

# Stroke in India

## Incidence and prevalence

Stroke is a major health problem in India.<sup>1</sup> A recent community survey<sup>2</sup> in the eastern Indian city of Kolkata showed the prevalence rate of stroke to be 545 per 100 000 population. The average annual incidence rate of stroke in the same study was 145 per 100 000 persons per year.<sup>2</sup> These rates, age standardised to world standard population, are similar to or higher than many Western nations.<sup>3</sup> These rates are also much higher than those reported previously from other parts of India.<sup>4,5</sup> Stroke burden in India has been rising in the last few decades, in contrast to developed countries, where stroke prevalence has decreased or plateaued.<sup>6,7</sup>

## Reasons for the rise of stroke burden in India

The reasons for a rise in stroke burden in India include smoking, increasing longevity, and changes in lifestyle accompanying urbanisation. In India, the average life expectancy rose from 41.2 years in 1951-1961 to 61.4 years in 1991-1996.<sup>8</sup> Indians may also be genetically prone to stroke due to a high prevalence of the metabolic syndrome consisting of central obesity, high levels of triglycerides, and low levels of HDL cholesterol with or without glucose intolerance.<sup>8</sup>

## Studies of stroke risk factors in India

The Indian Council of Medical Research (ICMR), in 1989, found hypertension, diabetes mellitus, tobacco use and low concentration of normal haemoglobin, as the most important risk factors for ischaemic strokes.<sup>9</sup> The World Health Organisation (WHO) Task Force Report on Stroke (1989), found hypertension, smoking, elevated blood lipid levels and diabetes as important modifiable risk factors for ischaemic stroke in India.<sup>10</sup>

sis was the most common mechanism in the prospective, hospital based Hyderabad Stroke Registry. This was followed by lacunar, cardio-embolic and extracranial carotid disease respectively.<sup>21</sup> While intracranial disease is very uncommon in the West (<5%) and extracranial carotid artery disease is uncommon in far eastern countries like China and Japan (<5%), both vascular patterns are common in Indian stroke patients and this may be called 'the Indian pattern'. Common risk factors for the development of large and small artery disease are similar and constitute hypertension, diabetes and smoking.<sup>21,22</sup> For cardio-embolic stroke, rheumatic heart disease, and ischaemic heart disease are dominant risk factors in India.<sup>23</sup>

## Stroke mortality

The World Health Organisation estimated that in 1990, out of 9.4 million deaths in India, 619,000 deaths were due to stroke, giving a mortality rate of 73 per 100,000 population. In the same year, the number of deaths due to stroke were 22 times that due to malaria, 1.4 times that due to tuberculosis, 4 times that due to rheumatic heart disease and almost equal to that due to ischaemic heart disease.<sup>24</sup> Stroke mortality rates among Indians have been found to be two to three times higher than the in Caucasians.<sup>25</sup>

## Stroke outcome studies in India

Limited data suggests that recurrence may be higher in India due to poor compliance with treatment and control of risk factors.<sup>26</sup> Of the stroke survivors, only about one third are fully independent in their daily activities of living while more than one fourth cases are bed ridden. The poor outcome in functional recovery may be due to lack of rehabilitation and treatment facilities.<sup>26</sup>



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## Due to the increasing life span, urbanisation and changing life style, stroke is already a major public health problem in India

### What is specific to stroke in India?

Indian studies have shown that about 10% to 15% of strokes occur in people below the age of 40 years, which is high compared to other countries.<sup>11,12</sup> Cerebral venous thrombosis and rheumatic heart disease are important causes of stroke in the young.<sup>12</sup> Subacute tubercular meningitis leading to arteritis or autoimmune angiitis are also important stroke risk factors.<sup>13</sup> Reported risk factors among the young include coagulopathy, elevated lipoprotein(a) and elevated anticardiolipin antibodies.<sup>14-16</sup> Some Indian studies have reported interesting causes of stroke, like viper envenomation and also suggested mechanisms like squatting whilst on the toilet as an important triggering factor for stroke in Indians, by raising the blood pressure.<sup>17,18</sup>

### Stroke subtypes in India

The Indian Collaborative Acute Stroke Study (ICASS), a prospective study on consecutive and CT-confirmed cases of acute stroke from the major university hospitals in India, reported that up to 80% of stroke patients were ischaemic in nature.<sup>19</sup> In a population based study, done in Kolkata, CT scan proved infarction occurred in 68% of cases.<sup>20</sup>

Among the ischaemic strokes, intracranial atherosclero-

### Stroke services in India

There are no organised stroke services in many parts of India. The government health planners have so far focused their attention mainly on diseases related to infection and malnutrition. Secondly, low educational levels adversely affect the risk identification process and the taking of appropriate steps for stroke prevention. In the last decade, about fifty stroke units have sprung up in various cities of India. However, the majority of Indians live in villages, who cannot afford even a CT scan of the brain. General practitioners provide most of the stroke-related care in India. Home and traditional treatment of stroke is also an accepted practice in the rural areas of India. Many strange culture-specific beliefs about stroke treatment are in existence, one of which is that a massage with pigeon's blood can cure the paralysis.<sup>27</sup>

### Stroke thrombolysis in India

Tissue plasminogen activator (tPA) was only approved in 2006 for use in acute ischaemic stroke in India. At present approximately 15 stroke units in India use tPA. Thus far, approximately 400 patients have received intravenous tPA in different centres across the country. Intra-arterial thrombolysis therapy is being used in

approximately 10 centres in India with good results.<sup>27</sup> Most centres are in the private sector, although some government university hospitals have been running successful thrombolysis programs. The barriers towards stroke thrombolysis are due to a lack of infrastructure, lack of awareness and poor affordability. However, it is clear that hyperactive thrombolysis in acute ischaemic stroke is feasible in urban private and public sector tertiary hospitals and can be widely used if a greater number of dedicated stroke teams/stroke units become available, and the cost of drugs is reduced.

## Conclusion

Due to the increasing life span, urbanisation and changing life style, stroke is already a major public health problem in India. It is likely to assume epidemic proportion in the coming years and cause enormous strain on India's limited health care resources. The thrombolytic therapy is available to very few people. The main national health planning strategy should be the primary prevention of stroke by controlling the major risk factors of hypertension, diabetes and smoking. Stroke registries need to be set up at community and hospital level to understand not only the risk factors but also various stroke subtypes and their short and long-term outcomes. Such efforts will go a long way in evolving health care policies for appropriate and cost effective preventive and treatment strategies for stroke in India.

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