known to be a reduction in platelet count.[4] Platelet function is also altered in preeclampsia, but these alterations are complecated. Platelet aggregation is increased during the early stages of PE, while it is reduced in established severe disease. Longitudinal studies revealed that increased platelet aggregation may predate the development of PE by 2–5 weeks. [9]

Several platelet indices have been measured by hematology analyzers, depending on morphologic changes that occur during platelets activation.[12] The mean platelet volume (MPV) is probably the most widely studied platelet activation marker. Nowadays, main platelet indices such as mean platelet component (MPC) and platelet component distribution width (PCDW) have been investigated as prospective platelet activation marker.

MPV is a machine calculated measurement of average size of Platelet found in blood.MPV is higher when there is destruction of Platelets.The average normal value ofMPV is 9.13 fl. [13,14]

PDW is simple, practical and specific marker of activation of coagulation.PDW is a more specific marker of platelet activation as it does not increase during simple platelet swelling.Stander PDW ranges from 9 -14fl.[13] Plateletcrit is an effective screening tool for detecting platelet quantitative abnormality. Normal platelets count has a plateletcrit within arange of 0.20-0.36%. Plasma fibrinogen increases about 65% late in pregnancy. The increase in fibrinogen concentration contributes significantly to the striking increase in ESR.[11]

This study is aimed to evaluate some hematological and biochemical markers in pregnant women with preeclampsia which includes: 1. Platelet indices. 2. Fibrinogen levels.

PATIENTS AND METHODS

This retrospective case-control study was done in AL-Batool Teaching Hospital Department of Obstetrics and Gynecology from the 1st of September 2014 tothe 30th of September 2015, 75 woman who fulfill the inclusion criteria were involved in the study, they were divided into two groups: 25 pregnant women with preeclampsia&50 normal pregnant women as a control group (were all normotensive pregnant woman with single intrauterine pregnancy and uneventful obstetric history). The gestational age of each pregnant woman was estimated by ultrasound using fetal crown ramp length at 10-12 weeks of gestation.Inclusion criteria: Patients with preeclampsia (mild or sever) were included in this study & diagnosed according to the criteria of the ACOG Practice Bulletin.Mild PE was defined as new onset of hypertension of≥ 140/90 mmHg on more than two occasions taken 6 h apart after 20 weeks gestation, with proteinuria ≥ 0.3 g/24 h, but do not have the criteria ofsPE. Severe PE was defined as hypertension of≥ 160/110 mmHg, significant proteinuria (≥ 2 g/24 h) and signs of multiple organ damage, for example, headache, pulmonary edema, oliguria or even fetal growth restriction (FGR) was included in this study. Exclusion Criteria: Women with history of renal disease, insulin-dependent diabetes, asthma, chronic hepatitis, severe trauma history, anticoagulant drug-use history, history, smoking, HELLP syndrome, any blood disorders were all excluded. Informed consent was obtained from all patients.Whilet aking all aseptic precautions, 3.5 ml of venous blood was collected using clean aseptic venipuncture technique from each patient and control and was processed as follow: 2 ml of blood was obtained in an EDTA containing tube for counting platelets and platelet indices {mean platelet volume (MPV), mean platelet distribution width (PDW) and plateletcrit (PCT)}. Platelet counts were done by Sysmex 800i fully automated haematology analyzer.While platelet indices were calculated using fully automated hematology autoanalyzer (ABX Horiba Micros 60). Another 1.5 ml of venous blood was added into a clean disposable capped plastic tube

containing 3.8% trisodium citrate .After good mixing manually, the specimen was immediately centrifuged for 15 minutes. The obtained plasma was aspirated into clean, disposable, capped plastic tube for fibrinogen level. Fibrinogen level in plasma was done by the clotting method of Clauss.This test was performed using a commercially available kit; (Fibri-prest).The end point clot is determined by hook method.

Statistical Analysis

The parametric data expressed as mean plus minus standard deviation and comparison between groups done using unpaired *t* test, *p* value less than 0.05 was considered as significant.

RESULTS

The results of this study demonstrated that there was no significant difference in the age of patient,gestational age, between the two groups (the patient and the control), while systolic, diastolic & MAP were highly different between the control & the patient groups (p value <o.ooo1), as shown in the table (1).

Table (1): Comparison between control group and patient group by unpaired t-test

Parameters	Control (n=50) mean±SD	Patients (n=25) mean±SD	*P* value
Age (yr)	27.52±6.88	28.28±6.0	0.6247
Gestational age (week)	38.22±1.57	38.02±1.38	0.5636
Systolic BP (mmHg)	119.4±8.12	164.0±10.61	**< 0.0001**
Diastolic BP (mmHg)	77.0±5.15	97.8±8.18	**< 0.0001**
Mean arterial BP (mmHg)	91.13±5.01	119.87±6.12	**< 0.0001**
Fibrinogen (g/l)	3.16±0.42	2.22±1.22	**0.0009**
PDW (%)	15.19±1.75	18.21±3.04	**0.0001**
MPV($\mu m^{3)}$	8.85±0.85	14.81±4.33	**< 0.0001**
PCT (%)	0.26±0.09	0.31±0.09	**0.0236**
Platelets count ($x10^3/mm^3$)	267.66±72.59	201.2±76.54	**0.0008**

Regarding fibrinogen level it was lower in the patients with preeclampsia compared to the control group with mean 2.22±1.22 g/l in the PE group & 3.16±0.42g/l in the control, with p value 0.0009as shown in fig (1).

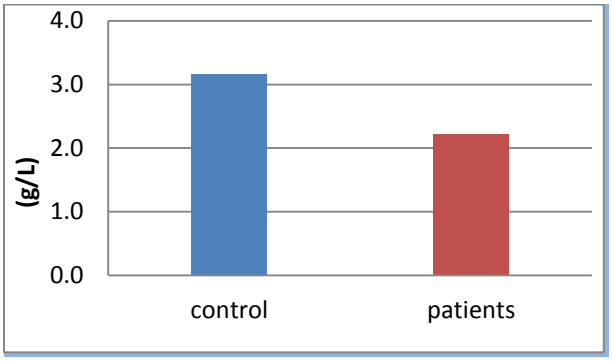

Figure 1: Fibrinogen level in the control and preeclamptic patients

Regarding platelet count it was also reduced in PE patients with mean count of 201.2±76.54 x103/mm3 while the mean count was 267.66±72.59 x103/mm3 in the control group with p value of 0.0008 as in fig(2).

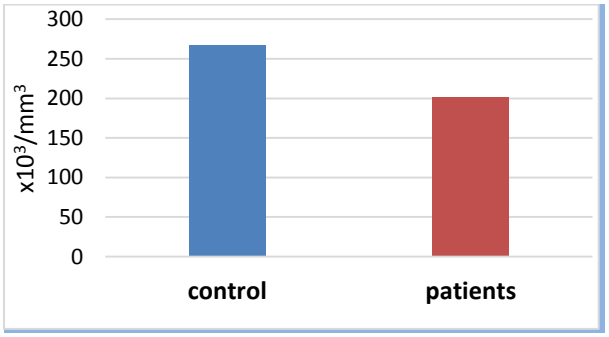

Figure 2: platelets count in the control and preeclamptic patients

Platelet indices were all higher in the patient group compared to the control group, the mean of PDW was 18.21±3.04% in the preeclamptic group &15.19±1.75% in the control (with p value 0.0001)as seen in fig.(3).

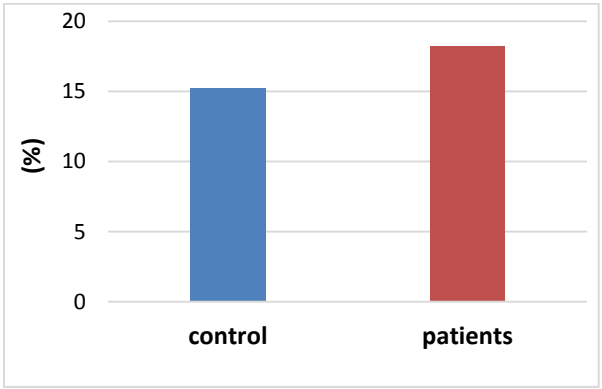

Figure 3: PDW in the control and preeclamptic patients

While MPVwas 14.81±4.33µm^3 in the patienst group &8.85±0.85µm^3 in the control group (with p value <0.0001), as seen in fig. (4).

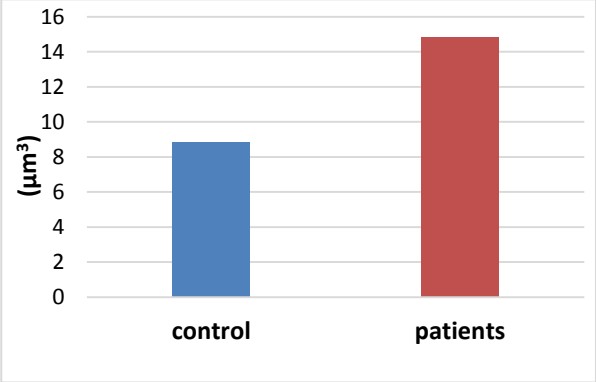

Figure 4: MPV in control and preeclampsia patients

The mean of PCTwas 0.31±0.09% in the patients group &0.26±0.09% in the control (p value 0.0236) as seen in fig. (5).

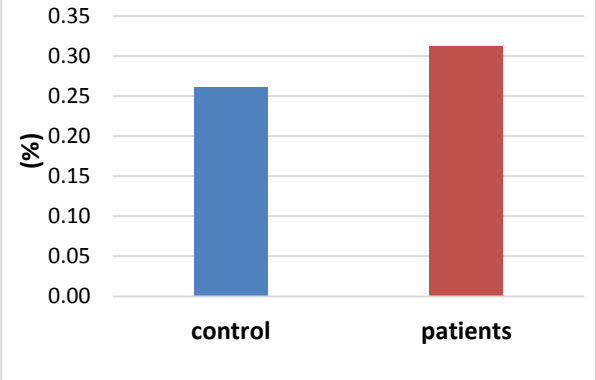

Figure 5: PCT in control and preeclampsia patients

DISCUSSION

Pregnancy is associated with complex still incompletely understood changes in blood coagulation favor hypercoagulable state.Preeclampsia is a multisystemic disorder affecting many systems including blood and hemostasis. Regarding platelet count, it was reduced in patients with preeclampsia, this finding agrees with studies done by Razia Sultana et al 2012,[11] C.E.P Orlikowski et al 1996,[14] Bahia NamavarJahromi et al 2009,[15] OnisaiMinodoraet al 2015,[16] Heilmann L et al 2007[17] & Shaifali Dadhichet al 2012.[18] Lazorov R et al 1999,[19] found that thrombocytopenia preceeded the onset of clinical symptoms of preeclampsia while, Lei Han et al 2014,[20] found that decreased platelet count is mainly caused by pregnancy itself rather than the preeclampsia. Our study also not agree with Kulkarini and Sutaria 1983,[21] who did not observe any significant difference in respect to platelet count in their study. In both studies, the reduction in platelets count was mild & it was caused by gestation itself This may be due to differences in criteria used for collecting the cases.

Regarding platelet indices, MPV was higher in preeclamptic group, this agrees with Lei Han et al 2014[20], who took blood samples from 3 groups of patients, normal pregnant women, mild preeclampsia and severe preeclampsia, during early and late pregnancy. The coagulative parameters and platelet indices were measured and compared among the groups. He found that (mean platelet volume (MPV) increased in patient with preeclampsia compared to normotensive women (p<0.05).Our study also agrees with a study that has been done by Yin SM et al 2005(22, Ozgur Dundaret al 2008,[23] Walker JJ et al 1989,[24] and Ahmed Y et al 1993.[25]

Regarding PDW, it was also higher in preeclamptic patients, similar findings were reported in studies conducted by Shaifali et al 2012,[18] Santos et al 2004,[26] Vamseedhar et al 2011[27] &Xiong et al 2002.[28]

PCT was higher in preeclamptic group in our study, but this notinconcordance with Karateke A et al 2015[29] & Freitas L G et al 2013,[30] who found that PCT was lower in preeclamptic group this may be related to the difference in study protocol, unequal number of patienst in the comparison groups

Regarding fibrinogen level in this study it was lower in preeclamptic group compared to control group, this agrees with Sawsan Khalil 2012,[31] while Bahia Namavar Jahromi et al 2009,[15] showed that there was no significant statistical difference in serum fibrinogen between normal pregnant & severe preeclamptic patients. This difference may be due to the difference in duration of study (longer duration in her study from2002-2005) &also difference in patient selection.

CONCLUSION

Platelet indices and fibrinogen level change significantly in preeclampsia, so they are useful in predicting preeclampsia

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