

Research Article**Correlation of Plasma Fibrinogen Level among Diabetic and Non Diabetic Ischemic Stroke Patients****Anbuselvan V¹, ShyamalaRamnath², Padmavathi. R³, Jayachandran Paulswamy⁴, Velmurugendran CU⁵**¹Associate professor Department of Physiology, Sri Ramachandra University, Chennai, India.²Professor&Head Department of Physiology, Chettinad Medical College and RI Chennai, India.³Professor Department of Physiology, Sri Ramachandra University, Chennai, India.⁴Occupational Health Physician, Chief Medical officer, Nissan Company, Orakadam, Chennai, India.⁵Professor &Head department of Neurology, Sri Ramachandra University Chennai. India***Corresponding author**

Dr.V. Anbuselvan

Email: dr.vas2003@yahoo.co.in

Abstract: Stroke is defined as rapidly developing clinical signs of focal disturbance of cerebral functions with symptoms lasting for 24hrs or longer or leading to death, with no apparent cause other than vascular origin. Fibrinogen participates in two crucial events in hemostasis. It is an adhesive protein essential for platelet aggregation and platelet plug formation at the site of vascular damage. To compare the plasma fibrinogen level among diabetic and non-diabetic 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 36 patients. Among them 20 were diabetic stroke patients and 16 were non diabetic stroke patient's .The age groups of 36 members were around 45 to 85 yrs. Plasma fibrinogen level was estimated by rapid turbid method with standardized reagents. Our results showed there was a marked rise level of plasma fibrinogen among diabetic stroke patients was around 516.5 ± 167 mg/dl P value < 0.001. When compared to non-diabetic subjects the value was around 386.8 ± 55 mg/dl the P value < 0.001. Which is statically significant. In conclusion the fibrinogen is a 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 diabetic stroke patients when compared to non-diabetic stroke patients.

Keywords: Atherothrombosis, Cerebral hemorrhage, cerebral thrombosis, cerebrovascular disease, Plasma Fibrinogen, Diabetes mellitus, Stroke

INTRODUCTION

A Stroke may also be called a cerebrovascular accident. Stroke is the most common clinical presentation in hospital admission out of which 85 – 90% is ischemic and 10-15% is hemorrhagic [1]. Nearly 25% of patients having stroke die in a year and 15 – 30% are disabled. Incidence of stroke increases with age; doubling every 5-10 years beyond the age of 55 years. Asians have high incidence of stroke than whites [2]. Based on the retrospective analysis of subjects admitted in urban hospitals in India, it was found that stroke constitutes nearly 2% of all hospital cases and 20% of neurological admission [3]. Ischemic stroke is a major component of cerebrovascular accidents in our setting. Several epidemiological studies have been carried out in the literature regarding ischemic strokes. Conventional risk factors were widely studied. They are Hypertension, Diabetes Mellitus, Hyperlipidemias, Smoking, Overweight, family history. The risk factors

like Increased Plasma fibrinogen level, Hyper Homocysteinemia, High level of Lipoprotein are loosely associated with incidence of stroke [4]. 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. Recent community surveys from many regions of India show a crude prevalence rate for stroke presumed to be of vascular origin in the range of 200/100,000 persons (0.2%). In approximately 1% of all patients with ischemic stroke and in up to 4% of young adults with stroke, the major precipitant of brain ischemia is Coagulopathy or pro-thrombotic disorders [5]. The contribution of pro-thrombotic disorders in children with ischemic stroke has been reported to be 20 to 50% in most studies. Since – Pro-thrombotic disorders contribute to the majority of cases of stroke, this study

was undertaken to find out the association of one of the pro-thrombotic factors namely Blood Fibrinogen level in stroke patients [6].

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 36 among them diabetic stroke patients were 20 patients and controls were around 16 normal persons. The age group between 45 to 85 yrs. A questionnaire was framed to the each patient about 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 analysed 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 490nm 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. Fibrinogen level in unknown sample = OD –TEST/ OD- STD XCONCENTRATION OF STD. Plasma glucose was estimated based on glucose oxidase/GOD peroxidase (POD) method as described by Trinder. This method selectively estimates β D Glucose in plasma. Enzopak-Glucose from Reckon Diagnostics Pvt. Ltd. Baroda was the reagent kit for quantitative estimation of glucose in plasma used in this study. Enzopak-Glucose is based on GOD/POD method. Glucose oxidase oxidizes the specific substance β D Glucose, to Gluconic acid and hydrogen peroxide. This Hydrogen peroxide is acted upon by peroxidase and oxygen is liberated. The liberated oxygen is transferred to chromogen system consisting of 4 amino antipyrine and phenolic compound to produce red quinoneimine dye. The intensity of the colour is directly proportional to the concentration of Glucose and is measured photo metrically at 505 nm [7, 8].

RESULTS

The study sample comprised of 36 subjects between the ages 45 – 85 yrs with a mean age of 69 yrs and standard deviation of 14.1 for the total group. The stroke patient belonged to the category of thrombotic stroke. Out of the 36 subjects 20 diabetic patients and 16 were non diabetic patients. Among diabetic patients 12 were males and 8 were females and among the non-diabetic group 10 were males and 6 were females.

Table-1: Blood glucose level of the study group (n=36)

Parameters	Diabetics (n=20)	Non- diabetics (n=16)
Age (yrs)	38 ± 5	56 ± 13*
Blood Sugar (mg/dl)	300.4 ± 5.9	143.6 ± 76*

All the data represented mean ±Standard deviation. *P<0.05. Independent ‘t’ test used for comparison.

Table 2: Comparison of Fibrinogen level between normal subjects and stroke patients

Parameters	Diabetics (n=20)	Non-diabetics (n=16)
Fibrinogen level (mg/dl)	516.5 ± 167mg/dl	386.8 ± 55mg/dl

Plasma fibrinogen levels were increased in diabetic subjects when compared to non-diabetic subjects P< 0.001. Data represented as Mean ± SD.

DISCUSSION

The normal fibrinogen level is 400 mg/dl (Text book of Physiology, by Ganong, 20th Edition P.522). The fibrinogen was elevated in all the stroke patients (547.5 mg/dl) in comparison to the normal subjects who had a normal fibrinogen level (326.8 mg/dl). Stroke can be due to thrombosis, embolism and haemorrhage [9]. The aetiology of the stroke patients in this study group was thrombosis as diagnosed by Neurologist using CT scan. The increase in fibrinogen level, a procoagulant factor could be a contributing factor for the development of thrombosis in these patients. Since, the principle parameter of this study was only fibrinogen the other procoagulant factors like excessive platelet aggregation and other coagulant factors were not

considered in this study [10]. The increase in fibrinogen level in thrombotic stroke patients has been observed in earlier studies. When the fibrinogen level was compared in various categories of risk factors such as diabetes, hypertension, both diabetes with hypertension and smokers. The caveat in the interpretation of this data is the small sample size in each category. The increase in fibrinogen level in diabetic stroke patients actually enhances the risk of developing stroke, because diabetes per se contributes to the atherosclerosis which is a major risk factor for the development of cerebrovascular accident [11]. The increase in the fibrinogen level which is a procoagulant factor enhances the problem of excessive thrombosis in addition to the generalized atherosclerosis which is a common finding

seen in the diabetic patients. Hence, the increase in fibrinogen level in these diabetic patients results in excessive likelihood of developing stroke, which is a very significant finding in this study [12]. The mean level of fibrinogen level in males was higher than females, which was not statistically significant in this study group that could be due to small sample size. It is already known that the females are less prone to develop atherosclerotic changes in the arteries because of the presence of estrogen, in their reproductive age group. The increased fibrinogen level seen in males than in female's shows that the males are more prone to develop stroke, due to increased atherosclerotic tendency as a result of estrogen and increased fibrinogen level, a procoagulant factor, similar finding was observed [13].

CONCLUSION

This study has shown a clear association between increased fibrinogen level and development of stroke. The pathogenesis of production of increased fibrinogen by the interplay of different variable has to be understood fully. Future laboratory studies are needed in this direction, so that preventive measure could be taken at various steps in order to reduce the morbidity and mortality associated with stroke [14].

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