Stroke Epidemiology among Young Persons in India: Every Step Counts

Stroke bears colossal neurological disease burden, as evidenced by emerging and expansive epidemiological literature. Stroke is the second most common cause of death worldwide, preceded only by ischemic heart disease, and the third most common cause of disability.[1] 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.[2] 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.[1]

Specifically, among younger patients, the epidemiolocal 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.[3] These numbers are alarming, considering that a large magnitude of stroke burden is borne by developing countries.

Worldwide, around 2 million individuals in the age group of 18--50 years, experience stroke, and these numbers are continuing to rise.[4] Stroke occurring in younger individuals presents specific implications. Apart from experiencing diverse predisposing factors for stroke, younger persons are within a socially and economically productive period. Hence, stroke in this age group tends to carry manifold social, physical, emotional, vocational, and economic connotations.[5]

Considering the gargantuan burden of stroke in India, and the vastness of the country, regional epidemiological efforts certainly inform enhanced understanding of the disease and pave the way for preventative efforts. The India State-level Disease Burden Initiative earlier identified that differing epidemiological transition existed throughout the country, resulting in vast state-wise variations in disease burden, essentially representing what the authors succinctly described as “nations within a nation.”[6]

Hence, the study by Singla *et al*.[7] holds immense value as it describes a population-based sub cohort of young stroke patients from the Ludhiana stroke registry. Epidemiological data on young stroke in India is limited, particularly from Tier 2 cities, such as Ludhiana. The study carries several important messages. The annual stroke incidence among younger individuals (defined as 18--49 years in this study) was 46 per 100,000 (95% confidence interval [CI] 41--51/100,000). Incidence data on stroke in India has hailed from Kolkata and Mumbai, the latter from a well-defined geographical area.[8] In comparison, incidence of young stroke is reported to vary between 5 and 15 per 100,000 person-years in Europe, 20 per 100,000 in North American, Australian and some Asian countries, and up to 40 per 100,000 from certain African countries and Iran, with data distinctly lacking from several Asian countries.[9] Data from the Dijon stroke registry in France (between 1985 and 2017) indicated that ischemic stroke incidence among young individuals rose between 2003 and 2007 compared to previous periods, and remained stable thereafter.[10]

Risk factors for stroke identified in this study included hypertension (72%), diabetes in 23%, dyslipidemia in 15%, and drug addiction in 9%. The former represent traditional vascular risk factors, and the rise in stroke incidence among young adults probably coincides with an increase in prevalent traditional risk factors among them.[11-13] Identification of these risk factors is important in the light of findings from other studies that vascular disease comprised the chief cause of mortality among young people with stroke who died during long follow-up.[14,15] Illicit drug use is recognized as a rarer risk factor for stroke in young among Western populations,[5] and emerges as a risk factor in this study due to the high prevalence of cocaine and heroin abuse in Punjab state. Similar risk factors, including diabetes, hypertension, dyslipidemia and obesity, have been recognized in this region earlier as well.[16] This shines a light on recognition of indigenous and local factors that may play a role in stroke development, to renew preventive and therapeutic paradigms. In general, the etiology of stroke in young is seen to be the same as those above 45 years, that is, atherosclerosis, which requires to be targeted aggressively. Even after exhaustive evaluation for other risk factors, up to 40% cases may remain idiopathic. These can be grouped into four groups: atherosclerosis-related, non-atherosclerosis related, hypercoagulable states and inherited causes. Atherosclerosis-related large vessel disease may be seen secondary to familial hyperlipidemia, homocystinuria, juvenile diabetes, and hypertension. Hypertension, which is a major risk factor, could be secondary due to renal vascular or parenchymal disease, primary hyperaldosteronism, pheochromocytoma, and coarctation of aorta, etc. Among the non-atherosclerotic causes, dissection is very important apart from cardioembolic causes, hypercoagulable states and inherited causes.

In this study, the case fatality rate for young persons with stroke was 18% (i.e., 127 deaths among 700 patients). Younger patients with stroke had better outcomes (measured as telephonic modified Rankin Scale (mRS) at 28 days post-stroke;

mRS = 0--2; 60%) compared to older patients (46%; OR 1.52 95% CI 1.15--2.00; $P = 0.003$). Functional recovery after ischemic stroke is known to be inversely related to age, with good functional outcomes being defined as modified Rankin scale score of ≤2 at 3 months.[17] However, long-term prognosis is of specific interest among younger patients, as they live longer with stroke sequelae. Hence, further longitudinal data is essential to establish long-term prognosis, not only in terms of mortality outcomes but also functional and psychosocial outcomes, including development of epilepsy, post-stroke pain, and cognitive impairment.

The study certainly represents a valuable effort informing the epidemiology of stroke among young persons from Ludhiana city in India. It encourages the consolidation of concerted efforts from other parts of the country as well. Future endeavors must also focus on longitudinal outcomes among young persons with stroke, to better understand and alleviate multitudinous sequelae which lie beyond the immediate stroke aftermath.

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