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Assessment of Risk Factors and Drug Utilization Pattern of Stroke Patients in Neurology Department Sk. Karishma\*, Dr. D. Rama Brahma Reddy, B. Narendra Kumar, K.Mahesh Babu, K. Swathi Sri, S. Sneha Nalanda Institute of Pharmaceutical Sciences, Kantepudi (V), Satenapalli (M), Guntur (D), AP

#### ABSTRACT

Stroke is the second leading cause of death behind heart diseases in 2013 and a major cause of permanent disability. The burden of stroke in terms of mortality, morbidity and disability is increasing across the world. Neuroprotective drugs has become the core treatment, Due to lack of awareness in people of hospitalization very soon after occurrence of symptoms leading to disability. So this study aimed to discuss in detail on risk factors of stroke and drug utilisation patterns to be followed to achieve rational drug use in effective treating and to prevent disability in stroke patients. The risk factors both modifiable and non modifiable risk factors and standard treatment guidelines for effective treatment in both Ischemic stroke and Hemorrhagic stroke were discussed in detail.

**Objectives:** To study the drug prescribing pattern among stroke patients and the indications for which they have prescribed. To determine the average drug encounter for prescription. To evaluate hazards, then remove or minimise its risk by adding control measures. Materials and Methodology: The current study was a prospective observational study of stroke patients to the department of neurology, Lalitha Super Specialities hospital Pvt Ltd, located in Guntur, Andhra Pradesh. The data collection for the study was conducted between September 2019 to January 2020. Data on demographic parameters, drug prescription pattern and clinical profile was documented. Results: There was high proportion of Ischemic strokes reported 81.61% than hemorrhagic stroke 18.39%. There were about 66.14% males affected when compared to 33.85% females. Mostly age group with 61-70 years were mostly affected in both the genders with 33.89% males and 26.49% females. The risk factor hypertension was reported as most prominent one with 80.26% and diabetes mellitus with 52.01% respectively. There was high proportion of Polypharmacy among the study was reported most of the prescriptions contain 8 drugs 21.28%. The most common category of drugs being consumed were antacids 11.30%, vitamins and supplements 11.28%, Nootropics 9.62%, Antihypertensives 9.52%, antiplatelets 9.305 and statins 8.93%. **Conclusion:** Prevention is better than cure early identification and management of risk factors like hypertension, diabetes mellitus and change in life style habits like smoking and alcohol consumption may reduce the risk of stroke. Proper prescribing pattern and monitoring the patients may prevent the ADR's and drug interactions occurring in stroke patients. Follow up of the patient should be taken for the medication adherence and to prevent relapse. The people with good educational background had the awareness on early identification of stroke symptoms and its risk factors.

Key words:

Stroke, Neuroprotective drugs, Drug utilisation patterns, rational drug use, Ischemic stroke, Hemorrhagic stroke.

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## **INTRODUCTION**

A stroke occur when the blood supply to the part of brain is interrupted or reduced, preventing brain tissue from getting oxygen and nutrients. Brain cells begin to die in minutes<sup>1</sup>. Stroke is ranked as the second leading cause of death worldwide with an annual mortality rate of about 5.5 million. Not only does the burden of stroke lie in the high mortality but the high morbidity also results in up to 50% of survivors being chronically disabled<sup>2</sup>.

# Types of stroke3:

1. Ischemic stroke: An ischemic stroke occurs when a blood clot keeps blood from flowing to brain. The blood clot is often due to atherosclerosis, which is a build up of fatty deposits on the inner lining of a blood vessel. A portion of these fatty deposits can break off and block blood flow in brain. An ischemic stroke can be embolic, meaning the blood clot travels from another part of body to brain. An estimated 15 percent of embolic strokes are due to atrial fibrillation.

- 2. Hemorrhagic stroke: A hemorrhagic stroke results when a blood vessel in brain ruptures or breaks, spilling blood into the surrounding tissues. There are three main types of hemorrhagic strokes. The first is an aneurysm, which causes a portion of the weakened blood vessel to balloon outward and sometimes rupture. The other is an arterio-venous malformation, which involves abnormally formed blood vessels. If such a blood vessel ruptures, it can cause a hemorrhagic stroke. Lastly very high blood pressure can cause weakening of the small blood vessels in the brain and result in bleeding into the brain.
- 3. Transient ischemic attack: Transient ischemic attack TIA a warning or mini stroke. Anything that temporarily blocks blood flow to brain causes a TIA. The blood clot and TIA symptoms last for a short period of time.

**Risk factors of stroke**<sup>4</sup>: According to AMERICAN STROKE ASSOCIATION (ASA) Guidelines, There are two types of risk factors in Stroke

- a) Risk Factors you can control treat and improve.
- b) Risk Factors not within your control.

- a. Risk factors you can control treat and improve.
  - 1. **Hypertension:** It is a leading cause of stroke and the most significant controllable risk factor. Uncontrolled high blood pressure causes damage and weakens blood vessels of brain leads to rupture or leak.
  - 2. Smoking: The nicotine and carbon monoxide in cigarette smoke damage the cardiovascular system and pave the way for a stroke. The use of birth control pills combined with cigarette smoking can greatly increase the risk of stroke.
  - 3. Alcohol consumption: Too much alcohol consumption raises your blood pressure. Atrial fibrillation increases your risk of stroke by five times, because it can cause blood clots to form in the heart. If these clots move up into the brain, it can lead to Stroke.
  - **4. Diabetes:** Type 1 or Type 2 Diabetes mellitus is an independent risk factor for stroke. Many people with diabetes also have high blood pressure and high blood cholesterol and are overweight increasing their risk even more. While diabetes is treatable, the presence of the disease increase your risk of stroke.
  - 5. **Diet:** Diets high in saturated fat, transfat and cholesterol can raise blood cholesterol levels. Diets high in sodium (salt) can increase blood pressure. Diets with high calories can lead to obesity. But a diet containing five or more servings of fruits and vegetables per day may reduce the risk of stroke.
  - 6. Physical inactivity: Physical inactivity can increase your risk of stroke, heart disease, overweight/obesity, high blood pressure, high blood cholesterol and diabetes.
  - 7. **Obesity:** Excess body weight and obesity are linked with an increased risk of high blood pressure, diabetes, heart disease and stroke.
  - **8. High blood cholesterol:** Large amounts of cholesterol in the blood can build up and cause blood clots leading to a stroke.
  - 9. Carotid artery disease: The carotid arteries in your neck supply blood to your brain. A carotid artery narrowed by fatty deposits from atherosclerosis (plaque buildups in artery walls) may become blocked by a blood clot causing a stroke.
  - 10. Other heart diseases: People who have coronary heart disease or heart failure are at higher risk of stroke than people who have healthy hearts. Dilated cardiomyopathy (an enlarged heart), heart valve disease and some types of congenital heart defects can also raise the risk of stroke. So work with your health care provider to manage these related conditions.

# b. Risk factors not within control:

- Age: The likelihood of having a stroke increases with age for both males and females. Although stroke is more common among the elderly, a lot of people under 65 also have strokes. Even babies and children can have a stroke.
- 2. **Family history:** If parent, grandparent, sister or brother has had a stroke, especially before reaching age 65, you may be at greater risk. Sometimes strokes are caused by genetic disorders like CADASIL, which can block blood flow in the brain.

- 3. Race: African-Americans have a much higher risk of death from a stroke than Caucasians do. This is partly because blacks have higher risks of high blood pressure, diabetes and obesity. Visit our Empowered to serve program to learn more. Hispanics and Latinos also have unique risks for stroke.
- 4. **Prior stroke, TIA or heart attack:** A person who has had a prior stroke has a much higher risk of having another stroke than a person who has never had one. A person who's had one or more transient ischemic attacks (TIAs) is almost 10 times more likely to have a stroke than someone of the same age and sex who hasn't. TIAs are smaller, temporary blockages in the brain that can produce milder forms of stroke-like symptoms but may not leave lasting damage. A TIA is a medical emergency.

## STANDARD TREATMENT GUIDELINES OF STROKE5:

- a. These 2018 guidelines are an update to the 2013 guidelines, which were published prior to the six positive "early window" mechanical thrombectomy trials that emerged in 2015 and 2016. In addition, in the last 3 months, two trials and showed a clear benefit of "extended window" mechanical thrombectomy for certain patients with large vessel occlusion who could be treated out to 16-24 hours.
- b. The benefits of intravenous (IV) tissue plasminogen activator (tPA) are time-dependent, and treatment for eligible patients should be initiated as quickly as possible (even for patients who may also be candidates for mechanical thrombectomy).
- c. IV tPA should be administered to all eligible acute stroke patients within 3 hours of last known normal and to a more selective group of eligible acute stroke patients within 4.5 hours of last known normal. Centers should attempt to achieve door-to-needle times of <60 minutes in ≥50% of stroke patients treated with IV tPA.
- d. Prior to initiation of IV tPA in most patients, a non contrast head computed tomography (CT) and glucose are the only required tests. An international normalized ratio, partial thromboplastin time, and platelet count do not need to have resulted prior to IV tPA initiation if there is no suspicion for underlying coagulopathy. Centres should attempt to obtain a non contrast head CT within 20 minutes of arrival in ≥50% of stroke patients who may be candidates for IV tPA or mechanical thrombectomy.
- e. For patients who may be candidates for mechanical thrombectomy, an urgent CT angiogram or magnetic resonance (MR) angiogram (to look for large vessel occlusion) is recommended, but this study should not delay treatment with IV tPA if indicated.
- f. Patients ≥18 years should undergo mechanical thrombectomy with a stent retriever if they have minimal pre-stroke disability, have a causative occlusion of the internal carotid artery or proximal middle cerebral artery, have a National Institutes of Health stroke scale score of ≥6, have a reassuring non contrast head CT and if they can be treated within 6 hours of last known normal. No perfusion imaging (CT-P or MR-P) is required in these patients.

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- g. In selected acute stroke patients within 6-24 hours of last known normal who have evidence of a large vessel occlusion in the anterior circulation and would have been eligible for obtaining perfusion imaging (CT-P or MR-P) or an MRI with diffusion-weighted imaging sequence is recommended to help determine whether the patient is a candidate for mechanical thrombectomy.
- h. In selected acute stroke patients within 6-16 hours of last known normal who have a large vessel occlusion in the anterior circulation and meet other eligibility criteria, mechanical thrombectomy is recommended. In selected acute stroke patients within 6-24 hours of last known normal who have large vessel occlusion in the anterior circulation and eligibility criteria, mechanical thrombectomy with a stent retriever is reasonable.
- i. As with IV tPA, treatment with mechanical thrombectomy should be initiated as quickly as nossible.
- j. Administration of aspirin is recommended in acute stroke patients within 24-48 hours after stroke onset. For patients treated with IV tPA, aspirin administration is generally delayed for 24 hours. Urgent anticoagulation (e.g., heparin drip) for most stroke patients is not indicated.
- k. The use of stroke units that incorporate rehabilitation is recommended for all acute stroke patients.
- It remains unknown whether it would be beneficial for emergency medical services to bypass a closer IV tPA-capable hospital for a thrombectomy-capable hospital. While such an approach may delay IV tPA administration for patients who are and who are not mechanical thrombectomy candidates, this approach would expedite thrombectomy for those who are mechanical thrombectomy candidates.

Drug utilisation pattern<sup>6</sup>: *Drug utilization research* was defined by World Health Organisation (WHO) in 1977 as «the marketing, distribution, prescription, and use of drugs in a society, with special emphasis on the resulting medical, social and economic consequences». Since then, a number of other terms have come into use and it is important to understand the interrelationships of the different domains. Drug utilization research is thus an essential part of pharmaco-epidemiology as it describes the extent, nature and determinants of drug exposure. Over time, the distinction between these two terms has become less sharp, and they are sometimes used interchangeably. However, while drug utilization studies often employ various sources of information that focus on drugs. The term epidemiology implies defined populations in which drug use can be expressed in terms of incidence and prevalence.

## **OBJECTIVES:**

- To assess risk factors and to describe the drug utilisation pattern of stroke patients in neurology department.
- To study the drug prescribing pattern among stroke patients and the indications for which they have prescribed.

- 3. To determine the average drug encounter for prescription.
- To analyse the conformity of the drug usage pattern with WHO indicators and standard treatment guidelines.
- **5.** To prevent and control future diseases.
- 6. To evaluate hazards, then remove or minimise its risk by adding control measures.

#### **MATERIALS AND METHODS:**

#### Study design

The current study was a prospective observational study of stroke patients presented to the department of neurology, Lalitha Super Specialties Hospital, located in Guntur, Andhra Pradesh. The data collection for the study was conducted between September 2019 to January 2020. The study had included all patients with stroke who were diagnosed either clinically or radiologically without any age or gender restrictions. Patients with all co-morbidities like diabetes mellitus, hypertension, and hyperlipidemia were also included. Patients who met with in hospital mortality, referred to higher centres due to critical illness, pregnant and lactating women and out patients were excluded from the study. Data on demographic parameters, drug prescription pattern and clinical profile was documented in structured proforma. The study was approved by institutional human ethics committee and informed written consent was obtained from all the participants.

#### RESULTS

Table 1: DESCRIPTIVE ANALYSIS OF GENDER (n= 446)

| S.No | Gender | Percentage |
|------|--------|------------|
| 1.   | Male   | 66.14%     |
| 2.   | Female | 33.85%     |

Figure: 1 Pie chart showing Descriptive analysis of Gender

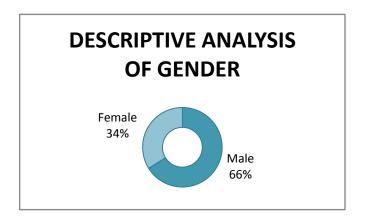


Table 2: DESCRIPTIVE ANALYSIS OF AGE GROUP (n= 446)

| S.No | Age group | Male      | Male   | Female    | Female |
|------|-----------|-----------|--------|-----------|--------|
|      |           | Frequency | %      | Frequency | %      |
| 1.   | 11-20     | 2         | 0.67%  | 0         | 0%     |
| 2.   | 21-30     | 2         | 0.67%  | 3         | 1.98%  |
| 3.   | 31-40     | 11        | 3.72%  | 10        | 6.62%  |
| 4.   | 41-50     | 48        | 16.27% | 34        | 22.51% |
| 5.   | 51-60     | 76        | 25.76% | 36        | 23.84% |
| 6.   | 61-70     | 100       | 33.89% | 40        | 26.49% |
| 7.   | 71-80     | 49        | 16.61% | 25        | 16.55% |
| 8.   | 81-90     | 7         | 2.37%  | 3         | 1.98%  |

Highest proportion of male (33.89%) subjects belongs to 61-70 year age group and highest proportion of female (26.49%) subjects also belongs to 61-70 year age group.

Figure 2: Bar diagram showing Descriptive analysis of age group

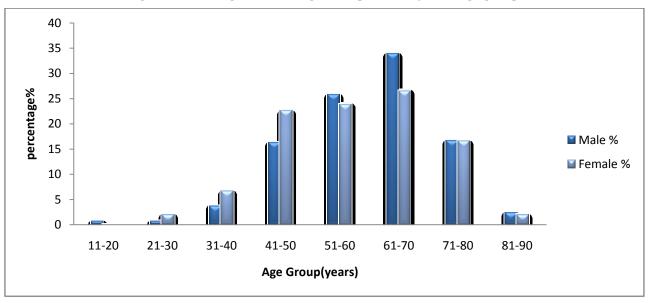


Table 3: Bar diagram showing Descriptive analysis of types of stroke (n=125)

| TYPE OF     | TOTAL     | TOTAL % | MALE      | MALE % | FEMALE    | FEMALE % |
|-------------|-----------|---------|-----------|--------|-----------|----------|
| STROKE      | FREQUENCY |         | FREQUENCY |        | FREQUENCY |          |
| Ischemic    | 364       | 81.61%  | 234       | 79.32% | 130       | 86.09 %  |
| stroke      |           |         |           |        |           |          |
| hemorrhagic | 82        | 18.39%  | 61        | 20.68% | 21        | 13.90%   |
| stroke      |           |         |           |        |           |          |

Highest proportions of Ischemic stroke (81.61%) were reported than Hemorrhagic stroke (13.89%). Among these males with ischemic stroke were 79.32% and females were found to be 86.09%. Males with hemorrhagic stroke were 20.68% and females were found to be 13.90%

100.00% 90.00% 80.00% 70.00% Percentage% 60.00% 50.00% ■ Ischemic stroke 40.00% ■ Hemorrhagic stroke 30.00% 20.00% 10.00% 0.00% Male % Female % Gender

Figure 3: Bar diagram showing Descriptive analysis of types of stroke

Table 4: Descriptive analysis of risk factor

| S.No | RISK FACTOR                         | FREQUENCY | PERCENTAGE% | NOT PRESENT | PERCENTAGE% |
|------|-------------------------------------|-----------|-------------|-------------|-------------|
| 1.   | Hypertension                        | 358       | 80.26%      | 88          | 19.74%      |
| 2.   | Diabetes Mellitus                   | 232       | 52.01%      | 214         | 47.99%      |
| 3.   | Old Cerebro Vascular<br>Accident    | 105       | 23.54%      | 341         | 76.46%      |
| 4.   | Smoking                             | 163       | 36.54%      | 283         | 63.46%      |
| 5.   | Alcohol Consumption                 | 167       | 37.44%      | 279         | 62.56%      |
| 6.   | Obesity                             | 70        | 15.69%      | 376         | 84.31%      |
| 7.   | Coronary<br>Artery<br>Disease (CAD) | 112       | 25.11%      | 334         | 74.89%      |
| 8.   | High Blood<br>Cholesterol           | 117       | 26.23%      | 329         | 73.77%      |

Among all risk factors hypertension was found to be most prominent one with 80.26% followed by diabetes mellitus with 52.01%. Alcohol consumption with 37.44% and smoking with 36.54%. The least reported risk factor was found to be obesity with 15.69%.

Descriptive analysis of risk factors

90
80
70
60
40
30
20
10
0
Not Present
Not Present

Odd Cerepto Vascular Accident. Scrobing. Records Consumption. Odd Consumption. Records C

Figure 4: Bar diagram showing Descriptive analysis of risk factors

Table 5: Descriptive analysis of Incidence of poly pharmacy in prescriptions (n= 446)

| S.No | NUMBER OF DRUGS IN | FREQUENCY | NUMBEROF DRUGS × | PERCENTAGE (%) |
|------|--------------------|-----------|------------------|----------------|
|      | PRESCRIPTION       |           | FREQUENCY        |                |
| 1.   | 5                  | 12        | 60               | 1.60%          |
| 2.   | 6                  | 62        | 372              | 9.90%          |
| 3.   | 7                  | 89        | 623              | 16.57%         |
| 4.   | 8                  | 100       | 800              | 21.28%         |
| 5.   | 9                  | 81        | 729              | 19.39%         |
| 6.   | 10                 | 36        | 360              | 9.58%          |
| 7.   | 11                 | 18        | 198              | 5.27%          |
| 8.   | 12                 | 23        | 276              | 7.34%          |
| 9.   | 13                 | 12        | 156              | 4.14%          |
| 10.  | 14                 | 10        | 140              | 3.72%          |
| 11.  | 15                 | 2         | 30               | 0.79%          |
| 12.  | 16                 | 1         | 16               | 0.42%          |
|      | TOTAL              | 446       | 3,760            | 100%           |

There was high proportion of Polypharmacy among the study population. There were about 21.28% who were taking more than 8 medications. The proportion of subjects who were taking 9 medications was found to be 19.39%. The proportion of subjects who were taking 7 medications was found to be 16.57%. The proportion of subjects who were taking 16 medications was found to be 0.42%.

Table 6: Descriptive analysis of different category of drugs prescribed (n= 446)

| S.No | CATEGORY OF DRUGS        | FREQUENCY | PERCENTAGE (%) |
|------|--------------------------|-----------|----------------|
| 1.   | Thrombolytics(tPA)       | 69        | 1.83%          |
| 2.   | Antiplatelets            | 350       | 9.30%          |
| 3.   | Statins                  | 336       | 8.93%          |
| 4.   | Nootropics               | 362       | 9.62%          |
| 5.   | Antibiotics              | 316       | 8.40%          |
| 6.   | Anti diabetics           | 232       | 6.18%          |
| 7.   | Vitamins and supplements | 424       | 11.28%         |
| 8.   | Antacids                 | 425       | 11.30%         |
| 9.   | Anti convulsants         | 165       | 4.39%          |
| 10.  | Anti coagulants          | 209       | 5.55%          |
| 11.  | Anti hypertensive's      | 358       | 9.52%          |
| 12.  | Anti emetics             | 252       | 6.70%          |
| 13.  | Others                   | 262       | 6.97%          |
|      | TOTAL                    | 3,760     | 100%           |

The most common categories of the drug being consumed were antacids (11.30%), followed by vitamins and supplements (11.28%), nootropics (9.62%), Antihypertensives (9.52%), antiplatelets (9.30%), Statins (8.93%) followed by other medications. The category other includes electrolytes, antihistamine, laxatives, cough syrups and anti-depressants.

Figure 5: Bar diagram showing Descriptive analysis of different category of drugs prescribed

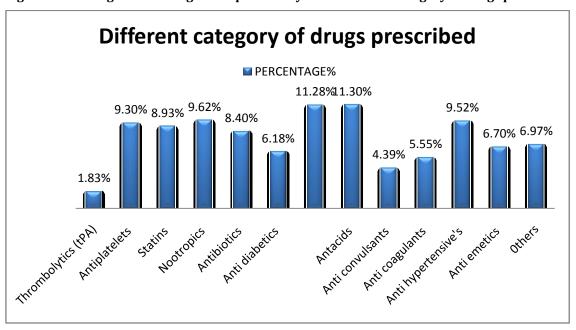
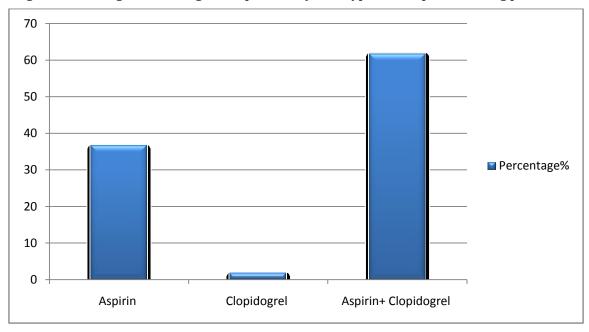


Table 7: Descriptive analysis of types of antiplatelet drugs prescribed

| TYPES OF ANTIPLATELETS DRUGS PRESCRIBED | FREQUENCY | PERCENTAGE (%) |
|---|-----------|----------------|
| Aspirin                                 | 128       | 36.58%         |
| Clopidogrel                             | 6         | 1.71%          |
| Aspirin+ Clopidogrel                    | 216       | 61.71%         |

Among the antiplatelet drugs 36.58% were taking aspirin alone, 1.71% were taking clopidogrel alone and remaining 61.71% were taking both aspirin and clopidogrel.

Figure 6: Bar diagram showing Descriptive analysis of types of antiplatelets drug prescribed



| S.No | Age group | Male      | Male   | Female    | Female |
|------|-----------|-----------|--------|-----------|--------|
|      |           | Frequency | %      | Frequency | %      |
| 9.   | 11-20     | 2         | 0.67%  | 0         | 0%     |
| 10.  | 21-30     | 2         | 0.67%  | 3         | 1.98%  |
| 11.  | 31-40     | 11        | 3.72%  | 10        | 6.62%  |
| 12.  | 41-50     | 48        | 16.27% | 34        | 22.51% |
| 13.  | 51-60     | 76        | 25.76% | 36        | 23.84% |
| 14.  | 61-70     | 100       | 33.89% | 40        | 26.49% |
| 15.  | 71-80     | 49        | 16.61% | 25        | 16.55% |
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|                              |           |                |

Among the antiplatelet drugs 36.58% were taking aspirin alone, 1.71% were taking clopidogrel alone and remaining 61.71% were taking both aspirin and clopidogrel.

#### DISCUSSION

Age is one of the risk factors for chronic diseases, including cancer, cardiovascular diseases and neuro-degeneration. In our study it was proved that patients with age group 61-70 are mostly affected males with 33.89% and females with 26.49% respectively. Uncontrolled blood pressure is one of the most common risk factors for stroke. In this study also we found that patients with hypertension 80.26%. High blood pressure increases the risk for stroke as much as 4- fold. Giving therapy

for hypertension can avoid stroke complications. Therefore it is important for physicians to monitor and control blood pressure in the normal range<sup>7</sup>. Atrial fibrillation was the independent predictor for hemorrhagic stroke. Patients having atrial fibrillation were less likely experience hemorrhagic stroke than ischemic stroke. Hemorrhagic stroke patients more likely to have coma, vomiting and neck stiffness but ischemic stroke patients were more likely presented with chest pain<sup>8</sup>. Factors that are responsible for the increase in ICP are the size of the infarct or the hematoma, associated oedema, and brain

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compliance. There are two types of prevention of stroke based on etiology:

- **a.** One is primary prevention of stroke that mainly antiplatelet therapy like aspirin, statin therapy and blood pressure management. In our study also it was proved that primary prevention included with Anti-platelets 9.30%, statins 8.93% and Anti hypertensive's 9.52%.
- **b.** Carotid endarectomy, carotid angioplasty, warfarin and heparin are listed under secondary prevention.

Common risk factors are:

- diabetes mellitus,
- hypertension,
- smoking and
- Obesity.

Prevention better than cure comes true for hypertensive and diabetes mellitus patients to avoid the larger risk of stroke events<sup>9</sup>. In our study also we found that common risk factors were found to be hypertension with 80.265, Diabetes Mellitus with 52.01%, alcohol consumption with 37.44% and smoking with 36.54% respectively.

The *drug utilisation patterns* of stroke contain drugs like:

- MANNITOL,
- ASPIRIN,
- CLOPIDOGREL,
- ATORVASTATINS,
- NIFEDIPINE,
- Multivitamin,
- ENOXAPARIN,
- PHENYTOIN,
- ATENOLOL,
- LOSARTAN,
- HEPARIN AND
- RAMIPRIL+TELMISARTAN+HYDROCHLORTHIAZ IDE in descending frequencies.

Antihypertensives were frequently used agents for stroke patients<sup>10</sup>. In our study also it was proved that Antihypertensives were frequently used agents with 9.52%. Study of risk factors and drug prescribing patterns can give best outcome in using the drugs in treating their co-morbid conditions. The knowledge of drug utilisation pattern can leads to forward the rational drugs use and helps to take measures to improve prescribing habits11. The higher incidence of stroke was found in males than in females due to increased stress levels in males and protective estrogens effects in females. In our study also it was proved that males were more affected with 66.14% and females were affected with 33.85%respectively. The least risk factor seen was past history of coronary artery disease<sup>12</sup>. In our study it was found that the least risk factor was obesity with 15.695. The knowledge of risk factors for stroke in stroke survivors was also very low. Some patients could easily identify hypertension, smoking and excessive alcohol consumption as risk factor for stroke. Less educated people had a low level of risk factors on stroke<sup>13</sup>. Smoker with history if hypertension, the risk of stroke was increased when compared with those having only hypertension or only smoking. Alcohol is one of the important risk factor for stroke14. In our study also it was found that alcohol is one of the important risk factor with 37.44%. Most of the patients who were victims of stroke come under the age group of 56-70 years. Piracetam has neuroprotective and antithrombotic effects that may help to reduce death and disability in patients with acute stroke. In our study also it was found that

nootropics were mostly prescribed with 9.62% to reduce death and disability. Mannitol as an anti-oedema therapy for most of the hemorrhagic stroke patients<sup>15</sup>. Piracetam found to be most effective in restoring language function. Uncontrolled BP significantly increases the risk of adverse cardiovascular outcomes such as Myocardial Infarction (MI) and stroke<sup>16</sup>. Awareness of risk factors and warning symptoms of stroke in general population is essential for prevention and initiation of prompt treatment. Younger age and higher level of education were associated with better knowledge about risk factors and warning symptoms of stroke. Higher was the economic status better was the knowledge of subjects related to risk factors and warning symptoms of stroke<sup>17</sup>. Hypertension and Diabetic Mellitus were frequent risk factors in the older patients. In our study also it was proved that hypertension and diabetes mellitus were frequent risk factors with80.26% and 52.01% respectively. The increasing prevalence of Diabetic Mellitus in the older age group is due to changing dietary habits in the population. Dyslipidemia is an important risk factor for coronary artery disease<sup>18</sup>.

#### CONCLUSION

The study findings suggest that hypertension is the major risk factor for stroke. To reduce hypertension, proper patient counselling is required for the stroke patients. Among all the drugs anti platelet drugs, antacids and vitamin supplements were majorly prescribed. Ischemic stroke is the most predominant form of stroke among the patients. Proper prescribing pattern and monitoring the patients may prevent the ADR's and drug interactions occurring in stroke patients. Follow up of the patient should be taken for the medication adherence and to prevent relapse. The people with good educational background had the awareness on early identification of stroke symptoms and it's risk factors. Lack of generic drugs prescribing and low incidence of drugs prescribing from essential drug list are the concern that are to be addressed in order to maintain rational drug therapy.

#### **ACKNOWLEDGEMENT**

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