

Short-term Survival of Stroke Patients According to Hemorrhagic and Ischemic Stroke Type in National Brain Center Hospital Jakarta

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Abstract

Background & Objectives: Stroke is the second leading cause of death in the world. The aim of this study was to identify a short-term (30 days) survival of stroke patients according to hemorrhagic (HS) and ischemic (IS) stroke type in National Brain Center Hospital Jakarta.

Method: A cohort retrospective study. Acute first-ever stroke inpatients were included in this study. The sample consists of 134 HS and 134 IS and recorded in medical record from January 1 to November 30, 2018. All study patients were followed-up from diagnosis time to event (death). The Kaplan-Meier method was used to estimate the survival probability and Cox Regression to investigate the effect of variables.

Results: Survival at 30 days was higher for IS (91,8%) than HS (78,3%) of the first-ever stroke ($p < 0,05$). Mean survival time of IS (27 days) was longer than HS (23 days). The risk of death for HS was (HR = 2,78; 95% CI 1,385 – 5,591) times greater than the risk of death for IS in National Brain Center Hospital Jakarta ($p < 0,05$).

Conclusions: Survival probability IS was higher than HS within 30 days of the first-ever stroke ($p < 0,05$).

Keywords: *Survival, Stroke, Hemorrhagic, Ischemic.*

Introduction

Stroke is the second leading cause of death in the world.⁽¹⁾ According to American Heart Association (AHA) estimates, 795.000 strokes occur in The United State and 610.000 of these are first attacks. Stroke kill nearly 130,000 people a year and on average, every 4 minutes someone dies of a stroke,⁽²⁾ while in United Kingdom there are more than 100,000 strokes each year, that is around one stroke every five minutes.⁽³⁾ In Asia, the highest mortality rates are observed in

Mongolia 222,6/100.000 person-years and Indonesia 193,3/100.000 person-years by the age-and sex-standardized.⁽⁴⁾

World Health Organization definition (WHO) of stroke: rapidly developing signs of focal (or global) disturbance of cerebral function with symptoms lasting over 24 h or leading to death with no apparent cause other than vascular.⁽⁵⁾ Stroke can be divided into two main types; hemorrhagic (HS) and ischemic (IS). Hemorrhagic stroke occurs when a weakened blood vessel ruptures.⁽⁶⁾ It's caused by a weakened vessel that ruptures and bleeds into the surrounding brain. The blood accumulates and compresses the surrounding brain tissue.⁽⁷⁾ Ischemic stroke occurs when an artery to the brain is blocked. This is most often caused by atherosclerosis, or gradual cholesterol deposition. If the arteries become too narrow, blood cells may collect and form blood clots. These blood clots can block the artery

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where they are formed (thrombosis), or can dislodge and become trapped in arteries closer to the brain (embolism).^(8,9)

Globally, stroke incidence according to stroke type is 15% - 30% for HS and 70% - 85% for IS. In Asia, 30% for HS and 70% for IS. HS cases are lower than IS, but HS cause death more often than IS.⁽⁹⁾ In earlier study, found that stroke type was a dominant factor for stroke survival in 1 year. Survival probability for IS (63,7%) was higher than HS (22,9%). The risk of HS was 3 times greater than the risk of IS.⁽¹⁰⁾

National Brain Center Hospital Jakarta is a vertical hospital owned by the Ministry of Health which is one of the centers for handling stroke. Stroke incidence has increased in the last 3 years in this hospital. This study was to identify a short-term (30 days) survival of stroke patients according to hemorrhagic (HS) and ischemic (IS) stroke type in National Brain Center Hospital Jakarta. Estimate stroke survival according to stroke type is essential to understanding stroke treatment in order to achieve optimal health outcome. The intervention in

secondary prevention may improve patient’s condition to decrease mortality rate of stroke.

Method

This is a cohort retrospective study. All study patients were followed-up for 30 days from diagnosis time to event (death). The sample consists of 134 HS and 134 IS. Simple random sampling technique was used to select the sample. The inclusion criteria; inpatients with acute first-ever stroke that recorded in medical record from January 1 to November 30,2018. The exclusion criteria; medical records were not available or not stored in the medical records department during the study. The Kaplan-Meier method was used to estimate the survival probability and Cox Regression to investigate the effect of variables.

Results

There were 268 patients included in this study. Of them, 134 were HS and 134 were IS. Table 1 shows characteristic of stroke patients;status, age, and gender.

Table 1: Characteristics of Stroke Patients

Variables	Total	HS	IS
No. of patients (%)	268 (100,0)	134 (50,0)	134 (50,0)
Stroke patients status			
Censor	229 (85,4)	106 (39,5)	123 (45,9)
Event (death)	39 (14,6)	28 (10,5)	11 (4,1)
Age (years)			
< 60	143 (53,4)	85 (31,7)	58 (21,7)
≥ 60	125 (46,6)	49 (18,3)	76 (28,3)
Gender			
Female	104 (38,8)	47 (17,5)	57 (21,3)
Male	164 (61,2)	87 (32,5)	77 (28,7)

Among 268 patients, 14,6% were died for 30 days. Event (death) of HS (10,5%) was higher than IS (4,1%). The mean age of patients was 37 years old for HS and 57 years old for IS. The age of HS patients were higher

at < 60 years old, while IS patients were higher at ≥ 60 years old. Male (61,2%) was higher than female (38,8%) in this study.

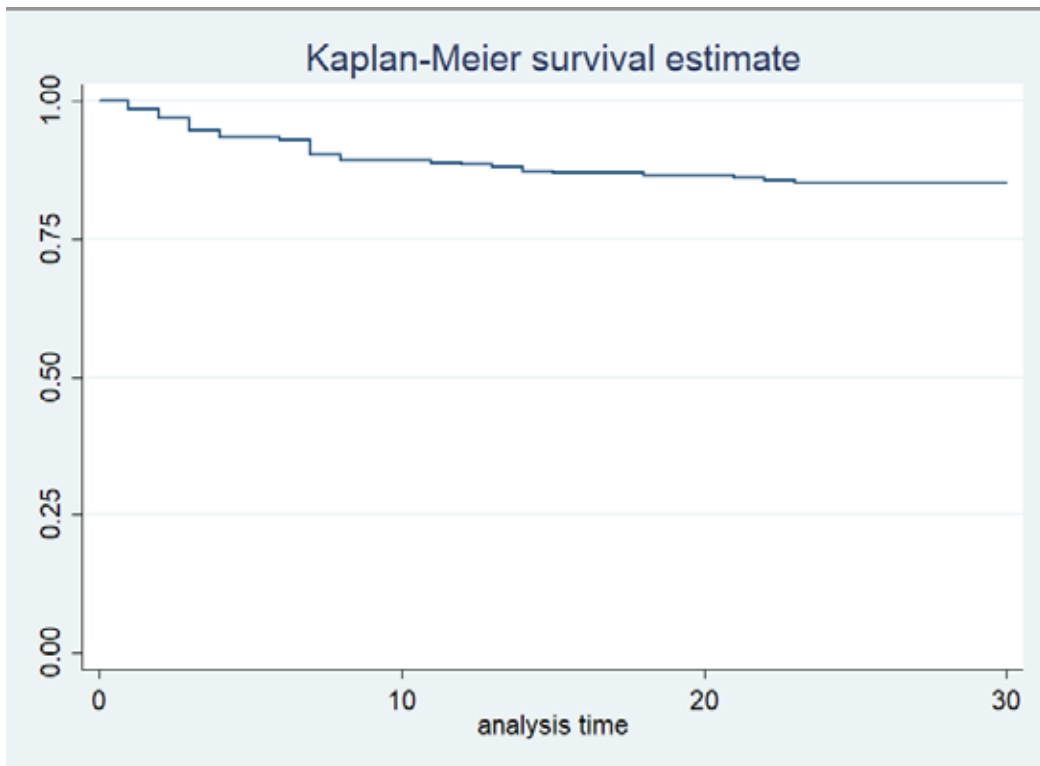


Figure 1: Cumulative Survival Probability

The Kaplan-Meier method was used to estimate the survival probability within 30 days of the first-ever stroke. (Figure 1.) shows cumulative survival probability curve of stroke patients. Among 268 patients, 98,5% survived for 1 day, 90,3% survived for 1 week, and 85,1% survived for 1 month.

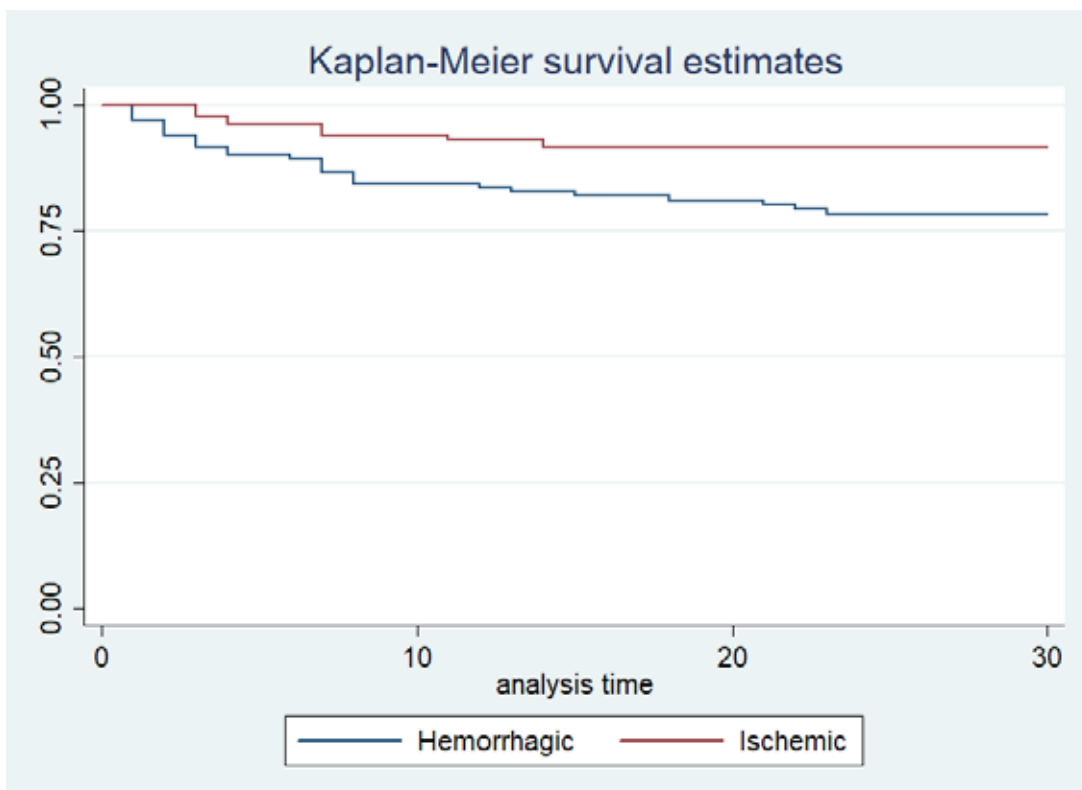


Figure 2: Survival Probability according to HS and IS

Survival at 30 days was higher for IS than HS of the first-ever stroke ($p < 0,05$). (Figure 2.) shows survival probability curve according to HS and IS. Among 134 HS patients, 97,0% survived for 1 day, 86,6% survived for 1 week, and 78,3% survived for 1 month. While, among 134 IS patients, 100,0% survived for 1 day, 94,0% survived for 1 week, and 91,8% survived for 1 month.

Overall mean survival time of patients stroke were 25 days. Mean survival time of IS (27 days) was longer than HS (23 days). The risk of death for HS was (HR = 2,78; 95% CI 1,385 – 5,591) times greater than the risk of death for IS in National Brain Center Hospital Jakarta ($p < 0,05$).

Discussion

We identified 268 inpatients with acute first-ever stroke from January 1 to November 30, 2018. Of those, 134 were HS and 134 were IS. The mean age of patients was 37 years old for HS and 57 years old for IS. The age of HS patients were higher at < 60 years old, while IS patients were higher at ≥ 60 years old. This suggests that HS may occur more often among younger people as reported in other studies.^(11,16,17) Male (61,2%) was higher than female (38,8%) in this study.

In our study, 39 patients (14,6%) died in 30 days. The Kaplan-Meier estimates the cumulative survival probability within 30 days were 98,5% survived for 1 day, 90,3% survived for 1 week, and 85,1% survived for 1 month. Event (death) of HS (10,5%) was higher than IS (4,1%). In previous studies, Butsing et al. found that 26% of stroke patients died within 30 days⁽¹¹⁾ and also study in Australia, found about 24% patients died in 28 days after stroke.^(10,14)

The number of HS cases are lower than IS, but HS cause death more often than IS.⁽⁹⁾ In earlier study, found that stroke type was a dominant factor for stroke survival.⁽¹⁰⁾ Our findings on Kaplan Meier analysis showed, the short-term survival probability was higher among IS than HS patients. All IS patients survived for 1 day, while HS patients had decreased survival (97,0%). For 1 month, 91,8% survived for IS, while 78,3% for HS. Consistent with other studies, Butsing et al. revealed the short-term survival probability for HS was shorter than for IS within 30 days of the first stroke.⁽¹¹⁾ Study by Lee et al. found that survival among patients admitted to hospital for HS was lower than among patients hospitalised for IS and TIA in the first 28 days after the index stroke.⁽¹²⁾

The Perth Community Stroke Study similarly observed higher 30-day case fatalities for HS than for IS.^(12,13) Study in Japan, showed the 30-day case fatality rate was substantially greater in patients with cerebral hemorrhage (63.3%) or subarachnoid hemorrhage (58.6%) than in patients with cerebral infarction (9.0%).⁽¹⁵⁾

Those who suffer IS have a much better chance for survival than those who experience HS, as HS not only damages brain cells but also may lead to increased pressure on the brain or spasms in the blood vessels.^(18,19) We found that overall survival time of patients stroke were 25 days. Mean survival time of IS (27 days) was longer than HS (23 days). The risk of death for HS was (HR = 2,78; 95% CI 1,385 – 5,591) times greater than the risk of death for IS in National Brain Center Hospital Jakarta ($p < 0,05$). Similar to another study by Mulyani et al. the risk HS was 3 times greater than the risk of IS.⁽¹⁰⁾

There are limitations to our study. First, we have not identified risk factors for death. Second, we couldn't do long-term follow-up because the patient's identity is confidential, so we couldn't call patients by phone to find out their status after discharged from the hospital.

Conclusions

Survival at 30 days was higher for IS than HS of the first-ever stroke ($p < 0,05$). Mean survival time of IS (27 days) was longer than HS (23 days). The risk of death for HS is (HR = 2,78; 95% CI 1,385 – 5,591) times greater than the risk of death for IS in National Brain Center Hospital Jakarta ($p < 0,05$).

Ethical Considerations: This study was approved by the National Brain Center Hospital Jakarta Ethics Committee (No: UM.01.05/12/004/2019) and Faculty of Public Health Universitas Indonesia Ethics Committee (No.443/UN2.F.10/PPM.00.02/2019).

Competing Interests: The authors declared that no competing interests exist.

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References

1. World Health Organization (WHO). Stroke : a Global Response is Needed. 2012. Available at: <https://www.who.int/bulletin/volumes/94/9/16-181636/en/#R1>
2. Benjamin, E. J. et al. Heart disease and stroke statistics - 2018 update: A report from the American Heart Association, *Circulation*. 2018
3. Stroke Association. State of The Nation Stroke Statistic 2018, *Stroke. Org.Uk*. 2018
4. Venketasubramanian, N. et al. 'Stroke Epidemiology in South, East, and South-East Asia : A Review', 19(3), pp. 286–294. 2017
5. World Health Organization (WHO). Project Principal Investigators: The World Health Organization MONICA Project (monitoring trends and determinants in cardiovascular disease): a major international collaboration. 1998
6. Adib M. Cara Mudah Memahami dan Menghindari Hipertensi, Jantung, dan Stroke. Yogyakarta: Dianloka Printika. 2009
7. American Heart Association (AHA), Hemorrhagic Stroke (Bleeds). Available at: <https://www.strokeassociation.org/en/about-stroke/types-of-stroke/hemorrhagic-strokes-bleeds>
8. UT Southwestern Medical Center Department of Neurology and Neurotherapeutics, The Internet Stroke Center. Texas, Available at: <http://www.strokecenter.org/patients/about-stroke/ischemic-stroke/>
9. Iskandar, J. Stroke Waspada! Ancamannya. Yogyakarta: Andi. 2011
10. Mulyani S. Ketahanan Hidup Setahun Pasien Stroke di RS Cipto Mangunkusumo Jakarta. Jakarta. 2003
11. Butsing N. 'Long-term Survival of Ischemic and Hemorrhagic Stroke Patients: An Analysis of National Thai Data', *Southeast Asian Journal of Tropical Medicine and Public Health*. 2018
12. Lee, A. H., Somerford, P. J. dan Yau, K. K. W. "Factors influencing survival after stroke in Western Australia.," *The Medical journal of Australia*. 2003
13. Hankey GJ, Jamrozik K, Broadhurst RJ, et al. Five year survival after first-ever stroke and related prognostic factors in the Perth Community Stroke Study. *Stroke* 2000.
14. Anderson. 'Predicting survival for 1 year among different subtypes of stroke. Results from the Perth Community Stroke Study'. 1994. Available at: <https://www.ncbi.nlm.nih.gov/pubmed/8091436>.
15. Kiyohara Y. Ten-Year Prognosis of Stroke and Risk Factors for Death in a Japanese Community. 2003
16. Rutten-Jacobs LA, Arntz RM, Maaijwee NM, et al. Long-term mortality after stroke among adults aged 18 to 50 years. *JAMA* 2013
17. Sun Y, et al. 5-year survival and rehospitalization due to stroke recurrence among patients with hemorrhagic or ischemic strokes in Singapore. *BMC Neurol* 2013
18. Perna R. Rehabilitation Outcomes: Ischemic versus Hemorrhagic Strokes; *Behavioural Neurology*. 2015
19. H. Simon, "Stroke," 2013 <http://umm.edu/health/medical/reports/articles/stroke#ixzz3KOOtA7Uk>.