Research Article

A CROSS SECTIONAL STUDIES ON TYPES OF STROKES IN DIABETIC PATIENTS IN PUDUCHERRY, SOUTH INDIA

Vithuavathi S., Racker., Senthilkumar*, and Kunal Sharma

Department of General Medicine, Aarupadai Veedu Medical College & Hospital,
Kirumambakkam, Pondicherry

A R T I C L E   I N F O

A B S T R A C T

Background: Diabetic populations have a higher risk of developing ischemic or hemorrhagic stroke than the general population. Stroke and diabetes mellitus are two of the leading causes of death worldwide. The global prevalence of established diabetes was around 2.8% in 2000 and is projected to be 4.4%by the year 2030.

Methods: The aim of this study was to assess the risk of developing ischemic and hemorrhagic stroke among diabetic patients. This is a cross sectional study done among the urban and rural area adult population in Puducherry, South India. Sample size of 70 diabetic patients was studied by using consecutive sampling method. Data was collected by administering a pre tested structured questionnaire. Data was analyzed using the SPSS version 20.0 software.

Results: Among the 70 people were studied in age group of 18–70 (aged 72.11 ± 18.3 years). Majority (55%) were more than 60-70 years of age. In this study, 40 of the diabetic patients were male and 30 were in female. The risk factors of hypertension (90%), diabetes mellitus (54%), dyslipidemia (46%), cardiac artery disease (34), atrial fibrillation (48%), ischemic heart disease (14), previous history of stroke (65), smoking (77%) and risky alcohol consumption (85%) were investigated.

Conclusions: It concluded that the prevalence and risk factors of strokes in diabetic patients. It is required to reduce the trouble for rising diabetes disease in the society. It is suggests that on focusing of interventions to prevent and control the strokes in diabetes diseases.

INTRODUCTION

Stroke and diabetes mellitus (DM) are two of the leading causes of death worldwide[1]. The prevalence of stroke in adult patients with DM is high and the risk of death is about twice that of people of similar age without DM[2]. 16% of patients with DM have stroke. Approximately 30% of stroke patients have DM[3]. The global prevalence of established diabetes was around 2.8% in 2000 and is projected to be 4.4%by the year 2030. This prevalence of diabetes rises with age[5]. Diabetes is defined as a group of metabolic diseases characterized by hyperglycemia resulting from defects in insulin secretion, insulin action or both. Type 2 DM is due to progressive loss of β-cell insulin secretion frequently on the background of insulin resistance. Criteria for diagnosis of diabetes by ADA are FPS≥126mg/dL or 2-h PG≥200 mg/dL or A1C≥6.5%o or patient with symptoms of hyperglycemia or hyperglycemic crisis random plasma glucose ≥200mg/dL[5].Stroke is the second most frequent cause of death worldwide[6,7].

Corresponding author: **Senthilkumar**
Department of General Medicine, Aarupadai Veedu Medical College & Hospital, Kirumambakkam, Pondicherry

The prevalence of 2.6% (5.5 million) leads to an annual cost of $58 billion. Of patients who have suffered a stroke, a large proportion either has, or is later diagnosed with diabetes (16–24%)[8]. Patients with diabetes are at 1.5 to three times the risk of stroke compared with the general population[9,10]. Diabetic patients more often develop ischaemic strokes and have an increased proportion of lacunar strokes that may be clinically silent. Additionally, infratentorial infarcts are more frequent in people with diabetes. Diabetic patients have a worse prognosis, with a two fold increase in the likelihood of subsequent strokes. The presence of diabetes is associated with significantly greater permanent neurological and functional disability and longer hospital stay. India has a higher number of people with diabetes than any other country, involving 50.8 million people in the age group of 20 to 79 in 2010 and this number is estimated to reach 87.0 million by 2030[11]. Thus India is being designated as 'diabetes capital' of the world. Prevalence of diabetes is increasing day by day and has acquired a pandemic status in India[4]. Patients with type 1 diabetes mellitus have a markedly increased risk of stroke compared with non diabetic subjects, and it is of note that these patients are at a high risk of stroke 10 to 15 years earlier than non diabetic subjects. The major risk factors for stroke are

age, hypertension, diabetes mellitus, hypercholesterolaemia, smoking, alcohol consumption, physical inactivity, obesity and a family history of stroke. Some risk factors are common for both hemorrhagic and ischemic stroke.

Ischemic stroke, that includes transient ischemic attack (TIA), is the most common type of stroke is a blockage that cuts off blood supply to affected parts of the brain. Ischemic strokes are often referred to as cerebrovascular accidents (CVA) and could be a thrombotic or embolic event. The effects of the blockage are related to the location of the blockage in the brain rather than the source; however the source becomes vitally important in identifying the cause for individual management and secondary stroke prevention. A transient ischemic attack (TIA) produces stroke symptoms that resolve when the arterial blockage is dislodged or dissolved spontaneously without medical intervention. Hill (2004)[12] considers TIA's to be high risk since 9.5% of those with a TIA will subsequently have a more severe ischemic stroke within 90 days. The opportunity for secondary prevention makes a TIA an extremely important medical event. Intracerebral hemorrhagic stroke differs from an ischemic stroke in that it is caused by a ruptured blood vessel as opposed to a blood clot. The ruptured vessel interrupts blood flow and delivery. Approximately 10-15% of all strokes are hemorrhagic and have an estimated 40%-50% mortality rate[13,14]. Hypertension is a major risk factor for both cerebral infarction and intracerebral hemorrhage. Other causes of intracerebral hemorrhages include infections, trauma, abnormalities in the blood vessels and blood clotting deficiencies[15]. The objective of this study was to estimate the prevalence of ischemic and hemorrhagic strokes and its associated risk factors in diabetic patients in Puducherry, South India.

MATERIALS AND METHODS

The cross sectional study was conducted at Arupadiveedu Medical College and Hospital, Puducherry, State of Puducherry, South India. The study was carried out from February 2016 to January 2018 in 70 patients with strokes in diabetic patients. All patients above 18 years of age admitted with acute ischemic stroke, confirmed by CT / MRI scan, were included in the study. The patients with haemorrhagic stroke or focal neurological deficit secondary to meningitis, encephalitis, brain abscess, space occupying lesion and multiple sclerosis were excluded from the study. The risk factors of hypertension, diabetes mellitus, dyslipidemia, cardiac artery disease, atrial fibrillation, ischemic heart disease, previous history of stroke, smoking, risky alcohol consumption and cardiovascular disease were investigated.

RESULTS

The study involved samples (n=70) who fulfilled the inclusion criteria. Among the 70 diabetic patients were studied in age group of 18-70 years. The diagnoses of stroke were divided relatively level between men (40) and women (30). The majority of men 60% than women were representing 40% of the sample. The mean ages for men were 70.20±10.3. The slightly lower than the mean age of 74.02±8.3 were found in females. In relation to residence area, 18 (36%) were urban patients and 52 (64%) were rural patients. The Socio-demographic characteristics of strokes in diabetic patients with various factors were shown in Table 1. It reveals the distribution of diabetic patients based on Education and there are 47 patients with High education levels and 23 patients with Low education levels. The

distribution of the patients based on marital status. There are 60 patients are married and 10 patients are unmarried. It reveals the distribution of patients based on economic status. Out of 70 diabetic patients 32 are Good, 11 patients medium and 27 are low.

Table 1 Socio-demographic characteristics of strokes in diabetic patients

Parameters	Ischemic Stroke (n=55)		Hemorrhage Stroke (n=15)		Mean ± SD	'p' value
	Number	Percentage	Number	Percentage		
Age in years						
18-30	2	3.6	1	6.7	5.1±2.82	
31-40	5	9.1	2	13	11±7.07	0.001[S]
41-50	8	15	2	13	14±6.2	
51-60	10	18	3	20	19±8.48	
61-70	30	55	7	47	51±24.04	
Gender						
Male (40)	32	68	8	53	60.5±10.3	0.001[S]
Female (30)	18	31	7	47	39±8.3	
Residence						
Rural	40	73	12	56	64.5±38.89	0.025[S]
Urban	15	27	3	44	35.5±16.97	
Education						
High education levels	38	69	9	60	60.5±46.66	0.000[S]
Low education levels	17	31	6	40	35.5±9.19	
Marital status						
Married	48	87	12	56	71.5±44.54	0.027[S]
Unmarried	7	13	3	44	28.5±11.31	
Economic status						
Good	30	55	2	13	34±25.45	0.009[S]
Medium	8	15	3	20	17.5±10.6	
Low	17	30	10	67	48.5±19.79	

S- Significant; p<0.05 level of significant.

Table 2 Risk factors associated with the prevalence of strokes in diabetic patients

Risk factors	Ischemic Stroke (n=55)		Hemorrhage Stroke (n=15)	
	Number	Percentage	Number	Percentage
Tobacco use				
Smoker	42	76	12	56
Non smoker	13	24	3	44
Alcohol consumption				
Drinkers	47	85	13	87
Non-drinkers	8	15	2	13
Hypertension				
Yes	52	94	13	87
No	3	6	2	13
Diabetes mellitus				
Yes	29	53	9	56
No	26	47	6	44
Dyslipidemia				
Yes	22	40	8	53
No	33	60	7	47
Cardiac artery disease				
Yes	18	33	5	36
No	37	67	9	64
Atrial fibrillation				
Yes	27	49	7	47
No	28	51	8	53
Ischemic heart disease				
Yes	8	15	2	13
No	47	85	13	87
Previous stroke				
Yes	35	64	10	67
No	20	36	5	33

The Risk factors associated with the prevalence of strokes in diabetic patients were shown in Table 2. There are 54 patients with smoker and 16 patients with non-smoker. Out of 70 patients 60 with drinkers, 10 patients are not drinkers. There are 65 patients had hypertension. The distribution of

risk factors of the 30 patients had recorded dyslipidemia, 23 patients had cardiac artery disease, and 38 had diabetes. Of all the patients identified, 34 were atrial fibrillation and 10 patients were ischemic heart disease. There were 45 patients had a family history of stroke prior to their event.

Statistical Analysis

Statistical analysis was performed using SPSS software program, version 20.0. The results were expressed as mean and standard deviation. The data were analyzed by analysis of variance (ANOVA). The results were considered significant when the p value was found to be <0.05 in a confidence interval of 95%.

DISCUSSION

The prevalence and risk factors of stroke has increased by about 100% in developing countries over the last 10 years[16,17]. It observed that the diabetic patients were higher in the age group of >60 (51%) and lower <20 (5%) which was statistically significant (p=0.001). The majority of men 60% than women were representing 40% of the sample. The mean ages for men were 70.20±10.3. The slightly lower than the mean age of 74.02±8.3 were found in females[18]. In relation to residence area, 18 (36%) were urban patients and 52 (64%) were rural patients. The rural patients were (64.5±38.89; p=0.025) in higher than urban area (35.5±16.97; p=0.025) as compared with ischemic and hemorrhage stroke. The education status showed a higher proportion of patients (60%; 60.5±46.66; p = 0.000) and a lower proportion (40%; 35.5±9.19) were observed. The married patients (71%; 71.5±44.54; p=0.027) were than unmarried (28%; 28.5±11.31). The good economic status of ischemic and hemorrhage stroke patients (55% vs. 13%; 34±25.45; p = 0.009) and a lower status of (15% vs. 20%; 17.5±10.6) were presented. The value of 77% (54/70) smokers and 23% (16/70) non-smokers had both ischemic and hemorrhage strokes in diabetic patients. Alcoholic's patients were at daily drinkers (85%) and 15% had non drinkers. There are 65 (90%) patients had hypertension. The distribution of risk factors of the 30 patients had recorded dyslipidemia (46.5%)[19,20], 23 patients had cardiac artery disease (34.5%), and 38 had diabetes (54.5%). Of all the patients identified, 34 were atrial fibrillation (48%) and 10 patients were ischemic heart disease (14%)[21-23]. There were 45 patients had a family history of previous strokes (65.5%). In hypertension, the most powerful and modifiable risk factor was found in 90% of these patients[24]. This is higher than 78% shown in recent study of 159 stroke patients, and 65 % in another study[25]. The diabetes mellitus was recognized as the second most common risk factor for stroke, found in 54.5% patients. This is comparable to 41.5% by Syed et al.[20]. The risk of stroke in diabetic patients is about four times than that found in non-diabetic individuals[26].

CONCLUSION

It concluded that the prevalence and risk factors of strokes in diabetic patients were identified. The hypertension and diabetes were the major risk factors in both ischemic and hemorrhage strokes in diabetic patients. It is required to reduce the trouble for rising diabetes disease in the society. It is suggests that on focusing of interventions to prevent and control the strokes in diabetes diseases.

References

1. Barnett JM. Forty years of progress in stroke. Stroke, 2010; 41: 1068.
2. Aliona N, Lars T, Annette F, Anna Therese B, Ulrike WA, Halvor N. Impact of Diabetes Mellitus on 1867 Acute Ischemic Stroke Patients. *Journal of Research in Diabetes,* 2015; Article ID 112104, DOI: 10.5171/2015.112104.
3. Reeves MJ,Vaidya RS, Fonarow GC, Liang L, Smith EE, Matulonis R, Olson DM, Schwamm LH. Quality of care and outcomes in patients with diabetes hospitalized with ischemic stroke, Stroke, 2010; 41 (5): e409-17.
4. Wild, SR, Green G, Sicree A, King RH. Global prevalence of diabetes-Estimates for the year 2000 and projections for 2030. Diabetes Care.2004; 27: 1047-53.
5. American diabetes association diabetes care, 2017; pg.11-24.
6. Murray CJ, Lopez AD. Mortality by cause for eight regions of the world: Global Burden of Disease Study. Lancet 1997; 349:1269-76.
7. Sacco RL, Benjamin EJ, Broderick JP et al. American Heart Association Prevention Conference. IV. Prevention and Rehabilitation of Stroke. Risk factors. Stroke 1997; 28:1507-17.
8. Bell DS. Stroke in the diabetic patient. Diabetes Care 1994; 17:213-19.
9. Kissela BM, Khoury J, Kleindorfer D et al. Epidemiology of ischemic stroke in patients with diabetes: the greater Cincinnati/Northern Kentucky Stroke Study. Diabetes Care 2005; 28:355-9.
10. Folsom AR, Rasmussen ML, Chambless LE. Prospective associations of fasting insulin, body fat distribution, and diabetes with risk of ischemic stroke. The Atherosclerosis Risk in Communities (ARIC) Study Investigators. Diabetes Care 1999; 22:1077-83.
11. IDF. 2009. Unwin N, Whiting D, Gan D, Jacqmain O, Ghyoot G, editors. IDF diabetes atlas. 4th Ed. Belgium: International Diabetes Federation.12.
12. Hill MD, Yiannakoulias N, Jeerakathil T, Tu JV, Svenson LW, Schopflocher DP. The high risk of stroke immediately after transient ischemic attack. Neurology, 2004; 62, 2015-2020.
13. Woo D, Haverbusch M, Padmini S, Kisella B, Khuri J, Schneider A, Broderick J. Effect of untreated hypertension on hemorrhagic stroke. Stroke, 2004; 35: 1703-1708.
14. Go AS, Mozaffarian D, Roger VL, Benjamin EJ, Berry JD, Borden WD, Turner MB. Heart disease and stroke statistics update. Circulation, 2010; 121: e46-e215.
15. Wolf-Maier K, Cooper RS, Banegas JR, Giampaoli S, Hense H, Joffres M,Vescio F. Hypertension prevalence and blood pressure levels in 6 European countries, Canada, and the United States. *Journal of the American Medical Association*, 2003; 289(18): 2363-2369.
16. Feigin VL, Lawes CM, Bennett DA, Barker-Collo SL, Parag V. Worldwide stroke incidence and early case fatality reported in 56 population-based studies: a systematic review. Lancet Neurol. 2009; 8: 355-69.
17. Kamal A, Itrat A, Murtaza M, Khan M, Rasheed A. Ali A. The burden of stroke and transient ischemic attack in Pakistan: a community-based prevalence study. BMC Neurology. 2009; 9: 58-62.

18. O'Donnell MJ, Xavier D, Liu L. Risk factors for ischaemic and intracerebral haemorrhagic stroke in 22 countries (The Interstroke study): a case-control study. Lancet. 2010; 376:112–123.
19. Khan NI, Naz L, Mushtaq S, Rukh L, Ali S, Hussain Z. Ischemic stroke: prevalence of modifiable risk factors in male and female patients in Pakistan. *Pak J Pharm Sci* 2009; 22: 62-67.
20. Syed NA, Khealani BA, Ali S, Hasan A, Akhtar N, Brohi Hl. Ischemic stroke subtypes in Pakistan: the Aga Khan University Stroke Data Bank. *J Pak Med Assoc.* 2003; 53: 584-8.
21. Osmani AH, Durrani RK, Ara J. Comparison of outcome in different types of stroke due to cerebral ischemia. *J Coll Physicians Surg Pak.* 2010; 20:42-6.
22. Kaul S, Sunitha P, Suvarna A, Meena AK, Uma M, Reddy JM. Subtypes of ischemic stroke in a metropolitan C=city of South India (One year data from a hospital based stroke registry). Neurol India. 2002; 50: S8-S14.
23. Liu X, Xu G, Wu W, Zhang R, Yin Q, Zhu W. Subtypes and one year survival of first-ever stroke in Chinese patients: the Nanjing Stroke Registry. Cerebrovasc Dis. 2006; 22(2): 130-136.
24. Robitaille C, Dai S, Waters C, Loukine L, Bancej C, Quach C, Quan H. Diagnosed hypertension in Canada: Incidence, prevalence and related mortality. Canadian Medical Association Journal. 2012; 184(1): 49-56.
25. Taj F, Zahid R, Syeda U R, Murtaza M, Ahmed S, Kamal A.. Risk factors of stroke in Pakistan: a dedicated stroke clinic experience. *Can J Neurol Sci.* 2010; 37: 252-7.
26. Aquil N, Imtiaz B, Arshia A, Ejaz AV, Bashir AS. Risk factors in various subtypes of ischemic stroke according to TOAST criteria. *J. College of Phys. Surg. Pak.* 2011: 21(5): 280-283.

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