ORIGINAL RESEARCH PAPER
Volume - 12 | Issue - 01 | January - 2023 | PRINT ISSN No. 2277 - 8179 | DOI : 10.36106/ijsr
INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

STUDY ON PREVALENCE OF DIABETES MELLITUS AND ITS RELATION WITH CLINICAL OUTCOME IN ACUTE ISCHEMIC STROKE PATIENTS OF ADULT AGE GROUP IN A TERTIARY CARE HOSPITAL

Cardiology

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ABSTRACT

Introduction: A stroke, or cerebrovascular accident, is defined as an abrupt onset of a neurologic deficit that is attributable to a focal vascular cause. Thus, the definition of stroke is clinical, and laboratory studies including brain imaging are used to support the diagnosis. Cerebral ischemia is caused by a reduction in the blood flow that lasts longer than several seconds. **Aims:** To compare the clinical outcome of acute ischemic stroke among non-diabetic and diabetic (well controlled and poorly controlled) patients of adult age group **Materials and Methods:** The present study was a prospective study. This Study was conducted from March 2019 to August 2020 at Department of NRS Medical College & Hospital, Kolkata. **Result:** In our study, 100 patients in the study Atrial Fibrillation (risk factor) is absent in 88 and present in are 12 cases comprising 88.0 % and 12.0 % respectively. **Conclusion:** We found that chronic hyperglycemia is associated with an increased risk for cardiovascular outcomes and all-cause mortality among patients with type 2 diabetes, likely independently from other conventional risk factors.

KEYWORDS

Diabetes, Hyperglycemia, Stroke and Outcomes.

INTRODUCTION

Among all the neurological diseases of adult life, the cerebrovascular ones rank the first in frequency and importance. Cerebrovascular disease is estimated to account for 7.8 million deaths yearly throughout the world and represents about 13 percent of all causes of death [1]. The mortality rate of stroke in the acute phase is as high as 20% and its remains higher for several years after the acute event in stroke patients than in the general Population. Stroke also entails a high socioeconomic burden due to increased morbidity and mortality. Ischemic stroke account for more than 80% of total stroke events [2].

Early identification of individuals at risk could be of help in primary prevention strategies [3]. Diabetes mellitus remains an independent risk factor of stroke and coronary heart disease. Diabetes is also one of the most consistent predictors of recurrent stroke or stroke after transient ischaemic attacks (TIA). The increased risk of recurrent strokes due to diabetes ranges from 2.1 to 5.6 times that of non-diabetic patients and is independent of glucose control during inter stroke period. Approximately one-third of all patients with diabetes have undiagnosed diabetes (i.e. not recognized by their clinicians) and usually present as complications like stroke, myocardial infarction and diabetic foot.

The prevalence of previously recognized diabetes mellitus in acute stroke patients is estimated between 8-20%. About 6-42% of acute stroke patients have previously un-recognized diabetes mellitus. More evidences are now available to demonstrate how hyperglycaemia and insulin resistance exacerbate brain injury and induce cell lysis [4]. Brain CT scans obtained in the first several hours after an infarction generally show no abnormality, and the infarct may not be seen reliably for 24–48 hour. CT may fail to show small ischemic strokes in the posterior fossa because of bone artefact; small infarcts on the cortical surface may also be missed.[5]MRI reliably documents the extent and location of infarction in all areas of the brain, including the posterior fossa and cortical surface. Diffusion-weighted imaging is more sensitive for early brain infarction than standard MR sequences or CT, as is fluid-attenuated inversion recovery (FLAIR) imaging. [5] Hyperglycaemia worsens brain injury during ischemia, (glucose >200 mg/dL), so it is reasonable to prevent hyperglycaemia as much as possible. [5]

AIMS AND OBJECTIVE

GENERAL

To investigate the importance of pre-stroke glycemic control on survival, stroke severity, and functional outcome of patients with acute ischemic stroke.

SPECIFIC

1. To study prevalence of diabetes mellitus in acute ischemic stroke patients.
2. To compare the clinical outcome of acute ischemic stroke among non-diabetic and diabetic (well controlled and poorly controlled) patients of adult age group.

MATERIALS AND METHODS

Study site: Department of NRS Medical College & Hospital, Kolkata.

Study population:
All patients are diagnosed as acute ischemic stroke (both diabetic and nondiabetic) admitted to Nil Ratan Sircar Medical College and Hospital will be included in the study. Informed consent will be taken from them.

Study design: A Prospective study.

Period of study: From March 2019 to August 2020

Selection Criteria
Inclusion Criteria –
adult patients (both diabetic and nondiabetic) admitted in general medicine ward of NRS Medical College & Hospital with clinical features of acute stroke (<7days of onset) and CT Scan or MRI of brain suggestive of ischemic stroke.

Exclusion Criteria –
1) Transient ischemic attack
2) Hemorrhagic stroke
3) Intracranial space occupying lesions
4) Cerebral venous thrombosis
5) Recurrent cerebrovascular accident

RESULT AND DISCUSSION

The present study was a prospective study. This Study was conducted from March 2019 to August 2020 at Department of NRS Medical College & Hospital, Kolkata.

Amomg 100 patients, 61 cases are non-smoker and 39 cases are smoker comprising 61.0 % and 39.0 % respectively. Prevalence of smoking has been found to be more in diabetic patients (45.95%) compared to non-diabetic patients (34.92%)(2 =12.67, p value 0.03). Among 100 patients, Atrial Fibrillation (risk factor) is absent in 88 and present in 12 cases comprising 88.0 % and12.0 % respectively.

Prevalence of atrial fibrillation has been found to be more in diabetic patients (21.62%) compared to non-diabetic patients (6.35%)(2 =14.47, p value 0.002)

In age group 40 yrs, out of 5 patients- 2 are diabetic, 1 patient stress hyperglycemic and 2 are euglycemic, in age group 40-60 yrs, out of 49 patients- 18 are diabetic, 12 are stress hyperglycemic and 19 are euglycemic, in age group 60 yrs, out of 46 patients, 17 are diabetic, 9 are stress hyperglycemic and 20 are euglycemic.

Mean FBS and PPBS values in diabetic patients are 162.22 mg/dl and 244.05 mg/dl respectively, 129.82 mg/dl and 201.86 mg/dl respectively in stress hyperglycemic patients and 95.15 mg/dl and 148.22 mg/dl in euglycemic patients (For FBS, 2 =30.01, p value 0.000 and for PPBS, 2=25.9, p value 0.001).

In this study, serum HbA1C has been measured for only those patients having elevated FBS and/or PPBS value and then patients have been categorised based on HbA1c as stress hyperglycemic (HbA1C 6.5%, 22 cases, 37.29%), well controlled diabetic (HbA1c 6.5%-7%, 7 cases, 11.86%), moderately controlled diabetic (HbA1c 7%-8%, 16 cases, 27.12%) and poor controlled diabetic (HbA1c 8%, 14 cases, 23.73%). Most of the diabetic patients in this study belong to moderately and poor controlled group.

Among known diabetic cases, for those treated with OHA, mean NIHSS score on day 1 is 7.69, on day 7 is 5.69 and on day 15-30 is 3.75, for those treated with OHA+Insulin, mean NIHSS score on day 1 is 12.67, on day 7 is 9.67 and on day 15- 30 is 7.00, for those with no treatment, mean NIHSS score on day 1 is 13.50, on day 7 is 11.50 and on day 15-30 is 8.50. So, outcome is worst for those patients who received no treatment.

Sunanda T, Natuva Sai Sampath Kumar, Amaresh Reddy P, Ganesh Vallampalli, Prasad PNS et. al. conducted a study on 130 patients. Cases were 100 acute ischemic stroke patients with diabetes. They were grouped into good glycemic control <7 HbA1c (No=60), poor glycemic control >HbA1c (No=40). Controls were 30, (acute ischemic stroke patients without Diabetes). Glycemic status indicatiors like FPG, PPG, HbA1C had very high statistical significance (0.0001) values among 3 groups of patients. High mean FPG of 161.28 mg/dl was noted in poor glycemic control groups when compared to 103.8 mg/dl in good glycemic control 97 mg % in non-diabetic group. PPG also had similar trend of statistical distribution among 3 groups with high mean PPG of 209.53 mg% was noted in poor glycemic group. Poor glycemic control group had statistically significant high HbA1c value 8.5 ± 1.26 when compared to good glycemic control group (5.92 ± 0.46) and non-diabetics (5.74 ± 0.4)(70).

Chunyan Lei, Bo Wu, Ming Liu , Yanchao Chen et. al. [6]conducted a study on 2057 patients of acute ischemic stroke, out of which 180 lost follow up. The final group comprised 526 patients with diabetes (28.0%) and 1351 without diabetes (72.0%). At baseline, patients with diabetes were older and had higher systolic blood pressure, fasting glucose levels, and hypertension rates than did patients without diabetes. During follow-up, 78 deaths from all causes occurred among patients with diabetes, including 51 deaths from cardiovascular causes. Among patients without diabetes, 193 deaths from all causes occurred, including 126 deaths from cardiovascular causes.

Kamouchi M, Matsuki T, Hata J, Kuwashiro T, Ago T, Sambongi Y, Fukushima Y, Sugimori H, Kitazono T, FSR Investigators et. al. [7]conducted a study from the Fukuoka Stroke Registry (FSR), a multicenter stroke registry in Japan. 3627 patients with first-ever ischemic stroke within 24 hours after onset were included in the present analysis. The patients were categorized into 4 groups based on their PSGC status: excellent (hemoglobin [Hb] A1c on admission <6.2%), good (6.2–6.8%), fair (6.9–8.3%) and poor (≥8.4%). Study outcomes were neurological improvement (≥4 points decrease in the National Institutes of Health Stroke Scale [NIHSS] score during hospitalization or 0 points on NIHSS score at discharge), neurological deterioration (≥1 point increase in NIHSS score) and poor functional outcome (death or dependency at discharge, modified Rankin Scale 2–6). The age- and sex- adjusted ORs for neurological improvement were lower, and those for neurological deterioration and a poor functional outcome were higher in patients with poorer PSGC status. After adjusting for multiple confounding factors, these trends were unchanged (all probability values for trends were<0.002). These findings were comparable in patients with noncardioembolic and cardioembolic infarctions.

CONCLUSION

There is a linear correlation between admission day hyperglycemia and acute ischemic stroke in its severity, and outcome. The diabetic patients are found to have more severe stroke and poor functional outcome and also increased mortality. Outcome is worse in longer duration of diabetes, poorer glycemic control. This is a subgroup of stroke patients that should be kept under close supervision and in effective treatment. Hence, restoration of normoglycemia as soon as possible should be encouraged though conclusive evidences are lacking. An active treatment of other concomitant risk factors associated with cerebrovascular disease seems pertinent in diabetic stroke patients. In the interim, we should fare well with adhering to good general stroke management, normalization of body temperature, fluid balance and hemodynamics or we may otherwise risk the favourable outcome even in the patients with normoglycemia.

Smoking

Smoking	Non Diabetic	Percentage	Diabetic	Percentage	Total	2	p-value
No	41	65.08	20	54.05	61	12.67	0.03

Distribution Of Patients According To Hba1c Levels

HbA1c levels	Count	Percentage
< 6.5	22	37.29
6.5 - 7	7	11.86
7 - 8	16	27.12
> 8	14	23.73
Total	59	100.00

Distribution Of Diabetic And Nondiabetic Patients According To Alive Or Dead

Status	Non Diabetic	%	Diabetic	%	Total
Alive	61	96.8	31	83.8	92
Dead	2	3.2	6	16.2	8
Total	63	100	37	100	100

NIHSS Score According To Hba1c Level

NIHSS Score	HbA1c levels	Count	Mean	SD	Minimum	Maximum
Day 1	< 6.5	21	5.62	1.32	3	9
	6.5 - 7	7	6.00	0.82	5	7
	7 - 8	15	7.47	1.96	4	12
	> 8	9	11.11	3.26	8	17
Day 7	< 6.5	21	3.86	1.15	2	7
	6.5 - 7	7	4.43	1.13	3	6
	7 - 8	15	5.67	1.80	3	10
	> 8	9	8.56	3.57	6	16
Day 15-30	< 6.5	21	1.90	1.00	1	5
	6.5 - 7	7	2.71	0.76	2	4
	7 - 8	15	3.80	1.61	1	7
	> 8	9	5.89	2.93	3	12

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