



A STUDY ON CORRELATION OF SERUM CORTISOL AND SEVERITY OF STROKE

General Medicine

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ABSTRACT

Background: Stress response after stroke can increase levels of cortisol and catecholamine's. This cortisol response to stroke is identified in both cerebral infarction as well as ICH. High Serum cortisol level have been related to the severity and adverse clinical and functional outcome in stroke. The correlation of Serum cortisol and severity of stroke is not well studied in the rural population. Aim: 1. To investigate if a single Serum cortisol level determination could predict the outcome of stroke. 2. Whether Serum cortisol as well as stroke severity is related to any clinical or paraclinical parameters of known relevance in acute stroke. 3. To gain knowledge of the level of correlation between various clinical and paraclinical parameters with serum cortisol and stroke severity.

Materials and methods 65 patients admitted with acute stroke within 24 hours of onset. Patient recruited from medical wards and IMCU of Tirunelveli medical college hospital. Study design: Cross sectional descriptive study. Study period: January 2017 to January 2018. A diagnosis of cerebral infarction or an intracerebral haemorrhage based on clinical findings as well as history at the time of admission and with the help of CT scan. Blood samples taken for Total Count, Blood sugar and Serum cortisol levels. Serum cortisol estimated by competitive immune enzymatic colorimetric

Results: Out of 50 patients, Mean cortisol level was about 18.43 mg/dl with SD of 9.93 mg/dl. Scandinavian stroke scale assessment, which is a measure of severity of stroke ranged from 4 to 50 in our patients for a total of 60 at the time of admission with mean of 27.7 and SD of 12.03. Correlation between serum cortisol and scandinavian stroke scale (SSS) score was found to be statistically significant with p value of <0.001.

Conclusion: Serum cortisol is a prognostic marker to predict functional outcome and mortality in patients with stroke. This is evidenced by high correlation between serum cortisol and scandinavian stroke scale (SSS) score. SSS score is inversely related to stroke severity i.e., lower the score, higher the severity.

KEYWORDS

Stroke, Serum cortisol level, Scandinavian Stroke scale

BACKGROUND:

Stroke, a common neurological disorder causing death in developing as well as developed countries. Stroke is defined as an acute neurological injury occurring due to vascular pathological process which manifest either as brain infarction or haemorrhage. Stress response after stroke can increase levels of cortisol and catecholamine's. This cortisol response to stroke is identified in both cerebral infarction as well as ICH. High Serum cortisol level have been related to the severity and adverse clinical and functional outcome in stroke. The cortisol response is related positively to blood glucose, WBC count, fibrinogen levels and other markers of inflammatory and immune response. Insular damage results in increased catecholamine levels. Normal circadian rhythm of cortisol secretion is lost. It is uncertain that this stress response to stroke is just an epiphenomenon to stroke severity or it independently contributes to prognosis and functional outcome.

AIM: 1. To investigate if a single Serum cortisol level determination could predict the outcome of stroke. 2. Whether Serum cortisol as well as stroke severity is related to any clinical or paraclinical parameters of known relevance in acute stroke. 3. To gain knowledge of the level of correlation between various clinical and paraclinical

parameters (Blood Pressure, sugar and Total Count) with serum cortisol and stroke severity.

MATERIALS AND METHODS:

Inclusion criteria 65 patients admitted with acute stroke within 24 hours of onset. Patient recruited from medical wards and IMCU of Tirunelveli medical college hospital.

Exclusion criteria : Age < 18 years, liver disease, Pregnancy, Recurrent stroke, Patients on following drugs – Phenytoin, steroids, rifampicin, ketoconazole, 15 patients were excluded as per exclusion criteria.

METHODOLOGY : Study design: Cross sectional descriptive study. **Study period** : January 2017 to January 2018. At the time of admission, Pulse rate, systolic & diastolic blood pressure, and scandinavian stroke scale (SSS) were recorded in all patients. A diagnosis of cerebral infarction or an intracerebral haemorrhage based on clinical findings as well as history at the time of admission and with the help of CT

scan. Blood samples taken for Total Count, Blood sugar and Serum cortisol levels. Barthel index and modified rankin score are calculated at discharge and then monthly till 3 months from onset of stroke. Serum cortisol estimated by competitive immune enzymatic colorimetric method. –

RESULTS and observations Out of the 50 patients, 39 were male, 11 were female. Mean age of presentation is 62 years.

Table:1

Patient characterise	%
Age	62 years
Male	78%
SHTN	70%
DM	42%
Smokers	44%
Alcoholics	32%

Table:2

Indicators	Mean	SD
SBP	162 mmHg	21.75
DBP	98 mmHg	8.73
TC	0.214	3320
Blood Sugar	134	29
Serum cortisol	18.43	9.93

Table:3

Age	Mean cortisol
<60	17.7
>60	19.1

Table:4

Barthel	Mean	SD
at discharge	31	12.49
at end of 3 months	61.90	23.03

Table:5

Sex	Mean cortisol
Male	19.11
Female	16.05

Table:6

	No	Cortisol mean
Haemorrhage	16	23.18
Infarct	34	16.2

Table:7

Rankin score	Mean	SD
at discharge	3.98	0.714
at end of 3 months	2.40	1.16

Table:8

Factor	Correlation co-efficient
SBP	0.602
DBP	0.337
TC	0.698
Admission blood sugar	0.748

Age distribution ranges from 42 – 90 years Out of 50 people , 35 were hypertensives (70%) and Out of 50, 21 were diabetic (42%).34% had both diabetes and Hypertension (17 patients), 22% were free of DM and SHTN44% with stroke were smokers (22 patients), 32% were alcoholics (16 patients)11 patients were both alcoholic and smoker (22%)Out of 50 patients, 16 patients had Hemorrhagic stroke& 34 patients had ischemic stroke.M.C site for ischemic stroke ,– Middle cerebral artery territory Average SBP on admission was 162mmHg with SD of 21.75. All 50 had SBP > 130mmHg..Average DBP was 98mmHg with SD of 8.73.TC revealed 10,214 cells on average with SD of 3320 cells.Blood sugar revealed an average random blood sugar of 134 mg/dl .Serum cortisol measured ranged between 2.36-4.23 mg/dl.(reference range 3.09 – 16.66mg/dl.Mean cortisol level was about 18.43 mg/dl with SD of 9.93mg/dlMean cortisol value was significantly higher in patients with haemorrhagic stroke than in patients with ischemic stroke .Scandinavian stroke scale assessment, which is a measure of severity of stroke ranged from 4 to 50 in our patients for a total of 60 at the of admission with mean of 27.7 and SD of 12.03.

Barthel index :Ranges from 5 to 55 out of a total 100with mean of 31 and SD of 12.49.

Modified Rankin score :Ranges from 3 to 6 out of a total of 6 with mean of 3.98 and SD of 1.16 Correlation between serum cortisol and scandinavian stroke scale (SSS) score was found to be statistically significant with p value of <0.001..Similar significant correlation (p vale <0.001) was found between serum cortisol and indices of functional outcome like Barthel index and Modified Rankin score..At the end of 3 months, the functional outcome showed high correlation with the admission day cortisol level, the correlation co-efficient being 0.819.Relationship between s.cortisol and other parameters like SBP, DBP , TC and blood sugar were analysed and found to be statistically significant.Similar relationship existed before SSS and these parameters

DISCUSSION:Here we evaluated the relationship between admission day Serum cortisol and stroke severity as determined by scandinavian stroke scale (SSS) score and our Study showed a statistically significant correlation between serum cortisol and stroke severity..Studies conducted by department of Neurology, University of Copenhagen, have shown that elevated serum cortisol is an indirect indicator of stroke severity.Chistensen H, Boysen G, et all (2004) showed serum cortisol reflects severity and mortality. Also shown that serum cortisol correlated well with SSS, PR and our study showed Significant correlation between serum cortisol and various parameters like SBP, DBP, TC admission blood sugar (p<0.001).Our study showed a statistically significant correlated between s.cortisol and SSS score p<0.001.SSS score is inversely related to stroke severity i.e., lower the score, higher the severity.It is observed that patients who had high cortisol levels on admission have a lower SSS score and hence more severe stroke and was statistically significant.

CONCLUSION:High serum cortisol correlated with severity of stroke as evidenced by an inverse relation with SSS. As serum cortisol level increases SSS score decreases.High serum cortisol also correlated with systolic blood pressure, diastolic blood pressure, total count and admission blood sugar level. The highest correlation coefficient was observed with random blood sugar level at admission and the lowest was for diastolic blood pressure. This shows that admission blood sugar level correlates well with serum cortisol and

hence with stroke severity.Serum cortisol is a prognostic marker to predict functional outcome and mortality in patients with stroke. This is evidenced by high correlation between serum cortisol and indices of functional outcome like B1 and MRS at the end of three months.

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