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INTRODUCTION

Fifteen million people worldwide suffer from stroke annually, of which 5 million die and another 5 million are left permanently disabled, placing a burden on the family and community (1). Till date, despite the application of secondary prevention worldwide, **first-ever stroke survivors** remain at imminent risk of **stroke recurrence and death** in the short and long term. Their cause is multifactorial (2,3).

However, the burden of stroke in low and middle-income countries, including **Lebanon**, is higher than in high-income countries and is still rising (4,5). Extensive data were published on the stroke recurrence and fatality determinants worldwide but there is scarcity of related papers from the Middle East and North Africa (MENA) region (6,7). Stroke types, risk factors, knowledge and adherence to medication were addressed in various Lebanese papers (8-11), but there are no research studies, yet which investigate the recurrence of stroke and death after first-ever stroke.

OBJECTIVES

1. To measure the **cumulative risk rates of stroke recurrence and death** in a time-to-event survival analysis at 3, 6 and 12 month among Lebanese survivors post first-ever stroke
2. To identify the **predictors** of stroke recurrence and death risks among Lebanese first-ever stroke survivors, including baseline characteristics, lifestyle, pre-existing conditions, and stroke-related factors

MATERIAL AND METHODS

- A prospective longitudinal multicenter study in Beirut and Mount Lebanon
- First-ever stroke survivors ≥ 18 years of age, admitted to the hospital between February and May 2018 were eligible
- Stroke clinically and neuro-radiologically confirmed

MATERIAL AND METHODS

Figure 1. Flow diagram of the recruitment process

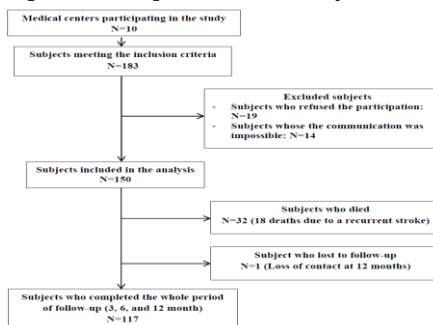


Figure 2. Recruitment and Follow-up period

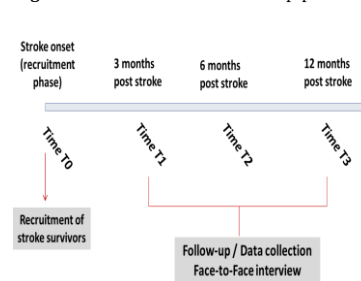


Table 1. Measuring instruments used for the evaluation of post-stroke conditions and diagnosis of disabilities

National Institutes of Health Stroke Scale (NIHSS)	Stroke severity
modified Rankin Scale (mRS)	Disability degree
Short Form Health Survey (SF12), (MCS and PCS)	Quality of life
Mini-Mental State Examination (MMSE)	Cognitive function
Hospital Anxiety and Depression Scale (HADS)	Depression and anxiety
Modified Ashworth Scale (MAS)	Spasticity and Muscle tone
Fatigue Severity Scale (FSS)	Fatigue
"Douleur Neuropathique 4" questionnaire (DN4)	Neuropathic pain diagnosis
Social Support Rating Scale (SSRS)	Social support

Statistical analysis: Kaplan-Meier method was used to calculate the cumulative rates of stroke mortality and recurrence. Cox-regression univariate and multivariable analyses were performed to identify the predictors of both outcomes

RESULTS

Figure 3. The percentage of stroke types and subtypes according to TOAST classification

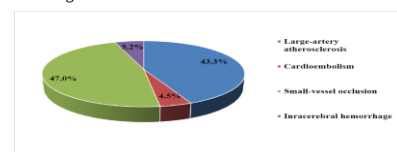


Figure 4. Kaplan Meier estimates of one-year probability of survival after a first-ever stroke among subjects with and without stroke recurrence

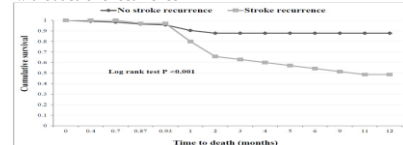
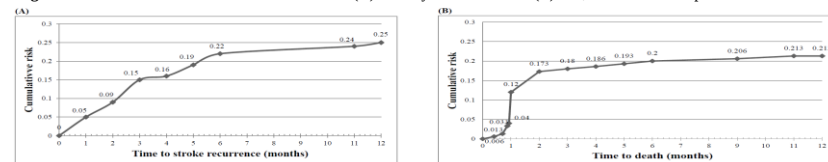


Figure 5. Cumulative risk rates of stroke recurrence (A) and any-cause of death (B) at 3, 6 and 12 month post-stroke



RESULTS

Table 2. Independent predictors of 1-year stroke recurrence using Cox Proportional Hazard regression multivariable analysis

Variables	AHR [95%CI]	p-value
High educational level	0.164 [0.036 - 0.745]	0.019
Higher MCS of QoL at 3 months	0.927 [0.876 - 0.980]	0.008
Higher MCS of QoL at 6 months	0.904 [0.843 - 0.969]	0.004
MMSE at 6 months	0.908 [0.831 - 0.992]	0.033
Depression at 6 months post-stroke	1.176 [1.060 - 1.305]	0.002

Table 3. Independent predictors of 1-year any-cause of death using Cox Proportional Hazard regression multivariable analysis

Variables	AHR [95%CI]	p-value
Age	1.039 [1.002 - 1.078]	0.040
Prolonged hospital stay at stroke index	1.037 [1.006 - 1.069]	0.018
HADS ≥ 11 at 3 months post-stroke	1.302 [1.027 - 1.650]	0.029
Recurrent stroke at 3 months	3.557 [1.679 - 7.537]	0.001
MMSE ≥ 24 at 3 months	0.866 [0.758 - 0.989]	0.034
Epileptic seizures at 3 months post-stroke	7.313 [1.538 - 34.768]	0.012

AHR: Adjusted Hazard Ratio; CI: Confidence Interval. All these multivariable analyzes included all variables and confounding factors that had a value of $p \leq 0.05$ in the univariate analysis. The method of selection of the variables which has been chosen here is the backward stepwise method.

CONCLUSIONS

- Stroke recurrence and death were commonly found in the first year post-stroke, with the largest rates recorded in the acute phase
- Risk of stroke recurrence in Lebanon is higher compared to that in western and other eastern countries
- A large number of the patients died or had recurrent events due to poor functional, neurological, cognitive and mental prognosis
- Lower cognitive scores, greater neuropsychological, disability, and severity scales were positively associated with both these outcomes among Lebanese population
- Implementing effective therapies for secondary prevention is necessary in the acute phase (stroke unit management, thrombolytic, and other reperfusion therapies), as well as rehabilitation and long-term follow-up efforts are needed in order to cope with the burden of stroke in people who have developed or survived a stroke.

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