



STUDY OF BLOOD UREA NITROGEN AS PROGNOSTIC MARKER IN SEVERITY OF ACUTE ISCHEMIC STROKE

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ABSTRACT

A stroke, also known as a cerebrovascular accident, is characterized by a sudden onset of neurological impairment caused by a local vascular problem. Patients with stroke are often at increased risk of dehydration as they have a reduced level of consciousness, are physically dependent, unable to communicate, have difficulties in swallowing and decreased oral intake. BUN levels showed strong association between with stroke severity. Higher BUN are associated with increased severity of Acute ischemic

KEYWORDS :

INTRODUCTION

A stroke, also known as a cerebrovascular accident, is characterized by a sudden onset of neurological impairment caused by a local vascular problem. Cerebrovascular disease includes widespread and highly destructive conditions, including ischemic stroke and hemorrhagic stroke. Stroke is the second leading cause of mortality worldwide and the third leading cause of years of life lost due to disability. Although stroke rates have increased worldwide, they are decreasing among the wealthy and increasing among people with little access to health care. Cerebral ischemia occurs when blood flow to the brain decreases over an extended period of time. Neurological symptoms appear quickly because the neurons do not have glycogen, which leads to a rapid loss of energy. Intracranial hemorrhage occurs when there is bleeding in or around the brain. This bleeding can cause neurological symptoms by exerting pressure on neural structures or increasing pressure inside the skull due to the damaging effects of the blood [1]

Blood urea nitrogen (BUN), a waste product of protein metabolism produced in the liver and excreted by the kidney, is often used in combination with creatinine (Cr) to evaluate renal function in clinical settings. However, the fact that BUN level can be influenced by multiple factors including protein intake, corticosteroids, gastrointestinal bleeding, and dehydration [2], suggests a role beyond the renal function indicator. A prospective study among 3355 acute ischemic stroke patients suggested that BUN rather than eGFR was significantly associated with in-hospital mortality [3] another prospective study showed that higher BUN levels predicted mortality among 9420 acute coronary syndrome patients independent of eGFR, serum Cr, or estimated Cr clearance [4]. This evidence suggested that BUN may confer additional cardiovascular risks, and could be a better predictor for cardiovascular outcomes in comparison to other renal function indexes [[2], [3], [4]]

Patients with stroke are often at increased risk of dehydration as they have a reduced level of consciousness, are physically dependent, unable to communicate, have difficulties in swallowing and decreased oral intake. Rodriguez et al [5] have demonstrated that elderly patients presenting with

transient ischemic attack or acute ischemic stroke often demonstrate increased plasma osmolality that likely represents a fluid depleted state, and possibly contributes to cerebral ischemia and worse neurological outcome in stroke patients. The role of volume depletion or dehydration as a risk factor contributing to END was further studied by Lin et al [6], [7] who demonstrated that blood urea nitrogen/ creatinine (BUN/Cr) ratio higher than 15 and urine specific gravity (USG) > 1.010 were more frequently seen in SIE (Stroke in Evolution) patients

Aims and Objectives

- 1) To study BUN in patients of acute ischemic stroke
- 2) To Analyze the prognostic significant of BUN in severity of Acute Ischemic Stroke based on NIHSS scale.

MATERIALS AND METHODS

Ethical clearance was obtained from the Institute's Ethical Committee, and informed consent was obtained from all participating patients prior to the commencement of the study.

Study Design

This prospective cohort study was conducted at SRN Hospital, MLN Medical College, Prayagraj, U.P., India, spanning from June 2023 to May 2024. The sampling technique used was purposive sampling and all the patients who came to our SRN Hospital and met the inclusion criteria were included in the study.

CASES

All patients of cerebrovascular accidents (ischemic stroke) presenting to the Medicine department within 48 hours of onset with Age > 18 years would be recruited after informed consent.

Statistical Analysis

Categorical variables were presented as numbers and percentages (%), while continuous variables were expressed as mean and standard deviation (SD). Quantitative variables between two groups were compared using the Unpaired t-test where appropriate. The strength of association between two scale parameters was assessed using the Spearman correlation coefficient as appropriate. A p-value of <0.05 was

considered statistically significant. Data were entered into an MS Excel spreadsheet and analyzed using Statistical Package for Social Sciences (SPSS) version 23.0.

RESULTS

A total of 100 patients diagnosed with acute ischemic stroke fulfilling the inclusion criteria were enrolled in the study “Study of Blood Urea Nitrogen as prognostic marker in severity of Acute Ischemic Stroke ”.

According to the NIHSS score, there were 41 patients with minor stroke with score between 0-4, 30 patients had a moderate stroke with a score of 5 to 15, 9 patients had a moderate to severe stroke with a score of 16 to 20 and 20 patients had a severe stroke with a score of more than 20 as shown in Table 1.

Table 1: Distribution Of Acute Ischemic Stroke Patients According To Severity Based On NIHSS

Severity	NIHSS score	n	%
Minor stroke	0-4	41	41.00

Table 4: Association Of Mean Serum Urea (mg/dl),BUN (mg/dl) and S. Creatinine (mg/dl) Between Severities Of Acute Ischemic Stroke Patients

	Minor stroke		Moderate stroke		Moderate to severe stroke		Severe stroke		Overall		F	p-Value
	Mean	±SD	Mean	±SD	Mean	±SD	Mean	±SD	Mean	±SD		
BUN(mg/dl)	24.73	1.86	31.20	1.49	34.67	0.71	50.25	6.18	32.67	9.95	304.200	<0.001

CONCLUSION

It is concluded that according to the NIHSS score in our study, there were 41 patients with minor stroke with score between 0-4, 30 patients had a moderate stroke with a score of 5 to 15, 9 patients had a moderate to severe stroke with a score of 16 to 20 and 20 patients had a severe stroke with a score of more than 20. Mean BUN levels showed strong association between with stroke severity. Higher BUN are associated with increased severity of Acute ischemic.

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Moderate stroke	5-15	30	30.00
Moderate to severe stroke	16-20	9	9.00
Severe stroke	>20	20	20.00

For minor strokes, 80.49% of the cases are male (33 out of 41) and 19.51% are female (8 out of 41). In the moderate stroke category, males constitute 76.67% (23 out of 30) while females account for 23.33% (7 out of 30). For moderate to severe strokes, 77.78% are male (7 out of 9) and 22.22% are female (2 out of 9). In severe stroke cases, the male proportion decreases to 60% (12 out of 20), with females making up 40% (8 out of 20).

Blood Urea Nitrogen (BUN): Mean BUN levels also showed an increase with stroke severity. Minor stroke patients had a mean of 24.73 mg/dl, moderate stroke patients had 31.20 mg/dl, moderate to severe stroke patients had 34.67 mg/dl, and severe stroke patients had significantly higher levels at 50.25 mg/dl. The overall mean was 32.67 mg/dl. The p-value was highly significant (<0.001), suggesting a strong association between higher BUN levels and increased stroke severity as shown in table 4