

Association between the serum sodium level and Glasgow Coma Scale (GCS) level in patients of ischemic stroke

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ABSTRACT

Objective: To determine the correlation between the serum sodium level and Glasgow Coma Scale (GCS) level in patients of ischemic stroke at tertiary care Hospital.

Material and methods: This observational study was conducted at medicine department of Isra University Hospital Hyderabad. Study was conducted during one year from March 2018 to February 2019. The entire patient who was diagnosed as ischemic stroke disease within 24 hours as per CT scan or MRI scan and either of gender were included in the study. After taking informed consent a 3ml blood sample was taken from each patient and immediately was sent to the Hospital diagnostic laboratory for the assessment of serum sodium level. Hyponatremia was defined as serum sodium concentration <135mmol/L. Glasgow Coma Scale (GCS) was used for outcome and it was divided into good outcome (GCS 14-15), intermediate outcome (GCS 8-13) and poor outcome (GCS 3-7). All the data was recorded via study proforma. Data analysis was done by using SPSS version 20.

Results: Total 50 patients were studied in this study, their mean age was 61.84±10.27 years and males were 32(64.0%) There was a weak positive correlation between serum sodium level and Glasgow Coma Scale (GCS) $r=0.006$.

Conclusion: It was concluded that the serum sodium level and Glasgow Coma Scale (GCS) were proportionally correlated among patients of ischemic stroke.

Key words: stroke, outcome, serum sodium, GCS

INTRODUCTION

Stroke is the most common and big health issue. Globally it is very much circulated and is positioned at the subsequent top reason for death all throughout the world.¹ Elevated morbidity and mortality may be because of its complication as; infection, cerebral edema and its linked cardiovascular diseases.² However electrolytes imbalance and stress hyperglycemia may be the independent prognostic factors elevated morbidity and mortality.³ Advancement of the hyponatremia may cause of further sensorium change among stroke cases and when happen abruptly patients convulsion and worsen cerebral edema leading cerebral ischemic changes producing further damage of the brain and leads to death.^{3,4} Alteration in the serum sodium level is the commonest electrolyte disorder estimated in the patients those having neurological disorders and acute stroke individuals.¹ Though outcome of the decreased sodium level among cases of acute stroke is not well recognized and some studies have been carried out regarding it and as per findings the death rate estimated from 14% to 44%.¹ Hypertension, dyslipidemia, smoking habits and diabetes mellitus (DM) are the vital issues of ischemic stroke in Pakistan.⁵ In the Pakistani population the incidence of ischemic stroke estimated to be high as 54.5% mostly in poor socioeconomic status peoples.⁵ The Glasgow Coma Scale (GCS) is the recognized coma scale in the serious care for the determination of neurologic status among cases and for approximating their long-term prognosis.⁶

Decisive Glasgow Coma Scale of cases having stroke at presence and consequent follow-up is the usual clinical

practice in the several institutions.⁷ Glasgow coma scale of less than 3, pupillary alteration, gaze palsy and incontinence. Risk of the mortality in early some days is the good evaluated by the III clinical variables like, paresis, coma and incontinence, the indicators of the neurological dysfunction severity, along with cardiovascular issues as atrial fibrillation, heart failure and peripheral vascular illness.⁷ Cases who having none of these reasons are more likely to be the survive.⁷ On other hand it is observed that the low level of serum sodium level is the independent prognostic factor of the short-term mortality among cases with stroke.⁸ However this study has been conducted to evaluate the association between the serum sodium level and Glasgow Coma Scale (GCS) level in patients of ischemic stroke at tertiary care Hospital.

MATERIAL AND METHODS

This observational study was conducted at medicine department of Isra University Hospital Hyderabad. Study was conducted during one year from March 2018 to February 2019. The entire patient who was diagnosed as ischemic stroke disease within 24 hours as per CT scan or MRI scan and either of gender were included in the study. All the ischemic stroke patients having diarrhea, chronic liver disease, chronic kidney disease, uncontrolled diabetes and congestive heart failure and those who were not willing to participate in the study were excluded. After taking informed consent a 3ml blood sample was taken from each patient and immediately was sent to the Hospital diagnostic laboratory for the assessment of serum sodium level. Hyponatremia was assessed as positive on concentration

less than 135mmol/L of serum sodium just after the patient's admission and before the any treatment administration. It was further categorized as mild (serum sodium level 130 to 134 mEq/L), moderate (serum sodium level 125 to 130 mEq/L) and severe (less than125 mEq/L). Glasgow Coma Scale (GCS) was used for outcome and it was divided into good outcome (GCS 14-15), intermediate outcome (GCS 8-13) and poor outcome (GCS 3-7).⁹ All the data was recorded via study proforma. Data analysis was done by using SPSS version 20.

RESULTS

Total 50 patients were studied in this study. Patient's mean age was 61.84+10.27 years. Out of all study subjects males were 32(64.0%) and females were 18(36.0%). 14(28.0%) patients were illiterate, 09(18.0%) had primary level education, 12(24.0%) had middle school level education and 15(30.0%) were showed secondary level education. Right side weakness was among 27(54.0%) of the cases and 23(46.0%) had left side weakness. Table.1

There was a weak positive correction between serum sodium level and Glasgow Coma Scale (GCS) $r=0.006$. Figure.1

Table.1 Descriptive statistics demographic variables n=50

Variables	Mean+SD	Statistics
Age(years)	Mean+SD	61.84+10.27
Gender	Male	32(64.0%)
	Female	18(36.0%)
Residential status	Urban	26(52.0%)
	Rural	24(48.0%)
Educational level	Illiterate	14(28.0%)
	Primary	09(18.0%)
	Middle	12(24.0%)
	Secondary	15(30.0%)
Socioeconomic status	Poor	29(58.0%)
	Middle	14(28.0%)
	Upper	07(14.0%)
Weakness	Right	27(54.0%)
	Left	23(46.0%)

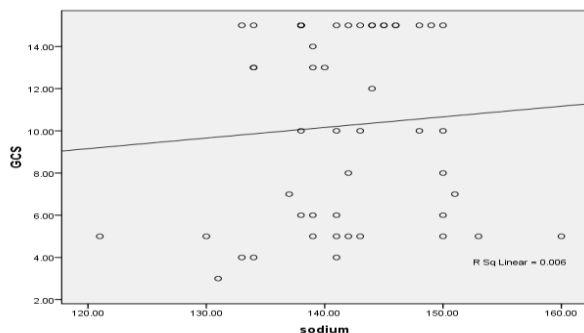


Fig. 1: Correlation between GCS and sodium level n=50

DISCUSSION

Stroke is the major cause of the mortality in the several countries and estimated as a big cause of the physical

disabilities, predominantly among peoples of middle-aged and elderly population.¹⁰ However in this study the patient's mean age was 61.84+10.27 years and males were in majority 32(64.0%). Similarly Pawan T Ojha et al¹¹ reported that the average age of the study subjects was 49.06 years and males were 53% and females were 47%. In another study of Aquil N et al¹² reported that average age of study participants was 63.5 years. However Khan NI et al¹³ found lower average age as 41. 3 years as compared to this study, while they found similar findings regarding gender ratio as 78% were males and females were 22% with male to female ratio as 1.96:1.

In this study out of all 28.0% patients were illiterate, 18.0% had primary level education, 24.0% had middle school level education and 30.0% were seen with secondary level education. However Khan NI et al¹³ also found similar findings regarding educational status as they found illiterate cases in majority. In this study there was a positive correction between serum sodium level and Glasgow Coma Scale (GCS) $r=0.006$ and p -value 0.001. No such studies have been found on this type of correlation. However one study in the literature have been found on the correlation between nitric Oxide (NO) with Glasgow Coma Scale and they observed the negative correlation between nitric Oxide and GCS scale, $r=0.144$ and $p>0.05$.¹⁰

CONCLUSION

It was concluded that the serum sodium level and Glasgow Coma Scale (GCS) were positively correlated among patients of ischemic stroke. Due small sample size and some other limitation of the study and un-availability of such studies, further large scale studies are suggested on this type of correlation by taking patients outcome.

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