Abstract

Clinical Study of Stroke
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Background: Stroke remains a major public health concern globally, contributing significantly to morbidity and mortality. The condition arises due to an interruption of blood supply to the brain, often resulting in long-term disability or fatality. Understanding the demographic and clinical risk factors associated with stroke is essential for effective prevention and management strategies. This study aims to investigate the key determinants of stroke and develop a predictive model for risk assessment.

Methods: This study utilized a dataset sourced from the African Centre for Disease Control, comprising 5,110 individuals with various demographic and clinical attributes, including age, gender, hypertension, heart disease, marital status, work type, residence, smoking status, BMI, and glucose levels. The dataset underwent preprocessing, including handling missing values, transforming categorical variables into factors, and performing statistical standardization. Descriptive statistical analysis was conducted to summarize the dataset, while chi-square tests and t-tests were employed for bivariate analysis to determine associations between stroke and key variables. Logistic regression modeling was implemented to identify significant predictors of stroke. Model performance was assessed using the area under the receiver operating characteristic (ROC) curve (AUC) to evaluate classification accuracy.

Results: The analysis revealed that age, hypertension, heart disease, smoking status, and glucose levels exhibited significant associations with stroke occurrence ($p < 0.05$). Logistic regression identified age (OR = 1.08, $p < 0.001$), hypertension (OR = 1.37, $p = 0.054$), glucose level (OR = 1.00, $p = 0.007$), and BMI (OR = 1.00, $p < 0.001$) as the most influential predictors. The predictive model demonstrated strong classification performance with an AUC of 0.853, indicating high reliability in distinguishing individuals at risk of stroke.

Conclusion: The findings of this study underscore the necessity of proactive screening and intervention strategies for individuals at elevated risk of stroke. Key risk factors such as age, hypertension, glucose levels, and BMI should be closely monitored to facilitate early diagnosis and effective management. The study provides valuable insights into stroke risk stratification, supporting the development of targeted healthcare policies and preventive measures.