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RESEARCH ARTICLE

# Assessment On Prevalence Modifiable Risk Factors, Treatment Trends By Using National Stroke Scale and SSS In Stroke Patients

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## ABSTRACT

To estimate prevalence and treatment trends in stroke individuals and to assess the severity of risk factors in stroke and stroke severity using national stroke scale and Scandinavian stroke scale. We conducted a prospective observational study in a Rajiv Gandhi institute of medical sciences in kadapa from November 2016 to April 2017. A total of 192 subjects of both sexes was included in the data analysis. According to national stroke scale it is used to assess the severity of risk factors in the stroke individuals and Scandinavian stroke scale it is used to assess the stroke severity in patients diagnosed as stroke. It was observed that the prevalence of ischemic stroke (79.1 %) was higher when compared to hemorrhagic stroke (20.9 %). The incidence of stroke was estimated higher in males (59.37 %) as compared to females (40.63 %). Hypertension (91.9 %) was the profound causative risk factor for stroke followed by hyperlipidemia (67.7 %), alcohol (36.9 %), diabetes mellitus (35.4 %), smoking (30.2 %) ($X^2$ = 73.75, p value < 0.0001). The common prescribing trends for stroke patients were cognitive enhancer nootrophil (71.3 %). Followed by dyslipidemics (67.1%), anti-platelets (61.4%), anti-hypertensive's (38.5%), and anticoagulants (3.6%). Our study findings concluded knowledge of the risk factors for stroke in stroke survivors was very low and based on their level of education; we counselled the study subjects and recommended the medication adherence.

## KEYWORDS

Stroke, Prevalence, Risk Factors, Scandinavian Stroke Scale (SSS), National Stroke Scale (NSS) Treatment Trends

## INTRODUCTION

Stroke is classically characterized as a neurological deficit attributed to an acute focal injury of the central nervous system (CNS) by a vascular cause, including cerebral infarction, intra cerebral haemorrhage (ICH), and sub arachnid haemorrhage (SAH).[1] it is one of the leading causes of mortality and morbidity worldwide. There is a rapid increase in burden of stroke in coming years and limited availability of stroke care in India.

Prevalence is a statistical concept referring to the number of cases of diseases that are present in a particular population at a given time. The estimated prevalence rate of stroke range, 84-262/1, 00,000 in rural and 334-424/1, 00,000 in

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urban areas. The incidence rate is 119-145/1, 00,000 based on the recent population based studies.

Broadly, a stroke can be classified as ischemic and hemorrhagic stroke. An Ischemic stroke is the most common form of stroke, accounting for around 85% of strokes. This type of stroke is caused by blockages or narrowing of the arteries that provide blood to the brain, resulting in ischemia - severely reduced blood flow.

Hemorrhagic stroke is caused by arteries in the brain either leaking blood or bursting open. The leaked blood puts pressure on brain cells and damages them[2]

Development of risk factors may increase the severity of stroke. Out of 100% patients there are Seventy-two percentages of patients had 1 or more risk factors diagnosed before the stroke.

The modifiable risk factors for stroke are high blood pressure and atrial fibrillation are the most important; the rest being high blood cholesterol levels, diabetes mellitus, cigarette smoking, Lack of physical activity, obesity, unhealthy diet, heavy alcohol consumption & the non-modifiable risk factors, advanced age is the single most significant risk factor[3]

Proper management reduces the incidence and progression of the disease. The patients are treated with a different class of drugs among which cognitive enhancer drug nootrophil was given, followed by dyslipidemics-atorvastatin, anti platelet drugs-aspirin, clopidogrel, anticoagulants-heparin, warfarin, anti-hypertensive's-amlodipine, enalapril and we observed that mortality rate were reduced, better outcomes were seen[4] .

## MATERIAL & METHODS

The prospective observational study was carried out for a period of six months (Nov 2016- Apr 2017) in the Department of General Medicine of RIMS, Government General Teaching Hospital, situated in Kadapa. A study was conducted after approved by the Institutional Human Ethical Committee, Annamacharya College of Pharmacy.

A total sample subject of 192 in patients from the Department of both general medicine (GM) and intensive care unit (ICU), who were diagnosed with the stroke were included after collecting the informed consent from each individual subject. The data were collected through Annexure i.e. patients demographics sheet, national stroke scale, Scandinavian stroke scale.

Selection of study subjects includes 1) Patients of age >18 years of both sexes were included in the study. 2) Patients diagnosed as cerebrovascular accident of Ischemic and hemorrhagic stroke along with C T scan and other commodities were included in the study. 3) Patients with modifiable risk factors only were included. 4) Patients who are willing to give their informed consent and patients in whom CT/MRI could not be obtained and patients with intracranial abnormalities, sub dural hematoma and dementia were excluded from the study.

The data collected was recorded, computed and analyzed using MS-EXCEL 2010.the results were published as a percentage proportion along with the graphical representation in the form of bar diagram or in tabular form.

## RESULTS

In our study a total of 192 subjects were included from Dec 2016-June-2017of six months of ICU and GM wards. The majority were 114 (59.37%) of males and 78 (40.63%) of females. As shown in the table 1.

Table 1: Representing Gender wise stroke distribution

| S.no | Gender | Number of patients (%) |
|---|---|---|
| 1. | Males | 114 (59.37%) |
| 2. | Female | 78 (40.63%) |

The mean age of males (60.7 ± 11.5), females (59.2±10.2). Stroke incidence was predominant in males than females. Mortality was higher in males than females who are with ischemic stroke. Stroke were higher in the age groups of

>65yrs followed by 51-65yrs. 36-50yrs and 20-35yrs.

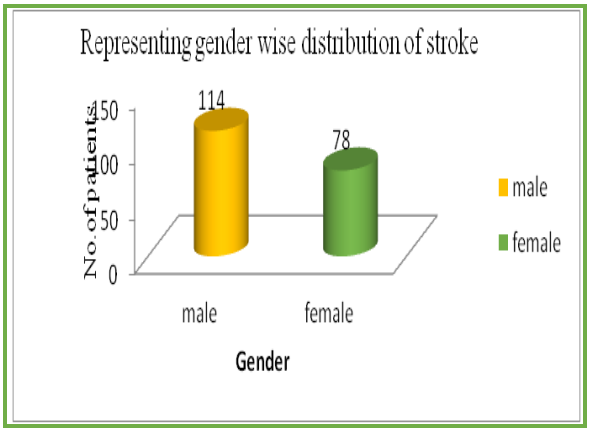


Figure 1: Representing Gender Wise Stroke Distribution

Table 2: Representing various groups of the study population

| S. no | Age Group | Number of Patients | | | |
|---|---|---|---|---|---|
| | | Male | | Female | |
| | | Ischemic | Hemorrhage | Ischemic | Hemorrhage |
| 1. | 20-35 | 4 (3.9%) | 1 (7.7%) | 3 (5.9%) | 1 (3.8%) |
| 2. | 36-50 | 16 (15.8%) | 2 (15.5%) | 10 (19.6 %) | 4 (14.8%) |
| 3. | 51-65 | 40 (39.6%) | 7 (53.8%) | 15 (29.5 %) | 10 (37%) |
| 4. | >65 | 41 (40.7%) | 3 (23%) | 23 (45%) | 12 (44.4%) |

**Prevalence:** prevalence is calculated by using Number of existing cases of disease in population in time period / Number of persons in population in the same time period And the prevailing value was found to be 400 in 10,000 subjects. And male to female ratio was found to be 3:1.

Table 3: Prevalence of type of stroke, according to gender wise

| Gender | Ischemic | Hemorrhagic | Total |
|---|---|---|---|
| Males | 101 (52.6%) | 13 (6.8%) | 114 (59.4%) |
| Females | 51 (26.5%) | 27 (14.1%) | 78 (40.6%) |
| Total | 152 (79.1%) | 40 (20.9%) | 192 (100%) |

Table 3 shows that Out of 192 study subjects, 101 (88.59%) males' subjects were experienced with ischemic stroke and 13 (11.41%) male subjects were experienced with hemorrhagic stroke. And 51 (65.38%) female subjects were experienced with ischemic stroke and 27 (34.62%) females were experienced with hemorrhagic stroke.

Table 4: Representing various types of stroke in study subjects

| S. No | Type of Stroke | Number of Patients (%) | |
|---|---|---|---|
| | | Male | Female |
| 1. | Ischemic stroke | 101 (88.59%) | 51 (65.38%) |
| 2. | Hemorrhagic stroke | 13 (11.41%) | 27 (34.62%) |

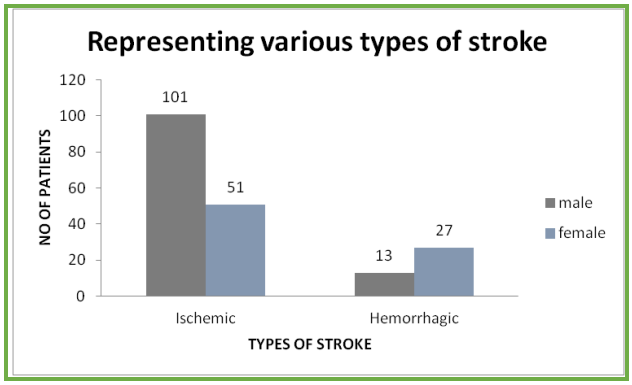


Figure 2: Representing various types of stroke in study subjects

In our study majorly farmers 48 (42%) were male subjects more prone to both ischemic and hemorrhagic stroke and followed by employee 34 (29.8%), Labour 31 (27.1%). And in the female subjects majority 28 (35.8%) of labour are more prone to both ischemic and hemorrhagic strokes followed by housewives 26 (33.3%), farmer 19 (24.3%) and employee 5 (6.4%).

Table 5: Representing occupation in study subjects

| Occupation | Number of Patients (%) | | | |
|---|---|---|---|---|
| | Male | | Female | |
| | Ischemic | Hemorr-hagic | Ischemic | Hemorr-hagic |
| Farmer | 40 (39.6%) | 8 (61.5%) | 11 (21.6%) | 8 (7.5%) |
| Labor | 29 (28.8%) | 2 (15.5%) | 17 (33.3%) | 11 (29.6%) |
| Employee | 32 (31.6%) | 3 (23%) | 3 (5.9%) | 2 (40.7%) |
| House wife | - | - | 20 (39.2%) | 6 (22.2%) |

Out of 192 study subjects , 98 (89.90%) of males and 41 (63.07%) of female subjects with ischemic stroke and 11 (10.10%) of males and 24 (36.93%) of female subjects with hemorrhagic stroke. The most commonly seen Co morbidities in our study were hypertension 95 (94%) 13 (100%)of males, 32 (62.7%)15 (55.5%) of females followed by diabetes 38 (37.6%) 5 (38.4%) of males, 3 (5.8%) 3 (11.1%) of females and hyperlipidemia67 (66.3%) 7 (53.8%) of males, 45(88.2%) 11 (40.7%) of females, alcohol 64 (63.3%) 7 (53.8%) of males and smoking 53(52.4%) 5(38.4%) of males in both ischemic and haemorrhagic stroke respectively.

Table 6: Representing assessment of Co morbidities in the stroke population

| S.No | Comorbidities | Number of Patients (%) | | | |
|---|---|---|---|---|---|
| | | Males | | Females | |
| | | Ischemic | Hemorr hagic | Ischemic | Hemorr hagic |
| 1. | Hypertension | 95 (94%) | 13 (100%) | 32 (62.7%) | 15 (55.5%) |
| 2. | Diabetes mellitus | 38 (37.6%) | 5 (38.4%) | 3 (5.8%) | 3 (11.1%) |
| 3. | Hyperlipidemia | 67 (66.3%) | 7 (53.8%) | 45 (88.2%) | 11 (40.7%) |

Risk factors in patients were assessed by using a national stroke scale. A total of 192 subjects; hypertension was the profound causal risk factor for stroke. The majority of risk factors were 108 (94.7%) of males, 67 (85.8%) of female subjects, followed by hyperlipidemia74 (64.9%) of males, 56 (71.7%) of female subjects, alcohol 71 (62.2%) of male subjects, Smoking58 (50.8%) subjects and also Diabetes mellitus43 (37.7%) of males, 25 (32%) of female subjects and chi square value was found to be 73.75 and p value was found to be<0.0001.This shows that it is statistically significant.

Table 7: Risk factors associated in the stroke population

| Risk Factors | Number of Patients (%) | | Total |
|---|---|---|---|
| | Male | Female | |
| Hypertension | 108 (94.7%) | 67 (85.8%) | 175 (91.9%) |
| Diabetes mellitus | 43 (37.7%) | 25 (32%) | 68 (35.4%) |
| Hyperlipidemia | 74 (64.9%) | 56 (71.7%) | 130 (67.7%) |
| Alcohol | 71 (62.2%) | - | 71 (36.9%) |
| Smoking | 58 (50.8%) | - | 58 (30.2%) |

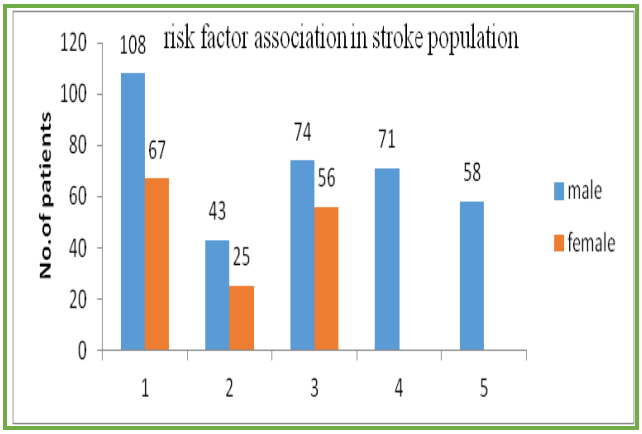


Figure 3: Representing risk factors associated in the stroke population

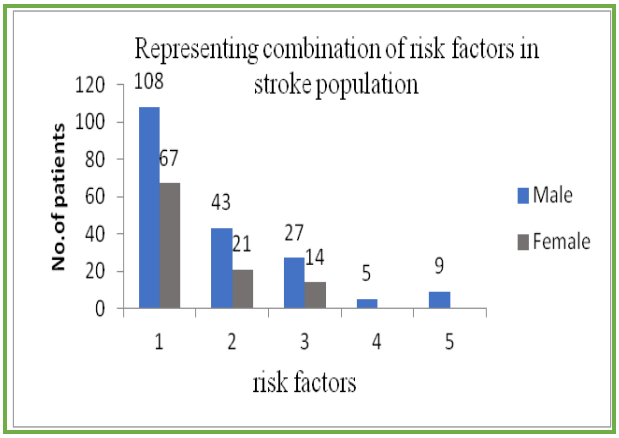


Figure 4: Representing combination of risk factors in stroke population

In this study majority of risk factor hypertension was seen in 175 (91.9%) and followed by combination of hypertension+ diabetes mellitus 64 (33.3%) takes second place and hypertension + diabetes mellitus + hyperlipidemia 41 (21.3%), hypertension + diabetes mellitus + hyperlipidemia + alcohol5 (2.6%) and hypertension+ diabetes mellitus+ hyperlipidemia + alcohol + smoking 9 (4.6%) in both male and female study subjects respectively.

Table 8: representing a combination of risk factors in the stroke population

| Risk Factors | Number of Patients (%) | | Total |
|---|---|---|---|
| | Male | Female | |
| HTN | 108 (94.7%) | 67 (85.8%) | 175 (91.9%) |
| HTN + DM | 43 (37.7%) | 21 (26.9%) | 64 (33.3%) |
| HTN+ DM +HL | 27 (23.6%) | 14 (17.9%) | 41 (21.3%) |
| HTN+ DM +HL+A | 5 (4.3%) | - | 5 (2.6%) |
| HTN + DM + HL +A+ S | 9 (7.8%) | - | 9 (4.6%) |

HTN-Hypertension, DM - Diabetes mellitus, HL -Hyperlipidemia,

A - Alcohol, S -Smoking

Table 9: Representing CT scans Impression

| S. No | CT Scan Impression | Types of Stroke | Males | Females |
|---|---|---|---|---|
| 1. | Infarcts | Ischemic | 101 (88.59%) | 51 (65.38%) |
| 2. | Bleeds | Hemorrhagic | 13 (11.41%) | 27 (34.62%) |

CT scan is one of the majorly used diagnostic tests in stroke. CT scans impression includes infarcts and bleeds. 101 (88.59%) of males and 27 (34.62%) of females with infarcts. 13 (11.41%) of males and 27 (34.62%) of females with bleeds.

Treatment data of 192 study subjects were collected from the individual patient case sheet. Among 192 patients, cognitive enhancer drug nootrophil was given to 137 (71.3%), Dyslipidemics drug Atorva was given 129 (67.1%), Anti ulcer drug Pantop was given to 129 (67.1%) followed by Antiplatelets Aspirin 118 (61.4%), clopidogrel 75 (39%), Osmotic diuretic mannitol was to106 (55.2%),optineuron was given to 76 (39.5%), patients with hypertension were treated with Anti hypertensives mainly calcium channel blocker amlodipine74 (38.5%),angiotensin receptor blocker telmisartan 20 (10.4%),losartan 4 (2%), Angiotensin converting enzyme inhibitors enalapril 16 (8.3%),diabetes was treated by metformin 12 (6.2%), glibenclamide 9 (4.6%),

insulin 10 (5.2%), Anti coagulantsheparin 7 (3.6%), warfarin 1 (0.5%). Majority of stroke patients were prescribed Antiplatelets, Dyslipidemics, Cognitive enhancers. And chi square value was found to be ($X^2$=328.8), p value was found to be <0.0001 this shows both values are statistically significant.

Table 10: Treatment trends in stroke population

| Drugs | Number of Patients | | Total (%) |
|---|---|---|---|
| | Male | Female | |
| Nootrophil | 78 (68.4) | 59 (75.6) | 137 (71.3%) |
| Atorvastatin | 73 (64.0) | 56 (71.7) | 129 (67.1%) |
| Pantoprazole | 79 (69.2) | 50 (64.1) | 129 (67.1%) |
| Aspirin | 67 (58.7) | 51 (65.3) | 118 (61.4%) |
| Mannitol | 54 (47.3) | 52 (66.6) | 106 (55.2%) |
| Optineuron | 46 (40.3) | 30 (38.4) | 76 (39.5%) |
| Clopidogrel | 43 (37.7) | 32 (41) | 75 (39%) |
| Amlodipine | 45 (39.4) | 29 (37.1) | 74 (38.5%) |
| Telmisartan | 13 (11.4) | 9 (11.5) | 20 (10.4%) |
| Enalapril | 7 (6.1) | 9 (11.5) | 16 (8.3%) |
| Metformin | 6 (5.2) | 6 (7.6) | 12 (6.2%) |
| Ranitidine | 3 (2.6) | 9 (11.5) | 12 (6.2%) |
| Insulin | 8 (7.0) | 2 (2.5) | 10 (5.2%) |
| Glibenclamide | 6 (5.2) | 3 (3.8) | 9 (4.6%) |
| Heparin | 3 (2.6) | 4 (5.1) | 7 (3.6%) |
| Losartan | 2 (1.7) | 2 (11.5) | 4 (2%) 8 |
| Warfarin | 1 (0.8) | 0 (0.0) | 1 (0.5%) |

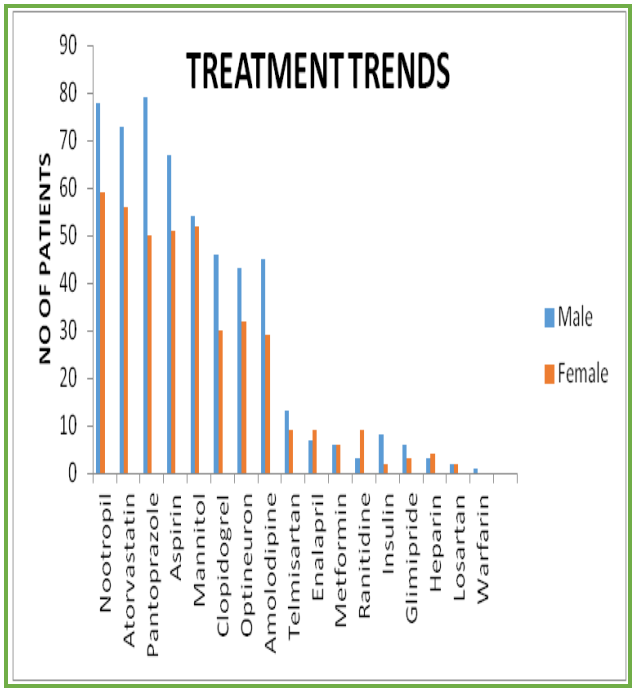


Figure 5: Treatment trends in stroke population

Risk factor severity was assessed by using SSS. SSS were mainly included in 4 categories, namely Very severe stroke 0-18, severe stroke 19-32, moderate stroke 33-44and mild stroke 45-58.Out of 192subjects, In51 (33.6) subjects, 49 (48.6) males and 2 (4) females with ischemic stroke were under very severe stroke, 34 (22.4) subjects, 22 (21.7) male and12 (23.5) female with severe stroke, followed by 55 (36.2) subjects, 27 (26.8) males and 28 (54.9) females with moderate severity and also 12 (7.8) subjects, 3 (2.9) males and 9 (17.6) females with mild stroke.

In 15 (37.5) subjects, 6 (46.4) males and 9 (33.4) females with hemorrhagic stroke were under very severe stroke followed by 11 (27.5) subjects, 3 (23) males and 8 (29.6) females with severe stroke, 13 (32.5) subjects, 3 (23) male and 10 (37) female with moderate stroke and 1 (2.5) subject, 1 (7.6) male patient and 0 (0) female with mild stroke. Compared with ischemic stroke, hemorrhagic stroke is less commonly seen and also the patients with ischemic stroke are more prone to severity than hemorrhagic stroke.

Table 11: Representing severity of stroke in the study population by using SSS

| S. No | Type of Stroke | Severity of Stroke | | | Total |
|---|---|---|---|---|---|
| | | Severity | Males | Females | |
| 1 | Ischemic | Very severe stroke | 49 (48.6) | 2 (4) | 51 (33.6) |
| | | Severe stroke | 22 (21.7) | 12 (23.5) | 34 (22.4) |
| | | Moderate stroke | 27 (26.8) | 28 (54.9) | 55 (36.2) |
| | | Mild stroke | 3 (2.9) | 9 (17.6) | 12 (7.8) |
| 2 | Hemorrhagic | Very severe stroke | 6 (46.4) | 9 (33.4) | 15 (37.5) |
| | | Severe stroke | 3 (23) | 8 (29.6) | 11 (27.5) |
| | | Moderate stroke | 3 (23) | 10 (37) | 13 (32.5) |
| | | Mild stroke | 1 (7.6) | 0 (0) | 1 (2.5) |

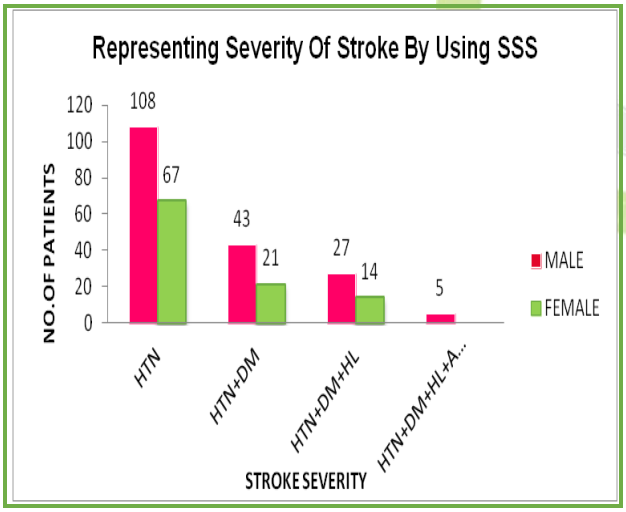


Figure 6: Representing severity of stroke

## DISCUSSION

The data were collected from 192 in patients of GMM and ICU using specially designed data collection forms. Among the total population of 192 patients, 114 were males and 78 were females are found. This study shows the prevalence of ischemic stroke was 79.1% and hemorrhagic stroke was 20.9% and commonly prescribed drugs for stroke patients were nootrophil 137 (71.3%) , atorvastatin 129 (67.1%) , pantoprazole 129 (67.1%), aspirin 118 (61.4%), mannitol 106 (55.2%), optineuron 76 (39.5), clopidogrel 75 (39%), amlodipine 74 (38.5%), telmisartan 20(10.4%), enalapril 16(8.3%), metformin 12 (6.2%), ranitidine 12(6.2%), insulin 10(5.2%), glimipride 9(4.6%), heparin 7 (3.6), losartan 4 (2%), warfarin 1(0.5%). This result was supported by Surendra Reddy et al which says that prevalence of ischemic stroke was found to be greater as compared to that of hemorrhagic stroke and current prescribing trends in stroke patients.[5]

The present study reveals that the majority of the patients who got admitted in the hospital were in the age group between >65 years (41.1%) followed by patients of age group 51 - 65 years (37.5%) and 36 -50 years (16.6%) and the least comes under the range of 20-35 years (4.8%) in both males and females. This data was supported by Indira Kumara. n et al which says that stroke increases with the age [(6)]

By using standard questionnaires and demographic forms , a major risk factor was found to be hypertension 175 (91.9%), followed by hyperlipidemia 130(67.7%), alcohol 71(36.9%) , diabetes 68 (35.4%), smoking 58 (30%). this was supported by SangramVurumadla et al which says that hypertension is the major risk factor, followed by hyperlipidemia, diabetes, alcohol, smoking[7].

## CONCLUSION

Our study concludes that Stroke remains a devastating and prevalent disease. The prevalence of stroke is higher in males114 (59.37%) than females78 (40.63%) and major type of stroke was found to be ischemic than the hemorrhagic stroke with the age group of 51-65 years (60.7 ± 11.5 yrs).In our study Majorly farmers48 (42%) were male and in the female subjects majority 28(35.8%) of labor followed by employee, housewife more prone to both ischemic and hemorrhagic strokes. Risk factors were assessed by using a national stroke scale and concludes that 90% of stroke victims had Hypertension175 (91.9%) was the major risk factor and followed by diabetes mellitus 68 (35.4%), hyperlipidemia 130(67.7%), alcohol l71 (36.9%) and smoking 58 (30.2%). In our study we assessed severity of stroke by using SSS and categorize stroke severity in to four categories in this Moderate stroke were 68 (35.4) subjects followed by very severe stroke 66 (34.3),severe stroke 45(23.4) and mild stroke13 (6.7).This study also explains the treatment trends in stroke patients, and most commonly prescribed drugs were cognitive enhancer neutrophil in 137(71.3%) subjects followed by dyslipidemics-atorvastatin 129(67.1%), anti platelet drugs-aspirin, clopidogre l118(61.4%),anticoagulants-heparin, warfarin 7(3.6%), anti-hypertensive's-amlodipine, enalapril 74(38.5%) and we observed that mortality rate were reduced, better outcomes were seen.

Our study findings concluded knowledge of the risk factors for stroke in strokesurvivors was also very low and based on their level of education and we counseled the study subjects and we strongly recommended medication adherence and effective control of blood pressure, blood sugar level, cholesterol, alcohol and smoking and increasing physical activity, limit saturated fats,increase consumption of vegetables, fruits, cereals may be important mile stone to reduce the incidence and further risk prevention in stroke.

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