



**Research Article**

**COMPARATIVE STUDY OF PLASMA FIBRINOGEN LEVEL IN STROKE PATIENTS WITH  
NORMAL SUBJECTS**

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**Abstract: Background:** Cerebrovascular diseases are the major causes of disability and mortality in developed countries. According to neurologist stroke is termed as an event of “Cerebral vascular Accident” (CVA). Although the role of fibrinolytic systems have been studied in past trends there are clinical evidences that indicate that the increase in plasma fibrinogen level is associated with increased risk of prevalence of episodes of stroke. Increased activity of von- will brand factor is mainly associated with increased bleeding in the brain regions appropriately. The above mentioned factors plays a major role in vascular components as well as in higher centers of central nervous system by decreasing the blood flow inside the vascular components and in major blood vessels of our body by increasing the ischemic response. The purpose of our study is to rule out the possible role of increased plasma fibrinogen level among the stroke patients. **Materials and Methods:** The present study was conducted on stroke patients those who are admitted in the Stroke ward of Department of Neurology, SRMC&RI. The sample size was around 76. Among them 50 were stroke patients and 26 were normal subjects. The age groups of 76 members were around 21 to 85 yrs. Plasma fibrinogen level was estimated by rapid turbid method with standardized reagents. Results were analyzed accordingly. **Results:** Our results showed there was a marked rise level of plasma fibrinogen among stroke patients was around  $547.5 \pm 167$ mg/dl n=50. P value < 0.001. When compared to normal subjects the value was around  $326.8 \pm 55$ mg/dl n=26 the P value < 0.001. Which is statically significant. Data represented as Mean  $\pm$  SD. **Conclusion:** Fibrinogen is factor which is responsible for the non –traditional stroke. The increased fibrinogen level in blood may lead to excessive clumping of blood cells, causing a clot formation in the major artery, which may promote the development early stage of Stroke in old age. From our study we concluded that the serum plasma fibrinogen level is elevated in stroke patients. .

**Keywords:** Stroke, Fibrinogen, Cerebral vascular Accident (CVA)

**Introduction:**

Stroke is defined as the sudden loss of onset brain function due to reduced blood supply to brain. The major cause of developing ischemic response in the brain is due to thrombosis of blood vessels in brain followed by severe hemorrhage. The positive risk factors such as old age, high blood pressure, smoking, dyslipidemia, and diabetes mellitus increase the risk of onset of stroke. Brain cell requires constant balanced oxygen and glucose from the blood stream. In adequate oxygen supply along with vessel wall disrupter increases the strength of prevalence of stroke among old age peoples<sup>4</sup>. More than 2400 years ago the father of modern medicine, described stroke as the sudden onset of paralysis. Until recently, modern medicine had very little power over this disease, but the world of stroke medicine is changing and new better therapies are being developed every day<sup>1,2</sup>. Johann Jacob Wafer et al... In 1820 was the first person to demonstrate the stroke by post-mortem, bleeding in the brain of patients who died of apoplexy and he also described, apart from bleeding, the blockage of the main arteries supplying the brain. Thus stroke is termed known as “Cerebral vascular

Accident”(CVA). After several years of research the medical science has come up with an array of risk factors and various pathological mechanism behind the stroke. The risk factors like Increased Plasma fibrinogen level, Hyper Homocysteinemia, High level of Lipo-protein are closely associated with incidence of stroke. This has helped to identify the potential candidate for stroke among the patients just by looking at the presence of the risk factors in the blood and to employ the methods of modifying or eliminating these risk factors and thereby to prevent the incidence of stroke in our patients<sup>3</sup>. Bhalla.A.et.al show a crude prevalence rate for stroke presumed to be of vascular origin in the range of 200/100,000 persons (0.2%). The major precipitant factor of brain ischemia is Coagulopathy or prothrombotic disorders. The contribution of prothrombotic disorders in children with ischemic stroke has been reported to be 20 to 50% in most studies. Since Prothrombotic disorders contribute to the majority of cases of stroke, this study was undertaken to find out the association of one of the prothrombotic factors namely blood Fibrinogen level in stroke patients<sup>5</sup>.

**Materials and methods:**

The present study was done on stroke patients those who are admitted in the Stroke ward of Department of Neurology, SRMC&RI. The sample size was around 76 among them stroke patients were 50 patients and controls were around 26 normal persons. The age group between 21 to 85 yrs. Informed written consent was obtained. A questionnaire was given to the patient asking about the personal history like smoking, alcoholism, physical exercise and history of diabetes and hypertension. All the patients were examined by a thorough clinical examination including recording of blood pressure, fasting Blood sugar, Serum Cholesterol, Plasma Fibrinogen, and 12 lead ECG recording were done by standard methods. Plasma fibrinogen was estimated by rapid turbid method with standardized reagents. To avoid diurnal variations samples were preserved with stocks reagents. Results were analyzed accordingly by Rapid Turbid metric Method the protein standards are prepared from the Quality control serum. A 200 mgs% protein standard is prepared. 0.2ml of standard solution is rinsed into 3.8ml of 12.5% sodium sulphite solution. The test tube is shaken well and allowed to stand for 10 minutes, the turbidity is read in the calorimeter at 490 nm and (optical density) O D value was noted and a curve is plotted for the standard solution. A 0.2 ml of sample plasma is added into 3.8 ml of 12.5% sodium sulphite solution. The mixture is shaken well and allowed to stand for 10 minutes. The turbidity is read in the calorimeter at 490 nm and OD value was noted. This OD value was compared with the curve plotted for the standard solution of the reading was taken in mgs%. Calculation for fibrinogen level was analyzed by standard the Claus's formula-

$$\text{Fibrinogen level in unknown sample} = (\text{OD}_{\text{test}} / \text{OD}_{\text{Std}}) * \text{Concentration of STD}$$

**Results:**

The study sample comprised of 76 subjects of age between 21 – 83 yrs. Among the 76 subjects, 26 were normal subjects and 50 were patients who got admitted in stroke ward. Among the control group n= (26) among them 16 were males and 10 were females. And among the stroke group n= (50), among them 38 were males and 12 were females. Out of the 76 study subjects 24 were hypertensive, all belonging to the stroke group and 52 were non-hypertensive.

Among the total 76 subjects of the both the group 15 were diabetic and the remaining 61 were non-diabetic. In the stroke group, 15 were diabetic and the remaining 35 were non-diabetic. In the entire group only 9 subjects were smokers. The remaining 67 were non-smokers. There was no history of alcohol consumption in the whole group. Our results showed there was a rise in level of plasma fibrinogen among stroke patients was around  $547.5 \pm 167 \text{ mg/dl}$ . The stroke patients were grouped into three categories based on age. In Group I n=25 Less than 40yrs the plasma fibrinogen was around  $355.8 \pm 72.5 \text{ mg/dl}$ . In Group II n= 31, the age group around 41-59yrs the plasma fibrinogen was around  $515.1 \pm 172.4 \text{ mg/dl}$ . In Group III n= 20 the age

Above 60yrs the plasma fibrinogen was around  $550.3 \pm 198.5 \text{ mg/dl}$ . Fibrinogen level was compared between the three groups.  $P < 0.05$ . Three groups are significantly different from each other. All data expressed as Mean  $\pm$  SD. Comparing the fibrinogen level between the three groups. The elderly age group above 60yrs had the highest fibrinogen level among the three groups. All data expressed as Mean  $\pm$  SD. when compared to normal subjects the value was around  $326.8 \pm 55 \text{ mg/dl}$ , the P value  $< 0.001$ . which is statically significant. Data represented as Mean  $\pm$  SD. Our study shows the plasma Fibrinogen level in stroke patients was 40% higher when compared to normal subjects.

**Table 1: Shows the Fibrinogen level in normal subjects compared with stroke patients**

Parameters	Normal (n=26)	Stroke (n=50)
Fibrinogen level (mg/dl)	$326.8 \pm 55$	$547.5 \pm 167$

**Legend -1.** The mean plasma fibrinogen level was high in stroke patients' n=50 of both the genders were around  $547.5 \pm 167 \text{ mg/dl}$ . In normal subjects n=26 of both the genders were around  $326.8 \pm 55 \text{ mg/dl}$  which is statically significant. Data represented as Mean  $\pm$  SD, P value  $< 0.001$ . The mean Fibrinogen level in stroke patients was 40% higher when compared with normal subjects.

**Table 2: Shows the Fibrinogen level in stroke patients by Age Categories**

Age Categories	Fibrinogen level (mg/dl)*
Group I (Less than 40yrs)	$355.8 \pm 72.5$
Group II (41-59yrs)	$515.1 \pm 172.4$
Group III (Above 60yrs)	$550.3 \pm 198.5$

**Legend 2** -The fibrinogen level has significant different between the three groups III group has the highest fibrinogen level  $P < 0.05$ . All data expressed as Mean  $\pm$  SD.

**Discussion:**

The normal fibrinogen level is  $400 \text{ mg/dl}$ . From our study we concluded that Fibrinogen level in stroke patients was 40% higher than the fibrinogen level in normal subjects. The smokers in this study group had a high level of fibrinogen, which was significantly different from the non-smokers. The fibrinogen level linearly increased with the increase with age, similar to earlier study by Di. Mino Get...al in 1990 from their study they stated that increase in fibrinogen level by  $25 \text{ mg/dl}$  in every 10 years of increase in age. This proves that elderly people at higher risk of getting stroke and again the probable mechanism could be through the increased fibrinogen level in blood. The level of fibrinogen is high in males than females. Though the variables like diabetes and hypertension contributed individually to the increase in plasma fibrinogen, it is observed that the group in which both these two variables existed together they have an additive effect on the plasma fibrinogen. The group in which there were no known risk

factors like smoking, hypertension and diabetes also had increased fibrinogen level, which indicated that increased fibrinogen level alone could cause development of stroke. Similar observation was found in the study by Kayoed et al in 2003.<sup>7, 8</sup>. By keeping age as a factor Quzilbash et al...Conducted a study in 1995 they correlated the incidence of stroke and cardio vascular dysfunction by keeping age has a factor which proves that increased in plasma fibrinogen level is the voluntary potential factor for episodes of stroke<sup>9</sup>. Fraser Bremen et al ...in 2000 correlated the Relation between circadian patterns in levels of circulating Lipoprotein (a), Fibrinogen, Platelets and related lipid variables in men, they stated that role of fibrinogen in stroke is by narrowing the blood vessels. Apart from fibrinogen other risk factors such as smoking, blood pressure, hemtocrit, can favor the incidence of stroke in old age people<sup>10</sup>.

Honezarenko.K et al...In 1999 from their study they concluded that elevated levels of haemostatic agents and inflammatory markers leads to cerebral ischemia by increasing the abnormal coagulation components in the blood<sup>11</sup>. Lars Wilhelmsen et al...Conducted a study on correlating the plasma fibrinogen level among both stroke patients and those who are suffering from cardio vascular diseases he proved that atherosclerosis is the major cause which promotes stroke as well as myocardial infection<sup>(12,13)</sup>. Fu and Nair et al... conducted a study on correlating the endocrine disorder which favors the stroke in 1988 they proved that prolonged stress and plasma fibrinogen level increases the incidence of stroke above 45 years periodically<sup>14</sup>.

#### Conclusion:

Plasma fibrinogen is an acute phase reactant protein produced by the liver, and it is strongly elevated in stroke patients without or with traditional risk factors. Fibrinogen is responsible for the increased risk of stroke in old age group. The increased fibrinogen level in blood may lead to excessive clumping of blood cells, causing a clot formation in the artery, which may lead to a development of Stroke or Myocardial infarction<sup>15</sup>. Since the plasma level fibrinogen is elevated in stroke patients. Apart from that the fibrinogen level should be periodically monitored in patients with hypertension, diabetes, smokers, alcoholics, obese and elderly people in order to reduce the development risk of stroke by appropriate intervention such as lifestyle modification, diet modification, regular exercise, and drugs etc., early onset of the above mentioned components can reduce the mortality of population which happens on behalf of stroke.

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