



Predicting Mortality in Patient with Ischemic Stroke: A Survival Analysis

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ABSTRACT:

Introduction:

Stroke is the most common cause of disability, and the second leading cause of mortality in the world (1) which make it a worldwide health issue. prevalent neurological disease with a prevalence of 80.1 million cases globally in 2016 (2). Ischemic stroke (AIS), which accounts for approximately 80% of stroke cases. Many cardiac risk factors are related to AIS. To the best of our knowledge, no study has comprehensively investigated hypertension outcomes among stroke patients in Algeria according to gender. The aim of our study is to long-term health outcomes after acute ischemic stroke and analyse the association between gender, hypertension and poor survival outcomes.

Material and methods:

We conducted a descriptive and analytic cohort study, with prospective data collection among patients, admitted in the emergency ward of Lamine Debaghine hospital Algiers. All ischemic stroke from January 2022 to January 2024 were included in the study. The approval of patients was obtained for using their medical records. The mortality risk associated with risk factors known in the literature was studied such as the following variables: gender, prior stroke, heart failure, atrial fibrillation, hypertension, diabetes and cardiopathy. Long-term follow-up data, including mortality. Data were analysed by a survival curve using the Kaplan-Meier method.

Results:

In the present study, 30 patients died. among patients with a history of arterial hypertension, 4/13 women died. 21/40 men died. the survival time in hours was calculated. The cumulative proportion of survivors in hypertensive men was 97.5% and 87.5% at 72 hours of life compared to 92.3% in women after 72 hours of life. At 96 hours it reaches 77.2% in men, 76.9% in women and stops there. Meanwhile, for men, at 120h it reached 74.3%, at 144h it became 68.2%, at 168h it reached 61% until 720h where it reached 0%. Men with no history of hypertension reached 648 hours of life (approximately 31 days) before the end of the study.

Discussion:

In our study 74.7% of the cases had hypertension which had a significant p-value (< 0.05), when associated to death. As stated by literature, hypertension is the most prevalent and modifiable risk factor for stroke and is associated with worsened outcomes. studies recognized gender as a predicting factor of poor outcome. Kaplan Meier survival curve indicating survival time in hours. At 24h surviving in male gender with hypertension 97.5% and 87.5% at 72h versus 92.3% in female gender after 72h. At 96h it reached 77.2% in male gender, 76.9% in female gender and stopped there. survival time in men reached 720 h, during the uncensored study period

Keywords: Ischemic stroke, Kaplan-Meier method, survival analysis, hypertension, mortality, risk factors

Introduction:

Stroke is the most common cause of disability, and the second leading cause of mortality in the world (1) which make it a worldwide health issue. It is reported as the most prevalent neurological disease with a prevalence of 80.1 million cases globally in 2016 (2). Ischemic stroke, which accounts for approximately 80% of stroke cases, is the most common type (3). It accounts for more than 5.5 million deaths each year worldwide (4)

many studies have investigated negative predictive factors in the survival of stroke patients as Intermittent claudication, urinary incontinence, and previous history of ischemic attack, stroke type, history of hypertension, ischemic heart disease and diabetes... (5,6)

To the best of our knowledge, no study has comprehensively investigated hypertension outcomes among stroke patients in Algeria according to gender. The aim of our study is to long-term health outcomes after acute ischemic stroke and analyse the association between gender, hypertension and poor survival outcomes.

Materials and methods:

We conducted a descriptive and analytic cohort study, with prospective data collection among patients, admitted in the emergency ward of Lamine Debaghine hospital Algiers. All ischemic stroke from January 2022 to January 2024 were included in the study. The approval of patients was obtained for using their medical records... Data were analysed by a survival curve using the Kaplan-Meier method. The age, gender, medical history, Glasgow scales at the admission, length of stay, the territory, clinical features, the evolution of the patient were registered. We used the medical files, TDM results as sources of information. Long-term follow-up data, including mortality. The mortality risk associated with risk factors known in the literature was studied such as the following variables: gender, prior stroke, heart failure, atrial fibrillation, hypertension, diabetes and cardiopathy.

Results:

the incidence of ischemic stroke among populations at risk of developing a stroke from any causes was 40.3 %. 81.01% were male with (sex ratio: 4.21). Maximum age was 89-year-old minimum age was 17-year-old and the mean age was 62.41years. (tab1). 34.2% of the patients had a heart disease (fig1). 43% of the patients were diabetics. 74.4% of the cases have high blood pressure. 98.7% had a stroke before (fig2). The predominant affected artery was the middle cerebral artery with 53.2% of the cases (fig 3). The most relevant clinical presentation was consciousness disorders 39.2% of the cases (fig 4). In the present study, 30 patients died. among patients with a history of arterial hypertension, 4/13 women died. 21/40 men died. the survival time in hours was calculated. We reported the cumulative proportion of surviving patient with / without hypertension according to gender during the period (tab3). at 24h Cumulative Proportion of surviving in male gender with hypertension of 97.5% and 87.5% at 72h versus 92.3% in female gender after 72h. At 96 hours it reaches 77.2% in men, 76.9% in women and stops there. Meanwhile, for men, at 120h it reached 74.3%, at 144h it became 68.2%, at 168 h it reached 61% until 720 h where it reached 0%. Survival time in men reached 720 h, during the uncensored study period. Men with no history of hypertension reached 648 hours of life (approximately 31 days) before the end of the study. The mortality risk reported to medical history of hypertension, diabetes, cardiopathy the P-values F and (CI=95% and $\alpha=0.05$) are reported in (tab 2). Kaplan Meier survival curve indicating survival time in hours among admitted patients (fig 5).

Discussion:

In our study, 74.7% had a history of high blood pressure. Hypertension was linked to death with a significant difference (p value < 0.05). As reported in the literature, hypertension is the most prevalent and modifiable risk factor for stroke and is associated with worsened outcomes. (7). We found out that gender was significantly related to mortality (p -value < 0.05). studies recognized gender as a predicting factor of poor outcome (8.9). The mortality in male gender was 52.5% of men versus 30.8% cases in women. studies described male gender as a poor outcome predicting factor (9.10) but some studies found a gender disparity in death when correlated to age that was related to hormonal life cycle of female gender (8). Kaplan Meier survival curve indicating survival time in hours (fig5). we noticed at 24h Cumulative Proportion of surviving in male gender with hypertension of 97.5% and 87.5% at 72h versus 92.3% in female gender after 72h .at 96h it reached 77.2 % in male gender, 76.9% in female gender and stopped there. meanwhile for men, it still decreasing till reaching 0% at 720h. meanwhile the men with no hypertension records reached the 0% at 648 hours (approx. 31 days) Our data suggest that among patients with AIS with concomitant elevated mortality in both gender with hypertension. Moreover, the baseline differences between women and men in our cohort of patients with AIS and length of surviving is consistent with prior studies demonstrating that women with AIS are less affected (8 times) by coronary disease than men (10.11). So as AIS, since cardiovascular risk factors are well known for their impact on mortality in AIS patients. (6)

Tables and figures:

Tab1: Proportion of different age brackets

Age brackets	Proportion
17-38	6.3%
39-60	34.2%
60 and more	53.2%

Tab 2: Risk factors and number death for ischemic stroke

Studied factors	P-value (bilat)	Risk value	CI=95%
Hypertension	0.005	44.07%	[32.15, 56.71]
AF	0.85	35.71%	[16.18, 61.4]
HEART FAILURE	0.024	100%	38.26, 100
Ischemic heart disease	0.53	50%	18.76, 81.24
Diabetes	0.61		
Prior stroke	0.43		
Age >62year	0.28	31.43%	[18.45, 48.08]
gender	0.036	60.71%	[47.62, 72.44]

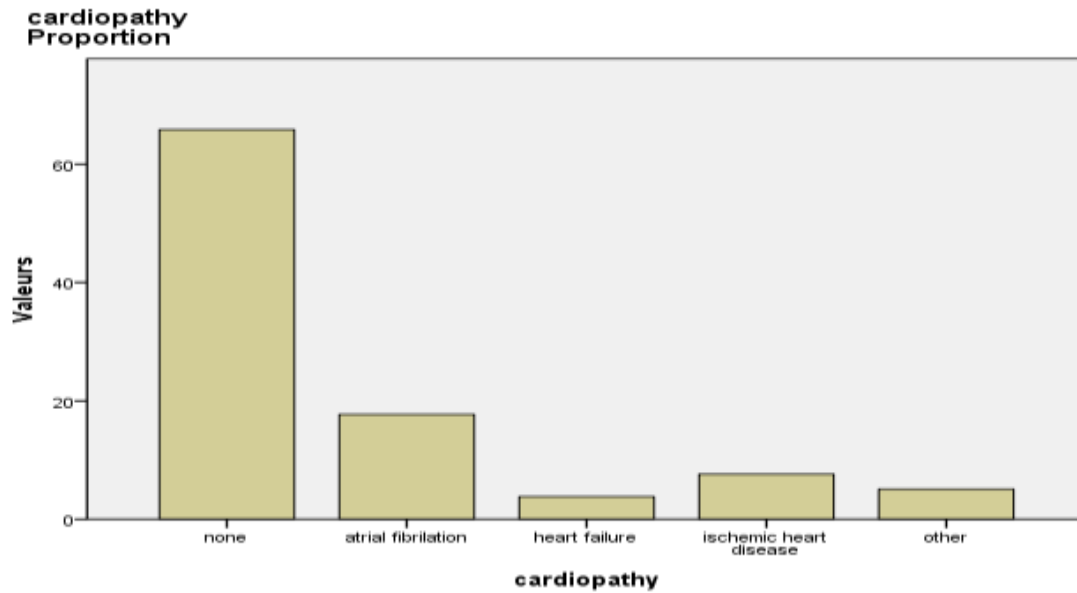


Fig 1: Proportion of patients with an associated cardiopathy

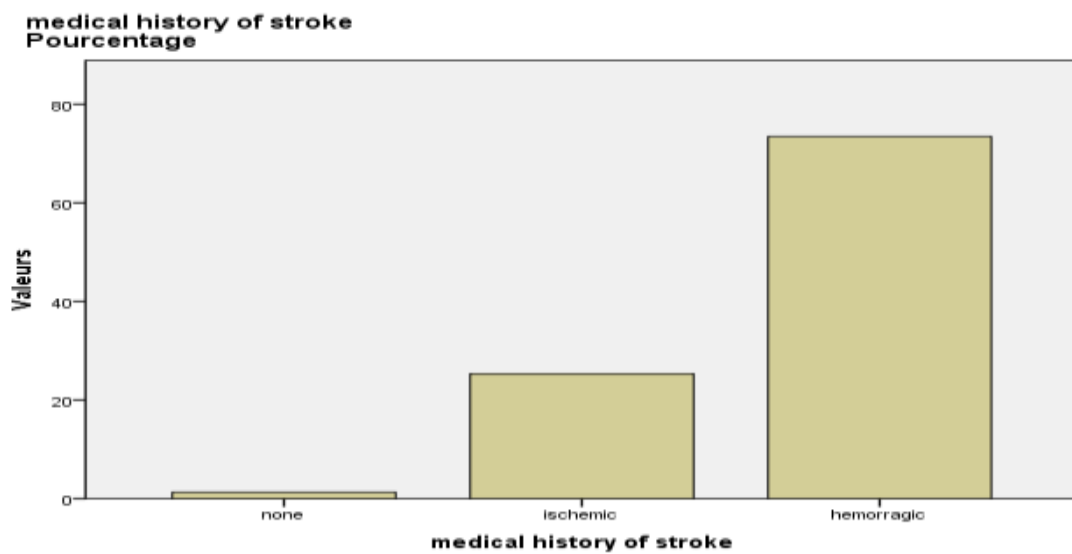


Fig 2: Proportion of cases with prior stroke

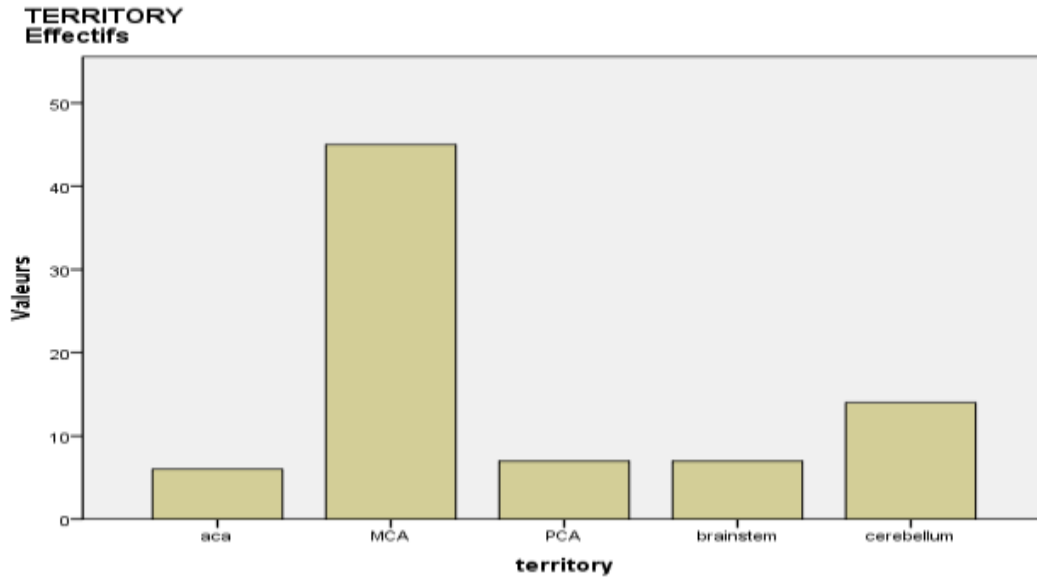


Fig 3: Territory of ischemic strokes

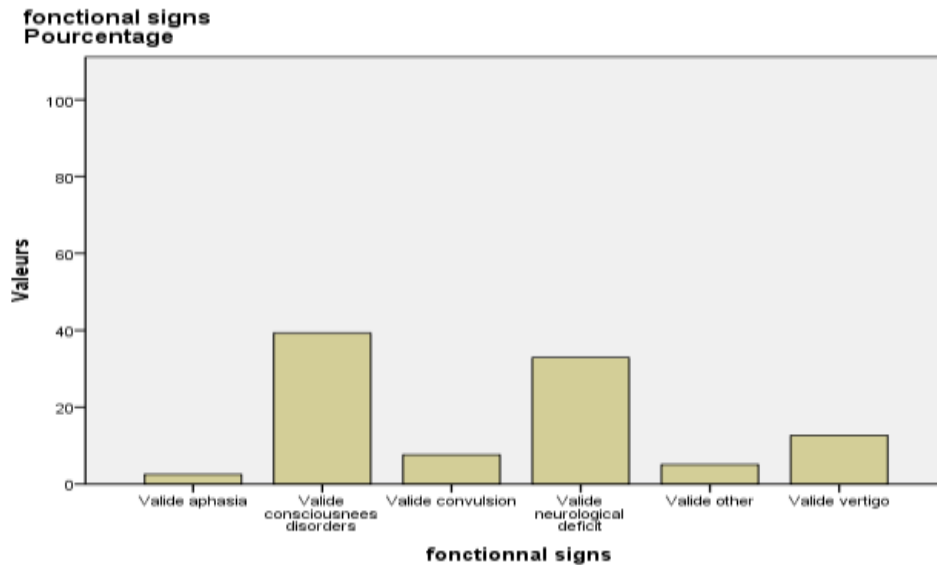


Fig 4: Proportion of clinical features

We pose the null hypothesis that the survival times between men and women who have been admitted for a stroke, depending on arterial hypertension are identical. We seek to know if there is a significant difference between the different distributions (men versus women) based on arterial hypertension (table 3). SPSS gave us significant tests (Log Rank, Breslow and Tarone-ware), using the Chi-square test. Therefore, we must reject the null hypothesis that survival times are the same and accept that they are not. Indeed, when we look at the survival curves, we clearly see a difference between the two survival curves. Fig (5,6)

Tab3: Test for equality of survival distributions, depending on of hypertension (a) adjusted for gender (Overall comparisons)

	Khi-deux	ddl	P-value
Log Rank (Mantel-Cox)	4.180	1	0.041
Breslow (Generalized Wilcoxon)	3.884	1	0.049
Tarone-Ware	4.598	1	0.032

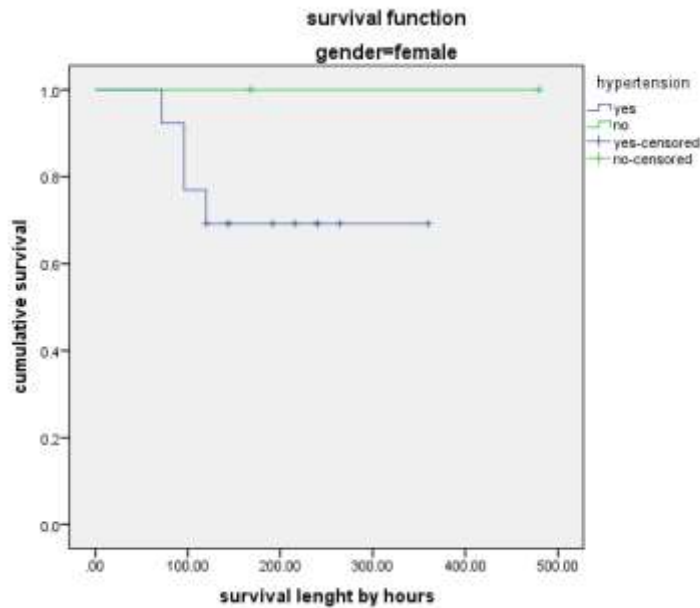
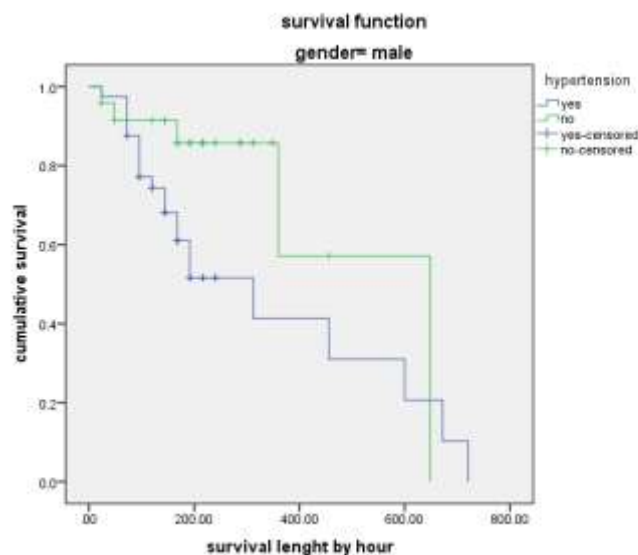


Fig 5: survival curves of patient with Ischemic stroke according to gender with or without hypertension



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