

Relationship between Platelet Count and Volume in Patients with Ischemic Stroke

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Abstract: Background: A prevalent medical condition that results in fatality and long-term impairments is stroke. The abrupt loss of neurologic function associated with a stroke is brought on by a focused disturbance in the blood supply to the brain brought on by ischemia or hemorrhage. Excitotoxicity, oxidative and nitrative stress, inflammation, and apoptosis are a few of the pathophysiological events that contribute to brain injury after stroke.

Objectives: Estimate the platelet count and MPV Mean platelet volume in Ischemic Stroke patients and healthy volunteers by using automatic complete blood count and find the linkage between the platelet count and MPV with Ischemic Stroke occurrence.

Methodology: Based on 55 samples from patients and a control group, in the period from 13 November 2022 to 8 January 2023 under the supervision of general surgery doctors. Two ml blood sample with EDTA tube was collected from each Patients group with ischemic stroke after clinically diagnosis and Healthy control group, and by using the clinical hematology analyzers CBC to estimate of the PLT count and MPV.

Results: In these study. Result show that the mean platelet count of patients group was higher than that of the control group in a highly significant manner ($p = 0.002$), while the platelet volume of patients group was lower than that of control group in a no significant manner ($P = 0.213$).

Conclusion: The results of this study emphasize that platelets play a role in the pathogenesis of stroke, PC and MPV appeared to be significantly different from control populations. Ischemic stroke demonstrated significantly higher PC, and revealed significantly lower MPV.

INTRODUCTION

Ischemic stroke is caused by either a thrombotic or an embolic event that stops blood from getting to the brain. (Hui, Tadi and Patti, 2022). Several risk factors, such as diabetes, smoking, high cholesterol, and high blood pressure, have been linked to cerebral stroke (Ludhiadch et al., 2022).

The spread of stroke is changing quickly, and the number of strokes around the world keeps going up. (El-Hajj et al., 2016). Stroke is the second most common cause of impairment and death in the world (Saini, Guada and Yavagal, 2021). With 5.9 million people will have died and 102 million disability-adjusted life years will have been lost. (Feigin et al., 2014). Stroke is the third largest cause of death in Iraq (Baktash et al., 2021). Only heart disease and death from war kill more people.

Intravascular clotting is caused in part by the platelets in the blood. People used to think that the size of a platelet showed how active it was. (Al-Tameemi and Ameen, 2012) looked at platelet indices as a way to identify acute ischemic stroke (IS) on their own. Changes in mean platelet volume (MPV) and platelet count (PC) could be a sign or indicator of an acute stroke (AS) (Sadeghi et al., 2020).

Platelets are vital parts of thrombosis and are crucial to the process, which can be triggered by inflammation, platelet rupture, and other factors. The coagulation pathway is started and the hemostatic block is formed by activated platelets. The evaluation of platelet activity takes into account platelet indicators. Some platelet indices include platelet count (PC), mean platelet volume (MPV), and platelet distribution width (PDW). (Zarmehri et al., 2020)

METHODOLOGY

A case control analytical study was conducted on 55 healthy control group and 55 patients group with ischemic stroke identified based on clinical features and MRI of Brain admitted in the specialized center for diseases of the nervous system in Al-Diwaniyah Teaching Hospital.

A lab worker will take a blood sample for a CBC from a vein, usually on the inside of the elbow or the back of the hand. It won't take long at all to finish the exam.

Five ml blood sample with EDTA tube was collected from each Patients group with ischemic stroke after clinically diagnosis and Healthy control group, and by using the clinical hematology analyzers CBC to estimate of the PLT count and MPV.

The Study Instrument

1. Blood collection tubes and other phlebotomy supplies*
2. Disposable gloves, lab coat and eye protection*
3. Automated Hematology Analyzer is an electrical resistance type blood cell counter. Uses a human whole blood specimen and produces results for 12 hematology parameters including the PLT count and MPV

RESULTS AND DISCUSSION

Table 1 Mean platelet count (MPC) among the Study group and control group.

Study group			Control group		
Plate late count	Frequency (n)	%	Plate late count	Frequency (n)	%
Low	0	0	Low	0	0
Normal	22	40	Normal	55	100
High	33	60	High	0	0
Total	55	100.0	Total	55	100.0
Mean	281.01		Mean	171.959	

Table (2) : Mean platelet volume (MPV) among the Study group and control group

Study group			Control group		
Plate late volume	Frequency	%	Plate late volume	Frequency	%
Low	1	1.81	Low	0	0
Normal	41	74.54	Normal	55	100
High	13	23.63	High	0	0
Total	55	100.0	Total	55	100.0
Mean	9.36		Mean	7.01	

The results of the present study in Table 1 and Table 2 explored the statistics of Mean platelet count and volume. This finding was the percentage of platelet count in study group 40% normal and 60% high with mean 281.01 while in the control group 55% normal with mean 171.959 show in table (1). while The percentage of platelet volume in study group 1.81% low and 74.54 % normal and high with mean 9.36 while in control group 100% normal and high with mean 7.01 show in table (2).

By contributing to thromboembolic processes, platelets have been linked to the onset of stroke symptoms and the subsequent development of localized cerebral ischemia. Blood platelets are an important part of the blood-vascular axis, which works together to stop bleeding. Platelets play a crucial role in the initiation of a hemostatic plug and in providing a scaffold for the subsequent activation of coagulation. Exposure of the vascular sub endothelium, fibrin deposition, and aberrant surfaces (such as atheroma) are all factors that might trigger platelet activation (Asada et al., 2020). These findings agree with those of (Chen et al., 2015) that the majority of patients with ischemic stroke had increase in MPC and slightly increase at MPV value in study group while was normal in control group. Also, These findings agree with those of (Altintas et al., 2016) that most samples participating in the study had high value of MPC and normal MPV as a result of ischemic stroke. These findings agree with those of (Lok et al., 2017) that show there is an increase in Mean platelet volume for patients with ischemic as result of the finding with a mean (8.5). These findings are agreed with those of, (Sotero et al., 2021) which shows that there is high value for Mean platelet count and within normal Mean platelet value among patients with ischemic stroke.

These findings agree with those of (Chen et al., 2015), who found that half of the samples in the study had an increase in MPC value rather than control group which was normal MPC.

These findings agree with those of (Zheng et al., 2020) , which result was found that half of the samples in the study had an increase in MPC value rather than control group which was normal MPC on other direction there is normal value for MPV for all group.

CONCLUSION

Platelets were shown to be considerably different from control populations in terms of PC and MPV, highlighting their significance in the pathogenesis of stroke. Ischemic stroke was associated with markedly increased PC and indicated markedly decreased MPV.

RECOMMENDATIONS

1. Our results emphasize the importance of MPC /Plt ratio for the identification of ischemic stroke
2. Researching the association between platelet count and MPV in disease susceptibility in individuals with ischemic stroke requires a bigger sample size investigation.
3. A follow up study based on large reasonable number of patient in order to find prognostic importance of these biomarker.

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