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A COMPARATIVE STUDY OF LIPID PROFILE AND ECG CHANGES IN ISCHEMIC AND HAEMORRHAGIC STROKE

Medicine

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ABSTRACT

Objective The study was done to compare the risk factors, lipid profile, and ECG changes in patients of ischemic and haemorrhagic stroke. **Methodology** All patients clinically and radiologically diagnosed to be ischemic or haemorrhagic stroke, detailed history, clinical examination, ECG, CT scan brain and routine blood investigation was done on arrival.MRI brain was done when required. Repeat CT scan brain and clinical evaluationwas done after 24 hours to look for complications or improvements, as well as ECG was repeated to look for development of any further changes and comparison was made. **Results** Out of 80 patients, 34(42.5%) suffered from Haemorrhagic stroke and 46(57.5%) suffered from ischemic stroke. Out of 34 patients who suffered from haemorrhagic stroke 25 had history of hypertension, 22 had history of diabetes, 20 had history of smoking, 12 had history of stroke, 22 had history of alcohol intake, 8 was found to have obesity, and 12 had sedentary lifestyle. Out of 46 ischemic stroke patients, 44 had history of hypertension, 34 had history of diabetes, 24 had history of smoking, 18 had history of stroke, 22 had history of alcohol intake, 9 were obese, and 23 had sedentary lifestyle. Lipid profile was found to be elevated in both type of stroke, however, total cholesterol and LDL were more in ischemic comparatively, while HDL and triglyceride was higher in haemorrhagic. ECG changes were seen in 52.5% of the patients and were more common in haemorrhagic stroke. **Conclusion** It was seen that the risk factors such as older age, hypertension, diabetes, dyslipidemia, sedentary lifestyles favoured ischemic stroke and smoking, alcohol, obesity favoured haemorrhagic stroke. Higher cholesterol and LDL levels favoured ischemic more than haemorrhagic stroke. ECG changes were more common in haemorrhagic stroke

KEYWORDS

INTRODUCTION

Stroke is defined as an abrupt onset of a neurological deficit that is attributable to a focal vascular cause .[1] WHO clinically defines stroke as —the rapid development of clinical signs and symptoms of a focal neurological disturbance lasting more than 24 hours or leading to death with no apparent cause other than vascular origin.[2]

Ischemic stroke is produced by a sudden obstruction of the arterial system, which results in a loss of blood supply to the brain tissues. Emboli or thrombus could be the cause of the blockage. 50 –85% cases are due to ischemic stroke.[3] Intracranial haemorrhage is caused by bleeding directly into or around brain and produces neurologic symptoms by mass effect on neural structure or increased intracranial pressure.

The present study has been undertaken to compare the risk factors, lipid profile and ECG changes in ischemic and haemorrhagic stroke.

METHODOLOGY:

This hospital based observational study was conducted in the Department of Medicine at FAAMCH, Barpeta, Assam, for a period of 1 year, representing mostly the low socioeconomic rural as well as urban population with a low literacy rate. Inclusion Criteria includes all patients clinically and radiologically diagnosed to be ischemic or haemorrhagic stroke.

For each patient irrespective of age and sex detailed history and clinical examination was done. Laboratory parameters including fasting lipid profile, complete blood counts, Liver function tests, kidney function tests, routine urine examination, thyroid function and coagulation profile tests were done. The patients were investigated for electrocardiogram, CT scan brain on arrival. Echocardiography and MRI brain was done when required. All the patients were clinically and radiologically evaluated by repeat CT scan brain after 24 hours to look for complications or improvements, as well as ECG was repeated to look for development of any further changes.

Ethical clearance was taken from institutional ethical committee, Fakhruddin Ali Ahmed Medical College and Hospital, Barpeta.

RESULTS:

Out of 80 patients, 29 subjects were **female** and 51 patients were **male**. Out of 29 female patients, 12(35%) suffered from haemorrhagic stroke and 17(38%) suffered from ischemic stroke. Out of 51 male patients, 22 (65%)suffered from haemorrhagic stroke and 29(63%) suffered from ischemic stroke

The average **age** of the patients who suffered from haemorrhagic stroke was **46.7+15.1 years** and the average age of the patients who suffered from ischemic stroke was **51.8+15.2 years**.

Out of 34 patients who suffered from haemorrhagic stroke, 25 had history of **hypertension**and out of 46 patients who suffered from ischemic stroke, 44 had history of hypertension.

Out of 34 patients who suffered from haemorrhagic stroke, 22 had history of **diabetes**and out of 46 patients who suffered from ischemic stroke, 34 had history of diabetes.

In haemorrhagic group of 34 subjects, 20 patients were found to have history of **smoking**andin ischemic group of 46 subjects, 24 patients found to have history of smoking.

Out of 34 subjects who suffered from haemorrhagic stroke, 12 patients had history of stroke and out of 46 patients who suffered from ischemic stroke, 18 patients had past history of stroke.

Out of 34 patients from haemorrhagic group, 22 patients had history of alcohol intake and out of 46 patients from ischemic group, 28 patients had history of alcohol intake.

In haemorrhagic group of 34 patients, 8 subjects were found to have **obesit**y while in ischemic group 9 out of 46 patients were found to have

obesity. In the haemorrhagic group 12 patients were **living sedentary life style**and in the ischemic group23 patients were living sedentary life style.

The average **total cholesterol** of haemorrhagic group was 188.8 ± 33.2 mg/dl in contrast to the ischemic group was 196.4 ± 32.2. mg/dl. The average **LDL-C** of haemorrhagic group was 133.7 ± 32.4 in contrast to the ischemic group was 139.3± 30.2. The average **HDL-C** of haemorrhagic group was 57.1 ± 11.0 in contrast the ischemic group was 55.0 ± 10.4. The average **triglyceride** of haemorrhagic group was 155.7± 41.5in contrast to the ischemic group which was 149.8 ± 40.8.

From haemorrhagic group of 34 subjects, 16 patients had serum **total cholesterol** levels more than 200 mg/dl. From ischemic group of 46 patients, 32 patients had serum total cholesterol levels more than 200 mg/d.

From haemorrhagic group of 34 patients, 24 patients had **serum LDL** level of more than 100mg/dl from ischemic group of 46 patients,42 patients had serum LDL level of more than 100mg/dl.

From haemorrhagic group of 34 patients, 26 patients had **serum HDL** level less than 40 mg/dl. From ischemic group of 46 patients, 37 patients had serum HDL level less than 40 mg/dl.

Out of 34 patients who suffered from haemorrhagic stroke, 20 patients had **serum triglyceride** level more than 150 mg/dl. Out of 46 patients who suffered from ischemic stroke, 21 patients had serum triglyceride level more than 150 mg/dl.

20 out of 34 patients of haemorrhagic stroke showed **ECG changes** following stroke. The most common ECG abnormality was **ST segment changes (47%)** followed by **Qt prolongation(35.2%).Tall t waves** were seen in 10 patients and t wave inversion was seen in 6 patients. Sinus tachycardia was seen in 6 and sinus bradycardia in 10 patients. Atrial fibrillation was not encountered among haemorrhagic stroke patients.

26 out of 46 patients of ischemic stroke showed ECG changes following stroke. The most common ECG abnormality was **ST segment changes (17.3%).** Tall t waves were seen in 4 patients and t wave inversion was seen in 8 patients. Qt prolongation was seen in 4 patients and sinus bradycardia in 5 patients. Atrial fibrillation was seen in 8 patients.

Post 24 hours ECG was repeated and no significant changes seen from the first ECG were seen. The **clinical features** at presentation in ischemic and haemorrhagic stroke were comparable. 27 ischemic and 35 haemorrhagic stroke patients presented with *hemiplegia. Speech involvement* was seen in 21 ischemic and 26 haemorrhagic stroke patients. *UMN palsy* was seen in 19 ischemic and 16 haemorrhagic stroke patients. *Altered sensorium* was seen in 18 ischemic and 16 haemorrhagic stroke patients *Convulsion* was seen in 14 ischemic and 16 haemorrhagic stroke patients. *Instability of gait* was seen in 14 ischemic and 24 haemorrhagic stroke patients. *Headache* was seen in 12 ischemic and 23 haemorrhagic stroke patients. *Vomiting* was seen in 14 ischemic and 30 haemorrhagic stroke patients. *Giddiness* was present in 19 ischemic and 21 haemorrhagic stroke patients. 2 ischemic and 5 haemorrhagic stroke patients were in *coma* following event of stroke.

The most common location involved was capsule-ganglionic region both in ischemic(30) and haemorrhagic(24)

DISCUSSION

Until recently, there had been few studies on stroke in India, however, many prospective and retrospective studies are currently being undertaken to focus on the burden of stroke and to examine stroke prevention strategies.

In our study 80 stroke patients were analysed for risk factors, lipid profile and electrocardiographic changes post stroke, where 46 patients had ischemic and 34 haemorrhagic stroke.

Risk Factors

Sex:

29 patients were female and 51 were males. The percentage of male subjects in ischemic was 63% and in haemorrhagic was 65%.This could be due to sex differences in the effect of triglycerides, as well as lifestyle risk factors smoking, and physical activity on subclinical atherosclerosis like carotid intimal medial thickness in men and women. [4]However the differences were not statistically significant.

Age:

mean age of incidence of stroke was 49.6 + 15.2 years. Haemorrhagic stroke occurs at a slightly younger age with mean age 46.7 + 15.1 years andin ischemic stroke was 51.8 + 15.1 years.

hypertension was prevalent in 73.6% of haemorrhagic and 95.7% of the ischemic stroke patients. However, the evidences showed that long standing systemic hypertension and diabetes did not have significant role to play as risk factors. But there might have been a bias since long standing hypertension and diabetes are diagnosed only at the presentation of stroke or MI.

Ivica Bilićet al found that Ischemic stroke patients had a higher prevalence of hypertension (79% vs. 72%). [5] Elisabeth et al found that hypertension was associated with substantially higher incidence rates and absolute numbers of cerebral infarction.[6]

Diabetes was prevalent in 73.9 %of ischemic stroke patients as compared to 64.7% of haemorrhagic stroke patients. Most of the other studies yields the same results.

KK Anderson et al found that presence of diabetes favoured ischemic stroke more than haemorrhagic.[7]similarily, AA Ahangar et al found that diabetes was more prevalent in ischemic than haemorrhagic stroke. [8]

Smoking was found in 52.2% of ischemic stroke patients as compared to 58.9% in haemorrhagic. KK Anderson et al found that smoking history favoured haemorrhagic more. 52.8% of the haemorrhagic stroke patients had history of smoking whereas 40.7% of ischemic stroke patients had smoking history.[7]

History of previous stroke was present in similar numbers of ischemic and haemorrhagic stroke patients. Rosa de Lima et al found that previous stroke history favours ischemic more than haemorrhagic.[9]

History of alcohol consumption was more haemorrhagic than that in ischemic strokes (64.7% vs 60.9%).**Obesity was found** to be higher in haemorrhagic stroke than ischemic stroke(23.6% vs 19.6%), with a total of 22.3% of patients being obese. History of sedentary life style was present in 50% of in ischemic and 35.2% of haemorrhagic stroke patients.

Lipid profile

It is found in our study that dyslipidemia(total cholesterol and LDL) was significantly higher in ischemic stroke **Total cholesterol** 69.6 % of the patients of ischemic stroke had cholesterol levels higher than 200mg/dl compared to 47.1% of haemorrhagic stroke. There was a statistically significant difference in cholesterol levels between the two groups. Similar results observed in a study conducted in western Washington that mean TC level in haemorrhagic stroke was lower than that in ischemic stroke. [10]

LDL-C: percentage of patients with LDL-C more than 100 was higher in ischemic than in haemorrhagic stroke (i.e. 91.4% vs 70.6%). Thrivikram T et al (4) found that LDL-C was significantly higher in thrombotic stroke group compared to haemorrhagic stroke group ($p < 0.05$)[11]

The average **HDL-C** of haemorrhagic group was 57.1 ± 11.0 mg/dl in contrast to the average HDL-C of ischemic group was 55.0 ± 10.4 mg/dl. However, this difference was not significant.

The average **Triglyceride** levels of haemorrhagic group was 155.7 ± 41.5mg/dl in contrast to the average Triglyceride leve ls of ischemic group was 149.8 ± 40.8mg/dl. However, this difference was not significant. In a study done by Gurmeet Singh et al, it was found that triglyceride levels are higher in haemorrhagic stroke patients. [12]

Comparison of ECG changes post stroke in ischemic and haemorrhagic stroke

In our study the most common **ECG abnormality** detected was

changes in the ST segment in the patients of cerebral haemorrhage. ST changes were present in 47% of the patients with haemorrhagic stroke out of them 24% had ST elevation and 23% had ST depression. The next common abnormality in our study was **QTc prolongation** which was seen in 35.2% percent of patients with haemorrhagic stroke. Study done by Arruda and Lacerda 33.67% of the patients with ICH had QTc prolongation.[13]

In 29.4% of patients with haemorrhagic stroke tall T waves were found. Cruickshank et al observed Tall T waves and short PR interval in their study on CVA53 In our study 17.6% of patients with haemorrhagic and 17.3% patients with cerebral infarction T wave inversion was observed. In 13% of patients with cerebral infarction and 47% of patients with ICH and 100% of patients with SAH rhythm disturbances were observed. Out of the 6 patients of SAH 4 had sinus tachycardia and 2 had sinus bradycardia.Sinus bradycardia was most commonly observed in patients with haemorrhagic stroke. In study of Stoberet.al sinus bradycardia was observed in 23% of ICH patients[14] Q wave was observed in 7% of patients with cerebral infarction. This is similar with study of Chou et al. [15] KK Anderson et al found that atrial fibrillation favoured ischemic stroke more than haemorrhagic [6]

CONCLUSION

In conclusion of our study, it was seen that the risk factors such as older age, hypertension,diabetes and dyslipidemia and sedentary lifestyle favoured ischemic stroke and those such as smoking, alcohol consumption, obesity favoured haemorrhagic stroke. Risk factors such as previous stroke history was not related to stroke type.It was observed that higher levels of Total cholesterol and LDL levels favoured ischemic more than haemorrhagic stroke.

ECG changes were seen in 52.5 % of the stroke patients and it was more commonly seen in haemorrhagic stroke patients. Evaluation of the risk factors as well as lipid profile is necessary for the prevention of stroke in the face of very high incidence of this disabling disease worldwide. Cardiac abnormalities following the event of stroke is common. It is important to distinguish such cardiac abnormalities occurring following stroke from diseases such as CAD to initiate appropriate and early management. Hence, further studies are required on the ECG changes following stroke

Limitations

The emergence of diseases like antiphospholipid antibody syndrome, homocysteinemia etc. in the causation of stroke, necessitates their exclusion.

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