

ASSOCIATION BETWEEN MEAN PLATELET VOLUME AND GESTATIONAL DIABETES MELLITUS: A CASE CONTROL STUDY

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Introduction

Gestational Diabetes Mellitus (GDM), one of the most prevalent medical disorders complicating pregnancy, can be defined as any degree of glucose intolerance that is first recognised in pregnancy [1]. GDM is known to have a chronic low-grade inflammatory state which causes injury to endothelial cells leading to platelet activation [2]. Enhanced recruitment of platelets thus causes larger platelets to be found in the circulation. These larger platelets have a higher aggregability and more reactivity. They consist of dense granules, producing higher quantities of Serotonin, β -thromboglobulin, and also elevated Thromboxane A2 when compared with smaller sized platelets. Platelet volume is an indicator of function of platelets and their activation, and it is evaluated by Mean Platelet Volume (MPV) measurement [3].

Mean platelet volume along with platelet count are easily available platelet indices that have been hypothesised to be associated with GDM which may aid in early diagnosis and appropriate management of this complication.

Aims and Objectives

- To establish an association between the levels of Mean Platelet Volume and presence of Gestational Diabetes Mellitus in pregnant women.
- To study the relation between Mean Platelet Volume and other platelet indices in pregnant women with and without GDM.

Methods and Materials

- **Study setting** : Government Lady Goshen Hospital
- **Study design** : Hospital based Case Control Study
- **Study duration** : 2 years

73 Cases
73 Controls

CASES – Antenatal women aged 18-35 years between 24-28 weeks period of gestation diagnosed with Gestational Diabetes Mellitus according to Carpenter and Coustan criteria.

CONTROLS – Antenatal women aged 18-35 years between 24-28weeks period of gestation with a 50g glucose challenge test showing one hour glucose level less than 140mg/dl with no other co-morbidity.

MATCHING – All cases and controls were matched with respect to Age (18-35 years), Gestational age (24-28 weeks) And Parity in a 1:1 ratio.

Results

A total of one hundred and forty-eight pregnant women were included in the study in accordance with the inclusion criteria which were grouped into Cases (n=73) and Controls (n=73). The age distribution and parity were comparable between the two groups.

The average Platelet count in cases was found to be 2.32 lacs in comparison to 2.57 lacs in controls which was statistically significant (p=0.01). This implied that the platelet count in women with GDM was notably lower than in healthy pregnant women.

The average Mean Platelet Volume in the cases were found to be 9.22fl and in controls the average was 8.27fl and result was highly significant (p<0.001). A comparison of the Mean Platelet Volume in the two groups revealed that the MPV was considerably higher in patients with GDM than those without GDM.

The mean Plateletcrit in cases was 0.21% which was comparable to the controls and was statistically not significant. The mean Platelet Distribution Width in cases was 17.7% and in controls was 17.8% which was statistically not significant. Both the study groups had similar values of Haemoglobin and Haematocrit and no statistical significance was noted in these parameters.

Blood parameters	Cases (N=73)		Controls (N=73)		p value
	Mean	SD	Mean	SD	
Platelet Count (L)	2.32	0.59	2.57	0.56	0.01*
Mean Platelet Volume (fl)	9.22	0.77	8.27	0.49	<0.001*
Plateletcrit (%)	0.21	0.06	0.21	0.04	0.75
Platelet Distribution Width (%)	17.7	0.76	17.8	0.51	0.28

Table 1. Comparison of Platelet parameters in cases and controls.

In primigravida, the Mean platelet count was found to be 2.35 lacs in comparison to 2.67 lacs in controls and the results were found to be statistically significant (p=0.03) whereas no such difference was noted in multigravidas.

An inverse correlation was noted between Platelet count and the value of GCT (p=0.02) implying that the platelet count decreased proportionally with the increased value of GCT (**Figure 1**). The Mean Platelet Volume exhibited a positive correlation with the value of GCT (p=<0.001) implying that the MPV increased proportionately with the value of GCT (**Figure 2**).

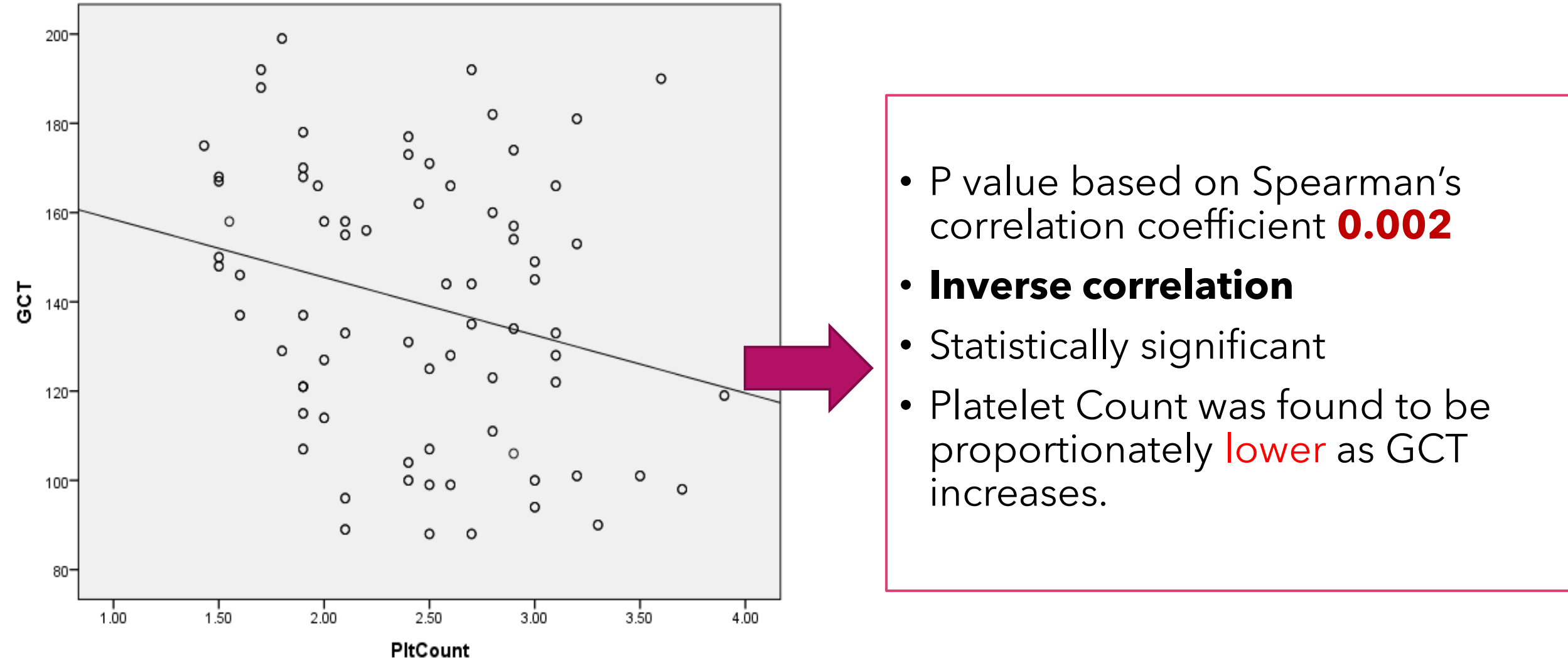


Figure 1. Correlation between GCT and Platelet count

- P value based on Spearman's correlation coefficient **<0.001**
- **Positive correlation**
- Statistically significant
- MPV was found to be proportionately **higher** as GCT increases

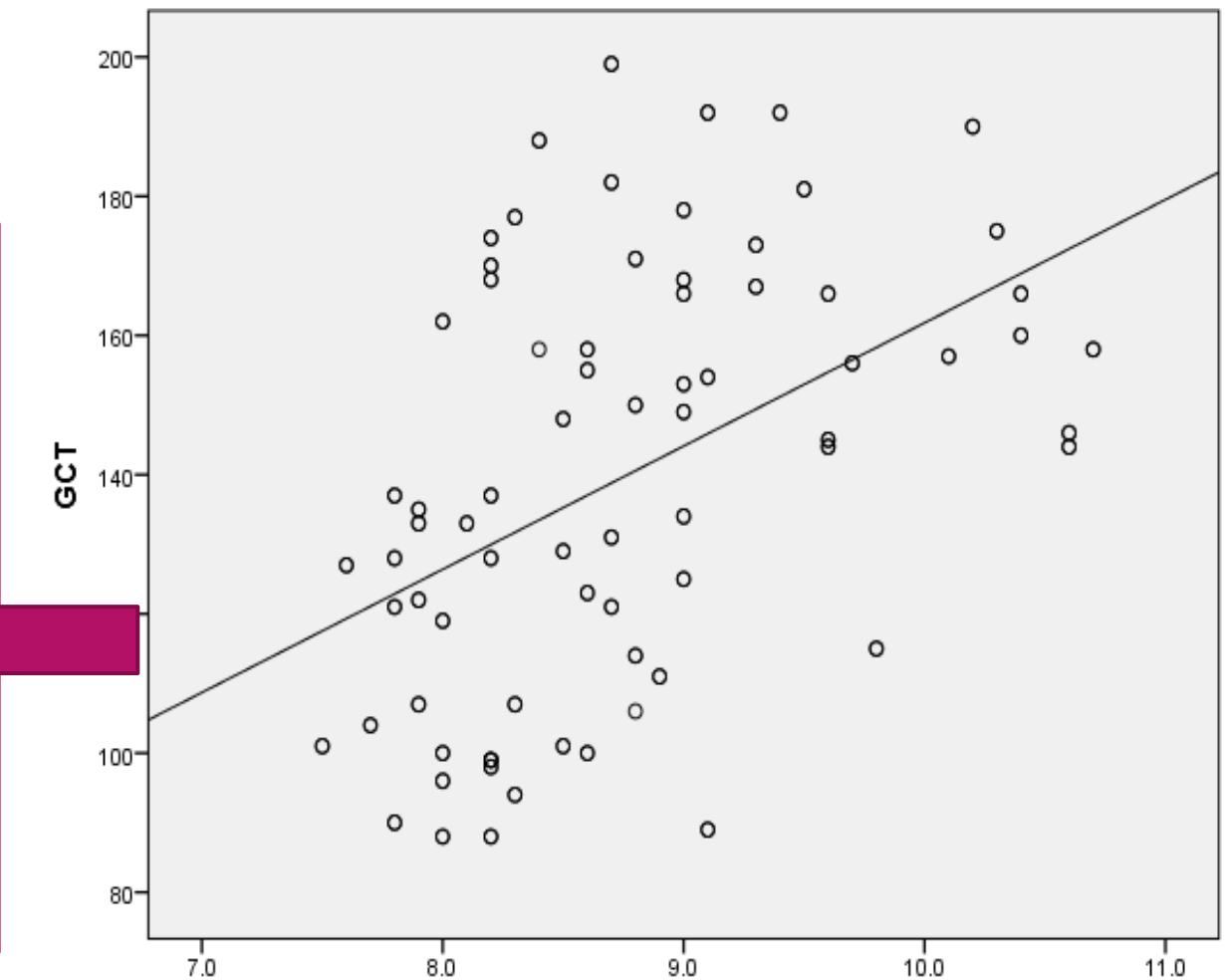


Figure 2. Correlation Between GCT and Mean Platelet Volume

Discussion

In the resent study, the platelet count was remarkably lower in cases than in the control group. Similar results were shown by studies conducted by Erikci et al and Ozlem et al [4, 5]. This implies that a higher level of activation and recruitment of platelets in patients with GDM owing to a chronic mild inflammatory condition leads to a significantly lower platelet count. A study done by Ahmet et al, however, showed contrasting results [6]. In most studies the Mean Platelet Volume was noted to be considerably elevated in patients with Gestational Diabetes Mellitus as compared to healthy patients which was similar to our study.

On performing Spearman's regression analysis, there was a positive correlation between Mean Platelet Volume and the value of Glucose Challenge Test, which, to our knowledge, has not been reported in previous studies. An inverse correlation between Platelet Count and value of Glucose challenge test was also noted. These findings suggest that as the value of GCT increases, the Mean Platelet value increases whereas the platelet count decreases.

There was no association of Plateletcrit or Platelet Distribution Width with GDM patients. Also, no significant association was found between Haemoglobin and Haematocrit values with GDM, and similar findings have been reported by Erikci et al and Ercin et al [4, 8].

The study conducted by Sayed et al elucidated an inverse correlation between platelet count and Mean Platelet volume which was not found in the present study [9]. According to our findings, there was no correlation between Mean platelet volume and value of Fasting blood sugar levels which was similar to the findings of the research conducted by Nilgun et al.

Diabetic patients have a higher level of platelet activation compared to non-diabetic subjects. Platelet volume is an indicator of platelet function and activation, and it is evaluated by measurement of Mean Platelet Volume.

Conclusions

The values of Mean platelet volume and platelet count exhibited a significant association with the occurrence of Gestational Diabetes Mellitus. We identified a true association which was present at the time of diagnosis of GDM, prior to disease progression, so that Mean platelet volume and platelet count may, in future, be used as predictive markers of Gestational diabetes mellitus.

A positive correlation between MPV and value of GCT and an inverse relationship between the platelet count and value of GCT suggests that these markers may also be used to study disease severity and worse blood sugar derangements may be expected when these parameters are deranged.

There is an already established relationship between MPV and likelihood of occurrence of cardiovascular accidents in patients with Type 2 Diabetes Mellitus. Therefore, it is important to consider the rise in MPV levels as a risk factor in pregnant women for the prediction of development of type 2 Diabetes and IHD in the future and we propose that further research should be undertaken for the same.

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