



ASSOCIATION OF FIBRINOGEN LEVELS WITH SEVERITY OF DISEASE IN ISCHEMIC STROKE

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ABSTRACT

Background: The incidence of stroke has increased in the recent times and it has become a significant disease not only in the developed countries but in the developing countries as well. Many studies have been conducted to determine the significance of fibrinogen levels in stroke patients. In this study, we tried to find a co-relation between serum Fibrinogen level and severity and mortality in stroke patients. **Methods:** In this study, patients admitted to tertiary care center were taken. 50 patients were included in the study. The inclusion criteria was new onset ischemic stroke admitted within 24hrs of the onset of stroke. The definitive diagnosis was done by CT scan and MRI in all the patients. Serum fibrinogen levels were measured in all the patients at the time of admission. The patients were followed up till a period of 1 month to check the severity and the mortality. **Results:** Mean fibrinogen levels when infarct volume was 30-40cm² was 482.34mg/dl; 511.42 when the size was between 40-50cm²; the mean fibrinogen level was 536.88 when the infarct volume was between 50-60cm² and 631.45 when the infarct volume was 60-70cm². This shows that as the size of infarct increases, the level of fibrinogen increases showing increase in severity. Out of 50 patients, 8 patients died. Mean fibrinogen level was 584.34±8.21 in patients who died and 510.23±9.32 in the rest 42 patients who survived at the end of 1 month. **Conclusion:** Mean fibrinogen levels were higher in stroke patients and a strong positive co-relation is found between severity of stroke, size of stroke and fibrinogen level was proved. Also higher mortality was found in patients with increased fibrinogen.

KEYWORDS

INTRODUCTION

Stroke is a major global health problem. Stroke is the second leading cause of death worldwide according to the Global Burden of Diseases.^[1,2] In India, the incidence of stroke ranges from 105-152/100,000 persons per year.^[3] Thus stroke poses a serious public health concern for India. Hence its very important to look for the factors responsible for the incidence of stroke. The main risk factors for stroke include diabetes, smoking, hypertension and hyperlipidemia. Abnormalities of coagulation are also linked to stroke.^[4] Various studies have been done to find the co-relation between various biological markers and stroke. Leptin, CRP, Insulin, Cortisol, Fibrinogen, Protein C, Protein S, von Willebrand Factor, D-dimer and Anti-thrombin III have proven values for prognosis and relationship with lesion volume in stroke patients.^[5,6] At the time of blood clot formation, plasma Fibrinogen is converted to fibrin by thrombin. Hypercoagulability and role of fibrinogen is suspected to play an important role in the stroke pathogenesis in many studies.^[7,8] Plasma fibrinogen level

being a serum marker can be effectively used as a marker in stroke patients as compared to the CT-scan and MRI scans which are not widely accessible and are also quite expensive. In the present study, we tried to find a co-relation between serum fibrinogen and infarct volume on CT scan in acute ischemic stroke patients.

METHODS

This study is hospital based on a tertiary care center in India. The study was conducted in Medicine wards. Period of study was August 2018 to August 2019. The inclusion criteria was new onset stroke admitted within the 24hrs of the onset of stroke. Patients with past history of stroke, active infections, malignancy, renal, cardiac or liver disease were excluded from the study. Pregnant women were also excluded from the studies. CT scan and MRI Brain were done in all the patients. The patients were followed up for a period of 1 month to check for the severity and mortality.

RESULTS

A total of 50 patients were enrolled in the study. 32 were male and 18 were females. The average age in the male patients was 65 ± 6.12 years and in the female patients were 68 ± 5.98 years. The average height was 167 ± 7.2 in males and 164 ± 6.8 in females. The average weight was

63.88 ± 9.61 kgs in males and 59.53 ± 8.76 kgs in females. BMI was 23.64 ± 5.11 in males and 22.89 ± 5.28 in females. 20(62.5%) were smokers in males and 3(16.66%) were smokers in females. 9(28.12%) were diabetics in males and 8(44.44%) in females. 19(59.3%) were hypertensive in males and 10(31.25%) in females.

Table 1: Baseline characteristics of the study patients.

	Male(32)	Female(18)
Age(yrs)	65 ± 6.12	68 ± 5.98
Height(cm)	167 ± 7.2	164 ± 6.8
Weight(kg)	63.88 ± 9.61	59.53 ± 8.76
BMI(kg/cm ²)	23.64 ± 5.11	22.89 ± 5.28
Smoking(Yes)	20(62.5%)	3(16.66%)
Diabetic (Yes)	9(28.12%)	8(44.44%)
Hypertensive(Yes)	19(59.3%)	10(31.25%)

The co-relation between infarct volume and fibrinogen levels is showed in the table below. The infarct volumes were divided into 4 groups from 30-40cm², 40-50cm², 50-60cm² and 60-70cm². The mean infarct volumes were 37.43, 42.87, 56.89 and 65.24 respectively. Mean fibrinogen levels were 482.34 with SD of 4.57 when infarct volume was 30-40cm². It was 511.42 with SD of 3.29 when infarct volume was 40-50cm². Mean

fibrinogen levels were 536.88 with SD of 4.53 in the 50-60cm² infarct volume range. Mean levels were 631.45 with SD of 3.72 when the infarct volume was 60-70cm². As the mean fibrinogen levels increase, the mean infarct volume increases and it's a proven fact that with increase in the infarct volume, the morbidity increases. The p value in this was 0.036 which shows that the co-relation is statistically significant.

Table 2: Association of Fibrinogen levels with infarct volume in Stroke patients.

Infarct volume range(cm ²)	Mean Infarct Volume(cm ²)	Fibrinogen level(mg/dl)		P value
		Mean	SD	
30-40	37.43	482.34	4.57	0.036
40-50	42.87	511.42	3.29	
50-60	56.89	536.88	4.53	
60-70	65.24	631.45	3.72	

Out of 50 patients, 8 patients died. The mortality rate was 16%. Mean fibrinogen levels in the patients who died was 584.34 ± 8.21 mg/dl and in the patients who were

alive was 510.23 ± 9.32 mg/dl. The p value was 0.04 which shows that the difference was statistically significant.

Table 3: Association of Fibrinogen levels with stroke mortality in stroke patients.

Mortality	Fibrinogen level	P value
Dead (8)	584.34 ± 8.21	0.04
Alive (42)	510.23 ± 9.32	

DISCUSSION

In the present study, 50 stroke patients were taken who were admitted within first 24 hours after the onset of stroke. Stroke is of two types: Ischemic or Hemorrhagic type. Ischemic stroke is 10 times more prevalent than hemorrhagic stroke in Western countries.^[9,10,11,12]

In our study, we only took patients with ischemic stroke. A study by Nayak SD et al showed thrombotic stroke incidence of 24% and hemorrhagic stroke incidence of 25%.^[13] A study by Anderson KK et al had 89.9% ischemic stroke and 10.1% hemorrhagic stroke.^[14] In our study, 12 patients were in the age group of 40-50. This is similar to the study of Azam R et al.^[15]

The most common cause of ischemic stroke was atherosclerosis was ischemic stroke(70%) followed by embolism(26.7%) and sickle cell disease(3.3%). These findings are similar to the findings seen in Tripathi M. et al.^[16] Smoking was also a significant parameter in our study for the development of ischemic stroke. Many studies have showed the same type of co-relation.

Mean fibrinogen level was significantly higher in the ischemic stroke patients as compared to normal. This correlates with the findings of the study by Narayanswamy M et al.^[17] It was observed in our study that as the infarct volume increased from 30-40cm² to 60-70cm², the mean fibrinogen level increased from 482.34 to 631.45. The mean fibrinogen levels in the

patients who died was 584.34 ± 8.21 and in the patients who were alive was 510.23 ± 9.32 . This shows that mean fibrinogen levels are also associated with increase in mortality.

CONCLUSION

Hence, in our study we could see that with the increase in the levels of fibrinogen levels, the morbidity of the ischemic stroke increase as well as the mortality increases. Thus, mean fibrinogen levels can be used as a marker for determining the severity of ischemic stroke.

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