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Editorial

Stroke management: An overview

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Cerebrovascular disorders are one of the leading causes of disability and mortality. According to WHO stroke is defined as “rapidly developed clinical signs of focal (or global) disturbance of cerebral function, lasting more than 24 hours or leading to death, with no apparent cause other than of vascular origin”. The lifetime risk of developing stroke is one in five for women and one in six for men and increases with advancing age. Stroke is the second most common cause of death worldwide, preceded only by ischemic heart disease, and the third most common cause of disability. In India, the significant rise in the incidence of stroke in the last decade can be attributed to various socio-economic changes that resulted in altered lifestyle with restricted physical activity, excessive intake of processed food and increased stress at work place leading to enhanced development of risk factors including type-2 diabetes, hypertension, obesity and hyper-lipedema. Ischemic stroke is the most common accounting for around 80% of total stroke cases in India. Around 10% to 15% of all strokes occur in the young affecting people below 40 years. Dalal et al. reported a crude prevalence rate of 200 per 100,000 population., based on community survey data for ‘hemiplegia’ caused by stroke from different regions of India. Dr MV Padma Shrivastav, Head, Neurosciences Centre, AIIMS, New Delhi, India says “ stroke has become the 5th leading cause of death in 2016 from 12th cause in 1996 and claims 119-145 lives in every 1,00,000 population

which is almost a 100% increase. Attempt to reduce the stroke burden in India with a large population of 1.3 billion across a number of states, inequalities of health indices and infrastructure and also varying diverse cultural ethos, is an extremely challenging and arduous task. To minimize the detrimental effect of stroke on the health status of the population, awareness should be created among community regarding preventable risk factors of stroke.

In India, the Indian Global Burden of Disease Study 1990–2019 estimated that stroke was the largest contributor to disability adjusted life years (DALYs), and a chief contributor to deaths caused by neurological disorders. The total neurological disorder DALYs contributed by stroke was determined to be 37.9% (95% uncertainty interval 29.9–46.1). The Global Burden of Diseases, Injuries, and Risk Factors Study (GBD) 2019 indicated that the vast proportion of stroke burden is borne by low and middle-income countries, with the age standardized death rates and DALYs being four times higher in World Bank low-income countries. A global systematic review of population-based stroke studies has documented that the incidence rate of stroke in LMICs has increased from 56/100,000 person-years during 1970-1979 to 117/100,000 person-years during the period 2000-2008. This study has also reported a decrease in the stroke incidence from 163 per 100,000 person-years in 1970-1979 to 94 per 100,000 person-years during 2000-2008 in high-income countries (HICs) indicating approximately 42 per cent decrease in stroke incidence in HICs and more than double increase in

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stroke incidence in LMICs, during the past four decades.

Specifically, among younger patients, the epidemiological trends are highly concerning. Between 1990 and 2013, an increase in prevalence of cases, deaths and DALYs was observed among younger adults aged 20–64 years. An absolute increase in stroke deaths by 36.7% [95% UI, 26.3–48.5] among younger adults was observed in developing countries, compared to declining trends in developed countries. These numbers are alarming, considering that a large magnitude of stroke burden is borne by developing countries.

The lifetime risk of developing stroke is one in five for women and one in six for men and increases with advancing age.

Major Risk Factors of Stroke

For prevention, it is important to identify risk factor for stroke. Some recognized risk factors are:

Well documented modifiable risk factors

1. Hypertension
2. Diabetes Mellitus
3. Dyslipidemia
4. Obesity and Body fat distribution
5. Physical inactivity
6. Tobacco use
7. Structured cardiac diseases such as rheumatic valve disease
8. Atrial fibrillation
9. Sickle cell disease
10. Carotid stenosis
11. Excessive Alcohol consumption
12. Unhealthy diet and nutrition

Less – well documented modifiable risk factors

1. Migraine
2. Metabolic Syndrome
3. Drug Abuse
4. Obstructive Sleep apnea
5. Hyperhomocysteinemia
6. Hypercoagulability
7. Elevated Lp (a)
8. Inflammation and Infection

Non-modifiable risk factors

1. Genetic factors
2. Increasing age
3. Low birth weight
4. Race/ethnicity
5. Low socio-economic status
6. Male gender

Types of strokes

Ischemic stroke: Account for 80%. Results from occlusion in the blood vessel supplying the brain. **Thrombotic:** Occlusion due to atherothrombosis of small/large vessels supplying the brain. **Embolic:** Occlusion due to embolus arising either from heart (e.g. atrial fibrillation, valvular disease) or blood vessel

Hemorrhagic stroke: Account for 20%. Results from rupture of blood vessels leading to bleeding in brain. **Intracerebral:** Bleeding within the brain due to rupture of small blood vessels. Occurs mainly due to high blood pressure.

Subarachnoid: Bleeding around the brain; commonest cause is rupture of aneurysm.

Other causes: Head injury

Stroke: Symptoms, Onset of stroke symptoms varies as per type of stroke

Thrombotic stroke: Develop more gradually.

Embolic stroke: Hits suddenly.

Hemorrhagic stroke: Hits suddenly and continues to worsen.

Stroke: Symptoms

Dizziness.

Confusion.

Loss of balance/coordination.

Nausea/vomiting Numbness/weakness on one side of the body.

Seizure.

Severe headache.

Movement disorder/speech disorder/blindness etc (depending on the area of brain affected).

Additional symptoms for hemorrhagic stroke.

Pain upon looking at or into light.

Painful stiff neck.

People may also experience “silent strokes” with no symptoms

A silent stroke is a stroke which causes brain damage, but does not exhibit classic symptoms of stroke. They are detected only when a person undergoes a brain scan.

Transient Ischemic Attack (TIA)

“Mini stroke”

Stroke symptoms last for less than 24 hours (usually 10 to 15 minutes)

Result as a brief interruption in blood flow to brain.

Every TIA is an emergency.

TIA may be a warning sign of a larger stroke.

Patients with possible TIA should be evaluated by a physician.

Diagnosis of acute ischemic stroke

Physical examination: For carotid bruits.

Brain imaging (cranial CT and/or MRI): Detect small vessel disease. Helps to effectively discriminate between ischemic and hemorrhagic stroke, and stroke from brain tumors.

Doppler ultrasonography/Angiography: Detect large vessel atherosclerosis.

ECG/Echocardiography: Detect cardiac embolism.

Exclusion of conditions mimicking stroke (hypoglycemia, migraine, seizure).

Emergency Medical Care for Neurologic Emergencies

Provide reassurance.

Ensure proper airway and breathing.

Place the patient in a position of comfort.

If you suspect stroke, transport immediately and notify hospital.

Assess and care for any injuries if you suspect any type of trauma.

Management of acute ischemic stroke

Patients with acute stroke needs emergency evaluation and management as “Time is Brain”. With each passing minute, more neurons become non- salvageable in ischemia.

Systemic thrombolysis

Intravenous recombinant tissue plasminogen activator (rt-PA): Within 3 hrs of onset of stroke. Dose 0.9 mg/kg, max 90 mg.

Antiplatelet agents: Aspirin 75-325 mg (not during first 24hrs following thrombolytic therapy). Clopidogrel 75mg, a potential alternative or a combination of clopidogrel and aspirin .

Anticoagulants: Heparin/LMWH are not recommended in acute treatment of ischemic stroke. Recommended in setting of atrial fibrillation, acute MI risk, prosthetic valves, and coagulopathies and for prevention of DVT.

Intra-arterial thrombolytics: An option for treatment of selected patients with major stroke of < 6 hrs duration due to large vessel occlusion.

BP management: Should be kept within higher normal limits since low BP could precipitate perfusion failure. Markedly elevated BP (>220/110mmHg) managed with nitroglycerin, clonidine, labetalol, sodium nitroprusside. More aggressive approach is taken if thrombolytic therapy is instituted **Blood glucose management:** Should be kept within physiological levels using oral or IV glucose (in case of hypoglycemia)/insulin (in case of hyperglycemia).

Elevated body temperature management: Antipyretics and use of cooling device can improve the prognosis.

Management of acute hemorrhagic stroke

Analgesics/Antianxiety agents: To relieve headache.

Analgesics having sedative properties are beneficial for patients having sustained trauma (e.g. morphine sulphate) Antihypertensives: (e.g. sodium nitroprusside, labetalol).

Hyperosmotic agents (e.g. mannitol, glycerol, furosemide): To reduce cerebral edema, and raised intracranial pressure.

Adequate hydration is necessary.

Surgical intervention may occasionally be life saving.

Management of TIA evaluation within hours after onset of symptoms

CT scan is necessary in all patients Antiplatelet therapy with aspirin (150 mg/d), consider use of clopidogrel, ticlopidine, or aspirin-dipyridamole in patients who are intolerant to aspirin or those who experience TIA despite aspirin us

Secondary prevention of stroke

The prevention of stroke is more rewarding than treating a patient with acute stroke. Recurrence: Annual risk is 4.5 to 6%. Five year recurrence rates range from 24 to 42%; one-third occur within first 30 days, hence high priority should be given to secondary prevention.

Patients with TIA or stroke have an increased risk of MI or vascular event.

Management of hypertension (goal <140/85 mm Hg).

Diabetes control (goal <126 mg/dL).

Lipid management: Statins (goal cholesterol <200 mg/dL, LDL <100 mg/dL).

Antiplatelet agents: Aspirin (mg), clopidogrel (75 mg). A fixed dose combination of the two drug may also be used.

Anticoagulants: Warfarin (target INR 2 to 3); esp. recommended in patients with cardio-embolic stroke Appropriate life style modification (cessation of smoking, exercise, diet etc).

Surgical interventions

1. Balloon angioplasty/stenting.
2. Carotid endarterectomy/Bypass.
3. Decompressive surgery.

Challenges in delivering stroke care in India

Developing countries with limited resources including India harbor the largest proportion of the stroke patients due to the bigger share of the world population. While the incidence of stroke in India was earlier reported to be less than the developed countries, recent epidemiological studies have demonstrated that incidence and prevalence are similar. There is a global **increase in the life expectancy** including India resulting in exponential age-related increase in the stroke incidence is a major public health challenge.


The **number of qualified doctors** available in India and other developing countries to manage the patients with stroke and other neurological disorders is very low. Specialized neurological care is available only in the urban areas. **Lack of awareness about symptoms** of stroke among the people may delay in seeking medical attention. Even when the patient seeks medical attention, these episodes may be ignored or misdiagnosed as non-neurological events by the practitioner.

For patients to be eligible for the medical revascularization, they need to reach a **“stroke-ready hospital”** or hospital with established “stroke unit” early enough. Interval from entry of the patient to the emergency department and starting of the IV-tPA infusion (door-to-needle time) can be shortened if the patient directly comes to the “stroke-ready hospital” which has a round-the-clock availability for cerebral imaging and stroke team. A number of stroke-ready hospitals and those with dedicated stroke units are very few in India, and there is an urgent need to have more number of stroke units available within the reach of majority of the population.

Lack of **imaging facilities**, unavailability, and high cost of thrombolytic agent are the major hurdles in the effective management of acute ischemic stroke. Incomplete recanalization of occluded arteries with IV-tPA

led to intra-arterial tPA infusion and subsequently use of mechanical thrombectomy trials. However, **availability of endovascular therapies is limited** to larger hospitals in metropolitan cities due to the limited number of trained personnel and the required infrastructure. There is **rampant malpractice by the unqualified and self-styled stroke specialists** distributed throughout the country misguiding and mismanaging patients with stroke. The myths and lack of education about symptoms of stroke, nihilistic attitude by the patient, and caregivers about stroke recovery are an alarming challenge doctors. Many patients from rural and urban background travel long distances to alternative medical system care and often subjected to unscientific combination therapies with the combination of allopathic and alternative medications. There is an urgent need for the medical fraternity to collectively address the situation to form strategies to improve the stroke care in India.

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