International Journal of Advances in Medicine
Kumar GS et al. Int J Adv Med. 2019 Oct;6(5):1397-1401
http://www.ijmedicine.com
pISSN 2349-3925 | eISSN 2349-3933
DOI: http://dx.doi.org/10.18203/2349-3933.ijam20194188

Original Research Article

Study comparing the clinical profile of patients with stroke in diabetic and non-diabetic patients

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Received: 23 August 2019
Accepted: 10 September 2019

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ABSTRACT

Background: A stroke occurs when a blood vessel that carries oxygen and nutrients to the brain is either blocked by a clot or bursts (or ruptures). Computed tomography (CT) and magnetic resonance imaging (MRI) was done to determine the type of stroke. Diabetes mellitus is a well-recognized risk factor for ischemic stroke. The study was undertaken to assess the clinical characteristics, outcome pattern and to compare the pattern of stroke in diabetics and non-diabetics.
Methods: An observational cross-sectional prospective study wherein a hundred stroke patients being admitted to MGMGH, Trichy were sampled and the clinical profile along with outcome is compared in diabetic and non- diabetic populations and the statistical significance of the same.
Results: The proportion of patients with poor outcome following stroke was significantly higher in diabetics compared with non-diabetic patients being chi square value was 37.6514 and p value was found to be significantly less than 0.0001.
Conclusions: The study resulted the large hemorrhages are twice as much common in the diabetic population compared to the non-diabetic population , the incidence increases with the chronicity of diabetes and the outcome is superior in the non-diabetics compared to the diabetics admitted in Mahatma Gandhi Memorial Government Hospital, Tiruchirappalli, Tamil Nadu, India.

Keywords: Diabetes, Hemorrhage, Infarct, Stroke

INTRODUCTION

A stroke is a disease which affects the arteries leading to and within the brain. It is the leading cause for disability in United States. A stroke occurs when a blood vessel that carries oxygen and nutrients to the brain is either blocked by a clot or bursts (or ruptures). When that happens, part of the brain cannot get the blood (and oxygen) it needs, so brain cells die.

Routine lab tests included blood count, random blood glucose level, HbA1c, fasting lipid profile, electrocardiogram (ECG). Computed tomography (CT) and magnetic resonance imaging (MRI) were done for determination of the type of stroke. Stroke was classified into ischemic and haemorrhagic stroke. Ischemic stroke was further classified into four subcategories which are cortical infarcts, sub-cortical infarcts, cerebellum and brainstem.

Diabetes mellitus affects more than 200 million people worldwide.[1] Diabetes mellitus has been established as a risk factor for causing stroke.[2] Stroke in diabetics is 1.5-3 times in comparison to non-diabetics.[3] The pattern of strokes in diabetics is comparatively different than non-diabetics. A study conducted by Europeans showed that diabetic patients were more likely to experience ischemic strokes (77.5% versus 71.9%) and less likely to

experience haemorrhagic stroke than non-diabetic patients (85% versus 11.5%).[2] The study conducted by Ali et al showed that diabetics are more likely to have an ischemic stroke and suffer from lacunar infarctions.[4] In a study conducted by Sarkar, ischemic stroke and lacunar strokes in diabetic patients than the non-diabetic patients and there was a higher incidence of transient ischemic attack.[5]

The objective of the present study was to compare the clinical presentation of stroke in diabetics and non-diabetics.

METHODS

This was an observational cross-sectional prospective study, which was conducted at Mahatma Gandhi Memorial Govt. Hospital attached with K.A.P. Viswanatham Government Medical College, Tiruchirappalli from December 2015 to December 2016.

After approval of the institutional ethics committee, a hundred stroke patients admitted to MGMGH, Trichy were included and the clinical profile along with outcome was compared in diabetic and non- diabetic patients.

Inclusion criteria

Any patients of age group more than18 years presenting with focal neurologic deficit involving any of the limbs or speech or bladder disturbances were included. Neurologic deficits should be lasting for more than 24 hours. Patients or attendants should be able to give written informed consent.

Exclusion criteria

Patients less than18 years of age are excluded from the study. Neurologic deficits lasting for less than24 hours, arising not due to infarction because of a hemorrhage which is extra parenchymal like e.g., subarachnoid hemorrhage, subdural hemorrhage, extradural hemorrhage or mimickers of cerebrovascular accident like epilepsy. A non-conclusive CT scan of brain was done, which did not show infarct or hemorrhage.

Consent

A written informed consent was obtained from all the participants and their relatives wherever necessary.

Sample collection

When the patient was admitted in our hospital, after obtaining informed consent, about 2 ml of blood was collected in plain tube under aseptic precautions and sample allowed to clot and these rum collected from this specimen by way of centrifugation and this sample was used for estimation of random blood glucose.

In all these patients on the very next day of admission another 2 ml of blood collected and the process is repeated to estimate the fasting blood glucose, at least eight hours of fasting and the patient is challenged with seventy five grams of anhydrous glucose exactly 2 hours postprandial, 2 ml of venous blood is sample to estimate the 2 hour post prandial glucose (2PPG) and the inferences are noted as diabetic or non-diabetic.

Data collection

Patients presenting with a typical history and a clinical examination which is suggestive of cerebrovascular accident above an age of 18 years are enrolled in our study and an immediate blood sample taken to estimate random blood sugar followed by a thorough clinical examination which classifies these patients into anyone of the seven Brunnstorm's staging followed by an urgent non contrast CT scan of brains to confirm the diagnosis, to ascertain the type of stroke-ischemic or hemorrhagic to assess the size of the lesion as small, medium or large.

Small-sized stroke in our study is taken as a lesion 5 mm in diameter which is not visible in more than two adjacent slices of the CT brain and on the contrary a large sized stroke is any lesion of size which is equal to or greater than 10 mm in diameter or involving one complete vascular territory, medium-size stroke is anything between small and large. These patients are followed up with conservative management and these patients are re-assessed at the time of discharge to classify the recovery at discharge in anyone of the seven Brunnstorm's stages.[6]

Statistical analysis

All these data are collected and compiled and statistical analysis performed. Tests of significance were used wherever required, appropriately.

RESULTS

Table 1 shows the age and sex distribution of patients. This study performed with 100 patients the age distribution revealed the maximum population affected by stroke belongs to the age group of 55 to 64 years (30%) followed by 26% of the total patients were in the age group of 65 to 74 years.

In this cross sectional study was observed that out of 60% diabetes population, 22% never knew that they had diabetes earlier whereas only 38 patients knew that they were diabetic. Remaining 40% were found to be euglycemic (Table 2).

Distribution of infarct and haemorrhage size in diabetic and non-diabetic populations versus diabetes chronicity are presented in Table 3. The observation showed that infarct being the predominant pattern occurring in whole of 62% of the stroke population. Hemorrhage occurs in whole of 38% of the observed population.

Table 1: Group wise age and sex distribution of patients.

Characteristics	No. ofpatients N (%)
Age of the patient (in years)	
25-34	5 (5)
35-44	8 (8)
45-54	21 (21)
55-64	30 (30)
65-74	26 (26)
≥75	10 (10)
Sex	
Male	67 (67)
Female	33 (33)

The incidence of small and medium sized infarcts which has got relatively better prognosis was almost double when compared to diabetic population. On the other hand, life threatening large sized infarcts which carried a poor prognosis was almost 20 times more common among diabetic society. Medium and large scale hemorrhages were more widely seen in diabetic population compared to non-diabetic population. The prevalence of small sized hemorrhages are almost equivalent to that of the non-diabetic population but the prevalence of medium sized hemorrhages are almost triple and the large sized hemorrhages are twice as much commoner than their non-diabetic counterparts. It was observed that as the diabetes goes chronic the incidence of small sized hemorrhages goes down to zero and medium to large sized hemorrhages do occur most often in these subset of populations.

Table 2: Diabetic status versus gender for patients with stroke.

Sex	Euglycemia	%	New diabetics	%	Old diabetics	%
Male	26	65	17	77.2	24	63.1
Female	14	35	5	22.7	14	36.8
Total	40		22		38	

Table 3: Distribution of infarct and haemorrhage size in diabetic and non-diabetic population's vs. diabetes chronicity.

Infarct and hemorrhage size distribution in diabetics and non-diabetics						
Infarcts	**Small**	**%**	**Medium**	**%**	**Large**	**%**
Non-diabetics	16	25.8	10	16.1	1	1.61
Diabetics	8	12.9	4	6.45	23	37.09
Total	62					
Hemorrhage						
Non-diabetics	7	18.42	3	7.89	3	7.89
Diabetics	6	15.78	13	34.21	6	15.78
Total	38					
Infarct and hemorrhage size vs. diabetes chronicity						
Chronicity (in years)						
Infarcts (n=28)						
<5	6	21.4	3	10.71	2	7.14
6-9	0	0	0	0	13	50
>10	0	0	0	0	4	14.28
Hemorrhage (n=10)						
<5	2	20	2	20	0	0
6-9	0	0	2	20	2	20
>10	0	0	2	20	0	0

As the chronicity increases, the incidence of medium to large hemorrhages increases. Almost after a period of 5years there is no small sized lesion and there are only medium or large sized lesions. In general the prognosis is far better in diabetics with 26.6% of the population went home with a Brunnstorm's staging of 4 and above which have a reasonably not a better prognosis and 44 patients went home with a Brunnstorm's staging of below 4 which have a reasonably poor prognosis (Table 4). The proportion of patients with poor outcome following stroke was significantly higher in diabetics as compared with non-diabetic patients.

Table 4: Brunnstorms staging in non-diabetics and diabetics at discharge.

Sex	Good prognosis	%	Bad prognosis	%
Male	21	60	5	2
Female	14	40	0	0
Total	35		5	
Chi-square test				
Diabetic	16	26.6	44	73.3
Non-diabetic	35	87.5	5	12.5
Total	51		49	

χ^2=37.6514; p<0.0001(significant).

DISCUSSION

Stroke or cerebrovascular accident is one of the diseases occurring in this modern era which cripples the individual causing significant mortality and if the patient survives leaves the significant morbidity. Many a times these patients were investigated and retrospectively the risk factors were identified and treatment initiated or altered to modify the risk factor with an aim of secondary or tertiary prevention.Diabetes mellitus is a well-recognized risk factor for ischemic stroke. The study was undertaken to assess the clinical characteristics, outcome pattern and to compare the pattern of stroke in diabetics and non-diabetics.

In this study we found that stroke mostly affected the age group of 55 to 64 years. The findings are similar by Zafar et al in which the mean age of diabetic stroke patients were found to be 59.5 years and for non-diabetic stroke it was 60.4 years.[7] Our study found out that stroke affected more in males as compared to females. The study conducted by Mulneir et al using the General Practice Research Database, contrasted to our study by showing increased risk of stroke in younger patients and more predominantly among females.[8]

In this study, it was found that as age increased, females were more frequent with risk of stroke in comparison to males. The study reported by Ho et al revealed that there was a female preponderance for as pointed out by national and international journals.[9]

Our study resulted that out of 100 individuals with stroke, ischemic or infarct stroke had more number of patients compared to hemorrhage stroke. The study conducted by Ali showed that there was a higher incidence of ischemic stroke in diabetic patients than the non-diabetic patients. Our study showed higher incidence of infarct and the incidence of large sized infarcts were more in diabetic patients and small and medium sized infarcts were more in non-diabetic patients. Our study findings were similar with many other study findings by Kissela et al, Air et al, Jorgensen et al which suggested that diabetes are more prone to have ischemic stroke and less to have hemorrhagic stroke.[3,10,11] The study conducted by Megherbi et al showed that stroke in diabetic patients has a specific clinical pattern and a poor prognosis in terms of motor function, which emphasizes the need for early diagnosis and treatment of every case of diabetes.[12]The European BIOMED Stroke Project also showed that diabetic patients were more likely to likely to have lacunar multiple infarctions.[12] The study observations reported by Tuttolo Mondo et al and Karapanayatoides et al showed higher prevalence of lacunar stroke was seen more in diabetic patients than non-diabetic patients.[13,14]

CONCLUSION

Though stroke has several risk factors diabetes is undoubtedly a risk factor to be watched for and the there is a definite and increased risk of acquiring either an ischemic and hemorrhagic stroke which is definitely large and worse causing significant neurological damage with prolonged hospital stay and poor recovery when compared to the general population.

The clinical profile of stroke is different in diabetics and non-diabetics and the outcome is superior in the non-diabetics compared to the diabetics admitted in Mahatma Gandhi Memorial Government Hospital, Tiruchirappalli and this difference is statistically significant.

Major limitation of the study is the period and number of samples in this study which is minimal. It's a cross sectional study and the sampling doesn't represent any particular population and so the validity of extrapolating or projecting it to the community is not suitable or apt. Several other co-morbidities existed in these stroke patients for e.g., hypertension which also has the propensity to cause stroke and this complex interplay and its influence is not abolished in this study. Few cases were discharged against medical advice and these cases with poor Brunnstorm's staging were eliminated. The observer bias could not be eliminated.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

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Cite this article as: Kumar GS, S. Rajeswaran, Padmanaban UB. Study comparing the clinical profile of patients with stroke in diabetic and non-diabetic patients. Int J Adv Med 2019;6:1397-401.