

Stroke subtypes and risk factors in the Jaffna district – A hospital based study

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Abstract

Objective: To determine the stroke subtypes and risk factors in the Jaffna district and to determine if it differed from the rest of Sri Lanka.

Methods: A hospital based prospective, cross sectional study was carried out in 448 stroke patients admitted to the Jaffna Teaching Hospital, from December 2014 to August 2015. Diagnosis of stroke was made according to the WHO definition and confirmed by a CT brain. The patients were investigated for conventional risk factors. The data was statistically analyzed using SPSS.

Results: There were a total of 448 cases included in the study of which 226 (50.45%) were males and 222 (49.55%) were females. The mean age of the patients was 66.0 ± 12.23 for males and 67.25 ± 12.12 for females. Stroke subtypes showed preponderance for ischaemic strokes (84.15%). Hypertension was the commonest risk factor (56%) and the other risk factors were ranked as follows; past history of stroke (39.4%), smoking (30.8%), diabetes mellitus (26.05%), dyslipidaemia (15.8%), family history of stroke (12.3%) and ischaemic heart disease (11.9%).

Conclusions: Ischaemic stroke was the commonest subtype and lacunar stroke was the commonest presentation according to the OCSF classification. Hypertension was the commonest risk factor. Preventive strategies to detect hypertension and diabetes early and public awareness of the ill effects of smoking should contribute significantly in the reduction of stroke burden.

Index words: haemorrhagic stroke, ischaemic stroke, risk factors, stroke subtypes, Northern Province, Jaffna, Sri Lanka

Introduction

Stroke is the second most common cause of death and third most common cause of disability worldwide.

Several population studies focusing on epidemiology and risk factors have been carried out internationally and regionally¹. However the risk factor profile for strokes vary in different population groups. Detailed assessment of risk factors in stroke of a country is relevant to understand the aetiology and helps in planning preventive strategies to reduce future stroke burden. Regional and ethnic variation within the country should also be taken into consideration when advocating preventive measures.

Published data on stroke subtypes and risk factor profiles in Sri Lanka is sparse. The demographic pattern of Sri Lanka shows a transition towards an ageing population^{2,3,4}. There have been no published data from the Northern Province of the country, which was a war torn area for the last 3 decades. The demographic changes in the region due to the war, and migration of youth post war also can contribute to change in incidence of non-communicable diseases such as stroke. Thus we carried out a hospital-based study at the Jaffna Teaching Hospital, the only tertiary care hospital in the Northern Province. This is the first ever study on stroke from the Northern Province of Sri Lanka.

Methodology

This is a hospital based prospective study conducted at the Jaffna Teaching Hospital, carried out from 01/12/2014 to 31/08/2015. Situated in the Jaffna district, this is the only tertiary care hospital in the Northern Province of Sri Lanka. The Jaffna district is one of the 25 administrative divisions of Sri Lanka and has a population of 583,378.

Consecutive patients admitted with a stroke to the 8 medical wards during the study period were recruited to the study. A diagnosis of stroke was made according to the WHO definition and transient ischaemic attacks (TIAs) were excluded from the study. Detailed clinical history was obtained and clinical examination was performed as per a standard proforma. Full blood count, blood glucose, lipid profile, urea, creatinine, electrolytes and a 12 lead ECG were performed in all patients and echocardiography was done in selected patients. The patients were categorized as infarctions or haemorrhages based on CT findings.

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Risk factors were evaluated in all cases. Hypertension, diabetes mellitus, dyslipidaemia and atrial fibrillation were considered to be present if there was a history or they were on treatment for the condition. Smoking and alcohol use was defined according to international standards.

Data was corroborated by documented evidence in medical records, scans and medication history in addition to interviewing patients and carers.

The data was compiled and entered in excel sheet and analysed using SPSS.

Results

There were a total of 448 cases included in the study of which 226 (50.45%) were males and 222 (49.55%) were females. The mean age at presentation was 66.0 ± 12.23 for males and 67.25 ± 12.12 for females. Of the 448 cases 377 (84.15%) were ischaemic strokes while 71 (15.85%) were haemorrhagic strokes. Of the ischaemic strokes 49 (13.0%) were total anterior circulation strokes (TACS), 93 (24.7%) were partial anterior circulation strokes (PACS), 202 were lacunar strokes (LACS), 14 (3.7%) were posterior circulation strokes (POCS) and 17 (4.8%) were not classifiable. The cardiovascular risk factors for ischaemic and hemorrhagic strokes are shown in Table 1.

There were no statistically significant differences between the studied cardiovascular risk factors between ischaemic and haemorrhagic strokes.

Hypertension was the commonest risk factor amongst both ischaemic (56.5%) and haemorrhagic (56.3%) strokes. We compared the stroke risk profiles between hypertensive and non-hypertensive stroke patients.

253/448 (56.47%) were hypertensive. There were 53.8% females in the hypertensive group vs 44.1% females in the non hypertensive group ($p = 0.043$). The mean age at presentation of hypertensives vs non hypertensives is 67.80 ± 11.19 vs 65.1 ± 13.22 ($p=0.020$). The pattern of stroke subtypes and risk factors amongst hypertensives and non hypertensives are in Table 2.

The statistically significant differences included more females in the hypertensive group and non-hypertensive patients presented at a younger age. Other cardiovascular risk factors including past history of stroke, diabetes mellitus, dyslipidaemia and ischaemic heart disease were more common in the hypertensive group.

Diabetes was the third commonest risk factor, behind smoking which ranked second. Thus we did a sub analysis comparing the stroke risk profiles amongst diabetic and non-diabetic stroke patients. 132/448 (29.46%) were diabetic and of the diabetics 70 (53%) were male and 152 (49.4%) were males in the non-diabetic group ($p = 0.481$). Mean age at presentation in the diabetics vs non-diabetics was 67.16 ± 9.67 vs 66.40 ± 13.09 ($p = 0.547$). The pattern of stroke subtypes and risk factors amongst diabetic and non-diabetic patients are shown in Table 3.

Table 1. Cardiovascular risk factors in ischaemic and haemorrhagic strokes

	<i>Ischaemic stroke N = 377</i>	<i>Intracerebral haemorrhage N = 71</i>	<i>p value</i>
Gender –			
Male	187 (49.6%)	39 (54.9%)	> 0.05 (0.411)
Female	190 (50.4%)	32 (45.1%)	> 0.05 (0.411)
Past history of stroke	90 (23.9%)	11 (15.5%)	> 0.05 (0.122)
Family history of stroke	45 (11.9%)	9 (12.7%)	> 0.05 (0.416)
Hypertension	213 (56.5%)	40 (56.3%)	> 0.05 (0.980)
Diabetes mellitus	117 (31.0%)	15 (21.1%)	> 0.05 (0.093)
Dyslipidaemia	66 (17.5%)	10 (14.1%)	> 0.05 (0.482)
ischaemic heart disease	47 (12.5%)	8 (11.3%)	> 0.05 (0.778)
Other heart disease	18 (4.8%)	3 (4.2%)	> 0.05 (0.718)
Smoking	126 (33.4%)	20 (28.2%)	> 0.05 (0.387)
Alcohol	87 (23.1%)	16 (22.5%)	> 0.05 (0.921)
Hormonal therapy	1 (0.3%)	0 (0%)	> 0.05 (0.665)
Drug abuse	0 (0%)	0 (0%)	

Past history of stroke, hypertension, dyslipidaemia and ischaemic heart disease were more common among the diabetics.

A sub analysis of the influence of gender on the pattern of stroke showed that 226 (50.45%) were males. The mean age at presentation in males vs females is 66 ± 12.23 vs 67.26 ± 12.12 years ($p=0.275$). The pattern of stroke subtypes and risk factors are shown in Table 4.

Of the studied cardiovascular risk factors hypertension was more common amongst the females while

past history of stroke, smoking and alcohol consumption were more common amongst the males.

Of the 448 patients 26 (5.8%) were young strokes (below the age of 45 years), of whom 16 (61.5%) were males and 10 (38.5%) were females. The stroke subtypes and frequencies of the risk factors amongst young stroke and comparison with other strokes are shown in Table 5.

Hypertension was the commonest risk factor amongst young strokes followed by a past history of stroke and smoking. The risk factors were same in both groups except for diabetes which was more common in the elderly.

Table 2. Pattern of stroke subtypes and risk factors amongst hypertensive and non-hypertensive stroke patients

	<i>Hypertensive stroke patients N = 253</i>	<i>Non-hypertensive stroke patients N = 195</i>	<i>p value</i>
Stroke subtypes –			
Ischaemic stroke	213 (84.2%)	164 (84.1%)	> 0.05 (0.980)
Haemorrhagic stroke	40 (15.8%)	31 (15.9%)	
Past history of stroke	74 (29.2%)	27 (13.8%)	< 0.05 (0.000)
Family history of stroke	35 (13.8%)	19 (9.7%)	> 0.05 (0.342)
Diabetes mellitus	94 (37.2%)	38 (19.5%)	< 0.05 (0.000)
Dyslipidaemia	62 (24.5%)	14 (7.2%)	< 0.05 (0.000)
Ischaemic heart disease	41 (16.2%)	14 (7.2%)	< 0.05 (0.004)
Other heart disease	14 (5.5%)	7 (3.6%)	> 0.05 (0.677)
Smoking	79 (31.2%)	67 (34.4%)	> 0.05 (0.484)
Alcohol	62 (24.5%)	41 (21%)	> 0.05 (0.387)

Table 3. Pattern of stroke subtypes and risk factors amongst diabetic and non-diabetic stroke patients

	<i>Diabetic stroke patients N = 132</i>	<i>Non-diabetic stroke patients N = 316</i>	<i>p value</i>
Stroke subtypes			
Ischaemic stroke	117 (88.6%)	260 (82.3%)	>0.05 (0.093)
Haemorrhage stroke	15 (11.4%)	56 (17.7%)	
Past history of stroke	39 (29.5%)	62 (19.6%)	<0.05 (0.022)
Family history of stroke	19 (14.4%)	35 (11.1%)	> 0.05 (0.168)
Hypertension	94 (71.2%)	159 (50.3%)	< 0.05 (0.000)
Dyslipidaemia	51 (38.6%)	25 (7.9%)	< 0.05 (0.000)
Ischaemic heart disease	31 (23.5%)	24 (7.6%)	< 0.05 (0.000)
Other heart disease	9 (6.8%)	12 (3.8%)	> 0.05 (0.319)
Smoking	40 (30.3%)	106 (33.5%)	> 0.05 (0.506)
Alcohol	32 (24.2%)	71 (22.5%)	> 0.05 (0.685)

Table 4. The influence of gender on the pattern of stroke subtypes and risk factors of stroke

	Male N = 226	Female N = 222	p value
Stroke subtypes –			
Ischaemic stroke	187 (82.7%)	190 (85.6%)	> 0.05 (0.411)
Haemorrhage stroke	39 (17.3%)	32 (14.4%)	
Past history of stroke	62 (27.4%)	39 (17.6%)	< 0.05 (0.012)
Family history of stroke	24 (10.6%)	30 (13.5%)	> 0.05 (0.235)
Hypertension	117 (51.8%)	136 (61.3%)	< 0.05 (0.043)
Diabetes mellitus	70 (31%)	62 (27.9%)	> 0.05 (0.481)
Dyslipidaemia	35 (15.5%)	41 (18.5%)	> 0.05 (0.402)
Ischaemic heart disease	32 (14.2%)	23 (10.4%)	> 0.05 (0.221)
Other heart disease	8 (3.5%)	13 (5.9%)	> 0.05 (0.512)
Smoking	110 (48.7%)	36 (16.2%)	< 0.05 (0.000)
Alcohol	97 (42.9%)	6 (2.7%)	< 0.05 (0.000)

Table 5. The stroke subtypes and risk factors amongst young strokes and other stroke patients

	Young strokes N = 26	Other strokes N = 422	p value
Stroke subtypes –			
Ischaemic strokes	20 (76.9%)	357 (84.6%)	> 0.05 (0.299)
Haemorrhage strokes	6 (23.1%)	65 (15.4%)	
Past history of stroke	6 (23.1%)	95 (22.5%)	> 0.05 (0.947)
Family history of stroke	4 (15.4%)	50 (11.8%)	> 0.05 (0.654)
Hypertension	12 (46.2%)	241 (57.1%)	> 0.05 (0.275)
Diabetes mellitus	3 (11.5%)	129 (30.6%)	< 0.05 (0.039)
Dyslipidaemia	3 (11.5%)	73 (17.3%)	> 0.05 (0.449)
Ischaemic heart disease	0 (0%)	55 (13%)	> 0.05
Other heart disease	2 (7.7%)	19 (4.5%)	> 0.05 (0.561)
Smoking	5 (19.2%)	141 (33.4%)	> 0.05 (0.135)
Alcohol	3 (11.5%)	100 (23.7%)	> 0.05 (0.153)

Discussion

The mean age of presentation in our study was 66.0 ± 12.23 for males and 67.25 ± 12.12 for females which was slightly higher than the population study in an urban area where the mean ages were 64.7 ± 11.9 for males and 61.6 ± 13.0 for females² and other hospital based studies where the mean ages varied from 55.8 years to 64.5 years^{4,5,6}, however the mean age is less than those reported in the Western populations. The difference could be either due to differences in methodology or due to the widely

spoken of demographic transition and migration of youth post war.

In our study there were almost equal number of males and females (50.45% males and 49.55% females). This differs from the population-based study conducted in Colombo² where there was a 2:1 male to female ratio and the hospital based study in Colombo⁴ where the male to female ratio was approximately 1.475:1. Other hospital-based studies done at Colombo also show a male predominance^{5,6}. This difference may be due to the

post war effect, demographic transition and death and migration especially of the males during the war and the post war period.

The distribution of the stroke subtypes in our study showed a preponderance for ischaemic strokes (84.15%). This is similar to the global trend but slightly higher than one of the hospital based study in Colombo where 74.7% had ischaemic strokes and the rest had haemorrhagic strokes⁴. Another hospital based study showed a similar distribution to our study with 83.3% ischaemic strokes and 16.7% haemorrhagic strokes⁶.

In the population based study in Colombo² risk factors were ranked as hypertension (62.5%), smoking (45.8%), diabetes mellitus (33.3%), past stroke (29.2%), family history of stroke (20.8%) and ischaemic heart disease (8.3%). Hypertension was the commonest risk factor in our study, however the other risk factors were ranked as follows past history of stroke (39.4%), smoking (30.8%), diabetes mellitus (26.05%), dyslipidaemia (15.8%), family history of stroke (12.3%) and ischaemic heart disease (11.9%). The difference could be explained by the fact that the study in Colombo was a population based study while our study is a hospital based study. However hypertension was also the commonest risk factor in the population based study as well as the other hospital based study in Colombo⁴.

An interesting finding was that hypertension occurred in nearly equal number of patients in ischaemic and haemorrhagic strokes in our study, however in another hospital based study in Colombo hypertension occurred in 97.6% of patients with haemorrhagic strokes and 59.6% patients with ischaemic strokes.

Since hypertension was the commonest risk factor, the sub analysis between hypertensives and non hypertensives showed that there is no significant difference in the stroke subtypes. Hypertension was a significant risk factor in females, but this differed from the study in Colombo where hypertension occurred equally in males and females². Past history of stroke and smoking were significant risk factors in males and this correlates well with the population study from Colombo².

Our study had 26 young strokes. Hypertension was the commonest risk factor even amongst young strokes. The risk factor profile was the same amongst young strokes as well as the older patients except that diabetes was significantly more common in the elderly.

Conclusion

The mean age at presentation was slightly higher in our study population and the males and females were equally affected in our study. Ischaemic stroke was the commonest subtype and lacunar strokes were the commonest ischaemic stroke sub type. Ischaemic stroke was the commonest amongst the young strokes as well. Hypertension was the commonest risk factor followed by past history of stroke, smoking and diabetes mellitus.

Preventive strategies to detect hypertension and diabetes in the community, and public awareness of the ill effects of smoking can contribute significantly in the reduction of stroke burden. Suitable measures should be adopted as primary and secondary prevention to reduce stroke risk. A population-based study should be carried out in the Jaffna district to further evaluate the prevalence of stroke and the risk factors. Though the differences when compared with other studies from other parts of Sri Lanka mainly Colombo are minor, population based studies from North and the South are needed to establish the true burden of stroke in the country.

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