



## Short-Term Outcome of Hemorrhagic Stroke Patients Admitted to Medicine Ward in Dhaka Medical College Hospital

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### Abstract

Cardiovascular diseases are the leading cause of mortality worldwide, with a disproportionately high burden in low- and middle-income countries. Biomarkers play a crucial role in the early detection, diagnosis, and treatment of cardiovascular diseases by providing valuable insights into the normal and abnormal conditions of the heart and vascular system. The biomarkers derived from the cells and tissues can be identified and quantified in the blood and other body fluids and in tissues. Changes in their expression level under a pathological condition provide clinical information on the underlying pathophysiology that could have predictive, diagnostic, and prognostic value in the treatment of a disease process, and therefore incorporated in clinical guidelines. This enhances the effectiveness of biomarkers in risk stratification and therapeutic decisions in personalized medicine and improvement in patient outcomes. Biomarkers could be protein, carbohydrate, or genome-based and may also be derived from lipids and nucleic acids. Computational biology has emerged as a powerful discipline in biomarker discovery, leveraging computational techniques to identify and validate biological markers for disease diagnosis, prognosis, and drug response prediction. The convergence of advanced technologies, such as artificial intelligence, multi-omics profiling, liquid biopsies, and imaging, has led to a significant shift in the discovery and development of biomarkers, enabling the integration of data from multiple biological scales and providing a more comprehensive understanding of the complex signaling and transcriptional networks underlying disease pathogenesis. In this article, we reviewed the role of computational biology integrated with genomics, proteomics, and metabolomics, together with machine learning techniques and predictive modeling and data integration in the discovery of biomarkers in cardiovascular diseases. We discussed specific biomarkers, including epigenetic, metabolic, and emerging biomarkers, such as extracellular vesicles, miRNAs, and circular RNAs, and their role in the pathophysiology of the heart and vascular diseases

**Keywords:** Short-term outcome; Hemorrhagic stroke; Intracerebral hemorrhage; Cerebral vascular diseases

### Introduction

The human nervous system stands as the most intricate, extensively studied, yet incompletely understood physiological system known to humanity. Its structure and functions intricately intertwine with every facet of life—physical, cultural, and intellectual [1]. Cerebrovascular diseases represent the leading cause of disability in industrialized nations, imposing a significant social burden. The evolving incidence of stroke over recent

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**Citation:** Farzana Sultana, Fazle Rabbi, Amran Ahmed, Molla Md. Rubaiat, Aziza sultana, Farhana sultana, Atikur Rahman, Bishnu Pada Saha. Short-Term Outcome of Hemorrhagic Stroke Patients Admitted to Medicine Ward in Dhaka Medical College Hospital. *Cardiology and Cardiovascular Medicine*. 8 (2024): 415-419.

**Received:** August 08, 2024

**Accepted:** August 29, 2024

**Published:** September 24, 2024





spontaneous intracerebral hemorrhage outcomes, involving 156 patients aged 16 to 60 years. Adnan et al. [12] highlighted a younger age of onset in men compared to women. It was observed that among our participants, 45 (75.0%) were male and 15 (25.0%) were female. Ong and Raymond [10] conducted a study aimed at identifying major risk factors for stroke and predictors of one-month mortality, including 246 patients (139 male and 107 female) with a male-to-female ratio of 1:0.77. Juvela et al. [11] undertook a prospective follow-up study to determine independent prognostic factors, including preictal variables, for spontaneous intracerebral hemorrhage outcomes. Their study included 156 consecutive patients (96 men and 60 women), resulting in a male-to-female ratio of 1:0.63. Such variations may be influenced by geographic factors. In our study, regarding the distribution of CT findings among patients with hemorrhagic stroke, it was observed that 51.7% had right-sided intracerebral hemorrhage, 40.0% had left-sided intracerebral hemorrhage, 5.0% had pontine hemorrhage, and 3.3% had brain stem hemorrhage. Regarding the outcomes of the patients in our study, out of 60 participants, it was observed that the condition of 48 (80.0%) improved, 8 (13.3%) remained stable, and 4 (6.7%) died. Hemorrhagic stroke is associated with more severe morbidity and higher mortality rates compared to ischemic stroke. Only 20% of patients regain functional independence, and the 30-day mortality rate for hemorrhagic stroke ranges from 40% to 80%. Approximately half of all deaths occur within the first 48 hours. Primary intracerebral hemorrhage (PICH) is particularly linked to higher mortality and increased disability among survivors. In the present study of 60 patients, 80.0% showed improvement, 13.3% remained static, and 6.7% died. Ong and Raymond [10] studied predictors of one-month mortality and reported a mortality rate of 20.3% at one month. A recent investigation conducted by Zia et al. [13] involving 474 intracerebral hemorrhage (ICH) patients revealed that male gender was predictive of poorer outcomes among those under 75 years of age. Within 28 days, mortality rates were 20.0% for women and 23.0% for men ( $P=0.38$ ). For patients aged 75 years or older, mortality rates were 26.0% for women and 41.0% for men ( $P=0.02$ ). Yonghong et al. [14] explored the relationship between admission blood pressure and in-hospital mortality or disability in acute stroke patients in Inner Mongolia, China. The study included 2178 acute ischemic stroke and 1760 hemorrhagic stroke patients confirmed by computed tomography or magnetic resonance imaging.

### Limitation of the Study

The current study was conducted over a short period due to time constraints. The study population was recruited from a single hospital in Dhaka city, which may limit the generalizability of the findings to the broader population. Additionally, a small sample size was another limitation of the study.

### Conclusion and Recommendation

Right-sided intracerebral hemorrhage is more prevalent among patients experiencing hemorrhagic stroke. Despite advancements in medical science, approximately one-fifth of hemorrhagic stroke patients in Bangladesh continue to face persistent morbidity or mortality. This underscores the ongoing challenges in managing and treating hemorrhagic stroke effectively, highlighting the need for enhanced strategies in acute care, rehabilitation, and long-term management to improve outcomes for affected individuals. Continued efforts in public health initiatives and healthcare infrastructure development are crucial to addressing these issues and reducing the burden of hemorrhagic stroke in Bangladesh.

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