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Original Research Article

Study the Association of Mean Platelet Volume with Recurrent pregnancy loss

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Abstract: The present study aims to evaluate the relationship between mean platelet volume and recurrent pregnancy loss. This was a prospective study to the evaluation of 70 women who had a history of recurrent pregnancy loss and 70 pregnant women without a history of recurrent pregnancy loss in the first trimester. The mean age of cases was 27.0 ± 5.2 and controls was 27.1 ± 5.2 and mean body mass index (BMI) of cases and controls was 22.94 ± 3.39 and 23.11 ± 2.65 respectively. There was no statistically significant difference between the two groups in terms of age, BMI, haemoglobin, TLC, hematocrit, mean corpuscular volume, mean corpuscular haemoglobin, mean corpuscular haemoglobin concentration($p>0.05$). Mean platelet volume levels were significantly higher in cases (11.48 ±1.32 fl) than controls (10.28 ±1.44 fl) ($p =< 0.001$). An increased mean platelet volume value in first-trimester pregnant women is associated with increased risk of pregnancy loss.
Keywords: recurrent miscarriage, mean platelet volume, thrombophilia.

INTRODUCTION:

Recurrent pregnancy loss is defined as three or more consecutive pregnancy losses at or less than 20 weeks of gestation or with a fetal weight of fewer than 500 grams [1]. The American Society for Reproductive medicine (2008) proposed that recurrent pregnancy loss is defined as two or more failed clinical pregnancies confirmed by either sonographic or histopathological examination. Recurrent pregnancy loss affects between 1 in 300 and 1 in 100 couples [2]. Recent evidence indicates that two or more, not necessarily consecutive, miscarriages constitute recurrent miscarriage [3]. Parental chromosomal anomalies and thrombotic complications constitute two of the most common known causes of recurrent miscarriage [4]. The aetiology of recurrent pregnancy loss is multifactorial and includes uterine anomalies, endocrinological disorders, immunological causes, infections, chromosomal abnormalities and maternal autoimmune diseases. However, the underlying cause cannot be clarified in 50–60% of all recurrent miscarriages [5, 6]. Approximately 10–15% of all pregnancies result in an abortion and these spontaneous miscarriages are mostly due to chromosomal abnormalities. Thrombophilia has been identified as one of the main causes of recurrent pregnancy loss. Thrombophilia induces platelet activation, which ends up with alterations in platelet morphology. That is why mean platelet volume (MPV) has been investigated as the markers of Platelet activation and thus predictors of thrombophilic disorders [7-10].

Thrombophilia, which is a condition with an increased tendency to venous thrombosis, is associated with recurrent miscarriage. Microemboli in the uteroplacental circulation, which lead to placental insufficiency and inflammation, are considered to cause recurrent miscarriage in pregnant women with thrombophilia [11]. Mean platelet volume (MPV) is an important risk factor for the development of atherothrombosis and embolism [12]. Increased MPV has been defined as an independent risk factor in the development of thromboembolism [13].

MATERIALS AND METHODS:

This study comprises patients who attended department of Obstetrics and Gynaecology, SMS Medical College and associated hospitals, Jaipur between January 2015 to October 2016. After application of exclusion criteria, 70 patients were included in our study. Age and body mass index parameters of the patients were recorded. Body mass index was calculated as weight (kg) divided by the square of height (m2). Total blood count parameters, including haemoglobin (Hb), TLC, hematocrit, mean corpuscular volume, mean corpuscular haemoglobin, mean corpuscular haemoglobin concentration ($p>0.05$), and mean platelet volume (MPV).Women who had experienced recurrent pregnancy loss due to uterine

anomalies and endocrinopathies were excluded. All laboratory tests were performed immediately after sampling. Total blood count parameters, including Hb, MCV, RDW, WBC, and MPV, were measured in both groups [14].

STATISTICAL ANALYSIS:

Continuous variables will be summarised as mean and SD while Nominal/Categorical variables as percentages. Z- The test will be used for analysis of continuous variables and Karl Pearson's Correlation Coefficient will be used for find out the correlation between two variables. Mini tab software will be used for all statistical calculation.

RESULTS:

The study comprised a total of 70 women who had a history of recurrent pregnancy loss (cases) and 70 pregnant women without a history of recurrent pregnancy loss (controls). The mean age of cases was 27.0 ± 5.2 and controls was 27.1 ± 5.2 and Mean body mass index (BMI) of cases and controls was 22.94 ± 3.39 and 23.11 ± 2.65, respectively. There was no statistically significant difference between the two groups in terms of age, BMI, haemoglobin, TLC, hematocrit, mean corpuscular volume, mean corpuscular haemoglobin, mean corpuscular haemoglobin concentration($p>0.05$). Mean platelet volume levels were significantly higher in cases (11.48 ±1.32 fl) than controls (10.28 ±1.44 fl) ($p =< 0.001$). . The comparison of mean MPV Values of patients between the groups is shown in Table 1.

Table 1: Comparison of blood parameters of patients between the groups

Parameters	Mean ± SD		P VALUE	Significance
	CASES	CONTROLS		
Age (Yrs.)	26.94 ±4.15	25.77± 3.93	>0.05	NS
TLC (103/ul)	9.28±2.3	9.10 ± 1.50	>0.05	NS
Hemoglobin(g/dl)	11.27±1.53	11.07±1.30	>0.05	NS
MCV(fl)	85.49±7.75	82.30±11.80	>0.05	NS
MCH(pg)	27.10±3.14	27.71±6.90	>0.05	NS
MCHC(g/dl)	31.62±1.40	31.94±1.28	>0.05	NS
MPV(fl)	11.48±1.32	10.28±1.44	<0.001	Sig
Hematocrit	35.54±4.15	34.19±4.47	>0.05	NS

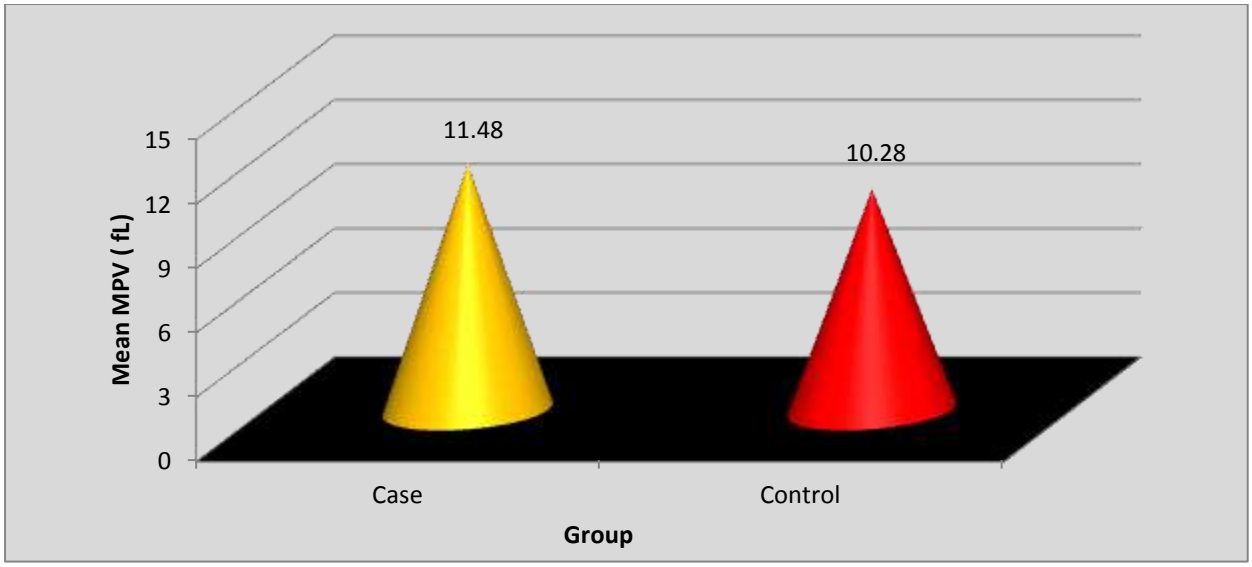

Fig-1:Graph showing mean MPV of Case & Control group subjects

DISCUSSION:

Pregnancy causes many alterations in hemostatic balance and, thus, leads to a tendency towards thrombophilia. Such a tendency is considered as a mechanism that compensates for the hemostatic challenge of delivery. The natural inclination towards thrombophilia in pregnancy is due to the increase in several clotting factors, including factor I, factor VII, factor VIII and von Willebrand factor. Moreover, other markers reflecting hypercoagulability (such as D-dimer and/or prothrombin fragment) are increased during pregnancy [15, 16].The European Society of Human Reproduction and Embryology defines recurrent miscarriage as three or more consecutive pregnancy losses occurring before 20 weeks [17]. Meanwhile, the American Society for Reproductive Medicine defines recurrent miscarriage as two or more failed clinical pregnancies that are documented by ultrasonography or

histopathological examination [3]. The term thrombophilia is used to describe a disorder associated with an increased tendency to venous thromboembolism [18]. Thrombophilia is also associated with an increased risk of both single miscarriage and recurrent miscarriage [19]. Various forms of thrombophilia are associated with recurrent miscarriage, but the causal relationship is not yet fully illuminated. However, micro-emboli in the uteroplacental circulation, which lead to placental insufficiency and inflammation, are thought to cause recurrent miscarriage, placental abruption, preeclampsia and intrauterine growth retardation in pregnant women with thrombophilia [20]. The most important thrombophilia associated with recurrent miscarriage is antiphospholipid syndrome (APS) [21]. Antiphospholipid antibodies have been associated with a variety of medical problems, including arterial and venous thrombosis, recurrent miscarriage, and severe pregnancy with early onset, intrauterine growth retardation and fetal loss. Antiphospholipid antibodies used in the diagnosis are lupus anticoagulant, anticardiolipin antibodies, and anti-β2-glycoprotein [22].

Increased in Mean platelet volume (MPV) is physiological variable with haemostatic importance.The MPV test is an indicator of platelet size. Increased MPV indicates that platelet diameters are greater. An increase in MPV shows that new platelet synthesis in bone marrow has increased. Thus bigger, younger and more functional platelets are produced and MPV increases, Increased in cases deep vein thrombosis [23], severe anaemia [24], antiphospholipid antibody syndrome [26], low birth pregnancies and pre-eclamptic pregnancies [27, 28], it decreases in cases of Kawasaki disease [29]. Increased MPV has been defined as an independent risk factor in the development of thromboembolism. Mean platelet volume increase has been associated clinically with cardiovascular and cerebrovascular morbidity. Increased MPV has also been identified as an independent risk factor for myocardial infarction in patients with coronary heart disease [30]. In addition, MPV was found to be increased in some conditions with increased risk of cardiovascular morbidity, including diabetes mellitus [31], hypercholesterolemia [32], obesity, hypertension, and smoking [33]. Mehmet Yilmaz *et al.;* in 2013 conducted a study showed that significantly higher MPV values in patients with recurrent pregnancy loss [34] and our study also showed that there are significantly higher MPV values in patients with recurrent pregnancy loss

CONCLUSION:

Our study support that increased MPV in pregnant patients has a high risk of recurrent pregnancy loss because it leads to thrombosis, which leads to micro emboli in uteroplacental circulation, placental inflammation and insufficiency which leads to recurrent pregnancy loss. In conclusion, in our study, MPV values in a pregnant woman with a history of recurrent pregnancy loss were significantly higher than the control group. Higher MPV in cases suggest the role of thrombophilia in the pathogenesis of recurrent pregnancy loss. Increased MPV are associated with recurrent pregnancy loss which is helpful in the early management of these high-risk patients. Our study concludes that simple determination of MPV value help in both early identification and management of these high-risk patients.

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