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A DEMOGRAPHIC STUDY ON RISK FACTORS OF STROKE AND IT'S MANAGEMENT

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ABSTRACT

Stroke is the damage to brain caused due to interruption or reduction of blood supply to the brain, resulting in lack of oxygen to the brain. It is the second most leading cause of death and major contributing to disability world-wide. Stroke is divided into 3 types based on formation of blood clot. The main risk factors of stroke are hypertension, hyperglycaemia, obesity, thrombocytopenia. Now-a-days covid infection and covid vaccination influence the blood clotting factors and considered as one of the risk factor of stroke due to elevation of D-dimer levels that leads to clot formation. Our study was conducted on total count of 230 patients. Among them, 55.7957% patients had hypertension, 80.9% are hyperglycaemic patients [55.81% DM, 25.09% DI] 27.68% with covid infection, 26.079% covid vaccination, 3.75% obesity, 1.33% thrombocytopenia.

KEYWORDS: Stroke, ischemic stroke, hemmorhagic stroke, risk factors, hypertension, diabetes, covid infection, covid vaccination.

INTRODUCTION

Stroke is also called as Brain attack or Cerebrovascular accident (CVA) which occurs when the blood flow to the brain is decreased or stopped, which leads to death of the brain cells due to lack of oxygen.[1] Stroke is divided into to 3 major types based on site of clot formation.

Ischaemic stroke: Ischemic stroke is a type of stroke that occurs when blood supply to part of brain is interrupted or reduced, preventing brain tissue from getting enough oxygen and nutrients.[1,2] It is the most common type of stroke which occupies 87% among all types of stroke occurs when blood vessels in brain become narrowed or blocked, causing severely reduced blood flow. This may cause fatty deposits that build up in blood vessels and other debris also travel through the blood stream and form blood clots causing stroke. Covid-19 infection may increase risk of Ischaemic stroke.[2]

Hemmorhagic stroke: Hemmorhagic stroke occurs due to rupture of any blood vessel in the brain causing internal bleeding. It occurs mostly when a blood vessel in the brain leaks or ruptures. Brain haemorrhage can start from many conditions that can affect the blood vessels mainly due to elevation of uncontrolled blood pressure and can be treated with blood thinners. A less common cause of bleeding in the brain is rupture of an irregular angle of thin walled blood vessel called atrial vessel malformation. It is again divided into 2 subtypes as intra cerebral hemmorhagic stroke and subarachnoid hemorrhagic stroke.[3]

Intracerebral hemorrhagic: Most common type of hemmorhagic stroke which occurs due to high blood pressure that can cause the thin walled arteries to rupture releasing blood into the brain tissue.[4]

Subarachnoid hemmorhage: Less common type of hemmorhagic stroke refers to bleeding in area between the brain and the tissues that covering the brain.

Transient ischaemic stroke: Transient ischaemic stroke also called as "Mini stroke" which is a transient episode causes neurological dysfunction occurs when the blood supply to the part of thebrain is briefly blocked and last for only few minutes to hours which is a sign of future stroke which is mainly caused due to high influence of risk factors including hypertension, hyperglycaemia, covid infection and covid vaccination conditions due to elevation of D-dimer levels.[5]

RISK FACTORS

Hypertension: Elevation of blood pressure levels may cause stroke indirectly. Normal range of blood pressure is 120-130/80-90 mm of Hg. But in stroke patients elevated BP levels are seen ranges above 180/120 mmHg which is dangerously high and require immediate medical attention. This elevated BP level effects the flow of blood causing burst or blockage of blood vessel. It

mainly causes ischemic stroke and in rare cases leads to hemmorhagic stroke.[6,7,8]

Diabetes Mellitus: It is a group of diseases that refers to elevation of glucose levels in our body. Normal glucose levels are 110 mg/dl (FBS), where as in stroke patients it may elevated up to 180 or 200 mg/dl. RBS normal level is 180 mg/dl, whereas in stroke people it may elevated up to 300-600 mg/dl which may cause pathologic changes in blood vessels at various locations and can lead to stroke if cerebral vessels are directly effected. It mainly leads to ischemic stroke, hemmorhagic stroke on elevated levels.[6]

Diabetes Insipidus: Is a disorder of salt and water metabolism marked by intense thirst and heavy urinations, imbalance of electrolytes may cause osmotic pressure that effects brain oxygen levels that leads to brain hypoxic condition resulting in low supply of blood (or) clotting of blood vessel in brain.[6]

Covid Infection: From last 2 years covid-19 infection is one of the pandemic which causes respiratory disorders but it indirectly affects blood supply to the brain due to elevation of D-dimer levels in body. D-dimer levels[9] may be elevated due to drugs used for treatment the treatment of covid infection and cause effect on clotting factors. It is a high risk in aged patients and the patients who had other chronic disorders.

Covid Vaccination: Both covaxine and covishield vaccines mainly causes thrombocytopenia (or) cerebral thrombolysis. Among them, covaxin has high prevalence of stroke.[9]

Obesity: Also called hyperlipdaemia due to elevation of lipid levels in the body. High lipid levels forms a thin layer of adipose tissue around blood vessels forming reduced space between the walls and vessels which may lead to decrease in blood supply to the brain cells causing hypoxic condition.[10]

SYMPTOMS[11,12,13,14]

Symptoms include trouble walking, seeing, speaking, slurred speech, blurred vision, loss of consciousness, confusion, ataxia, gaint, dyspnoea, upper and lower limbweakness, sudden severe headache with no cause.

Stroke can be diagnosed through CT brain, MRI brain, MRA brain, doppler test, prothrombin time complete blood analysis.[15]

TREATMENT

Stroke can be treated by using both surgical and conservative therapies, but can be mostly treated by using medical therapy. Early treatment can be given with medication TPA [Tissue Plasminogen Activator] commonly called as clot buster which can minimise brain damage. Conservative therapy includes drugs like anticoagulants, antacids, thrombolytics, anti platelet agents and surgical methods include thrombectomy. Drugs prescribed for other than clotting are Inj.Labetalol, Tab.Amlong, Inj.Lasix to control hypertension; Inj.Human Actrapid, Tab.Glimipride and Metformin for diabetes; osmotic agents like Inj.Mannitol is also prescribed to hemorrhagic stroke patients.[9,15]

Anti Coagulants: These drugs act slowly as controlled therapeutic inhibition of blood clotting.[16]
Example: Low Molecular Weight Heparin.

Anti Platelet Aggregators: They act irreversibly on cyclo-oxygenase pathway, resulting in inhibition of conversion of arachidonase to prostaglandin G2/H2 and thrombinase A2 causing irreversible inhibition of platelet aggregration.[17]
Example: Tab.Aspirin 75 mg, Tab.Clopitab.

Thrombolytics: They dissolve thrombin in the vascular bed by activating plasmogen to form plasmin. It is a proteolytic enzyme that breaks the cross links between fibrin molecules to destabilise the structural integrity of blood clots.[18,19]
Examples: Tab.Alteplase 200 mg.

Osmotic Agents: They play a key role in therapy of acute stroke by reducing the cerebral edema and cerebral perfusion by decreasing viscosity.[20]
Example: Inj.Mannitol.

MATERIALS AND METHODS

Study Design: A descriptive-demographic study was conducted in our hospital, after clearing ethical committee clearance on incidence of risk factors of stroke along with its percentage patterns and management.

Source of data: **Life Neurovascular Hospital.**
Study duration: 6 months period starting from September 2021 to February 2022

Methods of collection of data
By reviewing patient profile forms.
By reviewing history from patients.

Study population: All the inpatients and outpatients of neuro department of Life hospital, Guntur.

Inclusion criteria
- All adult patients > than 25 years

Exclusion criteria
- Infants, children, adults < 25 years, HIV patients.

RESULTS AND DISCUSSION

The main goal of our study was to ascertain the risk factors and management of stroke. In our study titled "Demographical Study Of Risk Factors Of Stroke And Its Management" was conducted on **230** patients. Out of

them, 150 were males (65.21%) and 80 were females (34.78%).

Table 1: Distribution of data based on gender (n=230)

S.No	Gender	Frequency (n=230)	Percentage(%)
1	Males	150	65.21%
2	Females	80	34.78%

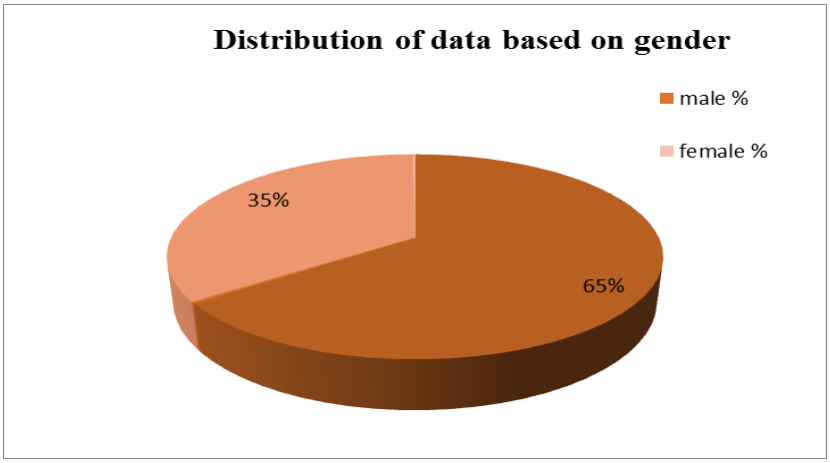

Figure 1 Distribution of data based on gender.

Table 1: shows the distribution of data based on gender, males were 150 (65.21%) and females were 80 (34.78%). According to our study, males had the higher incidence of stroke when compared to females because majority of risk of stroke is seen greater in males than females. By comparing our study with **Pawan T ojha et al.,**[21] which studied about the risk factors of stroke according to sex; males are at higher risk when compared to females which is similar to our study. **Sunil Tukaram Kotkunde et al.,**[10] study was conducted on 238 patients, among them females are 96 members with percentage of 40.3% and males are 142 members with percentage of 59.7%, our study correlates with this study in percentage of sex distribution in which males are highly effected than females. This shows prevalence of stroke was more in males than in females which is clearly depicted in the **Fig 1.**

Table 2: Distribution of data based on age group.

S. No	Age (years)	No. of patients (n=230)	Percentage(%)
1	25-35	07	3.04
2	35-45	34	14.78
3	45-55	48	20.86
4	55-65	56	24.34
5	65-75	80	34.78
6	75-85	5	2.17

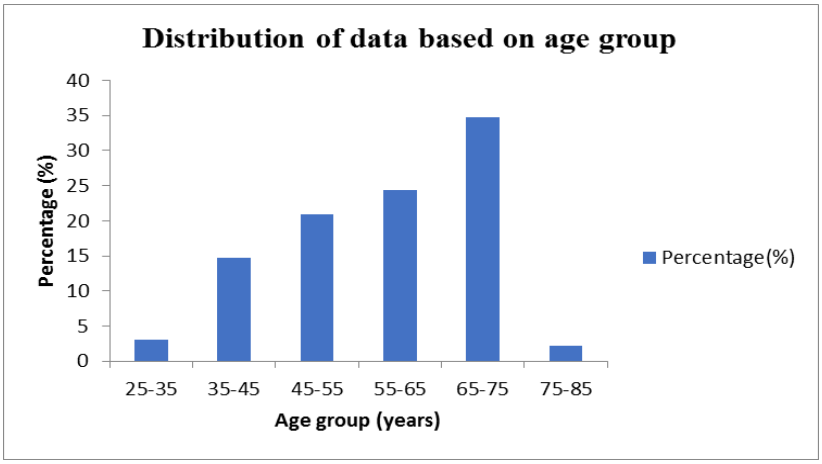

Figure 2 Distribution of data based on age group.

Table 2: shows the distribution of data based on age group range of interval of 5 years i.e., 25-35, 35-45, 45-55, 55-65, 65-75 and 75-85 with percentage of its frequency was 3.04%, 14.78%, 20.86%, 24.34%, 34.78%, 2.17% respectively. Among these, the higher incidence range of patients effected with stroke was observed in 65-75 age group with a frequency of 80 patients among 230, with 34.78%. It was depicted in **Fig 2.**In the study of **Rishi Shethi et al.,**[8] the high risk prevalence occurs in age group of >.45 years, but in our study we got the high prevalence of stroke between the age group of 65-75 yearsbecause our study was conducted on only lower number of patients, so that we found the exact figure of age group among them.

Table 3: Distribution of data based on type of stroke.

S. No	Type	No. of patients (n=230)	Percentage(%)
1	Ischemic stroke	180	78.26
2	Hemorrhagic stroke	45	19.56
3	Recurrent stroke	5	2.17

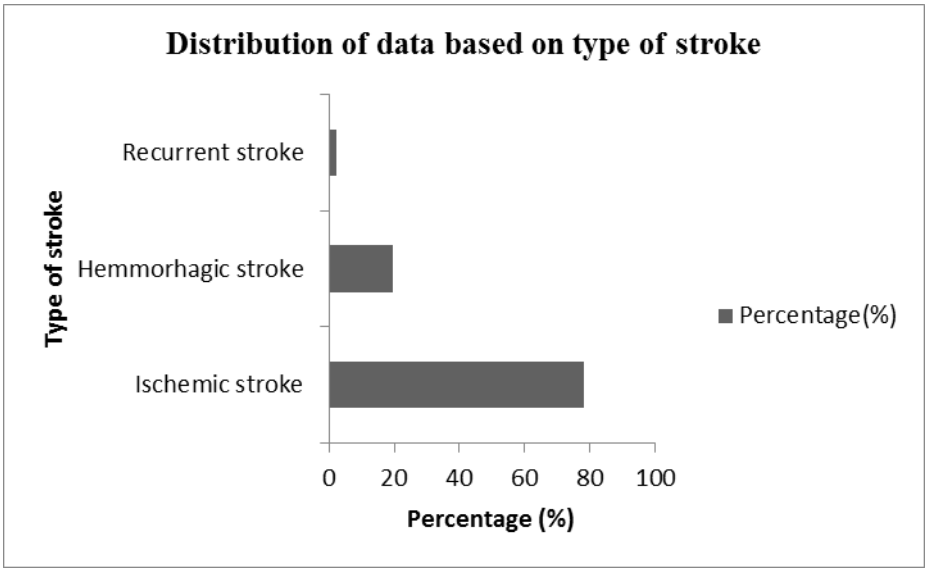

Figure 3: Distribution of data based on type of stroke.

Table 3: shows the distribution of data based on the type of stroke among 230 stroke patients, ischemic stroke with 78.26%, hemorrhagic stroke with 19.56%, transient ischemic stroke with 0% and recurrent stroke with 2.17%. The ischemic stroke was found to be the most commonly caused type of stroke in people according to our study was depicted in **Fig 3.** Similar to our study, the study of **Danilo Toni et al.,**[18] Recurrence of stroke due to highly prevalence of risk factors conducted study out of 1794 patients; recurrent ischemic stroke has maximum index of subtypes of stroke and sometimes may vary based on patient health condition.

Table 4: Distribution of data based on type of stroke correlate to gender.

S.No	Type	Frequency		Percentage (%)	
		Males (n=150)	Females (n= 80)	Males %	Females%
1	Ischemic stroke	115	65	63.88	36.11
2	Hemmorhagic stroke	34	11	75.55	24.44
3	Recurrent stroke	3	2	60	40

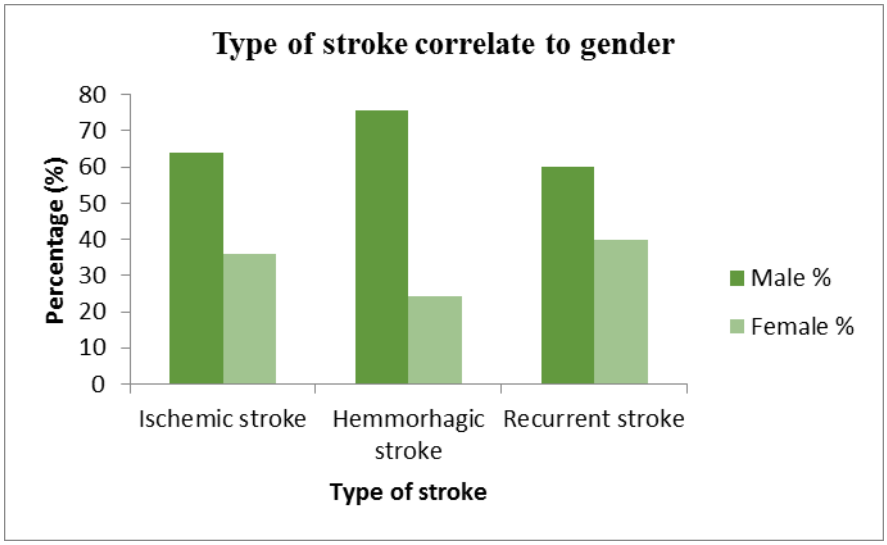

Figure 4 Distribution of data based on type of stroke correlate to gender.

Table 4: shows distribution of data based on type of stroke in correlation with gender, males are highly effected with hemorrhagic stroke with 63.88% and females are highly effected with ischemic stroke with 36.11%. In our study, there were no reported cases of transient ischemic stroke in our hospital. A clear demographical representation was depicted in **Fig.4.** According to the study of **Sunil Tukaram et al.,**[10] compared to all types of stroke, ischemic stroke is highly effectable stroke in males. His study was conducted on 238 patients, among them females are 96 members with percentage of 40.3% and males are 142 members with percentage of 59.7%, our study correlates with this study in percentage of sex distribution males are highly effected than females also.

Table 5: Distribution of data based on type of stroke correlate to age group.

S.No	Age (years)	Ischemic stroke		Hemorrhagic stroke		Recurrent stroke	
		Frequency (n=180)	Percentage (%)	Frequency (n=45)	Percentage (%)	Frequency (n=5)	Percentage (%)
1	25-35	4	2.22	3	6.66	0	0
2	35-45	26	14.44	8	17.77	0	0
3	45-55	39	21.66	7	15.55	3	60
4	55-65	45	25	10	22.22	0	0
5	65-75	64	35.55	15	33.33	1	20
6	75-85	2	1.11	2	4.44	1	20

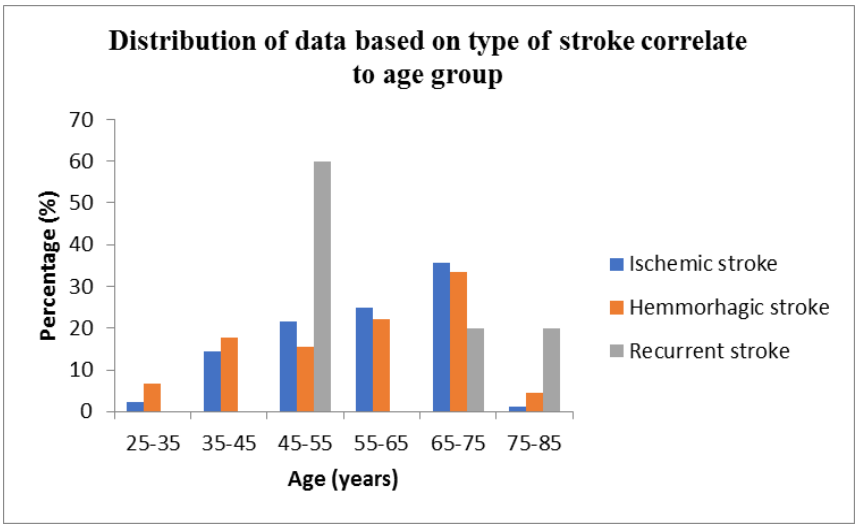

Figure 5 Distribution of data based on type of stroke correlate to age group.

Table 5: shows distribution of data based on type of stroke correlate to age group, ischemic stroke and hemorrhagic stroke is highly seen in the age group of 65-75 years with 35.55% and 33.33%. Recurrent ischemic stroke is highly seen in 45-55 years age group with 60%. TIA has no reported cases in our study. By analysing all the age group patients we determined that the age group between 55-85 years patients are highly effected due to risk factors and social habits that triggers and increase the risk of stroke. Age between 25-45 group people have low chances to effect. From the article **Mathew J Reeves etal.,**[14] the high prevalence age group was 45-65 years higher in males due to risk factors taken in his descriptive study from 1999 – 2004. 84.8% per 100,000 effected males of age 45-65. Lower risk factor mortality rate in males of age over 25 years, women are effected in older age about 85 years.

Table 6: Distribution of data based on risk factors.

S.No	Risk Factors	Males		Females	
		Frequency (n= 150)	Percentage (%)	Frequency (n=80)	Percentage(%)
1	Hypertension	46	30.6667	27	33.75
2	Diabetes mellitus	37	24.6667	23	28.75
3	Diabetes insipidus	20	13.3334	9	11.25
4	Thrombocytopenia	2	1.3334	0	0
5	Covid vaccination	10	6.6667	3	3.75
5a	Covishield				
5b	Covaxine	16	10.6667	4	5
6	Covid infection	19	12.6667	11	13.75
7	Obesity	0	0	3	3.75

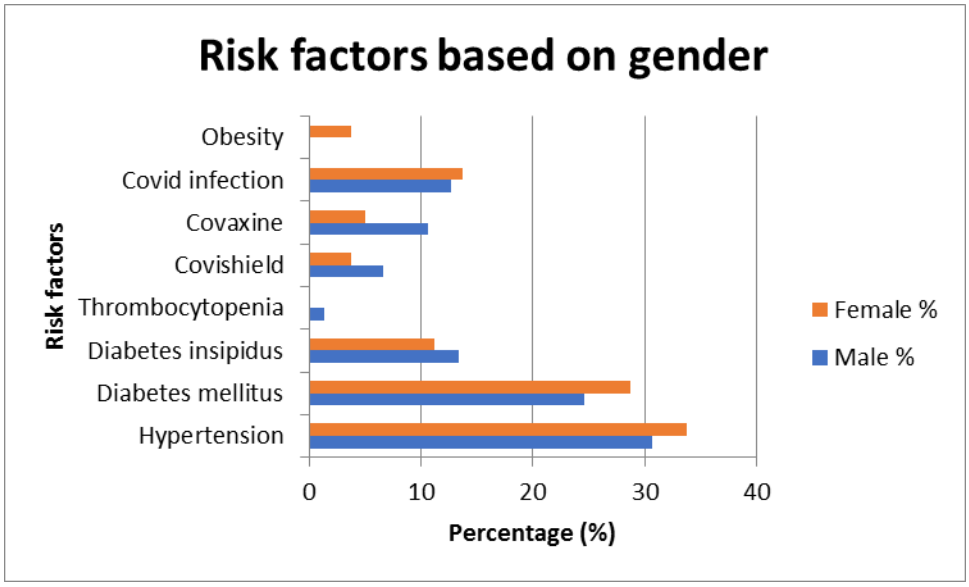

Figure 6 Distribution of data based on risk factors.

Table 6: shows the distribution of data based on risk factors of stroke observed in the study duration. From all the risk factors taken, hypertension has the highest range with a frequency of 46 (30.66%) and second most happened risk factor is diabetes mellitus 37 (24.66%), diabetes insipidus 20 (13.33%), due to covaxine effected patients are 16 (10.66%). From this study, we observed that common highest risk factor is hypertension and lowest risk factor is thrombocytopenia and is clearly depicted in **Fig 6**. Similar to our study, **Gudis Bereda etal.,**[12] studied that the most commonly found risk factor for stroke is hypertension observed highly in males causing ischemic stroke. Diabetes is the second most higher incidence of stroke which can cause hemorrhagic stroke,. **Stefanian Nannoni etal.,**[22], explains that now-a-days from last 2 years covid infection and covid vaccination people had most incidence of stroke due to increase in d-dimer levels or decrease platelets levels causing clotting of blood vessels.

Table 7: Distribution of data based on drugs prescribed in stroke.

S.No	Drugs	Classification	No. of prescriptions		Percentage(%)	
			Males	Females	Males	Females
1	Tab Aspirin (325 mg)	Antiplatelet aggregator	20	25	13.33	31.25
2	Inj Heparin	Anticoagulant	11	22	7.33	27.50
3	Tab Clopitab (75 mg)	Antiplatelet aggregator	4	0	2.66	0
4	Tab GMP $_2$	Oral hypoglycemic agent	17	0	11.33	0
5	Inj Human Actrapid Insulin	Oral hypoglycemic agent	20	9	13.32	11.25
6	Inj Mannitol	Osmotic agent	15	8	10	10
7	Tab Alteplase	Thrombolytic agent	17	10	11.34	12.5
8	Tab Atorvas	Anti-hyperlipidaemic agent	0	3	0	3.75
9	Inj Labetalol	Anti-hypertensive agent	25	1	16.66	1.25
10	Tab Amlong	Anti-hypertensive agent	21	2	1.34	2.5

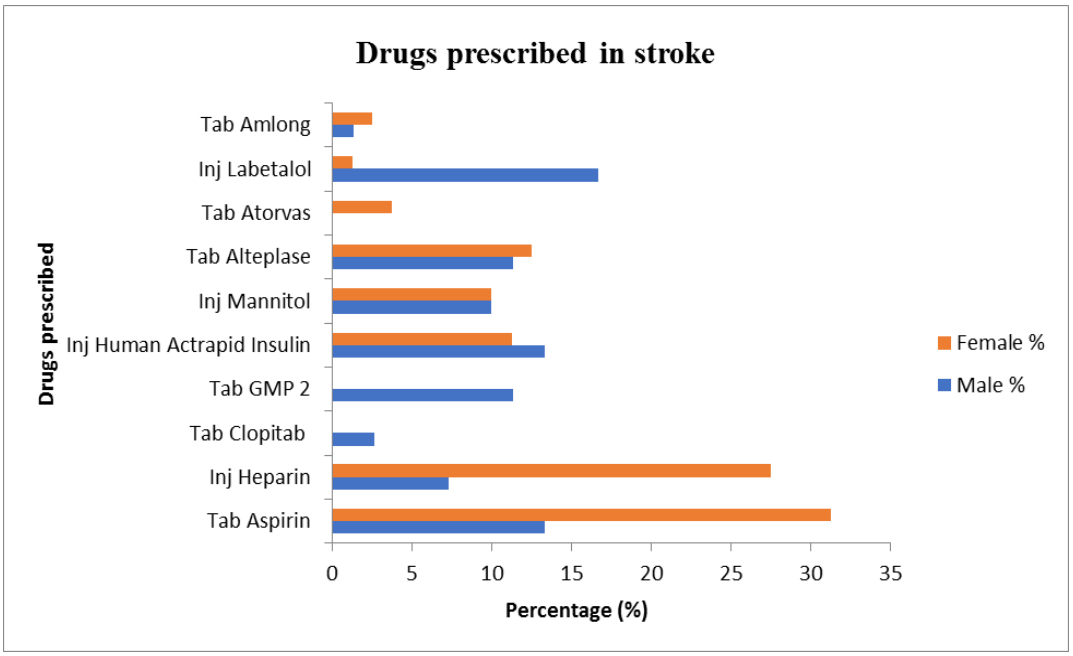

Figure 7 Distribution of data based on the drugs prescribed in stroke management.

Table 7: this shows the distribution of data based on the drugs prescribed in management of stroke, most commonly prescribed drugs include anti platelet aggregator drugs like tab.aspirin 325 mg, Tab.clopitab 75 mg, anti coagulant like Inj Heparin for three times a day and for hypertension Inj.labetolol to control elevated BP levels, and for hypoglycaemia mostly preferred inj.human actrapid. Aspirin is the most commonly prescribed medication for stroke management along with other supportive drugs based on the patients condition. Similar to our study **Robert Hurford et al.,**[15] performed a study on 135 people, among them 65 people are effected with stroke due to hypertension as a risk factor and are treated with intravenous antihypertensive drugs (Inj.Labetolol 60mg) and 40 people had diabetes as a risk factor and adviced Inj.Human Insulin because of its fast action to decrease glucose levels. Remaining supportive treatment was given for reducing blood clot mostly preferred ASPIRIN and CLOPITAB. Unlike our study, **Eivind Berge et al.,**[19] for hemorrhagic stroke IV thrombolysis is the best treatment, his study was on 1000 haemorrhagic patients in which 78.98% people shows higher effectiveness to IV thrombolysis. The mostly adviced drugs are depicted in **figure 7.**

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CONCLUSION

In this study, we determined that the incidence of ischemic stroke is higher among all other types with age group of above 45 years having higher ratio of males than females. Also revelaed that hypertension is the most

common significant cause of stroke than any other risk factors in most of the patients. Between covid infection and covid vaccination, covid vaccinated patients had high prevalence of stroke than covid infected patients. Out of all 230 patients analysed in neurology department, it was observed that 150 males are at high risk of stroke than the other 80 females. Among males, 115 are effected with ischemic stroke, 34 are effected with hemmorhagic stroke, 3 are effected with recurrent ischemic stroke. Among females, 65 are effected with ischemic stroke, 11 members are effected with haemorrhagic stroke, 2 are effected with recurrent ischemic stroke. Also found that the most common and effective medication for stroke management are antiplatelet aggregators like Aspirin, Clopitab with combination of other suitable drugs based on the patient profile. between covid infection and covid vaccination, covid vaccine patients are high prevalence of stroke.

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