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Burden of Stroke in UAE- A Single Centre Retrospective Review of Ischemic and Haemorrhagic Strokes in Patients Visiting Ras Al-Khaimah Hospital

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Abstract

Purpose*: This study aims to retrospectively review the data of patients admitted to our in-patient and outpatients visiting our Neuroscience department for determining the epidemiology of stroke and its sub-types with further details about the etiology of the strokes.*

Methods: *We carried out a retrospective review of the data from 70 consecutive patient records admitted between April 2014 and August 2019 with a clinically confirmed diagnosis of stroke by Magnetic resonance imaging (MRI) or Magnetic resonance angiography (MRA) or computed tomography (CT-scan) in a tertiary care hospital at the United Arab Emirates (UAE).*

Findings: *The mean age of the patients was 55 ± 10 years with male predominance. The frequency of strokes was high in the age group of 40-59 years. 41.18% of total strokes were ischemic while 2.94% of patients suffered a hemorrhagic stroke. Hypertension (28.3%), smoking (25%), and diabetes mellitus (17.5%) were common risk factors associated with stroke.*

Conclusion: *This paper highlights the epidemiology of stroke subtypes in the UAE. Our results highlight that ischemic stroke form the largest cohort of cases and particularly the age of strokes is much younger than the worldwide average. Asian residents in the UAE show some of the highest prevalence of uncontrolled high blood pressure and smoking, which are two major risk factors for the development of stroke. Especially early follow-ups for treatable risk factors such as hypertension, diabetes mellitus, and Dyslipidaemia can be focused on to prevent the stroke epidemic in UAE/ME. Community drives engaging the population in learning the FAST protocol and thrombolysis window is essential.*

Keywords: Stroke, Cerebrovascular disease, UAE, ischemic stroke, haemorrhagic stroke, Young stroke, Stroke in UAE.

Introduction

Stroke is defined as a focal neurological deficit lasting for more than 24 hours having a vascular aetiology. It is a common neurological disorder and is the second leading cause of death in the world and the third leading cause of disability. Stroke is caused due to the sudden death of some brain cells due to the lack of oxygen when the blood flow to the brain is lost by block or rupture of the artery of the brain. It is also a leading cause of depression and dementia.**(**1**)** Strokes mainly affect the individuals who are the most productive of a nation. United Arab Emirates (UAE) is one such nation with over 175 nationalities a part of its demographic mix.

The incidence and prevalence of stroke in the Middle East (ME) have increased drastically in the last decade exceeding that of developed countries. A systematic review found that the incidence rate of stroke in Middle Eastern countries (22.7–250/100,000 population per year in 2000–2014) have even crossed

the rates in developed countries (crude stroke incidence rates of 112–223 per 100,000 of population per year in 2000–2008).**(2)**The majority of stroke burden is borne by low and middle-income countries as a major proportion of mortality and stroke-related disability-adjusted life years (DALYs) varies between the developed and developing countries.**(3)**

There is a scarcity of epidemiology on strokes in the UAE. As per the reports published in media- The UAE is known to see between 10,000 and 12,000 strokes every year, and it is the leading cause of disability in the country. Strokes are also the third leading cause of mortality. It is estimated that stroke-related deaths in the ME will double by the year 2030. Moreover, approximately 100 new strokes occur per every 100,000 population in the UAE. One in six people will develop stroke in their lifetime, irrespective of gender.**(4)**

Since UAE has an 11% Emirati population while the rest of the population is mixed nationalities from over 175 nationalities, we intended to also see the link between the nationalities and the types of strokes. **(5)**Asian residents in the UAE show some of the highest prevalence of uncontrolled high blood pressure and smoking, which are two major risk factors for the development of stroke. The lifestyle for most ex-pats living in UAE is stressful. Diabetes is also commonly found in the workforce from Asia. The global stroke average is 65 years while the strokes in UAE have been much younger as the demographics of the country constituting the majority of the population between 40-55 years old.**(5)**This study aims to retrospectively review the data of patients admitted to our in-patient and out-patients visiting the department of neurology for determining the epidemiology of stroke and their sub-types with further details about the aetiology of the strokes.

Material and Methods

We carried out a retrospective study of all the patients who had a clinical diagnosis of stroke with neurological deficit and pointing to a vascular cause as confirmed by Magnetic resonance imaging (MRI) or Magnetic resonance angiography (MRA) or computed tomography (CT-scan) between April 2014 and August 2019. We are a tertiary care center located in the northern emirates of UAE. Transient ischemic attack (TIA), which is a transient neurological deficit with recovery in 24 hours, was excluded from the analysis.

The data was collected from the health information system (HIS) and later was manually entered into data spreadsheets and evaluated. The basic demographics, stroke subtype as confirmed by CT/MRI, potential risk factors, socio-economic information were all collected and reviewed. Additionally, neurological examination findings at admission, haematological and biochemical results were also reviewed. The haematological and biochemical were not available in all the cases which potentially limited our review to only the risk factors, clinical features, and type of the stroke. The data on

demographics and risk factors collected and reviewed were age, gender, chronic arterial hypertension (HTN), type 2 diabetes mellitus (T2DM), cigarette smoking, alcohol intake, ethnicity or origin and presence of obesity.

The strokes were divided into ischemic and haemorrhagic followed by Stroke Project Classification subtype classification of all ischemic strokes. The data were analyzed using the SPSS software version 25 for windows. Descriptive and frequency statistics were obtained for the variables of interest.

Results

Out of the total patients visiting the department of neurology between April 2014 and August 2019, 70 patients had met the criteria for the clinical definition of stroke with the presence of a radiological diagnosis, among these, 52 were admitted in the hospital and rest were seen in outpatient department. The age of patients ranged from 20-85years with a mean age of 55+/- 10years. A total of 58.5% of the strokes were observed in patients aged above 50 years. The frequency was highest in the patients aged between 40-59 years. Males accounted for 75.7% and 24.2% were females. The male to female ratio was found to be 3.1:1 .as shown in Table 1.

Table 1: Age and gender breakdown in patients.

S.no	Age (years)	Male	Female	Total (%)
1	20-29	1	0	1
2	30-39	8	0	9
3	40-49	17	2	19
4	50-59	19	4	24
5	60-69	5	5	9
6	70-79	3	1	4
7	>80	0	2	4

Among various complex clinical features observed in patients suffering from stroke, this study reports around 45.78% of patients experienced hemiplegia / hemi paresis followed by slurred speech, ataxia, dizziness, and facial palsy with each reporting 22.89%, 8.43%, 7.26%, and 4.81% respectively as shown in Table 2.

Table 2: Clinical features of stroke

S.no	Symptoms	Freq(N)	%
1.	Hemiplegia/Hemiparesis	38	45.78
2.	Ataxia	7	8.43
3.	Dizziness	6	7.26
4.	Memory issues	3	3.61
5.	Visual disturbance	3	3.61
6.	Slurred Speech	19	22.89
7.	Facial palsy	4	4.81
8.	Other symptoms	3	3.61

HTN (34, 28.3%) emerged as the commonest modifiable risk factor of stroke. Others include T2DM (21, 17.5%), cigarette smoking (30, 25%), previous stroke (1, 0.8%), dyslipidaemia (12, 10%), alcohol consumption (12, 10%), cardiac disease history (9, 7.6%). The identified risk factors are shown in Table 3.

Table 3: Risk factors of stroke

S. no	Diagnosis	Freq(N)	Total (%)
1	HTN	34	28.3
2	TDM	21	17.5
3	Smoking	30	25
4	Previous Stroke	1	0.8
5	Cardiac history	9	7.6
6	Dyslipidemia	12	10
7	Migraine	1	0.8
8	Alcohol	12	10

HTN= Hypertension, DM= Type 2 diabetes mellitus, N= no. of subjects

The incidence of ischemic stroke was way higher than the haemorrhagic stroke as shown in table 4. Further applying the TOAST classification to the ischemic strokes, as seen in table 4a most patients had small vessel occlusion strokes. Very few strokes were of undetermined aetiology.

Table 4: Types of stroke

Stroke type	**Freq(N)**
Ischemic	68
Haemorrhagic	2

Table 4a: TOAST classification of stroke subtypes for ischemic stroke

S. no	**Stroke Type**	**Freq(N)**	**%**
1	Small Vessel occlusions	28	41.18
2	Large Vessel atherosclerosis	2	2.94
4	Embolic	14	20.58
5	Stroke of other determined etiology(embolic)	8	11.78
6	Undetermined etiology	14	20.58

The patients were classified into upper and lower socioeconomic status based on standard definitions of class status by WHO, with 68.5% patients from the upper socioeconomic status as shown in Table 5. Among various investigation tools, MRI brain (49, 61.25%) and MRA brain (18, 22.5%) respectively were the main diagnosis followed by CT scan (13, 16.25%) as shown in Table 6.

Table 5: Socio-economic status of subjects.

Socio Economic Status	**Male**	**Female**	**Total No**
Upper	33	15	48
Lower	20	2	22

Table 6: Types of radiological investigation for diagnosis of stroke.

Radiology Scan	Freq(N)	%
CT-Brain	13	16.25
MRI Brain	49	61.25
MRA Brain	18	22.5

Mean NIHSS score on admission and on discharge was 4.5 and 2.6 respectively as can be observed in Table 7.

Table 7: NIHSS score of patients on admission and on discharge.

Hospital Admission Status	NIHSS SCORE MEAN
On Admission	4.5
On Discharge	2.6

The nationalities break up is provided in the Table 8. As one can see the majority of the community with the stroke was Asian origin at 52.8% (37 out of 70 patients) and the local Emirati was 17.14% (12 out of 70 patients). Indians, Bangladeshi and Philippines constituted the majority of the Asian cohort.

Table 8: The ethnicity and origin break down of patients

Ethnicity/origin	Freq (N)
Asian (India, Bangladesh, Philippines and Pakistan)	37
Emirati (Local UAE population)	12
Other (Africa, Europe, UK and USA)	21

Discussion

The pattern and outcome of stroke are not widely studied in the UAE. In this regard, our retrospective review plays a significant role in reporting the burden of stroke along with its risk factors and outcomes in the UAE.

There are few studies from the registry of Cleveland clinic documenting the prevalence of haemorrhagic strokes and few media articles pointing to the prevalence of stroke. The retrospective review suggested that out of the total admissions at the department of neurosciences over 5 years strokes constituted 10 percent of the admissions. This is similar to the other studies conducted in the Middle Eastern region.**(6)**

In our study, stroke was seen predominantly in males with 75.7% of cases whereas a mere 24.2% of stroke cases were reported from females. The male-to-female ratio in our study is 3.1:1 which is similar to other studies conducted in the middle eastern and Asian populations.**(7–9)** Among these women, 52.9% were above the age of 60. These results were consistent with the study conducted by Ajayi AO which reported that patients with male gender and higher education are more aware of their increased risk for stroke than female gender and lower education.**(10)** Our study results also revealed a high frequency of stroke cases in subjects aged between 40-59, which is conflicting with other studies which reported a predominance of stroke in the sixth decade of life in the ME region.**(7–9,11,12)**

The ischemic stroke was more frequent than haemorrhagic stroke, and it coincides with the results of other studies.**(8,13–15)** Around 20% of strokes were found to be undetermined. Previous studies reported that the frequency of undetermined strokes varies between 4-50%.**(16–18)**

The symptoms of stroke may differ according to the location of the stroke**(19)**. Since our study reported a higher proportion of ischemic stroke, neurological characteristics were predominantly seen in the majority of the patients with hemiplegia, slurred speech, ataxia, dizziness, and facial palsy observed in 45.78%, 22.89%, 8.43%, 7.26%, and 4.81%.

Among several risk factors like HTN, T2DM, smoking, dyslipidemia, alcohol consumption, and cardiac history, the most common risk factor to cause stroke was HTN followed by smoking and diabetes mellitus. Alcohol consumption and dyslipidemia condition were reported to be equivalent risk factors for stroke based on our study. HTN is the most important risk factor as the rise in both systolic and diastolic blood pressure increases the risk for hypertension. Around 20-30% of increased risk is reported with a small increase of 10mmHg in mean arterial pressure.**(20)** T2DM is a major risk factor for atherosclerosis and stroke. It is associated with a four-fold higher risk for stroke when compared with normal individuals in a general population. Therefore, it is vital to ensure good glycaemic control among diabetics to prevent the development of stroke. Another major reason could be the non-adherence to the prescribed medication and poor cardiovascular health that may have contributed to poor control of these risk factors resulting in a stroke. Therefore, these risk factors need to be controlled and modified as early as possible.**(7)**. Further, in the management of stroke, it is imperative to address all the risk factors and not just focus on a few ones. The pattern of these risk factors is similar in other ME countries along with the low level of self-awareness.**(21,22)**

Early and accurate diagnosis of stroke is vital in providing emergency treatment and preventing adverse consequences. Current national clinical guidelines for stroke from the royal college of physicians

recommend brain imaging within 24 hours for all the patients suspected of stroke. In our study, the most commonly used brain imaging tool for radiological investigation in stroke was MRI (61.25%), followed by MRA, and CT-scan of the brain used in 22.5% and 16.25% of patients respectively. This is in contrast to the studies which reported CT-scan being used in almost 90% of stroke patients in ME countries and UAE, USA, and Europe.**(23)** The reason for this at our center is that most patients do not hit the emergency in the stipulated window period for thrombolysis. Most patients do come outside the window period of thrombolysis. The rate of thrombolysis at our center is under 1%. The national ambulance protocols in the country often divert the patients to the government hospitals and hence the private hospital like ours only receive patients outside of the window period mostly within the first 24 hours of the stroke.

There were more strokes in the higher socio-economic stratum pointing to the lifestyle factors responsible for the strokes. This compares to the study done in Saudi Arabia and also other ME countries. Most strokes were small vessel types as compared to the western countries where one sees a larger proportion of large vessel or cardio-embolic strokes.

In conclusion, this paper highlights the exact epidemiology of the stroke subtypes in the UAE. The overall prevalence of stroke was found to be 10% of all admissions. The Asian ethnicity or origin particularly India, Bangladesh and Philippines were the largest groups followed by the local Emirati population. The ratio of male: female was found to be 3.1:1. Ischemic stroke was significantly more frequent (41%) than haemorrhagic stroke. HTN, T2DM, and smoking habits were the significant risk factors for stroke in the UAE. Incidence of stroke is increasing in ME countries, hence, successful awareness, prevention, and control of stroke in ME countries is an essential component. This requires a multipronged and sustained effort involving a broad array of interventions, key players, and innovative new resources. Especially early follow-ups for treatable risk factors such as HTN, DM, Dyslipidaemia which can be improved considering the optimal drug regimens available and lifestyle modification is necessary. Most importantly, reduced cigarette smoking helps in the prevention of stroke.

The major limitation of this study is that it is retrospective in nature and only from a single hospital in UAE. The study may not exactly showcase the UAE-wide prevalence however it still highlights the types of strokes, aetiology of the stroke, and the community or ethnicity prevalence of strokes in UAE.

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