Stroke Epidemiological Data of Nine Asian Countries

ASIAN ACUTE STROKE ADVISORY PANEL (AASAP)*

Abstract

Objective : To study the existing stroke epidemiology of nine Asian countries.

Method : Stroke epidemiological data of nine Asian countries were collected and updated by the Asian Acute Stroke Advisory Panel (AASAP). The data included demographic information, health care resources and stroke epidemiology of individual countries.

Result : Countries with good epidemiological data of stroke are Hong Kong, Taiwan, South Korea and Singapore. In these countries strokes rank as the second or third leading causes of death in the population. Malaysia, Thailand, Phillippines and Indonesia are countries with moderate epidemiological data of stroke. The available epidemiological data of stroke in these countries are mainly hospital-based information. Community-based studies are in the planning stage. India is the only country with fair epidemiological data of stroke available. The limitations of epidemiological study of stroke in India are due to their huge population size, poor income and limited health care resources.

Conclusion : Combating strokes worldwide will never be truly accomplished unless basic information of developing countries is analysed and understood. The strength and weakness of information concerning strokes in developing countries need to be documented before the worldwide implementation of a stroke prevention programme.

Key word : Stroke, Cerebrovascular Disease, Stroke Epidemiology

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Stroke is the third leading cause of death in developed countries. Epidemiological data concerning stroke are well established in Europe, America and Australia. Asian countries, which comprise more than half of the world's population have less documented statistics concerning stroke. In January 1996 leading neurologists from 9 Asian countries formed an "Asian Acute Stroke Advisory Panel (AASAP)" to conduct a stroke epidemiology study in Asia. National geographical data of each country member were searched and summarised. The existing stroke epidemiological data in each country were compared to the baseline information. This is the most up-to-date epidemiological data concerning existing health care resources of stroke in Asian countries which will be retrieved extensively and discussed.

MATERIAL AND METHOD

Sixteen leading neurologists from 9 Asian countries (Hong Kong, India, Indonesia, Malaysia, the Philippines, South Korea, Singapore, Taiwan and Thailand) have met repeatedly since January 1996 to conduct this stroke epidemiological study in Asia. Each member's task was to collect all the existing up-to-date stroke epidemiological data from each individual country for comparison. Demographic data and health care resources concerning strokes in each country were also collected. They were data on the population, life expectancy, income, elderly population, race, literacy rate, stroke incidence, stroke prevalence, number of neurologists and neurosurgeons, number of hospitals, number of beds, number of CT-scans and MRI, number of stroke admissions per year, number of stroke deaths, ranking of stroke deaths, percentage of stroke deaths, stroke subtypes and stroke risk factors. All the available data were compared for each individual country to the available baseline stroke epidemiological data and heath care resources for stroke management.

RESULTS

Demographic data of each individual country included population, percentage of urbanisation, life expectancy, income (gross national product per capita), elderly population, race and literacy rate are tabulated in Table 1 for comparison. National health resources of the nine Asian countries, i.e. number of neurologists, neurosurgeons, hospitals, hospital beds, stroke units, CT brain scans and MRI are tabulated in Table 2.

Stroke epidemiological data of the nine Asian countries, namely stroke incidence, prevalence, number of stroke victims, number of stroke admissions per year, percentage of stroke deaths, the ranking of stroke deaths, standardised death rate, crude death rate and percentage of stroke subtypes are tabulated in Table 3. Stroke risk factors of the nine Asian countries, i.e. hypertension, smoking rate, diabetes mellitus, hyperlipidaemia, prior stroke, and atrial fibrillation are tabulated for comparison in Table 4.

DISCUSSION

This stroke epidemiological data from 9 Asian countries which accounted for 1,332.9 million inhabitants or about one-fourth of the world population are important information for worldwide stroke data. China is not included in our study due to the unique situation of huge area and a population of more than one billion inhabitants. Data from Japan is well established and we consider Japan as a developed country in Asia unlike the others, thus Japan was not included in our study.

Epidemiological data of stroke in the 9 Asian countries can be graded as good, moderate, or fair according to the completeness of data available. We can not standardise our data into the same format of epidemiological criteria because this is a collection of data from the existing information. However, we are planning to conduct a proper epidemiologic study of stroke in our group in the near future.

Countries with good epidemiological data of stroke are Hong Kong, Taiwan, South Korea and Singapore. The average life expectancy of the population of these countries is around 75 years and their yearly income per capita is high at over 10,000 US dollars. The main ethnicity of these countries is Chinese or Korean and they live mostly in urban areas. Health care resources for stroke management in terms of personnel, instruments and hospital beds are well-balanced with population and size of the area to be covered. Stroke is definitely a leading cause of death, it is ranked between second and third in these countries. Risk factors for stroke have been well studied and the population in these countries is at high risk of stroke.

Countries with moderate epidemiological data of stroke are Malaysia, Thailand, the Phillip-

Table 1. Demographic data of nine Asian countries.

Demographic data	SIN	MAL	IND	TLD	INDO	HK	PLP	TWAN	KOR
1. Population (million)	3.1M[1]	20.6M[1]	943.7M[1]	61M[1]	197.6M[1]	6.4M[1]	69.3M[1]	21.7M[1]	45M[1]
Urban	100%	47%	27%	36%	34%	95%	46%	58%	78%
Rural	0%	53%	73.22%	64%	66%	5%	54%	42%	22%
2. Life expectancy (yr)	76[1]	72[1]	61[1]	69[1]	63[1]	79[1]	67[1]	75[1]	72[1]
Male	74.2	69.1	60.8	67.4	60.8	76		72	
Female	78.5	73.7	64.5	71.7	64.5	81		78	
3. GNP/Per Capita Income	US$ 26,400[1]	US$ 3,930[1]	US$ 335[1]	US$ 2,680[1]	US$ 940[1]	US$ 23,200[1]	US$ 1,130[1]	US$ 12,265[1]	US$ 10,076[1]
4. Age>60/65 yrs (%)	9.7% (>60)[2]	5.80%(>60)[7]	7%(>60)[10]	8.4%(>60)[13]	5%(>60)[16]	9%(>60%)[20]	5%(>65)[22]	7.3%(>65)[25]	5.5%(>65)
5. Race	78% Chinese[2]	50.7% Malay[7]	100% Indian[10]	89% Thai[13]	93% Malay[16]	98% Chinese[20]	80% Filipino[22]	98% Chinese[25]	100% Korea
	14% Malay	27.5% Chinese		10% Chinese	5% Chinese	2% Others	15% Filipino	2% Aborigines	
	7% Indian	7.8% Indian		1% Others	2% Others		Chinese		
	1% Others	14% Others					5% Others		
6. Literacy rate	91.6%[1]	89.3%[1]	52.1%[1]	93.8%[1]	84.4%[1]	92.2%[1]	94%[1]	93.2%[1]	97.4%[1]

Note: NA = Data Not Available; SIN = Singapore; MAL = Malaysia; IND = India; TLD = Thailand; INDO = Indonesia; HK = Hong Kong; PLP = Philippines; TWN = Taiwan; KOR = Korea

Table 2. National health resources of nine Asian countries.

National health resource	SIN	MAL	IND	TLD	INDO	HK	PLP	TWAN	KOR
1. No.of neurologists	21[2]	15[8]	405[10]	150[13]	303[16]	30[20]	99[23]	414[25]	674
2. No.of neurosurgeons	15	16	483	150	43	41	40	172	923
3. No.of hospitals (total)	25[2]	102 (public)[7]	13,700[10]	788 (public)[13]	830 (general);[16]	41 (public)[20]	1,111[23]	596[25]	28,121
		200 (private)		255 (private)	96 (special)				(including clinics)
4. No.of teaching hospitals	5[2]	5[7]	146[10]	12[13]	30[16]	2[20]	7[23]	26[25]	252
5. No.of hospital beds	10,446[2]	42,500[7]	810,000[10]	90,740[13]	110,460[16]	29,342[20]	37,571[23]	112,380[25]	
Public	8,346	35,000		80,259	58,912	24,940		39,923	
Private	2,100	7,500		10,481	51,548	4,402		72,457	
6. No.of stroke units	2[2]	0[8]	5[10]	1[13]	1[16]	3[20]	1[23]	7[25]	4
7. No.of CT	13[2]	22[8]	510[10]	150[13]	35[16]	NA	25[23]	264[25]	700
8. No.of MRI	5	10	203	20	10	9[20]	6	38	160

Note: NA = Data Not Available; SIN = Singapore; MAL = Malaysia; IND = India; TLD = Thailand; INDO = Indonesia; HK = Hong Kong; PLP = Philippines; TWN = Taiwan; KOR = Korea

Table 3. Stroke epidemiological data of nine Asian countries.

Epidemiological data	SIN	MAL	IND	TLD	INDO	HK	PLP	TWAN	KOR
1. Stroke incidence	NA	NA	NA	NA	Rural:51.6/100K[17] (survey in rural area in west Java) Urban:NA	100-200/100K	NA	330/100K[26] (age>35)	280/100K[35]
2. Stroke prevalence	NA	NA	90-222/100K[11]	690/100K[14] (age > 20)	NA	NA	NA	1,430-1,640/100K[26] (age≥35)	NA
3. No. of stroke patients/yr	NA	2%[9] (of all hosp.adm)	2%[11] (of all hosp.adm)	NA	4.9%(of all adm in 95)[17] (Cipto M. Hosp.)	NA	5,591(1993)[24] in 7 teaching hosps.	NA	NA
4. No. of strokes adm/yr	6,086[2]	1,096[9] (KL Hosp.)	NA	500[15] (Siriraj Hosp)	1,101[17]	18,000[20]	16,775 (neuro pts in 7 hosps.)[24]	772 (NTUH)[27] 430 (SKH)	145/100K (male)[35] 162/100K (female)
5. Percentage of stroke deaths	27.8%[3] (1,692)	29.20%(320)[9] (KL Hosp.)	NA	20%[15]	31.2%[17] (Cipto M. Hosp.)	18.89%[20] (3,400)	40%[24]	NA	NA
6. Cause of deaths	3rd[3]	4th[9] (KL Hosp.)	3rd[11]	6th[13]	1st[17] (Cipto M. Hosp. deaths)	3rd[20]	3rd[24]	2nd	2nd
7. Percentage of all deaths	10-12%[3]	NA	NA	NA	11.4%[17]	10%[20]	NA	12.20%[30]	28.4%[36] (among deaths >65)
8. Standardised death rates (>1990)	59/100K[4]	NA	NA	NA	rising	NA	rising	falling	NA
9. Crude death rates (>1990)	50.3/100K[3]	NA	NA	11/100K[13]	falling	52/100K[20]	NA	65/100K falling[30]	80.4/100K[36]
10. Stroke Subtype	SGH/TTSH[5] 32% / 25% (atherothrombotic) 10% / 10% (cardioembolic) 24%/39% (lacunar) 7% / 0% (undetermine) 27%/26% (hemorrhagic)	KL Hosp.; pts>60[9] 53% (cerebral infarction) 33% (cerebral haem) 7.8% (lacunar) 2.6% (SAH) 2.6% (subdural hematoma)	83%[12] (ischemic stroke) 17% (hemorr stroke)	Siriraj Hosp.[15] 70% (ischemic stroke) 30% (hemorr stroke)	9% (TIA)[19] 4% (RIND) 26.1% (ICH) 60.9% (thrombosis) 4.6% (emboli) 1.2% (SAH) 2.1% (others)	70%[21] (ischemic stroke) 30% (hemorr stroke)	53%[24] (ischemia with infarct) 17% (ischemia without infarct) 30% (hemorrhage)	SKH[31] 63% (infarction) 28% (ICH) 6% (SAH) 4% (others)	48.4%[37] (ischemic stroke) 31.4% (ICH) 18% (SAH) 2.2% (others)

Note: NA = Data Not Available; SIN = Singapore; MAL = Malaysia; IND = India; TLD = Thailand; INDO = Indonesia; HK = Hong Kong; PLP = Philippines; TWN = Taiwan; KOR = Korea
SGH = Singapore General Hospital, TTSH = Tan Tock Seng Hospital, KL Hosp = Kuala Lumpur Hospital, SKH = Shin-Kong WHS Hospital.

Table 4. Stroke risk factors of nine Asian countries.

Risk factors	SIN		MAL		IND	TLD		INDO	HK		PLP		TWAN		KOR	
	Gen. pop.(6)	Stroke pop.(5) (TTSH.)	Gen. pop.	Stroke pop.(9) (KL Hosp)	Gen. pop.	Stroke pop	Gen. pop.	Stroke pop	Gen. pop.	Stroke pop.(18)	Gen. pop.	Stroke pop.(21)	Gen. pop.	Stroke pop (R.R.)	Gen. pop.	Stroke pop.(32-34)	Gen. pop.	Stroke pop.(37)
1. Hypertension	13.6%	67.8%	NA	53%	3%	NA	7.69%	48%	NA	66.1%	NA	45%	NA	6.0	NA	63%	NA	74.7
2. Smoking	33.0%	22.3%	NA	27%	25%	NA	NA	NA	NA	33%	NA	NA	NA	NA	NA	40.6%	NA	22% (ICH)
3. Diabetes mellitus	8.6%	39.7%	NA	32%	2.5%	NA	3.60%	28.80%	NA	17.9%	NA	15%	NA	4.0	NA	28.9%	NA	28% (infarct)
4. Hyperlipidaemia	19.0%	6.3%	NA	54%	NA	NA	NA	NA	NA	7.8%	NA	NA	NA	2.0	NA	10%	NA	9.8%
5. Prior Stroke	NA	18.6%	NA	NA	NA	NA	NA	NA	NA	NA	NA	15%	NA	NA	NA	18.1%	NA	NA
6. Atrial fibrillation	NA	NA	NA	NA	NA	NA	NA	NA	NA	13.2%	NA	12%	NA	3.0	NA	11%	NA	NA
																		9.9%

Note: NA = Data Not Available; SIN = Singapore; MAL = Malaysia; IND = India; TLD = Thailand; INDO = Indonesia; HK = Hong Kong; PLP = Philippines; TWN = Taiwan; KOR = Korea

pines and Indonesia. Life expectancy of the population in these countries is on average 70 years and the yearly income per capita is moderate at over 1,000 US dollars. The main racial groups are Malay or Thai and they live mostly in rural areas. Overall health care resources for stroke management are inadequate except for only a few main cities of each country. Stroke ranks fourth to sixth as the leading cause of death in the population. Risk factors for stroke are available mainly from hospital-based studies and they are subjected to admission bias. There is thus a great opportunity to conduct a proper nationwide epidemiological study on stroke in these countries.

A country with fair epidemiological data of stroke is India, which is a large country with a population of nearly one billion inhabitants, with a low yearly income per capita of 335 US dollars. There are a few small surveys for the prevalence of stroke patients and some hospital-based studies, but it is difficult to do large epidemiologic studies for stroke incidence and prevalence. The ratio of neurologists and neurosurgeons per person in India is less than one per one million. The exact data on health care resources in terms of hospital beds and instruments for stroke investigation are not available. There are quite a number of stroke patients especially in the rural areas in India who have been treated at home without any doctor verification of diagnosis. Thus, true stroke prevalence and incidence in India is still unknown. Stroke risk factors in India are still at the beginning stage of epidemiological study.

Concerning stroke management, there are only 13 stroke units available in the 9 Asian countries, i.e. 5 stroke units in India, 3 stroke units in Hong Kong, 2 stroke units in Singapore and 1 stroke unit each in Thailand, Indonesia and Philippines. Thus, most stroke patients are treated by general medical physicians in most of the countries. Acute stroke units are being planned in leading institutes of each individual country to shorten hospital stay and reduce the mortality and morbidity rate regarding stroke.

The existing baseline epidemiological data of strokes of these nine Asian countries are vital for conducting future studies to accomplish the most cost-effective means.

Developing stroke strategy worldwide cannot be completed if basic information concerning

the infrastructure of health care resources is lacking and the strength and weaknesses of each individual country are not understood. Asian Acute Stroke Advisory Panel (AASAP) is now conducting an epidemiological study of hospitalised stroke patients in member countries to verify the essential epidemiological data of stroke. In the meantime, AASAP has encouraged individual countries to conduct community-based epidemiological data of strokes in Asia. We expect additional information to be executed in each country so that we can abolish the gap of "data not available".

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ข้อมูลวิทยาการระบาดของโรคหลอดเลือดสมองในเอเชีย 9 ประเทศ

กลุ่มคณะกรรมการโรคหลอดเลือดสมองเฉียบพลันแห่งเอเชีย

วัตถุประสงค์ : เพื่อศึกษาข้อมูลทางวิทยาการระบาดของโรคหลอดเลือดสมองที่มีอยู่ในปัจจุบันทั้งหมดของ 9 ประเทศในทวีปเอเชีย.

วิธีการศึกษา : ได้รวบรวมข้อมูลทางวิทยาการระบาดของโรคหลอดเลือดสมองใน 9 ประเทศในเอเชีย โดยกลุ่มคณะกรรมการโรคหลอดเลือดสมองเฉียบพลันแห่งเอเชีย ข้อมูลประกอบด้วย อายุ, เพศ, เชื้อชาติ, ระดับการศึกษา, สถานภาพของระบบสาธารณสุขของประชาในแต่ละประเทศ, ตลอดจนข้อมูลที่เกี่ยวข้องกับวิทยาการระบาดของโรคหลอดเลือดสมอง เช่น อัตราความชุก, อัตราตาย, จำนวนผู้ป่วยในโรงพยาบาล (จำแนกตามชนิดของโรค), ทรัพยากรทางการแพทย์ที่มีอยู่ในปัจจุบัน (ได้แก่ จำนวนประสาทแพทย์, ประสาทศัลยแพทย์, เครื่องมือคอมพิวเตอร์สมอง, เอ็มอาร์ไอ), ตลอดจนหน่วยที่ทำหน้าที่ดูแลผู้ป่วยโรคหลอดเลือดสมองในประเทศต่าง ๆ ทั้ง 9 ประเทศ.

ผลการศึกษา : ประเทศที่มีข้อมูลทางด้านวิทยาการระบาดเกี่ยวกับโรคหลอดเลือดสมองที่จัดอยู่ในระดับดีมี 4 ประเทศ ได้แก่ สิงคโปร์, เกาหลีใต้, ฮ่องกงและไต้หวัน ซึ่งในประเทศกลุ่มนี้พบว่าโรคหลอดเลือดสมองเป็นสาเหตุการตายที่สูงเป็นอันดับสองหรืออันดับสามในประชากร, สำหรับประเทศไทย, มาเลเซีย, ฟิลิปปินส์ และอินโดนีเซีย ได้จัดอยู่ในกลุ่มประเทศที่มีข้อมูลทางวิทยาการระบาดของโรคหลอดเลือดสมองในระดับปานกลาง เพราะข้อมูลส่วนใหญ่ของประเทศเหล่านี้จะเป็นข้อมูลที่ได้จากการศึกษาในโรงพยาบาลเป็นหลัก. ส่วนข้อมูลของโรคหลอดเลือดสมองที่ทำการศึกษาในชุมชนยังคงอยู่ในระดับแผนงานวิจัยหรือกำลังดำเนินการอยู่ในปัจจุบัน. ส่วนประเทศอินเดียจัดเป็นประเทศเดียวที่มีข้อมูลทางวิทยาการระบาดของโรคหลอดเลือดสมองในระดับน้อย. สาเหตุเป็นเพราะประเทศอินเดียมีประชากรจำนวนมาก และอาศัยอยู่กระจายในเนื้อที่ประเทศที่มีขนาดกว้างขวาง นอกจากนี้ประชากรยังมีรายได้ต่ำและมีความจำกัดในด้านทรัพยากรทางด้านสาธารณสุขเกือบทุกด้าน.

สรุป : การดำเนินการแก้ไขปัญหาของโรคหลอดเลือดสมองทั่วโลกจะไม่ประสบความสำเร็จได้เลย ถ้าหากยังขาดข้อมูลพื้นฐานทางระบาดวิทยาเกี่ยวกับโรคนี้ในแต่ละประเทศ. การทำความเข้าใจและวิเคราะห์ข้อมูลทางวิทยาการระบาดอย่างถูกต้องและเป็นระบบเป็นสิ่งจำเป็นอย่างยิ่ง. จุดอ่อนและจุดแข็งของข้อมูลทางวิทยาการระบาดที่มีอยู่ในปัจจุบันของประเทศที่กำลังพัฒนาจำเป็นจะต้องนำมาศึกษา และวิเคราะห์กันอย่างจริงจังก่อนที่จะลงมือปฏิบัติการแก้ไขปัญหาโรคหลอดเลือดสมองพร้อมกันทั่วทุกประเทศในโลกต่อไปในอนาคต.

คำสำคัญ : โรคหลอดเลือดในสมอง, วิทยาการระบาด, 9 ประเทศในเอเชีย

กลุ่มคณะกรรมการโรคหลอดเลือดสมองเฉียบพลันแห่งเอเชีย
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