



Assessing the Potential Risk Factors for Patients with Brain Stroke: A Retrospective Study

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KEYWORDS

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ABSTRACT:

The primary cause of impairment is stroke. When you factor in cancer and coronary heart disease, it is the third most common cause of death. It has a significant global impact on public health. The estimated five million stroke-related fatalities globally are expected to double due to anticipated significant changes in demographics and lifestyle, such as rising rates of obesity, diabetes mellitus, smoking, and hypertension. This study traced the risk factors of brain stroke patients using the Kaggle search engine dataset, which comprised the medical records of 201 people with the condition. The mortality was modelled using the Cox regression approach, which took into consideration the observed covariates. It was determined that five variables significantly increased the incidence of brain stroke in patients.

INTRODUCTION

The average lifespan of a human being is currently increasing daily as a result of technological improvements. The introduction of technological equipment like computers, smartphones, and portable devices has caused a shift in lifestyle from an active lifestyle to a sedentary one. Due to their sedentary lifestyles, young people are also experiencing a number of health issues, including diabetes, hypertension, cardiovascular illnesses, and strokes. These issues are not exclusive to the ageing population. Smart health care devices are necessary to track people's health utilizing noninvasive smart procedures and biomarkers. Studies in the body of current research demonstrate the detrimental effects of a sedentary lifestyle on human health⁽¹⁻³⁾.

A stroke, also known as a cerebrovascular accident (CVA), is a clinical syndrome marked by an abrupt loss of neurologic function that lasts for at least 24 hours. It is caused by a disruption in cerebral circulation, which is brought on by a cutoff of the blood supply to the brain and represents focal involvement of the central nervous system (CNS)⁽⁴⁾. In 80–90% of instances, cerebral infarction, often known as ischemic stroke, is the cause of stroke, while intracerebral parenchymal haemorrhage accounts for 10–20% of cases⁽⁴⁾. The primary cause of impairment is stroke. It is thought to

be connected to one in ten fatalities worldwide and is the third most common cause of mortality in the USA, after cancer and coronary heart disease (CHD)⁽⁵⁾.

People 45 years of age and older account for 95% of stroke cases, while people over 65 accounts for two thirds of stroke cases⁽⁶⁾. Therefore, stroke is frequently thought of as an illness that only affects the old, even though one-third of stroke victims are under 65⁽⁷⁾. By 2020, the estimated five million stroke-related deaths that occurred globally in 1990 are expected to have doubled, with the majority of the increase expected in developing nations due to anticipated significant changes in population, lifestyle, and health. These changes include higher rates of obesity, smoking, diabetes mellitus (DM), and hypertension (HT)⁽⁸⁾. Ischemic stroke is associated with both controllable and non-modifiable risk factors. Determining each patient's risk variables can provide information about the stroke's aetiology, the best course of therapy, and a secondary preventive strategy⁽⁴⁾.

Age, race, sex, ethnicity, history of migraines, sickle cell disease, fibro muscular dysplasia, and inheritance are examples of non-modifiable risk factors. The most significant modifiable risk factors include carotid stenosis, diabetes mellitus, heart failure (HF), atrial fibrillation (AF), and hypertension (HT). Lifestyle problems include excessive alcohol consumption,



cigarette smoking, illicit drug use, obesity, sedentary behavior, and usage of oral contraceptives⁽⁴⁾.

BACKGROUND OF THE STUDY

In a stroke, there is insufficient blood supply to the brain, which results in the death of brain cells. There are two basic types of stroke: hemorrhagic (caused by bleeding) and ischemic (caused by a lack of blood supply). Both lead to abnormal brain function in certain areas. An inability to move or feel on one side of the body, difficulty speaking or understanding, dizziness, or loss of vision on one side are some signs and symptoms of a stroke. Symptoms and indicators frequently show up quickly after the stroke. A transient ischemic attack (TIA), sometimes referred to as a mini-stroke, is a stroke if symptoms go away in less than an hour or two. Severe headaches can also be a sign of hemorrhagic strokes. A stroke can leave behind permanent symptoms. Loss of bladder control and pneumonia are examples of long-term consequences.

The primary cause of stroke risk is elevated blood pressure. High blood pressure, smoking, obesity, diabetes mellitus, end-stage renal disease, diabetes, high blood cholesterol, and atrial fibrillation are additional risk factors. Although there are less frequent causes, occlusion of a blood artery is usually the cause of an ischemic stroke. Either bleeding into the brain directly or into the area between the brain's membranes might result in a hemorrhagic stroke. A brain aneurysm that has ruptured may cause bleeding. Medical imaging, such as a CT or MRI scan, is used to support the diagnosis, which is usually made after a physical examination. While ischemia usually does not appear on a CT scan in its early stages, a scan can rule out bleeding but not always ischemia. To identify risk factors and rule out other potential causes, additional tests are performed, including blood and

electrocardiograms (ECGs). Similar symptoms may be caused by low blood sugar.

Reducing risk factors, operating to widen the carotid arteries in patients with severe stenosis, and using warfarin in patients with atrial fibrillation are all examples of prevention. Doctors may advise taking statins or aspirin for preventive. Emergency care is typically needed after a stroke or TIA. If an ischemic stroke is discovered within three to four and a half hours, a drug that dissolves clots may be used to treat it. For certain hemorrhagic strokes, surgery is beneficial. Stroke rehabilitation is the process of trying to regain lost function. Ideally, this happens in a stroke unit, but these are not readily available everywhere in the globe.

OBJECTIVES

- Identifying possible risk factors for the development of individuals who have suffered a brain stroke.
- To determine the qualitative variables by utilizing percentage and frequency analysis.
- To determine the quantitative variables by applying the mean and standard deviation.
- Using multivariate logistic regression analysis, determine other qualities and demographic variables.

STATISTICAL ANALYSIS

The features of our study population were determined using descriptive statistics. To ascertain the mean and standard deviation for quantitative data, and frequency and proportion for qualitative data. A statistical method that can be used to choose and combine input variables that are connected to a certain result is multivariate logistic regression analysis. Version 20 of the Statistical Package for Social Science (SPSS) was used for data coding and analysis. Every statistical test was run with a 5% significance threshold.

RESULTS AND DISCUSSION

Table: 1- Qualitative Variable

Demographical Variables	Frequency	Percentage
Gender wise		
Male	104	51.7
Female	97	48.3
Age wise		



Below 30	34	16.9
31-40	26	12.9
41-50	23	11.4
51-60	31	15.4
Above 61	87	43.3
Hypertension		
No	154	76.6
Yes	47	23.4
Heart Disease		
No	168	83.6
Yes	33	16.4
Ever Married		
No	52	25.9
Yes	149	74.1
Work Types		
Govt.Employee	27	13.4
Private Employee	114	56.7
Self- Employee	44	21.9
Children's	16	8.0
Residence Types		
Rural	95	47.3
Urban	106	52.7
Smoking Status		
Formerly Smoked	48	23.9
Never Smoked	40	19.9
Smokes	52	25.9
Unknown	61	30.3
Stroke		
No	161	80.1
Yes	40	19.9

Data Sources: healthcare-dataset-stroke-data.cs

Out of the 201 patients who had a brain stroke, the majority (51.7%) were men, and over half (43.3%) fell within the above-61 age range. The proportion of patients who lived in cities was 52.7%. The distribution of patients by worker level was found to be as follows: government employees (13.4%), private employees (56.7%), self-employed people (21.9%), and children (8.0%). The percentage of patients experiencing a brain

stroke was 19.9%. While 76.6% of the participants in this study had no hypertension, 23.4% of them had known hypertension. In terms of the patient's family history, 16.4% of patients disclosed a history of heart disease in their family. According to this survey, 25.9% of smokers have previously smoked. Twenty-nine percent had never smoked. Thirty-three percent of the patients were found to be unknown smokers (Table -1).

Table: 2- Quantitative Variable

Demographical Variables	Mean	Standard Deviation
Average Glucose Level	126.72	59.24
BMI	29.33	3.36



Data Sources: healthcare-dataset-stroke-data.cs

Regarding distribution of risk factors according to the Average Glucose Level (126.72 ± 59.24) and Average of the BMI (29.33 ± 3.36). (Table-2).

Table: 3-Demographic characteristics and other attributes: Multivariate logistic regression analysis

Variables	Groups	Beta	Expected Beta	95% CI	Wald	P-Value
Gender	Male	0.343	1.409	0.581-3.421	0.575	0.448
	Female	0 ^b	-	-	-	-
Age wise	Below 30	19.898	438336588.5	29965829.78-6411935402	211.309	0.000*
	31-40	2.962	19.344	2.115-176.911	6.882	0.009*
	41-50	19.470	285677633.9	0.000- c	0.00	0.996
	51-60	0.846	2.330	0.783-6.935	2.309	0.129
	Above 61	0 ^b	-	-	-	-
Hypertension	No	-1.057	0.348	0.118-1.027	3.654	0.050*
	Yes	0 ^b	-	-	-	-
Heart Disease	No	-0.922	0.398	0.135-1.1176	2.779	0.096
	Yes	0 ^b	-	-	-	-
Smoking Status	Formerly Smoked	0.289	1.335	0.469-3.796	0.293	0.588
	Never Smoked	1.218	3.380	1.000-11.426	3.842	0.050*
	Smokes	1.867	6.469	1.522-27.502	6.393	0.011*
	Unknown	0 ^b	-	-	-	-
Residence Types	Rural	0.172	1.188	0.497-2.840	0.150	0.699
	Urban	0 ^b	-	-	-	-

*95% significance level

b.This parameter is set to zero because it is redundant.

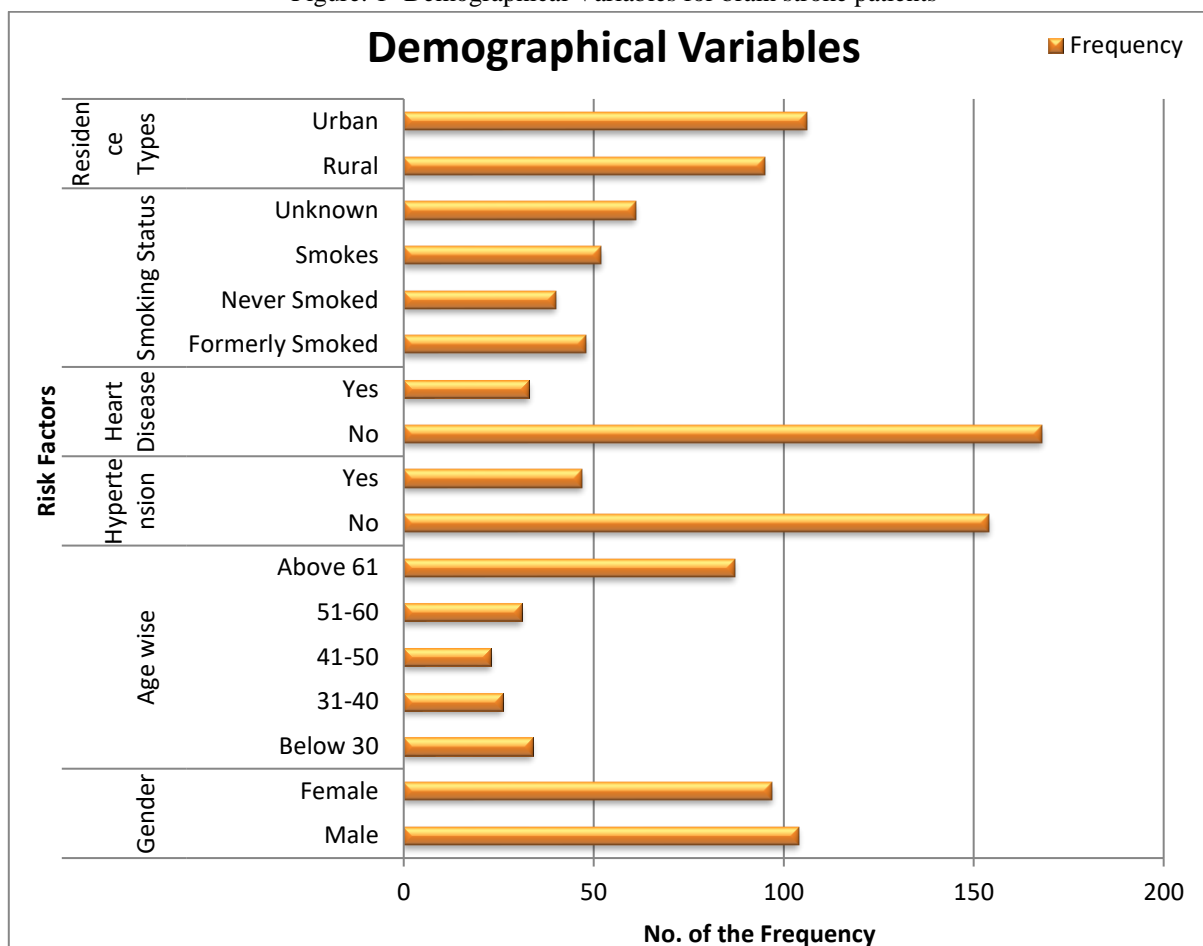
c.Floating point overflow occurred while computing this statistic. Its value is therefore set to system missing.

The final logistic regression model for the development of brain stroke contains six variables. In demographical order wise, the six predictive potential risk factors for the development of brain stroke were: Gender (0.581-3.421, P-Value 0.448), Age wise (2.115-176.911, P-Value 0.000), Hypertension (0.118-1.027, P-Value 0.050), Heart Disease (0.135-1.1176, P-Value 0.096),

Smoking Status (1.000-11.426, P-Value 0.050), Residence Types (0.497-2.840, P-Value 0.699). The final predictive model for development of brain stroke has included five (Age wise below 30 and 31-40, Hypertension, Smoking Habits Never Smoked and Smokes) significantly statistical variables ($P < 0.05$).



Figure: 1- Demographical Variables for brain stroke patients



CONCLUSIONS

Our findings demonstrate the important roles that smoking, heart disease, and hypertension play in predisposing people to brain stroke. They also suggest that future efforts should concentrate on aggressively controlling hypertension and detecting it early in order to reduce the risk of stroke and its aftereffects. Our results highlight the critical role that public health plays in hypertension and urge prompt identification and management of the condition in the community.

Knowing that stroke is a chronic condition with high priority worldwide, a comprehensive community health campaign should be initiated, emphasizing community education on stroke risk factors and the identification of symptoms, prognosis, and outcomes associated with stroke. Early detection and treatment are crucial because they can enhance results, provide regular, ongoing follow-up, and reduce impairment with current

treatment options. Programmes that educate front-line healthcare workers on basic supportive measures could lead to better results in situations where access to advanced stroke diagnosis and treatment is still restricted.

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