

Young stroke in Bangladesh: addressing rare cases with diagnostic challenges and much-needed solutions

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ABSTRACT

Stroke is a leading cause of mortality and morbidity in Bangladesh, and young adults are increasingly affected. Common risk factors include hypertension, diabetes, dyslipidaemia, obesity and smoking, whereas rare causes include haematologic disorders, premature atherosclerosis, vasculopathy and arteritis. Treatment barriers include inadequate infrastructure, a lack of trained staff and high intervention costs. Bangladesh faces a scarcity of neurologists and well-equipped hospitals, necessitating strategies to mitigate the burden of stroke among young people. This editorial summarises the current knowledge regarding the aetiology, pathophysiology and challenges in diagnosing and treating stroke in young people in Bangladesh, while addressing rare vasculopathy. Initiatives to support young stroke survivors and their families were also discussed. Prospective cohort studies, such as the Norwegian Stroke in the Young Study, provide insights into optimising prevention and early intervention by assessing family history and subclinical vascular diseases, which have also been highlighted. Recommendations include advanced neuroimaging for risk assessment, incorporating patient care and rehabilitation into medical education, conducting relevant research and promoting healthy lifestyles through campaigns and training of the healthcare staff.

The brain and its vital blood supply, neurons with neural networks serve as a directory for nerve conduction and sensory, motor and autonomic perception of the whole body. Interruption of this outflow following trauma or spontaneously leads to cerebrovascular diseases, such as stroke, transient ischaemic attack, intraventricular haemorrhage, etc. Stroke is the most common neurological condition and the leading cause of brain damage. It is described as the sudden onset of a non-convulsive neurological deficiency caused by the interruption of cerebral circulation.¹ It affects people of all ages, ranging from paediatric to geriatric patients. According to a recent trend in the literature, people aged 18–50 years are increasingly admitted to hospitals for stroke.²

According to the latest WHO data released in 2020, stroke-related deaths account for 18.74% of all deaths in Bangladesh, with an age-adjusted death rate of 119.20 per 100 000

population.³ Along with conventional aetiologies, a small percentage of ischaemic strokes in young people are caused by heritable abnormalities of the connective tissue, isolated angiitis of the central nervous system and other genetically determined conditions.^{4,5}

The Framingham Heart Study risk assessment reported that the majority of patients (36.0%) were between the ages of 41 and 45 years, and more than 75.0% of stroke patients had some kind of heart condition.⁶ According to the Northern Manhattan Stroke Study, there are 23 strokes per 100 000 people aged 20–44 years annually. Of these, 26% had subarachnoid haemorrhage, 30% had intracerebral haemorrhage and 45% had ischaemic stroke.^{7,8} In addition to prothrombin, the G20210A and factor V Leiden mutations are inherited and acquired thrombophilias that are more common in patients with patent foramen ovale, particularly in younger patients with stroke. These mutations are most commonly found in patients with European ancestry.^{9–11} Venous clot formation is caused by an autosomal dominant deficiency in anti-thrombin III. Antiphospholipid syndrome and other connective tissue disorders, such as systemic lupus erythematosus (SLE), have doubled stroke risk in younger individuals with SLE.¹²

Bangladesh, a developing country with its low and limited resource settings, is encountering a loss of patients due to diagnostic and treatment delays, especially when dealing with rare cases of stroke and stroke mimics. Inadequate infrastructure that ensures timely treatment within critical time windows, limited availability and prohibitive costs of thrombolytic therapy, limited availability of mechanical thrombectomy devices, limited access to CT, delays in neuroimaging, and lack of trained staff and resources for interventional procedures are the main obstacles.^{1,13}

Two cases were reported at Dhaka Medical College (DMC), which were diagnosed with inherited Protein S deficiency protein S, which had been dormant previously due to



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the effect of oral contraceptive pills or pregnancy and became more pronounced and culminated in arterial stroke. Both patients presented with typical stroke manifestations such as hemiplegia and aphasia.¹⁴ Takayasu's arteritis is a type of large-vessel granulomatous vasculitis with major intimal fibrosis and vascular narrowing. The pulmonary arteries, aorta and branches are the primary organs affected.¹⁵ A case of young stroke due to Takayasu's arteritis in 2017 in Combined Military Hospital, Chittagong, depicting a cadet of 20 years who was treated with antiviral therapy for chicken pox presented with right-sided hemiplegia and impaired sensorium. After routine imaging for all possible causes, the patient was diagnosed with Takayasu's arteritis with ischaemic stroke and right-sided hemiplegia with chickenpox.¹⁶ Antiretroviral therapy acts as a trigger for oxidative stress and impaired nitric acid regulation, which could lead to endothelial dysfunction and precipitate the pathogenesis of Takayasu Arteritis.¹⁷ In 2019, the authors reported another case of a young female who presented with motor aphasia, right-sided hemiplegia and dysphagia after falling on the floor at midnight on waking. The patient was a known case of hypertension (HTN) and had a history of injectable contraceptive intake for 10 years. Eventually, cerebral angiography revealed diffuse stenosis of the proximal left MCA and obliteration of the distal MCA. She was diagnosed with moyamoya disease and acute ischaemic stroke with rectus sheath hematoma and HTN.¹⁶

In our country, rare cases, such as moyamoya disease, are often overlooked because of the lack of orientation and investigation facilities. In particular, imaging with higher accuracy in rural or semiurban areas delays diagnosis and treatment, culminating in a referral loop.¹⁸ From this discussion, each of these diagnoses identifies the need for increased knowledge to be shared regarding the causes of strokes in young people and timely treatment of these strokes. Furthermore, there are no national practices for registry maintenance or studies pertaining to juvenile strokes.¹⁹ It is time to reform the database along with young stroke statistics and specific national protocols, as the disease rate increases with change due to hereditary or acquired consequences.

Therefore, a prospective cohort follow-up based on the details of risk factors and clinical and subclinical vascular diseases is required to improve the long-term outcomes. One initiative of this type, the Norwegian Stroke in the Young Study, was started in 2010 with the goal of increasing awareness of heredity and the onset of arterial vascular disease in young patients with ischaemic stroke and their families. Additionally, reduction of stroke recurrence and other clinical arterial events, physical disability, cognitive impairment and death are the main goals for optimising stroke diagnosis, prevention and early intervention.²⁰ A subgroup analysis of this ongoing project revealed that young and middle-aged stroke patients reported a high family history of cardiovascular disease, and ischaemic stroke was associated with increased carotid intima-media thickness in patients aged <45 years.^{5 21} The author of

one study recommended public dissemination of knowledge to improve accessible tools for risk stratification and molecular research.²¹

Bangladesh can implicate the findings by starting from the family level, with a view to increasing awareness of the generation of a family history of cardiovascular events and subsequent measures to ameliorate disease inheritance. In low-resource environments, a sedentary lifestyle can be discouraged in the younger generation if we concentrate on education regarding inherited HTN, dyslipidaemia, diabetes and atherosclerotic diseases. Moreover, the results of this study may be used to emphasise more focused genetic research, age-wise patterns of risk factors and stroke prevention.

Furthermore, younger stroke victims and their families can receive direct support from The Stroke Awareness and Support Association, a non-profit organisation dedicated to raising awareness in the USA. Information about therapy, clothing, school and broad support is available for parents dealing with day-to-day difficulties in caring for children with poststroke hemiplegia.²²

Bangladesh is a densely populated nation, with only 2213 hospitals, 45 723 registered physicians, and 60 trained neurologists. Furthermore, DMC and Bangabandhu Sheikh Mujib Medical University are the only institutions offering neurology training programmes.²³ Only 1300 technologists use this equipment to perform 45 MRIs and 150 CT scans across Bangladesh.²⁴

RECOMMENDATIONS

Strengthening stroke surveillance and data collection

A robust stroke surveillance system is essential for understanding the epidemiology of stroke in young people in Bangladesh. The establishment of a National Stroke Registry would facilitate systematic data collection on incidence, risk factors and treatment outcomes. This registry should be integrated into existing public health information systems to inform evidence-based policy decisions and resource allocations.

Improving diagnostic and treatment infrastructure

In Bangladesh, access to specialised stroke care is inconsistent, especially in rural regions. To enhance diagnostic capabilities, the government should invest in advanced imaging technologies, such as MRI, CT scans and carotid ultrasound, at district and subdistrict hospitals. Furthermore, it is essential to create and distribute standardised clinical guidelines for the diagnosis and treatment of young stroke patients among healthcare professionals to ensure consistent care.

Enhancing preventive and risk reduction strategies

Considering the widespread presence of modifiable risk factors, such as high blood pressure, diabetes and smoking, among young adults, it is essential to establish a nationwide screening initiative at community health-care centres. These programmes should focus on the early identification of cardiovascular risk factors and

offer specific interventions such as programmes to quit smoking, nutritional guidance, and lifestyle change campaigns.

Capacity building and healthcare workforce development

Many primary healthcare practitioners lack the specialised training necessary to effectively diagnose and treat young stroke patients. To address this problem, stroke training programmes should be integrated into the curricula of medical, nursing and paramedical education. Additionally, continuous medical education programmes should be developed to provide general practitioners and emergency care providers with the skills needed to manage young stroke.

Policy integration and healthcare financing

In Bangladesh, financial limitations frequently delay the prompt diagnosis and treatment of young stroke patients. To alleviate this economic strain, it is essential to implement public health insurance programmes that cover stroke-related diagnostics, emergency care and rehabilitation. Moreover, government subsidies for crucial stroke medications and rehabilitation services can improve the long-term prognosis of young stroke survivors.

A thorough, multisectoral strategy—encompassing monitoring, infrastructure enhancement, preventive initiatives, skill development and financial backing—is crucial to tackle the increasing incidence of stroke in young adults. By adopting these policy and healthcare system suggestions, Bangladesh can greatly enhance the prevention, diagnosis and treatment of stroke among young individuals.

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