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A Retrospective Analysis of 118 Stroke Cases Admitted to Aseer Hospital in Abha: Classification and Associated Factors

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Abstract **Original Research Article**

Background: A stroke is a medical disorder in which inadequate flow of blood through the brain contributes to the death of cells. There are two kinds of common strokes, ischemic and hemorrhage. Hypertension, diabetes mellitus and cerebrovascular injury are the risk factors for strokes. This research aimed to classify the most common type of stroke as well as the common risk factors associated with it in one of Saudi Arabia's major hospitals, located in the city of Abha. ***Methods and materials:*** From 1/1/2018 to 1/10/2019, data was collected from 118 patients with stroke. ***Results:*** The most prevalent type of event was ischemic stroke (91%), with hemorrhagic stroke comprising the remainder (9%). In addition, hypertension was the most common risk factor for stroke. In addition, we found that stroke events associated with hypertension and diabetes in patients over the age of 70 were more likely to occur relative to younger patients, $p>0.05$. Further study showed no correlation between stroke type and patient age, $p>0.05$. We also found no connection between the type of stroke and the specific imaging examinations performed, $p>0.05$ and the type of examination was independent of the stroke stage. ***Conclusion:*** We conclude that ischemic stroke was the most common type in the Abha city region of the Kingdom of Saudi Arabia, particularly among aging populations, and the common risk factor associated with stroke was hypertension.

Keywords: Stroke, Ischemic, Hypertension, Age, Risk factors, Initial diagnostic imaging.

INTRODUCTION

A stroke or Cerebrovascular Accident (CVA) involves the quick loss of brain function associated with shortage of blood supply to the brain [1]. Caused by ischemia (lack of blood flow), hemorrhage or blockage (thrombosis, arterial embolism), stroke is a major reason for severe, long-term neurological impairment and cognitive dysfunction, as well as a leading cause of fatality worldwide [2]. There are no proven drug treatments, however, for recovery after stroke [3]. Stroke may result in permanent impairment of physical, psychological, social, and cognitive functions, depending on its extent and type [4, 5]. The reported risk factors include hyperlipidemia, arterial hypertension, diabetes mellitus, cigarette smoking, micro-vascular breakdown, and age. Other risk factors documented include comorbidities such as AIDS, sickle cell disease and cerebral malaria, which is particularly frequent in hot and humid climates such as the tropics [6, 7].

Stroke is a diversified cerebrovascular illness with a vast range of genetic variations and associated symptoms [8]. For this reason, its categorization into subtypes is required before any intervention [9] can take place. Ischemic stroke is the most common form, accounting for over 80 % of all strokes [10]. Yet its subtyping requires considerable evaluation, from the first investigation of the patient to the delayed prognosis [11]. In addition, it is important to investigate the relationship between cerebrovascular risk factors and ischemic subtypes in order to develop an appropriate precautionary plan [12]. Epidemiological studies have shown a wide difference in the prevalence of stroke forms and ischemic subtypes between countries [11, 13], [14]. This variability may be linked to variation in lifestyles, related risk factors and preventive measures; variations in study designs and methods for the diagnosis of strokes may have also led to inconsistencies [11]- [13]. In addition, various associations between ischemic subtypes and risk factors

for strokes are reported in the literature [15]. Hypertension and diabetes, however, were more closely associated with small vessel disease, while large artery atherosclerosis was more closely correlated with hyperlipidemia and smoking [16, 17].

While the incidence of stroke has continued to decline in the West, it is undoubtedly rising in Asia [18]. Research indicates that the Gulf region is facing a double impact of stroke due to reductions in the rates of infectious diseases and growth in those of non-communicable diseases [19].Stroke has thus been identified as a significant health concern, with the prediction that subsequent casualties in this area will almost double by 2030 [20]. On the other hand, one study revealed that, in Gulf Cooperation Council (GCC) countries, a large percentage of patients were unaware of stroke to the extent that they did not know the meaning of the word. Moreover, stroke awareness was poorest among the groups which belonged to the highest risk bracket for the disease [21]. Arab countries are communities with common lifestyle and dietary habits that can affect the risk of stroke, disease, and post-event recovery, as well as sharing some characteristics with European and east Asian populations [6]. Stroke is seen as a rapidly rising issue in Saudi Arabia and a significant cause of disease and death. Therefore, it is one of the Kingdom's most crucial socioeconomic health issues [22].

The aim of this research is to confirm the association between stroke disease and risk factors that may contribute to the disorder in the specific context of Saudi Arabia. Additionally, it seeks to determine whether there are any factors causing the rise in incidences of stroke. The research focuses on many variables, including age and gender. and will investigate the association between the age, gender and stroke frequencies of patients. It will also describe the most common initial diagnostic modalities applied to cases of stroke.

METHODS AND MATERIALS

The research was carried out at Aseer Hospital, a specialized facility for the treatment of cerebrovascular diseases in Abha, Saudi Arabia. Once ethical approval was obtained, the medical records of the patients were studied and all patients diagnosed with stroke between 1/1/2018 and 1/10/2019 were identified for analysis. Data from 118 patients were analysed according to gender, age, type of stroke and additional diagnoses. The data was then analyzed using the SPSS (23) programme. The significance values were adjusted to the level of 5 % using the Pearson's Chi-Squared Test in order to determine the association between each participant variable and each calculated field in the datasets. The Chi-Squared test was chosen for its ability to represent explicit and direct analysis. In order to draw more meaningful comparisons, the patients were divided into two groups on the basis of age (less than 70 years of age and 70 or older).

RESULTS

A total of 118 patient data sets (82 males and 36 females) were used in this study. The mean age for males and females was 64. Information on the risk factors seen in our data is illustrated in Table 1. Of the 118 patients, 99 patients had hypertension, 84 patients were diabetic, 32 patients had ischemic heart disease (IHD), 29 had been previously diagnosed with a CVA, 4 with arterial fibrillation (AF), 3 with previous stroke, 2 with previous transient ischemic attack (TIA), and only 1 with peripheral artery disease (PAD).

Table-1: Risk factors for stroke patients of Aseer Hospital, 2018-2019

Risk factors	No. by Gender	Total No.
Hypertension	Male: 67	99
	Female: 32	
Diabetes	Male: 57	84
	Female: 27	
Ischemic heart disease (IHD)	Male: 23	32
	Female: 9	
Old cerebrovascular accident (CVA)	Male: 21	29
	Female: 8	
Previous stroke	Male: 1	3
	Female: 2	
Arterial fibrillation (AF)	Male: 2	4
	Female: 2	
Peripheral artery disease (PAD)	Male: 1	1
	Female: 0	
Previous transient ischemic attack (TIA)	Male: 1	2
	Female: 1	

Regarding the type of imaging examination, 74% of patients with hypertension underwent a CT scan, compared to only 26% with MRI, as seen in Figure 1. Further analysis showed no association between the type of exam performed and whether the patients were hypertensive or not, p>0.05. This also applied to patients with diabetes and previous CVA diagnoses. In addition, we found that the type of examination was not associated with the age of the patients, with older patients (>70 years old) likely to undergo CT scans as frequently as relatively younger patients (< 70 years old), p>0.05.

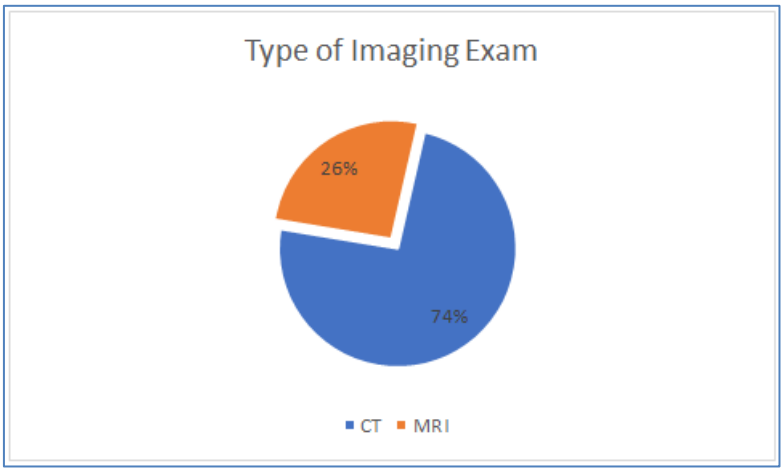

Fig-1: The type of imaging exam used to scan patients with stroke

In regard to the risk factors affecting patients, we found the older patients with hypertension and diabetes were more likely to be diagnosed with stroke compared to younger patients (an odds ratio [OR] of 5.7 with a 95% confidence interval (CI) of 1.9 to 17.7, P < 0.05 for the older patients, as opposed to an OR of 2.7 with a 95% CI of 1.2 to 6.1, P < 0.05 for the younger group).

Of the total of 118 patients, 91% had suffered ischemic stroke, while only 9% had been diagnosed with haemorrhagic stroke. Further analysis revealed no association between the type of stroke and the age of patients, p>0.05. Furthermore, although 75% of patients with ischemic stroke underwent CT compared to only 25% which underwent MRI, we found no relationship between the type of stoke and the type of imaging exam, p>0.05.

Concerning the stage of stroke, 44 patients had been diagnosed with a specific stage of stroke compared to 74 whose stage of stroke was unknown. Further analysis showed that the type of examination was not dependent on the stage of stroke, p>0.05. In addition, we found no relationship between the age of patients and whether the stage was identified or not.

DISCUSSION

The most prominent risk factors for stroke in our population were hypertension, diabetes mellitus and cerebrovascular accident. Hypertension has been identified as the most widespread risk factor globally for all such stroke patients, and its incidence does not vary between hospital and population-based research [14]. In Arab countries, diabetes mellitus rates are higher than in more developed countries: 19 % in Japan [23] and in Norway 12 % [15], contrasted with 56% in Kuwait and 57% in Qatar [24]. Community based studies carried out by Y. Bejot *et al*., [25] indicated lower diabetes rates in patients who have suffered stroke.

Our findings on the risk factors for stroke broadly correspond with those of other studies of the national context. For instance, it has been reported that the main risk factors for stroke in the Saudi Arabian population were family medical history of stroke (14%), smoking (19%), systemic hypertension (38%), cardiac diseases (27%), and diabetes mellitus (37%) [26]. Hypertension was also found to be the most significant risk factor for stroke among those different curable health conditions in the Saudi Arabian population [27]. The specific risk factors for stroke were found by another study to be (40.4%) for hypertension joined with diabetes, hypertension individually (24.9 %), and diabetes solely (11.6 %), indicating that the combined effect of hypertension and diabetes mellitus leads to an increased risk of stroke, particularly for women [28]. These previous findings converge with those of the present study, as seen in Table 1, with ischemic stroke being the most common case and the most common risk factors being hypertension and diabetes mellitus.

Stroke frequency in Saudi Arabia has been found to increase gradually with age until the eighth decade of people's lives [29]. Al-Jadid verified that a higher rate of stroke occurred in the 61-70 age brackets, and in the 20-30 and 31-40 age groups with less frequency [22]. Another study from Saudi Arabia also found that stroke emerged more frequently in the age cohort of 61-70, whereas the age group of 30-40 was least affected [30]. In terms of risk factors affecting

patients, we found that older patients with hypertension and diabetes were highly likely to suffer a stroke compared with young patients (with a 95 % confidence interval of 1.2 to 5.5, $p < 0.05$, and of 37 with a 95 %, at a p-value of < 0.05, respectively).

In terms of the relationship of stroke incidence and gender, our results differed from previous findings. One study indicated that men were at higher risk [22], and an investigation of 500 Saudi stroke patients revealed that 68.4 % were males and 31.6 % were females [27]. In our research, however, we could not detect an effect of gender on the likelihood of having stroke, since our sample was not representative and only had 36 female (30.5 %) and 82 male patients (69.5%). Therefore, our study does not demonstrate that men are particularly vulnerable to this condition, i.e., males and females in the context of this study should be considered to have a similar risk of stroke. In fact, we observed that the comorbidity of high blood pressure found in 83.9% of our sample was a much more significant risk factor, irrespective of gender. High blood pressure may present a particularly large risk because Abha is situated in a high-altitude area of the Kingdom of Saudi Arabia.

Already at high levels, the worldwide prevalence and impact of stroke is growing, as measured by its increased incidence, risk of death, Disability-Adjusted Life Years (DALYs) and economic effect, especially in low- and middle-income nations [31, 32]. However, the incidence and prevalence of strokes in Saudi Arabia remains low in comparison to those reported in Western countries, which may be due to the younger population in this region [27, 33, 34].

LIMITATION

The main limitation in our study is the small sample size due to the hospital-approved time limit for data collection.

CONCLUSION

Ischemic stroke was by far the most prevalent type of the disease reported in this study. Furthermore, with respect to the risk factors affecting patients, our findings showed that older patients with hypertension and diabetes are more likely than younger patients to have stroke. Further research showed no correlations between stroke type and patient age, nor between the test-type and the stage of stroke. Lastly, we found that hypertension is the most significant stroke risk factor in our sample. While acknowledging that the sample size was limited, this research is the first of its kind to be carried out in Abha in the province of Assir, and we intend to continue our data collection to include all major hospitals in the province in order to generalize our findings with greater confidence.

Competing interests

The authors declare no competing interests.

Authors' contributions

All authors engaged in the search for literature, evaluations of reviewed articles, the data analysis and the manuscript review. The final version of the manuscript was read and accepted by all readers.

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