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ASSESSMENT OF PLATELET COUNT AND ITS ASSOCIATION WITH STROKE SEVERITY IN PATIENTS WITH ACUTE ISCHEMIC STROKE FROM LARKANA

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ABSTRACT

Background: *Platelets are crucial in vascular disease progression, with mean platelet volume (MPV) being a significant physiological variable. Large platelets are more reactive, produce prothrombotic factors, and aggregate easily. Their characteristics are determined by their bone marrow megakaryocyte. Platelet production mechanisms are unclear, but they may be controlled by hormonal factors.*

Methodology: *This cross-sectional study was conducted in private clinics and neurology wards in the Larkana region between June to October 2024. The sample size consisted of 120 cases and 120 controls, A clinical diagnosis of stroke was made, and brain imaging confirmed the diagnosis. The NIHS scale, used to evaluate stroke patients, was used to track progress and predict prognosis. Blood samples were collected and analyzed using an automated hematology analysis system. The results were compared using the t-test for independent samples and an independent sample t-test for differences in mean values among cases with varying illness severity scores.*

Results: *A study found that 68.3% of stroke cases were male, with 31.7% female. The majority were from metropolitan areas, with an average age of 52.42 years. The majority of patients were aged 27-30, with 7% experiencing a small stroke, 26% a moderate stroke, 37% a moderate to severe stroke, and 30% a severe stroke. The study found no significant difference in mean platelet count between 25-35 age groups.*

Conclusion: *The study concludes that ischemic stroke is more common in males and middle-aged and older adults, with more cases in urban areas, and that stroke contributes to decreased platelet count.*

Keywords: *Ischemic stroke, Severity, Platelets, Larkana.*

INTRODUCTION

In acute ischemic stroke, clinicians and researchers must assess the extent of anatomical and clinical damage 1It is already known that platelets play a part in both innate and adaptive immunity. Furthermore, platelets' antimicrobial peptides have a direct, strong, and immediate antibacterial effect that helps reduce risk. When atherosclerotic plaques erode or rupture, 2A platelets become crucial to the pathogenesis of ischemic stroke 3. Because hemostasis maintains the integrity of the vessels, platelets are necessary. The hemostatic factor thromboxane A2.3 and the prothrombotic agent serotonin, which is produced by platelets, are directly responsible for hemostasis of circulating cells.

Platelet size-determining MPV is positively correlated with platelet activity markers such as thromboxane A2, platelet factor 4, and β-thromboglobulin.6, 7When platelet size and platelet counts (PC) are elevated, the thrombotic tendency is elevated.3Due to their higher granular content, larger platelets react more readily than smaller ones, generate more thromboxane A2 and other prothrombotic factors, and accumulate more collagen, adrenaline, and adenosine diphosphate (ADP).8. Studies have shown a correlation between cardiovascular risk factors such as myocardial infarction, diabetes mellitus, hypercholesterolemia, metabolic syndrome, smoking, and ischemic stroke and larger platelets.9 and 10 This study sought to determine whether platelet counts and the severity of acute ischemic stroke were related.

Methodology:

This cross-sectional study was carried out in the Larkana region's private clinics and neurology ward between June to October of 2024. with permission from the Institutional Review Board. 120 cases and 120 controls made up the sample size. Participants in this study had to be at least 18 years old. Patients from the Larkana region and those with a confirmed ischemic stroke were also included in this study. Patients who were younger than 18 years old and older than 75 years were not allowed to participate in this study, nor were those who lived in other parts of Larkana.

In addition to conducting clinical assessments of patients at Larkana, a non-probability convenience sampling technique was employed following informed consent. Throughout the course of treatment, every patient underwent a thorough medical history that included any medications, cerebrovascular accidents, ischemic heart disease, a thorough examination of the nervous system and overall health, and an investigation of all suggested biochemical characteristics 11

The study included patients who showed signs of an acute ischemic stroke. A clinical diagnosis of stroke was made (associated with a quick onset of neurological impairments lasting 24 hours or longer), and brain imaging (CT computed tomography and magnetic resonance imaging, or MRI) corroborated the diagnosis.12 The NIHS is a clinical instrument that assesses the degree of stroke severity in patients. Patients are divided into four categories: minor, moderate, moderate to severe, and severe stroke. The scale extends from 0-42. The NIHSS is frequently used in clinical practice and research to evaluate stroke patients at the outset, track their progress, and forecast their prognosis. In order to obtain fresh blood samples from the veins into tubes containing ethylene-diamine-tetra-acetic acid (EDTA) as an anticoagulant, a forearm vein was pierced. After venipuncture, samples could be processed for no more than two hours. The samples were kept between venipuncture and processing at room temperature (25°C). To calculate the platelet count and mean MPV (in fL), an automated haematology analysis system (Sysmex XN-3000) was utilized. The Statistics Package for Social Sciences (SPSS) version 24.0 software was used to analyze the data. Mean and standard deviation were used to calculate the results. The t-test for independent samples was employed to ascertain whether there was a significant difference in the means and SD between the case and control groups. To find out how the mean values of the above listed characteristics varied amongst cases with varying illness severity scores, an independent sample t-test was employed. P-values ≤0.05 were considered statistically significant.

Results:

Table 1.0 demonstrates that, out of 120 stroke cases, 68.3% were reported to be male and 31.7% to be female, whereas, out of the control group, 63.3% were male and 36.7% were female. This indicates that the proportion of males is high. Male stroke patients were 52.42 years old on average, while female stroke patients were 52.22 years old on average. The mean age of the control group was 50.12 years old, and the mean age of the family control group was 49.87 years old. The minimum age observed was 28 years in cases and 27 years in controls. In comparison to the control group, which was 30% rural and 70% urban, 33.3% of patients were from rural areas, and 66.7% were from urban areas. This indicates that the majority of patients are from metropolitan areas.

Table 1.0 Comparison of Demographic Variables between Cases and Controls

Variable	Category	Cases (n=120)	Controls (n=120)
Sex	Male	82 (68.3%)	76 (63.3%)
	Female	38 (31.7%)	44 (36.7%)
Age (Mean age in years)	Male	52.42 years	50.12 years
	Female	52.22 years	49.87 years
Age (Range in years)	Minimum	27 years	25 years
	Maximum	75 years	74 years
Residency	Rural	40 (33.3%)	36 (30.0%)
	Urban	80 (66.7%)	84 (70.0%)

Figure 1.0 displays the study population, with 3% of patients reported to be between the ages of 27 and 30, 13% to be between the ages of 31 and 40, and a greater proportion of patients reported to be between the ages of 41 and 50, 24% to be between the ages of 51 and 60, and 5% to be between the ages of 71 and 75 years.

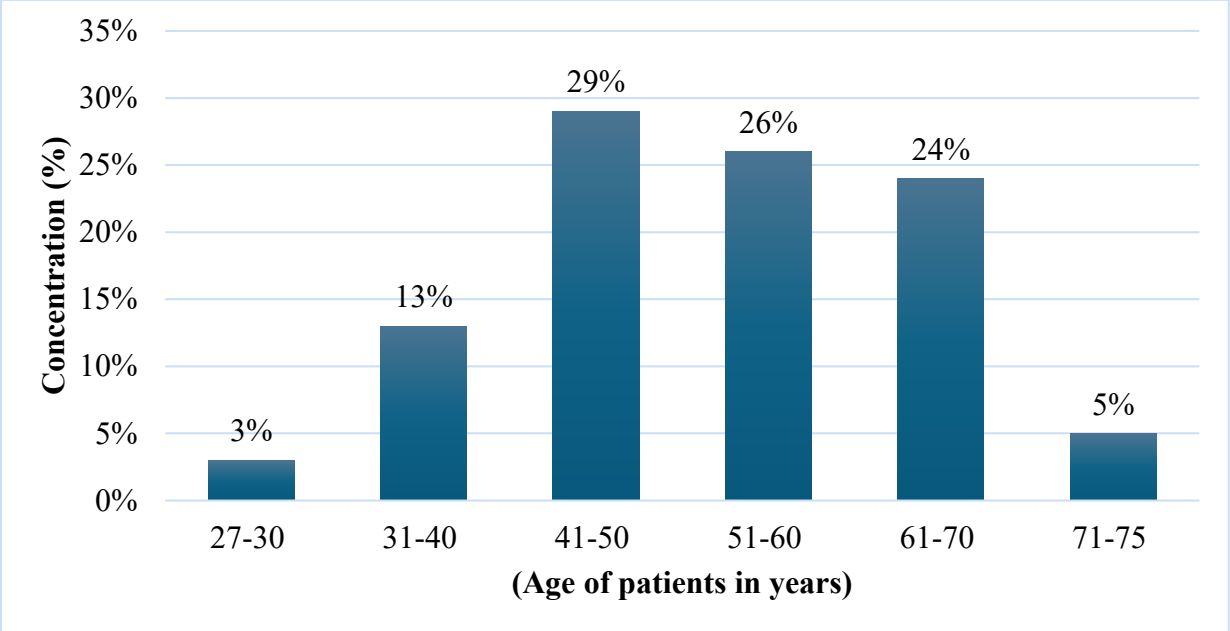

Figure 1.0 Age-Wise Distribution of Study Participants

Figure 2.0 illustrates how patients are categorized based on the severity of their strokes: 7% reported having a small stroke, 26% reported having a moderate stroke, 37% reported having a moderate to severe stroke, and 30% reported having a severe stroke.

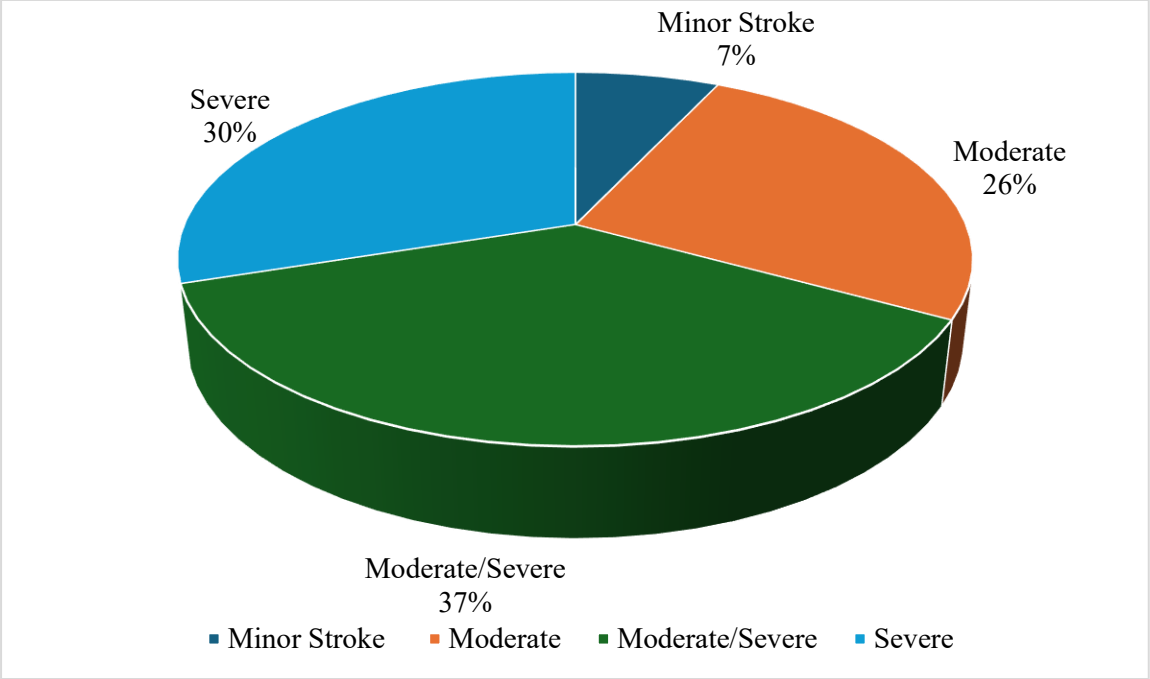

Figure 2.0 Distribution of Stroke Severity among Patients Based on NIHSS Score

Table 2.0 indicates that 348 ± 42 × 10⁹/L is the mean platelet count for 7% of instances of mild stroke. In comparison to minor stroke cases, 26% of patients had a moderate stroke, with a mean and SD platelet count of 332 ± 48 ×10⁹/L. With a platelet count of 318 ± 40 × 10⁹/L, which is lower than that of mild stroke, 37% of cases were reported to have moderate to severe stroke, and 30% had a platelet count of 305 ± 38 ×10⁹/L.

Table 2.0 Platelet Count Distribution According to Stroke Severity

Stroke Severity	Patients (n)	Percentage (%)	Platelet Count (Mean ± SD, ×10⁹/L)
Minor Stroke	8	7%	348 ± 42
Moderate	31	26%	332 ± 48
Moderate/Severe	44	37%	318 ± 40
Severe	36	30%	305 ± 38

Table 3.0 indicates that there was no statistically significant difference in the mean platelet count in the 25–35 age group, which was 342 ± 46 ×10⁹/L in cases and 355 ± 44 ×10⁹/L in controls. According to the study, middle-aged patients' mean platelet counts were slightly lower than those of the control group, at 336 ± 42 ×10⁹/With a mean of 328 ± 48 ×10⁹/L and a p-value of P=0.02, the mean platelet count in patients aged 46–55 was significantly greater than in controls. According to the study, the mean platelet count of the 56–65 age group was 318 ± 40 × 10⁹/L for the cases, whereas the higher value of 340 ± 42 × 10⁹/L for the controls (p=0.0). Platelet counts in the 66–75 age group dropped considerably from 335 ± 40 ×10⁹/L to 309 ± 38 ×10⁹/L, according to the study; the p-value was 0.001.

Table 3.0 Age-wise Platelet Count in Cases and Controls

Age Group (years)	Cases (Mean ± SD)	Controls (Mean ± SD)	Normal Range (×10⁹/L)	p-value
25–35	342 ± 46	355 ± 44	150–450	0.21
36–45	336 ± 42	352 ± 40	150–450	0.04

46–55	328 ± 48	348 ± 46	150–450	0.02
56–65	318 ± 40	340 ± 42	150–450	0.01
66–75	309 ± 38	335 ± 40	150–450	0.001

Discussion:

With a mean age of 52.4 years and an urban residency rate of 66.7% in patients and 70% in control, our results showed that there were 68.3% male cases and 63.3% control. Another study from Pakistan confirmed that among ischemic stroke patients, the male-to-female ratio was 1:3:1, with the male being more dominant (13). Other research supports our findings that women have fewer hospitalizations due to later hospitalization and a lower burden of disease, since more stroke incidents were documented in men with higher risk factors for smoking, hypertension, and occupational stress (14). The age range for ischemic stroke cases is 28–75 years, whereas the age range for control cases was 27–74 years. The lower age range emphasizes the young stroke, as a recent study from Karachi revealed that hospital-based data indicate that stroke cases among people in their 20s and 30s are caused by cerebro vascular disease in Pakistan (15). According to our findings, urban areas accounted for the majority of cases (66.7%) and controls (70%) whereas rural areas had 33.3% of cases and 30% of controls. An epidemiological survey indicates that the burden of stroke is high in rural regions because of preventive care, whereas another study from Pakistan contrasts this finding, showing that the rural population had a higher number of cases due to treatment delays (16). Our findings showed that 26% of respondents had a moderate stroke, 37% had a moderate to severe stroke, 30% had a severe stroke, and 7% reported having a mild stroke. When compared to comparable studies with worldwide stroke According to one study, 29% of people have severe strok, 49% have moderate strok, and 22% have light stroke (17). According to our findings, the mean platelet count decreases with stroke severity, going from 348 in moderate stroke to 305 in severe stroke. Another study confirms our findings that patients with decreased platelet counts had a higher risk of stroke (18). Another Pakistani study emphasizes the link between the platelet-rich plasma ratio and the severity of sickness (19). Our results showed that the platelet count was slightly lower in middle age compared to the control group. This is consistent with prior studies that indicated decreased platelet counts in stroke cases as the severity of the disease increased.

Conclusion:

The findings of the study showed that ischemic stroke was more common in middle-aged and older adults and in men than in women. Additionally, more instances of moderate to severe stroke were recorded from urban populations. The number of platelets decreased with age and severity of illness; this suggests that stroke may be a contributing factor to the change in platelets.

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