A Prospective Study of Prescribing Pattern in the Management of Stroke at a Tertiary Care Hospital

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Abstract:- Stroke is a neurological insufficiency marked by an acute focal injury to the central nervous system due to vascular causes which also includes cerebral infarction, intracranial haemorrhage along with subarachnoid haemorrhage. To assess the prescribing pattern in the management of stroke at a tertiary care hospital. A prospective observational study was carried out for a period of 6 months in both ischemic and hemorrhagic stroke patients with age group between 18 – 90 years. Patient demographic and other data's were collected using a specially designed data collection form. The Modified rankin scale was used to measure the severity of stroke. All the data was analyzed using graphpad. A total of 100 patients were enrolled in the study. Male gender (60%) was more prone to stroke, majorly in the age group of 60-80 years of age along with the social risk factors like tobacco (21%) and smoking (20%). Hypertension (52.38) was found as a dominant past medical history in stroke patients. The prescribing pattern in the management of stroke were appropriate to the condition of the patient which comprises of anti-platelets (27%), anti-lipidemic (26%), anti-hypertensive (26%) and other medications for the treatment of the comorbid conditions such as hypertension (52%), diabetes (17%), dyslipidemia and other conditions. The duration of stay (22 days) is directly proportional to the extent of disability of the patient as well as the comorbidities which invariably increases the cost of therapy. The direct medical cost was found to be linearly proportional to the extent of disability and comorbid condition of the patient. Cerebrovascular stroke is a crucial public health problem and thus it is vital to monitor the prescribing patterns and its management. The need of clinical pharmacist is needed to facilitate recovery of the patient and enhance the healthcare experience along with reducing the economic burden and length of stay in hospital so as to decrease morbidity and mortality.

Keywords:- Stroke, Prescribing Pattern, Management, Modified Rankin Scale, Hypertension, Cost.

I. INTRODUCTION

Stroke is a neurological insufficiency marked by an acute focal injury to the central nervous system due to vascular causes which also includes cerebral infarction, intracranial haemorrhage along with subarachnoid haemorrhage[1]. Atherosclerosis is a causative factor in most cases of ischemic stroke, which particularly of the cerebral vasculature. Emboli can arise either from intra- or extra-cranial arteries (including the aortic arch) or, as is the case in 20% of all ischemic strokes, the heart. Cardiogenic embolism is presumed to have occurred if the patient has concomitant atrial fibrillation, valvular heart disease, or any other condition of the heart that can lead to clot formation[2]. Haemorrhagic stroke is caused by a weakened vessel which ruptures and bleeds into the surrounding regions of brain. This blood accumulates and compresses the brain tissue surrounding it[3].

Cerebrovascular disease is the second leading cause of death worldwide, accounting for 10% of all deaths. The most common form of cerebrovascular disease is stroke. It is considered as one of the second major causes of death and the rate of mortality in India ranging from 262 strokes /10000 patients in rural to significantly higher rates of 424 patients/10000 people in urban area of India. India lost a whopping 870 crores in 2005 due to stroke and it was estimated to increase the cost to almost 5500 crores and combined loss of 1% of gross GDP. The in-patient cost itself accounted for almost 70% of the total treatment cost and severe stroke costs almost twice as much as mild stroke[4].

A blood vessel in the brain bursts and spills into the surrounding brain tissue damaging the brain cells. Haemorrhagic strokes are due to rupture of blood vessels leading to compression of brain tissue from expanding hematoma. This distorts and injures the tissue; pressure may lead to loss of blood supply to affected tissues leading to infarction. Blood released by the brain haemorrhage appears to have direct toxic effects on brain tissue and vasculature.

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II. MATERIAL AND METHODS

A. Study Design
The study on the prescribing pattern in the management of stroke is assessed through a prospective and observational study, over a period of 6 months, at a tertiary care hospital, Vadodara.

B. Study Duration:
6 months (September 2019 – March 2020)

C. Target Population
In the present study, patients with hemiplegia, slurred speech, facial droop and who are diagnosed to have ischemic and haemorrhagic stroke with assessing severity through Modified Rankin scale are the target population. Patients admitted in the general medicine ward and ICU is included in the study. The study criteria includes patients diagnosed with stroke, patients of either gender with >18 and <90 years of age and excludes the patients <18 years of age and special population of pregnant and lactating womens.

D. Ethical Consideration
The study proposal is obtained from Institutional Ethical Committee of Parul Sevashram Hospital, Vadodara and approval No: PUIECHR/PIMSR/00/081734/2301.The study is carried out among the stroke patients and the purpose of the study was well explained to the participants. An informed consent is obtained and maintained confidentially.

E. Designing Of Patient Data Collection Form
A specially designed patient data collection form is prepared and validated. The data form was structured to obtain the demographic details of stroke patients. Patient data collection form is given in and is used to collect the necessary information from the patient medical records which consists of patient demographic details (name, age and gender), social and family history, patient present complaints, past medical and medication history, co- morbidities, blood pressure, length of stay, laboratory data and medication regimen with their dose and route of administration.

➢ Study Tools
The modified Rankin Scale (mRS) is a commonly used scale for measuring the degree of disability or dependence in the daily activities of people who have suffered from stroke. The mRS is a 7-level ordered categorical scale capturing levels of patient functional independence following a stroke.

> *Data Analysis*
The collected data are tabulated and statistically analysed. Different types of graph, figure and tables are used to summarize the data visually.

> *Statistical Analysis*
The statistical analysis is performed using GRAPHPAD PRISM. All data was expressed as mean ± standard deviation. We used paired student t-test is used. $P<0.05$ was considered as statistically significant.

III. RESULTS AND DISCUSSION

Out of 100 patients, 92 patients were enrolled for the study, and 8 patients were drop-outs. Baseline characteristics were calculated initially. The baseline characteristics of the study population are presented in Table 3. The clinical characteristics are such as: Mean age ± SD in Population (60 ± 11 years), Male gender (59%) and female gender (41%), Mean length of hospital stay in Population (22 ± 12 days).

A. Types of Stroke
Out of 92 patients majority of the patients were found to be suffering from ischemic stroke (89%), followed by hemorrhagic stroke (9%).
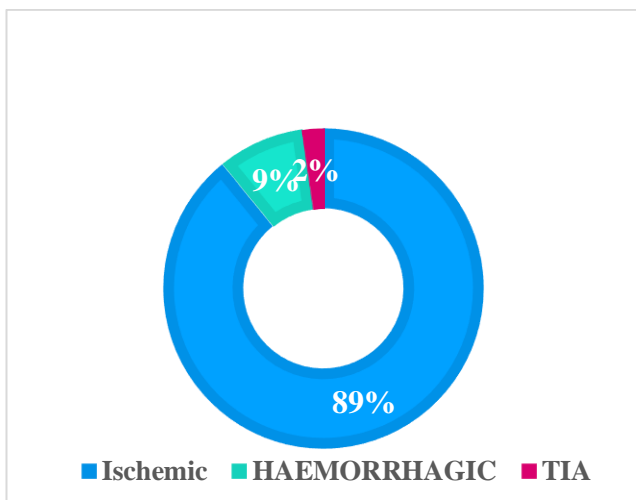

Fig 1: Types of Stroke

The incidence of haemorrhagic stroke is 20% whereas that of ischemic was 80%. Our study reported that ischemic stroke (89%) was more prevalent followed by (9%) haemorrhagic and (2%) TIA. Ischemic stroke is a major type of stroke was also observed in previous study conducted by Abbasi[7]. Up to 85 % of all strokes are of ischaemic origin. Atherosclerosis of the arteries that supply the brain is the most observed cause of ischaemic stroke. There can be large artery atherosclerotic infarction which occurs when there's a hindrance to normal perfusion, usually caused by a severe arterial stenosis or due to atherosclerosis and coexisting thrombosis. Microatheroma, lipohyalinosis, and other occlusive diseases of the small penetrating brain arteries are the most frequent causes of small, sub-cortical lacunar infarcts. About 20 % of ischaemic strokes are due to

cardiogenic embolism, most typically from atrial fibrillation. A variety of other occlusive disorders may be the primary cause or variably contribute to stroke pathogenesis.

B. Percentage Distribution of Comorbidities
Patients with Hypertension as a comorbid condition were found to be highest among 92 patients that is 66 patients (52.38%).
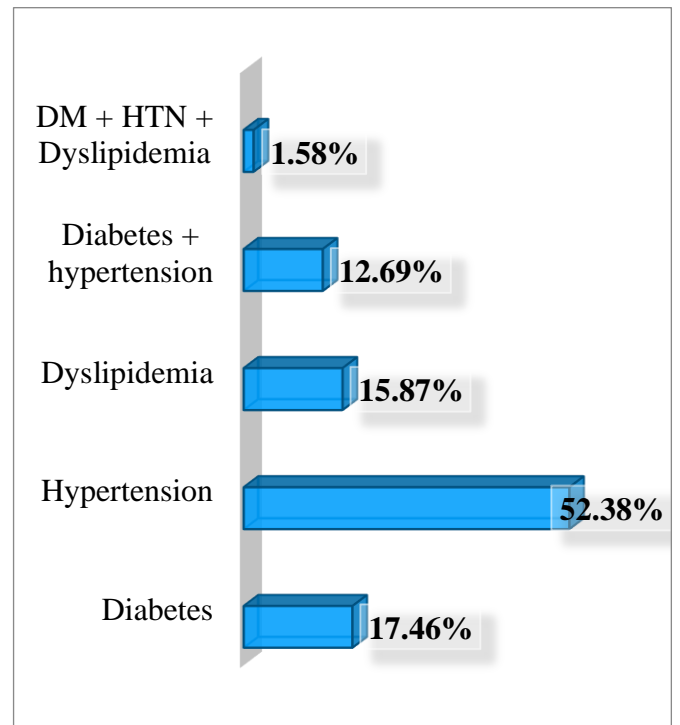

Fig 2: Comorbid Conditions

In the previous decades, the CVS prevalence has shown upward trend with patient age. It may be attributed to the greater incidence of HTN, Diabetes mellitus, dyslipidaemia, sedentary lifestyle, and alterated dietary habits. A Study by Renjen et al.[32] demonstrated that the typical age of stroke patients were 57.1 ± 1.7 years which is relatable to our study during which the mean age was 59.7 +11. Multiple studies in the past indicates that the risk of CVS increases two fold for every successive decade after the age of 55 years[8,9]. HTN affects innumerable people across the globe and is a significant risk factor for both cerebral infarction as well as intracerebral hemorrhage [10]. The greater the blood pressure, higher will be the risk for risk as per Lewington et al.[11]. Chobanian et al., indicated that optimum control of high BP contributes to stroke prevention[12] . Risk of getting a stroke are often reduced by minimum 38% by regulation of HTN, McMahon and Rodgers[13]. Hypertension as a risk factor was detected in 53.8% of our studied patients which was almost close to 56.9% as per Renjen et al., 2015[14]. The contribution of dyslipidemia within the progress of cerebrovascular disease is less certain than that for CAD; more prominent association has been obsereved with decreased high-density lipoprotein (HDL) cholesterol and increased total cholesterol to HDL ratio than with the total cholesterol level, LDL cholesterol and triglycerides. Dyslipidemia was found in 17.45% of our patients which was slightly lower than the

study conducted by Renjen et al. Diabetes was a contributing risk factor found in 19.04% of cases in this study which is consistent to the studies performed by Lai SL et al[15].

C. Clinical Presentation

Among all the clinical manifestations like hemiparesis, hemiplegia, aphagia, slurred speech, unconsciousness, headache, confusion, convulsions etc., the most commonly observed manifestations were slurred speech(20.8%), hemiplegia(19.07%) .
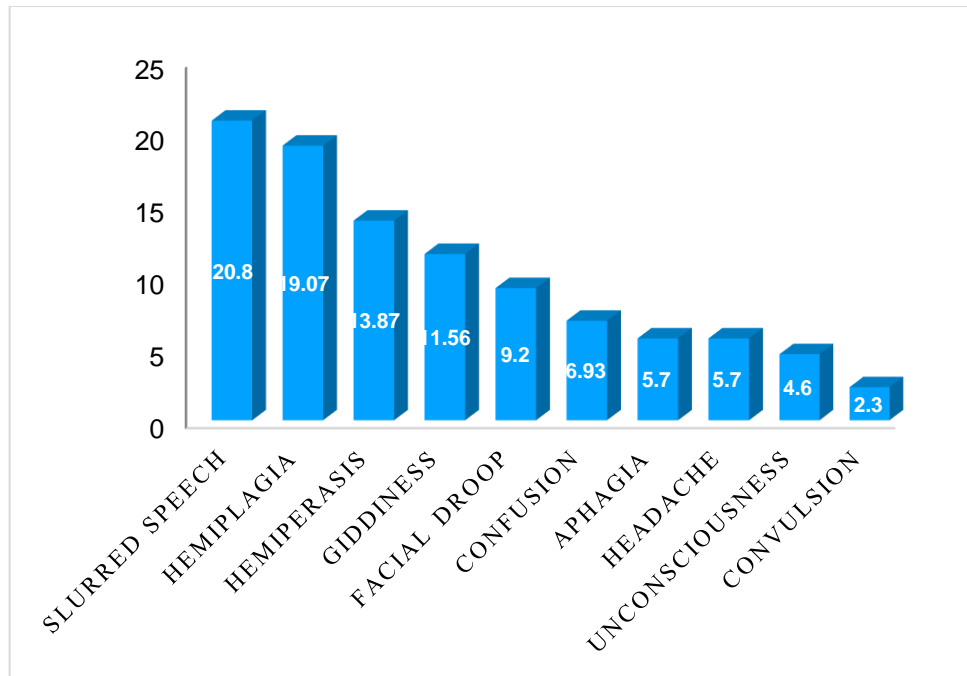

Fig 3: Clinical Manifestations of Stroke

In our recent study most of the patients presented with predominant symptoms like slurred speech (Speech defects), change in speech followed by weakness on the right side, headache, weakness on the left side and deviation of the mouth. In our study it absolutely was observed that maximum patients presented with slurred speech (20.8%), followed by hemiplegia (19.7%), hemiparesis (13.87%), giddiness (11.56%), facial droop (9.2%), confusion (6.93%), aphagia (5.7%), headache (5.7%), unconsciousness (4.6%) and convulsion (2.3%). These findings were in concordance with the study conducted by Aiyar [16].

D. Disability on Admission

On the Basis of mRS Score of 92 patients, the extent of disability on admission was calculated and 32 patients had a mRS score of 3(34.78%) followed by 27 Patients with mRS score of 4(29.34%).
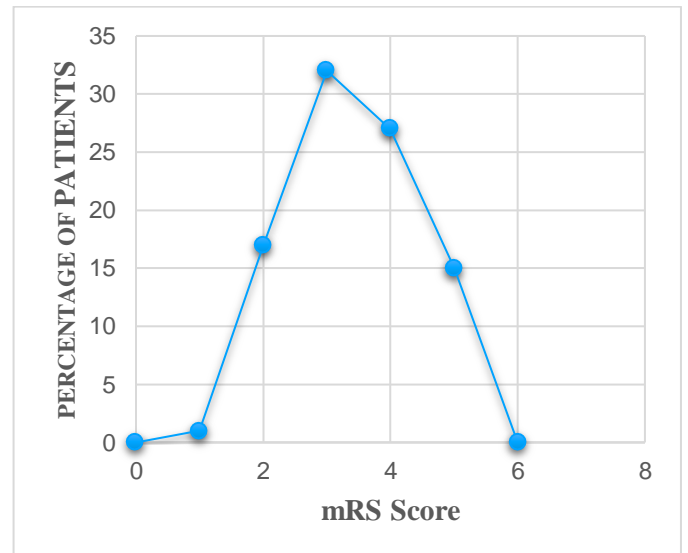

Fig 4: mRS Score on Disability

Functional disability is strongly correlated to the cost of stroke within the years after the stroke event. The results from this study indicate higher costs with worse functional disability, there's a rise in average per-patient costs after stroke (comparing mRS 5 to mRS 0–2). These conclusions hold even after stratifying the results by different age groups. This sensitivity analysis further indicated that the youngest population (<60) incurred the highest costs in any level of

disability. Previous study by Lekander I. et al., have also indicated an analogous relationship between functional disability and costs. 47 If a treatment can reduce a patient's functional disability from mRS 4–5 to mRS 0–2, the potential benefit could possibly be substantial also in terms of financial terms. It also focuses on the importance of the continuous

rehabilitation in order to maintain optimum functional ability in the years after stroke.

E. Prescribing Patterns In Stroke Patients

Amongst 92 patients, 80 Patients were prescribed anti-platelets (27%), 76 Patients were prescribed anti-lipidemic, and69 Patients were prescribed antihypertensive.
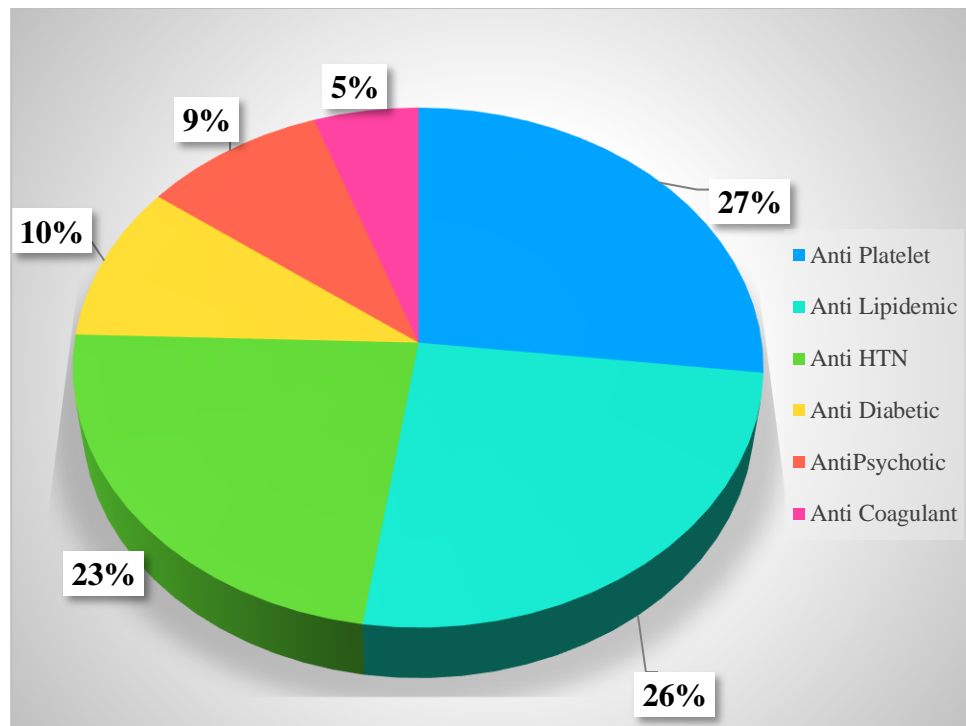

Fig 5: Prescribing Pattern of Drugs

In the present study, most of the patients were prescribed with anti-platelets (aspirin, clopidogrel) and dyslipidemics (atorvastatin) which is comparable to the findings conducted by Prathyusha et al. where the identical drugs were prescribed in stroke patients[17].

In previous study conducted by Johnston et al., the majority of patients with minor ischaemic stroke or high-risk TIA, received a combination of clopidogrel and aspirin which cause a lower risk of major ischemic events whereas higher risk of major haemorrhage at 90 days than those that received aspirin alone[18]. This is in concordance with our study within which most typically prescribed anti-platelets in our study were combination of Aspirin and Clopidogrel (72%) followed by aspirin only (23%) and clopidogrel(3%).

Other drugs prescribed in our study are Atorvastatin (26%), and Amlodipine (23%), antidiabetic (10%), antipsychotic (9%) and anticoagulants (5%).

In all category of antihypertensive calcium channel blockers were used employed in majority of prescriptions (26%), which is comparable to study conducted by Abbasi et al.

The anti-hypertensives followed are Angiotensin receptor blocker (21%), beta blockers (20%), diuretics (10%), Angiotensin converting enzyme (5%) and centrally acting antihypertensive (4%).

IV. CONCLUSION

The prescribing pattern in stroke patients is not well known to the medical world owing to the limited number of studies conducted worldwide on it. Stroke is a disease which causes long duration of hospital stay of patient because of the slow recovery of the patient and the other secondary assistive therapies to the patient. The duration of stay directly varies with the extent of disability of the patient which invariably increases the cost of therapy and increases and mortality and morbidity of patient.

Antihypertensive drugs have a supporting role in the management of the disease by controlling the BP and therefore regularizing the vascular supply. Atorvastatin was the most commonly prescribed drug for treating dyslipidemia. Drugs prescribed for the treatment of stroke were according to AHA/ASA guidelines. Majority of the prescriptions were rational and the findings necessitate the early and appropriate management of stroke to prevent further complications of stroke. Such long term therapy involves a major economic burden on the patient including

the direct, indirect healthcare cost along with intangible expenses incurred to the patient. The presence of comorbid condition such as hypertension or diabetes results in increased costs of treatment due to it complicated treatment regimens and high drug pricing. The therapy cost is directly proportional to the extent of disability of patient upon admission as more disability results into longer and complicated therapies.

Physiotherapy, lifestyle changes and better management of risk factors have a major effect on recovery of stroke with improve quality of life and symptoms. There is a need of clinical pharmacist and healthcare team for the management of stroke to facilitate speedy recovery of the patient, to enhance the healthcare experience for the patients, reducing the economic burden, eliminating drug related issues and length of stay in hospital.

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