Risk Factors of Stroke in Patients Admitted in European Gaza Hospital, Gaza Strip: A case Control Study in Medical Unit Setting

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Abstract
Background: Worldwide stroke is one of the leading causes of mortality and morbidity. It is a global health problem and is a leading cause of disability. In rapid increase in burden of stroke in coming years and limited availability of stroke care in Palestine, it would be better to study stroke prevention strategies. The current hospital based case-control study was undertaken with aim, to identify the risk factors for stroke.

Material and Method: Study was carried out in European Gaza Hospital from March 2014- May 2014. A retrospective case-control, age and sex matched study was designed to find the risk factors. Cases: The study consisted of 100 hospitalized computed tomography scan proved cases of stroke. Controls: The controls were selected from patients who attended the study hospital for conditions other than stroke. For each case of stroke, one control was selected. The controls were matched to cases in respect to age (± 5 years), sex. One hundred controls were selected in the same manner.

Results: In a total of 100 cases, 59% were males and 41% were females. Sixty percent were more than 51 years with a mean age of 54.74 years. Ischemic stroke was found in 66 patients and hemorrhagic stroke was found in 34 patients. Bivariate analysis included odds ratio and its 95% confidence intervals were identified, hypertension (OR=4.181), psychological troubles (OR=3.026), obesity (OR=2.923), diabetes (OR=2.733), smoking (OR=2.020), and hypercholesteremia (OR=1.909) as a risk factor for stroke.

Conclusion: This is a study that quantifies the contribution of different factors to the overall risk of stroke. Finding that, hypertension, psychological troubles, obesity, diabetes is the biggest risk factors for all types of strokes are important because, like many other factors, these are modifiable risks, that can be treated by appropriate medication and lifestyle changes.

ABBREVIATIONS
CT: Computed Tomography; CVD: CerebroVascular Disease; CI: Confidence Interval

INTRODUCTION
It has been said that no single medical measure could make as much as contribution to the quality of life in old age as prevention of cerebro-vascular disease. An understanding of the etiological factors that contribute to the onset of stroke is required in order to assess the potential for stroke prevention [1].

The term CerebroVascularDisease (CVD) covers all disorders that an area of the brain is either temporarily or permanently affected by ischemia or hemorrhage, with one or more of the cerebral blood vessels affected by disease. Stroke is a generic
term referring to a group of disorders that comprise cerebral infarction, cerebral hemorrhage, and subarachnoid hemorrhage, which characterizes the abrupt and sudden nature of onset [2].

Globally, stroke is one of the leading causes of mortality and morbidity. It is a global health problem and is a leading cause of disability. Nearly 20 million people each year will suffer from stroke; of these 5 million will not survive [3]. According to the World Health Organization, around 5.71 million people died from stroke in 2004, [4] and it is estimated that this figure will increase to 6.3 million in 2015 and 7.8 million in 2030 [5]. Additionally, in the Eastern Mediterranean Region, CVD and stroke account for 31% of deaths, and hypertension currently affects 26% of the adult population in the Region [6].

Stroke is also the main cause of impairment with 20% of survivors needing institutional care after 3 months and 15% - 30% being permanently disabled [7]. It is a life changing event which not only affects people that may be disabled, but their families and their caregiver.

Palestine with more than 1.6 million inhabitants [8] is undergoing remarkable economic and demographic changes in recent years, resulting in a transition from poverty and nutritional deficiency diseases towards lifestyle related cardiovascular and cerebro-vascular diseases. Despite rapid economic boom, a large segment of the Palestinian population still lives in poverty. Given the anticipated increase in burden of stroke in coming years. According to the Palestinian Ministry of Health, stated that CVD are the fourth leading cause of death in the general population (11.8%) at age below 60 years, the sixth in males (6.7%) and the third in females (10.5%), and the second (in purple) above 60 years with a prevalence of (13.9%).

In the southern part of Palestine, Khanyounis and Rafah district is a well-defined area with a total population of 591,000 native Palestinian inhabitants [8]. European Gaza Hospital is the governmental hospital in Khanyounis and Rafah district that offers medical services to patients with acute stroke.

Patients with stroke are admitted to the emergency department of European Gaza Hospital and treated as inpatients. The hospital is located in the center of the district and offers 24-hour emergency services for acute stroke.

Generally, It is recognized that stroke is a multifactorial condition. A number of risk factors have been shown to be associated with stroke are age, sex, hypertension, serum cholesterol, smoking, diabetes mellitus, obesity, physical inactivity and dietary factors. However, their relative contribution in the outcome of stroke varies from one study to another and from population to population [9].

In rapid increase in burden of stroke in coming years and limited availability of stroke care in Palestine, it would be better to study on population based stroke prevention strategies, because preventive methods will reduce the incidence of stroke. So in view of the increasing incidence, high health care costs and the potential for prevention of stroke a current study was undertaken to identify the important risk factors contributing to the outcome of stroke.

This study was carried out to identify stroke-related risk factors among patients with stroke in Khanyounis and Rafah district, southern Palestine.

MATERIALS AND METHODS

The present study was carried out at European Gaza hospital, Palestine from March 2014- May 2014. The study was designed as age (±5) and sex matched case control study.

Cases

The study consisted of 100 hospitalized (CT) scan proved cases of stroke. The recruitment of cases in the study was performed retrospectively. The patients were categorized as Infarction or hemorrhagic stroke based on CT findings. Hence we did include cases who had a past history of any type of stroke.

Controls

The controls were selected from patients who attended the study hospital for conditions other than stroke. For each case of stroke, one control was selected. The controls were matched to cases in respect to age (± 5 years) and sex. One hundred controls were selected in the same manner.

Sample size

The researcher used Epidemiological Information Program (Epi-info) to calculate the sample size. Prevalence of hypertension in the general population, 17%, [10] allowable error of 5% and with 80% the power of study, sample size calculated was 95. Hence a total of 100 cases and an equal number of controls were finally included in the study.

Risk factors

Seven risk factors namely hypertension, diabetes mellitus, cigarette smoking, serum cholesterol, smoking, psychological troubles and obesity were identified.

The subject was considered to have hypertension if they had systolic blood pressure ≥140 mmHg or diastolic blood pressure ≥90 mmHg or if the subject had history or treatment of hypertension. Diabetes mellitus was diagnosed. If a subject had fasting blood glucose level was ≥120 mm/dl or if the subject had history or treatment of diabetes mellitus. On admission we have considered only those who currently smoked cigarettes, which was defined as smoking more than 10 cigarettes per day for more than 6 months. Subjects were considered to have obesity only when body mass index was >25 kg/m². And if participants had serum cholesterol ≥220mg/dl, were considered as hypercholesterolemia.

Statistical analysis

Bivariate analysis on matched pairs was carried out. Odds ratio, their 95% Confidence Interval (CI), Chi square test was calculated for all the risk factors.

The continuous type of data, namely Age, systolic and diastolic blood pressure, fasting blood sugar level, body mass index and serum cholesterol level were presented with mean ± SD and were compared by using unpaired “t” test.

Ethical and administrative considerations

An administrative approval was obtained from European
Gaza Hospital director to conduct the study. Every participant was provided with a full explanatory form attached to questionnaire included the purpose of the study, assurance about the confidentiality of the information, the instructions how to respond to the questionnaire, and a statement indicating that the participation is voluntary. Honesty was maintained during reporting and analysis of the data with respect to confidentiality and respecting of results.

**RESULTS AND DISCUSSION**

Table 1 and Table 2 shows the distribution of cases and controls according to age and gender. Among cases 60% were ≥ 51 years of age group and among controls 56% were ≥ 50 years of age. The mean age of cases was 54.74 years and that of controls were 53.22 years. Statistically, there was no significant difference found between cases and controls.

Among cases and controls 59% of subjects were males and 41% were females. As sex was one of the matching variable, the number of males and females in controls is identical. Male and female ratio in the study was 1:1.4 as shown in (Table 2).

According to CT scan findings, it was found that 66% of patients had ischemic stroke, while hemorrhagic stroke was found in 34 patients (Table 2). There is no association between CT scan finding and gender.

The potential risk factors for stroke were investigated as shown in Table 3. Both systolic blood pressure (159.92 mmHg vs 129.13 mmHg) and diastolic blood pressure (90.39 mmHg vs 77.01 mmHg) was higher among cases than among controls. Stroke victims had higher fasting blood sugar level (133.57 mg/dl vs 100.90 mg/dl) and serum cholesterol levels (209.32 mg/dl vs. 156.29 mg/dl) than the control group. The difference between cases and controls across all risk factors was found to be statistically significant.

We performed a Univariate analysis to identify the association between risk factors and stroke. Table 4 Described comparison of cases and controls according to exposure to risk factors and results of Univariate analysis.

**Hypertension**

In the current study among cases of stroke 59.0% among controls 23.0%, had hypertension and the difference was found statistically significant ($X^2 = 26.789, P<0.000$). Hypertension was found to be significantly associated with stroke. ($OR = 4.181, 95% CI 2.610-8.893$).

When we analyzed about systolic and diastolic blood pressure separately, among cases 79% patients had SBP≥ 140 mmHg compared to 31% among controls, OR=8.373, 95% CI 4.409 to 15.899, $P<0.000$ and 59% had DBP≥ 90 compared to 22% among controls (OR= 5.102, 95% CI 2.748 to 9.471, $P<0.000$) SBP and DBP were found to be significantly associated with stroke.

Thus hypertension, whether systolic or diastolic has emerged as a significant risk factor for stroke in the present study.

**Diabetes mellitus**

The stroke cases had significantly higher proportion of diabetes mellitus (29%) than controls (13%) ($X^2= 7.715, P < 0.005$). The risk of stroke associated with diabetes mellitus was also high and significant ($OR = 2.733, 95% CI 1.323-5.646$).

**Smoking**

Out of 100 cases of strokes 51% were smokers compared to 34% of controls. This difference was statistically significant ($X^2= 5.913, P<0.015$). Risk of stroke associated with habit of smoking ($OR= 2.020, 95% CI 1.143–3.573$).

**Psychological troubles**

The stroke cases had significantly higher proportion of troubles (33%) than controls (14%) ($X^2= 10.040, P < 0.002$); also the risk of stroke associated with psychological troubles was three times higher ($OR= 3.026, 95% CI 1.499 to 6.105$).

**Obesity**

Among cases 76% and among controls 52% were obese. This difference was statistically significant ($X^2= 12.50 P<0.000$).
The risk of stroke associated with obesity was also high and significant (OR= 2.923, 95% C.I 1.598-5.346).

Hypercholesterolemia

35% of cases had value of serum cholesterol > 220 mg/dl as against only 22% among controls. It was found that, hypercholesterolemia level is significantly associated with stroke. \( (X^2= 4.1467, P<0.041) \); also the risk of stroke associated with hypercholesterolemia was two times higher (OR= 1.909, 95% C.I. 1.020 to 3.572).

DISCUSSION

The current case-control study of risk factors for stroke identified seven risk factors. Univariate analysis demonstrated that hypertension is the most important risk factor for stroke (59%, OR=4.181) followed by psychological troubles level (33%, OR = 3.026), obesity (76% OR 2.923), diabetes mellitus and elevated total cholesterol were significantly associated with strokes (29%; OR = 2.733), smoking (51% OR = 2.020), and hypercholesterolemia (35%, OR = 1.909). Similar findings were found in many studies. A recent study conducted in 22 countries included India by Donnell et al identified major risk factors for stroke that contribute to 90% of stroke in these countries. He showed that the top risk factors for stroke are – hypertension (34.6%), smoking (18.9%), waist hip ratio (26.5%) diet (18.8%), regular physical activity (28.5%), diabetes (8%), alcohol intake (5%), psychosocial stress (4.6%) depression (5.2%), cardiac causes (6.7%) [13].

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Prasad et al study titled as “Stroke in young: An Indian prospective” revealed that smoking, increased BMI, diabetes and hypertension are significantly associated with strokes among young people [14].

CONCLUSION

This is a study that quantifies the contribution of different factors to the overall risk of stroke. It was found that, hypertension, hypercholesterolemia, diabetes and obesity are the biggest risk factors for all types of strokes and are important. Like many other factors, these are modifiable risks. That can be treated with appropriate medication and lifestyle changes. This is very important to low-income settings as screening programs.
relatively little training, resources and interventions are expensive: weight reduction and cessation of cigarette smoking these simple methods and lifestyle alterations have a greater potential for stroke prevention. Moreover, public awareness about the ill effects of cigarette smoking can contribute in the reduction of stroke burden. Suitable measures to reduce the stroke risk can be adopted as primary and secondary prevention in these cases.

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REFERENCES


