Review article :

Stroke In KSA; Epidemiology And Clinical Delineation

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Abstract

Many countries are struggling to improve their existing health care services and in creating and maintaining balance in cost, quality, and access to health care. Kingdom of Saudi Arabia (KSA), is a large country that occupies a total land area of 2250000 km2, and population exceeds 32 million, is struggling like many other nations to improve its existing health care facilities countrywide to control the escalating costs and to provide quality care to its citizens. Stroke is considered one of the most common type of cerebrovascular disease that occurs in adults and leads to permanent disability and high mortality rate globally. It is one of the most common cause of death in developing countries. Stroke became a major problem and a significant cause of morbidity and mortality in KSA. Data available on incidence, prevalence, and socio-demographic parameters of stroke in KSA is still deficient as compared to the developed countries; due to the lack of appropriate findings being conducted/reported in the kingdom. Also, since very few specialized research medical institutes exist in KSA, there is lack of comprehensive studies on medical facilities and practices for this clinical service. This review article focuses on various aspects of stroke in KSA from the studies that have been published recently covering different issues of stroke in different regions of the kingdom which might be very help-

الملخص

على الصعيد العالمي، تكافح العديد من البلدان لتحسين خدمات الرعاية الصحية الحالية لديها وفي خلق التوازن في التكلفة والجودة والحصول على الرعاية الصحية والحفاظ على هذا التوازن. المملكة العربية السعودية، بصفتها دولة كبيرة تحتل مساحة إجمالية قدرها ٢٢٥٠٠٠٠ كيلومتر مربع ويزيد عدد سكانها عن ٣٢ مليون نسمة، تكافح مثل العديد من الدول الأخرى لتحسين وإعادة تكوين مرافق الرعاية الصحية الحالية في جميع أنحاء البلاد للسيطرة على التكاليف المتصاعدة وتقديم رعاية جيدة لمواطنيها. تعتبر السكتة الدماغية من أكثر أنواع أمراض الأوعية الدموية الدماغية شيوعًا والتي تحدث عند البالغين وتؤدي إلى إعاقة دائمة وارتفاع معدل الوفيات على مستوى العالم. كما أنه أحد أكثر أسباب الوفاة شيوعًا في البلدان النامية. أصبحت السكتة الدماغية مشكلة رئيسية وسببًا مهمًا للوفيات في المملكة العربية السعودية. لا تزال المعطيات المتوفرة حول حدوث السكتة الدماغية وانتشارها والمعايير الاجتماعية والديموغرافية للسكتة الدماغية في المملكة العربية السعودية ناقصة للغاية مقارنة بالدول المتقدمة؛ على الأرجح بسبب عدم وجود نتائج مناسبة يتم إجراؤها أو الإبلاغ عنها في المملكة. أيضاً نظرًا لوجود عدد قليل جدًا من المعاهد الطبية البحثية المتخصصة في المملكة العربية السعودية؛ هناك نقص في الدراسات الشاملة حول المرافق والممارسات الطبية لهذه الخدمة السريرية الخاصة. تركز مقالة المراجعة هذه على جوانب مختلفة من السكتة الدماغية في المملكة العربية السعودية من الدراسات التي تم نشرها مؤخرًا والتي تغطي قضايا مختلفة من السكتة الدماغية في مناطق مختلفة من المملكة والتي قد تكون مفيدة جدًا لمقدمي الرعاية الصحية لإعداد ووضع استراتيجيات الوقاية الأولية والتوزيع السليم للموارد الصحية

ful for the health care providers to set up and make primary prevention strategies and proper allocation of health resources in order to improve stroke care.

Key Words:
Cerebrovascular diseases, Kingdom of Saudi Arabia, Stroke.

لتحسين رعاية السكتة الدماغية في المملكة العربية السعودية.

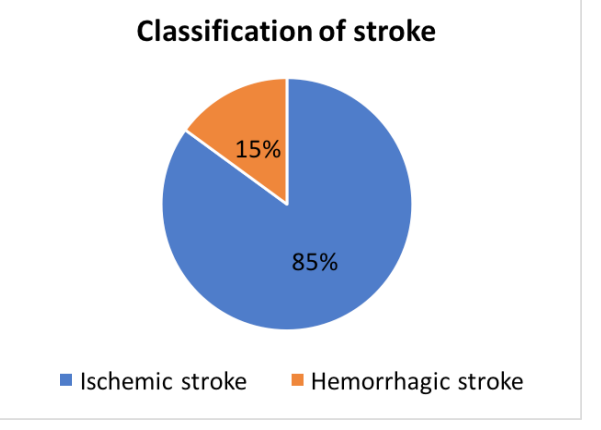
الكلمات المفتاحية:
أمراض الأوعية الدموية الدماغية، المملكة العربية السعودية، السكتة الدماغية.

Key point box:
• Annual cases of stroke in KSA are around 43-57 per 100,000 population with predominant ischemic type (79-87%).
• The greatest risk factor of stroke is hypertension followed by diabetes mellitus, heart disease, and smoking.
• Reported post stroke complications include dysphagia, stress ulcers, pneumonia, depression, anxiety, and abnormal troponin levels.
• Stroke mortality rate is high (27%) in KSA as compared with other Middle east countries.
• Majority of stroke patients (95%) were treated and received supported care in non-specialized stroke hospitals.

INTRODUCTION

Stroke is an event that occurs when blood supply to the brain is either interrupted or severely reduced, resulting in deprivation of oxygen and nutrients to the brain tissue1. Stroke can be classified into two types; ischemic and hemorrhagic strokes. Ischemic stroke represents 85% of stroke cases, which occurs due to blockage of the brain arteries, leading to brain damage and loss of cognitive function. The remaining 15% of stroke cases are hemorrhagic strokes, which results from blood escaping from the arteries into the nearby brain tissue, causing a permanent damage there, see figure -1. Hemorrhagic stroke causes more damage than ischemic strokes[2].

Figure -1: Stroke types



Cardio-embolic stroke represents 14% to 30% of all ischemic strokes, which occurs

in the presence of a cardiac emboli that circulate into the brain arteries, leading to occlusion of the brain blood vessels and damaging the brain tissue, which requires immediate intervention. Heart disease like atrial-fibrillation is the main cause of cardio-embolic strokes, and its prevalence is strongly increasing with age. Other risk factors for cardio-embolic stroke include; diabetes mellitus, hyperlipidemia, hypertension, cardiac disease, and sedentary lifestyle [3]. Risk of ischemic stroke is five times higher in people with atrial-fibrillation than in those without atrial-fibrillation. Anti-thrombotic drugs are prescribed for ischemic stroke prevention [4]

Globally cerebrovascular diseases are the sixth major cause of permanent disease burden. It is expected to shift to the fourth place by 2020 [5]. Stroke is one of the primary reasons of irreversible neurological destruction and functional impairment globally [6]. There is no standard drug or therapy available to improve recovery after stroke events. Stroke can leave a psychological, cognitive, physical, and social function disturbances, which depends on the type and severity of the stroke event [7, 8]. World Health Organization estimated that every year around 15 million people all over the world will be affected with stroke, among which 5 million will die, and 5 million will suffer from ongoing disabilities [9, 10].

Stroke is an important cause of morbidity and mortality globally [11]. Stroke is one of the most common cause of death in adult life after cancer and ischemic heart disease[12]. Globally about 65% of stroke deaths are reported in the developing countries, and almost 40% of these stroke deaths are reported in individuals younger than seventy years old. The global incidence of stroke will broaden as the number of people older than 65 years is expected to increase by 2025, reaching 10% of the total population [13].

It is important to keep monitoring the burden of stroke on a global scale and to compare it with different countries and regions over time, including projections and trends relevant to other major illnesses. This will help in filling the gap in estimating the disease burden across the countries. Since the epidemiology of stroke is rapidly changing, on-going population-based studies serves as best source for planning and organizing stroke care and services [14].

The Middle East area confronts a double burden of stroke, because of the declining rates of contagious diseases and rising rates of non-contagious diseases [15]. The burden of stroke in low- and middle-income countries are now increasing, and affecting the morbidity, incidence, mortality, disability adjusted life, and economic impact [16].

The incidence and prevalence of stroke in

KSA is lower than the western countries. This might be due to the high proportion of the young population in this county [17]. As per to our knowledge, no studies have been recently conducted on the incidence and prevalence of this disease in KSA. Previous findings and published studies related to stroke in KSA are assume and taken into consideration for designing future stroke studies in KSA.

The goal of this review article is to analyze and assess variety of aspects of stroke in KSA, including its types, outcome, risk factors, comparing the results with those studies have been reported before, and epidemiological data (incidence and prevalence, including; Saudis and non-Saudis, gender difference, young and non-young patients, age standardized rates, mortality, and global burden) in KSA.

After reviewing the published reports of stroke in KSA, it was concluded that the data on incidence and prevalence, risk factors, clinical patterns, and outcome of stroke in KSA were underreported. This review will provide a background for designing future stroke studies in KSA, the outcome of this study will be helpful in strategic planning of stroke management in KSA.

METHODS:

This review article was undertaken to identify the epidemiology and clinical delineation of stroke in Saudi Arabia. Google schooler was used as search strategy to establish the prevalence, risk factors, clinical patterns, and outcome of stroke in Saudi Arabia, through the available published literature on PubMed and Web of Science websites. Key words in the title, and synonyms and terms of the keywords were used in the search of literature. Articles found in the reference lists were considered when their titles were relevant. Limits on year of publication were applied to exclude old studies, of more than 20 years old.

Incidence and prevalence of various stroke types in KSA:

Every year more than 15 million population all over the world is affected by either new or recurrent stroke events. The highest burden of this disease is reported in low- or middle-income regions, due to lack of basic health care infrastructure, less specialized healthcare units and rehabilitation services [18]. The incidence of stroke and its prevalence in KSA is low if compared to western countries, because of the high proportion of young population in this county [18]. Al-Rajeh et al., reported that the crude incidence rate for first incidence of stroke in KSA was 29.8 per 100,000 population per annum. The same study also reported that ischemic strokes were predominated by 69%, while hemorrhagic strokes were

rare 1.4% 10. A research study was carried out by Al-Rajeh et al., on a large-scale in hospitals that treated the National Guard community of Saudi Arabia, informed that the incidence rate of strokes was 43.8 per 100,000 per annum (10). Al-Amri et al., reported that annual cases of stroke in KSA are 57.64 per 100,000 population [19].

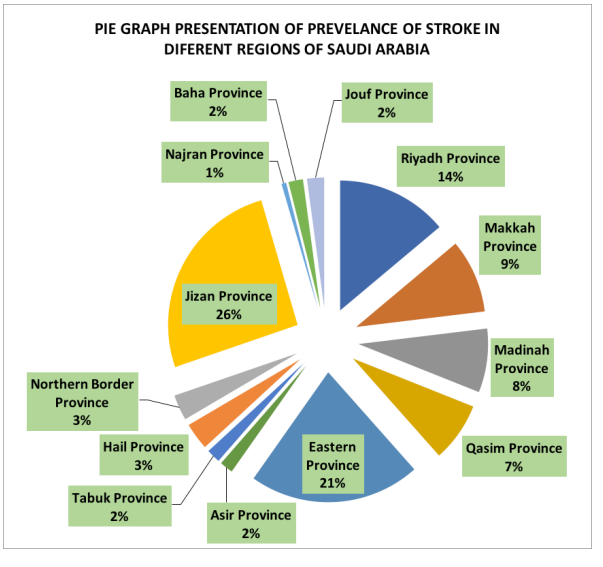
El-Sayed et al., reported that the most common stroke subtypes were ischemic strokes, which were 79% of the total cases, and 46% of it were with lacunar infarcts, followed by intracerebral hemorrhages which were 18.8%, and 2.2% of it were Sub-Arachnoid hemorrhages in KSA [10]. AL-RAWI et al., reported that among 950 patients admitted in a tertiary hospital in Duhok city in KSA, 84.5% (803) were ischemic strokes while 15.5% (147) were haemorrhagic strokes 20. Yaqub et al., reported that among 200 local Saudi stroke patients, cerebral infarction cases were 87%, cerebral hemorrhages were 6.5%, subarachnoid hemorrhages were 4.5%, and the least were venous infarctions which were 2% [10].

The most commonly affected artery was the middle cerebral artery, which represents 52% of the arterial infarcts, lacunar infarcts were observed in 21% of the total cases with arterial infarcts, elevated blood pressure was noticed in 41% of the cases with arterial infarcts, and 62% with cerebral hemorrhages [10]. Also, two more local studies, Al-Rajeh et al., and Emam et al., established that the occurrence of ischemic stroke was higher when compared to other types of strokes [21, 22]. A recent study published by Al-Hazmi et al., established that the incidence of ischemic strokes is highest 85.26% among all other stroke subtypes, whereas occurrence of hemorrhagic and embolic strokes holds equal proportion 7.37% in KSA [23].

Saudi Arabia and World data:

Al-Ahmari et al., provided apparent information about stroke prevalence [24]. It was revealed that prevalence of strokes is low in KSA when compared with those recorded in the western and Asian countries. This could be due to the predominance of the younger age groups in this region. The prevalence of stroke in various region of KSA have also been reported as illustrat-

Figure -2: Stroke prevalence in Saudi provinces (Al-Ahmari, 2016).



ed in pie figure -2. The major risk factors for stroke includes old age [10, 25], male gender 26, cigarette smoking [27], dyslipidemia, high blood glucose level, and cardiac diseases [28].

Major risk factors of stroke:

Stroke has numerous risk factors, which are either modifiable or non-modifiable [29]. The most common modifiable risk factors are; alcohol consumption, cigarette smoking, elevated blood pressure, dyslipidemia, high blood glucose level, and cardiac diseases, whereas; sex, age, positive family history, and race are among non-modifiable risk factors [29, 30]. The modifiable risk factors can be prevented by adopting healthy lifestyle, regular use of medications of modifiable risk factors, alteration in individual's behavior such as giving up on alcohol and smoking, and maintaining healthy level of body mass index [31]. Stroke can be prevented by controlling the modifiable risk factors [32].

A latest local study by Al-Hazzani et al., reported that hypertension was the most frequently identified risk factor for stroke among Saudi stroke patients, followed by dyslipidaemia, cigarette smoking, and old age 27. Maqbul et al., reported that among young Saudi individuals; obesity, high fatty meals, and cigarette smoking are the most common risk factors for stroke [33]. Al-Rajeh et al., reported that the main risk factors for stroke in Saudi population are; hypertension 38%, diabetes 37%, heart disease 27% (including: atrial fibrillation, valvular disease, cardiomyopathy, ischemic heart disease), cigarette smoking 19%, and family history of stroke 14% 17. El-Sayed et al., conducted on national level reported some of the general risk factors of stroke, including; diabetes along with hypertension 40.4%, elevated blood pressure 24.9%, diabetes 11.6%, atrial fibrillation 5.8%, heart diseases 5.5%, prior stroke or transient ischemic attack 2.1% for each, and smoking 1.8% [10]. A study done by Awada et al., reported that elevated blood pressure (52%) was the main underlying cause of stroke in KSA, followed by hyperglycemia and heart diseases. Also, atherosclerosis 36%, elevated blood pressure and diabetic arteriopathy 24%, and cardiac embolisms 19% set up to be the most common reasons for cerebral infarction [10].

It is become an evident, that the main predisposing factors for stroke in KSA are; elevated blood pressure, hyperglycemia, heart disease, and cigarette smoking. It was observed that people suffering from both hyperglycemia and high blood pressure have a higher threat for stroke [34]. The most effective modifiable risk factors in prevention of stroke are; smoking cessation, controlling blood pressure, use of anti-thrombotic drugs in atrial fibrillation,

and controlling diabetes [35].

Influence of age:

In KSA the occurrence of stroke relates to age until the seventh decade [10]. Recent studies estimated that stroke happen more in the age between 61-70, and less common in the age between 20-40 [10, 26]. Studies by Asirvatham et al., and Al-Eithan et al., from KSA showed that stroke happen in age between 61-70 more than the age between 30-40 [10, 25]. One of the stroke studies by Al-Sulaiman et al., in Saudi children have been done in Al-Khobar, a city in KSA, reported that 20,895 of the Saudi children had stroke. The prevalence of stroke in children was 29.7 for each 100,000 in the pediatric section. Ischemic strokes represent 90%, while hemorrhagic strokes represent 10% in Saudi children [36, 37].

Gender differences:

A small number of data have been available and published in KSA regarding the gender differences of stroke, representing that it affects male population more than female population [10]. Al-Jadid et al., reported that men are more susceptible of getting stroke than women [26]. A large-scale study carried out by Al-Rajeh et al., on 500 local Saudi individuals with stroke also reported the same, that among them 31.6% were females and 68.4% of stroke patients were males [10].

Saudis and non-Saudis:

KSA has a total population of about 32 million, among which 63% are local Saudis, and the remaining 37% are foreign expatriates [38]. A local study by Al-Rajeh et al., was conducted on 372 subjects, including 262 Saudi locals and 110 non-Saudis to study the types and etiologies of stroke among local and expatriates. According to this study men to women ratio were 2.2:1, and Saudi to non-Saudi ratio were 8.2:1. The incidence of stroke expanded with age until the seventh decade in local Saudis, and it was declined after the sixth in non-Saudi individuals. The incidence of different stroke types in Saudis were; 61% ischemic, 17% hemorrhagic, and 22% were unspecified. On the other hand, ischemic 46%, hemorrhagic 47%, and unspecified 7% were recorded in non-Saudi individuals. Intracerebral bleeding was more common than subarachnoid bleeding and was experienced more frequent in local Saudis than expatriates. Subarachnoid bleeding was three times more typical in expatriates than in locals 21. Al-Rubeaan et al., reported that ischemic stroke among Saudis with pre-existing type 1 and type 2 diabetes was similar to non-Saudis [39].

Post stroke complications:

Baig et al., reported that among 492 patients of stroke admitted in a tertiary care hospital of Eastern province of KSA, almost 9.6% patients developed post-stroke

epilepsy [40]. Ibrahim et al., reported a study conducted in King Khalid University in KSA, concluded that dysphagia is highly prevalent among stroke patients [41]. Khayyat et al., carried out a study in tertiary care hospital of Jeddah in KSA, involving 278 patients. The most common post stroke complications were; stress ulcers 17%, pneumonia 14% and venous thromboembolism 3%. Abnormal troponin levels were also observed in 34% of the patients [42]. Al-Busaidi et al., reported that among 60 stroke patients, 17% of the patients developed post stroke depression. Al-Busaidi et al., reported that among 76 stroke patients, 18.4% patients developed mild to moderate anxiety and 23.7% patients developed moderate to severe depression post stroke event [43]. Ullah et al., reported that among 60 stroke patients, 63.3% patients developed musculoskeletal pain, 21.6% developed depression, 18.3% developed urinary tract infections, and 7% developed stroke progression post stroke event [44].

Mortality rate in KSA:

The mortality rate of stroke is higher in developing countries as compared to developed countries. Al-Hazzani et al., reported that mortality rate due to stroke in developed countries is 3-11% and 7-15% in developing countries. Various factors affect the mortality rate of a country such as age (increasing age increases the chances of stroke deaths), gender, and availability of specialized stroke units in hospital. It was also reported that the mortality rate of stroke in Middle East region is found to be 8 to 28%. This study reported that the mortality rate in KSA due to stroke was 27% [28].

Current critical care of stroke in KSA:

KSA lags behind other developed countries of the world in combating and managing stroke care. Majority of the stroke patients (95%) were treated in non-specialized stroke hospitals, where they receive non-reperfusion supportive care for both non-large vessel occlusion and large vessel occlusion, and only 5% of stroke patients were treated in specialized stroke units, where they receive international standard treatment IV-tPA (intravenous tissue plasminogen activator) [45]. This difference in health care services is mainly due to improper allocation of resources and lack of organization of care. This situation has provoked the Ministry of Health in KSA to established specialized stroke care units in hospitals to improve stroke care, and to provide standard treatment to all stroke patients [45]. Hence by improving the current infrastructure, adopting the international standard guidelines, developing advanced specialized stroke units will not only help KSA to combat stroke more effectively, but also decrease the overall morbidity and mortality associated with stroke.

CONCLUSION

Stroke has become one of the most critical cause of morbidity and mortality in KSA, and its incidence is increasing due to different risk factors. The increasing cases of stroke has provoked Saudi government to take and establish strategies to combat stroke. In this regard, Ministry of Health in KSA has introduced stroke care development program to provide advanced stroke care and treatment. This model predicts that stroke care development program is associated with improved patient outcomes and lower overall costs compared with the current stroke care program. Also, KSA health system adopted and introduced latest technologies such as the use of telemedicine, which will reduce the overall stroke burden and will prevent post-stroke complications. This review is a compilation of recently published studies in KSA covering different aspects of stroke on different regions, which might be very helpful for the health care providers of this region to set up and make primary prevention strategies and proper allocation of health resources in this area.

CONFLICT OF INTEREST

There is no conflict of interest.

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