

FREQUENCY OF LEUKOCYTOSIS IN ACUTE ISCHEMIC STROKE

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ABSTRACT

Objective: To determine the frequency of leukocytosis in patients having acute ischemic stroke.

Methods: This study was carried out in the Department of Medicine, MTI-HMC, Peshawar, from 03-12-2015 to 02-06-2016. Through a cross sectional study, a total of 126 patients presenting with presenting neurological deficit, admitted at Medical Ward. After taking history, appropriate physical examination was performed to find the leukocytosis.

Results: Amongst 126 patients, 75 were males patients and 51 females patients with age range of 30-60 years (Mean $47.22 \text{ years} \pm 7.76\text{SD}$). Over all frequency of leukocytosis in newly-detected acute ischemic stroke were observed in 55(43.65%).

Conclusion: The incidence of leukocytosis is high in acute ischemic stroke, so consideration may be made while managing such patients.

Key Words: Ischemic stroke, leukocytosis, hypertension, diabetes mellitus.

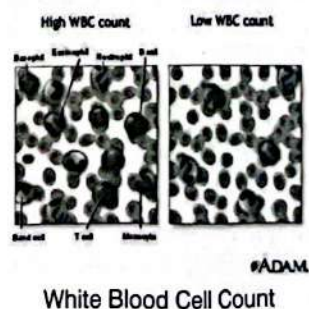
INTRODUCTION

Stroke is a main health problem worldwide because of its high risks of morbidity and mortality¹. As per 2005 World Health Organization report, about 5.7 million deaths are caused by stroke, and over 50 % of cases occurred in Asians^{2,3}. Ischemic Stroke accounts for over 50 % of all types of stroke cases. Inflammation and inflammation related atherosclerosis play a central role in Ischemic stroke progress and prognosis⁴. Accurate data about the occurrence and frequency of stroke in Pakistan is lacking but the burden is assumed to be high because of the high frequency of major risk factors for stroke in our population⁵.

Stroke is defined as a syndrome of quick onset of neurological deficit, usually focal, lasting more than 24 hour or leading to death with no cause apparent other than a vascular one. The load of ischemic stroke is increasing worldwide because of the rise in the major risk factor for ischemic stroke i.e. hypertension, diabetes, obesity, smoking and dyslipidemia⁶. Leukocytosis is an increase of the concentration of leukocytes or white blood cells in blood, and is generally considered to be present when the white cell count (WCC) exceeds $11 \times 10^9/\text{l}$. Widely considered to be an indicator of infection or inflammation, leukocytosis can also occur in a variety of other clinical situations, such as trauma, exercise, therapy with drugs such as steroids or lith-

ium, malignancy, poisoning, psychosis and diabetic ketoacidosis⁷. Leukocytosis may represent an 'acute phase marker' analogous to C-reactive protein (CRP) or the erythrocyte sedimentation rate (ESR). Interestingly, raised circulating catecholamines can cause leukocytosis, perhaps as part of a generalized stress response⁷. A large study showed that higher admission leukocyte counts were associated with several fold increase risk of dependency and death among acute cerebral infarction patients. Leukocytosis was observed in 46.7% of acute ischemic stroke patients⁸. The rationale of the study is to investigate the frequency of leukocytosis obtained at admission in first ever acute ischemic stroke patients. Changeable conclusions have been drawn on the association of leukocytosis and stroke, a greater understanding of leukocytes contribution in acute ischemic stroke and its effect on morbidity and mortality is still required. Although international studies on this topic have been done, local data on this aspect of stroke is lacking. Better understanding of the effect of leukocyte count in the acute phase of stroke might have profound implications for the acute management of stroke, and it might improve clinical outcome.

The figure below show high and low WBC counts.



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OPERATIONAL DEFINITIONS

ISCHEMIC STROKE: It was defined as quick start of cerebral shortage usually focal lasting more than 24 hours with no obvious cause other than a vascular one. It was diagnosed on CT brain showing hypodense lesion, done 12 hours after onset of symptoms.

LEUKOCYTOSIS: It was defined as WBC count $\geq 10,000$ cells/mm³.

MATERIAL AND METHODS

This study was carried out in the Deptt of Medicine, MTI-HMC, Peshawar 03-12-2015 to 02-06-2016. Through a descriptive cross sectional study design, a total of 126 patients Through a descriptive cross sectional study design, a total of 126 patients presenting with presenting neurological deficit, admitted through Medical Ward were selected. After taking history, appropriate physical examination was performed to find the leukocytosis. Inclusion criteria was both genders with age between 30-60 years and with acute ischemic stroke presented within 24 hours of onset at arrival. Exclusion criteria was patients with transient ischemic attacks, pwith haemorrhagic stroke, patients with other causes of stroke, i.e. hereditary, metabolic, acquired coagulopathies, drugs, and all other causes of stroke, patients with other causes of leukocytosis e.g.: Infections, blood disorders, drugs (e.g. steroids). All patients who presents with acute ischemic stroke were admitted to Medical Ward. Detailed history and clinical examination were performed for all patients. WBC counts were collected within 24 hours of admission. Early CT scan head performed for all patients to rule out haemorrhage. Relevant neuroimaging were performed if required to rule out other causes of stroke like MRI for space occupying lesions, CTA (CT angiography) for carotid or vertebral artery dissection. Relevant laboratory investigations were performed such as Liver function tests, Renal function tests, Blood glucose, Serum electrolytes, 64 Full blood count, to rule out hypoglycaemia, hepatic encephalopathy, and uremic encephalopathy. All other causes of leucocytosis were ruled out with detailed history and clinical examination, urine RE, chest X-ray. All the data were stored and analyzed in SPSS version 10. Descriptive statistics were used to calculate Mean \pm SD for numerical variables like age. Frequencies and percentages were calculated for categorical variables like gender, leukocytosis. Leukocytosis was stratified among age and gender to see effect modifiers. All results were presented in the form of tables and graphs.

RESULTS

In this study, 126 patients having newly detected acute ischemic stroke had observed. The mean age of the patients was 47.22 years \pm 8.74SD with range of 30-60 years. Majority of the patients presented with stroke were follow in age range of 46-55 years. There were 13 (10.3%) patients in the age range of less than 35 years,

Table 1: Distribution of Patients By Age (n=126)

	Frequency	Percent-age	
≤ 35.00	13	10.3%	47.22 \pm 8.75
36.00 - 45.00	36	28.6%	
46.00 - 55.00	48	38.1%	
56.00+	29	23.0%	
Total	126	100.0%	

Table 2: Gender Wise Distribution (n=126)

Gender	Frequency	Percentage
Male	75	59.52%
Female	51	40.48%
Total	126	100%

Table 3: Stratification of Leukocytosis With Age (n=126)

	Leukocytosis		Total
	Yes	No	
Age (in years) ≤ 35.00	6 46.2%	7 53.8%	13 100%
36.00 - 45.00	16 44.4%	20 55.6%	36 100%
46.00 - 55.00	17 35.4%	31 64.6%	48 100%
56.00+	16 52.2%	13 44.8%	29 100%
Total	55 43.7%	71 56.3%	126 100%

Table 4: Stratification of Leukocytosis with Gender (n=126)

Gender	Leukocytosis		Total
	Yes	No	
Male	33 44%	42 56%	75 100%
Female	22 43.1%	29 56.9%	51 100%
Total	55 43.7%	71 56.3%	126 100%

36 (28.6%) patients in the age range of 36-45 years, 48 (38.1%) patients in the age range of 46-55 years and 29 (23%) patients in the age range of more than 55 years. (Table 1). There were 75 (59.52%) male patients and 51 (40.48%) female patients while the male to female ratio was observed as 1.47:1. Over all frequency of leukocytosis in newly-detected acute ischemic stroke were observed in 55(43.65%) while 71(56.35%) were free of leukocytosis. Age wise distribution of leukocytosis in newly-detected acute ischemic stroke was found a little

bit high in older age group and the rest of age group have almost same pattern. it was insignificant with P value = 0.402 Table 3. The majority of females detected with acute ischemic stroke having leukocytosis as that of male patients but statistically insignificant with p-value=0.535. Table 4.

DISCUSSION

Stroke is the commonest reason for admission to a neurology unit in our part of the world.³ World Health Organization defines stroke as quick onset of a new neurological deficit qualified to obstacle or break in the cerebral arterial system persisting for at least 24 hours and had to include specific localizing findings confirmed by neurological examination and by computed tomography (CT) scan brain, with lack of evidence of an underlying non-vascular reason.⁴ Stroke can be "Transient" if complete recovery occurs in 24 hours, "Evolving" if a neurological deficit continues to worsen 6 hrs after the onset and "Complete" when a fixed non evolving deficit is established. Out of complete type, ischemic strokes accounts for nearly two-third of all strokes, which further are either of thrombotic or embolic type.⁵ Ischemic stroke (70.1%) is far more common than the hemorrhagic type (29.9%) in Pakistan as well.⁴ In my study the mean age of the patients was 47.22 years \pm 8.75SD. As compared with the study of Barech et al³⁸ the mean age of the patients was 61 \pm 9.7 years, which is comparable with our study. In another study conducted by Taj et al³⁹ at Agha Khan University Hospital Karachi and found that mean age of the patients was 57 \pm 13.9 years, the average age is low as that study as we have limited the study up to 60 years of age. In our study there were 59.5% male patients and 40.5% female patients. As compared with the study of Barech et al³⁸ there were 60.3% male patients and 39.7% female patients, which is similar with our study. In another study conducted by Khan et al³⁹ there were 78% male patients and 22% female patients, which is also similar with our study. In a study conducted by Taj et al⁴⁰ at Agha Khan University Hospital Karachi and found that there were 65.4% male patients and 34.6% female patients, which is also comparable with our study. Previous studies concluded that in-admission higher WBC is of independent predictors of weak result while releasing from hospital.⁴¹ They introduced in-admission higher WBC as independent predictors of in-hospital mortality.⁴² Several studies have evaluated the relation between the leukocytosis and prognosis of patients suffering from ischemic stroke.⁴⁴ In a previous research, 400 patients are fond with acute cerebral stroke in Poland. Accordingly, increasing in-admission WBC independently was accompanied by worse prognosis and higher mortality rate. The main difference of the study with our is related to considering hemorrhagic stroke along with its ischemic type⁴³. In one of the study, meaningful relationship was observed between in-admission higher levels of blood WBC and patient's weak diagnosis.⁴³ Zaremba et al

studied the relation between in-admission leukocytosis and undesired prognosis of ischemic stroke in patients with coronary heart disease and reported a meaningful result⁴⁶. Different studies have emphasized the relation between increasing of in-admission WBC's and serious prognosis of those patients with ischemic stroke^{47,48}. In the preceding research, it is demonstrated that increasing of ESR in patients suffering from stroke at carotid artery area at 6 first hour may be accompanied by a serious prognosis^{49,50}. In another study, a relation was indicated between ESR level during initial stages of stroke and the patients worse prognosis.⁵¹ In another study on 208 patients with ischemic stroke, it was suggested that increasing WBC is accompanied by a worse prognosis in these patients.⁵²

CONCLUSION

It is concluded in my study that the high incidence of leukocytosis, seems to be major risk factor of acute ischemic stroke. This will continue to challenge the clinicians. It requires appropriate supervision and counseling of patients. This risk factor can be changeable but need awareness, education, elimination of poverty, regular use of medication and changes in life approach. Further randomize control trials to confirm it as independent prognostic factor while managing acute ischemic stroke patients.

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