



**ORIGINAL RESEARCH PAPER**

**Medicine**

**STROKE TOPOGRAPHY AND INHOSPITAL MORTALITY IN DIABETIC AND NONDIABETIC STROKE PATIENTS IN VINDHYA REGION**

**KEY WORDS:** Topography, Stroke, Diabetic, Nondiabetic, Mortality.

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**ABSTRACT**

**BACKGROUND:** Stroke is defined as an abrupt onset of neurologic deficit that is attributable to a focal vascular cause. It represents the second most common cause of mortality and the third most common cause of disability in developed countries. diabetes is an important causative factor for higher mortality among stroke patients, Hence the need of a study to assess the prognosis of stroke in Diabetic and Nondiabetic patients.

**MATERIAL AND METHODS:** This was a cross sectional observational study conducted on 500 patients of stroke for a duration of 1 year. Written informed consent was taken from all patients. History, clinical examination and radiological investigations (CT SCAN/ MRI) were done for confirmation of stroke.

**RESULTS:** Out of 500 patients 72.8% had ischemic stroke and 27.2% had haemorrhagic stroke. Among diabetic group ischemic stroke was distributed in the following manner- cortex 32.94%, basal ganglia 27.64%, thalamus 17.6%, brain stem 12.94%, cerebellum 8.82% in contrast to non-diabetics where it was in the following order cortex 28.86%, basal ganglia 22.68%, thalamus 20.61%, Brain Stem 16.49%, cerebellum 11.34%. Among diabetic patients distribution of intracerebral hemorrhage was as follows cortex 10.52%, basal ganglia 21.05%, thalamus 39.47%, brain stem 7.89%, cerebellum 21.05% compared to nondiabetic group where it was cortex-19.38%, basal ganglia 45.91%, thalamus 14.28%, brain stem-12.24%, cerebellum 8.16%. In our study in-hospital mortality was 17% (85 patients), in diabetic group mortality was 26.44% and in nondiabetic group it was 10.27%. Hemorrhagic stroke had higher mortality (27.94%) as compared to ischemic stroke (12.91%). In diabetic group male diabetic stroke patients had higher in hospital mortality than female diabetic stroke patients and it was statistically significant (p<0.0010).

**CONCLUSION:** In our study topographically overall basal ganglia was the most common area to be involved followed by cerebral cortex, thalamus, brainstem, and cerebellum. In diabetic group cortex was the most commonly involved area while in nondiabetic patients basal ganglia was most commonly involved area. Our study shows that mortality in diabetic stroke were significantly higher than nondiabetic and among them haemorrhagic stroke significantly surpassed ischemic stroke. Mortality in diabetic stroke was also sex dependent with male patients showing significantly more mortality than female.

**INTRODUCTION:**

A Stroke is defined as an abrupt onset of neurologic deficit that is attributable to a focal vascular cause.<sup>[1]</sup> Stroke can be divided into two broad categories ischemic stroke and hemorrhagic stroke. Worldwide, stroke is the second most common cause of mortality and the third most common cause of disability.<sup>[2]</sup> Patients having haemorrhagic stroke had a higher risk of mortality than those diagnosed with ischemic stroke.<sup>[2]</sup> Diabetes is known to produce deleterious effect on microvasculature, which may result in an increased risk of bleeding.<sup>[3]</sup> It has been suggested that stroke patient with diabetes mellitus have higher in- hospital mortality rates and poorer outcome than those without diabetes.<sup>[4-11]</sup> Therefore, screening and better glycaemic control is believed to reduce the risk of mortality after acute stroke.<sup>[12]</sup>

Different findings are reported in the literature regarding the impact of DM on mortality among stroke patients. The German stroke study found DM to have a significant impact on early outcome.<sup>[13]</sup> However, a Polish study suggested that diabetes had no effect on the course and outcome of ischemic stroke.<sup>[14]</sup>

Our study is aimed at analysing the topography of stroke and in hospital mortality of diabetic and nondiabetic stroke patients of Vindhya region admitted in Sanjay Gandhi hospital Rewa (MP).

**MATERIAL AND METHOD**

The present study Was conducted in Department of Medicine, Sanjay Gandhi Memorial Hospital, associated with Shyam Shah Medical College, Rewa between April 2017 to March 2018 (12 months).

**STUDY DESIGN**

Cross sectional & observational study.

**Duration of study:** 01 year from April, 2017 to March, 2018.

**SAMPLE SIZE:** 500 patients of stroke.

**INCLUSION CRITERIA**

All patients older than 18 years presenting clinically and radiologically with feature of stroke.

**EXCLUSION CRITERIA:**

1. Age less than 18 years
2. Stroke due to other causes
  - History of head injury
  - Drugs
  - Hypercoagulable stroke
  - Eclampsia
  - Infection
  - Sub Arachnoid Hemorrhage

**DATA COLLECTION**

This was a cross sectional observational study conducted on 500 patients of stroke who fulfil inclusion criteria was taken for this study for a duration of 1 year. Written informed consent was taken from all patients. History, clinical examination and radiological investigations (CT-SCAN/MRI, Head) were done . Diabetic, and non-diabetics were defined as per American Diabetics association 2017 criteria of HbA1c (<5.7% normal, 5.7% to 6.4% impaired glucose tolerance ≥6.5% diabetes). Diabetic and non-diabetic patients were further grouped according to type of stroke.

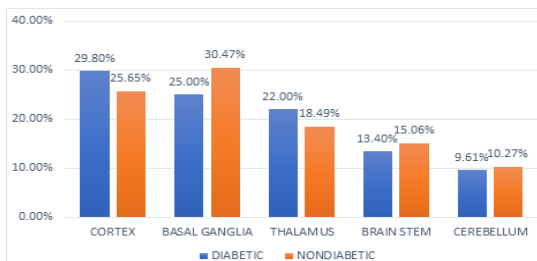
**Statistical Analysis**

Statistical analyses were carried out using a computer based statistical analysis programme, SPSS (Statistical Program for Social Sciences) version 22.0. The Chi Square was used wherever comparisons were needed between the two groups or between two categories in the same group. A p value < 0.05 was considered

significant. The analysed data was graphical represented by, bar graphs etc

**OBSERVATION AND RESULTS**

**DISTRIBUTION OF DIABETIC AND NON-DIABETIC PATIENTS OF STROKE ACCORDING TO AREA OF STROKE INVOLVED**



**GRAPH NO-1**

Our study shows that overall basal ganglia was the most common area to be involved followed by cerebral cortex, thalamus, brainstem and cerebellum.

**DISTRIBUTION OF DIABETIC PATIENTS OF STROKE ACCORDING TO AREA OF STROKE INVOLVED**

**TABLE No- 1**

AREA INVOLVEMENT	ISCHEMIC	HEMORRHAGIC	TOTAL
CORTEX	56 (32.94%)	4 (10.52%)	60
BASAL GANGLIA	47 (27.64%)	8 (21.05%)	55
THALAMUS	30 (17.64%)	15 (39.47%)	45
BRAIN STEM	22 (12.94%)	3 (7.89%)	25
CEREBELLUM	15 (8.82%)	8 (21.05%)	23
TOTAL	170	38	208

- Among diabetic group ischemic stroke was distributed in the following manner- cortex 32.94%, basal ganglia 27.64%, thalamus 17.64%, brain stem 12.94%, cerebellum 8.82%.
- Distribution of intracerebral hemorrhage was as follows cortex 10.52%, basal ganglia 21.05%, thalamus 39.47%, brain stem 7.89%, cerebellum 21.05%

**DISTRIBUTION OF NONDIABETIC PATIENTS OF STROKE ACCORDING TO AREA OF STROKE INVOLVED**

**TABLE No- 2**

AREA INVOLVEMENT	ISCHEMIC	HEMORRHAGIC	TOTAL
CORTEX	56 (28.86%)	19 (19.38%)	75
BASAL GANGLIA	44 (22.68%)	45 (45.91%)	89
THALAMUS	40 (20.61%)	14(14.28%)	54
BRAIN STEM	32(16.49%)	12(12.24%)	44
CEREBELLUM	22(11.34%)	8(8.16%)	30
TOTAL	194	98	292

- In Nondiabetics, distribution of ischemic stroke was in the following order cortex 28.86%, basal ganglia 22.68%, thalamus 20.61%, brain stem 16.49%, cerebellum 11.34%.
- In Nondiabetics, distribution of hemorrhagic stroke was cortex 19.38%, basal ganglia-45.91%, thalamus-14.28%, brain stem-12.24%, cerebellum-8.16%.

**IN-HOSPITAL MORTALITY BETWEEN DIABETIC AND NONDIABETIC PATIENTS OF STROKE.**

**TABLE NO – 3**

Variables	Mortality	Diabetic (n=208)	Nondiabetic (n=292)	Total
Type	PRESENT	55 (26.44%)	30 (10.27%)	85 (17%)
	ABSENT	153 (21.63%)	262 (52.4%)	415 (83%)
Male	PRESENT	45 (14.9%)	22 (7.53%)	67 (22.18%)
	ABSENT	87 (41.82%)	148 (49.0%)	235 (77.81%)
Female	PRESENT	10 (4.8%)	8 (2.73%)	18 (8.7%)
	ABSENT	66 (31.73%)	114 (59.13%)	180(90.9%)
Ischemic Stroke	PRESENT	31(14.9%)	16 (5.47%)	47(12.91%)
	ABSENT	139 (66.83%)	178(91.75%)	317(87.09%)
Hemorrhage Stroke	PRESENT	20 (9.61%)	18 (6.16%)	38 (27.94%)
	ABSENT	18 (8.6%)	80 (27.39%)	98 (72.06%)

In our study total mortality was 17%, In diabetic group mortality was significantly higher (26.4%) as compared to nondiabetic group (10.2%) (p value was 0.0001). Mortality of haemorrhagic stroke patients was significantly higher than ischemic stroke ( p value was 0.0011). In diabetics male mortality was 21.6%, in diabetic females it was 4.8%. In Nondiabetic male mortality was 7.53%, in females it was 2.73%. Mortality was more in male diabetic stroke patients as compared to female patients and it was significant (P value was 0.0010).

**DISCUSSION**

**Area of brain involvement**

Overall the area of brain affected by ischemic stroke was 30.76%-cortex, basal ganglia 25%, thalamus 19.23%, brainstem 14.83%, cerebellum 10.13% compared to the study done by **Vaidya C, Majmudar D et al<sup>[15]</sup>**, where cortex was involved in 49% followed by basal ganglia 10.5%, by **Eapen et al<sup>[16]</sup>**. In which most common site was parietal 56% followed by basal ganglia. In diabetic group ischemic stroke was distributed in the following manner- cortex 32.82%, basal ganglia 27.64%, thalamus 17.64%, brain stem 12.94%, cerebellum 8.8% in contrast to non-diabetics where it was in the following order cortex 28.86%, basal ganglia 22.6%, thalamus 20.61%, brain stem 16.4%, cerebellum 11.34%.

Overall the area of brain affected by hemorrhagic stroke was in following order- cortex 16.9%, basal ganglia 38.97%, thalamus 21.32%, brain stem 11.02%, cerebellum 11.76.% compared to study done by **Vaidya C, Majmudar D et al<sup>[15]</sup>** where hemorrhage was found in thalamus 24.7% followed & basal ganglia 13.4% comparable study done by **Eapen et al<sup>[16]</sup>** and **Aiyer et al<sup>[17]</sup>**. Among diabetic patients distribution of intracerebral hemorrhage was as follows cortex 10.5%, basal ganglia-21%, thalamus-39.4%, brain stem-7.89%, cerebellum-21% compared to non-diabetic group where it was cortex 19.38%, basal ganglia-45.91%, thalamus-14.28%, brain stem 12.24%, cerebellum 8.51%.

**Prognosis of diabetic and nondiabetic stroke patients**

In present study in hospital mortality was 17% (85), in diabetic group it was 26.4% and in nondiabetic group it was 10.2% which correlates with the study done by **Waled M. Sweileh<sup>[18]</sup> et al** where it was 21%, including 27.4% in diabetic and 15.7% in nondiabetic group. Male diabetic stroke patients had higher in-hospital mortality than female diabetic stroke patients and it was statistically significant p <0.0010 which correlates with study done by **Sasaki et al<sup>[19]</sup>**. Mortality in haemorrhagic stroke was 27.94% compared to 12.91% in ischemic stroke which correlates with European BIOMED stroke project<sup>[3]</sup>.

**CONCLUSION**

In our study topographically overall basal ganglia was the most common area to be involved followed by cerebral cortex, thalamus, brainstem, and cerebellum. In diabetic group cortex was the most commonly involved area followed by basal ganglia and thalamus while in nondiabetic patients basal ganglia was most commonly involved area. Our study shows higher in-hospital mortality in diabetic stroke patients compared to nondiabetic stroke patients and mortality was significantly higher in haemorrhagic stroke compared to ischemic stroke. Mortality of diabetic male patients was significantly higher than their female counterparts.

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