CORRELATION OF PLATELET INDICES IN PATIENTS WITH ACUTE CEREBRO-VASCULAR ACCIDENT

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Abstract

Background: Platelets in particular play an important part in the formation of cerebral atherothrombotic events. Increased MPV (mean platelet volume) may be an indicator of increased platelet activation, and may thus be related to the severity and prognosis of stroke; the larger the MPV, the worse the outcome. This study done to determine the Mean Platelet Volume (MPV) in patients with acute cerebro vascular accident (both ischemic & haemorrhagic) and correlate platelet indices with severity of acute cerebrovascular accident.

Method: A prospective case control study of 30 Patients of acute stroke carried out at Mahatma Gandhi Medical College and Hospital, Jaipur.

Results: It is observed that MPV and IPF in stroke cases (9.94±1.133 fl and 10.07±6.970 respectively) was statistically significantly higher than control group (8.56±0.8119 fL and 8.686±4.731 respectively). Platelet count was statistically significantly lower in cases than control group (199.8 ± 65.60×10^3/μL and 265.9 ± 95.53×10^3/μL respectively). PDW in stroke cases was higher than control group but statistically non-significant. All platelet indices have significant relationship with severity.

Conclusion: This study has shown an association of elevation of MPV, IPF & PDW and reduction of platelet count in acute ischemic stroke and hemorrhagic stroke. The observations here suggest a role for larger platelets in the genesis of cerebral thrombosis. These platelet indices are found to be associated with the severity in acute stroke overall and also among patients with ischemic stroke.

Keywords: Cerebrovascular accident, Ischemic and haemorrhagic stroke, Platelet indices, Mean platelet volume.

INTRODUCTION

A stroke or cerebrovascular accident is defined as an abrupt onset of a neurological deficit that is attributable to a focal vascular cause.[1] In India, community surveys show a prevalence rate for hemiplegia in the range of 200 per 1,00,000 persons. Platelets in particular play an important part in the formation of cerebral atherothrombotic events and ischemic processes, which encompass adhesion, release reaction, and aggregation of platelets.[2,3]. Circulating platelets are heterogeneous with regard to their size, density, and reactivity, and platelet volume indices are biomarkers of degree

of platelet activation that are thought to be associated with systemic inflammatory responses. These indices include platelet count (PC), mean platelet volume (MPV), and platelet distribution width (PDW). The present study is designed to show that increased MPV may be an indicator of increased platelet activation, and may thus be related to the severity and prognosis of stroke; the larger the MPV, the worse the outcome.

Materials and methods:

A prospective case control study of 30 Patients of acute cerebro vascular accident (both ischemic and haemorrhagic) with definitive signs of neurlogical deficit, confirmed by imaging CT/MRI brain and carried out from November 2023 to October 2024 at Mahatama Gandhi Medical College and Hospital, Jaipur. MPV level was compared between stroke patients and control.

Patients with thrombocytopenia <1 lac either due to infective cause/hereditary cause/ drug induced, any patient with malignancy, those unable to communicate because of cerebro vascular accident without a valid respondent and those presenting after 48 hrs of cerebro vascular accident would be excluded. Controls are without cerebrovascular accident and excluded those who have thrombocytopenia <1 lac either due to infective cause / hereditary cause/ drug induced / autoimmune, those with malignancies and those unable to communicate.

Complete general and neurological examination was done. CBC with differential count and other value, RFT and LFT were estimated. ECG, CT/MRI of brain were done.The difference in means of two groups would be analysed using student's 't' test and difference in means of >2 groups would be analyzed using anova test.

Difference in proportion would be analyzed using chi square test. Odds ratio would be calculated for raised level of platelet indices. The level of confidence would be kept 95% for all statistical analysis.

RESULTS:

Table 1: Comparison of age, gender and platelet parameters in case and control groups

Parameters	Case Group (N=30) Mean ± SD	Control Group (N=30) Mean ± SD	p Value
Age (Years)	48.60±8.268	45.76±8.235	
Gender (m/f)	21/9	20/10	
Platelet Count ($\times 10^3$/µL)	199.8 ± 65.60	265.9 ± 95.53	<0.0001
MPV(fL)	9.94±1.133	8.56±0.8119	<0.0001
IPF (%)	10.07±6.970	8.686±4.731	0.0483
PDW(fL)	12.87±3.594	11.61±2.992	0.0582 NS

As a total of 60 subjects, mean age of case group was 48.60±8.268 years, and the mean age of control group was 45.76±8.235 years. There were 21 male cases and 9 female cases in study group in contrast to 20 male cases and 10 female cases in control group. Comparison of the two group regarding demographic & Hematological parameter shown in table 1.

As shown in table 1 there is no statistically significant difference among the two groups with regards to the age and sex composition (p>0.05). Mean platelet count in cases and controls were 199.8 ± 65.60 and 265.9 ± 95.53×10^3/µL respectively. Mean platelet count in case group was significantly lower than control group (p<0.0001). Mean of MPV in cases and controls were found 9.94±1.133 and 8.56±0.8119fL respectively. It is observed that MPV in stroke cases was statistically significantly higher than control group (p value of <0.001). Mean of IPF in cases and controls were found 10.07±6.970 and 8.686±4.731 respectively. It is observed that IPF in stroke cases was statistically significantly higher than control group (p=0.0483). Mean of PDW in cases and controls were found. 12.87±3.594 fL and 11.61±2.992 fL respectively. It is observed that PDW in stroke cases was higher than control group but statistical non-significant (p value of 0.0582). (Table.1)

The mean value of Platelet count was higher in mild group (229.3 ± 72.76×10^3/μL) as compared to moderate (165.6 ± 64.53×10^3/μL) and severe group (176.3±46.46×10^3/μL), which was statistically significant (P=0.0456). The mean value of MPV was higher in severe group (10.59±0.9959 fl) as compared to mild (7.95±0.5727 fl) and moderate group (9.31±1.054 fl), which was statistically significant (P<0.0001). The mean value of IPF was higher in moderate group (13.25±8.328) as compared to mild (5.238±2.0098) and severe group (10.68±4.839), which was statistically significant (P=0.0011). The mean value of PDW was higher in moderate group (14.80±3.825 fL) as compared to mild (9.96±1.645 fL) and severe group (13.20±2.154 fL), which was statistically significant (P<0.0001). (Table.2)

Table 2: Comparison of platelet parameters in stroke cases among study subjects according to severity group

Hematological parameters mean ± SD	Mild (n=10)	Moderate (n=15)	Severe (n=5)	P value
Platelet Count (×10^3/μL)	229.3 ± 72.76	165.6 ± 64.53	176.3±46.46	0.0456
MPV(fL)	7.95±0.5727	9.31±1.054	10.59±0.9959	<0.0001
IPF (%)	5.238±2.098	13.25±8.328	10.68±4.839	0.0011
PDW(fL)	9.96±1.645	14.80±3.825	13.20±2.154	<0.0001

DISCUSSION

The mean age for cases was 48.60±8.268 years when in contrast with 45.76±8.235 years in controls. The greater part of the patients were in the age gathering of 61-70 yrs. The finding of this study was equivalent with study done by Bath et al[4] (65±9 years).The mean age in our investigation was lower in contrast with some western examinations like O'Malley et al[5] (79.5 ± 6.5 years), Butterworth et al[6] (71.9±10.8 years), A. Muscari et al[7] (78 years) and Pikija et al[8] (76 years) however it is higher when compared with an Indian examination by in Parvaiz et al[9] (58 years).

We found a male prevalence among cases in our study. Similar results seen in various studies, M/F proportion being 214/87 in Bath et al[5], 59/41 in Parvaiz et al[9] and 52/48 in Farahnaz et al[10] considers. There are additionally a couple of studies where a female dominance was seen like 19/39 in investigation by O'Malley et al[5] and 32/49 in Pikija et al[8].

Platelet parameters evaluated were mean platelet volume (MPV), total platelet count, IPF and PDW. MPV in stroke cases was measurably essentially higher than control gathering (p <0.001) in our study. The finding of this study was equivalent with study done by O'Malley et al[5] and D' Erasma et al[16]. In study done by Tohji et al[17], MPV in cases in contrast with controls was significantly lower.

Mean platelet count on the off chance was essentially lower than control gathering (p<0.0001. The finding of this study was equivalent with study done by O'Malley et al[5] ,D' Erasma et[16] and Tohji et al[17] .It is seen that IPF in stroke cases was measurably essentially higher than control gathering (p =0.0483*). It is seen that PDW in stroke cases was higher than control aggregate however factual non-huge (p = 0.0582).

The mean estimation of Platelet count was highest in gentle gathering compared to moderate and serious gathering which was measurable noteworthy (P=0.0456) and serious gathering have lowest value. Farahnaz et al[10] likewise directed comparative investigation and discovered low platelet count was found to be connected with extreme stroke case (p= 0.02).

The mean estimation of MPV was highest in serious gathering when in contrast with gentle and moderate gathering, which was factual huge (P<0.0001***) and gentle gathering have lowest value. Farahnaz et al[10] and Butterworth et al[6] likewise led comparative examination and discovered high MPV was altogether connected with extreme stroke case (p =0.002). While O'Malley[5] found no factually huge relationship with MPV and severity group. The mean estimation of IPF and PDW was highest in moderate gathering compared to gentle and serious gathering, which was factual noteworthy (P<0.001) and lowest value in gentle gathering.

CONCLUSION

In conclusion, this study has shown an association of elevation of MPV, IPF & PDW and reduction of platelet count in acute ischemic stroke and hemorrhagic stroke. The observations here suggest a role for larger platelets in the genesis of cerebral thrombosis. These platelet indices are found to be associated with the severity in acute stroke overall and also among patients with ischemic stroke.

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