

Stroke Awareness in Patients with Incident Stroke Compared to Patients without Stroke or Ischemic Heart Disease

Udaya Ranawaka, MBBS, MD,*† Chamila Mettananda, MBBS, MD, MRCP, FRCP, PhD,‡
 Chamila Thilakarathna, MBBS,§ Anushka Peiris, MBBS,§
 Anuradhini Kasturiratna, MBBS, MD,|| and Yasoma Tilakaratna, MBBS, MRCP, MD§

Background: Stroke awareness is known to influence treatment seeking and risk reduction behavior, but there is limited data from Sri Lanka and South Asia. *Aim:* To describe stroke awareness in incident stroke patients and to compare with patients without stroke and/or ischemic heart disease (IHD) in a Sri Lankan tertiary-care center. *Methods:* We studied awareness of stroke in all incident stroke patients admitted to a tertiary-care center in Sri Lanka and compared with a group of age- and sex-matched patients without stroke and/or IHD, over 2 years. Knowledge on stroke mechanisms, risk factors, symptoms, prognosis, treatment, and prevention were evaluated using a 40-item interviewer-administered questionnaire and converted to a composite score of 100%. Total awareness was categorized as Very poor (<24%), Poor (25%-49%), Good (50%-74%), and Very good (>74%). *Results:* One hundred and sixty four incident stroke patients (mean age 62.0 ± 11.5 years; 64.6% males) and 164 patients without stroke and/or IHD were studied. Mean stroke awareness was $47.79\% \pm 14.6$ in stroke patients, and $47.73\% \pm 14.9$ in the nonstroke and/or IHD patients ($P = .95$). Of the associations studied, better stroke awareness (>50%) was associated only with higher education levels (OR 1.90, 95%CI 1.33-2.72, $P < .001$) in stroke patients. *Conclusions:* Stroke awareness is not satisfactory in incident stroke patients and is no better than in patients without stroke and/or IHD. Better stroke awareness was associated with higher education levels.

Key Words: Stroke—awareness—stroke-patients—comparison—Sri Lanka

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From the *Department of Medicine, Faculty of Medicine, University of Kelaniya, Sri Lanka; †Professorial Medical Unit, North Colombo Teaching hospital, Ragama, Sri Lanka; ‡Department of Pharmacology, Faculty of Medicine, University of Kelaniya, Sri Lanka; §Department of Medicine, Faculty of Medicine, University of Kelaniya, Sri Lanka; and ||Department of Public health, Faculty of Medicine, University of Kelaniya, Sri Lanka.

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Department and institution where work was performed.

Department of Medicine, Faculty of Medicine, University of Kelaniya, Sri Lanka.

Professorial Medical Unit, North Colombo Teaching hospital, Ragama, Sri Lanka.

Address correspondence to Chamila Mettananda, MBBS, MD, MRCP, FRCP, PhD, Department of Pharmacology, Faculty of Medicine, University of Kelaniya, Talagolla Road, Ragama, Sri Lanka. E-mail: chamila@kln.ac.lk.

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Introduction

Stroke awareness positively influences treatment seeking behavior as well as the behavior leading to primary and secondary prevention of stroke.^{1,2} Recognition of stroke symptoms and seeking medical attention early are important in determining the timely delivery of optimal acute treatment including thrombolysis.³⁻¹⁰ Poor recognition of warning symptoms and signs is shown to be the main cause for delay in seeking emergency medical treatment.^{3,11,12}

The greatest burden of stroke is in the low- and low-middle income countries; 70% of stroke events and 87% of both stroke-related deaths and disability-adjusted life years occur in low- and middle-income countries.¹³⁻¹⁶ The burden is especially high in the South Asian region, where 40% of global stroke deaths occur.¹⁷ Sri Lanka is a low-middle income South Asian country with a high burden of stroke.^{17,18} Stroke is the fifth leading cause of in-hospital deaths in Sri Lanka,¹⁹ and stroke prevalence is 9.6-10.4 per 1000 population.^{18,20,21} Sri Lanka has a rapidly ageing

population due to the demographic transition,²² and vascular risk factors like diabetes mellitus and hypertension are increasing in prevalence.^{23,24} The burden of stroke in Sri Lanka is predicted to increase further due to demographic transition²² and increase in vascular risk factors,²³ but the available health care systems are ill-equipped to meet this challenge.²⁵ Primary and secondary prevention of stroke is the most cost-effective way to minimize the burden of stroke in resource-limited countries like Sri Lanka, where infrastructure and trained manpower required for advanced acute stroke care and multidisciplinary stroke rehabilitation are limited.²⁶

Previous studies have consistently highlighted deficiencies in knowledge on stroke in different communities worldwide.^{1,12,27-38} However, data from South Asia are limited. A previous community study in Sri Lanka highlighted many deficiencies in stroke awareness among adults and schoolchildren³⁹ but no data is available regarding stroke patients who are at high risk of developing recurrent strokes.

Aim

To describe stroke awareness in patients with incident strokes and to compare with patients without stroke or ischemic heart disease (IHD) in a Sri Lankan tertiary care center.

Methods

We studied stroke awareness in all incident stroke patients admitted to all the medical units of the Colombo North Teaching Hospital, Ragama, a tertiary-care center in Sri Lanka, over a period of 2 years (2015-2017). Patients with recurrent strokes, and incident stroke patients with a history of IHD were excluded as they were likely to have been educated regarding vascular and/or stroke risk reduction. Incident stroke patients with difficulty in communication (dysphasia, altered consciousness) were also excluded. Stroke awareness of incident stroke patients was compared with a group of age- and sex-matched patients admitted to the same ward with a diagnosis other than stroke or IHD (comparison group).

A 40-item, structured, interviewer-administered questionnaire was used to assess stroke awareness in several domains, including stroke mechanisms, risk factors, symptoms, prognosis, treatment options, and prevention based on a questionnaire previously used in a previous community survey of Sri Lanka.³⁹ Demographic and clinical data was obtained from medical records and direct patient interview by trained medical officers. Awareness was evaluated on spontaneous recall and was re-assessed after prompting with a list of responses. The total score obtained on spontaneous recall was converted to a score out of 100 (Stroke awareness score). Participants were categorized into 4 groups on their awareness score: Very

poor (<24%), Poor (25%-49%), Good (50%-74%), and Very good (>74%).

Ethical approval was obtained from the Ethics Review Committee, Faculty of Medicine, University of Kelaniya, Sri Lanka. Informed written consent of subjects was obtained.

Statistical Analysis

IBM SPSS statistics version 22.0 was used for analysis. Continuous variables were reported as means with standard deviation and categorical variables were reported as percentages. Multiple logistic regression was used to explore associations and were expressed as odds ratios and 95% confidence intervals. Means were compared with Student's t Test' (independent samples). Significance level was set at *P* less than .05.

Results

We studied 164 patients with incident strokes (mean age 62.0 ± 11.5 years; 64.6% males) and compared them with 164 age- and sex-matched nonstroke and/or IHD patients (mean age 62.0 ± 11.8 years; 64.6% males). Baseline characteristics were similar in the 2 groups except for a difference in educational levels with the nonstroke and/or IHD group having more subjects with education below grade 5 (Table 1).

All incident stroke patients (164 of 164) had heard of the term "stroke." However, only 91 (55.5%) of them knew that the brain was the organ involved in a stroke. "Lack of blood supply to the brain" and "bleeding into the brain" were identified as stroke mechanisms by 86 (52.4%) and 49 (29.9%) incident-stroke patients, respectively. Unilateral weakness was the presenting symptom of stroke known by most (79.3%) stroke patients. However, 12.2% could not name a single presenting symptom. Knowledge on presenting symptoms was not different between incident stroke patients and the comparison group (Table 2).

Hypertension, hyperlipidaemia, diabetes mellitus, and smoking were identified as important risk factors by 67.1%, 45.1%, 34.8%, and 26.2% of incident stroke patients; 19.5% could not recall at least one of them, 53.0% recalled 2 or more, and 12.1% recalled all 4. There was no significant difference in the knowledge of risk factors between the 2 groups (Table 2).

More than 80% of stroke patients were aware of different aspects regarding the emergent nature of stroke and the need for urgent treatment. However, awareness on available treatment options was inadequate. Less than half (43.9%) were aware of blood thinning medications, and only 7.3% were aware of "clot buster" therapy. A minority of stroke patients recognized physiotherapy (28.0%) and speech therapy (10.4%) as important treatment modalities. These findings were not different between the 2 groups (Table 2).

Table 1. Baseline characteristics

	Incident stroke patients n = 164	Nonstroke/IHD patients (comparison group) n = 164	<i>P</i>
Male sex, n (%)	106 (64.6)	106 (64.6)	1.00
Age, y, mean (SD)	62.0 ± 11.5	62.0 ± 11.8	.99
Level of education			
Up to grade 5	29	15	.047
Grade 6-10	53	51	
O/L or above	81	98	
Ethnicity			.24
Sinhalese	154	155	
Tamils	4	1	
Muslims	5	3	
Burghers	1	5	
Religion			.28
Buddhists	149	147	
Hindus	3	1	
Catholics	7	13	
Muslims	5	3	
Income			.31
<Rs. 10,000	48	48	
Rs. 10,000-19,000	55	66	
≥ Rs. 20,000	60	48	

IHD, ischemic heart disease; y, years; SD, standard deviation.

A majority (80.5%) of stroke patients knew that stroke was preventable. 57.3% identified controlling blood pressure as important, whereas smoking cessation (34.1%) and control of blood sugar (36.6%) and cholesterol (37.8%) levels were considered important by fewer participants. There was no difference in the awareness on preventive measures studied between incident stroke patients and the comparison group (Table 2). Almost all stroke patients (99.4%) and all nonstroke and/or IHD patients (100%) wished to seek Western (allopathic) medical treatment immediately when a stroke is suspected, and the majority in both groups preferred in-patient than out-patient treatment in the acute setting (Table 3).

Prompting with a list of options improved stroke awareness across all domains tested in both groups. In stroke patients, recognition of at least 1 stroke risk factor improved from 80.5% to 99.4%, identification of 2 or more of the 4 important risk factors improved from 53.0% to 98.2%, and identification of 3 or more stroke symptoms increased from 22.0% to 97.0% (Table 2).

Overall stroke awareness of incident stroke patients and nonstroke and/or IHD patients, as measured by the stroke awareness score, is shown in Figure 1. Low awareness scores (<50%) were seen in 52.3% of stroke patients and 45.5% of nonstroke and/or IHD patients. Mean stroke awareness score of incident stroke patients was 47.79% ± 14.6, compared to 47.73% ± 14.9 in the comparison group (*P* = .95).

Good and/or Very good overall stroke awareness (awareness score ≥50%) was associated with increasing level of education in stroke patients (OR 1.7, *P* = .03),

in the comparison group (OR 2.12, *P* = .01), and in the total sample (OR 1.9, 95%CI 1.33-2.72, *P* < .001). Better stroke awareness in the total sample was not associated with increasing age (OR 0.99, 95%CI .97-1.02, *P* = .58), male sex (OR .67, 95%CI .40-1.12, *P* = .12), or higher income levels (OR 1.33, 95%CI .97-1.81, *P* = .08) (Table 4).

When analyzed separately, awareness regarding symptoms of stroke was associated with higher education levels (OR 2.22, 95%CI 1.37-3.57, *P* = .001) and higher income (OR 1.45, 95%CI 1.02-2.07, *P* = .04) in the total sample. Knowledge of ≥2 risk factors was associated with higher education level (OR 2.08, 95%CI 1.48-2.92, *P* < .001) but not with increasing income levels (OR .93, 95%CI .69-1.26, *P* = .64; Supplementary Tables 1, 2).

The participants had received information on stroke from various sources. Doctors were the main source of information (62.5%) with television being the second commonest for the total sample (39.6%). However, health education materials were a poor source of information with less than 1% contribution. Source of information among incident stroke patients and nonstroke and/or IHD patients were not different (Table 5).

Discussion

We found that stroke awareness was not satisfactory in about half of the Sri Lankan stroke patients studied. Further, awareness among incident stroke patients was no better than that of nonstroke and/or IHD patients; this is a matter of concern as incident stroke patients are at high

Table 2. Awareness of stroke among incident stroke patients and nonstroke and/or IHD patients

Awareness parameter	Incident stroke patients (n = 164)		Nonstroke/IHD patients (comparison group) (n = 164)		P*
	Free recall n (%)	Free recall and prompted n (%)	Free recall n (%)	Free recall and prompted n (%)	
Awareness on stroke risk factors					
High blood pressure, n (%)	110 (67.1)	161 (98.2)	119 (72.6)	124 (97.6)	.336
High cholesterol levels, n (%)	74 (45.1)	158 (96.3)	95 (57.9)	157 (95.7)	.027
Diabetes, n (%)	57 (34.8)	159 (97.0)	61 (37.2)	154 (93.9)	.730
Smoking, n (%)	43 (26.2)	162 (98.8)	45 (27.4)	156 (95.1)	.901
Excess alcohol consumption, n (%)	46 (28.0)	162 (98.8)	37 (22.6)	153 (93.3)	.310
Obesity, n (%)	14 (8.5)	147 (89.6)	14 (8.5)	137 (83.5)	1.000
Stress, n (%)	44 (26.8)	159 (97.0)	41 (25.0)	152 (92.7)	.801
High fat diet, n (%)	31 (18.9)	159 (97.0)	30 (18.3)	151 (92.1)	1.000
High salt diet, n (%)	4 (2.4)	159 (97.0)	2 (1.2)	149 (90.9)	.685
Lack of physical exercise, n (%)	36 (22.0)	158 (96.3)	37 (22.6)	149 (90.9)	1.000
Awareness on symptoms and signs of stroke					
Weakness of 1 side, n (%)	130 (79.3)	153 (93.3)	121 (73.8)	142 (86.6)	.297
Sensory loss on 1 side, n (%)	41 (25.0)	152 (92.7)	59 (36.0)	142 (86.6)	.041
Walking difficulty, n (%)	53 (32.3)	150 (91.5)	51 (31.1)	136 (82.9)	.906
Slurred speech, n (%)	45 (27.4)	161 (98.2)	37 (22.6)	159 (97.0)	.372
Visual loss, n (%)	13 (7.9)	149 (90.9)	19 (11.6)	141 (86.0)	.352
Swallowing difficulty, n (%)	15 (9.1)	149 (90.9)	11 (6.7)	137 (83.5)	.541
Awareness on the need for immediate treatment of stroke					
Stroke is a cause for sudden death, n (%)	147 (89.6)	—	146 (89.0)	—	.500
Seeking medical care as soon as possible is important after a stroke, n (%)	145 (88.4)	—	145 (88.4)	—	.568
Early treatment will prevent severe disability following stroke, n (%)	142 (86.6)	—	141 (86.0)	—	.500
Awareness on available treatment measures for stroke					
Oral blood thinning medications, n (%)	72 (43.9)	144 (87.8)	73 (44.5)	148 (90.2)	1.000
Injections to dissolve blood clots, n (%)	12 (7.3)	143 (87.2)	22 (13.4)	141 (86.0)	.102
Physiotherapy, n (%)	46 (28.0)	147 (89.6)	43 (26.2)	136 (82.9)	.804
Speech therapy, n (%)	17 (10.4)	145 (88.4)	12 (7.3)	134 (81.7)	.437
Surgery, n (%)	82 (50.0)	144 (87.8)	99 (60.4)	140 (85.4)	.075
Awareness on available preventive measures for stroke					
Good blood pressure control	94 (57.3)	140 (85.4)	93 (56.7)	132 (80.5)	1.000
Good blood sugar control	60 (36.6)	139 (84.9)	62 (37.8)	127 (77.4)	.909
Good blood cholesterol control	58 (35.4)	140 (85.4)	54 (32.9)	127 (77.4)	.722
Stopping smoking	56 (34.1)	162 (98.8)	68 (41.5)	162 (98.8)	.105
Stopping alcohol	44 (26.8)	144 (87.8)	56 (34.1)	148 (90.2)	.210
Regular exercise	38 (23.2)	141 (86.0)	39 (23.8)	127 (77.4)	1.000

IHD, ischemic heart disease.

*Comparison of the 2 groups using spontaneous recall responses.

Table 3. Immediate response to a suspected stroke

	Total (n = 328)	Incident stroke patients (n = 164)	Nonstroke/IHD patients comparison group (n = 164)
Get admitted in a Government hospital	290 (88.4)	146 (89.0)	144 (87.8)
Get admitted in a private hospital	35 (10.7)	16 (9.8)	19 (11.6)
Visit a general practitioner	2 (.6)	1 (.6)	1 (.6)
Visit a consultant /specialist in private sector	0 (0)	0 (.0)	0 (0)
Visit an Ayurveda /indigenous practitioner	1 (.3)	1 (.6)	0 (0)

IHD, ischemic heart disease.

risk of recurrent stroke. Similar findings were reported from 2 recent studies.^{12,40}

Findings from a previous community survey of Sri Lankan adults and school children were largely in keeping with our study, with few differences.³⁹ More patients in our study were aware of the organ involved in stroke (56% versus 37%). Recognition of unilateral weakness as a presenting symptom of stroke was better in the community survey (93%) than in the present study (77%). Hypertension was the main risk factor identified in both studies. However, a relatively higher proportion of the general public identified diabetes (62%) and smoking (61%) as risk factors, compared to 38% and 28% in our study. Knowledge on causation, prevention and outcome of stroke was poor in the community survey in comparison to the present study. Having friends or relatives who had experienced a stroke was the main source of knowledge in the community survey (62%), whereas doctors (63%) were the main source of knowledge in our study. Although our data add to the findings from the previous study, it is important to note that the 2 studies are not comparable, as the study settings (community versus hospital based) and the time points were different.

Studies on stroke awareness conducted elsewhere have yielded variable results on stroke awareness. Knowledge of brain as the organ involved in stroke has varied in different countries; 15% of—Danish stroke patients,⁴¹ 35% of—Omani people at high risk of stroke,⁴² and about 50% of—Pakistani²⁸ and—Indian⁴³ general public, compared to 55% of—stroke patients in our study. Awareness of early stroke symptoms in our study was better than that of many other countries. Unilateral weakness was recognized as a symptom of stroke by 79.3% of our stroke patients compared to only 6%-15% in other countries.^{35,44} Only 11.6% of our stroke patients could not recognize at least 1 symptom, compared to 30%-66% patients in studies of other countries like Nigeria, India, Oman, France, Brazil, Australia.^{27,29,35,38,42,45-48}

Hypertension was the commonest risk factor identified in our study, similar to previous studies.^{28,29,35,41,43,45,47,49} At least 1 stroke risk factor was identified by 87.8% stroke patients in our study compared to 80% of Dutch stroke patients,⁴¹ 68% of American public,^{42,46} 21% of Indian public,⁴³ and 43% of high risk Omani public.⁴² Only 19.5% of stroke patients in our study could not identify a single risk

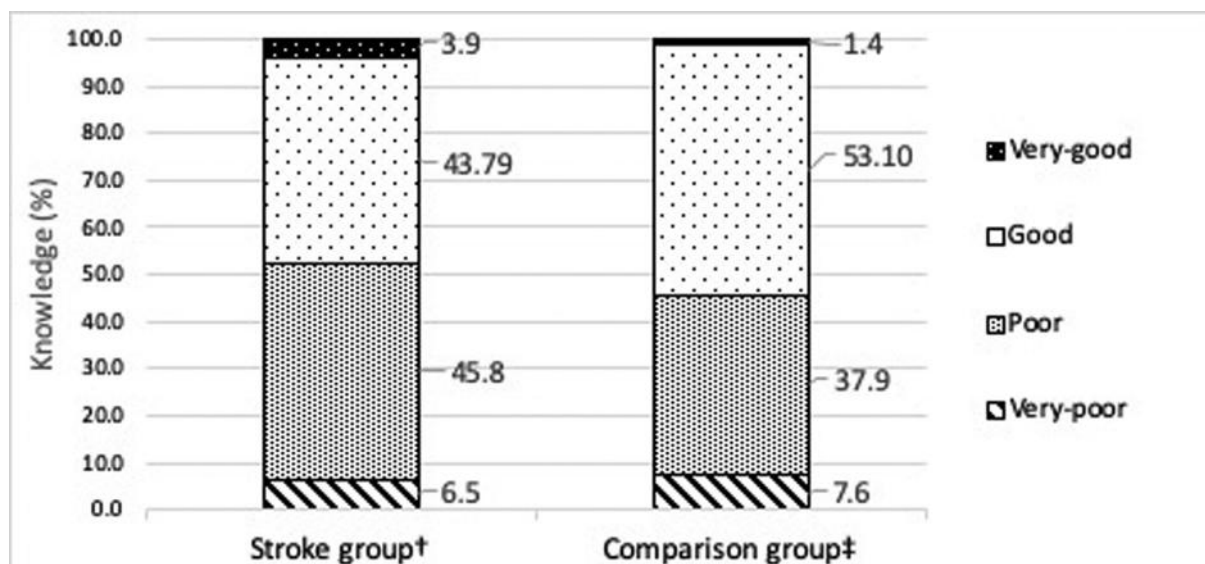


Figure 1. Distribution of knowledge and awareness on stroke among stroke patients and non-stroke/IHD patients missing cases - † 11, ‡ 19 IHD = Ischaemic heart disease

Table 4. Associations of having "Good" or "Very good" stroke awareness (score >50%)

Determinants of stroke awareness	Total (298*)			Incident stroke patients (152)		Nonstroke/IHD patients comparison group (146)	
	OR [†]	95%CI	P value	OR	P value	OR	P
Increasing age	.99	.97-1.02	.58	.99	.62	.99	.66
Male sex	.67	.40-1.12	.12	.75	.43	.55	.13
Higher education level	1.90	1.33-2.72	<.001	1.70	.03	2.12	.01
Higher income level	1.33	.97-1.81	.08	1.12	.59	1.67	.04

IHD, ischemic heart disease.

*missing data - 30.

[†]adjusted for all variables studied in table.

Table 5. Main sources of stroke awareness

Sources of stroke awareness	Total (182*)	Incident stroke patients (142)	Nonstroke/IHD patients comparison group (140)	P
Doctors	205 (62.5)	105 (64.0)	100 (61.0)	.648
Mass media				
television	130 (39.6)	60 (36.6)	70 (42.7)	.310
radio	37 (11.3)	12 (7.3)	25 (15.2)	.035
newspapers	4 (14.3)	25 (15.2)	22 (13.4)	.753
Other health care workers (nurses, midwives)	34 (10.4)	22 (13.4)	12 (7.3)	.102
Friends/relatives who had a stroke	34 (10.4)	17 (10.4)	17 (10.4)	1.000
Health education leaflets/materials	2 (.6)	1 (.6)	1 (.6)	1.000

IHD, ischemic heart disease.

*missing data - 46.

factor for stroke, compared to 27% of American public⁴⁶ and 21% of Indian controls.⁴³

Previous studies have reported better knowledge in younger age groups and with higher education levels,^{29,30,33,35,38,42,46,49,50} and poor knowledge among low socioeconomic groups.^{29,33,42,43,46,47,49,51,52} We too observed better stroke awareness with higher education levels but not with younger age. Association between stroke awareness and sex is not consistent in literature. Many studies have not identified an association, similar to our findings,^{33,36,53} but few report better awareness among females.^{35,37} We further observed better awareness on symptoms of stroke with higher education levels, similar to previous studies.^{1,33-35,46,49}

Doctors and mass media, especially television, were the key sources of knowledge for the participants of our study, as in several previous studies.^{35,46} However, contribution of health education materials for stroke awareness in our stroke patients was poor, unlike in some studies in literature.^{12,54} This is an important area for the country to work on as this is a low cost and easily implementable strategy for stroke prevention, especially with Sri Lanka's relatively high literacy rate of 92%.

Only a few previous studies have reported on stroke awareness among South Asians, despite the disproportionately high burden of stroke in the region.^{28,29,43,55} Our findings add to this limited literature. The main strength

of our study is the comparison of stroke awareness in stroke patients with nonstroke and/or IHD patients. To our knowledge, this is the first study comparing stroke patients with patients without stroke and/or IHD on their stroke awareness. Another strength is that we assessed both spontaneous recall and knowledge after prompting, whereas most studies have analyzed only 1 method of assessment. Stroke awareness improved markedly when a list of options was provided, similar to a few previous studies employing both methods.^{12,33} This study has some limitations. Each item tested in calculating the stroke awareness score was given equal weightage. A modified composite score with higher weightage given for key areas of knowledge may have provided more meaningful information. Further, our findings are from a tertiary care referral center in an urban hospital and therefore would not be representative of the entire country. Multicenter studies including patients from both urban and rural areas with larger sample sizes are needed to generate data applicable to the whole country.

Conclusion

Knowledge of stroke in Sri Lankan patients with incident stroke was deficient in many aspects and was not better than that of patients without previous stroke or IHD. There is a clear need to develop educational

programmes targeting both stroke and nonstroke patients as well as the community at large, with a view to promoting stroke risk reduction and appropriate treatment seeking behavior.

Conflicts of Interest

None.

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Supplementary materials

Supplementary material associated with this article can be found in the online version at doi:10.1016/j.jstrokecerebrovasdis.2020.104790.

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