

Stroke in Libya: A community Based Study of Risk Factors

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ABSTRACT

A stroke is the leading cause of adult mortality and disability. It is the second most common cause of death globally and may soon become the first cause of death worldwide. Among the most important risk factors for stroke are advanced age, hypertension, diabetes, previous stroke or transient ischemic attack. Hypertension and diabetes are the most important and frequent modifiable risk factors of stroke. Estimate the most important risk factors associated with stroke in Libyan population by using CHADS2 method.

This study is community based descriptive cross-sectional study among Libyan individuals who live in the capital of Libya. Individuals who do not have atrial fibrillation were interviewed about risk factors of stroke using CHADS2 Questionnaire.

Among the population screened (7497) over five years from (2010 to 2014), the mean age was 52.0, with a range of 16 to >80 years old. Prevalence of diabetes was in 39% of the population, with a higher incidence among males than females ($P = 0.001$). Hypertension was 38%, with the males having a higher rate than females in most of the age groups ($P = 0.041$). Diabetes and hypertension had an increased incidence with age groups over 40 ($P < 0.0001$).

Congestive heart failure was 15.2% which increased with age ($P < 0.0001$). The prevalence of congestive heart failure was the highest in females aged of 16-59 and in males aged over 60 years.

Transient ischemic attack (TIA) was 15%, with greater numbers in the males over the females in all the age groups ($P < 0.001$) and an increased incidence with age ($P < 0.0001$).

Prior stroke (ischemic or hemorrhagic) prevalence was 9.7%, it was more among males than females ($P < 0.05$) and increased with age over 40 ($P < 0.0001$).

In this study, it is concluded that stroke is a major public health problem in Libya and that the prevalence of stroke increases with increasing age, and males are affected more than females for most of age groups. Diabetes, hypertension, congestive heart failure and previous history of embolic or transient ischemic attack are major risk factors that are associated with stroke.

Keywords- Stroke; Prevalence; Risk factors; Libya.

INTRODUCTION

Stroke is the second leading cause of death above the age of 60 years.¹ Every year, 15 million people worldwide suffer a stroke. Nearly six million die and another five million are left permanently disabled.¹ In the developing world, compared to the developed world, stroke incidence is lower, even though the actual number of strokes is increasing due to the complex risk factors including ageing, socio-culture and behavior environment.²

The 2009 WHO World Health Report found 359,000 stroke related deaths (3% of all deaths) in Africa compared with almost 1.5 million (16% of all deaths) in Europe.³ In the Middle East and North Africa, stroke is increasingly becoming a major health problem, with deaths expected to nearly double by 2030.⁴ In Libya, the incidence of stroke varies from 63 to 162 per 100,000 of the population (depending on the location inside Libya) and males are affected more than females.⁵ According to

the WHO 2014 report, 78% of deaths in Libya are due to non-communicable diseases, which include stroke⁶ and the mean age of stroke is within the sixth and seventh decade (varying from 58.5 to 63).⁶

Stroke risk factors which are non-modifiable include the patient's sex and age. Men are 25% more likely to suffer strokes than women.⁷ Furthermore, advanced age is one of the most significant stroke risk factors where 95% of strokes occur in people aged 45 and older and two-thirds of strokes occur in those who are aged over 65.⁸

Modifiable risk factors include hypertension, diabetes, obesity, smoking, and lack of exercise.⁹ High blood pressure and diabetes mellitus are the most important modifiable risk factors of stroke.¹⁰ Hypertension accounts for 35-50% of stroke risk.¹⁰ Diabetic patients are at two to three times the risk of a stroke compared with the general population.¹¹ According to the Libyan Research Institute report in 2001; the percentage of people in Libya who



were hypertensive, diabetic, and obese was 21.6%, 7.9% and 31% respectively.¹² These number have increased, where according to the Center of Disease Control-World Health Organization (CDC-WHO) report in 2009 (done by Ministry of Health) the percentage of people that were hypertensive, diabetic, and obsess was 40%, 23.7%, and 63% respectively.¹³ Therefore, the main object of this study is to estimate the most risk factors associated with stroke in the Libyan population by using CHADS2 method

MATERIALS AND METHODS

The study is community based descriptive, cross-sectional study, among Libyan individuals who live in Tripoli and surrounding areas.

Populations: Individuals who are 16 years old or above.

*Population sample:*7497individuals.

Area: Libya, (Tripoli the capital) and surrounding areas.

Time: Five years from 1/1/2010 to 31/12/2014

CHADS2 Questionnaire is originally used to assess stroke risk in patients with atrial fibrillation (AF),¹⁴ however, it was adapted in this study to be used among patients without AF as reported in other studies elsewhere.¹⁵

Individuals were interviewed about the risk factors of stroke using CHADS2 Questionnaire (Table1), where doctors in the Community and Family Medicine Department at the University of Tripoli collected data, took histories (present, past, medical, and hospital admissions), performed medical examinations, and checked of any available investigations; discharge letters; and medical reports. Known cases of stroke or transient ischemic attack (TIA) had been established by medical diagnosis in the past by hospital specialists.

Statisticians gathered and analyzed all data information using SPSS package version 17- USA, using T-test and a *P value* was done to finalize the results of the study.

RESULTS

Using SPSS software independence sample t-test applied on age distribution of individuals screened for the whole study population (7497 individuals), the mean age was 52.0, and the age range was between 16 to >80 years old.

The age of participants was divided into 8 age groups (10 years interval within each group except for the last group which included those who were ≥80 year old)

Table 1: Shows CHADS2 questionnaire used in this study

Parameter
C: Congestive heart failure
H: Hypertension
A: Age andsex
D: DM
S: Prior stroke embolic or hemorrhagic) or Transient ischemicattack TIA)

Table 2: Shows age and sex structure of participants

Age	Sex		Total
	Male	Female	
10-19	81	62	143
20-29	453	479	932
30-39	534	500	1034
40-49	606	633	1239
50-59	650	667	1317
60-69	637	543	1180
70-79	641	448	1089
>80	279	284	563
Total	3881	3616	7497

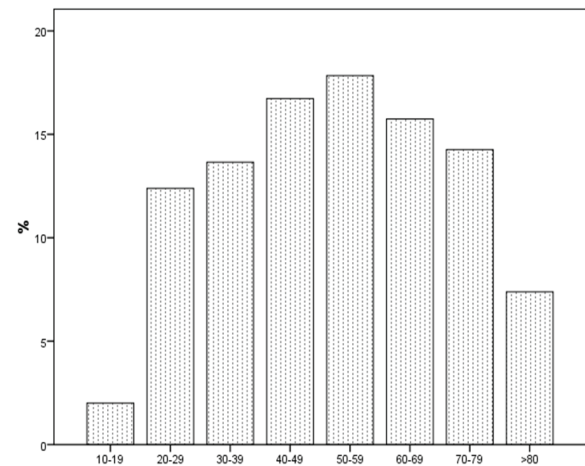


Figure 1: Shows participants 'age distribution.

From all the participants, males constituted 52.8% (3881) and females were 48.2% (3616) (Figure 2). Both age and sex distribution in this study are similar to the results of the Libyan census of 2010 (51% males and 49% females).

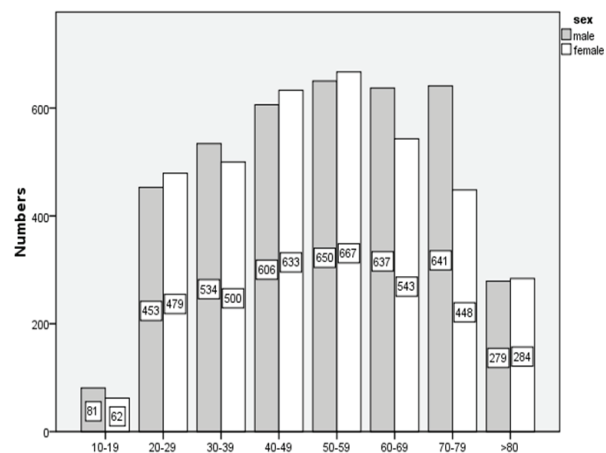
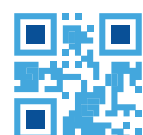


Figure 2: Shows participants' age and sex structure



Diabetes Miletus (DM) as a risk factor:

The prevalence of DM among the study population over five years was 39%, where 54.1% were males and 45.9% were females. The prevalence of DM among the males in the different age groups was higher in comparison to females (P value = 0.001) (Figure 3). Also, it was observed that the prevalence of DM increased with increasing age

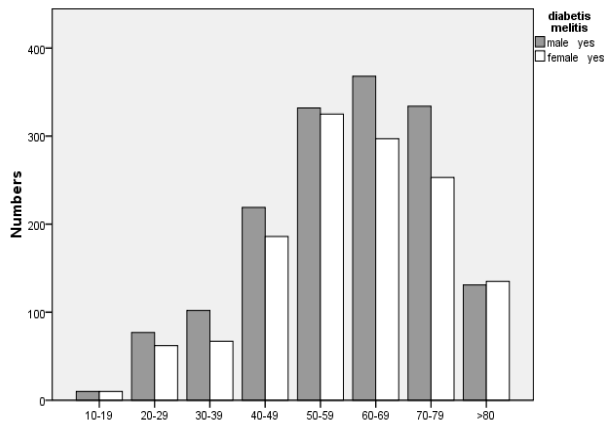


Figure 3: DM was found to be more prevalent in groups aged ≥ 40 in comparison to the younger age group (P value < 0.0001).

Hypertension (HT) as a risk factor:

The prevalence of HT among our participants was 38%, with the males and females constituting 50.2% and 49.8%, respectively (P value = 0.041). Among the different age groups, males had a higher rate than females except for the age groups 40-49, 50-59 and ≥ 80 where females had a higher rate. The relation between HT and age showed that the prevalence of HT increased with increase of age. Among the different age groups, higher rates were found in the age groups over 40 (P value < 0.0001) (Figure 4).

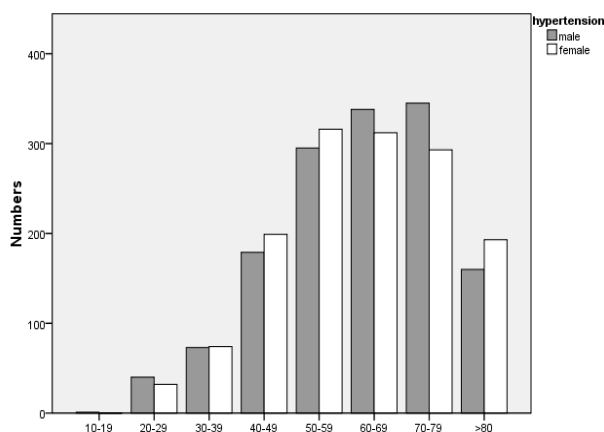


Figure 4: Shows hypertension distribution among males, females and within different age group.

Congestive heart failure (CHF) as a risk factor:

The prevalence of CHF among the study population was

15.2%, with 51.2% of them males and 48.8% females (P value < 0.05). Females had a higher prevalence rate among the different age groups compared to males except for age interval 60 to 79 where males had a higher rate (Figure 5).

Similarly to diabetes mellitus and hypertension, the prevalence of congestive heart failure increased with increasing age. Also, the age groups with the highest prevalence rate was in the age groups over 40 (P value < 0.0001).

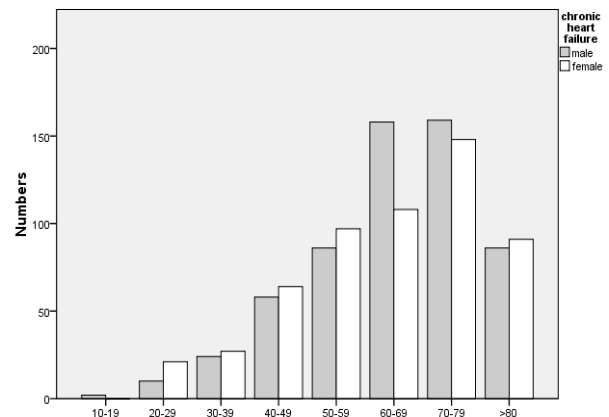


Figure 5: Shows congestive heart failure distribution within different age group for both males and females.

Transient ischemic attack (TIA):

The prevalence of TIA among the study participants was 15%, with 58.2% males and 41.8% females. Males had a higher TIA rate than females in all the age groups studied (P value < 0.001), (Figure 6).

Like the other study risk factors, the prevalence of TIA increased with increasing age. A higher prevalence rate was seen among those groups aged over 40 (P value < 0.0001) (Figure 6).

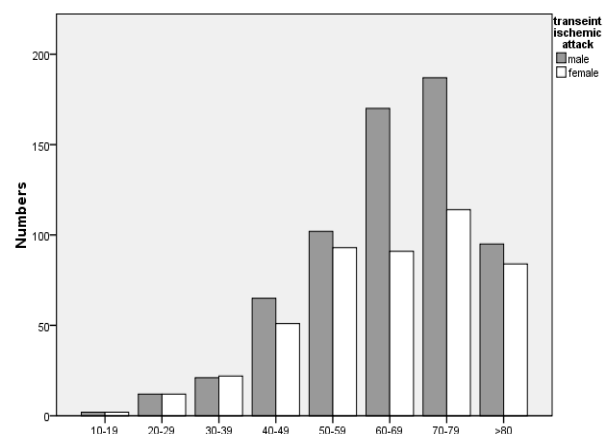
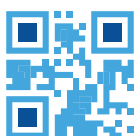


Figure 6: Shows transient ischemic attack distribution among males, females and within different age group.

Prior stroke (PS) (embolic or hemorrhagic):

Prior stroke prevalence rate was 9.7%, with the males and females constituting 51.1% and 48.9%, respectively (P value < 0.05). In comparison to males, females had a higher prior stroke rate in age groups from 16 to 69 and males dominated in ages over 70 years old (Figure 7).

As with the other risk factors, the same trend was also observed where the prevalence of PS increased with increasing age. Similarly, the age groups over 40 showed the highest prevalence rate (P value < 0.0001) (Figure 7).

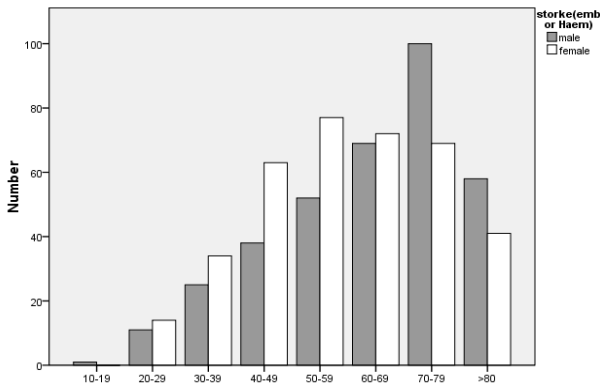


Figure 7: Shows prior stroke distribution within different age group for both males and females

DISCUSSION

This is the first time such a big study for assessing the stroke risk factors among the community population in Libya was carried out. From this study it is found that stroke is a very common and important public health problem among Libyan citizens.

In the past, different studies performed in Libya found high stroke prevalence rates.⁵ A study in Benghazi (Northeast of Libya) revealed a stroke crude annual rate of 162 per 100.000 of the population for those aged ≥ 45 years.¹⁶ This result is higher than the corresponding rates from some of the developed countries.¹⁷

In comparison to developing countries and results from this Libyan study, stroke prevalence rate in the USA is low, and the overall incidence of stroke in the young was 23 per 100 000 persons per year. However, like our Libyan study, stroke in the USA is more frequent in males than females.¹⁸ Conversely, the prevalence of stroke in Italy is high compared to other western countries and this is concordant with our high results.¹⁹

The prevalence of diabetes mellitus in this study was 39%, which is unexpectedly higher than the rate found by the Libyan Research Institute (7.9%) in 2001, and the rate found by CDC-WHO community survey (23.7%) in 2009.^{12,13} From these results, the prevalence has increased 15.8% in eight years (from 2001 to 2009), with a 2% increase each year. Subsequently, we expect the DM prevalence rate to double during the next years, especially if the overwhelming and distressing circumstances of

Libya are taken into account.

According to the Libyan Research Institute, the prevalence rate of hypertension among the Libyan population in 2001 was 21.6%¹², and according to the CDC-WHO survey in 2009 the rate increased to 40.6%.¹³ In the present study, the hypertension prevalence rate was high (38%) but lower than the result from the CDC-WHO survey.

Hypertension is the most frequent risk factor in stroke patients from Arab countries, affecting 24.9% to 67% of reported patients, whereas DM was present in 11.6% to 69.4% of the stroke patients.⁵ In line with this, our study also found that DM and hypertension are the most frequent risks of stroke.

This study found CHF prevalence rate as stroke contributing risk factor is high (15.2%); similar result found by other Libyan and Arab countries studies where found increasing rate of obesity, smoking, lack of exercise and eating of unhealthy diet among Libyan, and all of them are risk factors of cardiac disease.^{5,13}

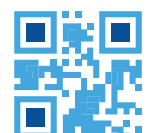
Hypertension, ischemic heart disease, diabetes mellitus, smoking and hypercholesterolemia are well-known risk factors of stroke. An Oxford shire community stroke project study showed that the risk factors were present in 80% of cerebral infarction cases, 52% of hypertension cases, 38% of ischemic heart disease cases, 25% of peripheral vascular disease cases, 20% of emboli to the brain cases generating mainly from cardiac lesions, and 10% of diabetes mellitus cases.²⁰ Similar to other studies carried out in Arab countries⁵; Mortel *et al*, reported diabetes second to hypertension as a risk factor of stroke, followed by heart disease and smoking.²¹ Likewise, the present study revealed DM and hypertension as leading risk factors followed by CHF.

In the present study a combined prevalence of stroke in TIA patients and those with prior stroke (embolic or hemorrhagic) was found to be 24.7% (15% and 9.7% respectively). In another Libyan study, the combined prevalence was found to be 57% in 2009 which studied multiple risk factors of stroke.¹³

Several articles have reported stroke incidence rates in Arab countries like Kuwait, Saudi Arabia, Qatar, Libya and Bahrain.⁵ The incidence varied from the lowest of 27.5 per 100,000 of the population per year in Kuwait to the highest of 63 per 100,000 of the population in Libya. The studies also indicated that the stroke rate increased with increasing age (affecting old people), males were affected more than females, and the most frequent stroke type was ischemic stroke. Hypertension was the most frequent risk factor, followed by DM, hyperlipidemia, cardiac diseases and cigarette smoking.⁵ Similar results were observed in this study (regarding Libya). The comparative results between Libya and the other Arab countries studied could be due to diet and lifestyle similarities among the Arab population

Even though they are from different countries, and these similarities may influence stroke risks, types and the survival after stroke.^{4,5}

In a 10 year report on Saudi Arabia, the incidence and



prevalence rate of stroke were low in comparison to those reported from Western countries, but this was mainly due to the age distribution of the Saudi population (young people constitute the majority of population).²² However, in this Libyan study, stroke was found to be more common in the older population (especially those aged over 40) even though the majority of the Libyan population is young as with the Saudi population.

This study and other reports from Libya have specified the stroke risk factors present among the Libyan population and these factors are showing an increased incidence.^{12,13} Stress is a major risk factor associated with an increased incidence of stroke-related risk factors (with no actual studies done in Libya). In our opinion, all the high prevalence of risk factors of stroke (DM, HT, CHF) and stroke prevalence itself, could be related to many complex factors but stress plays a major role especially due to the severe stress and trauma related to the civil war in Libya which started in 2011.

CONCLUSION

This study found stroke as a major important public health problem in Libya. Stroke prevalence rate increased with increasing age, and males were affected more than females. DM, HT and CHF and previous history of stroke or transient ischemic attack are major risk factors associated with stroke. Moreover, the incidence of stroke-related risk factors are increasing by time. The doubling prevalence rate of stroke in recent years might be related to sedentary life, obesity, bad eating habits, lack of exercise, epidemic of smoking, and severe stress from the continuous civil war in the country.

Strengths and limitations of the study

It is the first Libyan community based study that use CHADS2 questionnaire to assess stroke risk factors among those who do not have atrial fibrillation. Moreover, it uses a large sample size, thus, the prevalence rates produced from this study reflect the real situation in the Libyan community. Finally, because, this study is a cross-sectional study; therefore it explores associations, not causation.

RECOMMENDATIONS

Additional studies could be performed to measure stroke risk factors by using laboratory investigations and other medical diagnostic procedures, consequently, to estimate the most accurate and true rates.

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