A PROSPECTIVE STUDY ON THE TREATMENT FOR ACUTE
ISCHEMIC STROKE & AN UPDATE OF CURRENT TREND FOR THE
MANAGEMENT OF BLOOD PRESSURE IN PATIENTS WITH AIS IN
A TERTIARY CAE HOSPITAL, BANGALORE

Anil Babu*, Soujanya, Pooja Reddy, Naveen Reddy and Sreeja Medanki
India.

1. INTRODUCTION
Acute ischemic stroke is characterized by the sudden loss of blood circulation to an area of the brain, resulting in a corresponding loss of neurologic function. AIS is caused by thrombotic or embolic occlusion of a cerebral artery and is more common than haemorrhagic stroke.\(^1\) It is one of the major causes of permanent disability in the patients and also 3\(^{rd}\) largest reason of death worldwide. It can effect persons of all age groups.\(^2\)

Ischemic Stroke Symptoms
- Sudden numbness or weakness of the face, arm or leg, especially involving one side of the body.
- Sudden confusion, trouble speaking or understanding.
• Loss of vision in one or both eyes.
• Trouble walking, dizziness, loss of balance or coordination.
• Sudden, severe headache with no known cause.\[3\]

As per national vital statistics report, cerebrovascular disease (stroke) is the 2\textsuperscript{nd} leading cause of death and over 1.5 million stroke occur every year.\[4\] Stroke incidence and mortality are higher in Asian countries than in western countries.\[5\] Based on few epidemiological studies from 1971 to 1999, the crude prevalence rate of stroke was reported between 44 & 842 stroke per 1,00,000 persons. The annual incidence rate was between 13 & 124 strokes per 1,00,000 persons.\[6\] Stroke incidence rate was increased by 7.8% from 1988 to 2004. During the last one and half decade there is an increase of 17.5% in the number of strokes cases in India.\[7\] The estimated adjusted prevalence rates of stroke are between 84 & 262 stroke per 1,00,000 persons in rural areas and between 334 & 424 strokes per 1,00,000 persons in urban areas every year.\[8\]

The TOAST classification denotes five subtypes of ischemic stroke\[9\]
1) large-artery atherosclerosis,
2) Cardioembolism,
3) Small-vessel occlusion,
4) Stroke of other determined etiology, and
5) Stroke of undetermined etiology.

**PATHOPHYSIOLOGY**
Ischemic stroke may manifest in the form of thrombotic stroke (large vessel and small vessel types); embolic stroke (with/without known cardiac and/or arterial factor); systemic hypoperfusion (Watershed or Border Zone stroke); or venous thrombosis. Irrespective of the cause, compromised vascular supply to the brain is the primary event in majority (85–90%) of acute strokes. Low respiratory reserve and complete dependence on aerobic metabolism make brain tissue particularly vulnerable to effects of ischemia. A spectrum of severity is generally observed in the affected region of the brain, owing to the presence of collateral circulation. Thus, part of the brain parenchyma (core) undergoes immediate death, while others may only be partially injured with potential to recover (penumbra) Ischemia causes brain damage by activating the ischemic cascade, which progresses to local depletion of oxygen or glucose, causing failure of production of high energy phosphate compounds, like adenine tri-phosphate (ATP). This adversely affects energy-dependent processes necessary for tissue cell survival, and sets off a series of interrelated events culminating in cellular injury and death. The extent of damage usually depends on duration, severity, and location of ischemia. Neuron, owing to its role in impulse transmission, requires constant supply of glucose and oxygen, in order to maintain the ionic gradients across its membrane, and is most susceptible for hypoxic changes.\[10\]
Pictorial representation of the pathophysiology of the ischemic cascade in acute ischemic stroke.

**DIAGNOSIS**

Brain and neurovascular imaging is required for diagnosis. The current standard is non-contrast computed tomography (CT) of the head because it is fast and widely available.\(^{[11]}\) MRI has greater spatial resolution to detect brain ischemia in TIA or minor ischemia stroke, it is the modality of choice to make an inclusive imaging diagnosis of minor stroke.\(^{[12]}\) quick assessment of degree of disability.

Use of national institute of health stroke scale (NIHSS)\(^{[13]}\)

- NIHSS = 0-5 (TIA) (0: no signs) (1-5: minor stroke)
NHISS = 6–10 (moderately disabling stroke)
NHISS = 11–20 (moderate to severe disabling stroke)
NHISS ≥ 20 (severe to life threatening stroke)

Other useful imaging techniques are CBC, cerebral angiogram, echocardiogram, nuclear imaging intracranial vascular imaging (including CT angiography, MR angiography, Doppler ultrasound, and conventional angiography) and extra cranial vascular imaging (including carotid Doppler ultrasound, CT angiography, MR angiography, and conventional angiography), and perfusion CT and MRI techniques.[13]

THERAPEUTIC APPROACH
Currently the medical treatment approach of AIS focuses on the treatment of the immediate acute phase in an effort to reduce the progression of the ischemia, followed simultaneously by an attempt at revascularization and reperfusion of the brain parenchyma. Further treatment includes the reduction of the damage and neuronal cell death caused by the ischemia and subsequent metabolic cascade brought about by the abrupt reperfusion. This involves the use of neuroprotective strategies and a pharmacological approach to reducing the inflammatory response. Finally, treatment focuses on rehabilitation and retarding the progression of the vascular disease as well as prevention of further strokes. To understand the medical treatment strategies described above, following is provided a detailed description of the pharmacological agents that are used in the treatment of AIS and the science behind these choices of medications.[14]

Thrombolysis
The pinnacle of stroke therapy is without doubt thrombolysis and is rapidly becoming the gold-standard treatment in AIS. The NINDS rtPA Stroke Study compared the use of intravenous rtPA given within three hours after stroke onset versus placebo.[15] Recombinant tPA (rtPA) is a genetically synthesized tPA molecule that works in precisely the same way as endogenous tPA. It catalyses the cleavage of the zymogens plasminogen to yield the active enzyme plasmin. Plasmin in turn is responsible for the degradation of the interlinked fibrin monomers that make up the fibrin clot into soluble products. Endogenous tPA is usually present in relatively small amounts and regulates the breakdown of fibrin plugs in vessels and keeps coagulation in check. In turn, plasminogen activator inhibitor 1 (PAI-1) regulates the activation of tPA, thus hindering the degradation of the fibrin clot. However, when rtPA is
administered by infusion, there is insufficient PAI-1 to control the action of tPA, hence activated plasmin is produced in sufficient quantities to breakdown existing fibrin clots. Therapy with rtPA is given at a dose of 0.9 mg/kg IV without exceeding a maximum dose of 90 mg with 10% given as a loading bolus over 1 minute and the remainder as an infusion over 60 minutes. During the infusion and for one hour after concluding the infusion, the patient’s vital signs should be monitored and neurological assessment done every 15 minutes. Thereafter, observations should be carried out every 30 min for the next 6 hours and hourly afterward until 24 hours have transpired since treatment.[16]

Additionally, fibrinolytic therapy can be administered by the intra-arterial (IA) route directly to the artery occluded by the thrombus. This however requires that the centre have cerebral angiography equipment and highly trained interventional neuro-radiologist to carry out this procedure. The use of IA rtPA therapy is recommended for patients who are no longer eligible for IV infusion of rtPA due to the time-window restraints but are still within the 6-hour cut-off time for IA treatment. Also, patients who are excluded from IV rtPA due to contraindications such as recent surgery may be eligible for IA treatment instead in the case of occlusion of the middle cerebral artery (MCA) or another proximal cerebral artery. Nevertheless, IA therapy should not be considered an alternative to IV infusion when patients are eligible for the latter.[17,18] The combination of IV/IA rtPA therapy is not recommended.[19]

**Guideline recommendations**

Treatment of AIS: IV Administration of Alteplase, Infuse 0.9 mg/kg (maximum dose 90 mg) over 60 min, with 10% of the dose given as a bolus over 1 min. Admit the patient to an intensive care or stroke unit for monitoring. If the patient develops severe headache, acute hypertension, nausea, or vomiting or has a worsening neurological examination, discontinue the infusion (if IV alteplase is being administered) and obtain emergency head CT scan. Measure BP and perform neurological assessments every 15 min during and after IV alteplase infusion for 2 h, then every 30 min for 6 h, then hourly until 24 h after IV alteplase treatment. Increase the frequency of BP measurements if SBP is >180 mm Hg or if DBP is >105 mm Hg; administer antihypertensive medications to maintain BP. Delay placement of nasogastric tubes, indwelling bladder catheters, or intra-arterial pressure catheters if the patient can be safely managed without them. Obtain a follow-up CT or MRI scan at 24 h after IV alteplase before starting anticoagulants or antiplatelet agents.
- IV alteplase (0.9 mg/kg, maximum dose 90 mg over 60 minutes with initial 10% of dose given as bolus over 1 minute) is recommended for selected patients who may be treated within 3 hours of ischemic stroke symptom onset or patient last known well or at baseline state.
- For otherwise eligible patients with mild stroke presenting in the 3- to 4.5-hour window, treatment with IV alteplase may be reasonable. Treatment risks should be weighed against possible benefits.
- In otherwise eligible patients who have had a previously demonstrated small number (1–10) of CMBs on MRI, administration of IV alteplase is reasonable.
- In otherwise eligible patients who have had a previously demonstrated high burden of CMBs (>10) on MRI, treatment with IV alteplase may be associated with an increased risk of ICH, and the benefits of treatment are uncertain. Treatment may be reasonable if there is the potential for substantial benefit.
- IV alteplase for adults presenting with an AIS with known sickle cell disease can be beneficial.
- Abciximab should not be administered concurrently with IV alteplase.
- IV alteplase should not be administered to patients who have received a treatment dose of low-molecular-weight heparin (LMWH) within the previous 24 hours.
- The potential risks should be discussed during thrombolysis eligibility deliberation and weighed against the anticipated benefits during decision making.
- Given the extremely low risk of unsuspected abnormal platelet counts or coagulation studies in a population, it is reasonable that urgent IV alteplase treatment not be delayed while waiting for hematologic or coagulation testing if there is no reason to suspect an abnormal test.
- Treating clinicians should be aware that hypoglycaemia and hyperglycaemia may mimic acute stroke presentations and determine blood glucose levels before IV alteplase initiation. IV alteplase is not indicated for nonvascular conditions.
- Because time from onset of symptoms to treatment has such a powerful impact on outcomes, treatment with IV alteplase should not be delayed to monitor for further improvement.
- In patients undergoing fibrinolytic therapy, physicians should be prepared to treat potential emergent adverse effects, including bleeding complications and angioedema that may cause partial airway obstruction.
BP should be maintained <180/105 mm Hg for at least the first 24 hours after IV alteplase treatment.

The risk of antithrombotic therapy within the first 24 hours after treatment with IV alteplase (with or without EVT) is uncertain. Use might be considered in the presence of concomitant conditions for which such treatment given in the absence of IV alteplase is known to provide substantial benefit or withholding such treatment is known to cause substantial risk.

In patients eligible for IV alteplase, benefit of therapy is time dependent, and treatment should be initiated as quickly as possible.

**Mechanical Thrombectomy**

- Patients eligible for IV alteplase should receive IV alteplase even if EVTs are being considered.
- In patients under consideration for mechanical thrombectomy, observation after IV alteplase to assess for clinical response should not be performed.
- Patients should receive mechanical thrombectomy with a stent retriever if they meet all the following criteria: (1) prestroke mRS score of 0 to 1; (2) causative occlusion of the internal carotid artery or MCA segment 1 (M1); (3) age ≥18 years; (4) NIHSS score of ≥6; (5) ASPECTS of ≥6; and (6) treatment can be initiated (groin puncture) within 6 hours of symptom onset.
- Although the benefits are uncertain, the use of mechanical thrombectomy with stent retrievers may be reasonable for carefully selected patients with AIS in whom treatment can be initiated (groin puncture) within 6 hours of symptom onset and who have causative occlusion of the MCA segment 2 (M2) or MCA segment 3 (M3) portion of the MCAs.
- Although the benefits are uncertain, the use of mechanical thrombectomy with stent retrievers may be reasonable for carefully selected patients with AIS in whom treatment can be initiated (groin puncture) within 6 hours of symptom onset and who have causative occlusion of the anterior cerebral arteries, vertebral arteries, basilar artery, or posterior cerebral arteries.
- Although its benefits are uncertain, the use of mechanical thrombectomy with stent retrievers may be reasonable for patients with AIS in whom treatment can be initiated (groin puncture) within 6 hours of symptom onset and who have prestroke mRS score >1, ASPECTS <6, or NIHSS score <6, and causative occlusion of the internal carotid artery (ICA) or proximal MCA (M1). Additional randomized trial data are needed.
• In selected patients with AIS within 6 to 16 hours of last known normal who have LVO in the anterior circulation and meet other DAWN or DEFUSE 3 eligibility criteria, mechanical thrombectomy is recommended.

• In selected patients with AIS within 6 to 24 hours of last known normal who have LVO in the anterior circulation and meet other DAWN eligibility criteria, mechanical thrombectomy is reasonable.

• The technical goal of the thrombectomy procedure should be reperfusion to a modified Thrombolysis in Cerebral Infarction (mTICI) 2b/3 angiographic result to maximize the probability of a good functional clinical outcome.

• As with IV alteplase, reduced time from symptom onset to reperfusion with endovascular therapies is highly associated with better clinical outcomes. To ensure benefit, reperfusion to TICI grade 2b/3 should be achieved as early as possible within the therapeutic window.

• Use of stent retrievers is indicated in preference to the Mechanical Embolus Removal in Cerebral Ischemia (MERCI) device.

• The use of mechanical thrombectomy devices other than stent retrievers as first-line devices for mechanical thrombectomy may be reasonable in some circumstances, but stent retrievers remain the first choice.

• The use of a proximal balloon guide catheter or a large-bore distal-access catheter, rather than a cervical guide catheter alone, in conjunction with stent retrievers may be beneficial. Future studies should examine which systems provide the highest recanalization rates with the lowest risk for non target embolization.

• Use of salvage technical adjuncts including intra-arterial thrombolysis may be reasonable to achieve mTICI 2b/3 angiographic results.

• EVT of tandem occlusions (both extra cranial and intracranial occlusions) at the time of thrombectomy may be reasonable.

• It is reasonable to select an anaesthetic technique during endovascular therapy for AIS on the basis of individualized assessment of patient risk factors, technical performance of the procedure, and other clinical characteristics. Further randomized trial data are needed.

• In patients who undergo mechanical thrombectomy, it is reasonable to maintain the BP ≤180/105 mm Hg during and for 24 hours after the procedure.

• In patients who undergo mechanical thrombectomy with successful reperfusion, it might be reasonable to maintain BP at a level <180/105 mm Hg.
Anti-platelet therapy

Due to the thrombotic origin of AIS and the involvement of platelet aggregation in the development of said thrombus, anti-platelet drugs play an obvious and pivotal role in the Neurodegenerative Diseases medical treatment. Perhaps the most widely used anti-platelet agent is non-steroidal anti-inflammatory drugs (NSAID) acetylsalicylic acid, commonly referred to as aspirin, and its many derivatives. Although both historically and currently used as an anti-inflammatory drug, aspirin at low doses is an avid inhibitor of platelet aggregation. The mechanism of action of this medication is as dependent on its pharmacokinetics as its pharmacodynamics. As an anti-inflammatory, aspirin must become distributed within the tissues and inside intracellular compartment in order to effectively block the cyclooxygenases (COX) and thus the synthesis of prostaglandins. This necessitates higher dosages in order to achieve a sufficiently high concentration that falls within the therapeutic window. Conversely, in order to function as a platelet anti-aggregant, aspirin requires significantly lower doses as it must only become distributed within the intravascular compartment—in fact only in the portal circulation thus being independent of systemic bioavailability.

Aspirin binds and inhibits the platelet COX-1 irreversibly and consequently impairs the production of prostaglandins and thromboxane’s, noting thromboxane A2 (TXA2) in particular. The absence of TXA2 leads to the reduction in the TXA2-mediated amplification of platelet activation and thus hinders the platelet aggregation phenotype that includes morphological changes and expression of the fibrinogen receptor necessary for platelet aggregation. Low-dose (50 – 100 mg daily) aspirin is prescribed typically as a prophylactic in the prevention of cardiovascular and cerebrovascular disease.

The use of other antiplatelet medication such as clopidogrel, ticlopidine and dipyridamole has not been as formally evaluated in trials, as has aspirin. The routine use of these drugs is not recommended, however it is reasonable to suggest the use of, for example, clopidogrel at an initial dose of 300 mg, as it will efficiently inhibit platelet aggregation, when aspirin is not tolerated by the patient. [20]

Guideline recommendations

- Administration of aspirin is recommended in patients with AIS within 24 to 48 hours after onset. For those treated with IV alteplase, aspirin administration is generally delayed until 24 hours later but might be considered in the presence of concomitant conditions for
which such treatment given in the absence of IV alteplase is known to provide substantial benefit or withholding such treatment is known to cause substantial risk.

- Aspirin is not recommended as a substitute for acute stroke treatment in patients who are otherwise eligible for IV alteplase or mechanical thrombectomy.
- The administration of other glycoprotein IIb/IIIa receptor antagonists, including abciximab, in the treatment of AIS is potentially harmful and should not be performed. Further research testing the safety and efficacy of these medications in patients with AIS is required.
- In patients presenting with minor stroke, treatment for 21 days with dual antiplatelet therapy (aspirin and clopidogrel) begun within 24 hours can be beneficial for early secondary stroke prevention for a period of up to 90 days from symptom onset.

**Anticoagulant therapy**

Anticoagulants are a heterogeneous group of pharmacological agents that by interacting with the coagulation cascade disrupt the formation of the fibrin mesh that forms the scaffold of the clot. When in homeostasis, the blood elements that participate in this process are kept at check thus preventing the formation of a blood clot the use of anticoagulants in the first stages of AIS has been tried with little success. Both the International Stroke Trial and the consensus panel assembled by the National Institute of Neurological Disorders and Stroke (NINDS) recommend against the use of anticoagulants such as heparin within 24 hours of treatment with rtPA.\(^{[17,18]}\)

**Guideline recommendations**

- Urgent anticoagulation, with the goal of preventing early recurrent stroke, halting neurological worsening, or improving outcomes after AIS, is not recommended for treatment of patients with AIS.
- The usefulness of urgent anticoagulation in patients with severe stenosis of an internal carotid artery ipsilateral to an ischemic stroke is not well established.
- The safety and usefulness of short-term anticoagulation for non-occlusive, extra cranial intraluminal thrombus in the setting of AIS are not well established.
- At present, the usefulness of argatroban, dabigatran, or other thrombin inhibitors for the treatment of patients with AIS is not well established.
- The safety and usefulness of factor Xa inhibitors in the treatment of AIS are not well established.
Neuroprotective Agents
At present, no pharmacological or non-pharmacological treatments with putative neuroprotective actions have demonstrated efficacy in improving outcomes after ischemic stroke, and therefore, other neuroprotective agents are not recommended.

Other EVT
- Initial treatment with intra-arterial thrombolysis is beneficial for carefully selected patients with major ischemic strokes of <6 hours’ duration caused by occlusions of the MCA.
- Regarding the previous recommendation about intra-arterial thrombolysis, these data are derived from clinical trials that no longer reflect current practice, including the use of fibrinolytic drugs that are not available. A clinically beneficial dose of intra-arterial alteplase is not established, and alteplase does not have US Food and Drug Administration approval for intra-arterial use. As a consequence, mechanical thrombectomy with stent retrievers is recommended over intra-arterial thrombolysis as first-line therapy.
- Intra-arterial thrombolysis initiated within 6 hours of stroke onset in carefully selected patients who have contraindications to the use of IV alteplase might be considered, but the consequences are unknown.

Oxygenation
Maintaining adequate tissue oxygen saturation of >94% is important during periods of acute cerebral ischemia to prevent hypoxia and potential worsening of the neurologic injury. Supplemental oxygen should be administered if there is evidence of hypoxia. Hyperbaric oxygen therapy (HBOT) may be used to treat patients with ischemic neurological symptoms secondary to air embolism or decompression sickness. However, a few randomized control trials have shown either beneficial results or no improvement in the outcomes; the possibility of clinical benefit needs to explore further before recommending HBOT as a practice.

Blood Pressure
- In patients with AIS, early treatment of hypertension is indicated when required by co-morbid conditions (e.g., concomitant acute coronary event, acute heart failure, aortic dissection, post thrombolysis sICH, or preeclampsia/eclampsia). Lowering BP initially by 15% is probably safe.
In patients with BP <220/120 mm Hg who did not receive IV alteplase or EVT and do not have a co-morbid condition requiring acute antihypertensive treatment, initiating or reinitiating treatment of hypertension within the first 48 to 72 hours after an AIS is not effective to prevent death or dependency.

In patients with BP ≥220/120 mm Hg who did not receive IV alteplase or EVT and have no co-morbid conditions requiring acute antihypertensive treatment, the benefit of initiating or reinitiating treatment of hypertension within the first 48 to 72 hours is uncertain. It might be reasonable to lower BP by 15% during the first 24 hours after onset of stroke.

Although no solid data are available to guide selection of medications for BP lowering after AIS, the antihypertensive medications and doses included.

Starting or restarting antihypertensive therapy during hospitalization in patients with BP >140/90 mm Hg who are neurologically stable is safe and is reasonable to improve long-term BP control unless contraindicated.

Hypotension and hypovolemia should be corrected to maintain systemic perfusion levels necessary to support organ function.

Rehabilitation

It is recommended that early rehabilitation for hospitalized stroke patients be provided in environments with organized, inter professional stroke care.

It is recommended that stroke survivors receive rehabilitation at an intensity commensurate with anticipated benefit and tolerance.

High-dose, very early mobilization within 24 hours of stroke onset should not be performed because it can reduce the odds of a favourable outcome at 3 months.

It is recommended that all individuals with stroke be provided a formal assessment of their activities of daily living and instrumental activities of daily living, communication abilities, and functional mobility before discharge from acute care hospitalization and the findings be incorporated into the care transition and the discharge planning process.

A functional assessment by a clinician with expertise in rehabilitation is recommended for patients with an acute stroke with residual functional deficits.

The effectiveness of fluoxetine or other selective serotonin reuptake inhibitors to enhance motor recovery is not well established.
Secondary Prevention
The Framingham Heart Study and other international prospective epidemiological studies identified the major atherogenic risk factors for stroke as hypertension, diabetes mellitus, hyperlipidaemia, and smoking. Based on the results of a case-control study in the West Central India, diabetes mellitus, hypertension, tobacco use and low haemoglobin were the main risk factors for ischemic stroke. Secondary prevention includes measures to reduce the risk of recurrence of stroke in patients who have had TIA or stroke. The following risk factors should be evaluated within one week of the onset of acute phase:

- Hypertension
- Diabetes mellitus
- Smoking
- Carotid artery stenosis (for those with no disabling stroke)
- Atrial fibrillation or other arrhythmias
- Structural cardiac disease
- Investigation of rare causes in the absence of above mentioned risk factors

The secondary prevention measures include, but are not limited to.

- Anti-platelet therapy for all patients with established non-cardiac causes of ischemic stroke unless there is an indication of anticoagulation, including aspirin, or combination of aspirin and dipyridamole or clopidogrel etc.
- Oral anticoagulation for patients with ischemic stroke associated with mitral wall disease, prosthetic heart valves, or within 3 months of myocardial infarction.
- NOACs should be preferred over VKAs in cases of nonvalvular atrial fibrillation.
- Lowering of blood pressure for all patients using diuretics or combination of diuretics and an angiotensin converting enzyme inhibitor.
- Carotid intervention along with other secondary measures.
- Lipid lowering therapy including use of statins Not all stroke patients may be good candidates for all of the secondary prevention measures due to contradicting conditions and hence one or more of these measures need to be implemented on case- to-case basis. Long-term management of lifestyle risk factors and adherence to recommended medications (particularly in relation to the management of hypertension, cholesterol, and diabetes), carotid artery surgery and antiplatelet therapies are essential for effective secondary stroke prevention.\[^{21}\]
Lifestyle Measures
The following lifestyle measures can aid in timely recovery as well as secondary prevention of stroke.\cite{22}
- Regular exercise.
- Smoking cessation and avoiding environmental smoke.
- No alcohol or remaining within safe drinking limits.
- Effective weight loss with Use of low fat dairy products and products based on vegetable and plant oils, and reduction of red meat intake.
- Reduction of salt intake.

Flow Chart to Approach the Optimized Treatment of Ais
2. OBJECTIVE

- **Primary objective**
  - The aim of the study is to evaluate the treatment given for acute ischemic stroke with context of AHA/ASA guidelines and ISA consensus statement.
  - To discuss the management strategies of blood pressure in AIS.

- **Secondary objective**
  - To determine whether anti-hypertensive agent’s drug treatment reduces the risk for stroke.
- To evaluate the treatment given, by analysing the appropriateness of prescription with reference to
  - Drug interactions
  - Concomitant drugs

3. REVIEW OF LITERATURE

POWERS et al. provided the guidelines approved by the American heart association science advisory & coordinating committee. Under the title 2018 guidelines for the early management of patients with AIS. A guidelines for healthcare professionals from the American heart association/America stroke association (AHA/ASA), reviewed for evidence based integrity & endorsed by the American association of neurological surgeons and congress of neurological surgeons. The purpose of these guidelines is to provide up-to-date comprehensive set of recommendations for clinicians caring for the adults with arterial ischemic stroke in a single document which includes the complete management of AIS.[16]

ISA: Consensus Statement recommendations for the early management of acute ischemic stroke: a consensus statement for health care professionals from the Indian stroke association, it provides the complete information about the stroke and its treatment along with the preventive measures to be taken. These are followed by the Indian health care professionals along with AHA/ASA guidelines for the treatment of acute ischemic stroke.[14]

Thomas Brott et al. discussed about the treatment of acute ischemic stroke that intravenous thrombolysis with tPA is safe and improve outcome if treatment is initiated within three hours after the onset of symptoms. Intra-arterial revascularization may provide more complete restitution of flow in the middle cerebral artery than intravenous thrombolytic therapy. It improves outcome if undertaken within first 6 hours after the onset of symptoms.[23]

Alfonso Ciccone et al. randomly assigned 362 patients with AIS within 4.5 hours after onset to endovascular therapy (I.A + rtPA). A total of 181 patients were assigned to receive endovascular therapy & 181 intravenous tPA with a median time of 3.75 hours for endovascular and 2.75 hours for intravenous rtPA and concluded that endovascular therapy is not superior to standard treatment with intravenous rtPA.[24]

Werner Hacke et al. conducted a double blind parallel group trail and studied a total of 821
patients in which 418 are randomly assigned to the alteplase group and 403 to the placebo group. And concluded that intravenous alteplase administered between 3 & 4.5 hours after the onset of symptoms significantly improved clinical outcomes in patients with AIS. Alteplase was more frequently associated with symptomatic intracranial hemorrhage.\(^{[25]}\)

**G. Turc et al.** discussed the intravenous thrombolysis treatment for acute ischemic stroke and concluded that IVT with alteplase within 4.5 hours after onset is currently the only treatment proven to be clinically effective and which is usually approved for the management of the condition. It allows an approximately 10% absolute reduction in the risk of disability or death at 3 months despite a 2-7% risk of sICH. The contribution of additional endovascular therapy or next-generation thrombolytics will need to be determined.\(^{[26]}\)

**THOMAS HILLEN et al.** conducted a cohort of 457 patients with ischemic stroke, 393 (86.0%) were considered appropriate for anti-platelet medication, 32 (7.0%) for anticoagulant medication, and 254 (55.9%) for antihypertensive medication. The rates of non-treatment observed 3 months after the event were 24.4% for anti-platelet, 59.4% for anticoagulant, and 29.5% for antihypertensive medication. And concluded that Secondary prevention for a common disease such as stroke appears to be inadequate in the study area. Healthcare professionals need to consider antithrombotic and antihypertensive therapies for all stroke patients.\(^{[27]}\)

**HATCHER MA, et al** Ann pharmacother 2011, evaluated the literature regarding the use of intravenous tissue plasminogen activator (tPA) in the treatment of acute ischemic stroke, focusing on the usage criteria and administration time window and concluded that tPA is effective when administered up to 4.5 hours after ischemic stroke symptoms onset.\(^{[28]}\)

**Appleton JP, et al.** conducted a systematic review on study of blood pressure management in acute stroke which includes the data collected from many randomized trails. And clinical trials which has focused on whether aiming for a BP target in acute stroke, regardless of the agents used, improve outcome. They discussed all use of anti-hypertensive drugs. They concluded that despite the recent publication of several large clinical trials and systematic reviews there are no definitive recommendation that can be drawn regarding BP modulation in AIS. Antihypertensive drugs should be withheld after stroke until they can be given safely in patients who are neurologically stable. Early nitrates use in stroke subtypes are safe and associated with improved functional outcome. Whether there effects are medicated through
BP reduction specific pharmacological effects incorporating neuroprotection and/or reperfusion is unclear.\[^{29}\]

**Ritvij Bowry, et al.** discussed, the need for rapid BP control in both AIS and ICH often require IV agents. Such agents should be rapidly acting be easy to titrate, and have few side effects and short half life in which they mentioned when thrombolysis is not an option acute management of BP is a balancing act. And rapidly lowering BP to <140/90 mm hg. Is safe and may be associated with improved cardio graphic and clinical outcome some commonly used IV medications are nicardipine, nitroglycerine, enalapril, and sodium nitropruside.\[^{30}\]

**Nizam Ahmed, et al.** conducted a multivariable analysis and prospectively recorded 11080 treatment within 4 years. BP values were recorded based on this largest database they concluded that the groups with and without a history of hypertension and anti hypertensive treatment were imbalanced in baseline. And their results suggested a more active BP lowering approach early after intravenous thrombolysis.\[^{31}\]

**Gardian J Hubert, et al.** discussed about the management of blood pressure in acute ischemic stroke that there are vast divergent results which appears to differ in various patient population. The effect might be dependent on level of initial blood pressure, time of treatment, stroke severity, and history of hypertension, as well as intensity of blood pressure lowering. He concluded that moderate reduction in BP seems to be safe and even protective. Magnesium reduced BP within 24hrs by 4/3 mm hg and showed a benefit for those with higher BP. So, the rapid reduction does not seen to be dangerous, as long as reduction is moderate.\[^{32}\]

**Keun-sik Hong** conducted a multiple epidemiological studies showed that high BP was associated with an increased risk of stroke mortality and confirmed that BP lowering for the prevention of stroke and major cardio vascular events. Among several anti hypertensive classes which one is better for stroke prevention is still less clear, and adequate BP lowering is of great importance and regarding intensive or less intensive or less intensive BP lowering for primary stroke prevention, accumulated guidelines, favour intensive lowering.\[^{33}\]

**Aiyagari, et al.** discussed the management of blood pressure in acute ischemic stroke and added the AHA/ASA recommendations for BP management in acute ischemic stroke. That before intravenous thrombolytic treatment, BP should be lowered if >185 mm hg systolic or
>110 mm hg diastolic. After thrombolytic treatment SBP should be kept <180 mm hg and DBP <105 mm hg. Intravenous labetalol, nitroparte, nicardipine infusion and if BP remains elevated, sodium nitropruside are the recommended agents. Also suggested that with holding antihypertensive agents in there patients unless the DBP is >120 mm hg or the SBP is >220 mm hg and limiting the drop in BP during the first 24 hours by approximately 15%.[34]

Shane Guillory Discussed the management with co-morbidities that the stroke patients co-morbid conditions influence choice of antihypertensive agent both in the acute and long term setting. For most patients the recommendation of the joint national committee on prevention, detection, evaluation & treatment of high BP would apply. For diabetic patients ACE inhibition or ARBS for long-term B.P control & in primary lung disease. Avoid beta-blocking agents in reactive airway disease.[35]

MT mullen, et.al discussed the blood pressure management in acute stroke by collected database from various research articles and clinical trials. The evidence against treating hypertension in acute ischemic stroke in which low BP decreases cerebral perfusion and may potentiate infraction in the ischemic penumbra and several clinical trials have found an association between anti-hypertensive therapy in acute stroke and worse outcome. The beta-blocker stroke trial looked at low dose beta- blockade in acute stroke was stopped because of an increased risk of death. Meta-analysis of calcium channel blockers in acute stroke. Evaluating 29 trials & 7665 patients found that there was no effect of treatment. Evidence in favour of treating hypertension in acute ischemic stroke. Elevated BP may increase. Cerebral oedema after an acute infraction and raise the risk of hemorrhagic conversion. Anti-hypertensive agents may limit their process. Patient who receive intravenous or intra-arterial thrombolysis are at increased risk for hemorrhage.[36]

He J, Zhang Y, Xu T, et al. conducted a randomized trail and recruited 4071 patients with AIS with raised SBP (140–220 mm Hg) within 48 hours of onset and randomized them to either BP lowering (SBP 10–25% reduction within 24 hours and BP <140/90 mm Hg within 7 days) or control (no antihypertensive medication). Although a specific BP-lowering regimen was not being assessed, they suggested first-line (intravenous ACEi), second-line (oral CCA) and third-line (oral diuretic) medications. Mean SBP fell by 13% within 24 hours of randomization in the treatment group, compared with 7% in the control population. At 7 days, mean SBP in the treatment and control arms was 137 and 147 mm Hg respectively. The primary outcome of mRS ≥3 at 14 days or hospital discharge and secondary outcome of mRS
at day 90 were neutral. A subgroup analysis of time to treatment found that those randomized to BP lowering 24 hours or longer after ictus had a significant reduction in death or dependency at 3 months (OR 0.73, 95% CI 0.55 to 0.97, p=0.03).\textsuperscript{37}

Jose Cartillo et al. conducted a study on the relation between blood pressure (BP) and stroke outcome have shown contradictory results. They explored the association of systolic (SBP) and diastolic (DBP) BP during acute stroke with early neurological deterioration, infarct volume, neurological outcome, and mortality at 3 months. They included 304 patients with acute ischemic stroke. SBP and DBP on admission and on the first day were the average values of all readings obtained in the emergency department and during a 24-hour period after patient allocation in the stroke unit. A U-shaped effect was observed for every 10 mm Hg 180 mm Hg of SBP, the risk of early neurological deterioration, poor outcome, and mortality increased by 6%, 25%, and 7%, respectively, whereas for every 10 mm Hg > 180 mm Hg, the risk of early neurological deterioration increased by 40% and the risk of poor outcome increased by 23%, with no effect on mortality. Mean infarct volume increased 7.3 and 5.5 cm\textsuperscript{3} for every 10 mm Hg ≤ 180 and 180 mm Hg. A similar pattern was found in patients with DBP ≤ 100 or 100 mm Hg. These effects disappeared after adjustment for the use of antihypertensive drugs and BP drop >20 mm Hg within the first day, with the latter being the more important prognostic factor of poor outcome. And concluded that high and low SBP and DBP, as well as a relevant drop in BP, are associated with poor prognosis in patients with ischemic stroke.\textsuperscript{38}

4. METHODOLOGY

4.1 Duration of study

The study was conducted for a period of 6 months.

4.2 Site of the study

Study was conducted at tertiary care hospital. It is 500-bedded tertiary hospital having different specialities like medicine, surgery, orthopaedics, paediatrics, obstetrics and gynaecology.

4.3 Study design

A hospital based prospective study.
4.4 Size of study
Study was conducted in 140 patients.

4.5 Sources of data and materials
- Patient case sheet

4.6 Study Criteria
Inclusion Criteria
All the inpatient and outpatient in hospital who are treated for acute ischemic stroke in Tertiary care hospital.

Exclusion Criteria
- Psychiatric patient
- Children
- Pregnancy

4.7 Study Procedure
Eligible patients were enrolled based on inclusion and exclusion criteria. Structured data collection was used for collecting the details. This form mainly contains demographic details, social habits, current medication, past medical and medication history, laboratory investigations, and other relevant data needed for present study were collected from patient’s progress records, treatment chart, and laboratory reports.

The data collected are subjected to compare with the guidelines of AHA/ASA and for various drug-drug interaction and ADR by using, primary (Micromedex), secondary and tertiary resources which are available in clinical pharmacy department. The collected information was documented and subjected for assessment using suitable statistical method.

Statistical Methods: Descriptive statistical analysis has been carried out in the present Study. Simple percentage calculations were used and expressed using charts and graphs.
4.8 Study Flow Chart

```
4. Obtaining Permission From Human Ethical Clearance Committee
3. Data Collection Using Structured Data Entry
2. Statistical Analysis of Data
1. Conclusion of Analysed Data
5. Result Were Recorded And Interpretation Were Made
```

5. RESULT AND INTERPRETATION

We had done analysis in 140 cases in tertiary care hospital in that

<table>
<thead>
<tr>
<th>Gender</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>MALE</td>
<td>85</td>
</tr>
<tr>
<td>FEMALE</td>
<td>55</td>
</tr>
</tbody>
</table>

140 cases were examined in tertiary care hospital among that 60.71 % male and 39.29 % female (Figure 1).

![Gender Distribution](image)

Figure 1: Male and Female Patients.
Table 2: Number of Patients Admitted to Hospital.

<table>
<thead>
<tr>
<th>AGE</th>
<th>MALE</th>
<th>FEMALE</th>
</tr>
</thead>
<tbody>
<tr>
<td>30-40</td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td>41-50</td>
<td>5</td>
<td>7</td>
</tr>
<tr>
<td>51-60</td>
<td>24</td>
<td>8</td>
</tr>
<tr>
<td>61-70</td>
<td>31</td>
<td>19</td>
</tr>
<tr>
<td>71-80</td>
<td>16</td>
<td>8</td>
</tr>
<tr>
<td>&gt;80</td>
<td>8</td>
<td>11</td>
</tr>
</tbody>
</table>

- Accompanying major age group having AIS is 60-70 years i.e. 39.65% and 50-60 yrs. i.e. 22.85% (figure 2).

Figure 2: No of Patients Admitted To Hospital.

Table 3: Alcoholic and Smoker Patients.

<table>
<thead>
<tr>
<th>Nature of patients</th>
<th>Number</th>
<th>Percentage %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alcoholic</td>
<td>34</td>
<td>24.3%</td>
</tr>
<tr>
<td>Smoker</td>
<td>49</td>
<td>35%</td>
</tr>
<tr>
<td>Non Alcoholic and Non Smoker</td>
<td>57</td>
<td>40.7%</td>
</tr>
</tbody>
</table>

- In 140 patients 24.3% of patient was found to be smoker, 35% alcoholic. (Figure 3)

Figure 3: Alcoholic and Smoker Patients.
Table 4: Comorbidity.

<table>
<thead>
<tr>
<th>S.no</th>
<th>Comorbidity</th>
<th>No. Of Patients</th>
<th>Percentage %</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>AIS+HTN+DM+OTHERS</td>
<td>53</td>
<td>37.85%</td>
</tr>
<tr>
<td>2</td>
<td>AIS (ONLY)</td>
<td>19</td>
<td>13.57%</td>
</tr>
<tr>
<td>3</td>
<td>AIS+HTN</td>
<td>19</td>
<td>13.57%</td>
</tr>
<tr>
<td>4</td>
<td>AIS+DYSPLIPIDEMIA</td>
<td>14</td>
<td>10%</td>
</tr>
<tr>
<td>5</td>
<td>AIS+DM</td>
<td>12</td>
<td>8.57%</td>
</tr>
<tr>
<td>6</td>
<td>AIS+CAD</td>
<td>11</td>
<td>7.85%</td>
</tr>
<tr>
<td>7</td>
<td>AIS+AF</td>
<td>8</td>
<td>5.71%</td>
</tr>
<tr>
<td>8</td>
<td>AIS+MI</td>
<td>4</td>
<td>2.85%</td>
</tr>
</tbody>
</table>

Regarding co-morbidity, 37.85% of patients had AIS, HTN, DM and OTHERS & 13.75% patients had AIS and HTN.

Table 5: DRUG THERAPY.

<table>
<thead>
<tr>
<th>S.NO</th>
<th>THERAPY</th>
<th>NUMBER</th>
<th>PERCENTAGE %</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>INTRAVENOUS t-PA</td>
<td>10</td>
<td>7%</td>
</tr>
<tr>
<td>3</td>
<td>Endovascular Treatment</td>
<td>38</td>
<td>27%</td>
</tr>
<tr>
<td>4</td>
<td>Supportive Therapy</td>
<td>92</td>
<td>66%</td>
</tr>
</tbody>
</table>

Figure 4: Co-Morbidity of Acute Ischemic Stroke.

Figure 5: Drug Therapy Used In Treatment.
From our analysis, intravenous t-PA was given for 7% patients who were eligible. Patients who were not eligible were underwent endovascular treatment 27%. Patients eligible for intra-arterial t-PA 23%. Patients eligible for mechanical thrombectomy 4%. Lipid lowering agents were prescribed to rest of the patients 66%. Drugs used are

**Atorvastatin and Rosuvastatin**
Supportive care was carried out for all the patients with combination of dual anti- platelet therapy, anti-coagulant therapy and neuroprotective agents.

Anti- platelet drugs given are ASPIRIN and CLOPIDOGREL.

Anti-coagulant drugs given are ENOXAPARIN and WARFARIN.

Neuroprotective agents were prescribed for most of the patients for fast recovery

**Citocline, Levetriacetam And Edavarone**

**Table 6: Drugs prescribed.**

<table>
<thead>
<tr>
<th>SL.NO</th>
<th>DRUGS</th>
<th>NO. OF PRESCRIPTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Alteplase</td>
<td>30</td>
</tr>
<tr>
<td>2</td>
<td>Tenecteplase</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>Aspirin</td>
<td>93</td>
</tr>
<tr>
<td>4</td>
<td>Clopidogrel</td>
<td>62</td>
</tr>
<tr>
<td>5</td>
<td>Atorvastatin</td>
<td>92</td>
</tr>
<tr>
<td>6</td>
<td>Rosuvastatin</td>
<td>4</td>
</tr>
<tr>
<td>7</td>
<td>Enaxoparin</td>
<td>72</td>
</tr>
<tr>
<td>8</td>
<td>Warfarin</td>
<td>2</td>
</tr>
<tr>
<td>9</td>
<td>Citicoline</td>
<td>57</td>
</tr>
<tr>
<td>10</td>
<td>Levetriacetam</td>
<td>31</td>
</tr>
<tr>
<td>11</td>
<td>Edavarone</td>
<td>15</td>
</tr>
</tbody>
</table>

**MANAGEMENT OF BLOOD PRESSURE**

**Table 7: Blood Pressure Range In Patients.**

<table>
<thead>
<tr>
<th>Blood pressure</th>
<th>No.of patients</th>
<th>Percentage%</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;120</td>
<td>14</td>
<td>10%</td>
</tr>
<tr>
<td>121-140</td>
<td>25</td>
<td>18%</td>
</tr>
<tr>
<td>141-160</td>
<td>56</td>
<td>40%</td>
</tr>
<tr>
<td>161-180</td>
<td>28</td>
<td>20%</td>
</tr>
<tr>
<td>181-200</td>
<td>9</td>
<td>6%</td>
</tr>
<tr>
<td>201-220</td>
<td>7</td>
<td>5%</td>
</tr>
<tr>
<td>&gt;220</td>
<td>1</td>
<td>1%</td>
</tr>
</tbody>
</table>
Of 140 cases analysed the blood pressure range were recorded as given in FIGURE 6. BP ranging from 141-160 & 161-180 were seen highest with 40% & 20% respectively.

Table 8: Use of Anti-Hypertensive Drugs.

<table>
<thead>
<tr>
<th>Type of drug</th>
<th>No: of Patients</th>
<th>Percentage %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amlodipine</td>
<td>9</td>
<td>8%</td>
</tr>
<tr>
<td>Atenolol</td>
<td>4</td>
<td>3%</td>
</tr>
<tr>
<td>Cilnidipine</td>
<td>6</td>
<td>5%</td>
</tr>
<tr>
<td>Clonidine</td>
<td>9</td>
<td>8%</td>
</tr>
<tr>
<td>Labetolol</td>
<td>21</td>
<td>19%</td>
</tr>
<tr>
<td>Losartan</td>
<td>2</td>
<td>2%</td>
</tr>
<tr>
<td>Metaprolol</td>
<td>8</td>
<td>7%</td>
</tr>
<tr>
<td>Nicardipine</td>
<td>3</td>
<td>3%</td>
</tr>
<tr>
<td>Nifedipine</td>
<td>27</td>
<td>24%</td>
</tr>
<tr>
<td>Nebivolol</td>
<td>2</td>
<td>2%</td>
</tr>
<tr>
<td>Prazosin</td>
<td>10</td>
<td>9%</td>
</tr>
<tr>
<td>Ramipril</td>
<td>1</td>
<td>1%</td>
</tr>
<tr>
<td>Telmisartan</td>
<td>10</td>
<td>9%</td>
</tr>
</tbody>
</table>
In the management of blood pressure NIFEDIPINE, LABETOLOL and Telmisartan are prescribed with 24%, 19% & 9% respectively.

Figure 7: Use of Anti-Hypertensive Drugs.

### DRUG INTERACTIONS

<table>
<thead>
<tr>
<th>Drugs</th>
<th>Interacting Drugs</th>
<th>Effect</th>
<th>No. Of Patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Atorvastatin</td>
<td>Pantoprazole</td>
<td>Pantoprazole increases blood level or effect of Atorvastatin</td>
<td>11</td>
</tr>
<tr>
<td>Atorvastatin</td>
<td>Nifedipine</td>
<td>Increases risk of side effects like liver damage</td>
<td>7</td>
</tr>
<tr>
<td>Glimepiride</td>
<td>Sitagliptin</td>
<td>Increases risk of hypoglycaemia</td>
<td>2</td>
</tr>
<tr>
<td>Metformin</td>
<td>Nifedipine</td>
<td>Increases blood levels of Atorvastatin and side effects</td>
<td>4</td>
</tr>
<tr>
<td>Clopidogrel</td>
<td>Atorvastatin</td>
<td>Atorvastatin decreases level or effect of Clopidogrel</td>
<td>5</td>
</tr>
<tr>
<td>Telmisartan</td>
<td>Aspirin</td>
<td>Aspirin decreases effect of Telmisartan &amp; may effect kidney function</td>
<td>2</td>
</tr>
</tbody>
</table>

Table 9: Drug Interaction.
In 140 prescription 22.14% of prescription have interaction among prescribed drugs while 77.86% prescription were without drug interaction.

![Drug Interaction Chart]

**Figure 8: Drug Interaction.**

<table>
<thead>
<tr>
<th>Prescription Status</th>
<th>NO. OF PRESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prescription Adherence</td>
<td>104</td>
</tr>
<tr>
<td>Prescription Non-Adherence</td>
<td>36</td>
</tr>
</tbody>
</table>

In 140 prescriptions 74% of prescriptions were adhered with drug treatment while 26% were deviated.

![Prescription Adherence Chart]

**Figure 9: Prescription Adherence.**

4. DISCUSSION

The results of our study suggest that acute ischemic stroke is more prevalent in Male patients (60.71%) than Female counterparts (39.29%).

Our finding, provide direct evidence of an increasing burden of acute ischemic stroke...
especially among the elder aged population. Prevalence of AIS was found to be 35.65% had suffered from AIS within the age of 61-70 years and 23.14% of 50-60 years.

Our study shows that around 35% of patient had smoking habits and 24.3% have alcoholic behaviour which can be determined as well established risk factor of AIS.

Our study also show that disease condition i.e. co-morbidity affect the prevalence of AIS, 37.85% of patients were suffered from AIS with HTN, DM & OTHERS, 13.57% are having AIS with HTN and 10% are having AIS with Dyslipidemia.

In our analysis of treatment of AIS, we recognised that most hypertensive patient require single hypertensive drug to control BP, 26% of cases were treated with combination therapy and 74% were treated by monotherapy. In monotherapy Nifedipine, Labetolol and Telmisartan are major drug use. For combination therapy, prescriber prescribe, Amlodipine, Prazosin, cilnidipine. The most of the cases were treated with mono therapy.

In 140 prescriptions 22.14% of prescriptions had interaction among prescribed drugs while 77.85% prescriptions were without drug interaction. Major drug interaction was found in between ATORVASTATIN with NIFEDIPINE as these two drugs were administered in same time period.

IN 140 prescriptions 74% of prescriptions were adhered with drug treatment based on guidelines while 26% were deviated. In our analysis of treatment of AIS along with DM and HTN, patient were treated with thrombolytic (Alteplase) and anti-platelet (Aspirin) drugs, Oral hypoglycaemic drugs (Metformin, Sitagliptin) and CCB (Nifedipine) as combination therapy whereas AIS along with Dyslipidemia were treated with anti-platelet drugs (Aspirin/Clopidogrel), anti-coagulant drugs (Enoxaparin), neuroprotective drugs (citicoline, levetiracetam) and lipid lowering drugs (Atorvastatin). Non adherence was mostly found on prescription with Alpha blockers where prescriber prescribe without indication.

8. SUMMARY

Intravenous thrombolysis with alteplase is the mainstay medical treatment for acute ischemic stroke (AIS). While antiplatelet therapy with aspirin (acetylsalicylic acid) has been shown to decrease the risk of early recurrent stroke when initiated within 48 hours of ischemic stroke onset, it does not actually treat the stroke that has already occurred. Newer antiplatelet agents, alone and in combination with aspirin, have shown promising results for further prevention of
early recurrence, and clinical trials are ongoing. Acute therapeutic anticoagulation with unfractionated heparin (UFH) and low molecular weight heparin (LMWH) administered to unselected patients have not demonstrated clinical benefits in the acute ischemic stroke setting over antiplatelet agents.

Prevalence shows more male suffered from AIS and age group of 60-70 years.

Our study revealed that existing drug therapy was not ideal individually and so optimization of therapy is needed in large proportion of patients. Supportive therapy was given among 74% of patients.

The choices of drugs were irrational and 22.14% prescriptions were found with drug interaction and 74% prescriptions were prescribed according to the guidelines of AHA/ASA.

Summarily, 140 cases were evaluated for the prospective study of treatment for acute ischemic stroke and blood pressure management in a tertiary care hospital.

CONCLUSION
In India, thrombolysis is not possible in majority of patients due to delay in reaching hospital, no early access to scanning facility, lack of infrastructure, and high cost required for thrombolytic and/or endovascular therapy. Thus, for patients who reach after 6 hours of acute ischemic stroke, only supportive treatment is offered. This creates the scope for research on adjuvant therapy, which may help to improve stroke outcome. A 26% deviation from guidelines was observed in the treatment was observed with respect to Selection of antiplatelet, anti-coagulant, thrombolytic and anti hypertensive drugs for management of acute ischemic stroke, for management of the blood pressure NIFEDIPINE and LABETALOL are associated with better clinical outcome. Use of anti-hypertensive drugs doesn’t show much benefit. Concomitant drugs used are reported to the study department and suggestions were given. No errors were observed with respect to ADR. Around 22.14% prescriptions had DI and reported to the study department.

SUGGESTION
• All the prescriptions need to follow AHA/ASA guidelines & ISA consensus statement for optimization of therapy to attain better clinical outcome.
• Interacting drugs should be taken into consideration while prescribing.
• Patients should be counselled for non-pharmacological treatment and medical adherence.
Future Plan

- Pharmacoeconomic evaluation studies can also be done.
- In future a long time study with more number of patients has to be carried out.

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