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Epidemiology of Stroke in India: a Review

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Abstract

The need for research on epidemiological studies on Stroke management evolved from western countries where the resources of Stroke management and rehabilitation are synchronised. After the recovery, the person with Stroke is re-enabled to recognise his potential and join to the mainstream population as early as possible. In developed countries, such harmony is found to be missing due to several factors. This article is an effort to highlight the need for appropriate and precise data necessary for efficient planning and allocation of resources to the Stroke population and to make resources open, accessible and affordable to them.
Keywords : *stroke, CVA ,incidence , prevalence, mortality , India.*

Background

Stroke is a major health care problem and an important cause of morbidity and mortality (Warlow et al., 2008). It is third major cause of death worldwide**.** Nine out of ten strokes occur in people over the age of 55. Among neurological disorders stroke is a major cause of disability in adults and can result in highly complex clinical conditions (Devi, 2008) which leaves sufferers with long-term dysfunction (Feigin, McPherson, Barker, & Krishnamurthi, 2013).

Advances in stroke medical treatment have resulted in saving lives, reducing the extent of the impairment and increasing the survival of the patient. The development of a cost-effective primary prevention and rehabilitation plan, however, involves an in-depth knowledge of multiple epidemiological factors with a focus on incidence rates. Epidemiological studies have an impact on medical services and their distribution in an area. Epidemiological studies determine frequency, distribution and determinants of health related states and events and disease in human populations. Thus, epidemiology of Stroke assumes high significance (Park, 2005)

Most of the epidemiological information is collected from the region wise research. These studies rely on data from hospitals and Rehabilitation Centres that are available. In developing countries, unlike Developed Nations, there are no special databases or stroke registries. Developed countries constitute only 20% of the world population and the major part is formed by the developing Nations. Most of the stock data is estimated in developing countries like India. The estimation cannot be taken as precise data. Epidemiological studies from such nations are significant, not just to have global figures, but also to work out medical tools for judicial use.

Methodology

Aim: This paper is a report of a review conducted to provide an overview of the literature presenting the epidemiology of stroke in India.

Search methods: The databases were searched for the search terms:
"Epidemiology" "Stroke", "India". The databases used were: Cochrane, ICMR database and Pubmed, Stroke Journal.

Inclusion criteria: stroke, ischaemic , haemorrhagic, CVA, epidemiological studies.

Review design: Papers describing the epidemiology of Stroke in India in terms of Incidence, Prevalence or both.

Publication date: Articles published in English language from 2014 till date.

Search outcome

The search strategy generated 8 papers. After considering the titles and inclusion criteria out of these, 7 papers were taken for full article evaluation.

Data Extraction: The following study characteristics were recorded on a data extraction form: author and year, type of study , type of stroke, aetiology, age/sex, Incidence, Prevalence, Mortality, rural and urban areas and remarks.

(Table 1). These studies used the data of patients available from various hospitals and rehabilitation centres.

Kamalakannan et al (2017) conducted a systematic review of epidemiologic studies on stroke conducted in India to document the magnitude of stroke. All population-based, cross-sectional studies and cohort studies from India which reported the stroke incidence rate or cumulative stroke incidence and/or the prevalence of stroke in participants from any age group were included. The review showed that the crude stroke prevalence in different parts of India ranged from 44.29 to 559/100,000 persons during the past two decades. The cumulative incidence of stroke in India ranged from 105 to 152/100,000 persons per year during the past two decades in different parts of the country. Given the disabling nature of the condition and available evidence on the silent stroke epidemic in India, the rehabilitation needs of the stroke survivors are also expected to be high.

According to NCDIR -National Council for Disease Informatics and Research Factsheet produced by Indian Council of Medicine and Research-ICMR globally stroke is the second leading cause of death in adults and two-thirds of these deaths occurred in people living in developing countries. Stroke is a leading cause of disability and death in low-income and middle-income countries, and the Global Burden of disease study 2010 estimates that 68.6% incident strokes, 52.2% prevalent strokes, 70.9% stroke deaths, and 77.7% DALYs lost has occurred in these countries. It has been projected to cause 23 million first-ever strokes, 77 million stroke survivors, 61 million DALYs, and 7.8 million deaths by 2030 in low and middle income countries. Thus it has significant socioeconomic consequences for patients, care givers and also health services. In India, stroke is the second most common killer among all non communicable diseases. Stroke can affect nearly 15.4 lakh people at any time. It is responsible for nearly 6.3 lakh deaths every year in which 41 %patients do not survive after stroke and 64 lac life years are lost due to disability caused by stroke. The incidence of young stroke in urban area was 116/135and in rural area 119/138.

Venkatasubramanium et al (2017) carried out a study to evaluate stroke epidemiology in India. The study concluded that age sex standardized mortality per lac person is 82.4, incidence of stroke in lac 119-145 and prevalence of stroke per lac is .84-4.24 and disability adjusted life years short per lac is 1420.3.The risk factors for stroke were hypertension male (26.6%) female (24.7%),diabetes mellitis male(9.1%) female(8.3%), hypercholesterolemia male (4.5%) female(6.0%),insufficient physical activity male (10.8%) female(16.1%),obesity male(2.3%) female(5.1%), smoking male(20.4%) female(1.9%).In India incidence of stroke is higher in rural area and hemorrhagic stroke more commonly occur than ischaemic stroke. With better control of infectious diseases life expectancy is prolonged in India however, with econonomic transitions towards achieving developed country status risk factors are more prevalent thus raising the incidence of stroke and rise in number of disable survivors.

Paramdeep et al (2017) conducted survey study on stroke profile in urban and rural region of north west India .The study concluded that total of 4989 stroke cases were recorded in the year 2011-2013, who came to public and private hospital (59.1%) scan centers and physiotherapy center (0.3%).Hemorrhagic stroke was more in rural areas among Sikh farmers age <40 yrs than urban region. 69%of stroke cases were reported in centers from urban region and 31% from rural region due to lack of awareness about treatment and rehabilitation.

Suwanwela eta al (2016) studied stroke burden and stroke care system in India. He found out that India comes in low middle income group countries whose total population in lac is 1237 and per capita income is 12,195 (USD).the life expectancy for male is 67 yr ,female s is 73 yr and elderly >65% is 7.4.Incidence of stroke per lac per year is 119-145 and prevalence 0.09-0.42(%).The risk factors in stroke were hypertension 85%, Diabetes Mellitus 5 %, Dyslipipidemia 26%,Atrial fibrillation is 16%, Smoking is 26.8%.There are 35 stroke units in the country and 300 stroke unit beds and 1200 certified/practicing neurologist.

Kapoor et al (2014) concluded in his study that Younger patients with stroke account for 5-10% of all the stroke patients worldwide. In India nearly one-fifth of patients with first ever strokes admitted to hospitals are young adults. The incidence of stroke in young forming 8.55% of the total stroke patients .There were larger proportion of male patients with a ratio of 3:1.16 patients (50%) presented between 6 am and 12 pm in the morning hours of day. Maximum patients presented in winter months from November to January. Ischemic stroke is the most common subtype followed by haemorrhagic and embolic stroke. As far as the risk factors are concerned smoking, alcoholism, increased BMI, diabetes and hypertension are significantly associated with strokes among young people.

Wasay et al (2014) carried out study on Stroke in South Asian countries. According to the WHO estimate 2001, 86% of death related to stroke worldwide occurred in developing countries. Estimates of prevalence of stroke in India range from 44-843 per lac population. 10-15% of stroke occurs in people below age of 40 yr. Onset of stroke is almost 10 yr earlier than rest of world. Common risk factors for stroke and age of onset is even younger in females than in males. The mean age of stroke in India is 63 yr. Prevalence of stroke is 545 per lac population and incidence is 152 per lac population. Ischaemic stroke compromise 60-80% and haemorrhagic stroke is 20-32%. High prevalence of small vessel disease is due to undiagnosed /untreated hypertension causing stroke. In hospitals mortality is 7-32% resulting in poor functional outcome. 50 stroke units are present in India and more than 150 rehab clinics are actively involved in long term stroke care. Stroke mortality in India is 2-3 times higher than white population. In India level of awareness of risk factors and the warning symptoms of stroke among general population is very low.

Incidence and prevalence of stroke in India Stroke mortality in India is 2-3 times higher than white population. In India, stroke accounted for 1.2% of total deaths. The age-adjusted stroke prevalence rate was between 44-843/100,000 over the last decade. In North India the incidence rate of stroke was 145.3/lakh person per year. Out of which 69 % cases are from urban areas and 31% from rural areas. Ischaemic stroke compromise 60-80% and haemorrhagic stroke is 20-32% of the total cases reported. The chances for occurrence of disability among stroke survivors are 24- 54%.

Author (yr)	Type of study	Type of stroke	Etiology	Age/sex	Incidence/lac person	Prevalence/lac person	Mortality/ lac person	Rural/ urban	Remarks
Kamalakannan et al (2017)	Systematic review	Haemorrhagic	hypertension	>60 yrs Male>female	105-152	4.29-559	192	Rural> urban cases	-
Paramdeep et al (2017)	Epidemiological study in Ludhiana,punjab	Ischaemic>haemorrhagic	Hypertension, hyperlipdemia, tobacco,alcohol	<40 yr M>F	-	-	-	Urban. >rural	Only 3%of population visited rehab centres
Venkatasubramanium (2017)	Epidemiological study in South East Asia	Rural-haemorrhagic, urban -ischaemic	HT,DM,Obesity,Cholestrol	-	119-145	.84-4.24%	82.4/lac persons	-	-
Suwanwala et al (2016)	Epidemiological study in Asia	Ischaemic>haemorrhagic	Hypertension 85%,hyperlipidemia 26%,smooking 26%	M>F	119-145	.09-.42%	-	-	Neurologist 1200,stroke units35,stroke bed 100
NCDIR Factsheet 2019	Indian council of medicine and research	-	-	-	Urban 116, rural 119	-	86.5/lac persons,disability adjusted years 64lacs	Rural> urban	New cases 1.44-1.66 million
Kapoor et al (2014)	Epidemiological study in kangra HP	Ischaemic>haemorrhagic>embolic	Hypertension,Smooking ,Diabetes	41yr M>F 3:1	--	-	-	-	Young people suffer more in HP
Wasay et al (2014)	Epidemiological study in South east Asia	Ischaemic stroke compromise 60-80% and haemorrhagic stroke is 20-32%.	Hypertension	<63yrs/ M>F	152 per lac	545 per lac	7-32%	-	50 stroke units, 150 rehab clinics are present in India Stroke mortality in India is 2-3 times higher than white population.

Discussion

According to the WHO report, 86% of death related to stroke worldwide occurred in developing countries. Prevalence of stroke in India range from 44-843 per lac population and incidence is 152 per lac population. 10-15% of stroke occurs in people below age of 40 yr. Onset of stroke is almost 10 yr earlier than rest of world. Common risk factors for stroke and age of onset is even younger in females than in males. The mean age of stroke in India is 63 yr. Ischaemic stroke compromise 60-80% and haemorrhagic stroke is 20-32% of the total cases reported. (Venketasubramanum , Yoon, Pandian & Navarro 2017). In hospitals mortality is 7-32% resulting in poor functional outcome. Stroke mortality in India is 2-3 times higher than white population.

In North India the incidence rate of stroke was 145.3/lakh person per year. Out of which 69 % cases are from urban areas and 31% from rural areas with mean age 59+/-15 yrs. Haemorrhagic stroke is more in rural are as compared to urban areas (Kaur et al., 2017) .In India level of awareness of risk factors and the warning symptoms of stroke among general population is very low (Wasay, Khatri & Kaul 2014). The chances for occurrence of disability among stroke survivors are 24- 54%.Though there is significant decrease in mortality due to stroke in the last few decades, but there is a subsequent increase in the rate of impairments and disabilities in stroke survivors (Srivastava, Tally , Gupta & Murali 2010).

National stroke association (2014) estimated that almost 10% of stroke survivors recover completely, 25% survivors recover with slight impairment, 40% experience moderate to severe impairments and they must require special care. 10% need care in a nursing home or other long term facility. 15% die shortly after the stroke. Nearly 14% of stroke survivors experience a second episode of stroke in the first year.

Conclusion

The article highlights the need for a concentrated, concerted effort to research the extent of stroke in India at the state and national level. This will promote the preparation of primary stroke prevention policies and services and resolve the current magnitude of disability associated with stroke in the country. The recovery needs of stroke survivors are also expected to be high, considering the debilitating nature of the disease and available evidence of the silent stroke epidemic in India. Therefore, future investment in stroke epidemiology studies in India would lead to better preventive measures against stroke and related mortality being developed. It can also strengthen the organisation of cost-effective stroke treatment programmes and stronger recovery strategies to meet the unmet needs that are likely to be varied and important for stroke survivors.

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