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Assessment of Risk Factors for Hemorrhagic Stroke Patients in the Intensive Care Unit

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Abstract:
Hemorrhagic stroke is caused by the rupture of weakened arteries in the brain or surrounding the brain. The surrounding brain tissue becomes weakened and eventually dies as a result of the accumulation and compression of blood. It is life-threatening and often requires an operation, to reduce the increased intracranial pressure in the brain **Aim:** Assess risk factors for Hemorrhagic stroke patients in Intensive Care Unit **Design:** A descriptive research design was used. **Setting**: Intensive care unit in neurology hospital which affiliated to Assiut University. **Sample:** All adult males and female's patients with hemorrhagic stroke who were recently admitted through six months from the beginning of May 2023 to the end of October 2023. **Tools: Tool 1:** patient assessment tool for Hemorrhagic stroke, **tool 2:** Risk factors assessment tool**. Results:** More than half of studied patients were male (57.0%), with age more than 55 years old, also shows advanced age is the most common non modifiable risk factors while hypertension, Diabetes Mellitus, and smoking were the commonest modifiable risk factors among studied population. **Conclusion:** Based on the study findings, it can be concluded that effective management and strict control of modifiable risk factors, such as hypertension, diabetes, and smoking, are essential reducing the incidence of hemorrhagic stroke. Additionally, awareness of non-modifiable risk factors like advanced age can aid in early identification and monitoring of high-risk individuals **Recommendations**: -Future studies must be directed to non-therapeutic methods to lower the modifiable risk factors of hemorrhagic stroke such as body weight control, physical activity, and lifestyle modification.

Keywords: Intensive Care Unit, Hemorrhagic Stroke & Risk Factors.

Introduction:
Stroke is a major public health issue that can occurs suddenly with a risk of disability, increase health care costs, result in considerable death, and lower quality of life. Stroke incidence is increased in the elderly population. Although hemorrhagic stroke is more common than ischemic stroke, it is also more deadly and disabling. The prevalence and fatality rates of stroke vary among nations, states, and ethnic communities. In the last three decades, the burden of stroke has significantly decreased in high-income countries due to advancements in neurorehabilitation, acute treatment, and prevention **(Martono et al., 2024)**.

Hemorrhagic stroke occurs when a blood vessel bursts, blood leaks into the brain, it can be classified into subarachnoid hemorrhage and intracerebral hemorrhage. It is linked with severe morbidity and high mortality rates. The Progression of hemorrhagic stroke is usually associated with bad outcomes. Quick detection and treatment are crucial since the bleeding can spread quickly, leading to abrupt loss of consciousness and brain damage **(Unnithan et al., 2023)**.

The most common cause of hemorrhagic stroke is hypertension. Several factories, including diabetes mellitus, smoking, alcohol consumption, and obesity, have been linked to an increased risk of hemorrhagic stroke **(Sidhartha et al., 2015)**.

Compared to ischemic stroke, hemorrhagic stroke has a greater risk. A low Glasgow coma scale (GCS) score (≤8) and the presence of herniation syndrome enhance risk of in-hospital death. Young age, GCS score at admission, and small hematoma volumes have a protective effect in patients with hemorrhage and are important predictors of functional outcome **(Kwon et al., 2018)**.

Following a hemorrhagic stroke, the following events are likely to occur: death, functional impairment, diminished quality of life, ischemic stroke, and recurrence of intracerebral hemorrhage, cognitive decline, mental disorders, and epilepsy **(Wong et al., 2022)**. One strategy to avoid strokes is to use health promotion in a variety of ways, such as regular exercise, which helps to stabilize blood pressure, to prevent strokes from an early age. If one of the risk factors for strokes is elevated blood pressure, give up smoking, consume less high-sodium meals, and undergo routine medical exams **(Martono et al., 2024)**.

Over the past ten years, there have been significant advancements in the treatment of stroke, including

improvements in neurorehabilitation, acute therapy, and prevention. During this time, a number of important trials for hemorrhagic and ischemic stroke were published; which include mechanical thrombectomy for thrombolysis using MRI-based or perfusion-based imaging, and massive decrease of blood pressure to lower the intracerebral hemorrhage **(Kelly & Reinecke., 2022)**.

The primary goal of acute stroke care is directed toward minimize damage which results from stroke, maintain sufficient cerebral perfusion and minimize further damage. Stroke management contains two main phases: acute and rehabilitation phase. During the acute phase nursing care concentrates on monitoring the patient's neurological status, determining the severity of the stroke, and preventing problems related to neurological impairment and immobility brought on by the stroke immediately after patient admission **(Morton et al., 2017).**

Critical care nurses as a part of interdisciplinary team has a vital role in assessment, identification, monitoring, providing psychological support, also implementing rehabilitation plans, and providing end of life care. The integration of skills, knowledge, experience, talents, and attitudes to meet the requirements of patients in critical condition is reflected in nursing care **(Abd El-Hady et al., 2022)**.

Significance of the study

About 10% to 20% of strokes occur as a result of hemorrhagic stroke each year. In the United States, the United Kingdom, and Australia, the percentage of hemorrhagic stroke ranges from 8 to 15%, and in Japan and Korea, it ranges from 18 to 24%. The incidence is around 12% to 15% of cases per 1, 00,000 per year. The incidence is high in low and middle-income countries and Asians. The prevalence is rising worldwide, mostly in Asian and African nations. According to research from Japan, ICH incidence is decreased when hypertension is under control. In high-income nations, the case fatality rate ranges from 25% to 30%, but in low- to middle-income nations, it ranges from 30% to 48% (**Unnithan et al., 2023**).

Statistics of Intensive Care Unit at Assuit University Neurology Hospital in the years of (2022) reported that the number of patients admitted to the unit was 100 patients with hemorrhagic stroke, which require quick and massive medical and nursing care.

Aim of the study

This study aimed to assess Risk Factors for Hemorrhagic Stroke Patients in the Intensive Care Unit.

Research questions

What are the Risk Factors for Hemorrhagic Stroke Patients in the Intensive Care Unit?

Subjects and Methods

Research design:

To conduct this study a descriptive research design was used.

Setting:

This study was carried out in intensive care unit of a neurology hospital affiliated with Assiut University, which has three rooms (each containing 12 beds), that equipped with the necessary equipment, high flow supplemental oxygen, a Mechanical Ventilation machine, and physiological parameter Monitor.

Sample:

A convenient sample of all adult males and female's patients (100 patients) with hemorrhagic stroke who were recently admitted to intensive care unit was through six months were included in the sample.

Inclusion criteria:

This study include all patients who were newly admitted to intensive care unit and aged >18 years old.

Exclusion criteria:

Excluded from the current study the patients with any malignancies, also who were previously admitted to another health care setting.

Study tools

Two main tools were used to collect data in this study. Tools developed by the researcher after reviewing the related literature **(Mohamed et al., 2014 & Morton., 2017)** and it include:

Tool One: Patient assessment tool for hemorrhagic stroke:

This tool was developed by the researcher after reviewing the relevant and recent literature (**Mohamed et al., 2014** & **Morton., 2017)** and used to assess the studied patients regarding socio-demographic, medical data. This tool comprises two main parts as following:

Part (1): personal and clinical data: It includes demographic data (patient's code, age, gender, educational level, & socioeconomic status), past medical history and diagnosis on admission (CT brain results).

Part (2): Laboratory tests: Such as lipid profile, hemoglobin (HB) concentration and platelet count, blood sugar level and CT scan of the brain.

Tool two: Risk factors assessment tool: This tool was developed by the researcher after reviewing the relevant literatures (**Mohamed et al., 2014**), **(Abd El-Hady et al., 2022)** (**Amelia et al., 2017)** (**Roger et al., 2012)** and used to assess modifiable and non-modifiable risk factors of the patients admitted with hemorrhagic stroke.

Non-modifiable Stroke Risk Factors

Non-modifiable risk factors (also called risk markers) include age, gender, and race-ethnicity.

Age: In general, stroke is a disease of aging. The incidence of stroke increases with age, with the incidence doubling for each decade after age 55. In hemorrhagic stroke patients, the incidence increases after the age of 45. Some of the recent study reported that increases in incidence among younger persons may reflect changes in diagnostic testing as well, leading to greater sensitivity for the detection of stroke among those with minor symptoms (**Roger et al., 2012)**.

Gender: The relationship of gender to stroke risk depends on age. At young ages, women have as high or higher risk of stroke as men, though at older ages, the relative risk is slightly higher for men. The higher stroke risk among women at younger ages likely reflects risks related to pregnancy and the post-partum state, as well as other hormonal factors, such as use of hormonal contraceptives. Overall, more strokes occur in women than men, due to the longer lifespan of women compared to men (**Van et al., 2010)**.

Modifiable Risk Factors

The modifiable risk factors are of utmost importance, as intervention strategies aimed at reducing these factors can subsequently reduce the risk of stroke. Early identification and modification of risk factors is imperative.

Hypertension: it is the most important modifiable risk factor for stroke, with a strong, direct, linear, and continuous relationship between blood pressure and stroke risk, using a definition of hypertension that included both a history of hypertension as well as a blood pressure measurement of 160/90 mm Hg (**O'Donnell et al., 2010).**

Diabetes: Diabetes is an independent risk factor for stroke with a 2-fold increased risk in stroke for diabetic patients and stroke accounts for approximately 20% of deaths in diabetics. Pre-diabetics are also at increased risk of stroke **(Banerjee et al., 2012)**.

Dyslipidemia: The relationship between dyslipidemia and stroke risk is complex, total cholesterol, meanwhile, is inversely associated with hemorrhagic stroke, with hemorrhagic stroke risk increasing as total cholesterol decreases. The data on lipids and intracerebral hemorrhage are further complicated by the fact that some observational studies have found no increased risk of intracerebral hemorrhage with statin therapy, while some treatment trials have **(Hackam et al., 2012)**

Obesity: Body weight and obesity are risk factors for stroke, although the specific ways in which they increase stroke risk continue to be debated. Obesity is related to stroke risk factors such as hypertension and diabetes. A recent large meta-analysis, including 1.8 million participants from 97 cohort studies, found that 76% of the effect of body mass index (BMI, a common measure of obesity) on stroke risk was mediated by blood pressure, cholesterol, and glucose levels **(Suk et al., 2013)**.

Alcohol consumption: The relationship of alcohol consumption to stroke risk depends on stroke type. Alcohol consumption has a direct linear relationship with hemorrhagic stroke, such that consumption of even small amounts of alcohol appears to increase risk of hemorrhage. Heavy alcohol consumption is linked to hypertension, as well as poor blood pressure control in hypertensive patients who consume alcohol **(Hillbom et al., 2011).**

Smoking: Cigarette smoking remains a major risk factor for stroke, nearly doubling the risk with a dose response relationship between pack-years and stroke risk. It is estimated that smoking contributes to nearly 15% of all stroke deaths per year. Smoking cessation rapidly reduces the risk of stroke, with excess risk nearly disappearing 2-4 years after smoking cessation (**Malek et al., 2015**).

Life style related Risk Factors:

Diet: it influences the risk of stroke as well as the risk of other stroke risk factors such as diabetes, hypertension, and dyslipidemia. There are several limitations to diet studies including recall bias and measurement error, but some specific components of diet and nutrition are well-established risk factors for stroke. Salt intake, for example, is associated with an increased risk of hypertension and stroke, whereas increased potassium intake is associated with a decreased stroke risk (**Strazzullo et al., 2009**).

Physical inactivity: is associated with many poor health effects, including stroke. People who are physically active have a lower risk of stroke and stroke mortality than those who are inactive. The relationship between physical activity and stroke may be due to the associated decrease in blood pressure, reduction in diabetes, and reduction in excess body weight (**Amelia et al., 2017**).

Tool three: patient's outcomes assessment sheet:- these tool was developed by the researcher based on review of related literature **(Kennerly et al., 2022; Quach et al., 2019 & Mengel., 2019)** and include 2 parts as following

Part (1): The Braden Scale for predicting pressure score: was adopted from by (**Bergstrom et al 1988)** and reused by **(Kennerly et al 2022)** it used to assess and document a patient's risk for developing pressure injuries. The scale consists of six subscales sensory perception, moisture, mobility, activity, friction and shear. The total scores range from 9-23. A lower Braden score indicates higher levels of risk for pressure ulcer development; generally is classified as:

- Mild risk: 15-18
- Moderate risk: 13-14

- High risk: 10-12
- Severe risk: less than 9

Part (2): outcomes assessment sheet:

This used to assess short term complication such as deep venous thrombosis, aspiration pneumonia, and seizure, muscles weakness, swallowing difficulty anemia, and electrolyte deficiency, Also length of stay and mortality.

Methods

The study was conducted though two main phases as following.

Preparatory phase:

- **An official permission** was obtained prior to conducting the current study from neurology hospital at Assiut University administrator to make the study's implementation easier after explanation the aim of the study.
- **An approval** was taken from the local ethical committee and the study was followed the common ethical principles in clinical research.
- **Validity:** Study tools content validity was tested by three panels of juries' expertise in the field of critical care nursing and medical biostatistics.
- **Reliability**: Study tools reliability were tested using Cronbach alpha. It was 0.832 for tool one and 0.857 for tool two that means a highly reliable tool.
- **Pilot study**: A pilot study was done prior to beginning of data collection on 10% of cases (10 patients) to test the feasibility, clarity, and applicability of the study tools in addition to estimate the time needed to collect data. The pilot study analysis indicates that the tool utilized doesn't need to be modified. The pilot study subjects were excluded from the actual study.
- **Written approval** was taken from the relevant (for unconscious patients) after explaining the aim of the study by the researchers.
- All studied patients were assured about the privacy and data confidentiality.
- **Data collection:** The data collection period was extended for six months, from the beginning of May 2023 to the end of October 2023.

Ethical Considerations:

- Study proposal had been approved from the Scientific Research Ethical Committee of the Faculty of Nursing Assuit University.
- There is no risk for study subject during application of the research.
- The common ethical principles were followed.
- Written consent was taken after explaining the purpose and nature of the study from patients who were willing to participate in the study.
- Patients were assured that the collected data of this study will be used only for the purpose of this study.
- Confidentiality and anonymity were assured.
- Patients have the right to refuse to participate and/or withdraw from the study without any rational at any time.

Implementation phase

- The study Purpose was clarified to patients and their relatives in case of comatose patients.
- After taking the patient oral agreement for voluntary participation in the study, each patient was communicated personally by the researcher to fulfill the patient's assessment sheet throughout the following.
- Data was collected 3 days a week, during the morning and evening shift.
- The researcher went to the unit at 9 am, introducing herself for the nursing staff and to the oriented patients, and then explains the nature and purpose of the study ensuring oral agreement to participate.
- The researcher used tool one (part one) to assess patients Personal data (age, gender and cause of admission), Past history of chronic diseases (chronic kidney disease, hypertension, cardiopulmonary, neurological, and hepatic disease respiratory), this was done through asking and reviewing patient sheet.
- Also using tool one (part two): Some laboratory investigations were carried out to define the risk factors as:
  a- ECG to assess the heart diseases, history of MI, coronary artery disease, CHF, or arrhythmia.
  b- Blood sugar Level: Diabetes mellitus (when level of glucose > 7.0 moll/l (>126 mg/dl) or undergoing hypoglycemic treatment.
  c- Hypertension defined as SBP >140 mmHg, DBP> 80 mmHg or use antihypertensive treatment.
  d- Presence of Family history for stroke.

Evaluation phase

- The researcher used tool two to evaluate the study participant for the presence of modifiable and non-modifiable risk factors for hemorrhagic stroke as mentioned in tool section.
- By using The Braden Scale for predicting pressure score, the researcher assess the patients for development of pressure ulcer Patients by tool three part one **(Braden Scale)**. The total scores range from 9-23, as a lower Braden score indicates higher levels of risk for pressure ulcer development; generally is classified as:
  - Mild risk: 15-18
  - Moderate risk: 13-14
  - High risk: 10-12
- Severe risk: less than 9
  - And finally the researcher assessed the studied patients with previous mentioned setting for ICU discharge criteria (monitoring of the outcomes) by recording the following*:*

1. Discharge to home.
2. Transfer to another unit.
3. Mortality.
4. The length of patients' stays (LOS) from ICU admission till discharge.
5. Complications was monitored and recorded through the patients' hospitalization period includes (deep venous thrombosis, aspiration pneumonia, and seizure, muscles weakness and swallowing difficulty).

Statistical analysis

Statistical analyses were performed with IBM SPSS 26.0 software. The data were tested for normality by use of the Anderson-Darling test and for homogeneity variances. Categorical variables were described by number and percent (N., %), while continuous variables described by mean and standard deviation (Mean, SD).

Results

Table (1): Frequency distribution of the studied patients according to demographic characteristics (N=100)

Demographic characteristics	NO.	%
Age		
18-34 years	13	13.0%
34-54 years	20	20.0%
> 55 years	67	67.0%
Mean ± SD	62.2 ± 12.3	
Gender		
Male	57	57.0%
Female	43	43.0%
Occupation		
Unemployed	52	52.0%
Employer	28	28.0%
Retired	20	20.0%
Education		
Illiterate	32	32.0%
Read and write	1	1.0%
Primary	28	28.0%
Secondary	39	39.0%
Marital status		
Married	81	81.0%
Widow	19	19.0%

Statistical significant differences were considered when P-value used as follows:-
P >0.05 non-significant **P<0.05 significant*
***P<0.01 moderate significant* ****P<0.001 highly significant.*

Table (2): Frequency distribution of the studied patients according to clinical characteristics (N=100)

Clinical characteristics	NO.	%
Past medical history		
Diabetes mellitus	50	50%
Hypertension	87	87%
Unstanle angina	4	4%
Myocardial inafraction	8	8%
stroke	34	34%
Liver disease	36	36%
Renal impairment	10	10%
Respiratory disease	23	23%
CT brain		
Intracerebral Hemorrhage	39	39%
Subarachnoid hemorrhage	22	22%
Subdural hemorrhage	39	39%

Table (3): Means and standard deviation of the studied patients according to laboratory investigation (N=100)

laboratory investigation	Baseline day
low density lipoprotein	109.03±53.94
Creatinine	1.04± 0.97
Hemoglobin	15.31 ± 1.46
Platelet account	250.16 ± 61.79
Blood sugar	273.72 ± 132.61

Table (4): Frequency distribution of the studied patients according to risk factors (N=100)

Risk factors	NO.	%
Non modifiable risk factors		
Advanced age	67	67%
Personal history of another type of aneurysm	4	4%
Family history of an intracranial aneurysm	30	30%
Modifiable risk factors		
Diabetes mellitus	50	50%
Hypertension	87	87%
High blood cholesterol	52	52%
Coronary artery disease	12	12%
Congestive heart failure	12	12.0%
Atrial fibrillation	36	36%
Past stroke	34	34%
Antiplatelet drugs	50	50%
Transient Ischemic Attack	34	34%
Liver disease	36	36%
Smoking	54	54%
Renal impairment	10	10%
Obesity	31	31%

Table (5): Distribution of studied patients regarding outcomes (N=100)

Outcomes	NO.	%
Mortality	26	26.0%
LOS in ICU		
< 10 days	27	27.0%
>10 days	73	73.0%
Mean ±SD	14.43±8.60	

Table (6): Distribution of studied patients regarding Complications (N=100)

Complications	NO.	%
Pressure injury (Braden scale)		
On first day		
very high risk (9 or less)	6	6.0%
high risk (10 - 12)	14	14.0%
moderate risk (13 - 14)	10	10.0%
mild risk (15 - 18)	61	61.0%
no risk (19 - 23)	9	9.0%
Mean ±SD	15.34±3.33	
On the 7th day		
very high risk (9 or less)	61	61.0%
high risk (10 - 12)	30	30.0%
moderate risk (13 - 14)	3	3.0%
mild risk (15 - 18)	6	6.0%
no risk (19 - 23)	0	0.0%
Mean ±SD	8.55±3.14	

Complications	NO.	%
Complications:		
Aspirated pneumonia	52	52.0%
Hospital acquired pneumonia	40	40.0%
• Brain edema	39	39%
• Electrolyte deficiency(hyponatermia)	22	22.0%
• Muscles weakness	38	38.0%
• Seizure	8	8%
• DVT	4	4%

Table (7): Pearson correlation between Braden scale categories and risk factors among studied (N=100)

Risk factors	Braden scale categories					P - value
	Very high risk	High risk	Moderate risk	Mild risk	No risk	
Advanced age	4 (6.0%)	10(14.9%)	7 (10.4%)	40(59.7%)	6 (9.0%)	.031*
Personal history of another type of aneurysm	1(25.0%)	0 (0.0%)	0 (0.0%)	3 (75.0%)	0 (0.0%)	.404
Family history of an intracranial aneurysm	5(16.7%)	8 (26.7%)	4 (13.3%)	10(33.3%)	3(10.0%)	.001*
Diabetes mellitus	2 (4.0%)	9 (18.0%)	5 (10.0%)	30(60.0%)	4 (8.0%)	.029*
Hypertension	5 (7.5%	11(16.4%)	8 (11.9%)	39(58.2%)	4 (6.0%)	.323
High blood cholesterol	6 (11.5%)	6 (11.5%)	6 (11.5%)	30(57.7%)	4 (7.7%)	.001
Atrial fibrillation	0 (0.0%)	1(100.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	.184
Coronary artery disease	2(16.7%)	2 (16.7%)	1 (8.3%)	7 (58.3%)	0 (0.0%)	.415
Congestive heart failure	2(16.7%)	2 (16.7%)	1 (8.3%)	7 (58.3%)	0 (0.0%)	.415
Past stroke	3 (8.3%)	7 (19.4%)	2 (5.6%)	23(63.9%)	1 (2.8%)	.257
Antiplatelet	7 (14%)	11(22%)	13(26%)	9(18%)	10(5%)	.698
TIA	1 (2.9%)	4 (11.8%)	2 (5.9%)	21(61.8%)	6(17.6%)	.189
Liver disease	0 (0.0%)	3 (8.3%)	23(63.9%)	3 (8.3%)	7(19.4%)	.498
Smoking	2 (3.7%)	10(18.5%)	7 (13.0%)	33(61.1%)	2 (3.7%)	.029*
Renal impairment	0 (0.0%)	6(60%)	4(40.0%)	0 (0.0%)	0 (0.0%)	.345
Obesity	20(64.5%)	3 (9.7%)	3 (9.7%)	3 (9.7%)	2 (6.5%)	.030*

Table (1): Illustrates that more than half of studied patients were male (57.0%), with age more than 55 years old with mean ±SD (62.2 ± 12.3). Also, regarded Occupation, table demonstrate that more than half of studied patients were unemployed (52.0%) and majority of them were Married (81.0%).

Table (2): Shows that the most common past medical history were hypertension in half of studied patient (87%) followed by diabetes (50%) Also, in relation to current diagnosis based on CT brain results intracerebral and subdural hemorrhage were the common diagnoses (39.0%)

Table (3): Presents that low density lipoprotein mean on admission was (109.03±53.94), hemoglobin mean on admission was (15.31 ± 1.46) and blood sugar in the mean on admission was (273.72 ± 132.61).

Table (4): Illustrates that more than two thirds (67%) were advanced age and as regard modifiable risk factors the majority of sample (87%) were hypertension and more than half of sample were have smoking, and half of sample complain from diabetes mellitus .

Table (5): Illustrates that that majority of the studied patients (73%) last for more than 10 days with mean 14.43±8.60. Also, mortality rate represent about one quarter among study patients.

Table (6): Illustrates that that majority of the studied patients have very high risk of pressure ulcer at discharge (60%) with mean (8.55±3.14). While, mild risk for developing pressure ulcer presents in the first day. Also, aspirated pneumonia is the most common complication among studied patients outcome among studied patients.

Table (7): Pearson correlation between Braden scale categories and risk factors among studied. There are statistical significant relations between Braden scale categories and advanced age, family history of an intracranial aneurysm, diabetes mellitus high blood cholesterol, smoking and obesity with p value (0.031&0.029& 0.001&&0.029 and 0.030 respectively)

Discussion

Stroke is a major worldwide health concern as it is one of the main causes of illness, death, and disability. The burden and clinical outcome of stroke is rapidly changed globally, due to the increased life expectancy in the developing countries which have now a greater burden of cardiovascular disease. This has had a substantial effect on the public health system by altering the pattern of cause-specific mortality of stroke. **(Russell et al., 2020)**.

Hemorrhagic stroke occurs when a blood artery ruptures and causes bleeding into the brain, which is associated with a high fatality rate and poor results. Early identification and treatment are critical given the typical fast development of bleeding, causing quick worsening of consciousness and neurological functioning **(Trevisi et al., 2022)**

Hemorrhagic strokes are very dangerous because they lead to severe symptoms that get worse rapidly. These strokes frequently result in death or irreversible brain damage if prompt medical assistance is not received.

The discussion will cover the main result findings as follows:

As regard gender, the results of current study demonstrated that more than half of studied patients were male (57.0%), from the researcher point of view the male gender preponderance may be attributed to the stressful life style and workload of male life, as well as the increased incidence of smoking, which destroys blood vessels and increase incidence of cerebrovascular diseases.

These results come in line with study done by **(Hwang et al., 2023),** who investigated the epidemiology of ischemic and hemorrhagic stroke and discovered that the majority of their study subjects were male. Also in agreement with (**Somay et al., 2000**) who reported that between 401 patients in his study diagnosed with acute stroke (70.6%) were males while (29.4%) were females, also **Osuntokun et al.**, **2001** reported that among 318 patients who were admitted with acute CVS in Africa, about 70 % were male and 30% were female.

In relation to age, current study results illustrate that more than half of studied patient were aged more than 55 years old with mean ±SD (62.2 ± 12.3). the researcher interoperate that as one of the major risk factors for stroke is age; after age 55, the incidence roughly doubles every ten years, and most strokes happen to people over 65.

These results agree with (**Waziry et al., 2020**) in a study on "Time trends in survival following first hemorrhagic or ischemic stroke between 1991 and 2015". More than half of hemorrhagic stroke patients were males aged 55 or older. Also come line with (**Mohamed et al., 2014)** founded that more than half of hemorrhagic stroke patient in his study were aged more than 55 years (57.69).

Regarded Past medical history, current study results demonstrate that most common medical history in the studied patients was hypertension, diabetes mellitus and previous stroke (87%, 50% and 34% respectively). This is consistent with **(Hilton et al., 2021)** who investigated "in-hospital mortality after spontaneous intracerebral hemorrhage in the Stroke Belt" and found that hypertension, diabetes, and hyperlipidemia were the most frequent previous medical histories. And **(Tseng et al., 2023)** in his study found that hypertension, and diabetes were the most frequent previous medical histories.

Also, in the current study the history of previous strokes was common between studied patient (34%), this does not agree with **(Ayman, 2011),** who demonstrated that the history of previous stroke was (19.3%) among the studied sample that was not significant.

In the term of modifiable and non-modifiable risk factors for hemorrhagic stroke, the current study reveals that advanced age represented the most common non-modifiable risk factors for hemorrhagic stroke, while hypertension, diabetes mellitus, and high blood cholesterol were the most common modifiable risk factors for hemorrhagic stroke among the studied population. This might be due to the lack of regular exercise and fatty meal intake that contribute to the high incidence of hypertension. Poor control of this disease can cause damage to the blood vessels, increasing the risk of rupture and hemorrhage.

This agree with **(Kannikar et al., 2024)** who found that hypertension, diabetes mellitus, and dyslipidemia were the most common non-modifiable risk factors for acute hemorrhagic stroke. Also, **(Kitagawa., 2022)** reported that hypertension represented up to three-quarters of the risk factor for acute hemorrhagic stroke among his studied population.

In addition **(Wong et al., 2022)** in a study about "risk factors for stroke recurrence in patients with hemorrhagic stroke," found that hypertension was the most common risk factor for hemorrhagic stroke. Also**, (Gao., 2024)** reported that independent risk factors for hemorrhagic stroke include hypertension, previous history of ischemic stroke, and renal impairment. Also (**Mohamed et al., 2014**) reported that hypertension was the commonest risk factors among acute stroke patient in his studied sample with a percentage of (46.66%).

In relation to clinical patient's outcome:

Regarding pressure ulcers (Braden scale), the present study illustrates that more than half of the studied patients have a very high risk of pressure ulcers on

the 7th day (60%). While a mild risk of developing a pressure ulcer presents on the first day, Which may be due to variety factors such as malnourished, more of the study sample were obese, moreover, physical inactivity, urinary incontinence, which increase moisture of the skin under prominence area, and prolonged stay in ICU.

This is compatible with **(Qazi et al., 2022),** who assessed pressure ulcers in admitted patients at a tertiary care hospital and reported that nearly half of the study sample has a high-risk Braden scale. But I disagree with **(Veiga et al., 2022)**, who reported that more than half of patients with hemorrhagic stroke had a high-risk Braden scale on admission.

Regarding mortality rate, the present study shows that nearly one-third of stroke patients are dead. This may be due to advanced age and multi-comorbidities, which increase the risk of mortality. This is not consistent with **(Chen et al., 2023)**, who evaluated the age-related differences in risk factors, clinical characteristics, and outcomes for intracerebral hemorrhage (ICH) reported a lower rate of morality among their studied patients.

In terms of length of ICU stay, the present study reveals that more than half of patients last for more than 10 days with mean 14.43±8.60. This is compatible with **(Wong et al., 2022)** who studied the risk factors for stroke recurrence in patients with hemorrhagic stroke. And since the majority of their studies found patients stay for more than nine days, **(Miwa et al., 2024)**, who evaluated the clinical impact of body mass index on outcomes of ischemic and hemorrhagic strokes, reported that patients with strokes lasting for the same period.

Regarding complications, This study shows that the most common complications among studied patients are aspiration pneumonia and brain edema, explanation of this finding that majority of patients has swallowing difficulty and inability to protect the airway adequately which put them at risk for aspiration pneumonia, also brain edema result from bleeding around brain cell

Which in the line with the findings of **(Shaikh et al., 2024)** who evaluate the effect of the Charlson Comorbidity Index on In-Hospital Complications, Hospital Length of Stay, Mortality, and Readmissions among Patients Hospitalized for Acute Stroke, and founded that commonly reported complications among their patients were brain edema, pneumonia, deep vein thrombosis, Also **(Zhang et al., 2020)** reported that pneumonia was the most prominent complication among hemorrhagic stroke

Conclusion

Based on the study findings, it can be concluded that effective management and strict control of modifiable risk factors, such as hypertension, diabetes, and smoking, are essential reducing the incidence of hemorrhagic stroke. Additionally, awareness of non-modifiable risk factors like advanced age can aid in early identification and monitoring of high-risk individuals

Recommendations:

Based on the study findings, the following recommendations are suggested

- Future studies should focus non-therapeutic strategies to reduce modifiable risk factors of hemorrhagic stroke, such as weight control, physical exercise, and lifestyle adjustment.
- Creating educational initiatives to increase public understanding of hemorrhagic stroke warning signals and risk factors, as well as identifying stroke risk individual

References:

- **Abd El-Hady, R. Mostafa, M. Kandeel, A Ali, G (2022):** The Effect of Implementing Ischemic Stroke Nursing Management Protocol on Critical Care Nurses' Knowledge and Practices, Mansoura Nursing Journal (MNJ) Vol. (9), No. (1).
- **Ayman, Y. Helmy, A & El Batch, S (2011):** Study of Incidence, Risk Factors and Outcome of Acute Cerebrovascular Stroke Patients Admitted to Alexandria Main University Hospital, American Science; Vol (7), N (11), PP: 316-329.
- **Chen C, Xie Y, Pu M, Deng L, Li Z, Yang T, Yin H, Zhang Z, Lv X, Liu X, Cheng J & Li Q (2023):** Age-related differences in risk factors, clinical characteristics, and outcomes for intracerebral hemorrhage. Front. Aging Neurosci. 15:1264124
- **Gao C., (2024):** Targeting secondary brain damage following intracerebral hemorrhage: from bench to bedside, volume II, Frontiers in Neuroscience, Vol (18).
- **Hilton, L Lyerly, M & Gropen, T (2021):** Race and in-hospital mortality after spontaneous intracerebral hemorrhage in the Stroke Belt: Secondary analysis of a case–control study. Journal of Clinical and Translational Science, Vol (5), N (1), pp:115
- **Hwang, J. Kalra, A. Shou, B Whitman, G. Wilcox, C. Brodie, D. Zaaqoq, A Lorusso, R. Uchino, K. & Cho, S (2023):** Epidemiology of Ischemic Stroke and Hemorrhagic Stroke in Venoarterial Extracorporeal Membrane Oxygenation. Research square, rs.3.rs-3200908.
- **Kannikar, K. Pipat, P. Suphasit, S. Udomlack, P. Nisa, V. Narongrit K. Somsak, T. Verajit, C. Thanat, N. & Kittisak, S. (2024):** An ecological study of PM 2.5 and black carbon and acute

hemorrhagic stroke: a long term effect study. Environmental Research Communications, vol (6) no (2)

- **Kelly, M & Reinecke, H. (2022):** Admission Rates, Time Trends, Risk Factors, and Outcomes of Ischemic and Hemorrhagic Stroke From German Nationwide Data, Neurology , Vol(99), No(23) doi: https://www.10.1212/WNL.0000000000201259.
- **Kitagawa, K. (2022):** Blood pressure management for secondary stroke prevention Hypertensive Res. Vol (45), pp 936–43
- **Kwon, SM. Choi, K-S. & Yi H-J. (2018):** Impact of brain atrophy on 90-day functional outcome after moderate-volume basal ganglia hemorrhage. Scientific Rep. Vol (8) No (1), PP: 4819. https://doi.org/10.1038/s41598-018-22916-3.
- **Martono, M. Sudiro, S. Satino, S. Lestari, S, Insiyah, I. Martuti, S. & Fernanda, PA. (2024):** Prediction of factors influencing hemorrhagic stroke death with brain herniation in teaching hospitals. Electron J Gen Med. Vol (21), No (1), pp: 553. https://doi.org/10.29333/ejgm/13899.
- **Miwa K, Nakai M, Yoshimura S, Sasahara Y, Wada S, Koge J, Ishigami A, Yagita Y, KamiyamaA, Miyamoto Y, Kobayashi S, Minematsu S , Toyoda K & Koga M (2024**): Clinical impact of body mass index on outcomes of ischemic and hemorrhagic strokes. International Journal of Stroke.
- **Mohamed, SS. El-dean, HM. Mohammed, AM. & AbdEl-Aziz, AM. (2014):** Assessment of Modifiable and Non modifiable Risk factors associated with acute stroke at Assuit university hospital, Assiut Scientific Nursing Journal, Vol (2), No (3).
- **Morton, GP. & Fontaine, KD. (2017):** Critical Care Nursing A Holistic Approach, 11th edition, chapter 34, Copyright © 2016 Wolters Kluwer Health | Lippincott Williams & Wilkins, pp: 815-823.
- **Osuntokun, Bademosi, Akinkugbe & Carlisle**, **(2001):** Understanding the Essential of Critical Care Nursing. Pearson Education; Vol (10), pp: 205- 207.
- **Qiu, W., Liu, C., Ye, J., Wang, G., Yang, F., Pan, Z., Hu, W., & Gao, H. (2023):** Age-to-Glasgow Coma Scale score ratio predicts gastrointestinal bleeding in patients with primary intracerebral hemorrhage. Frontiers in neurology, 14, 1034865.
- **Russell, BW. Charles, E. Conteh, V. & Lisk, RD. (2020):** Risk factors, clinical outcomes and predictors of stroke mortality in Sierra Leoneans: A retrospective hospital cohort study, Annals of Medicine and Surgery , Vol (60), PP: 293–300
- **Shaikh N, Mohammed A, Seddiq M, Kidwai S., Shahzad. D., Mahmoud . M., (2024):** The Effect of the Charlson Comorbidity Index On In-Hospital Complications, Hospital Length of Stay, Mortality, and Readmissions Among Patients Hospitalized for Acute Stroke. Cureus 16(5)
- **Sidhartha, MJ. Purma, RA. Reddy, VL. Sagar, KN. Teja, PM. Subbaiah, VM. & Purushothaman, M. (2015):** Risk factors for medical complications of acute hemorrhagic stroke, Journal of Acute Disease; Vol (4), No (3), PP: 222–225.
- **Somay, G., Ozkaya B., & Sagduyu A., (2000):** The Ege Stroke Registry: AHospital-Based Study in the Aegean Region, Izmir, Turkey. Cerebrovascular Dis; 8:278- 88. 25
- **Trevisi, G. Caccavella, VM. Scerrati, A. Signorelli, F. Salamone, GG. Orsini, K. Fasciani, C. D'Arrigo, S. Auricchio, AM. D'Onofrio, G. Salomi, F. Albanese, A. De Bonis, P. Mangiola, A. & Sturiale, CL. (2022):** Machine learning model prediction of 6-month functional outcome in elderly patients with intracerebral hemorrhage. Neurosurgery Rev iew. Vol (45), N (4), PP:2857-2867
- **Tseng, W. Chiu, Y. Chen, Y. Chen, H. & Hsiao, M. (2023):** Early fever in patients with primary intracerebral hemorrhage is associated with worse long-term functional outcomes: a prospective study. BMC Neurology, Vol (23), pp: 375
- **Unnithan, A. Das, MJ. & Mehta, P. (2023):** Hemorrhagic Stroke, Continuing Education Activity, https://www.ncbi.nlm.nih.gov/books/NBK559173/
- **Waziry, R. Heshmatollah, A. Bos, D. Chibnik, LB. Ikram, MA. Hofman, A. & Ikram, MK. (2020):** Time Trends in Survival Following First Hemorrhagic or Ischemic Stroke between 1991 and 2015 in the Rotterdam Study. Stroke, vol (51), no (3).
- **Wong, Y. Tsai, C. & Ong, C. (2022):** Risk factors for stroke recurrence in patients with hemorrhagic stroke, Scientific Reports Vol (12), PP: 17151 | https://doi.org/10.1038/s41598-022-22090-7.
- **Wong, YS. Tsai, CF. & Ong, CT. (2022):** Risk factors for stroke recurrence in patients with hemorrhagic stroke. Sci Rep Vol (12), pp: 17151
- **Zhang P, Li Y, Zhang H, Wang X, Dong L, & Yan Z, (2020):** Prognostic value of the systemic inflammation response index in patients with aneurismal subarachnoid hemorrhage and a nomogram model construction. Br J Neurosurg. 12:1–7.
- **Roger VL, Go AS, Lloyd-Jones DM, Benjamin EJ, Berry JD, & Borden WB, (2012):** Executive summary: Heart disease and stroke statistics--2012 update: A report from the American heart association. Circulation. , vol (125), pp: 188–197. doi: 10.1161/CIR.0b013e3182456d46.

- **Van CJ, Luitse MJ, Rinkel GJ, van der Tweel I, Algra A, & Klijn CJ. (2010):** Incidence, case fatality, and functional outcome of intracerebral hemorrhage over time, according to age, sex, and ethnic origin: A systematic review and meta-analysis. Lancet Neurol, vol (9), pp: 167–176. doi: 10.1016/S1474-4422(09)703400.
- **O'Donnell MJ, Xavier D, Liu L, Zhang H, Chin SL, & Rao-Melacini P, (2010):** Risk factors for ischemic and intracerebral hemorrhagic stroke in 22 countries (the interstroke study): A case-control study. Lancet. vol (376), pp: 112–123. doi: 10.1016/S0140-6736(10)60834-3.
- **Banerjee C, Moon YP, Paik MC, Rundek T, Mora-McLaughlin C, & Vieira JR, (2012):** Duration of diabetes and risk of ischemic stroke: The northern manhattan study. Stroke; a journal of cerebral circulation. Vol (43), pp: 1212–1217. doi: 10.1161/STROKEAHA.111.641381.
- **Hackam DG, Austin PC, Huang A, Juurlink DN, & Mamdani MM, Paterson JM, (2012):** Statins and intracerebral hemorrhage: A retrospective cohort study. Arch Neurol. vol (69), pp: 39–45. doi: 10.1001/archneurol.2011.228.
- **Suk SH, Sacco RL, Boden-Albala B, Cheun JF, Pittman JG, & Elkind MS, (2013):** Abdominal obesity and risk of ischemic stroke: The northern manhattan stroke study. Stroke; a journal of cerebral circulation. Vol (34), pp: 1586–1592. doi: 10.1161/01.STR.0000075294.98582.2F.
- **Amelia K, Charles E, & Mitchell S V (2017):** Stroke Risk Factors, Genetics, and Prevention, Circ Res. 2017 Feb 3; 120(3):472–495. doi: 10.1161/CIRCRESAHA.116.308398
- **Strazzullo P, D'Elia L, Kandala NB, & Cappuccio FP. (2009):** Salt intake, stroke, and cardiovascular disease: Meta-analysis of prospective studies. BMJ. vol (339), pp: b4567. doi: 10.1136/bmj.b4567.
- **Hillbom M, Saloheimo P, & Juvela S. (2011):** Alcohol consumption, blood pressure, and the risk of stroke. Curr Hypertens Rep. vol (13), pp: 208–213. doi: 10.1007/s11906-011-0194-y.
- **Malek AM, Cushman M, Lackland DT, Howard G, & McClure LA. (2015):** Secondhand smoke exposure and stroke: The reasons for geographic and racial differences in stroke (regards) study. Am J Prev Med. vol (49), pp: e89–97. doi: 10.1016/j.amepre.2015.04.014