A Short Report on Strokes at San Fernando General Hospital

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DOI:
DOAJ: f2752ab823fb4c18898f2abf32c39f71

ABSTRACT

Stroke is a leading cause of mortality and disability globally and has been noted to have an increased incidence in developing countries. Despite being a highly prevalent non-communicable disease only limited data currently exist in Trinidad and Tobago. A cross-sectional study was done as an audit to assess stroke admissions for all patients older than 16 years old at San Fernando General Hospital. During the period 28th October, 2020 to 8th January, 2021 (72 days) there were 411 total stroke admissions (5.6 strokes per day). This consisted of 56.4% females and 43.6% males with the majority between the ages of 50 to 80 years for both sexes. Most stroke admissions were of Indo-Trinidadian ethnicity (60.2%) followed by Afro-Trinidadian (35.3%). Of the total stroke admissions 91.1% were found to be ischemic with 2.0% TIAs, and 5.9% hemorrhagic. Hypertension was the most common comorbidity found in stroke patients followed by diabetes mellitus at 77% and 51% respectively. Of the total stroke admissions, 34% had previous strokes. Length of stay averaged 5.3 days with a standard deviation of 9 days. The derived estimate of 347 strokes per 100,000 per year is comparable to the highest incidence globally. This high incidence was revealed despite factors that may lead the overall total to be an underestimate (only one hospital's region included and data collected during the COVID-19 pandemic). This preliminary study can be utilized to understand the burden of illness of stroke within one of the major hospitals in Trinidad and Tobago.

INTRODUCTION

Stroke has been ranked as the second leading cause of death, only surpassed by ischemic heart disease.[1] More than 6 million deaths from strokes account for 11% of the total deaths worldwide.[1] The global trend of non-communicable diseases (NCDs) accounted for 74% of the deaths globally in 2019[1] and as countries reach a certain socio-economic development stage the ratio of NCDs to total deaths increases.[2]

Stroke is rated as the third leading cause of disability worldwide[3] with the incidence in low and middle-income countries doubling over the last four decades whilst a decline is noted in high-income countries.[4] The need for

data on NCDs is vital for planning a national response to this rising problem.

Limited research is available concerning stroke admission and its local impact in Trinidad and Tobago. The only studies conducted revealed 1105 acute stroke admissions within two hospitals in Trinidad and a fatality rate of 29%.[5] Ischemic strokes accounted for 48.4% and 14.6% were hemorrhagic strokes in the second study.[6] This data contrasts the statistics published in developed countries with 87% of strokes being classified as ischemic.[7] Previous retrospective studies did not account for total acute stroke admissions and mortality in Trinidad and Tobago. This study was conducted as an audit to estimate the total number of stroke admission at San Fernando General Hospital (SFGH). SFGH is the main acute medical admission unit for southern Trinidad, encompassing a population of approximately 600 000, spanning one-third of the total area of Trinidad and Tobago. At the time of this study, SFGH was the only publicly run hospital with CT capability within its coverage area and would account for most strokes within southern Trinidad during this period.

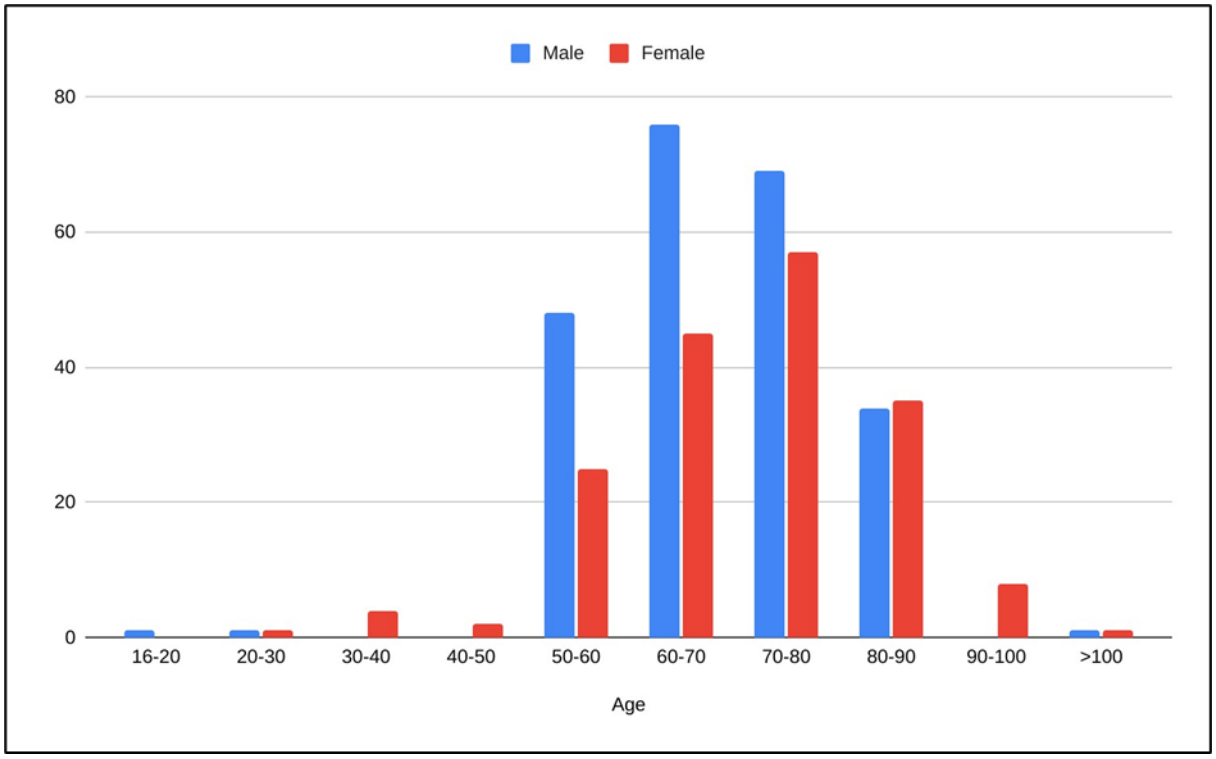
METHOD

All stroke admissions were defined as "rapidly developing clinical signs of focal (or global) disturbance of cerebral function, with symptoms lasting 24 hours or longer or leading to death, with no apparent cause other than of vascular origin".[8] A Transient Ischemic Attack (TIA) was defined as a transient episode of neurologic dysfunction due to focal brain, spinal cord, or retinal ischemia, without acute infarction or tissue injury classically defined as a neurologic deficit lasting less than 24 hours.[9,10] This definition was used as the admission criteria at SFGH between the period of October 28th, 2020 to January 8th, 2021 for patients matching this definition and age greater than 16 years old. A cross-sectional study design was conducted where all acute stroke admission sex, age, co-morbidities, presence of previous stroke, stroke type and Modified Rankin Scale (mRS) scores were recorded. All patient information was kept confidential and ethical approval was granted by the South-West Regional Health Authority Ethics Committee.

RESULTS

411 patients with the diagnosis of an acute stroke were admitted for the period of 28th October 2020 to 8th January 2021 (72 days) at SFGH. This gives an average daily stroke admission of 5.6 per day. The audit cohort consisted of 56.4% females and 43.6% males. The age

Figure 1: Age distribution



distribution is demonstrated in Figure 1 below. Most stroke admissions were of Indo-Trinidadian ethnicity (60.2%) followed by Afro-Trinidadian (35.3%), 3.5% were classified as "other" and 0.5% were of Chinese ethnicity.

All the possible types of strokes for medical admissions were taken into consideration and classified as:

- lacunar infarct (2-20mm in diameter in deep white, basal ganglia or pons)
- transient ischemic attack
- hemorrhagic
- non-lacunar infarcts, which represent ischemic infarcts larger than a lacunar infarct
- normal CT, which will represent a normal CT with clinical features of a stroke
- ischemic mixed, which represents the presence of both acute lacunar and non-lacunar infarcts on CT
- ischemic and hemorrhagic which shows both hemorrhage and acute ischemic infarcts on CT-subdural
- subarachnoid hemorrhages.

The study showed ischemic strokes to account for 91.1% of the total stroke admission, TIAs being 2.0%, and hemorrhagic 5.9% (excluding hemorrhage from subdural or subarachnoid hemorrhage).

Results are plotted in Table 1.

During admission, mRS scores were calculated to estimate the degree of disability suffered initially on admission :
17.1% were given an mRS of 0 (no disability),
-22.7% a score of 1 (no significant disability despite symptoms; able to carry out all usual duties and activities)
-15.1% a score of 2 (slight disability; unable to carry out all previous activities, but able to look after own affairs without assistance)
-12.2% a score of 3 (moderate disability; requiring some help, but able to walk without assistance)
-15.1% a score of 4 (moderately severe disability; unable to walk and attend to bodily needs without assistance)
-10.7% a score of 5 (severe disability; bedridden, incontinent, and requiring constant nursing care and attention)
-7.1% a score of 6 (dead). The mortality while in hospital was 13.8% while being admitted for an acute stroke.

Table 1. Type of stroke.

Stroke Type		Percentage	Total
Hemorrhagic		4.4%	
Subarachnoid		0.5%	
Subdural		0.5%	
Ischemic and Hemorrhagic		1.5%	
Normal CT	Ischemic Stroke	3.7%	91.1%
Ischemic Mixed		12.6%	
Ischemic Non-Lacunar		29.9%	
Lacunar		44.9%	
TIA		2.0%	

On admission, pre-existing co-morbidities were documented and represented in Table 2. Of note, 34% of the acute stroke patients suffered from a previous stroke with 44% of these known to have ischemic heart disease, 35% to be hypertensive, and 34% were diabetic. Length of stay for acute admission varied greatly but was estimated at an average length of 5.3 days with a standard deviation of 9 days.

DISCUSSION

Globally there is a crude rate of 185.01 strokes per 100,000 per year.[11] Compared to our gathered data of 5.7 strokes a day for our population 600,000, resulting in about 2081 new strokes a year (estimated 347 per 100,000 per year). World standard population incidence for strokes varies from 41 per 100,000 in Nigeria to 316 per 100,000 in Tanzania.[12] A crude comparison of data suggests that the incidence of stroke is higher in South Trinidad compared to the highest rates found internationally.

This study showed 77% of patients suffering from hypertension compared to 80.8% in previous studies.[5,6] Hypertension is the most prevalent risk factor for stroke which internationally has been estimated to be found in 64% of stroke patients.[13] Current evidence supports optimal hypertension treatment as a viable method to prevent strokes, newer evidence suggests that titrating blood pressures less than 130/80 mmHg and lowering blood pressure by 5mmHg decreases the risk of a major cardiovascular event by 10% regardless of initial diagnosis of hypertension.[14]

Diabetes mellitus has also been noted in a majority of stroke patients with an incidence of 51% on acute stroke admission. A relationship was already established from previous studies in Trinidad and Tobago between strokes and diabetes mellitus. The association between hypertension, diabetes and strokes shows the need for preventative care and early management of these risk factors to prevent stroke and other NCDs.

The age distribution of stroke patients revealed that in both sexes, strokes rarely occur before 50 years, with the majority occurring between the ages of 60 to 80 years in males and above 70 years in females. This highlights a key period when screening for stroke risk factors should be conducted.

This study showed the majority of strokes being ischemic (91.1%) which is comparable to that seen in international data (approximately 87%).[7] On the other hand, a closer look at this particular type of stroke showed 44.9% were lacunar in nature compared to 25% seen globally.[15] This

Table 2. Pre-existing Co-morbidities

Chronic Disease	Number	Percentage of total patients (n=411)
Hypertension (HTN)	318	77
Ischemic Heart Disease (IHD)	54	13
Diabetes Mellitus (DM)	211	51
Dyslipidemia	12	3
Atrial fibrillation	19	5
Chronic Kidney Disease (CKD)	24	6
Valvular Heart Disease (VHD)	1	0
Cancer	5	1
Smoker	17	4
Alcohol	7	2
SLE	1	0

may suggest that strokes in Southern Trinidad may be due to small vessel ischemia rather than an embolic source. The preponderance of lacunar infarcts in our cohort suggests small vessel ischemia and the possibility of strokes being caused by long-standing comorbidities.

The shortcomings of this study included the data being utilized from an audit on stroke admissions at SFGH. Patients that suffered from strokes but did not seek medical attention within the public hospital may have been inadvertently excluded. Patients who died before hospital admission would not be included. This study was conducted during the COVID-19 pandemic which may have resulted in fewer patients seeking medical attention. Data from previous studies were limited and investigations regarding the etiology of stroke admissions were not collected. These shortcomings could underestimate the number of strokes and the mortality only represented that of strokes in SFGH and not that of southern Trinidad.

CONCLUSION

This study highlights a greater incidence of stroke and recurrent strokes in the reported region than in most other countries. Despite possible underestimation due to the aforementioned limitations the total number of strokes could surpass the highest incidence recorded globally. The author hopes that this audit can spotlight the burden of strokes and other NCDs on the health care system of developing countries as well the importance of primary health care in reducing this burden.

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