Scholars Journal of Applied Medical Sciences (SJAMS) **ISSN 2320-6691 (Online)**
Sch. J. App. Med. Sci., 2015; 3(9B):3253-3264 **ISSN 2347-954X (Print)**

(An International Publisher for Academic and Scientific Resources)
www.saspublisher.com

Research Article

Clinical Profile of Patients with Cerebrovascular Accident: A Study from Rural Hospital

Madhura Talkad Lakshmikumar[1], Shruthi Bettegowda*[2], Spandana Vuyyuru [3]
[1]Professor, Department of Medicine, Adichunchanagiri Institute of Medical Sciences, Balagangadharanatha Nagar, Nagamangala, Mandya -571448, India.
[2]Associate Professor, Department of Medicine, Adichunchanagiri Institute of Medical Sciences, Balagangadharanatha Nagar, Nagamangala, Mandya -571448, India.
[3]3rd Year Resident , Department of Medicine, Adichunchanagiri Institute of Medical Sciences, Balagangadharanatha Nagar, Nagamangala, Mandya -571448, India.

***Corresponding author**
Dr. Shruthi B
Email: bettegowda.shruthi@gmail.com

Abstract: Cerebrovascular accident is a global health problem and leading cause of mortality and morbidity worldwide. Effective risk factor intervention offers a real hope of reducing stroke mortality and morbidity. Due to increase in burden of stroke in coming years and limited availability of stroke care in India, it would be better to study on preventive measures that will reduce incidence of stroke. The objective of our study was to assess the clinical profile, risk factors and the prognosis of cerebrovascular accident with reference to the risk factors in 100 patients presented with cerebrovascular accident. Study protocol included detailed clinical history, clinical examination and investigations. Advancing age, male gender, hypertension, diabetes mellitus, smoking, dyslipidemia, alcohol consumption, heart disease, carotid stenosis, family history of stroke, drugs and past history of transient ischemic attack were identified as risk factors for cerebrovascular accidents. Increasing age, male sex, low Glasgow coma scale at the time of admission, hypertension, diabetes mellitus, dyslipidemia, heart disease, smoking, carotid stenosis, presence of multiple risk factors, middle cerebral artery territory infarct, presence of trantentorial herniation, subarachnoid hemorrhage, intraparenchymal bleed with intraventricular extension were associated with poor prognosis. Ischemic stroke was more common than hemorrhagic stroke and hemorrhagic stroke was associated with poor prognosis. Some of these risk factors can be modifiable by changing lifestyle, people who are prone for cerebrovascular accident need to be screened, counseled and treated .A more extensive prospective case control study in future is required on cerebrovascular accidents in rural population.
Keywords: Cerebrovascular accident, Diabetes mellitus, Dyslipidemia, Hemorrhagic stroke, Hypertension, Ischemic stroke, Smoking

INTRODUCTION:

Cerebrovascular accident (CVA) is a global health problem and leading cause of mortality and morbidity worldwide [1]. Cerebrovascular diseases include: ischemic stroke, hemorrhagic stroke and cerebrovascular anomalies such as intracranial aneurysms and arteriovenous malformations (AVMs). CVA or stroke is defined as abrupt onset of a neurological deficit that is attributable to a focal vascular cause [2]. Stroke is a leading public health problem. Since the late 1990's there has been increase in the survival after stroke and therefore it has become a common cause of human suffering and leading cause of long term disability. Stroke and its sequel are important issues for health care planners in governments, insurance companies and medical services everywhere. Because the costs of treatment and the economic consequences of lost of productivity are so high, prevention of stroke will be a very cost effective strategy. An estimated 50% increase in the incidence of stroke is predicted by 2050 due to aging of populations in many industrialized societies. [3]. Risk factors for CVA are divided into modifiable and non modifiable risk factors. Non modifiable risk factors include age, sex, ethnicity and geography, family history of stroke [3-6]. Modifiable risk factors are smoking, alcohol consumption, drug abuse, arterial hypertension, diabetes mellitus, dyslipidemia, and heart disease [2, 3, 7-33]. Effective risk factor intervention offers a real hope of reducing stroke mortality and morbidity. Due to

increase in burden of stroke in coming years and limited availability of stroke care in India, it would be better to study on preventive measures that will reduce incidence of stroke [1]. As few data were available on CVA in rural population, this study is conducted to identify the risk factors and etiology in patients with CVA. An attempt has been made in this study to know the prognosis of CVA with reference to risk factors.

MATERIAL AND METHODS:

This Prospective observational study was carried out in 100 consecutive patients with Cerebrovascular accident (CVA), who were admitted in Intensive Care Unit (ICU) under the department of General Medicine. Ethics committee approval was taken for the study.

Inclusion Criteria:

- Patients of either sex with CVA admitted to ICU with symptoms and signs suggestive of acute loss of focal or global cerebral function.
- Patients admitted within 24 hours after the onset of symptoms.
- Age greater than or equal to 50 years.
- Evidence of ischemia or hemorrhage on CT scan or MRI of brain.
- Patients with first episode of CVA.

Exclusion Criteria:

- Patients with history of epilepsy, migraine and head injury.
- Ischemia or hemorrhage on CT brain due to infection, connective tissue disorders and tumors.
- Patients with Cortical venous thrombosis.
- Patients presented with transient ischemic attack.
- Patients with metabolic encephalopathy.

Study protocol included detailed clinical history, clinical examination and investigations. Risk factors for CVA like hypertension, diabetes, dyslipidemia; family history of CVA was evaluated. After taking consent, patients were subjected for CT scan of brain and other relevant investigations pertaining to their clinical status. Special investigations like MRI brain, CT Angiography, Magnetic Resonance Angiography were done wherever necessary. The risk factor profile of each patient was evaluated during the hospital stay.

In this study

- Patients with HbA1C > 6.5% and patients who were on anti-diabetic medication were considered under risk factor for diabetes mellitus.[34]
- Patients who were known hypertensive prior to the onset of CVA and newly detected patients with evidence of hypertensive retinopathy were considered under risk factor for hypertension.
- Dyslipidemia was diagnosed as per American Heart Association (AHA) guidelines (2011) as serum cholesterol > 200 mg/dl, low density lipoprotein (LDL) > 130 mg/dl, triglycerides > 150 mg/dl and high density lipoprotein (HDL) < 40mg/dl.[35]
- Patients with ischemic heart disease, congestive heart failure, rheumatic heart disease, atrial fibrillation, corpulmonale, and cardiomyopathy were considered as suffering from heart disease.
- Smoking (who were currently smoking more than 10 cigarettes per day for more than 6 months) and alcohol intake (> 3 standard drinks/day for a minimum of 6 months) were based on clinical history of consumption of these substances. [1,36]
- Family history of stroke was considered if the first degree relatives of the patient suffered from stroke.
- Past history of Transient ischemic attack(TIA)was considered if the patient had any symptoms suggestive of TIA in the past.[2]
- Carotid stenosis was considered as a risk factor if Carotid doppler study showed more than 50 % stenosis in the carotid arteries.[2]
- Drug induced Cerebrovascular accident was considered if patient was on drugs like cocaine, amphetamine, anticoagulants, thrombolytics or oral contraceptive pills.[2]

The prognosis was studied after one month of admission and a detailed neurological examination was performed on all survivors and prognosis was compared with the initial clinical examination for improvement, worsening or status quo.[37] The number of deaths was noted.

- Complete recovery (CR) – Improved without neurological deficits
- Partial recovery (PR) –Improved but had neurological deficits
- No recovery (no improvement) (NR) – patients with no improvement or worsening of neurological deficits.
- Death (D)

Statistical Methods

The data was entered in Microsoft Excel and was analyzed using Stata13.1 version. In descriptive statistics: results were expressed in percentages and proportions and were represented by using tables, bar diagrams and pie charts. In analytical statistics: Two sample proportion test using Z value was applied.

RESULTS:

Age: In this study 51 patients (51%) belonged to 70 years and above age group (Table 1).

Table 1: Age Distribution

Age	No. of Patients	Percentage
50-59	17	17.0%
60-69	32	32.0%
> 70	51	51.0%

Age and Prognosis:

In 50-59 years age group: 13 patients (76.47%) had CR (complete recovery), 1 patient (5.88%) had PR (partial recovery), 3 patients (17.65%) had NR (no recovery) and no patients expired. In 60-69 years age group: 8 patients (25%) had CR, 19 patients (59.38%) had PR, 3 patients (9.37%) had NR and 2 patients (6.25%) expired. In 70 years and above age group: 3 patients (5.88%) had CR, 14 patients (27.45%) had PR, 27 patients (52.94%) had NR and 7 patients (13.73%) expired (Table 2).

Table 2: Age and Prognosis

Recovery	Age	No. of Patients	Percentage
Complete Recovery	50-59	13	76.47%
	60-69	8	25%
	> 70	3	5.88%
Partial Recovery	50-59	1	5.88%
	60-69	19	59.38%
	> 70	14	27.45%
No Recovery	50-59	3	17.65%
	60-69	3	9.37%
	> 70	27	52.94%
Death	50-59	0	0%
	60-69	2	6.25%
	> 70	7	13.73%

Sex: Among 100 patients, 61 patients (61%) were males and 39 patients (39%) were females (Table 3).

Table 3: Sex Distribution

Sex	No. of Patients	Percentage
Male	61	61.0%
Female	39	39.0%

Sex and Prognosis:

Among 61 male patients, 9 patients (14.75%) had CR, 22 patients (36.06%) had PR, 24 patients (39.34%) had NR and 6 patients (9.84%) expired. Among 39 female patients, 15 patients (38.46%) had CR, 12 patients (30.77%) had PR, 9 patients (23.08%) had NR and 3 patients (7.69%) expired (Table 4).

Table 4: Sex and Prognosis

Recovery	Sex	No. of Patients	Percentage
Complete Recovery	Male	9	14.75%
	Female	15	38.46%
Partial Recovery	Male	22	36.06%
	Female	12	30.77%
No Recovery	Male	24	39.34%
	Female	9	23.08%
Death	Male	6	9.84%
	Female	3	7.69%

Clinical Presentation:

Motor weakness was the main complaint in 64 patients, next in frequency was altered sensorium, and followed by speech disturbances (Table 5).

Table 5: Clinical Presentation in CVA

Symptoms	No of patients
Motor weakness	64
Altered sensorium	56
Speech disturbances	33
Vomiting	20
Giddiness	13
Headache	12
Convulsions(first episode)	4

Glasgow Coma Scale (GCS) Score and prognosis:

In this study 50 patients were admitted with GCS of 13-15, 30 patients with GCS of 5-12 and 20 patients were admitted with GCS of 3-4.Among patients admitted with GCS of 13-15, 18 patients (36.0%) had complete recovery, 30 patients (60.0%) had partial recovery, 2 patients (4%) had no recovery and no patients expired. Among patients admitted with GCS of 5-12, 6 patients (20.0%) had complete recovery, 4 patients (13.33%) had partial recovery, 18 patients (60%) had no recovery and 2 patients (6.67%) expired. Among patients admitted with GCS of 3-4, 13 patients (65%) had no recovery and 7 patients (35%) expired (Table 6). [38]

Table 6: GCS Score at the Time of Admission and Prognosis

GCS Score		Complete Recovery	Partial Recovery	No Recovery	Death
13-15 (50 patients)	No. of Patients	18	30	2	0
	Percentage	36.0	60.0	4.0	0
5-12 (30 patients)	No. of Patients	6	4	18	2
	Percentage	20.0	13.33	60.0	6.67
3-4 (20 patients)	No. of Patients	0	0	13	7
	Percentage	0	0	65.0	35.0

Risk factors:

The major risk factors in the study group were hypertension (70), diabetes (39), smoking (35) dyslipidemia (31), and alcohol consumption (27) (Table 7).

Table 7: Risk Factors

Risk Factors	No. of Patients	Percentage
Hypertension	70	70 %
Diabetes Mellitus	39	39 %
Smoking	35	35 %
Dyslipidemia	31	31 %
Alcohol	27	27 %
Heart Disease	17	17 %
Carotid Stenosis	14	14 %
Family History of Stroke	11	11 %
Past history of TIA	6	06 %
Drug Induced	3	03 %

Hypertension and Prognosis:

Among 100 patients, 70 patients (70%) had hypertension. Among 70 patients with hypertension, 9 patients (12.86%) had CR, 24 patients (34.29%) had PR, 28 patients (40.0%) had NR and 9 patients (12.86%) expired. Among 30 patients without hypertension, 15 patients (50%) had CR, 10 patients (33.33%) had PR, 5 patients (16.67%) had NR and no patients expired. P value is significant in complete recovery, no recovery and death (Table 8).

Table 8: Hypertension and Prognosis

Risk Factor		Complete Recovery	Partial Recovery	No Recovery	Death
With Hypertension	No. of Patients	9	24	28	9
	Percentage	12.86	34.29	40.00	12.86
Without Hypertension	No. of Patients	15	10	5	0
	Percentage	50.00	33.33	16.67	0.00
P value		<0.01	0.926	0.023	<0.01

Diabetes Mellitus and Prognosis:

Among 100 patients, 39 patients (39%) had Diabetes mellitus. Among 39 patients with diabetes mellitus, 5 patients (12.82%) had CR, 12 patients (30.77%) had PR, 15 patients (38.46%) had NR and 7 patients (17.95%) expired. Among 61 patients without diabetes mellitus, 19 patients (31.15%) had CR, 22 patients (36.07%) had PR, 18 patients (29.51%) had NR and 2 patients (3.28%) expired. P value is significant in complete recovery and death (Table 9).

Table 9: Diabetes Mellitus and Prognosis

Diabetes Mellitus		Complete Recovery	Partial Recovery	No Recovery	Death
With Diabetes	No. of Patients	5	12	15	7
	Percentage	12.82	30.77	38.46	17.95
Without Diabetes	No. of Patients	19	22	18	2
	Percentage	31.15	36.07	29.51	3.28
P value		0.036	0.58	0.35	0.01

Heart Disease and Prognosis:

Among 100 patients, 17 patients (17%) had heart disease. Among these patients, 1 patient (5.88%) had CR, 4 patients (23.53%) had PR, 5 patients (29.41%) had NR and 7 patients (41.18 %) expired. Among 83 patients without heart disease, 23 patients (27.71%) had CR, 30 patients (36.14%) had PR, 28 patients (33.73%) had NR and 2 patients (2.41%) expired. P value is significant in death (Table 10).

Table 10: Heart Disease and Prognosis

Heart Disease		Complete Recovery	Partial Recovery	No Recovery	Death
With Heart Disease	No. of Patients	1	4	5	7
	Percentage	5.88	23.53	29.41	41.18
Without Heart Disease	No. of Patients	23	30	28	2
	Percentage	27.71	36.14	33.73	2.41
P value		0.0549	0.3171	0.7298	<0.01

Smoking and Prognosis:

Among 100 patients, 35 patients (35%) had smoking as risk factor. Among patients with smoking, 5 patients (14.29%) had CR, 3 patients (8.57%) had PR, 20 patients (57.14%) had NR and 7 patients (20.0%) expired. Among 65 patients without smoking, 19 patients (29.23%) had CR, 31 patients (47.69%) had PR, 13 patients (20.0%) had NR and 2 patients (3.08%) expired. P value is significant in partial recovery, no recovery and death (Table 11).

Table 11: Smoking and Prognosis

Smoking		Complete Recovery	Partial Recovery	No Recovery	Death
With Smoking	No. of Patients	5	3	20	7
	Percentage	14.29	8.57	57.14	20.00
Without Smoking	No. of Patients	19	31	13	2
	Percentage	29.23	47.69	20.00	3.08
P value		0.0951	0.0001	0.0002	0.0048

Dyslipidemia and Prognosis:

Among 100 patients, 31 patients (31%) had Dyslipidemia. Among patients with dyslipidemia, 6 patients (19.35%) had CR, 8 patients (25.81%) had PR, 10 patients (32.26%) had NR and 7 patients (22.58%) expired. Among 69 patients without dyslipidemia, 18 patients (26.09%) had CR, 26 patients (37.68%) had PR, 23 patients (33.33%) had NR and 2 patients (2.90%) expired. P value is significant in death (Table 12).

Table 12: Dyslipidemia and Prognosis

Dyslipidemia		Complete Recovery	Partial Recovery	No Recovery	Death
With Dyslipidemia	No. of Patients	6	8	10	7
	Percentage	19.35	25.81	32.26	22.58
Without Dyslipidemia	No. of Patients	18	26	23	2
	Percentage	26.09	37.68	33.33	2.90
P value		0.4660	0.2463	0.9158	0.0015

Carotid Stenosis and Prognosis:

Among 100 patients, 14 patients (14%) had Carotid stenosis. Among patients with Carotid Stenosis, 1 patient (7.14%) had CR, 4 patients (28.57%) had PR, 5 patients (35.71%) had NR and 4 patients (28.57%) expired. Among 86 patients without Carotid Stenosis, 23 patients (26.74%) had CR, 30 patients (34.88%) had PR, 28 patients (32.56%) had NR and 5 patients (5.81%) expired. P value is significant in death (13).

Table 13: Carotid Stenosis and Prognosis

Carotid Stenosis		Complete Recovery	Partial Recovery	No Recovery	Death
With Carotid Stenosis	No. of Patients	1	4	5	4
	Percentage	7.14	28.57	35.71	28.57
Without Carotid Stenosis	No. of Patients	23	30	28	5
	Percentage	26.74	34.88	32.56	5.81
P value		0.08	0.51	0.97	0.01

Alcohol Consumption and Prognosis:

Among 100 patients, 27 patients (27%) had alcohol consumption as risk factor. Among patients with alcohol consumption, 9 patients (33.33%) had CR, 2 patients (7.41%) had PR, 13 patients (48.15%) had NR and 3 patients (11.11%) expired. Among 73 patients

without alcohol consumption, 15 patients (20.55%) had CR, 32 patients (43.84%) had PR, 20 patients (27.40 %) had NR and 6 patients (8.22%) expired. P value is significant in partial recovery (Table 14).

Table 14: Alcohol Consumption and Prognosis

Alcohol Consumption		Complete Recovery	Partial Recovery	No Recovery	Death
With Alcohol	No. of Patients	9	2	13	3
	Percentage	33.33	7.41	48.15	11.11
Without Alcohol	No. of Patients	15	32	20	6
	Percentage	20.55	43.84	27.40	8.22
P value		0.1838	0.0006	0.0501	0.6537

Family History of Stroke and Prognosis:

Among 100 patients, 11 patients (11%) had family history of stroke. Among 11 patients with family history of stroke, 1 patient (9.09%) had CR, 1 patient (9.09%) had PR, 7 patients (63.64%) had NR and 2 patients (18.18%) expired. Among 89 patients without family history of stroke, 23 patients (25.84%) had CR, 33 patients (37.08%) had PR, 26 patients (29.21%) had NR and 7 patients (7.87%) expired. P value is significant in no recovery (Table 15).

Table 15: Family History of Stroke and Prognosis

Family History of Stroke		Complete Recovery	Partial Recovery	No Recovery	Death
With Family History of Stroke	No. of Patients	1	1	7	2
	Percentage	9.09	9.09	63.64	18.18
Without Family History of Stroke	No. of Patients	23	33	26	7
	Percentage	25.84	37.08	29.21	7.87
P value		0.2197	0.0645	0.0348	0.2593

Drug Induced CVA and Prognosis:

Among 100 patients, 3 patients (3%) had drug induced CVA. Among 3 patients with drug induced CVA, 1 patient (33.33%) had PR, 1 patient (33.33%) had NR and 1 patient (33.33%) expired. Among 97 patients without drug induced CVA, 24 patients (24.74%) had CR, 33 patients (34.02%) had PR, 32 patients (32.99%) had NR and 8 patients (8.25%) expired (Table 16).

Table 16: Drug Induced CVA and Prognosis

Drug Induced		Complete Recovery	Partial Recovery	No Recovery	Death
With Drug Induced	No. of Patients	0	1	1	1
	Percentage	0.00	33.33	33.33	33.33
Without Drug Induced	No. of Patients	24	33	32	8
	Percentage	24.74	34.02	32.99	8.25
P value		0.3230	0.9803	0.9901	0.1348

Past history of TIA and Prognosis:

Among 100 patients, 6 patients (6%) had past history of TIA. Among patients with past history of TIA, 1 patient (16.67%) had CR, 2 patients (33.33%) had PR, 3 patients (50%) had NR and no patients expired. Among 94 patients without past history of TIA, 23 patients (24.47%) had CR, 32 patients (34.04%) had PR, 30 patients (31.91%) had NR and 9 patients (9.57%) expired (Table 17).

Table 17: Past history of TIA and Prognosis

TIA		Complete Recovery	Partial Recovery	No Recovery	Death
With past history of TIA	No. of Patients	1	2	3	0
	Percentage	16.67	33.33	50.00	0
Without past history of TIA	No. of Patients	23	32	30	9
	Percentage	24.47	34.04	31.91	9.57
P value		0.6644	0.9716	0.3610	0.4269

Number of risk factors:

Among 100 patients, 31 patients (31%) had single risk factor and 69 patients (69%) had multiple risk factors (more than one risk factor)(Table 18).

Table 18: CVA with Single and Multiple Risk Factors

No of risk factors	No of patients	Percentage
Single risk factor	31	31%
Multiple risk factors	69	69%

Prognosis with Risk Factors:

Among 31 patients with single risk factor, 14 patients (45.16%) had CR, 13 patients (41.94%) had PR, 4 patients (12.90%) had NR and no patients (0%) expired. Among 69 patients with more than one risk factor (multiple risk factors), 10 patients (14.49%) had CR, 21 patients (30.43%) had PR, 29 patients (42.03%) had NR and 9 patients (13.04%) expired. P value is significant in complete recovery, no recovery and death (Table 19).

Table 19: Prognosis Associated with Single and Multiple Risk Factors

No. of Risk Factors		Complete Recovery	Partial Recovery	No Recovery	Death
With Single Risk Factor	No. of Patients	14	13	4	0
	Percentage	45.16	41.94	12.90	0.00
With Multiple Risk Factors (> 1 Risk Factor)	No. of Patients	10	21	29	9
	Percentage	14.49	30.43	42.03	13.04
P value		0.0009	0.2615	0.0042	0.0350

Prognosis in CVA:

Among 100 patients with CVA, 24 patients (24%) had complete recovery, 34 patients (34%) had partial recovery, 33 patients (33%) had no recovery and 9 patients (9%) expired (Table 20).

Table 20: Prognosis in CVA

Prognosis	No. of Patients	Percentage
Complete Recovery	24	24.0%
Partial Recovery	34	34.0%
No Recovery	33	33.0%
Death	9	9.0%

Type of CVA:

Among 100 patients, 82 patients (82%) had ischemic stroke and 18 patients (18%) had hemorrhagic stroke (21).

Table 21: Type of CVA

Type of CVA	No of patients	Percentage
Ischemic	82	82%
Hemorrhagic	18	18%

Etiology of CVA:

Among 100 patients with CVA, 76 patients (76%) had thrombotic stroke, 6 patients (6%) had embolic stroke, 14 patients (14%) had hypertensive intraparenchymal hemorrhage, 3 patients (3%) had drug induced (acitrom, streptokinase) intraparenchymal hemorrhage and 1 patient (1%) had subarachnoid hemorrhage(SAH)(Table 22).

Table 22: Etiology of CVA

Etiology	No of patients	Percentage
Thrombotic Stroke	76	76%
Embolic Stroke	6	6%
Hypertensive Intraparenchymal Hemorrhage	14	14%
Drug Induced Intraparenchymal Hemorrhage	3	3%
SAH	1	1%

Prognosis in Ischemic and Hemorrhagic Stroke:

Among 82 patients with ischemic stroke, 21 patients (25.61%) had CR, 32 patients (39.02%) had PR, 24 patients (29.27%) had NR and 5 patients (6.10%) expired. Among 18 patients with hemorrhagic stroke, 3 patients (16.67%) had CR, 2 patients (11.11%) had PR, 9 patients (50.0%) had NR and 4 patients (22.22%) expired. P value is significant in partial recovery and death (Table 23).

Table 23: Prognosis in Ischemic and Hemorrhagic Stroke

Type of stroke		Complete Recovery	Partial Recovery	No Recovery	Death
With Ischemic Stroke	No. of Patients	21	32	24	5
	Percentage	25.61	39.02	29.27	6.10
With Hemorrhagic Stroke	No. of Patients	3	2	9	4
	Percentage	16.67	11.11	50.00	22.22
P Value		0.4211	0.0236	0.0903	0.0304

Territory Infarct and Prognosis:

Among 82 patients with ischemic stroke, 80 patients had single territory infarct and 2 patients had infarct involving more than one territory. Among patients with single territory infarct, 17 patients had anterior cerebral artery (ACA) territory infarct, 40 patients had middle cerebral artery (MCA) territory infarct and 23 patients had posterior cerebral artery (PCA) territory infracts. Among patients with ACA territory infarct, 14 patients (82.35%) had complete recovery, 3 patients (17.65%) had partial recovery and no patients died. Among patients with MCA territory infarct, 4 patients (10%) had complete recovery, 12 patients (30%) had partial recovery, 21 patients (52.5%) had no recovery and 3 patients (7.5%) died. Among patients with PCA territory infarct, 3 patients (13.04%) had complete recovery, 17 patients (73.91%) had partial recovery, 2 patients (8.69%) had no recovery and 1 patient (4.35%) died. Among patients who had infarct involving more than one territory, 1 patient (50.0%) had no recovery and 1 patient (50.0%) died. Among patients with ischemic stroke, 3 patients had transtentorial herniation and all those 3 patients expired (Table 24).

Table 24: Single Territory Infarct and Prognosis

Single Territory Infarct and Prognosis		Complete Recovery	Partial Recovery	No Recovery	Death
ACA territory (17 patients)	No. of Patients	14	3	0	0
	Percentage	82.35	17.65	0	0
MCA territory (40 patients)	No. of Patients	4	12	21	3
	Percentage	10.0	30.0	52.5	7.50
PCA territory (23 patients)	No. of Patients	3	17	2	1
	Percentage	13.04	73.91	8.69	4.35

Hematoma Volume and Prognosis:

Among 17 patients with intraparenchymal hemorrhage, 12 patients had hematoma volume < 30 cc and 5 patients had hematoma volume > 30 cc. Among patients with hematoma volume < 30 cc, 3 patients (25%) had CR, 2 patients (16.67%) had PR, 7 patients (58.33%) had NR and no patients expired. Among patients with hematoma volume > 30 cc, 2 patients (40.0%) had NR and 3 patients (60.0%) expired. P value is significant in death (Table 25).

Table 25: Hematoma Volume in Intraparenchymal hemorrhage and Prognosis

Hematoma Volume		Complete Recovery	Partial Recovery	No Recovery	Death
< 30 cc (12 patients)	No. of Patients	3	2	7	0
	Percentage	25	16.67	58.33	0
> 30 cc (5 patients)	No. of Patients	0	0	2	3
	Percentage	0	0	40	60
P Value		0.2179	0.3311	0.4902	0.0031

Intraventricular Extension and Prognosis:

Among 17 patients with intraparenchymal hemorrhage, intraventricular extension of bleed was present in 7 patients and absent in 10 patients. Among patients without intraventricular extension of bleed, 3 patients (30%) had CR, 2 patients (20%) had PR, 5 patients (50%) had NR and no patients expired. Among patients with intraventricular extension of bleed, 4 patients (57.14%) had NR and 3 patients (42.86%) expired. P Value is significant in death (Table 26).

Table 26: Intraventricular Extension of Intraparenchymal Bleed and Prognosis

Intraventricular Extension		Complete Recovery	Partial Recovery	No Recovery	Death
Without intraventricular extension (10)	No. of Patients	3	2	5	0
	Percentage	30	20	50	0
With intraventricular extension (7)	No. of Patients	0	0	4	3
	Percentage	0	0	57.14	42.86
P Value		0.1103	0.2078	0.7715	0.0225

DISCUSSION:

CVA caused 5.7 million deaths in 2005 and 87% of deaths are reported in low and middle income countries [39]. It is the second most common cause of death worldwide [40]. Developing countries accounts for 85% of global deaths due to stroke and 15 to 30 % of stroke patients are permanently disabled [41]. In India, community survey have shown a crude prevalence rate for hemiplegia in the range of 200 per 100000 persons, nearly 1.5 percent of all the urban hospital admission, 4.5% of all medical and around 20% of all neurological cases [42]. In India the prevalence of stroke various in different regions of the country and the estimated prevalence is 12-20/1000 in the 75-84 years age group [1]. In our study maximum number of cases was seen in 7th decade. Stroke can affect a person at any age. Still, advancing age is the most important factor that predicts an increased likelihood of stroke. The risk of stroke approximately doubles with every 10 years increase in age. Patient's age also effects prognosis. Elderly patients have poor prognosis and increased mortality than younger ones [3]. In this study, male predominance was present and similar findings were observed in Anand et al, Nagaraja et al and Marwat MA *et al.;* study.[37,43,44]In almost all age groups, stroke is more common in men than in women except for a slight increase of stroke among women aged 15-30 years because Cerebrovascular events occur as a complication of pregnancy and puerperium.[3,4,5]In this study, hypertension was the most common risk factor and similar findings were observed in Marwat MA *et al.;* Pandiyan U *et al.;* study. [37, 45,] In this study, patients with hypertension as a risk factor had poor prognosis and in Turkey AM *et al.;* study, hypertension was the commonest risk factor for in-hospital mortality rate. [46]Arterial hypertension is the leading underlying potentially treatable condition that promotes stroke.[3] Suboptimal blood pressure (BP) control is the most common attributable risk for death worldwide, being responsible for 62% of Cerebrovascular diseases.[24] Because hypertension leads to coronary artery disease, cardiomyopathy and atrial fibrillation, it is an indirect risk factor for stroke secondary to cardioembolism.[25,26] Untreated hypertension is highly prevalent and is an important independent risk factor for hemorrhagic stroke.[27,28] Approximately one fourth of hemorrhagic strokes could be prevented if all hypertensive subjects received treatment.[29].

In this study, 39 patients (39%) had Diabetes mellitus and it correlates with Sorganvi V *et al.;* study (38%). [1] In this study, patients with diabetes had poor prognosis and similar findings were present in Pandiyan U *et al.;* study[45]. Patients with either type 1 or type 2 diabetes mellitus have an increased susceptibility for large artery atherosclerosis and small artery occlusive disease. Diabetes mellitus also leads to renal or cardiac disease, which indirectly promote arterial hypertension and stroke. Diabetes increases the levels of fibrinogen and clotting factors, increase platelet aggregation, which in turn promotes arterial thrombosis. [3]

In this study, 35 patients (35%) had smoking as a risk factor and similar finding was observed in Sorganvi V e *et al.;* study.[1] In this study, patients with smoking as a risk factor had poor outcome and similar findings were observed in Pandiyan U *et al.;* study.[45]Cigarette smoking is a well established risk factor for ischemic stroke and SAH [7-12] Mechanism of smoking in ischemic stroke is due to structural arterial wall damage and carotid atherosclerosis, leading to thrombosis or embolic phenomena.[13,14] The mechanism of thrombogenesis is due to short-term effect of smoking leading to increased fibrinogen levels and platelet aggregation, elevated hematocrit levels and reduced cerebral blood flow due to arterial vasoconstriction [15-17]. For SAH there is a strong association of smoking with aneurysm formation, growth and rupture[18,19]. In this study, patients with dyslipidemia as a risk factor had poor prognosis and similar findings were observed in Pandiyan U *et al.;* study [45]. Hypercholesterolemia is a key risk factor for ischemic stroke. It increases the susceptibility for atherosclerosis. Some effects of hyperlipidemia may be indirect due to effects on coronary artery disease, leading to myocardial infarction and cardioembolism [30].

In this study, 27 patients (27%) had alcohol consumption as a risk factor and it was 32% in Sorganvi V et al study [1]. Alcohol abuse and acute alcohol intoxication can lead to ischemic stroke due to alcohol induced cardiomyopathy, changes in viscosity and

disturbances in coagulation and fibrinolytic factors. Bouts of heavy alcohol consumption on weekends and holidays are associated with a high risk of stroke [20]. In this study, incidence of heart disease was 17% and it was 37% in Pandiyan U et al study. In this present study, patients with heart disease had poor prognosis and it was similar to Pandiyan U et al study. [45]There is a strong interaction between Cardiovascular and Cerebrovascular disease. Symptomatic coronary artery disease immediately identifies a person as being at high risk for stroke. It also affects survival after stroke. [3]The rate of stroke in persons with a history of ischemic heart disease, congestive heart failure or left ventricular hypertrophy is approximately two to four times more than in patients without cardiac problem. A large number of ischemic strokes will be secondary to cardiogenic embolism. Among persons more than 80 years, atrial fibrillation is the main cardiac condition that is associated with stroke [31]. Even if atrial fibrillation is an incidental finding, it influences risk stratification and prescribing anticoagulants helps in maximum risk reduction. Recurrent strokes are common among patients with cardioembolic stroke than those with stroke of other causes. [32] The 1-month mortality after cardioembolic stroke is higher than in stroke with other etiologies [3, 33]. In this study, 11 patients (11%) had family history of stroke and it was 31% in Sorganvi V *et al.;* study. [1]Ischemic stroke results from a number of inherited coagulation disorders or genetic disorders that dispose to arterial disease. Hereditary disorders of lipid metabolism can promote premature atherosclerosis and increases the risk of ischemic stroke. A family history of deep vein thrombosis, pulmonary embolism points to the possibility of hereditary prothrombotic state and it increases the risk of embolic stroke. [3].

In this study, past history of TIA was present in 6 patients (6%) and it was 32% in Sorganvi V *et al.;* study. [1] Small sample size in this study may be the reason for low incidence of family history of stroke, heart disease and past history of TIA. The risk of stroke after a TIA is approximately 10-15% in the first 3 months, and most events occur in the first 2 days [1, 2].

In this study, Ischemic stroke was more common than hemorrhagic stroke and similar findings were observed in Turkey AM, Zhang *et al.;* and Roy *et al.;* study. In this study, incidence of ischemic stroke was more and hemorrhagic stroke was less than Turkey AM, Zhang *et al.;* and Roy *et al.;* study. In this study, Cardioembolic stroke was 6% and it was 19.5 % in Somay G *et al.;* study. Small sample size in the present study may be the reason for this difference [46-49]. In this study mortality was more in hemorrhagic stroke than in ischemic stroke and similar findings were seen in Turkey AM and Zhang *et al.;* study [46, 47]. Hemorrhagic stroke is associated with increased mortality and in this study incidence of hemorrhagic stroke was less compared to other studies. Early hospitalization, maximum patients with GCS score of 13-15 at the time of admission and less number of patients with hemorrhagic stroke could be the reason for low mortality rate in the present study. In present study, 24% patients had complete recovery, 34% patients had partial recovery, 33% patients had no recovery, and 9% patients died. In Marwat MA *et al.;* study 13.6% patients had complete recovery, 34% patients had partial recovery, 25% patients had no recovery, and 27.2% patients died. In Marwat MA *et al.;* study, prognosis was studied after one week of admission and in this present study prognosis was studied after one month of onset of symptoms. This may be the reason for increased number of patients with complete recovery in the present study. In Marwat MA *et al.;* study, incidence of hemorrhagic stroke was 40.8% and it was 18% in the present study. Low mortality rate in this study could be due to less number of patients with hemorrhagic stroke [37]. In Zhang Y *et al.;* study of outcome of stroke after one month, 24.6 % of patients improved without neurological deficits and it correlates with the present study [47]. Low GCS score was associated with poor prognosis and similar findings were seen in Zhang Y *et al.;* study [47]. Presence of multiple risk factors had poor prognosis and Pandiyan U *et al.;* study showed multiple risk factors increased the morbidity and mortality of stroke [45]. In this study ACA territory infarct had good prognosis and similar findings were present in Kumral *et al.;* study [50]. In this study MCA territory infarct was associated with increased mortality and similar findings were observed in Zhang Y *et al.;* study [47]. In this study, poor prognosis in primary intraparenchymal bleed was due to hematoma volume > 30 cc and intraventricular extension of bleed. Similar findings were present in Nag *et al.;* study [51].

CONCLUSION:

Advancing age, male gender, hypertension, diabetes mellitus, smoking, dyslipidemia, alcohol consumption, heart disease, carotid stenosis, family history of stroke, drugs and past history of TIA were identified as risk factors for CVA. Increasing age, male sex, low GCS at the time of admission, hypertension, diabetes mellitus, dyslipidemia, heart disease, smoking, carotid stenosis, presence of multiple risk factors, MCA territory infarct, presence of trantentorial herniation, SAH, intraparenchymal bleed with intraventricular extension were associated with poor prognosis. Ischemic stroke was more common than hemorrhagic stroke and hemorrhagic stroke was associated with poor prognosis. Public awareness of the risk factors and their management may lead to primary prevention of CVA. Early hospitalization of patients and their management reduces the mortality and disability in CVA. More

prospective case control studies on the management of CVA are needed.

REFERENCES

1. Sorganvi V, Kulkarni MS, Kadeli D, Atharga S; Risk Factors for Stroke: A Case Control Study. IJCRR, 2014; 6: 46-52.
2. Smith WS, English JD, Johnston SC; Cerebrovascular diseases. In Harrison's Principles of Internal Medicine. 18th Edition, Longo DL et al editors, McGraw Hill, New York, 2012:3270-3299.
3. Adams HP, Norris JW; Ischemic cerebrovascular disease. CNS Series, 2003; 1-46.
4. Simons LA, McCallum J, Friedlander Y, Simons J; Risk factors for ischemic stroke: Dubbo Study of the Elderly. Stroke, 1998; 29: 1341-1346.
5. Bogousslavsky J, Van Melle G, Regli F; The Lausanne Stroke Registry: Analysis of 1,000 consecutive patients with first stroke. Stroke, 1988; 19: 1083-1092.
6. Feigin VL, Wiebers DO, Nikitin YP, O'Fallon WM, Whisnant JP; Risk factors for ischemic stroke in A Russian community: a population based casecontrol Study. Stroke, 1998; 29: 34-39.
7. Abbott RD, Yin Y, Reed DM, Yanok; Risk of stroke in male cigarette smokers. N Engl J Med., 1986; 315: 717-720.
8. Colditz GA, Bonita R, Stampfer MJ, Willett WC, Rosner B *et al.;* Cigarette smoking and risk of stroke in middle aged women. N Engl J Med., 1988; 318(15): 937-941.
9. Robbins AS, Manson JE, Lee IM, Satterfield S, Hennekens CH; Cigarette smoking and stroke in a cohort of U.S. male physicians. Ann Intern Med., 1994; 120(6): 458-462.
10. Teunissen LL, Rinkel GJ, Algra A, Van Gijn J; Risk factors for subarachnoid hemorrhage: a systematic review. Stroke, 1996; 27(3): 544-549.
11. Park JK, Kim HJ, Chang SJ, Koh SB, Koh SY; Risk factors for hemorrhagic stroke in Wonju, Korea. Yonsei Med J., 1998; 39: 229-235.
12. Knekt P, Reunanen A, Aho K, Heliövaara M, Rissanen A, Aromaa A *et al.;* Risk factors for subarachnoid hemorrhage in a longitudinal population study. J Clin Epidemiol., 1991; 44(9): 933-939.
13. Howard G, Wagenknecht LE, Burke GL, Diez-Roux A, Evans GW, Mc Govern P *et al.;* Cigarette smoking and progression of atherosclerosis: the Atherosclerosis Risk in Communities (ARIC) Study. JAMA, 1998; 279(2): 119-124.
14. Surgeon General of the United States. The Surgeon General's 1990 Report on the Health Benefits of Smoking Cessation: Executive Summary. MMWR Recomm Rep. Washington, DC: Office of the Surgeon General; 1990; 39: i-xv, 1-12.
15. Wannamethee G, Perry IJ, Shaper AG; Haematocrit, hypertension and risk of stroke. J Intern Med., 1994; 235: 163-168.
16. Kannel WB, Wolf PA, Castelli WP, D'Agostino RB; Fibrinogen and risk of cardiovascular disease: the Framingham Study. JAMA, 1987; 258(9): 1183-1186.
17. Wannamethee G, Shaper AG, Whincup PH, Walker M; Smoking cessation and the risk of stroke in middle-aged men. JAMA, 1995; 274(2): 155-160.
18. Juvela S, Poussa K, Porras M; Factors affecting formation and growth of intracranial aneurysms: a long- term follow-up study. Stroke, 2001; 32: 485-491.
19. Juvela S, Hillbom M, Numminen H, Koskinen P; Cigarette smoking and alcohol consumption as risk factors for aneurysmal subarachnoid hemorrhage. Stroke, 1993; 24(5): 639-646.
20. Wannamethee SG, Shaper AG; Patterns of Alcohol intake and risk of stroke in middle aged British men. Stroke, 1996; 27: 1033-1039.
21. Wintzen AR, de Jonge H, Loeliger EA, Bots GTAM; The risk of intracerebral hemorrhage during oral anticoagulant treatment: A population study. Ann Neurol., 1984; 16: 553-558.
22. Hylek EM, Singer DE; Risk factors for Intracranial hemorrhage in out-patients taking warfarin. Ann Intern Med., 1994; 120: 897-902.
23. A randomized trial of anticoagulants versus aspirin after cerebral ischemia of presumed arterial origin: the Stroke Prevention in Reversible Ischemia Trial (SPIRIT) Study Group. Ann Neurol., 1997; 42: 857-865.
24. Singh R, Wander PK, Wander GS; Resistant Hypertension Diagnosis and Mechanisms. In Medicine Update.24th edition, Joshi SR editors, Association of physicians of India, Mumbai, 2014: 24: 947.
25. Stephen MacMohan, Richard Peto; Blood pressure, stroke and coronary heart disease. Lancet, 1990; 335: 765-774.
26. Ralph BN, Agostino, Wolf PA; Stroke risk profile: Adjustment for antihypertensive medication: The Framingham study. Stroke, 1994; 25: 40-43.
27. Woo D, Sauerbeck LR, Kissela BM, Khoury JC, Szaflarski JP, Gebel J, *et al.;* Genetic and environmental risk factors for intracerebral hemorrhage: preliminary results of a population-based study. Stroke, 2002; 33: 1190-1196.
28. Kissela BM, Suerbeck L, Woo D, Khoury J, Carrozzella J, Pancioli A, *et al.;* Subarachnoid hemorrhage: a preventable disease with a heritable component. Stroke, 2002; 33: 1321-1326.
29. Woo D, Haverbusch M, Sekar P, Kissela B, Khoury J, Schneider A *et al.;* Effect of Untreated Hypertension on Hemorrhagic Stroke. Stroke, 2004; 35: 1703- 1708.

30. Linderstrom E, Boysen G; Influence of total cholesterol, high density lipoprotein, cholesterol and triglycerides on risk of cerebrovascular disease: the Copenhagen City heart study. BMJ, 1994; 309:11.
31. Broderick; Relationship of cardiac disease to stroke occurrence, recurrence and mortality. Stroke, 1992; 23: 1250-1256.
32. Sage JI, van Uitert RL; Risk of recurrent stroke in atrial fibrillation and nonvalvular heart disease. Stroke, 1983; 14: 668- 676.
33. Caplan LR, Hier DB, D'Cruz I; Cerebral embolism in the Michael Reese Stroke Registry. Stroke, 1983; 14: 530-536.
34. Powers AC; Diabetes Mellitus. In Harrison's Principles of Internal Medicine. 18th Edition, Longo DL et al editors, McGraw Hill, New York, 2012: 2968-2980.
35. Miller M, Stone NJ, Ballantyne C, Bittner V, Criqui MH, Ginsberg HN *et al.;* Triglycerides and cardiovascular disease: a scientific statement from the American Heart Assosciation. Circulation, 2011; 123(20): 2292-2333.
36. Gorelick PB; Alcohol and stroke. Stroke, 1987; 18: 268-271.
37. Marwat MA, Usman M, Hussain M; Stroke and Its Relationship to Risk Factors. Gomal Journal of Medical Sciences, 2009; 7: 17-21.
38. Ropper AH; Concussion and Other Head Injuries. In Harrison's Principles of Internal Medicine.18th Edition, Longo DL et al editors, McGraw Hill, New York, 2012:3381-3384.
39. Strong K, Mathers C, Bonita R; Preventing stroke: saving lives around the world. Lancet Neurol., 2007; 6: 182-187.
40. Lopez AD, Mathers CD, Ezzqati M, Jamison DT, Murray CJL; Global and regional burden of disease and risk factors, 2001: systematic analysis of population health data. Lancet, 2006; 367: 1747-57.
41. Adams RJ, Albers G, Alberts MJ, Benavente O, Furie K, Goldstein LB *et al.;* Update of the AHA/ASA recommendations for the prevention of stroke in patients with stroke and transient ischemic attacks. Stroke, 2008; 39(5):1647-1652.
42. Dalal PM; Cerebrovascular Disorders. In API Textbook of Medicine. 9th Edition, Munjal YP et al editors, The Association of Physicians of India, Mumbai, 2012:1401-1402.
43. Anand K, Chowdhury D, Singh KB, Pandav CS, Kapoor SK; Estimation of mortality and morbidity due to strokes in India. Neuro epidemiology, 2001; 20(3): 208-11.
44. Nagaraja D, Gururaj G, Girish N, Panda S, Roy Ak, Sarma GRK, *et al.;* Feasibility study of stroke surveillance: Data from Bangalore, India. Indian J of Med R., 2009; 130 (4): 396-403.
45. Pandiyan U, Arjundas G, Arjundas D; Risk Factors and Stroke Outcome-An Indian Study. IJPMR., 2005; 16(2): 29-33.
46. Turkey AM; Case fatality rate in one month duration for first ever stroke in Tikrit teaching hospital. Tikrit Medical Journal, 2012; 18(2): 29-37.
47. Zhang Y, Bayoumy IE, Zhang Y, Yang H, Liu J; Risk factors and predictors of early mortality after acute stroke: Hospital based study. Global Advanced Research Journal of Medicine and Medical Science, 2014; 3(6): 111-116.
48. Roy MK; ECG changes in cerebrovascular accidents-A prognostic parameters. JAPI. 1995; 43: 12-915.
49. Somay G, Topaloglu P, Somay H, Araal O , Halac GU, *et al.;* Cerebrovascular Risk Factors and Stroke Subtypes in Different Age Groups: A Hospital –Based Study. Turk J Med Sci., 2006; 36: 23-29.
50. Kumral E, Bayulkem G, Evyapan D, Yunten N; Spectrum of anterior cerebral artery territory infarction: Clinical and MRI findings. Eur J Neurol., 2002; 9: 615-629.
51. Nag C, Das K, Ghosh M, Khandakar MR; Prediction of Clinical outcome in Acute Hemorrhagic Stroke from a single CT Scan on Admission. N Am J Med Sci., 2012; 4(10): 463-467.