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Ministry of Higher Education
Emirates international University
Faculty of medicine & Health science
Department of Community Medicine

Factors Associated With Late Arrival of Acute Stroke Patients to Emergency Department on Sana'a Hospitals, 2023

A research submitted to the department of community medicine, faculty of medicine and health sciences, Emirates International University, in partial fulfillment for the degree of MBBH in general medicine and surgery.

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الجمهورية اليمنية
وزار ة التعليم العالي
الجامعة الإماراتية الدولية
كلية الطب والعلوم الصحية

العوامل المرتبطة بالوصول المتأخر لمرضى السكتة الدماغية الحادة إلى قسم الطوارئ في مستشفيات صنعاء (2023)

بحث مقدم لقسم طب المجتمع، كلية الطب والعلوم الصحية، الجامعة الإماراتية الدولية، للحصول على درجة بكالوريوس طب عام وجراحة

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DEDICATION

- *To the makers of our paths and supporters of our future; those who never get tired of motivating our compassionate hearts that are yearning to seek knowledge and build the future; "our great parents".*

- *To our brothers, who have been our source of inspiration and gave us strength when we thought of giving up.*

- *To our sisters, relatives, mentors, friends, and colleagues who have always been there for us whenever we need them.*

Abstract

Background: -

Stroke is a common neurological emergency which carries significant morbidity and mortality. The incidence of stroke is currently increasing among the populations of low- and middle-income countries. Stroke is a major health burden as it is a leading cause of physical disability in adults and the second most frequent cause of mortality after heart disease.

According to the latest WHO data published in 2020 Stroke death in Yemen reached 13,570 or 8.72% of total deaths. The age adjusted Death Rate is 127.49 per 100,000 of population ranks in Yemen #32 in the world.

Delay of getting medical intervention may has a very serious consequences and this can be due to many factors such as awareness of stroke signs and symptoms, perception of the importance of early presentation for treatment, religious and cultural beliefs, educational level, geographical accessibility and technical factors such as the availability of diagnostic facilities and therapies.

Objectives: -

The current study aims to assess the possible causes of patient's hospital arrival delay, challenges and barriers for the early diagnosis and treatment, awareness level of the patients or their relatives about stroke.

Method: -

cross-sectional study was conducted in many randomly selected hospitals in Sana'a city; from April to May 2023 .it included 250 patients. A questionnaire was designed for data collection about socio-demographic variables, modified risk factors, and other variables among participants.

Results: -

The result of the current study showed that (129) 51.6% out of the total (250) cases arrived at the golden hours ,while the rest (121) 48.4% patients arrived after the golden hours due to many factors such as lack of awareness, lack of transportation, distance from the hospital, lack of awareness about the importance of early arrival to the hospital for treatment of stroke, being alone during the onset of stroke, seeking alternative medicine to alleviate symptoms, rural residence, absence of thrombolysis in nearly hospitals, referral from local hospitals.

Conclusion: -

In conclusion, this study provides valuable insights into the causes and risk factors of stroke Yemeni patients. It offers recommendations for patients and their relatives, healthcare providers, to improve the prevention and management of stroke among patients. By implementing these recommendations, we can work towards reducing the burden of stroke and its complications in Yemeni patients and improving their

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Abbreviation

AF	***Atrial fibrillation***
ACA	Anterior Cerebral Artery
AIS	*Anterior Interosseous nerve syndrome*
AIS	Acute Ischemic Stroke
aOR	adjusted Odd Ratio
ATP	*Adenosine Tri-Phosphate*
CAST	Chinese Acute Stroke Trial
CHF	*Congestive heart failure*
CNS	*Central Nervous System*
COVID-19	*Coronavirus disease 2019*
CT	*Compacted Tomography*
CTA	*Compacted Tomography Angiography*
CTP	*Compacted Tomography Perfusion*
CVA	*CerebroVascular Accident*
DM	Diabetes mellitus
DNT	Door-to-Needle Time
DVT	Deep Venous Thrombosis
ECG	*Electrocardiogram*
ED	Emergency Department
EMS	Emergency Medical Service
ESR	*Erythrocyte Sedimentation Rate*
GWTG	Get With The Guidelines
HDL	*High- density Lipoprotein*
HIV	*Human Immunodeficiency*
HTN	*Hypertension*
IST	International Stroke Trial
IV	*Intravenous*
LDL	*Low-density Lipoprotein*
MCA	Middle Cerebral Artery
MI	*Myocardial infarction*
MRI	*Magnetic Resonance Imaging*
N:	*Number*
NIHSS	National Institute of Health Stroke Score
NINDS	National Institute of Neurological Disorders and Stroke
OAT	Onset Arrival Time
ODT	Onset to Door time
OR	Odd Ratio
P.value	*Probare value*
PAN	*Polyarthritis Nodosa*
PCA	posterior Cerebral Artery
PET	Positron Emission Tomography
PS	*Previous stroke*

rtPA	***Recombinant Tissue Plasminogen***
SD	Standard Deviation
TCD	Transcranial Doppler
TIA	Transient Ischemic Attack
Tpa	Tissue plasminogen activator
TUWTH	Thamar University Al-wahdah Teaching Hospital
WHO	*World Health Organization*

CHAPTER ONE

INTRODUCTION

1. Introduction:

1.1 Background:

Stroke is a common neurological emergency which carries significant morbidity and mortality. The incidence of stroke is currently increasing among the populations of low- and middle-income countries (1,2). Stroke is a major health burden as it is a leading cause of physical disability in adults and the second most frequent cause of mortality after heart disease (3). Apart from the serious impact that it has on one's health, stroke also imposes tremendous costs on a nation's society and economy. The expense associated with post-stroke rehabilitation and care is significant and the increasing number of disabled stroke patients can adversely affect productivity of a country (4). Despite the proven efficacy of intravenous tissue plasminogen activator (IV tPA) within the first 4.5 h after the onset of symptoms (5). only a small proportion of stroke victims receive this medication. The lack of administration of IV tPA is mainly due to the delayed presentation of patients to the emergency department (ED) (6,7). Factors contributing to this delay are many and are influenced by awareness of stroke signs and symptoms, perception of the importance of early presentation for treatment, religious and cultural beliefs, educational level, geographical accessibility and technical factors such as the availability of diagnostic facilities and therapies (8,9). Even for the patients arriving in golden time, the administration of rtPA is not always done. Also, the contraindications for administering intravenous thrombolytic should be identified (10).

– National guidelines have supported the rapid evaluation and treatment of patients with AIS. National Institute of Neurological Disorder timeline targets for attaining CT scan in 20 minutes to start rtPA infusion in 60 minutes of arrival to the Emergency Department. Currently, most hospitals struggle to have half of their AIS patients meet these targets (11).

1.2. Epidemiology:

According to the latest WHO data published in 2020 Stroke Death in Yemen reached 13,570 or 8.72% of total deaths. The age adjusted Death Rate is 127.49 per 100,000 of population ranks in Yemen #32 in the world (12). Also as shown in Figure 1, prevalence of stroke was found to be 6.1% (91/1482) among patients admitted to the Internal Medicine

Department at Thamar University Al-Wahdah Teaching Hospital (TUWTH), Ma'bar city Dhamar governorate (13).

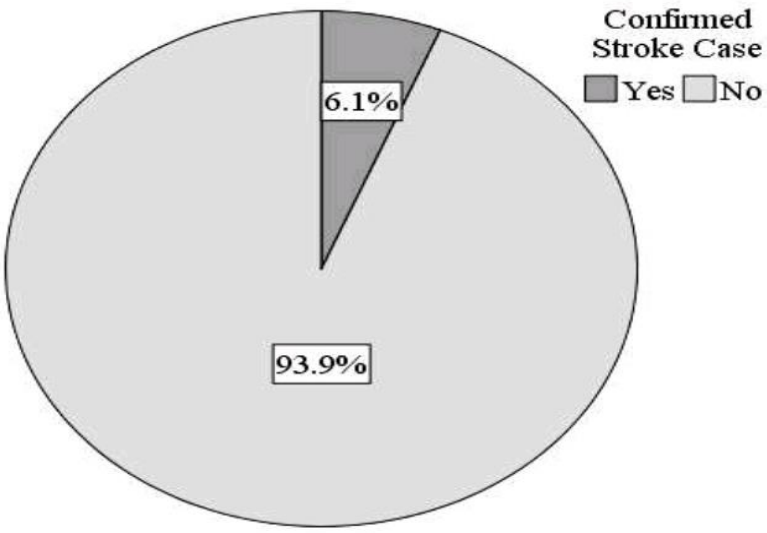


Figure 1. prevalence of stroke among pationt attending TUWTH during2016 (n=1482) (13)

A number of studies stated that the major risk factors for stroke are hypertension, diabetes mellitus, hyperlipidemia, smoking, ischemic heart diseases and obesity (14). It is well known that sedentary lifestyle including prolonged TV watching is also considered a risk factor that could lead to stroke. (15). It is believed that stroke is a preventable disease if lifestyle and other modifiable risk factors were targeted by the community or on individual level (16).

The clinical manifestations of stroke are highly variable because of the complex anatomy of the brain and its vasculature. Cerebral ischemia is caused by a reduction in blood flow that lasts longer than several seconds. Neurologic symptoms are manifest within seconds because neurons lack glycogen, so energy failure is rapid. If the cessation of flow lasts for more than a few minutes, infarction or death of brain tissue results. When blood flow is quickly restored, brain tissue can recover fully and the patient's symptoms are only transient: this is called a transient ischemic attack (TIA).

The most common small-vessel stroke syndromes are the following: (1) pure motor hemiparesis from an infarct isn the posterior limb of the internal capsule or the pons; the face, arm, and leg are almost always involved; (2) pure sensory stroke from an infarct in the ventral thalamus; (3) ataxic hemiparesis from an infarct in the ventral pons or internal capsule; (4) and dysarthria and a clumsy hand or arm due to infarction in the ventral pons or in the genu of the internal capsule. Transient symptoms (small-vessel TIAs) may herald a small vessel infarct; they may occur several times a day and last only a few minutes. Recovery from small-vessel strokes tends to be more rapid and complete than recovery from large-vessel strokes; in some cases, however, there is severe permanent disability(17).

1.3. STUDY JUSTIFICATION:

Stroke is one of the main causes of adult death in Yemen. The disease is a preventable disease through modifying the life styles of the adult people. Even after the onset of the disease it can be treatable if the treatment intervention started within the golden hours from the onset of the disease. There are many factors that lead to delay the treatment intervention within the standard time, so this study was designed to study these factors. This study will make clear picture about the causes of delaying the treatment intervention for stroke patients, as there is a gap in the publish studies related to this subject.

1.4. OBJECTIVES:

GENERAL OBJECTIVE:

To determine the factors associated with late arrival of acute stroke patients to emergency department.

SPECIFIC OBJECTIVES:

1) To measure the time consumed from the appearance of first symptom of stroke until starting of medical intervention.
2) To determine the challenges and barriers for the early diagnosis and treatment of the stroke patient.
3) To determine the awareness level of the patients or their relatives about stroke.

CHAPTER TWO

Review of Literature

2. Review of literature

2.1. INTRODUCTION:

Cerebrovascular diseases include some of the most common and devastating disorders: ischemic stroke and hemorrhagic stroke. Stroke is the second leading cause of death worldwide, with 6.2 million dying from stroke in 2015, an increase of 830,000 since the year 2000. In 2016, the lifetime global risk of stroke from age 25 years onward was 25%, an increase of 8.9% from 1990. Nearly 7 million Americans age 20 or older report having had a stroke, and the prevalence is estimated to rise by 3.4 million adults in the next decade, representing 4% of the entire adult population. Conversely, case-specific disability-adjusted life-years due to stroke are falling, likely due to better prevention and treatment, but overall disease burden will continue to climb as the population ages, and stroke is likely to remain the second most common disabling condition in individuals aged 50 or older worldwide.

Definition: an abrupt onset of a neurologic deficit that is attributable to a focal vascular cause. Thus, the definition of stroke is clinical, and laboratory studies including brain imaging are used to support the diagnosis.

Stroke has occurred if the neurologic signs and symptoms last for >24 h or brain infarction is demonstrating.

2.2. PATHOPHYSIOLOGY:

Acute occlusion of an intracranial vessel causes reduction in blood flow to the brain region it supplies. The magnitude of flow reduction is a function of collateral blood flow, and this depends on individual vascular anatomy (which may be altered by disease), the site of occlusion, and systemic blood pressure. A decrease in cerebral blood flow to zero causes death of brain tissue within 4–10 min; values <16-18mL/100 g tissue per minute cause infarction within an hour; and values <20ml/100 g tissue per minute cause ischemia without infarction unless prolonged for several hours or days. If blood flow is restored to ischemic tissue before significant infarction develops, the patient may experience only transient symptoms, and the clinical syndrome is called a transient ischemic attack (TIA).

-Focal cerebral infarction occurs via two distinct pathways.

(1) a necrotic pathway in which cellular cytoskeletal breakdown is rapid, due principally to energy failure of the cell; and (2) an apoptotic pathway in which cells become programmed to die. Ischemia produces necrosis by starving neurons of glucose and oxygen, which in turn results in failure of mitochondria to produce adenosine triphosphate (ATP).

Ischemia also injures or destroys axons, dendrites, and glia within brain tissue. Free radicals are produced by degradation of membrane lipids and mitochondrial dysfunction

Hemorrhagic stroke: Intracranial hemorrhage is caused by bleeding directly into or around the brain; it produces neurologic symptoms by producing a mass effect on neural structures, from the toxic effects of blood itself, or by increasing intracranial pressure.

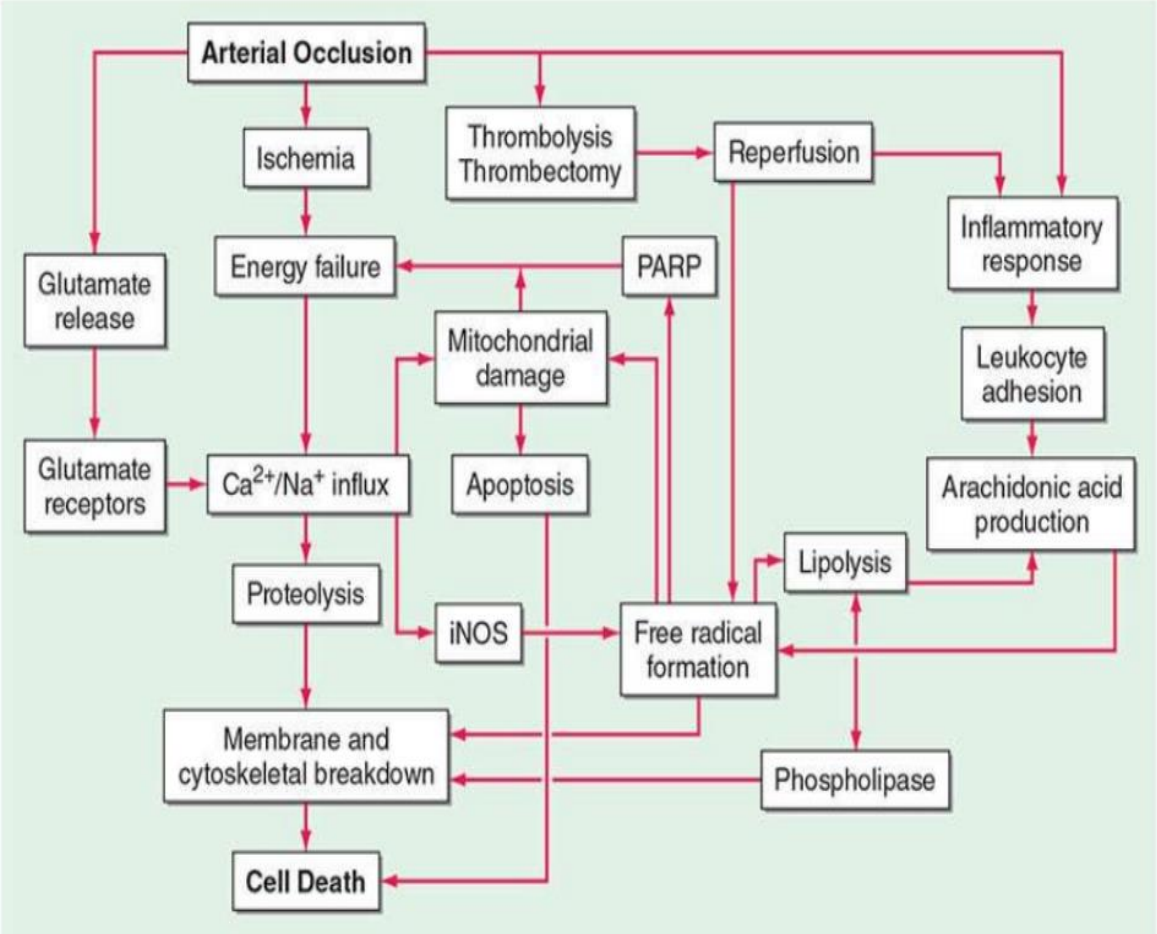


Figure 2. major steps in the cascade of cerebral ischemia (17)

Cause A generalized reduction in cerebral blood flow due to systemic hypotension (e.g., cardiac arrhythmia, myocardial infarction, or hemorrhagic shock) usually produces syncope.

2.3. CAUSES:

COMMON CAUSES	UNCOMMON CAUSES
Thrombosis	Hypercoagulable disorders
Lacunar stroke (small vessel)	Protein C deficiency[a]
Large-vessel thrombosis	Protein S deficiency[a]
Dehydration	Antithrombin III deficiency[a]
Embolic occlusion	Antiphospholipid syndrome
Artery-to-artery	Factor V Leiden mutation[a]
Carotid bifurcation	Prothrombin G20210 mutation[a]
Aortic arch	Systemic malignancy
Arterial dissection	Sickle cell anemia
Cardioembolic	β Thalassemia
Atrial fibrillation	Polycythemia vera
Mural thrombus	Systemic lupus erythematosus
Myocardial infarction	Homocysteinemia
Dilated cardiomyopathy	Thrombotic thrombocytopenic purpura
Valvular lesions	Disseminated intravascular coagulation
Mitral stenosis	Dysproteinemias[a]
Mechanical valve	Nephrotic syndrome[a]
Bacterial endocarditis	Inflammatory bowel disease[a]
Paradoxical embolus	Oral contraceptives
Atrial septal defect	COVID-19 infection
Patent foramen ovale	Venous sinus thrombosis[b]
Atrial septal aneurysm	Fibromuscular dysplasia
Spontaneous echo contrast	Vasculitis
Stimulant drugs: cocaine, amphetamine	Systemic vasculitis (PAN, granulomatosis with polyangiitis [Wegener's], Takayasu's, giant cell arteritis)
	Primary CNS vasculitis
	Meningitis (syphilis, tuberculosis, fungal, bacterial, zoster)
	Noninflammatory vasculopathy
	Reversible vasoconstriction syndrome
	Fabry's disease
	Angiocentric lymphoma

Figure 3. chiefly cause venous sinus thrombosis (17)

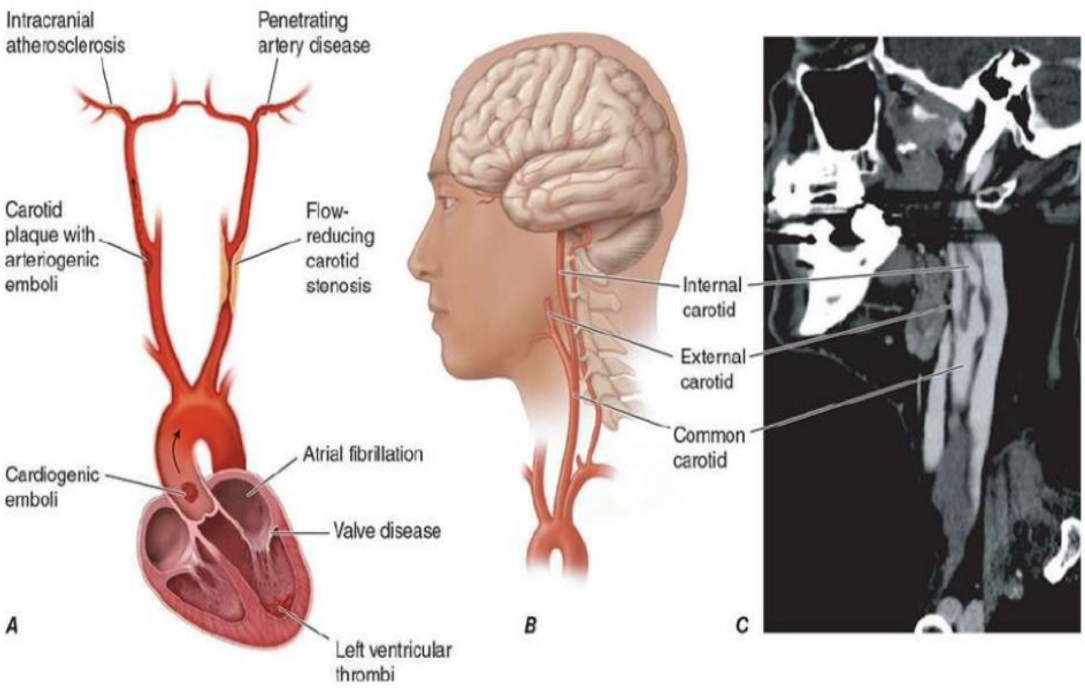


Figure 4. pathophysiology of ischemic strocke (17)

Focal ischemia or infarction, conversely, is usually caused by thrombosis of the cerebral vessels themselves or by emboli from a proximal arterial source or the heart**.**

Cardioembolic Stroke: Cardio embolism is responsible for ~20% of all ischemic strokes. Stroke caused by heart disease is primarily due to embolism of thrombotic material forming on the atrial or ventricular wall or the left heart valves. These thrombi then detach and embolize into the arterial circulation. The most significant cause of cardioembolic stroke in most of the world is nonrheumatic (often called nonvalvular) atrial fibrillation, Myocardial infarction (MI), prosthetic valves, rheumatic heart disease, and ischemic cardiomyopathy are other considerations Cardiac disorders causing brain embolism

Bacterial endocarditis: can be a source of valvular vegetations that give rise to septic emboli. The appearance of multifocal symptoms and signs in a patient with stroke makes bacterial endocarditis more likely. Infarcts of microscopic size occur, and large septic infarcts may evolve into brain abscesses or cause hemorrhage into the infarct, which generally precludes use of anticoagulation or thrombolytics.

Artery-to-Artery Embolic Stroke: Thrombus formation on atherosclerotic plaques may embolize to intracranial arteries producing an artery-to-artery embolic stroke.

CAROTID ATHEROSCLEROSIS: Atherosclerosis within the carotid artery occurs most frequently within the common carotid bifurcation and proximal internal carotid artery

OTHER CAUSES OF ARTERY-TO-ARTERY EMBOLIC STROKE: Intracranial atherosclerosis produces stroke either by an embolic mechanism or by in situ thrombosis of a diseased vessel. It is more common in patients of Asian and African-American descent**.** *Recurrent stroke* risk is ~15% per year, similar to untreated symptomatic carotid atherosclerosis.

■ *LESS COMMON CAUSES OF STROKE*

- Hypercoagulable disorders
- Systemic lupus erythematosus with Libman-Sacks endocarditis can be a cause of embolic stroke.
- Homocysteinemia may cause arterial thromboses as well; this disorder is caused by various mutations in the homocysteine pathways.

Disseminated intravascular coagulopathy can cause both venous and arterial occlusive events; COVID-19 infection may predispose for acute ischemic stroke due to large-vessel occlusion. Venous sinus thrombosis of the lateral or sagittal sinus or of small cortical veins (cortical vein thrombosis) occurs as a complication of oral contraceptive use, pregnancy and the postpartum period, inflammatory bowel disease, intracranial infections (meningitis), and dehydration

It is also seen in patients with laboratory-confirmed thrombophilia including antiphospholipid syndrome, polycythemia, sickle cell anemia, deficiencies of proteins C and S, factor V Leiden mutation (resistance to activated protein C), antithrombin III deficiency, homocysteinemia, and the prothrombin G20210 mutation. Women who take oral contraceptives and have the prothrombin G20210 mutation may be at particularly high risk for sinus thrombosis (17).

2.4. RISK FACTORS:

❖ Modifiable risk factors

Diabetes Mellitus and Blood Sugar Levels

The relative risk of stroke in people with diabetes mellitus (DM) ranges from 1.8-6 with a tendency to occur in young patients (18). The explanation of diabetes mellitus also states that DM triggers atherosclerosis and increases hypertension event because of the 2-fold risk of cerebral infarction resulting in changes in the vascular system (19).

Hypertension

Respondents who have a history of hypertension are at risk of 7.5 strokes (20). High blood pressure can cause severity in atherosclerosis and cause intracerebral lesions due to affected autoregulation of blood flow to the brain (19). Hypertension is also one of the most severe stroke risk factors encountered in stroke patients (18).

Smoking

Smoking is one of the bad lifestyles and can increase the risk of stroke by 1.5 times (21,22). Smoking also results in atherosclerosis, thus increasing the occurrence of thrombus (20). In addition, smoking can cause blood viscosity, fibrinogen, and platelet aggregation as well as lower HDL cholesterol and raise blood pressure (18).

Dyslipidemia and Cholesterol Levels

Plasma lipids and proteins increase the risk of cerebral infarction (18). LDL levels exceeding 150 mg/dL increase the risk of brain blood vessel blockage (20).

Physical Activity

Physical activity is associated with an increased risk of stroke (23). The increased risk even reaches 50%. This is due to the build-up of fatty substances, cholesterol, calcium and others in the blood vessels so as to decrease the flow of blood supply to the brain and heart (20). Physical activity acts as a protective effect that positively affects stroke prevention (22).

Obesity

Overweight can accelerate the occurrence of atherosclerosis, thus increasing the risk of stroke 2-fold (22). Obesity also affects high blood pressure and blood sugar levels, making the heart pump more extra the blood, triggering a stroke (20).

Alcohol

One of an unhealthy life style is consuming alcohol. Alcohol consumed will enter the blood and damage body tissues, especially the liver, trigger stress, thrombosis in the blood circulation, atherosclerosis, the rhythm of circadian is disrupted causing sleep disturbances, decreased memory, and increasing the sugar and fat levels (24).

Heart Disease

Heart defects cause embolism at risk of 3-4 strokes. Embolism is one of the triggers of the occurrence of atrial fibrillation non valvular (20). Heart disease atrial fibrillation is also a direct cause of stroke. In addition to myocardial infarction and arrhythmia also play a role in the incidence of stroke (22).

Tuberculosis

Tuberculosis disease is 1.51 times more at risk of stroke than non-sufferers. The results of this study are reinforced by the support of Sheu who for 3 years has followed up his patients who suffer from tuberculosis.

❖ Irreversible risk factors

Age

Stroke not only affects people with advanced age but can also strike young people due to unhealthy lifestyle and diet (25,23). As you get older, the body's immunity to a disease weakens so that the risk of stroke (22).

Gender

Men have a more tendency towards the occurrence of stroke, temporary suspicion resulting from smoking behavior and alcoholic beverages consumed (20). However, young women also have the same risk as men because it is related to pregnancy, postpartum conditions and hormonal factors such as the use of hormonal contraceptives (18).

Education and Knowledge Level

Knowledge can be influenced by many factors such as age, education, employment, interests, experience, and culture as well as information obtained (22). Knowledge that is sufficient to know a disease is quite helpful in efforts to prevent and improve health status.

Family History

The American Heart Association explains that the mechanisms in family history are genetic factors, genetic sensitivity factors, culture/environmental and lifestyle factors and interactions between genetic and environmental factors (19). A person who has a hereditary history of stroke tends to have a higher average blood pressure (26).

2.5. SYMPTOMS AND SIGNS:

Consider stroke in any patient presenting with acute neurologic deficit or any alteration in level of consciousness. Common signs and symptoms of stroke include the abrupt onset of any of the following:

•Hemiparesis, monoparesis, or (rarely) quadriparesis, Hemisensory deficits, Monocular or binocular visual loss, Visual field deficits, Diplopia, Dysarthria, Facial droop, Ataxia, Vertigo (rarely in isolation), Aphasia, Sudden decrease in the level of consciousness Although such symptoms can occur alone, they are more likely to occur in combination (27).

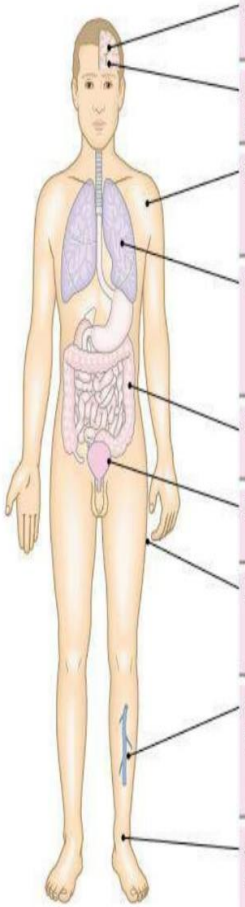
Establishing the time at which the patient was last without stroke symptoms, or last known to be normal, is especially critical when fibrinolytic therapy is an option. Unfortunately, the median time from symptom onset to emergency department (ED) presentation ranges from 4-24 hours in the United States (28).

Multiple factors contribute to delays in seeking care for symptoms of stroke. Many strokes occur while patients are sleeping and are not discovered until the patient wakes (this phenomenon is also known as "wake-up" stroke). Stroke can leave some patients too incapacitated to call for help. Occasionally, a stroke goes unrecognized by patients or their caregivers (29,30).

If the patient awakens with symptoms, then the time of onset is defined as the time at which the patient was last seen to be without symptoms or last known normal time. Input from family members, coworkers, and bystanders may be required to help establish the exact time of onset, especially in right hemispheric strokes accompanied by neglect or left hemispheric strokes with aphasia.

Vital signs, while nonspecific, can point to impending clinical deterioration and may assist in narrowing the differential diagnosis. Many patients with stroke are hypertensive at baseline, and their blood pressure may become more elevated after stroke. While hypertension at presentation is common, blood pressure decreases spontaneously over time in most patients.

Carotid or vertebrobasilar dissections and, less commonly, thoracic aortic dissections may cause ischemic stroke. Unequal pulses or blood pressures in the extremities may reflect the presence of aortic dissections(27).



Complications	Prevention	Treatment
Epileptic seizures		Anticonvulsants
Depression and anxiety	Be alert for mood disturbance Explain the process of recovery	Antidepressants and talking therapies (e.g. cognitive behavioural therapy)
Painful shoulder	Avoid traction injury Shoulder/arm supports Physiotherapy	Physiotherapy Local glucocorticoid injections
Chest infection	Nurse semi-erect Avoid aspiration (nil by mouth, nasogastric tube, possible gastrostomy)	Antibiotics Physiotherapy
Constipation	Appropriate aperients and diet Maintain hydration	Appropriate aperients
Urinary infection	Avoid catheterisation if possible	Antibiotics
Pressure sores	Frequent turning Monitor pressure areas Avoid urine damage to skin	Nursing care Pressure-relieving mattress
Deep vein thrombosis/ pulmonary embolism	Maintain hydration Early mobilisation Pneumatic compression stockings Heparin (for high-risk patients only)	Anticoagulation
Spasticity and contractures	Maintain normal posture (support weak limbs and reposition regularly) Avoid triggers (pain, infection, bowels)	Physiotherapy Orthotics (e.g. splints) Baclofen, local botox injections

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Figure 5. complication of acute stroke (31).

Diagnostic question	Investigation
Is it a vascular lesion?	Brain imaging
Is it ischaemic or haemorrhagic?	Brain imaging
Is it a subarachnoid haemorrhage?	CT/lumbar puncture
Is there any cardiac source of embolism?	ECG Prolonged ECG monitoring Echocardiogram
What is the underlying vascular disease, where intervention is indicated?	Ultrasound of carotids with Doppler MRA CTA Contrast angiography
What are the risk factors for stroke?	Full blood count Cholesterol Blood glucose Blood pressure
Is there an unusual cause?	ESR Serum protein electrophoresis Clotting/thrombophilia screen HIV/syphilis serology

(CT = computed tomography; CTA = computed tomographic angiography; ECG = electrocardiogram; ESR = erythrocyte sedimentation rate; MRA = magnetic resonance angiography; MRI = magnetic resonance imaging)

Figure 6. investigation of a patient with an acute strock (31)

2.6.INVESTIGATIONS:

IMAGING STUDIES:

- CT Scans CT radiographic images identify or exclude hemorrhage as the cause of stroke, and they identify extraparenchymal hemorrhages, neoplasms, abscesses, and other conditions masquerading as stroke. Brain CT scans obtained in the first several hours after an infarction generally show no abnormality, and the infarct may not be seen reliably for 24–48 h. CT may fail to show small ischemic strokes in the posterior fossa because of bone artifact; small infarcts on the cortical surface may also be missed.

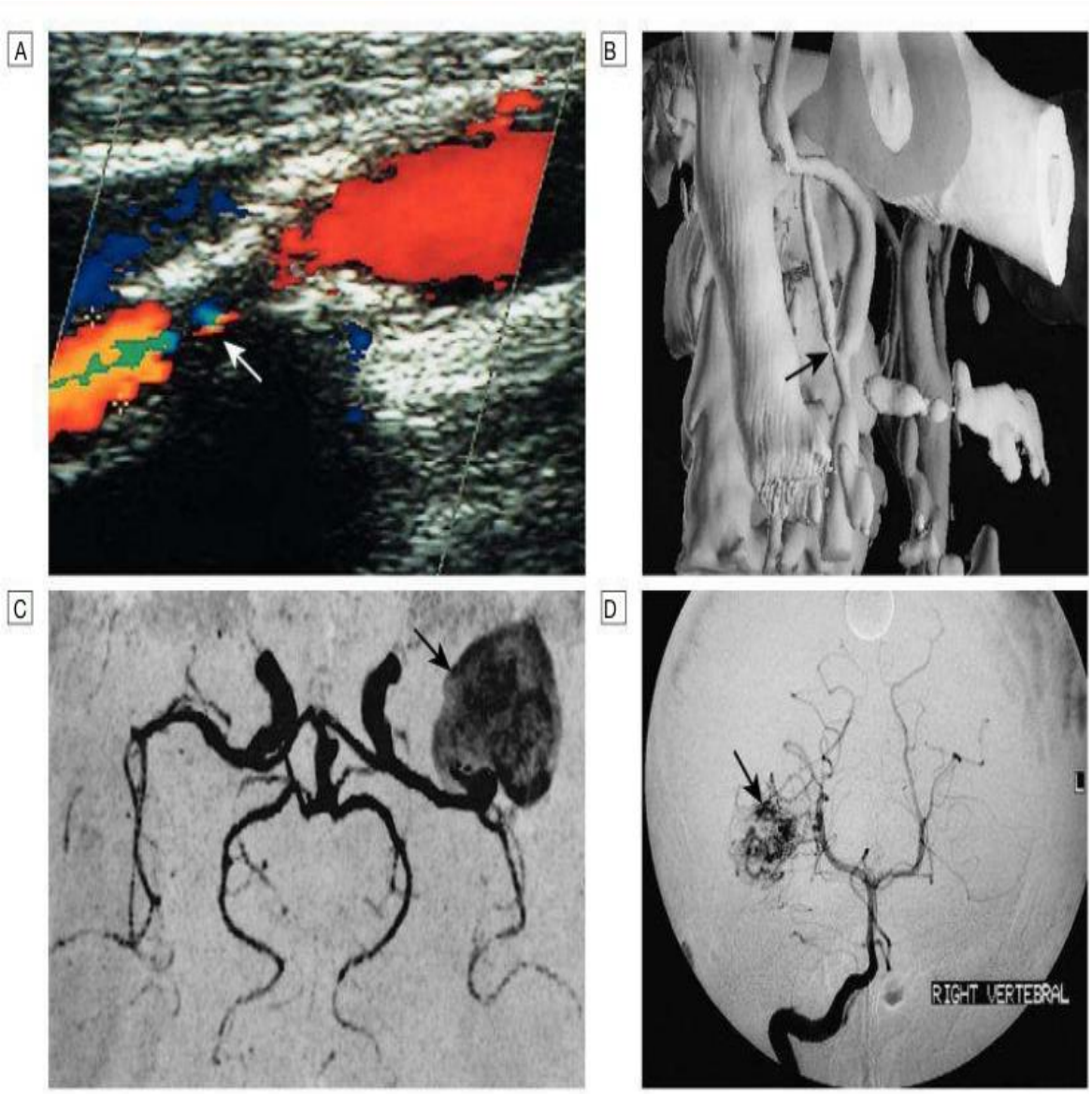

Figure 7. Different techniques for imaging blood vessels (31)

- Contrast-enhanced CT scans add specificity by showing contrast enhancement of subacute infarcts and allow visualization of venous structures. Coupled with multidetector scanners, CT angiography can be performed with administration of IV iodinated contrast allowing visualization of the cervical and intracranial arteries, intracranial veins, aortic arch, and even the coronary arteries in one imaging session

- *MRI.*

MRI reliably documents the extent and location of infarction in all areas of the brain, including the posterior fossa and cortical surface. It also identifies intracranial hemorrhage and other abnormalities and, using special sequences, can be as sensitive as CT for detecting acute intracerebral hemorrhage. MRI scanners with magnets of higher

field strength produce more reliable and precise images.

Cerebral Angiography: Conventional x-ray cerebral angiography is the gold standard for identifying and quantifying atherosclerotic stenoses of the cerebral arteries and for identifying and characterizing other pathologies, including aneurysms, vasospasm, intraluminal thrombi, fibromuscular dysplasia, arteriovenous fistulae, vasculitis, and collateral channels of blood flow.

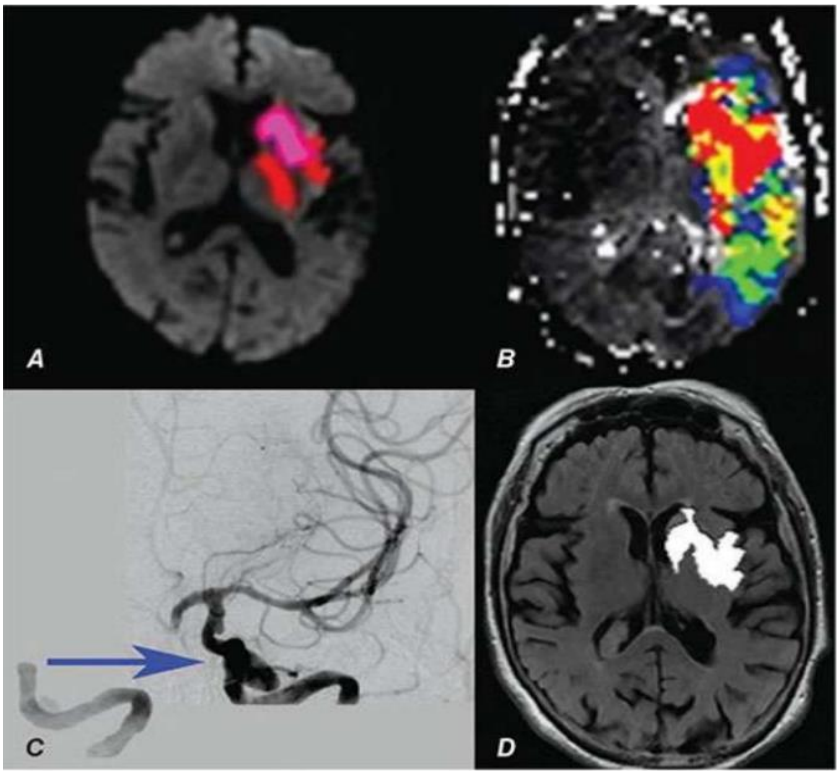

Figure 8. Magnetic resonance imaging(MRI) (17)

Ultrasound Techniques: Stenosis at the origin of the internal carotid artery can be identified and

Airway

- Perform bedside swallowing screen and consider nasogastric tube for feeding if swallowing is unsafe

Breathing

- Check respiratory rate

Circulation

- Check peripheral perfusion, pulse and blood pressure

Hydration

- If signs of dehydration, give fluids parenterally or by nasogastric tube

Nutrition

- Assess nutritional status and provide supplements if needed
- If unable to swallow, consider feeding via nasogastric tube

Medication

- If dysphagic, consider other routes for essential medications

Blood pressure

- Haemorrhagic stroke: consider lowering systolic blood pressure to 130–140 mmHg and maintain this blood pressure for at least 7 days
- Ischaemic stroke: unless there is heart or renal failure, evidence of hypertensive encephalopathy or aortic dissection, do not lower blood pressure abruptly
- Check blood glucose and treat if diabetes is diagnosed
- Avoid hypoglycaemia

Temperature

- If pyrexial, investigate and treat underlying cause
- Control temperature with antipyretics

Pressure areas

- Reduce risk of skin breakdown:
  - Treat infection
  - Maintain nutrition
  - Provide pressure-relieving mattress
  - Turn immobile patients regularly

Incontinence

- Check for constipation and urinary retention; treat these appropriately
- Avoid urinary catheterisation unless patient is in acute urinary retention or incontinence is threatening pressure areas

Prevention of deep vein thrombosis

- Consider intermittent pneumatic compression stockings in immobile patients

- Avoid bed rest after the first 24 hours

Figure 9. How to manage a patient with acute stroke (31)

quantified reliably by ultrasonography that combines a B-mode ultrasound image with a Doppler ultrasound assessment of flow velocity ("duplex" ultrasound). Transcranial Doppler (TCD) assessment of MCA, ACA, and PCA flow and of vertebrobasilar flow is also useful.

Perfusion Techniques Both xenon techniques (principally xenon-CT) and positron emission tomography (PET) can quantify cerebral blood flow. These tools are generally used for research but can be useful for determining the significance of arterial stenosis and planning for revascularization surgery (17).

2.7. TREATMENT:

Aim of treatment: minimizing the volume of brain that is irreversibly damaged, preventing complication, reducing the patient's disability and handicap through rehabilitation, and reducing the risk of recurrent stroke or other vascular events (31).

Priorities of Acute Stroke Consultation: Once stroke is suspected, the first priorities are to assess airway and blood pressure, followed by establishing the time last seen normal.

MEDICAL SUPPORT:

Attention is also directed toward preventing the common complications of bedridden patients—infections (pneumonia, urinary, and skin) and deep-venous thrombosis (DVT) with pulmonary embolism. Subcutaneous heparin (unfractionated and low-molecular-weight) is safe and can be used concomitantly. Blood pressure should be reduced if it exceeds 220/120 mmHg, if there is malignant hypertension or concomitant myocardial ischemia, or if blood pressure is >185/110 mmHg and thrombolytic therapy is anticipated. When faced with the competing demands of myocardium and brain, lowering the heart rate with a β1 -adrenergic blocker (such as esmolol) can be a first step to decrease cardiac work and maintain blood pressure. Fever is detrimental and should be treated with antipyretics and surface cooling. Serum glucose should be monitored and kept <10.0 mmol/ (180

ml/dl), and above at least 3.3mmol (60 mg/dl); a more intensive glucose control strategy does not improve outcome.

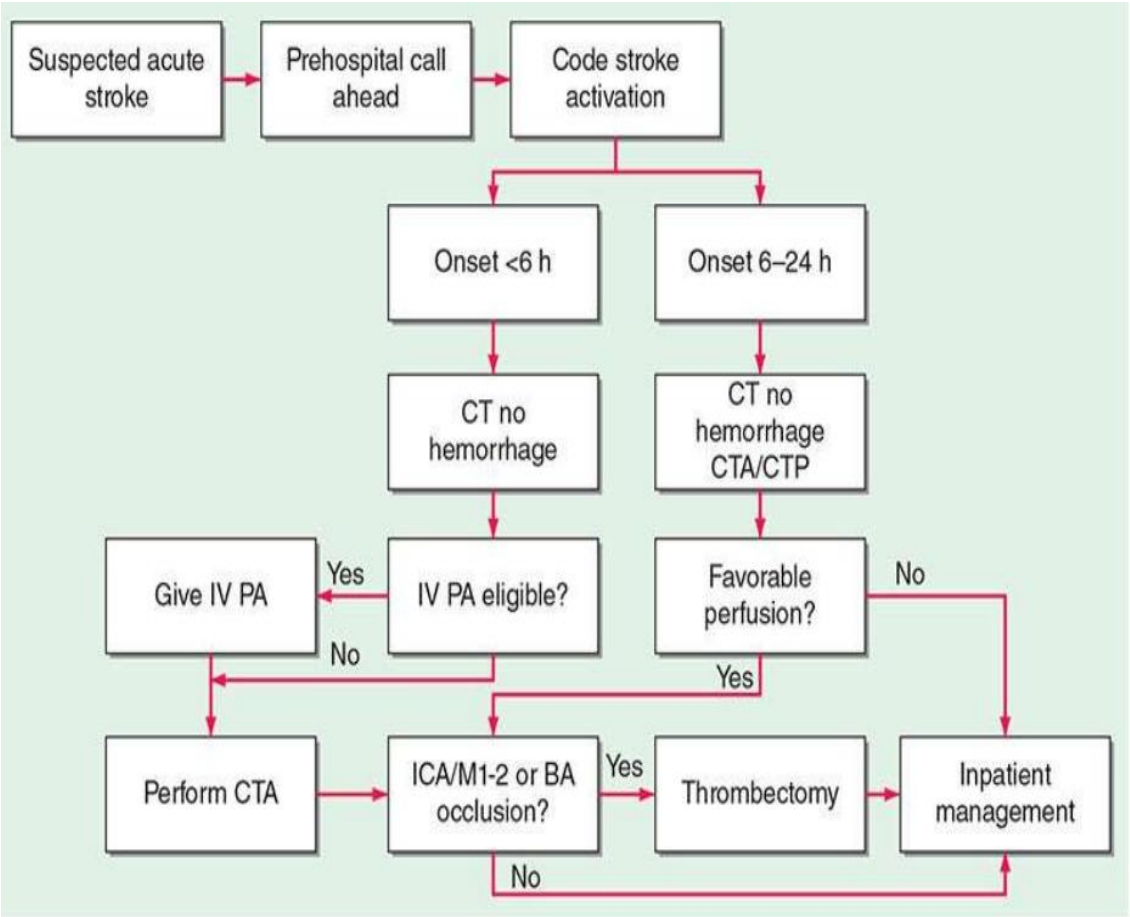

Figure 10. Management of acute stroke (17)

INTRAVENOUS THROMBOLYSIS: The National Institute of Neurological Disorders and Stroke (NINDS) Recombinant Tissue Plasminogen Activator (rtPA) Stroke Study showed a clear benefit for IV rtPA in selected patients with acute stroke. The NINDS study used IV rtPA (0.9 mg/kg to a 90-mg maximum; 10% as a bolus, then the remainder over 60 min) versus placebo in ischemic stroke within 3 h of onset. One-half of the patients were treated within 90 min. Symptomatic intracranial hemorrhage occurred in 6.4% of patients on rtPA and 0.6% on placebo. In the rtPA group, there was a significant 12% absolute increase in the number of patients with only minimal disability (32% on placebo and 44% on rtPA) and a nonsignificant 4% reduction in mortality (21% on placebo and 17% on rtPA). Thus, despite an increased incidence of symptomatic intracranial hemorrhage,

treatment with IV rtPA within 3 h of the onset of ischemic stroke improved clinical outcome.

ENDOVASCULAR REVASCULARIZATION: Ischemic stroke from large-vessel intracranial occlusion results in high rates of mortality and morbidity. Occlusions in such large vessels (middle cerebral artery [MCA], intracranial internal carotid artery, and the basilar artery) generally involve a large clot volume and often fail to open with IV rtPA alone. Endovascular mechanical thrombectomy has been studied as an alternative or adjunctive treatment of acute stroke in patients who are ineligible for, or have contraindications to, thrombolytics or in those who failed to achieve vascular recanalization with IV thrombolytics

ANTITHROMBOTIC TREATMENT: *Platelet Inhibition* Aspirin is the only antiplatelet agent that has been proven to be effective for the acute treatment of ischemic stroke; there are several antiplatelet agents proven for the secondary prevention of stroke. Two large trials, the International Stroke Trial (IST) and the Chinese Acute Stroke Trial (CAST), found that the use of aspirin within 48 h of stroke onset reduced both stroke recurrence risk and mortality minimally

Anticoagulation Numerous clinical trials have failed to demonstrate any benefit of routine anticoagulation in the primary treatment of atherothrombotic cerebral ischemia and have also shown an increase in the risk of brain and systemic hemorrhage. Therefore, the routine use of heparin or other anticoagulants for patients with atherothrombotic stroke is not warranted.

NEUROPROTECTION: Neuroprotection is the concept of providing a treatment that prolongs the brain's tolerance to ischemia. Hypothermia is a powerful neuroprotective treatment in patients with cardiac arrest and is neuroprotective in animal models of stroke, but it has not been adequately studied in patients with ischemic stroke and is associated with an increase in pneumonia rates that could adversely impact stroke outcomes.

STROKE CENTERS AND REHABILITATION: Patient care in stroke units followed by rehabilitation services improves neurologic outcomes and reduces mortality. Use of clinical pathways and staff dedicated to the stroke patient can improve care. This includes

use of standardized stroke order sets. Stroke teams that provide emergency 24-h evaluation of acute stroke patients for acute medical management and consideration of thrombolysis or endovascular treatments are essential components of primary and comprehensive stroke centers, respectively. Proper rehabilitation of the stroke patient includes early physical, occupational, and speech therapy. It is directed toward educating the patient and family about the patient's neurologic deficit, preventing the complications of immobility (e.g., pneumonia, DVT and pulmonary embolism, pressure sores of the skin, and muscle contractures), and providing encouragement and instruction in overcoming the deficit. The goal of rehabilitation is to return the patient home and to maximize recovery by providing a safe, progressive regimen suited to the individual patient (17).

2.8. PREVIOUS STUDIES:

This part contains a review of the previous studies in the word that looked for factor associated with late arrival of acute stroke patient to emergency department:

1- Study was done in Saudi Arabia between November2012 to April 2013 to study (Factors associated with late arrival of acute stroke patients to emergency department in Saudi Arabia) and the result of this study showed that, a total of 227 patients attending the emergency department were interviewed. The mean age was 60.4±15.6years. Approximately 56.4% presented after 4.5h of stroke onset. Factors associated with late arrival were being alone during the onset of stroke, not being transported in an ambulance, not knowing that they were experiencing a stroke, and residing outside the city of Riyadh. This study concluded that, more than half of patients missed the golden hours for thrombolysis due to delayed presentation. Reasons include lack of knowledge, underuse of ambulance and difficult access to care. Urgent community-based interventions are needed to address these factors (32).

2- Study was done in Makkah in Saudi Arabia a cross-sectional observational study carried out between March 2019 and June 2019, in the Al-Noor Specialist Hospital in Makkah to study (Factors associated with delayed hospital presentation for patients with acute stroke in Makkah) and the result of this study showed that, A total of 98 patients were observed in this study. Among them 52 patients were males and 46 were females. From the overall study sample 54 were presented early that is within 4.5 hours of the onset of stroke, whereas 44 of them were presented late that is after 4.5 hours of the stroke occurrence. This study concluded that, the current study focused on the factors associated to the delayed hospital presentation for patients with acute stroke. A significant number of included patients arrived late at hospital after the onset of stroke. Following the study findings, low education level, unemployment status, and lack of knowledge of stroke symptoms are risk factors for delayed hospital arrival (33).

3- Study was done in Egypt a prospective observational cross-sectional study conducted on 4124 AIS patients in the period from November 1, 2017 till the end of October 2018 to study (Stroke onset to needle delay: Where these golden hours are lost? An Egyptian center experience) and the result of this study showed that, the mean pre-hospital onset arrival

time (OAT) and intra-hospital door-to-needle time (DNT) for the studied patients were 147.2 ± 42.5 and 87.5 ± 16.4 min, respectively and the main causes of pre-hospital onset to arrival delay were stroke unawareness, long travel time, incorrect beliefs, non-available neurologists, stroke onset during sleep and multiple causes (18.2%, 20.5%, 12.7%, 9.1%, 16% and 23.5% of cases, respectively). This study concluded that, Increasing the chance of utilizing IV r-tPA for AIS patients' needs regular updating of the stroke chain of survival system to get the highest benefits from the available resources (34).

4- Study was done in Egypt an observational cohort study was conducted from January 2018 to January 2019 to study (Pre- and in-hospital delays in the use of thrombolytic therapy for patients with acute ischemic stroke in rural and urban Egypt) and the result of this study showed that, A total of 618 patients were included in the study, of which 364 patients (58.9%) lived in rural regions and 254 (41.1%) in urban regions. General demographic characteristics were similar between both groups. Approximately 73.3% of patients who arrived within the therapeutic time window were urban patients. The time from symptom onset till hospital arrival (onset to door time, ODT) was significantly longer among rural patients (738 ± 690min) than urban patients (360 ± 342min). Delayed onset to alarm time (OAT), initial misdiagnosis, and presentation to non-stroke-ready hospitals were the most common causes of pre-hospital delay and were significantly higher in rural patients. For patients arriving within the time window, the most common causes of in-hospital delays were prolonged laboratory investigations and imaging duration. This study concluded that, the limited availability of stroke-ready hospitals in rural Egypt leads to delays in stroke management, with subsequent treatment inequality of rural patients with acute stroke (35).

5- Study was done in Somalia a cross-sectional study conducted at a teaching hospital in Mogadishu, Somalia between June 2021 and May 2022 to study (Factors Influencing Early Hospital Arrival of Patients with Acute Ischemic Stroke, Cross-Sectional Study at Teaching Hospital in Mogadishu Somalia) and the result of this study showed that, Of the 212 patients in the study, 113 (53.3%) were male, while 99 (46.7%) were female. The mean age of the patients was 62 ±10. Hypertension was the most common risk factor among patients 121 (57%), followed by diabetes and hyperlipidemia. One hundred and forty (66%) patients lived in the city, while 72 (34%) lived outside of the city. About 53 (25%) of the patients were brought to the ED by ambulance, and only 32 (15%) reached the hospital in less than 4 hours. The majority of patients had no idea about stroke

symptoms and thrombolytic treatment. In univariate and binary logistic regression analysis, delays in hospital arrivals were associated with a travel distance of more than 10 km, transportation via non-ambulance means, living alone, lack of recognition of stroke symptoms, night-time stroke onset, lack of knowledge about thrombolytic treatment, and non-hemiplegic presentation. This study concluded that, Improving the modifiable factors through public education will prevent delays in the early hospital arrival of stroke patients and will improve early thrombolytic intervention and the overall outcome of these patients (36).

6- Study was done in Iran a cross-sectional study, all patients with acute stroke referred to Poursina Hospital from June to December 2016 were evaluated to study (Symptom-to-needle Times in Acute Ischemic Stroke and Its Prehospital Related Factors) and the result of this study showed that, A total of 322 patients were included. Their mean age was 74.4 years and 55.6% were male. According to findings, only 74 patients (22.98%) were transferred to the hospital via Emergency Medical Service (EMS), most of them (64.86%) arrived at the right time. There is a significant relationship between EMS transfer use and arriving at the hospital at the right time. Overall, 13.9% of patients received IV rtPA, and 75.5% of the patients received rtPA in less than 60 minutes. Among the patients arrived in the golden time, the average times to treatment were as follows: onset-to-door (OTD), 105 min; door-to-admission, 3 min; admission-to-doctor, 7 min; doctor-to-Computed Tomography (CT), 15 min; CT-to-treatment, 26 min; symptom to needle time, 152 min; and door-to-needle time (DNT), 49 min. This study concluded that, according to this study, although the two-third of eligible patients were transferred to the hospital at the right time, the rate of using EMS for patient transportation is low (37).

7- Study was done in India a prospective study was carried out during a 12-month period ending December 2012 in the department of Neurology, Malabar Institute of Medical Sciences, Kerala, India to study (Factors delaying hospital arrival of patients with acute stroke) and the result of this study showed that, A total of 264 patients attending the emergency department were included. There were 170 men and 94 women. The mean age was 61.5 ± 12.4 years. A total of 67 (25%) patients presented within 4 hours of stroke onset. Factors associated with early arrival (multivariate logistic regression analysis) were distance 15 km or less from hospital (P 0.03, odds ratio (OR) 2.7), directly reaching the stroke department (P < 0.001, OR 9.7), history of coronary artery disease (P 0.001, OR

3.84), higher educational status (P 0.001, OR 3.7), and presence of hemiplegia (P 0.001, OR 5.5). This concluded that, we found a considerable delay in the early arrival of patients to our stroke department. Health promotion strategies to improve community awareness of early symptoms of stroke, education of local physicians about the importance of early referrals to the stroke centers, and wider availability and use of ambulance services are promising methods to help expedite presentation to hospital post stroke and thereby improve the management of stroke in India (38).

8- Study was done in south India a cross-sectional descriptive study was conducted from the year 2017–2019 in the Sri Ramachandra university teaching hospital in Chennai, South India to study (Factors Associated with Prehospital Delay in Patients with Acute Stroke in South India) and the result of this study showed that, the prehospital delay was observed in 154 patients (73.3%) and the median prehospital delay was 11.30 h. The following are the factors significantly ($P < 0.05$) attributed for the delay in presenting to the hospital: contextual factors like using public transport (bus), taxi, time of onset of symptoms, 7 pm–3 am; family history of stroke, perceived cognitive and behavioral factors like, wishing or praying for the symptoms to subside on its own, hesitation to travel due to long distance, delay in arranging transport, and arranging money for admission and wasting time by shopping for general practitioners, nursing homes, and hospitals. The presence of stroke symptom, headache, significantly decreased the prehospital delay. This study concluded that, Prehospital delay is high in South India and influenced by clinical, contextual, and cognitive/ behavioral factors (39).

9- Study was done in Thailand a retrospective chart review of acute stroke patients treated at the Division of Neurology, Department of Medicine, Siriraj Hospital, Bangkok, Thailand between 2007 and 2010 was conducted to study (Factors Associated with Hospital Arrival Time in Acute Stroke) and the result of this study showed that, Of 1,045 patients, mean age was 65.4±13.8 years, 46.0% were female, and the median NIHSS score was 6. Regarding arrival time, 40.2%, 51.6%, and 59.14% of patients arrived at the hospital within 3, 4.5, and 6 hours, respectively. Only 6.6% arrived by ambulance. Multivariate logistic regression analysis revealed previous ischemic stroke/transient ischemic attack ($p=0.022$), diagnosis of severe stroke (NIHSS score >15) ($p=0.001$), seizure as an initial symptom ($p=0.023$), and diagnosis of hemorrhagic stroke ($p=0.004$) to be associated with early hospital arrival. Awakening or unknown-onset stroke ($p<0.001$)

and referral from other centers (p<0.001) were factors associated with late arrival. This study concluded that, the factors that significantly influenced hospital arrival time after acute stroke in Thai population are the very low rate of EMS used and the delay in the referral of patients from other hospitals. Further study to investigate strategies to improve stroke awareness and referral protocols are warranted (40).

10- Study was done in Turkey a direct interview survey between February and May 2019 to study (factors affecting in the arrival time to the hospital of patients with acute ischemic stroke) and the result showed that, a total of 251 patients and / or patient relatives who arrived to the emergency and neurology outpatient clinic were interviewed. Of the 251 patients included in the study, 119 (47.4%) were female and the mean age was 70 (34-94) years. Approximately 72.5% of the patients were arrived in the first 4.5-hour slice after the onset of stroke symptoms. Factors causing late arrival were determined as being female, having low NIHSS score and not using ambulance in transportation. This study concluded that, Due to the delay in arrival of 27.5% of the patients, there is no chance to apply thrombolytic therapy to eligible ones. The factors resulting in the delay were discovered as female gender, low severity of the stroke and transportation without ambulance. In this respect, community-oriented trainings are required (41).

11- Study was done in Denmark a cross-sectional survey at two noncomprehensive stroke centers in the Capital Region of Denmark. Data were collected at Herlev Gentofte Hospital from February 2018 to June 2018 and at Nordsjællands Hospital from September 2018 to January 2019 to study (Patient-reported factors associated with early arrival for stroke treatment) and the result of this study showed that, in total 479 patients with acute stroke were included (median age 74 (25th–75th percentile, 64–80), 40% women), of whom 46.4% arrived within 180 min of symptom onset. Factors associated with early hospital arrival were patients or bystanders choosing emergency medical service (EMS) for the first contact with a medical professional (adjusted odds ratio (OR), 3.41; 95% confidence interval, CI [1.57, 7.35]) or the patient's perceived symptom severity above the median score of 25 on a 100-point verbal scale (adjusted OR, 2.44; 95% CI [1.57, 3.82]). Living alone reduced the likelihood of early arrival (adjusted OR, 0.53; 95% CI [0.33, 0.86]). This study concluded that, in a mixed stroke population an increased perception of symptom severity and choice of the first contact to EMS, rather than to the patient's GP, increased the likelihood of hospital arrival within 180 min after stroke symptom onset. These

findings suggest that behavioral motivators and barriers related to quickly contacting EMS, either by the patient or a bystander, upon symptom onset and recognizing stroke symptom severity, need to be further addressed (42).

12- Study was done in US Demographic and clinical data from a large tertiary care center's Get With The Guidelines (GWTG) database were evaluated in 1874 patients presenting to the ED with a diagnosis of transient ischemic attack (TIA), intracranial hemorrhage, subarachnoid hemorrhage, or ischemic stroke from January 2015–July 2017 to study (Factors affecting time between symptom onset and emergency department arrival in stroke patients) and the result of this study showed that, the average time from symptom onset to presentation was 15.0 h (sd = 23.2), with 43.6% of the sample presenting within 4 h of symptom onset. Results suggested that female gender (Odds Ratio [OR] = 0.70; 95% Confidence Interval [CI] 0.23–0.74), drug abuse (OR = 0.41; CI 0.23–0.74), and diabetes were significantly associated with longer time to presentation. This study concluded that, a combination of demographics, stroke severity, timing, and health history contributes to delays in presenting for treatment for ischemic stroke. Stroke education concentrating on symptom recognition may benefit from a special focus on high-risk individuals as highlighted in this study (43).

13- Study was done in Korea Consecutive acute ischemic stroke patients who arrived at the hospital within five days of onset from September 2019 to May 2020 were selected from the prospective stroke registries of Seoul National University Hospital and Chung-Ang University Hospital of Seoul, Korea to study (Impact of onset-to-door time on outcomes and factors associated with late hospital arrival in patients with acute ischemic stroke) and the result showed that, Among the 539 patients, 28.4% arrived early and 71.6% arrived late. Early hospital arrival was significantly associated with favorable outcomes (three-month modified Rankin Scale [mRS]: 0−2, adjusted odds ratio [aOR]: 2.03, 95% confidence interval: [CI] 1.04–3.96) regardless of various confounders, including receiving reperfusion therapy and type of stroke onset time. Furthermore, a lower initial National Institute of Health Stroke Scale (NIHSS) score (aOR: 0.94, 95% CI: 0.90–0.97), greater pre-stroke mRS score (aOR: 1.58, 95% CI: 1.18–2.13), female sex (aOR: 1.71, 95% CI: 1.14–2.58), unclear onset time, and less 6 years of schooling (aOR: 1.76, 95% CI: 1.03–3.00 compared to >12 years of schooling) were independent predictors of late arrival. This study concluded that, Thus, the onset-to-door time of less 4.5 h is crucial for better clinical outcome, and lower NIHSS score, greater pre-stroke mRS score, female sex, unclear onset

times, and less 6 years of schooling were independent predictors of late arrival. Therefore, educating about the importance of early hospital arrival after acute ischemic stroke should be emphasized. More strategic efforts are needed to reduce the prehospital delay by understanding the predictors of late arrival (44).

CHAPTER THREE

Methodology

3. Methodology

3.1. Study design

The study was a cross - sectional study.

3.2 Study location

This study was conducted in nine Governmental and Private Hospitals including Al-Thawra Hospital, Al-Gumhori Hospital, Al-Kuwait, Dr Abd Al-Qadir Al-Mutawakel Hospital, 22 May Hospital ,48 Model Hospital, Yemen German Hospital, Al-Alia'a International Hospital and Al-Yemen Al-Saeed Hospital.

3.3 Study Period

The preparatory phase was from 1/4/2023 to 1/5/2023, data collection phase from 1/5/2023 to 10/5/2023 and data analysis and report writing was from 12/5/2023 to 12/6/2023.

3.4 Study population

The study was conducted among stroke patients who attending targeted hospitals during study period.

3.5 Sample size

The selected key indicator for sampling was the '(the proportion of stroke patients who arrival to hospital within the golden hours) the result of previous study conducted in Egypt showed that 73.3% stroke patients who arrived within the golden hours.

By using Epi info version 7., the average of the stroke patients who attend targeted 9 hospitals per month is 180 so the total the stroke patients who attend these hospitals per year is 2160. The total population is 2160, CI 95%, accepted margin of error 5% and the expected percentage of patients who arrived within the golden hours is 73.3%. So the minimum sample size is 266 as it is clear in the figure below.

Population survey or descriptive study
For simple random sampling, leave design effect and clusters equal to 1.

Population size:	2160
Expected frequency:	73 %
Acceptable Margin of Error:	5 %
Design effect:	1.0
Clusters:	1

Confidence Level	Cluster Size	Total Sample
80%	122	122
90%	194	194
95%	266	266
97%	317	317
99%	421	421
99.9%	612	612
99.99%	769	769

3.6 Sampling technique

Snow ball sampling technique was used for selecting the sample under study as all the patients who attended the targeted hospital during the study period**.**

3.7 Data collection

Stander questionnaire according to the study's aim was used, which includes the following parts:(Appendices 1)

Part one includes items regarding sociodemographic characteristics as (name, age, gender, address, occupation, marital status and income level)

And content family history.

Part two was about habits (Smoking, Chewing Qat, Shama and lack of movement).

Part three include causes, symptoms of stroke and past medical history (HTN, DM, MI, PS, AF, CHF and obesity).

Part four includes mode of transportation, diagnosis, treatment and type of stroke.

3.8 Data analysis

The data were entered into the computer, reviewed and cleaned, and then analyzed by using (SPSS) software program.

3.9 Ethical consideration

- Research protocol was reviewed and approved by the ethical committee of college of Medicine Emirates International University.
- Before patient ‘s interview, each patient informed about the aim of the study and the confidentiality of their data was ensured by the researcher.

Also, their rights to refuse or participate in the present study was confirmed and then oral informed consent obtained for interview.

CHAPTER FOUR

Result

Results

Distribution of the patient's by their sex

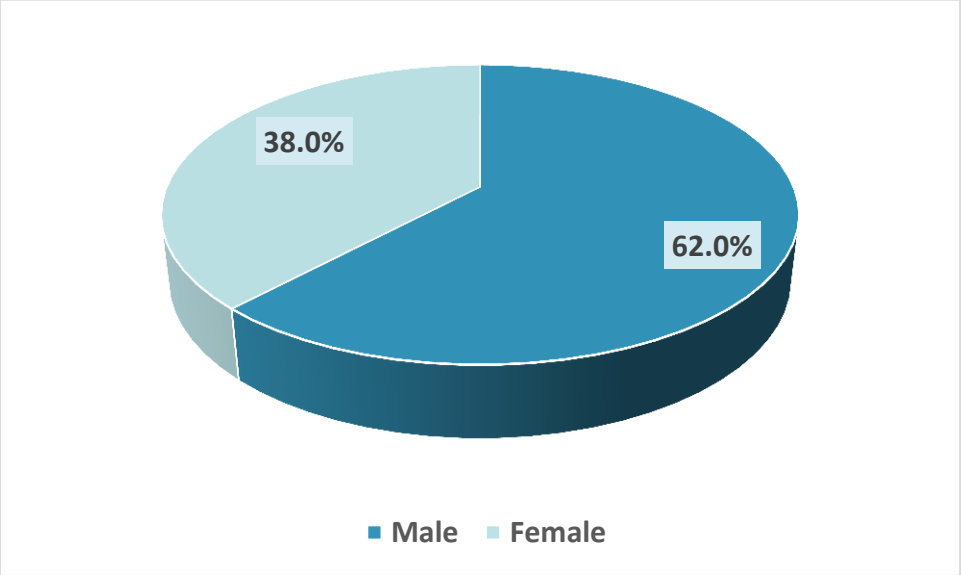

Figure 11. Distribution of the patient's by their sex

figure(11) shows the distribution of the sample by their sex, the result showed that males were more than females (62.0% and 38% respectively).

Distribution of the patients their Marital status

Table 1. patients by marital status

var.	No.	%
Marital status		
Single	13	5.2%
Married	189	75.6%
Widower	43	17.2%
Divorced	5	2.0%
Total	250	100.0%

table (1) shows the distribution of the stroke patients by their marital status and the result showed that, more than three quarters of the sample 75.6% were married followed by widowers 17.2%. those who are singles were about 5.2% of the total sample while the divorced were only 2.0%.

Distribution of the patient's by their residency

Graph (12) shows Address of patients

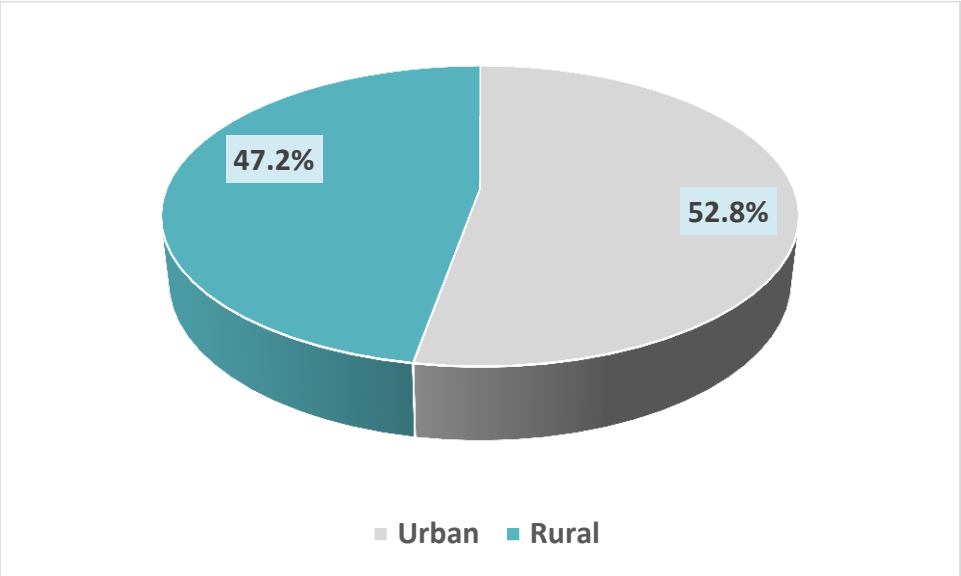

Figure 12. shows the address of patients

Figure (12) showed that 52.8% of stroke's patients were living in the Urban, while 47.2% were living in the Rural.

Distribution of the patients by their occupation

Table 2. distribution of patients by their occupation

var.	No.	%
Occupation		
Unemployed	50	20.0%
Housewife	77	30.8%
Worker	16	6.4%
Self free business	74	29.6%
Employee	33	13.2%
Total	250	100.0%

Table (2) shows the distribution of the sample by their occupation and the result showed that, more than 30% of the patients are Housewife, followed by those who are self-business 29.6%. those who are unemployed represented about 20.0% of the sample, while 13.2% were employed and 6.4% were workers.

Distribution of the patients by their income level

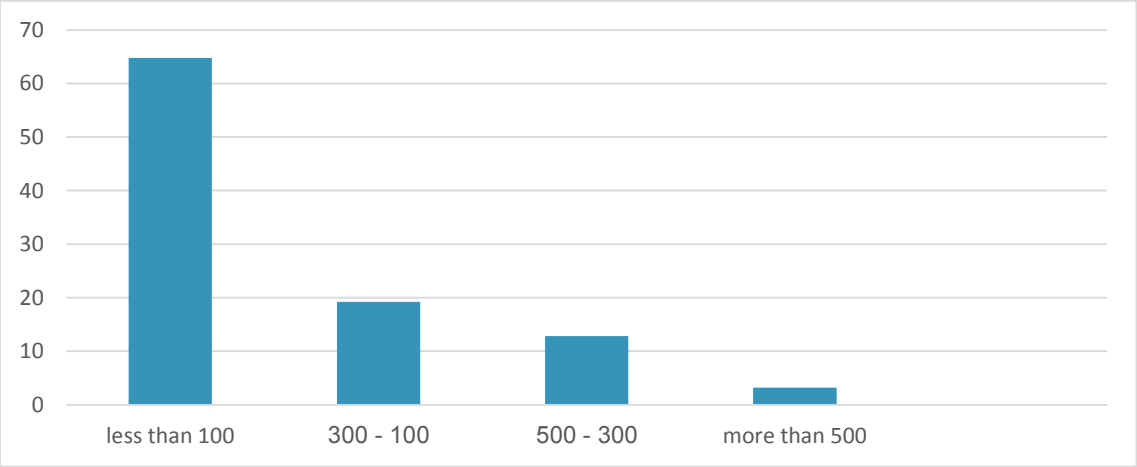

Figure 13. distribution of patients by their income level

Figure(13) shows the distribution of the sample by their monthly income, the result shows among all participants most of them 64.8% were low income and have monthly income less than 100 thousand and 19.2% were between 100-200 thousand. Those who have monthly income more than 300-500 thousand were only 12.8% and those who are more than 500 thousand were only 3.2%.

Distribution of the patients by the insurance

Figure (14) shows "Do you have insurance?" of patients

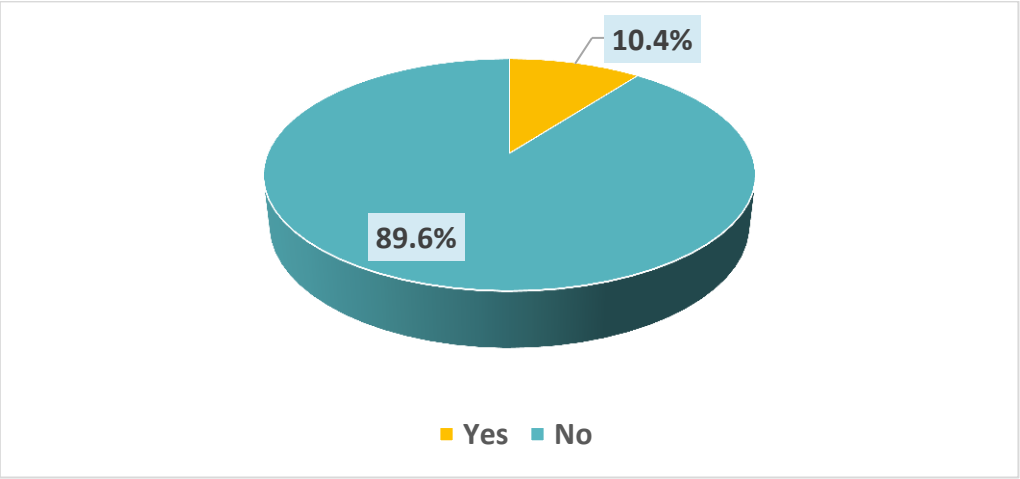

Figure 14. distribution of patients by their insurance

Figure (14) showed that almost of patients have no insurance (89.6%), while the patients that have insurance were about 10.4%

Distribution of the patients by their stress at work

Figure 15. distribution of patients by their stress at work

Figure (15) show the distribution of the sample by their stress at work, the study showed that about 47.6% have stress at their work , while 52.4% have no stress.

Kind of stress at work

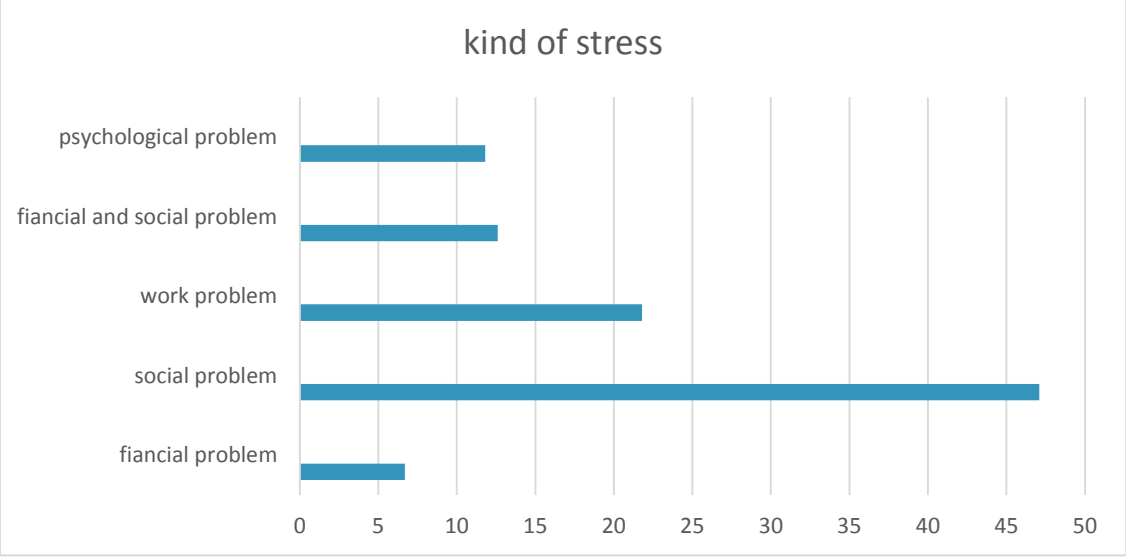

Figure 16. distribution of kind of stress

Figure (16) showed the distribution of the kind of stress, which showed Social stressed was about 47.1%, followed by 21.8% was work problems, 12.6% was mixed stress in the form of financial and Social problems, 11.8% of patients had psychological problems and those who were having only financial problems represented by 6.8%.

Distribution of the patient's bad habits

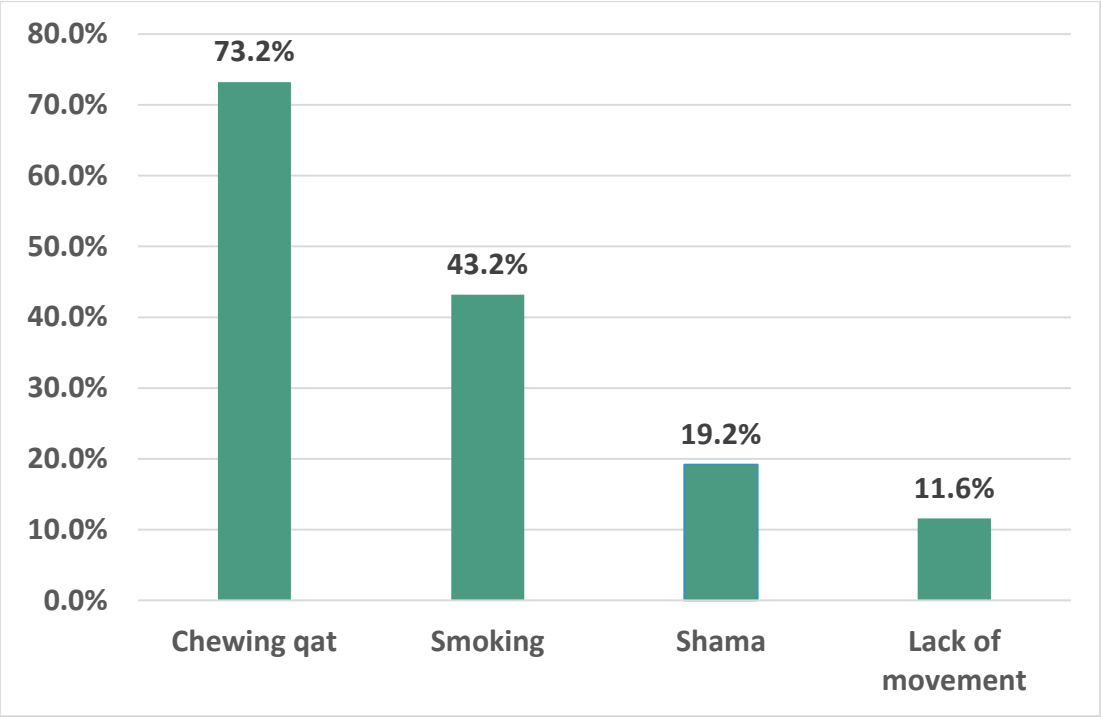

Figure 17. shows " Bad habits" of patients

Figure (17) showed the distribution of the patient's Bad habits, the result showed that more of half has been active showing qat about 73.2%, followed by 43.2% of patients are smoking, 19.2% are shama users and 11.6% noted that they are lacking of movement.

Distribution of chronic diseases among stroke patients

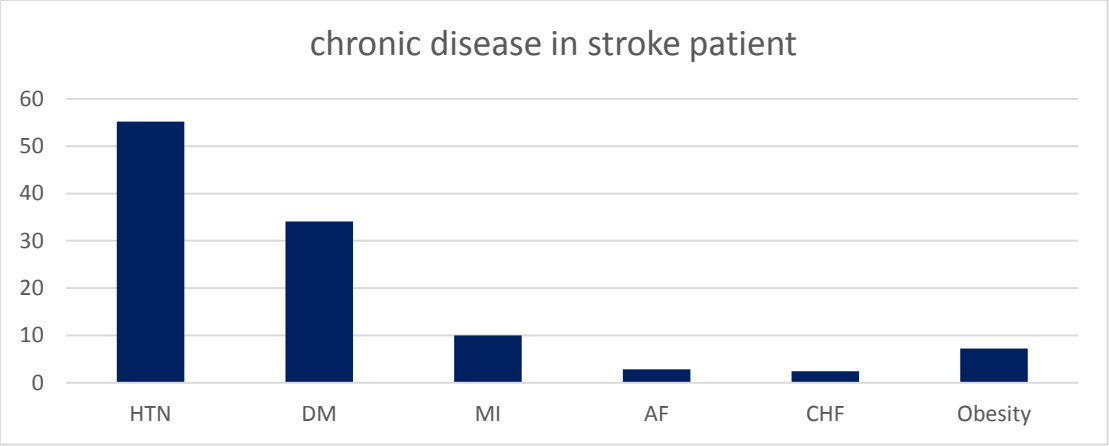

Figure 18. distribution of chronic disease among stroke patients

Figure (18) showed the distribution of the chronic diseases among the stroke patients, the results showed that's HTN was presented in more than half of the sample about 55.2%, and around 34.0% have DM, followed by 10.0% have MI, and 2.8% have AF, but patients who have CHF only present about 2.4%, and obesity found in 7.2%.

Distribution of the Causes of stroke

Table 3. causes of stroke

var.	**No.**	**%**
Age >40	214	85.6%
Gender(M>F)	153	61.2%
Heredity	36	14.4%
Previous vascular event such as MI, stroke or peripheral embolism	58	23.2%
Hypertension	140	56.0%
Cigarette smoking	98	39.2%
Diabetes mellitus	83	33.2%
Hyperlipidemia	15	6.0%
Heart failure	5	2.0%
Atrial fibrillation	7	2.8%
High alcohol intake	1	0.4%
Positive family history	35	14.0%
Oral contraceptive	12	12.6%
Polycythemia	5	2.0%

Table (3) showed the distribution of the cause if stroke, the study results show that 85.6% of patients are above the age of 40 years, the second most Cause is gender in which males more than females represent by 61.2%, also patients who have *HTN* presented by 56 0% with stroke, cigarette smoking presented by 39.2%, *DM* presented by 33.2%, also 23.2% are present in those who have previous vascular events, hereditary and positive family

history are presented at same percentage about 14.0% , Oral contraceptive was presented by 12.6% while Hyperlipidemia presented by 6.0%, Atrial fibrillation presented by 2.8% followed by 2.0%heart failure and 2.0% Polycythemia, the last cause was alcohol intake about only 0.4% are drinking.

Distribution of stroke patients symptoms

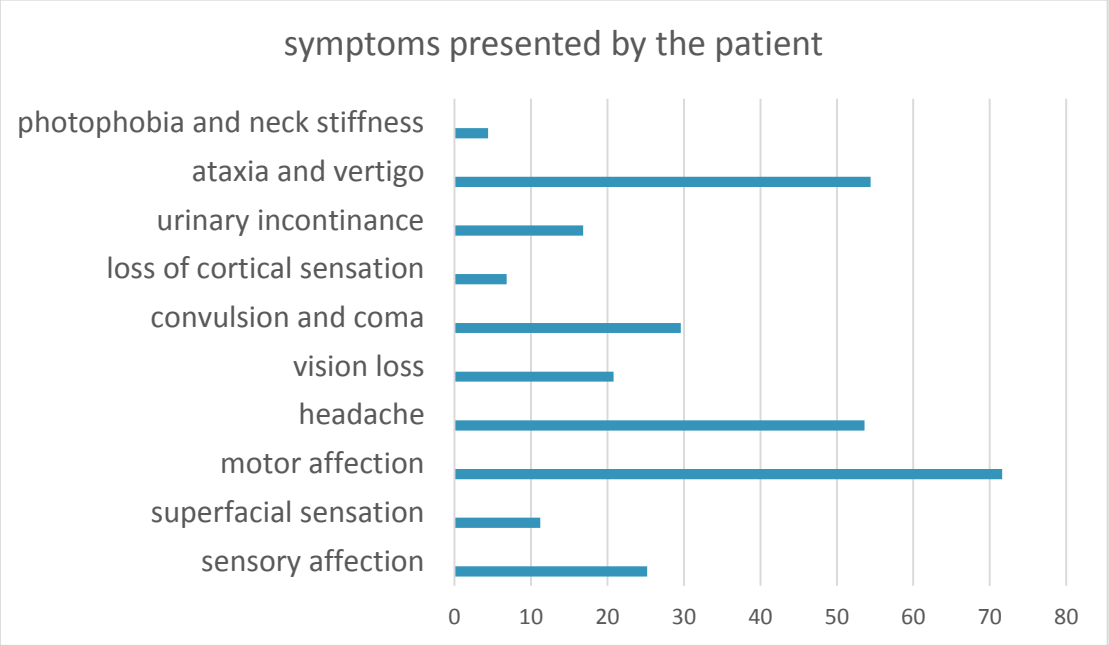

Figure 19. distribution of stroke patients symptom

Figure (19) showed the distribution of the stroke patients symptoms, the study results showed that more half patients have Motor affection with percentage 71.6%, the second most symptom was Ataxia and vertigo that presented by 54.4%, patients that came complaining of headache presented by 53.6%, and patients who complained with Convulsion and come presented by 29.6%, in which Sensory affection was presented by 25.2%, and patients who have vision loss presented by 20.8%, 16.8% of patients have presented by Urinary incontinence, but loss of Superficial sensation presented by 11.2%, in which loss of cortical sensation and Photophobia and neck stiffness was the most low symptoms that presented by 6.8% and 4.4% respectively.

Distribution of the first symptom that noted by the patient

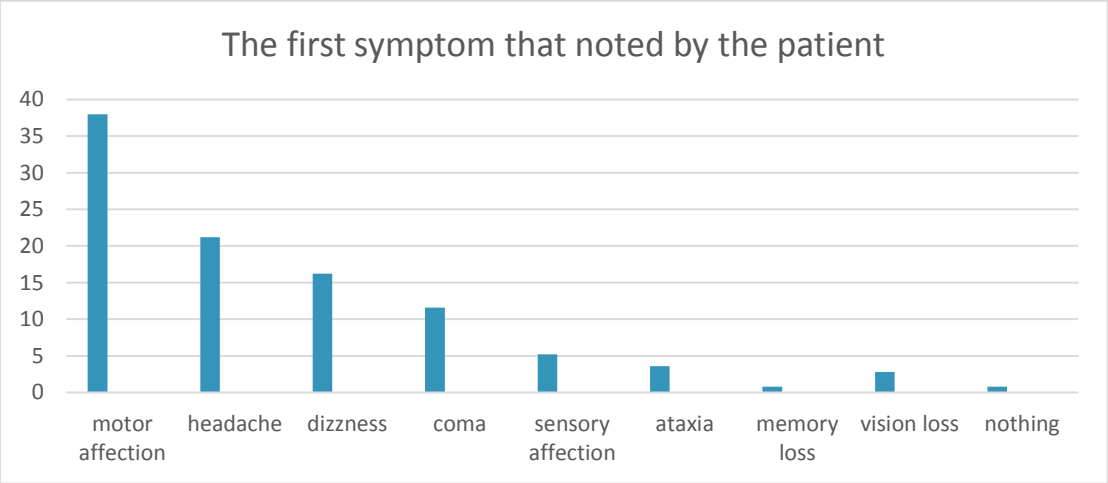

Figure 20. distribution of the first symptom that noted by the patient

Figure (20) showed the distribution of the first symptom that noted by the patient, the results showed that the most first symptom was Motor affection presented by 38.0%, followed by headache with presented 21.2%, followed by dizziness that was about 16.0%, followed by coma 11.6, and Sensory affection was presented by 5.2%, while Ataxia presented by 3.6%, vision loss presented by 2.8%, and memory loss 0.8%.

Distribution of the first action took after getting the first symptom

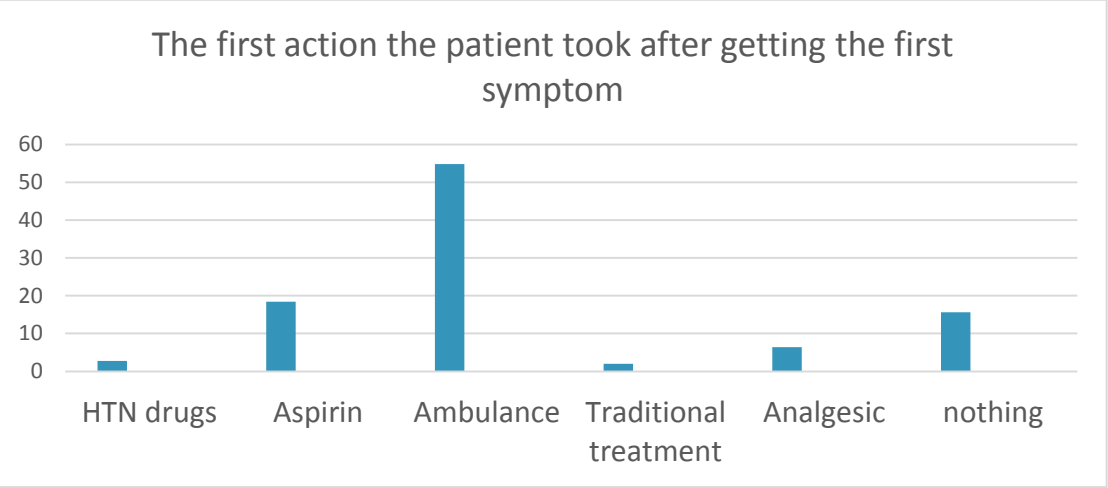

Figure 21. distribution of the first action took after getting the first symptom

Figure (21) show the distribution of the first action took after getting the first symptom, the result show that more than half of patient ambulate to the hospital by percentage 54.8%, while 18.4% had taken aspirin, followed by 15.6% nothing to do, and 6.4% taken analgesic, while *HTN* drugs presented by 2.8% and traditional treatment 2%.

Distribution of patients transmission him self to the hospital

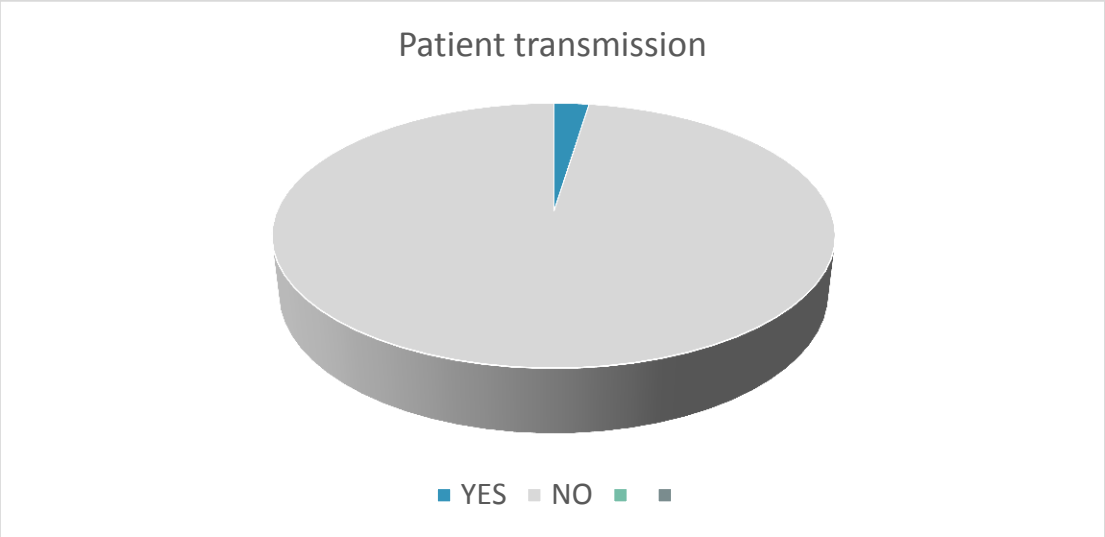

Figure 22. distribution of patient's transmission himself to the hospital

Figure (22) showed distribution of patient's transmission which result in 97.6% not transfer himself and 2.4% transfer himself.

Mode of transportation from the home to the hospital

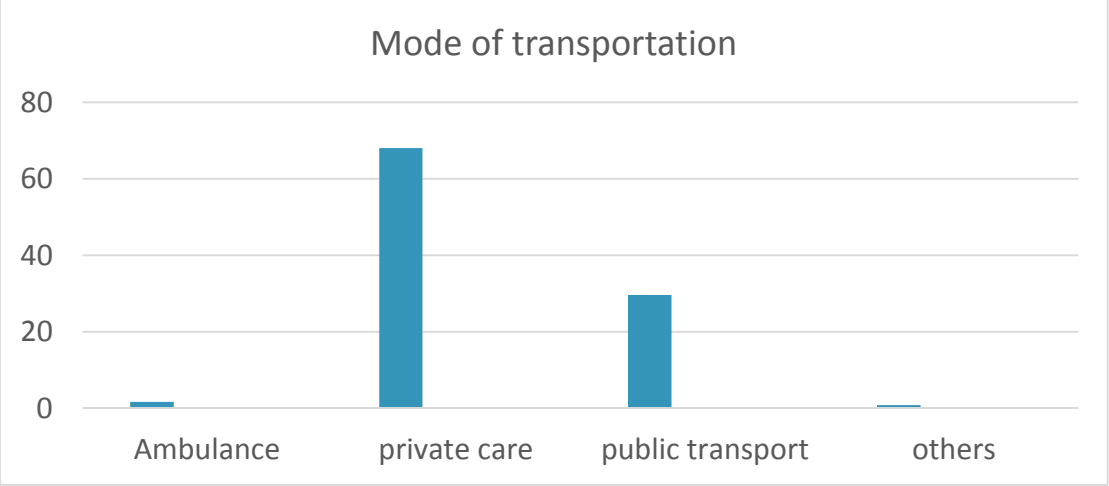

Figure 23. mode of transportation into the hospital

Figure (23) showed the Mode of transportation from home to the hospital, the results showed that more than half of patients was their transportation by private car with percentage 68.0%, white whom their transportation by public car was 29.6%, followed by ambulance transportation about 1.6%,

Distribution of admission units in which the patients was arrived

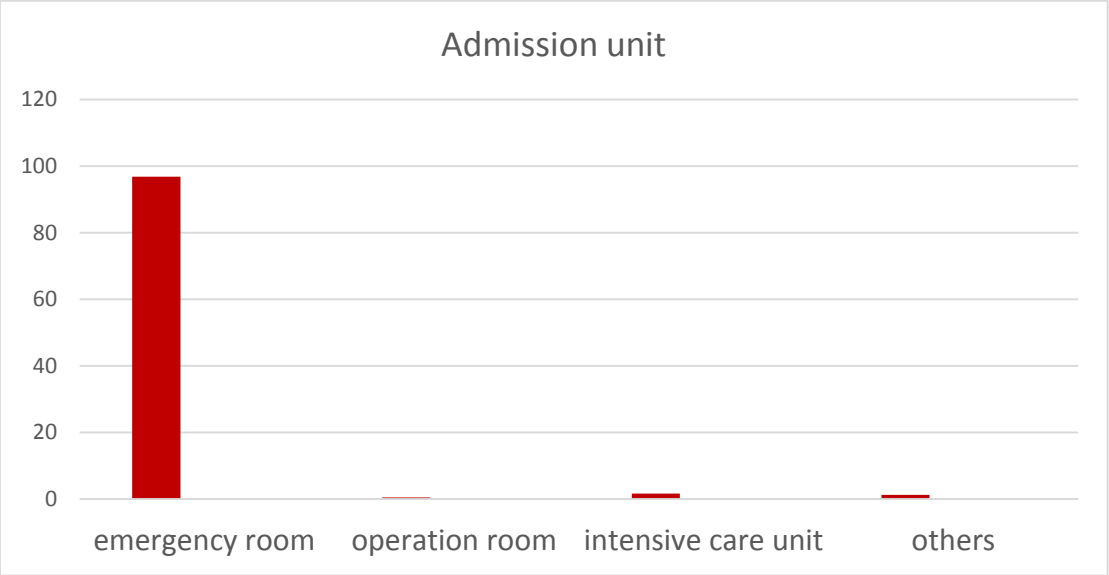

Figure 24. distribution of admission units in which the patients was arrived patients by their income level

Figure (24) showed that most of patients was admitted to the emergency room by percentage 96.8%, while the other are admitted to operation room or intensive care unit or other unit, it represents by 3.2%

Distribution of the patient's diagnostic methods

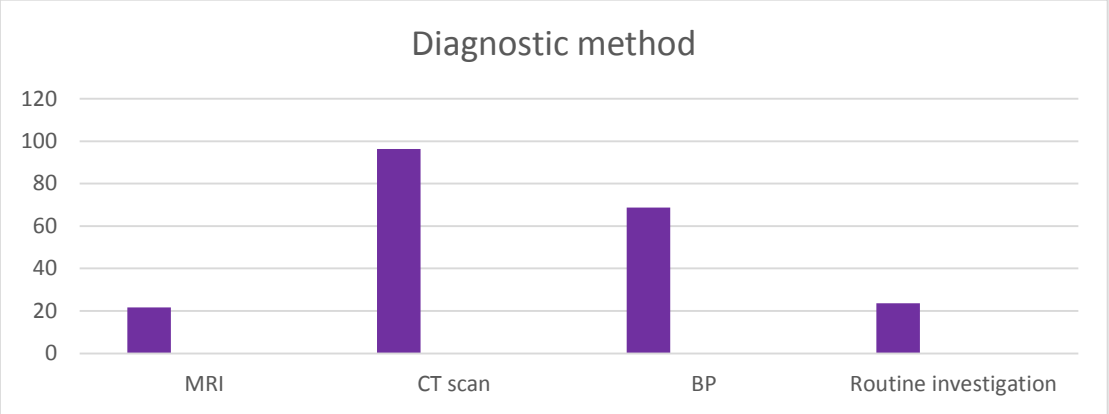

Figure 25. distribution of patient's diagnostic methods

Figure (25) showed that the distribution of the diagnostic methods in which the results showed that most of them was diagnosed by *CT* which presented by 96.4%, and patients who diagnosed by *MRI* was represented about 21.6% in other hand patients who have also *BP* diagnostic methods also presented by 68.8% and the other represented by 23.6%.

Availability and ease of getting hospital services

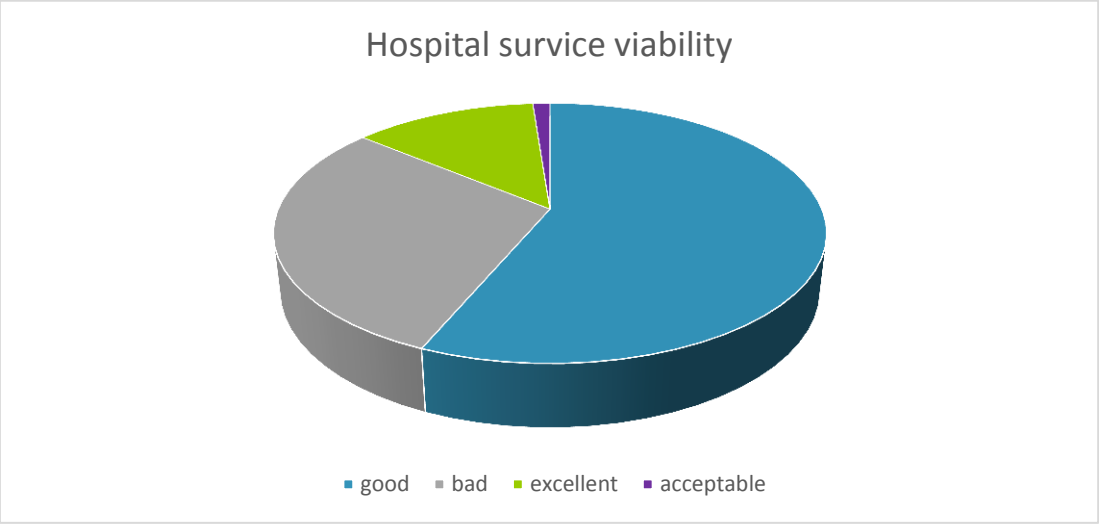

Figure 26. distribution of hospital availability and ease of getting hospital services

Figure (26) showed the distribution of the hospital service viability, the results showed that most of them says that they have good service by 56.4%, and 28.6% are bad services, and those who say that the service is excellent represented by 12.2% and the acceptable present about 1.2%.

Distribution of free medications that are available for use

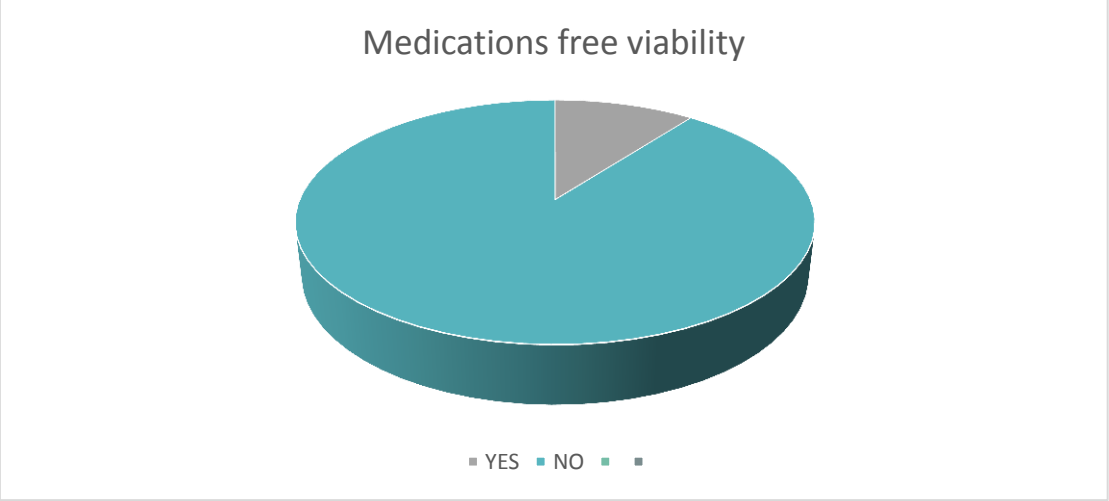

Figure 27. distribution of medications free viability

Figure (27) showed that about 89.6% are not available, while only 10.4% who received free medications.

How long did the patient need to reach the hospital since the first symptom appeared

Table 4. time needed from first symptom appeared to reach the hospital

	No.	%
How long did the patient need since the first symptom appeared to reach the hospital		
<= 3	127	50.8%
3 – 4	9	3.6%
4+	114	45.6%
Total	250	100.0%

Table (4)showed the results of the time that needed for patient between the first symptom that noted and the time to reach the hospital, half of patients was arrived at the Golden time which represent 50.8%, and those who reach the hospital between 3-4hr represent 3.6% and 45.6% those who came after 4hr.

Distribution of arrived at Golden hour

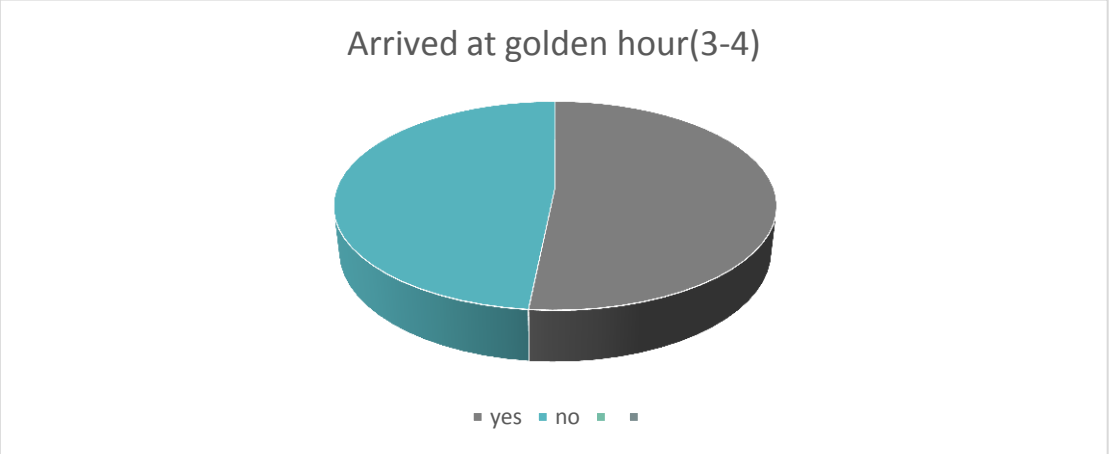

Figure 28. distribution of patients who were arrived at the golden hours

Figure (28) showed the distribution of patients that arrived at the Golden hour, the results showed that more than half of patients arrived at the Golden hour represented by 51.6%, while the patients that not arrived at the Golden hour represent by 48.4%

What are the causes for delay the arrival at the Golden hours

Table 5. in case of NO what were the causes

	No.	%
In case of No what were the causes		
Lack of aware	65	53.7%
Poverty	7	5.8%
Away distance	48	39.7%
Nothing	1	0.8%
Total	121	100.0%

Table (5) showed that the most cause of delayed the arrival is lack of awareness which represent by 53.7% ,the Away distance is represented by 39.7% and the Poverty is presented by 5.8%.

Distribution of the Time that needed for diagnosis after patients arrived

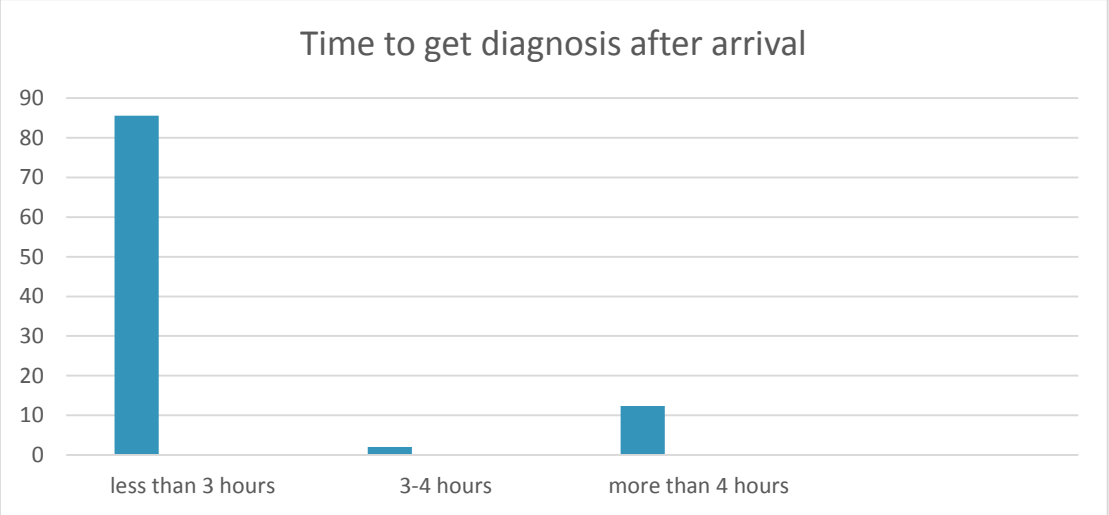

Figure 29. distribution of the time that needed for diagnosis after arrival

Figure (29) showed Distribution of the Time that needed for diagnosis after patients arrived, the result showed that 85.6% are get their diagnosis within 3hr ,while 12.4% get the diagnosis after 4hr, the remained get the diagnosis between 3-4 hr.

Distribution of the Time that needed for get treatment

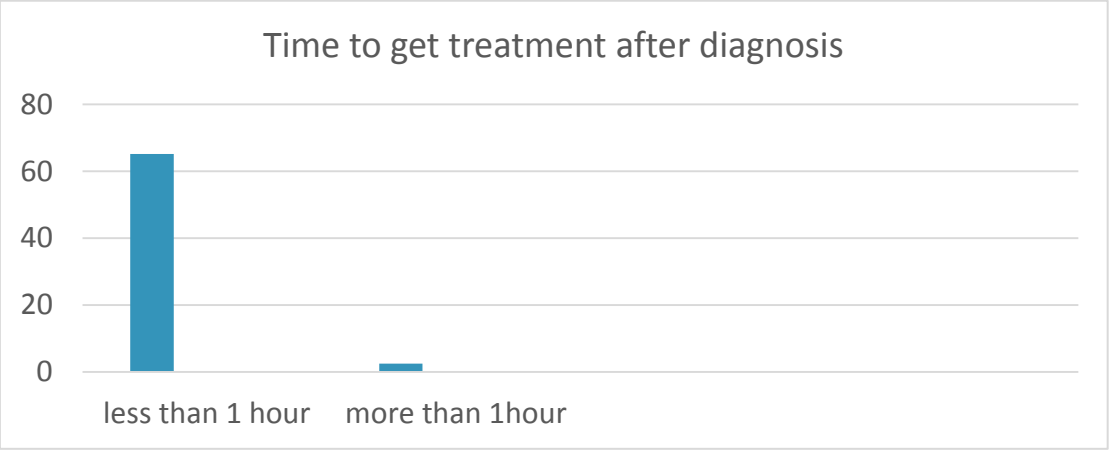

Figure 30. distribution of the time needed to get the treatment

Figure (30) showed the distribution of the Time that needed for get treatment, the results showed that more than half get the treatment before 1hr after the diagnosis which represented by 65.2%, while whom gathered the treatment after 1hr of diagnosis represented by 34.8%.

Total time that needed from the first symptom appeared to the diagnosis

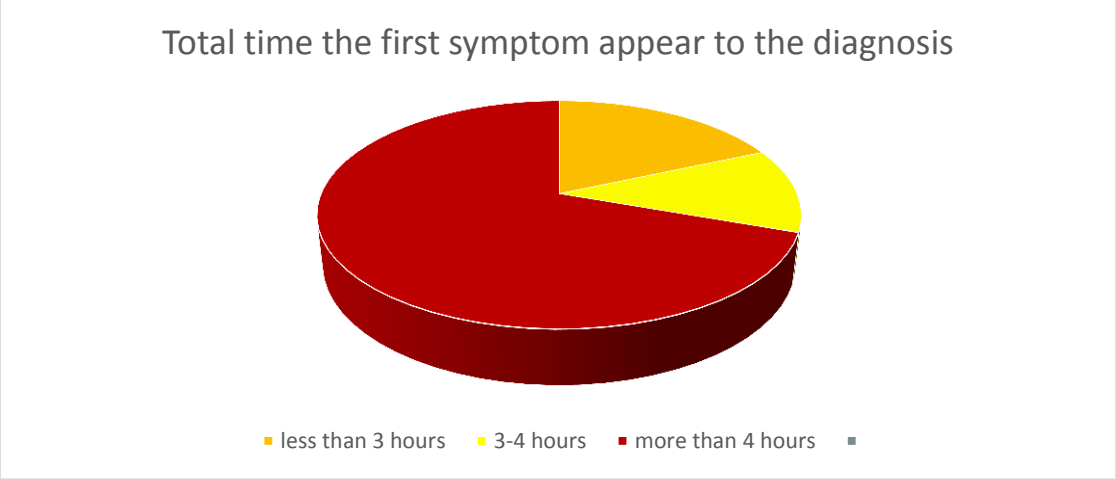

Figure 31. distribution of the total time that needed from the first symptom appeared to the diagnosis

Figure (31) showed the time needed between the first symptom appeared and the diagnosis, the results showed that more than half of patients get their diagnosis within 4hr and more after the first symptom appeared it represented by 69.6%, while 18.4% get their diagnosis after first symptom appeared within 3hr and less and 12.0% get it between 3-4hr.

The knowledge of the stroke symptoms with the persons who trans the patients

Table 6. the knowledge about stroke symptoms with persons who trans the patients

symptoms of stroke		
Sensory affection	19	7.6%
(pain, temperature, fine touch)	13	5.2%
Motor affection	50	20.0%
Headache	25	10.0%
Vision loss	8	3.2%
Convulsion, coma, personality changes	21	8.4%
Loss of cortical sensation	9	3.6%
Urinary incontinence	13	5.2%
Ataxia, vertigo, mild amnesias	34	13.6%
Photophobia, neck stiffness	6	2.4%

Table (6) showed that most of the transformers Know about Motor affection represented by 20.0%, followed by 13.6% known about Ataxia, vertigo and mild amnesias, the knowledge about Headache was only presented by 10.0%, the others symptoms have lower percentage of knowledge.

Distribution of the patient's transformers awareness of symptoms

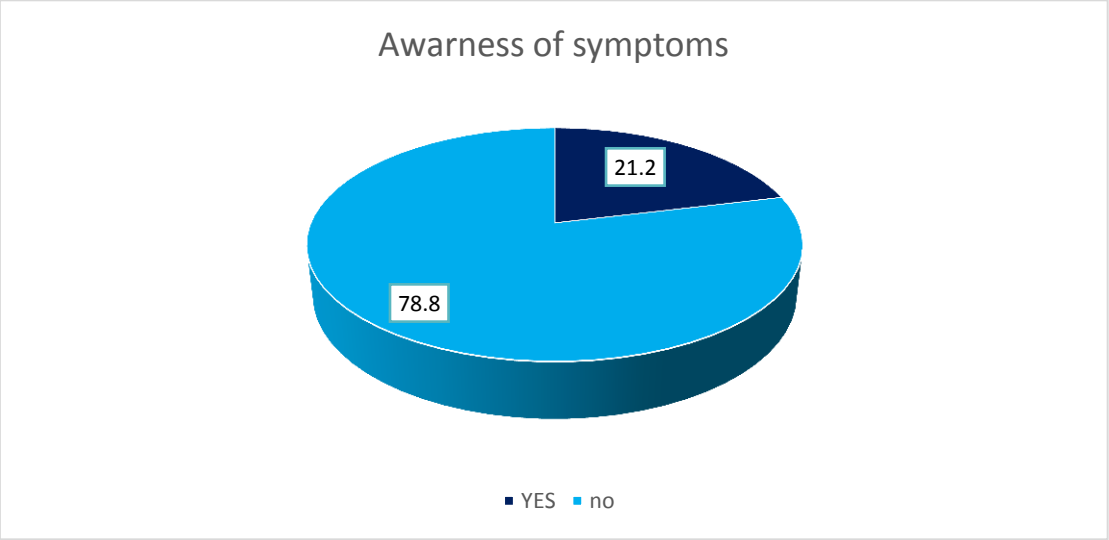

Figure 32. distribution of patient's awareness of symptoms

Figure (32) showed the distribution of the patient's transformers awareness of symptoms, the results showed that more than half are not aware about transformers by 78.8%, while 21.2% are aware.

Distribution of types of stroke

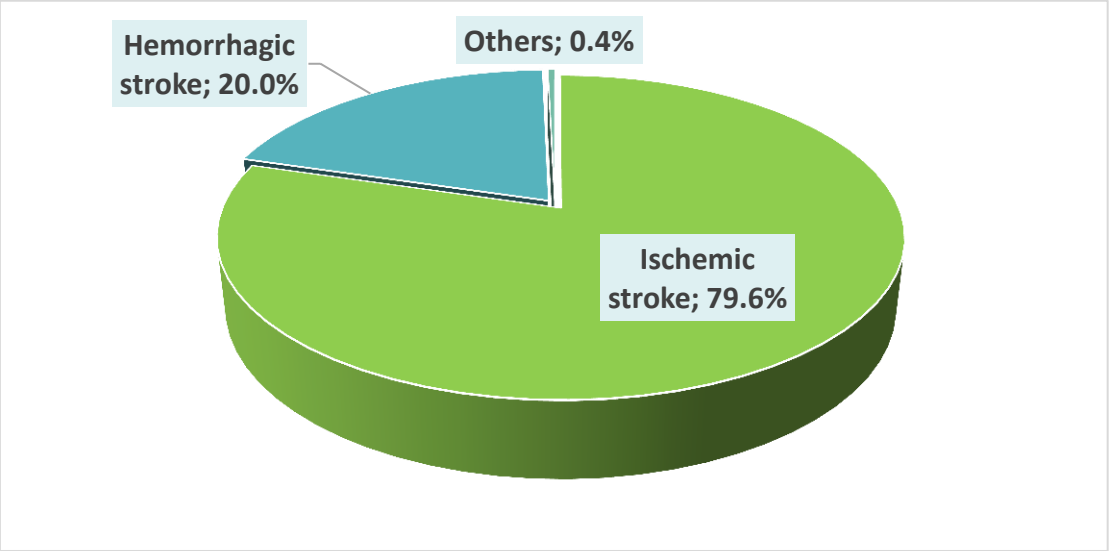

Figure 33. distribution of types of stroke

Figure (33) showed the types of stroke, about 79.6% are Ischemic, while 20.0% are Hemorrhagic stroke and 0.4% represents others.

Distribution of present of previous stroke

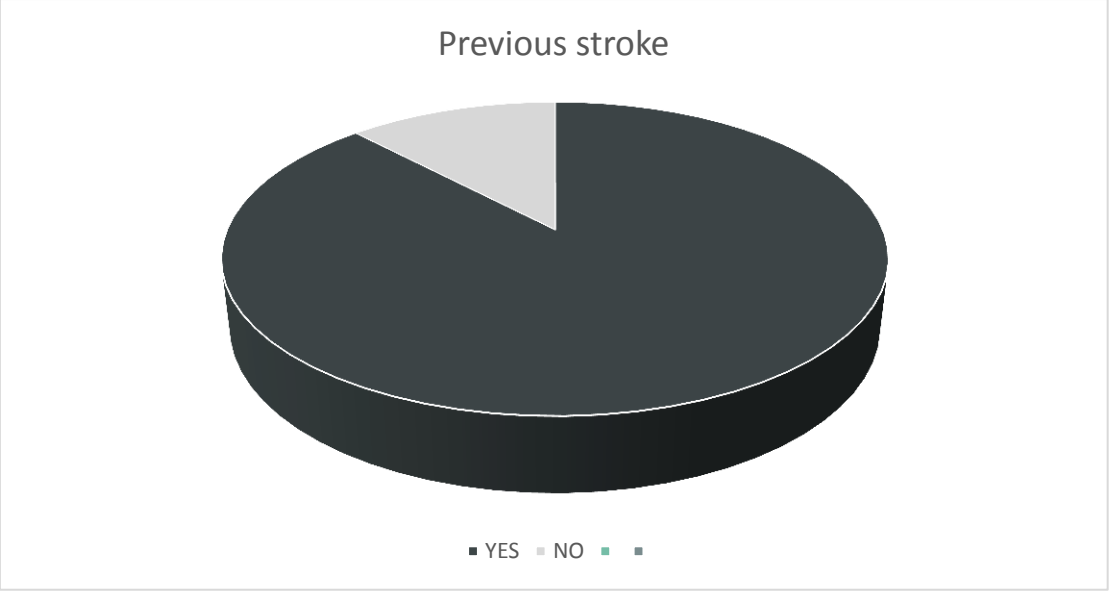

Figure 34. distribution of present of previous stroke

Figure (34) show the distribution of present of previous stroke, the results showed that about 76.8% have already Previous stroke, while 23.2% haven't got before.

Distribution of family past history

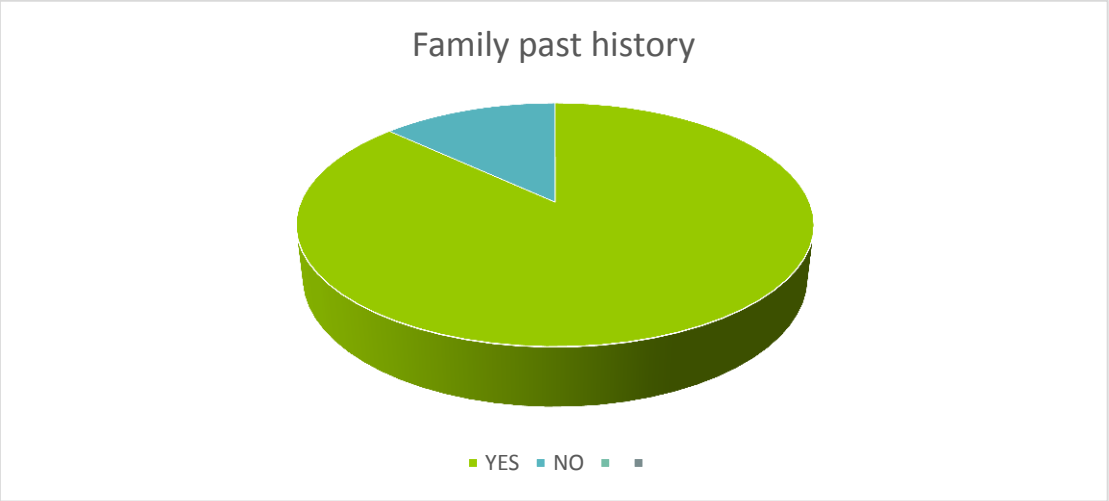

Figure 35. distribution of family past history

Figure (35) show the distribution of family past history, the results showed that most of them by percentage 78.8% had past family history and 21.2% are haven't got.

Table 7. Mode of transportation

Var.	How long did the patient need since the first symptom to reach the hospital						Chi-square	P-value
	<= 3		3 - 4		4+			
	No.	%	No.	%	No.	%		
Mode of transportation							4.401	0.623
ambulance	1	25.0%	0	0.0%	3	75.0%		
private car	89	52.4%	7	4.1%	74	43.5%		
public transport	37	50.0%	2	2.7%	35	47.3%		
Others	0	0.0%	0	0.0%	2	100.0%		
Total	127	50.8%	9	3.6%	114	45.6%		
In case of No what were the causes							30.384	<0.001*
Illiteracy	2	3.1%	4	6.2%	59	90.8%		
Poverty	0	0.0%	0	0.0%	7	100.0%		
Away distance	1	2.1%	2	4.2%	45	93.8%		
Nothing	1	100.0%	0	0.0%	0	0.0%		
Total	4	3.3%	6	5.0%	111	91.7%		
How long was the time to get started of treatment after the diagnosis							11.046	<0.004*
<= 1	95	58.3%	6	3.7%	62	38.0%		
1+	32	36.8%	3	3.4%	52	59.8%		
Total	127	50.8%	9	3.6%	114	45.6%		

How long was the time to get started of treatment after the diagnosis							0.763	0.683
<= 1	88	51.2%	5	2.9%	79	45.9%		
1+	39	50.0%	4	5.1%	35	44.9%		
Total	127	50.8%	9	3.6%	114	45.6%		

*. The Chi-square statistic is significant at the ،05 level.

According to the Mode of transportation

Among those who used the private cars 56.5% reached within the golden hours, while 52% of those who used the public transportation. among those who used the ambulance only 25% of them reach within the golden hours. there was some differences in those who reached within the golden hours among the difference this difference was not significant as the (p value =0.623).

According to arrival within the golden hours

The result shows the relation between the patients who reached the hospital within the golden hours which was 97.6% which was more than who can't reach the hospital at the same time with percentage of 2.3% ,while the relation between the patients who don't reach the hospital in time more than 4 hours were 91.7% which was more than who can reach the hospital at the same time with percentage of 2.3% there was a big difference in those who reached within the golden hours and who can't reached in the golden hours this difference was significant as the (p value =0.001).

According to the cause of dallying the arrival within the golden hours

The result show the relation between the patients who couldn't reach the hospital within the golden hours because of nothing with percentage of 100% which was more than the other causes as lack of awareness with percentage of 9.3% or because of away distance with percentage of 6.3% .while the relation between the patients who don't reach the hospital in time more than 4 hours because of poverty presented with percent of 100% which was more than the other causes.

there was a big difference in those who couldn't reached within the golden hours and their causes of dallied this difference was significant as the (p value =0.004).

According how its take to diagnosed the patients after arrival

The result shows the relation between the patients who reached the hospital within the golden hours and getting diagnosed in time less or equal to 1 hour were 62.0% which was more than who diagnosed in time more than 1 hour while the patients who reached in time more than 4 hours who diagnosed in time more than 1 hour were 59.8% which was more than other who diagnosed in time less or equal to 1hour which were 38.0%.

there was a difference in those who reached within the golden hours and how long it take to be diagnosed this difference was significant as the (p value =0.004).

According how its take from diagnosis the to start treatment

The result shows the relation between the patients who reached the hospital within the golden hours and started the treatment in time more than 1 hour were 55.1%with no difference with who started the treatment in time less or equal to 1 hour with percentage of 54.1% while the patients who reached in time more than 4 hours who started treatment in time less or equal to 1 hour were 45.9% with no difference with who started the treatment in time more than 1 hour in time with percentage of 44.9%. there was no differences in those who reached within the golden hours and how long its takes to start treatment this difference was not significant as the (p value =0.683).

Table 8. Shows sex, income and address

var.	How long did the patient need since the first symptom to reach the hospital						Chi-square	P-value
	<= 3		3 – 4		4+			
	No.	%	No.	%	No.	%		
Sex							0.105	0.949
Male	78	50.3%	6	3.9%	71	45.8%		
Female	49	51.6%	3	3.2%	43	45.3%		
Total	127	50.8%	9	3.6%	114	45.6%		
Address							4.067	0.131
Urban	75	56.8%	4	3.0%	53	40.2%		
Rural	52	44.1%	5	4.2%	61	51.7%		
Total	127	50.8%	9	3.6%	114	45.6%		
Income level in thousand riyals							1.843	0.934
< 100	81	50.0%	7	4.3%	74	45.7%		
100-300	23	47.9%	1	2.1%	24	50.0%		
300-500	18	56.3%	1	3.1%	13	40.6%		
>500	5	62.5%	0	0.0%	3	37.5%		
Total	127	50.8%	9	3.6%	114	45.6%		
Occupation							18.246	0.019*
Unemployed	28	56.0%	1	2.0%	21	42.0%		
Housewife	37	48.1%	2	2.6%	38	49.4%		
Worker	7	43.8%	1	6.3%	8	50.0%		
Self free business	29	39.2%	3	4.1%	42	56.8%		
Employee	26	78.8%	2	6.1%	5	15.2%		
Total	127	50.8%	9	3.6%	114	45.6%		

*. The Chi-square statistic is significant at the ،05 level.

Table (8) show how long did the patient need since the first symptom to reach the hospital

According to the sex

The result shows the relation between the females who reach the hospital in within the golden hours were 54.8% was more than males who reach the hospital at the same time which was 54.2% .

but the relation between male who reach the hospital in time more than 4 hours was 45.8% was more than females who reach the hospital at the same time which was 45.3% so there was no differences according to the sex and reaching the hospital in the golden hours with (p value=0.949).

According to the residency

The result shows the relation between patients address and reaching the hospital so patients who lives in urban areas who reach the hospital at time within golden hours were 59.8% which was more than the percentage of patients who lives in rural areas at the same time which was 48.3%.

And the relation between the patients who reach the hospital in time more than 4 hours who lives in rural areas were 51.7% which was more than the percentage of patients who lives in urban areas at the same time which was 40.2% so there was no differences according to the residency and reaching the hospital in the golden hours with (p value=0.131).

According to the income

The result show the relation between the patients income and reaching the hospital within the golden hours patients who have income more than 500 thousands who reach the hospital at time less than 3 hours were 62.5% which was more than patients who have income between 300-500 thousand who reach the the hospital at the same time which were 59.2% coming after that the patients who have income less than 100 thousands who reach the hospital at the same time which were 54.3% coming latest the patients who have income between 100-300 thousands who reach the hospital at the same time which were 50.0%

But relation between the patients who reach the hospital at time more than 4 hours who have income between 100-300 thousands was 50.0% which was more than patients who have income less than 100 thousands who reach the hospital at the same time which was 45.7% coming after that the patients who have income between 300-500 thousands who reach the hospital at the same time which was 40.6% coming latest the patients who have income more than 500 thousands who reach the hospital at the same time which was 37.5% so there was no differences according to the income and reaching the hospital in the golden hours with (p value=0.934).

According to the occupation

The result shows the relation between their occupation and reaching the hospital the percentage patient who are employee who reach the hospital in time within the golden hours were 84.9% which was more than other patients who reach the hospital at the same time who are unemployed with percentage of 58.0% coming after the housewife with percentage of 50.7% after that the patients who are workers with percentage of 50.1% latest patients who are self free worker with percentage of43.3%.

But relation between the patients who reach the hospital at time more than 4 hours who are self-free worker were 56.8% which was more than other patients who reach the hospital at the same time who are worker with percentage of 50.0% coming after patients who are housewife with percentage of 49.4% after that the patients who are unemployed with percentage of 42.0% latest patients who are employee with percentage of 15.2%. there was a significant difference in those who reached within the golden hours among the different occupation with (p value =0.019).

Table 9. Risk factors

var.	How long did the patient need since the first symptom to reach the hospital						Chi-square	P-value
	<= 3		3 – 4		4+			
	No.	%	No.	%	No.	%		
Previous stroke							1.906	0.386
Yes	25	43.1%	2	3.4%	31	53.4%		
No	102	53.1%	7	3.6%	83	43.2%		
Total	127	50.8%	9	3.6%	114	45.6%		
HTN							1.031	0.597
Yes	74	53.6%	5	3.6%	59	42.8%		
No	53	47.3%	4	3.6%	55	49.1%		
Total	127	50.8%	9	3.6%	114	45.6%		
DM							0.111	0.946
Yes	42	49.4%	3	3.5%	40	47.1%		
No	85	51.5%	6	3.6%	74	44.8%		
Total	127	50.8%	9	3.6%	114	45.6%		
MI							2.473	0.290
Yes	9	36.0%	1	4.0%	15	60.0%		
No	118	52.4%	8	3.6%	99	44.0%		
Total	127	50.8%	9	3.6%	114	45.6%		
Congestive heart failure							1.189	0.552
Yes	2	33.3%	0	0.0%	4	66.7%		
No	125	51.2%	9	3.7%	110	45.1%		
Total	127	50.8%	9	3.6%	114	45.6%		
Atrial fibrillation							2 .013	0.365
Yes	2	28.6%	0	0.0%	5	71.4%		
No	125	51.4%	9	3.7%	109	44.9%		
Total	127	50.8%	9	3.6%	114	45.6%		
Obesity							2.300	0.317
Yes	12	66.7%	0	0.0%	6	33.3%		
No	115	49.6%	9	3.9%	108	46.6%		
Total	127	50.8%	9	3.6%	114	45.6%		
Family past history							2.626	0.269
Yes	29	54.7%	0	0.0%	24	45.3%		
No	98	49.7%	9	4.6%	90	45.7%		
Total	127	50.8%	9	3.6%	114	45.6%		

Table (9) show the relation between the present of stroke risk factors and their arrival to the hospital to reach the treatment:

1. According to the present of previous stroke those whom arrived early within 4hr was presented 46.5%, while whom arrived after 4hr about 53.4%, and

2. According to the present of *HTN* most of them by percentage 57.2% arrived at 4hr while the others arrived within 4hr and more represented by 42.8%.
3. According to present of *DM* patients who arrived within 4hr are about 52.9% while whom become late after 4hr represented by 47.1%.
4. According to the present of *MI* about 40.0%, are arrived in the first 4hr, while 60.0% arrived after 4hr.
5. According to the present of Congestive heart failure the patients who arrived within 4hr are represented by 33.3% while who arrived after 4hr represented by 66.7%.
6. According to the present of *AF* the patients who arrived within 4hr are represented by 28.6% while who came after 4hr 71.4%.
7. According to the present of obesity the patients who arrived within 4hr 66.7%, while the others arrived after 4hr represented by 33.3%.
8. According to the present of family past history, the patients who arrived within 4hr represented by 54.7% and who arrived after 4hr represented by 45.3%.

The table showed that the patients whom have history of *HTN, DM, OBESITY ,past family history,* ,they have higher percentage of arrived early within 4hr, while the others arrived late than them.

Table 10. shows symptoms presented by the patient BY time arrive

var.	How long did the patient need since the first symptom to reach the hospital						Chi-square	P-value
	<= 3		3 - 4		4+			
	No.	%	No.	%	No.	%		
Sensory affection							0.56	0.756
Yes	30	47.6%	3	4.8%	30	47.6%		
No	97	51.9%	6	3.2%	84	44.9%		
Total	127	50.8%	9	3.6%	114	45.6%		
(pain, temperature, fine touch)							4.604	0.100
Yes	13	46.4%	3	10.7%	12	42.9%		
No	114	51.4%	6	2.7%	102	45.9%		
Total	127	50.8%	9	3.6%	114	45.6%		
Motor affection							4.234	0.120
Yes	89	49.7%	4	2.2%	86	48.0%		
No	38	53.5%	5	7.0%	28	39.4%		
Total	127	50.8%	9	3.6%	114	45.6%		
Headache							2.827	0.243
Yes	70	52.2%	7	5.2%	57	42.5%		
No	57	49.1%	2	1.7%	57	49.1%		
Total	127	50.8%	9	3.6%	114	45.6%		
Vision loss							2.366	0.306
Yes	22	42.3%	3	5.8%	27	51.9%		

var.	How long did the patient need since the first symptom to reach the hospital						Chi-square	P-value
	<= 3		3 - 4		4+			
	No.	%	No.	%	No.	%		
No	105	53.0%	6	3.0%	87	43.9%		
Total	127	50.8%	9	3.6%	114	45.6%		
Convulsion, coma, personality changes							3.029	0.220
Yes	36	48.6%	5	6.8%	33	44.6%		
No	91	51.7%	4	2.3%	81	46.0%		
Total	127	50.8%	9	3.6%	114	45.6%		
Loss of cortical sensation							0.359	0.836
Yes	9	52.9%	1	5.9%	7	41.2%		
No	118	50.6%	8	3.4%	107	45.9%		
Total	127	50.8%	9	3.6%	114	45.6%		
Urinary incontinence							1.765	0.414
Yes	18	42.9%	1	2.4%	23	54.8%		
No	109	52.4%	8	3.8%	91	43.8%		
Total	127	50.8%	9	3.6%	114	45.6%		
Ataxia, vertigo, mild amnesias							5.872	0.053
Yes	78	57.4%	3	2.2%	55	40.4%		
No	49	43.0%	6	5.3%	59	51.8%		
Total	127	50.8%	9	3.6%	114	45.6%		
Photophobia, neck stiffness							0.681	0.711
Yes	5	45.5%	0	0.0%	6	54.5%		
No	122	51.0%	9	3.8%	108	45.2%		
Total	127	50.8%	9	3.6%	114	45.6%		

Table (10) showed the relation between the first symptom that noted by the acute stroke patient and time to reach the hospital, the results showed that:

1. According to the Sensory affection the results showed that 52.4% of stroke's patient's came at less than 4hr, while 55.1% are not came at the first 4hr ,in other hands the patients whom came after 4hr was 47.6% ,while whom didn't come at the same time presented by 44.9%.
2. According to the pain, temperature and fine touch, the results showed that the patients whom came at the first 4hr was about 57.1% while the patients that didn't come at the same time presented by 54.1 %, in the other hands patients whom came after 4hr presented by 42,9% and who not 45.6%.
3. According to the motor affection the patients whom arrived at 4hr are 51.9% while who not are about 60.5%, in the other hand the patients whom came after 4hr are 48.0% while not come at the same time presented by 39.4%.
4. According to the Headache symptoms most of them coming at the first 4hr by 57.4% while who not come are 50.8% and who came after 4hr are 42.5% and who not are 49.1%.
5. According to the vision loss who came early within 4hr are 48.1% and the others are coming late after 4hr represented 51.9%.

6. According to the Convulsion, coma and personality changes symptoms, the patients who arrived within 4hr are about 55.4% while the patients whom came after 4hr are represented by 44.6%.
7. According to the loss of cortical sensation symptom the patients that came with 4hr about 58.8% ,while whom came after 4hr are 41.2%.
8. According to the Urinary incontinence symptom the patients whom came with the first 4hr are 45.3% ,while whom after 4hr represented by 54.8%.
9. According to the Ataxia, vertigo and mild amnesias symptom the patients who arrived within 4hr are about 59.6% while who came after 4hr presented by 40.4%
10. According to the photo phobia symptom whom arrived with in 4hr are about 45.5% ,and those whom came after 4hr represented by 54.5%.

The table showed that there is no significant difference between the type of symptoms that appear within acute stroke's patient's and times that arrived, but there is high percentage more than half of patients that came within the first 4hr was have (Ataxia and vertigo 59.6% ,loss of cortical sensation 58.8% Headache by 57.4%, fine touch 57.1%, Convulsion and coma 55.4%, Sensory affection by 52.4% motor affection by 51.9%)

CHAPTER FIVE

Discussion

Discussion

The chapter discuss in details the major findings and the implications of them. The result put in the context of the previous and recent research in form of comparing our findings with other researchers findings (where applicable) and comparing our findings based on the background variables. The main topics are: characteristic of sample under study, time from the appearance of first symptom until the time of medical intervention, factors which delay patient, knowledge of patient and relative about symptoms, risk factors of CVA within patient.

❖ Characteristics of sample under study:

- The current study shows that more of the patient were above of 60 years. This result was in agreement with other studies were conducted in **Saudi Arabia, Somalia, India, Korea, America.**
- The current study show that males were more than females, among almost of the cases (250) males represent more than two third of the case 155(62.0%) while females represent almost third of the cases 95 (38.0%). This result was in agreement with other studies were conducted in **Saudi Arabia, Thailand, Somalia, Egypt, Turkey, Korea.** In other side, the current study is not in agreement with other study was conducted in **America** result which showed that females are more slightly than males.
- The current study shows that urban residents 132(52.8%) were slightly more than rural resident 118(47.2%). This result was in agreement with other studies were conducted in **Saudi Arabia, Somalia, Egypt, America.**
- The current study shows that almost of the patients are from low income families (64.8%). This result was in agreement with other studies were conducted in **Saudi Arabia, Somalia, Turkey.**
- The current study, showed that housewives are considered a high-risk group according to the result of our researches with a (77) cases out of the total (250) cases are housewife's. And this result showed a high significant with a (P.value <0.019) This result was in agreement with other studies were conducted in **Iran**.
- The current study, showed that patients who are unemployed considered group affected according to the result of our researches with a (50) cases out of the total (250) cases are unemployed. This result was in agreement with other studies were conducted in **India, Saudi Arabia.**
- The current study, shows that almost of the patients happened to them ischemic stroke according to the result of our researches with a (199) cases out of the total (250) cases are ischemic, while patients with hemorrhagic stroke according to the result of our researches with a (50) cases out of the total (250) cases are hemorrhagic.

This result was in agreement with other studies were conducted in **Saudi Arabia, Thailand, Denmark, India, Somalia.**

- The current study, shows that the most common symptom is **motor affection** according to the result of our researches with a (179) cases out of the total (250) cases happened motor affection. This result was in agreement with other studies were conducted in **Saudi Arabia, India, Somalia, Turkey, Iran.**
- The current study, shows that majority of patients arrived by private car according to the result of our researches with a (170) cases out of the total (250) cases arrived with private car, mode of transportation could not be determined as a risk factor on the duration of the arrival. This result was in agreement with other studies were conducted in **Saudi Arabia.** In other side, the current study is not in agreement with other study was conducted in **Thailand, Turkey** that use of ambulance associated with early hospital arrival.

❖ **Time from the appearance of first symptom until the time of medical intervention:**

- The current study, shows that almost of the patients arrived within golden hour (3-4 hours) according to the result of our researches with a (129) cases out of the total (250) cases arrived within golden hour. This result was in agreement with other studies were conducted in **Saudi Makkah, Turkey**.
  While, patients who arrived after golden hour (3-4 hours) according to the result of our researches with a (121) cases out of the total (250) cases arrived after golden hour. This result was in agreement with other studies were conducted in **Saudi Arabia, Demark, India, Korea, Somalia.**
- The current study, showed that 46 (18.4%) of patients got medical intervention in less than 3 hours, while 30 (12.0%) of patients in between 3-4 hours and 174 (69,9%) of patients after 4 hours. This result was in agreement with other studies were conducted in **Saudi Arabia.**

❖ **Factors which delay patient:**

- The current study shows that about 121(48.4%) of patients arrive delay to hospital, almost of cases because of illiteracy, lack of transportation, distance from the hospital, lack of awareness about the importance of early arrival to the hospital for treatment of stroke, being alone during the onset of stroke, seeking alternative medicine to alleviate symptoms, rural residence, absence of thrombolysis in nearly hospitals, referral from local hospitals. And this result showed a high significant with a (P.value <0.001). This result was in agreement with other studies were conducted in **Saudi Arabia, Egypt.**

❖ **Knowledge of patient and relative about symptoms:**

- The current study shows that about 197(78.8%) of patients and relatives have no knowledge and awareness about symptoms of stroke so that patients is more likely to arrive late, may happen complications and symptoms become more serious. This result was in agreement with other studies were conducted in **Egypt, Saudi Makkah, Somalia.** In other side, the current study is not in agreement with other study was conducted in **Denmark** result which showed that knowledge of symptoms of stroke is good.

❖ **Risk factors of CVA within patient:**

- In the current study, patients having HTN are considered a high-risk group according to the result of our researches with a (140) cases out of the total (250) cases are having HTN. This result was in agreement with other studies were conducted in **Somalia, Turkey, Korea, Denmark.**
- In the current study, patients having Previous stroke are considered a high-risk group according to the result of our researches with a (58) cases out of the total (250) cases are having Previous stroke. This result was in agreement with other studies were conducted in **Turkey, Denmark.**
- In the current study, patients having DM are considered a high-risk group according to the result of our researches with a (85) cases out of the total (250) cases are having DM. This result was in agreement with other studies were conducted in **Turkey, India Denmark.**
- In the current study, patients having MI are considered a high-risk group according to the result of our researches with a (18) cases out of the total (250) cases are having MI. This result was in agreement with other studies were conducted in **Denmark.**
- In the current study, the result showed that there is a significant risk for the congestive heart failure with stroke. This result was in agreement with other studies were conducted in **Denmark, Turkey.**
- In the current study, the result showed that there is a significant risk for the atrial fibrillation with stroke. This result was in agreement with other studies were conducted in **Turkey, Denmark.**
- In the current study, patients having Hyperlipidemia are considered a high-risk group according to the result of our researches with a (15) cases out of the total (250) cases are having hyperlipidemia. This result was in agreement with other studies were conducted in **Turkey, India Denmark.**
- In the current study, smoker patients are considered a high-risk group according to the result of our researches with a (98) cases out of the total (250) cases are smokers. This result was in agreement with other studies were conducted in **Turkey, India.**
- In the current study, patients having positive family history are considered a high-risk group according to the result of our researches with a (53) cases out of the total (250)

cases are having positive family history. This result agreed with other studies were conducted in **Turkey, India.**

- In the current study, patients above 40 years are considered a high-risk group according to the result of our researches with a (214) cases out of the total (250) cases are above 40 years. This result was in agreement with other studies were conducted in **Saudi Arabia, Somalia, India, Korea.**
- In the current study, the result shows that males were more than females and this considered a high-risk group according to the result of our researches with a (155) cases out of the total (250) cases were males. This result was in agreement with other studies were conducted in **Saudi Arabia, Thailand, Somalia, Egypt, Turkey, Korea.**

CHAPTER SIX

Conclusion and Recommendations

Conclusion

- Stroke is one of the most serious and fatal conditions that need an urgent diagnosis and medical intervention to avoid its consequences.
- Mostly of the patients arrived at the golden hour but only,15% of the patients got the diagnosis at the golden hour.
- There is strong relationship between stroke and some chronic diseases such as (**HTN, DM, Hyperlipidemia).**
- There is strong relationship between stroke and positive family history.
- There is strong relationship between stroke and smoking.
- There is no relation between stroke and the history of some habits such as (**Chewing Qat and using Shama).**
- The knowledge about symptoms of stroke were poor.
- In addition, there is strong relationship between the history of previous stroke and occurring new stroke.
- There is relation between knowledge and early arrival to hospital and getting medical intervention.
- The mode of transport could not be determined as a risk factor on the duration of the arrival.
- There is a significant lack of awareness about the importance of early arrival to the hospital for treatment of stroke.
- Males have a more tendency toward the occurrence of stroke.
- Motor affection is the most common symptom.

Recommendations

- The importance of developing health education program about the disease and the importance of sending the patients to the health facilities as early as possible.
- Providing the health care services for stroke cases at the district hospitals to avoid any delay in the treatment intervention
- Enhance and Support the medical examination free at the public health facilities
- Educate patients and their families about the disease, its complications, and the importance of treatment in the early hours
- Providing integrated health centers with free examinations and medicines in rural areas to speed up treatment in the first hours
- Facilitate rapid transportation methods to facilitate treatment in the event that the necessary examinations and medicines are not available in health centers
- Conducting more research on the most common causes of stroke and how to avoid it and reduce the risk factors.

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Appendices

Stroke questionnaire

1. **Name:**
2. **Age:**
3. **Sex:**

☐ male ☐ female

4. **Marital status:**

☐ single ☐ married ☐ widower ☐ divorced

5. **Bad habits:**

☐ chewing Qat ☐ smoking ☐ Shama ☐ lack of movement

6. **Address:**
7. **Occupation:**

- Do you get stressed at work?
- What kind of stress are you exposed to?

8. **Income level:**

☐ < 100 ☐ 100-300 ☐ 300-500 ☐ >500

- Do you have insurance?

☐ Yes ☐ No

9. **Causes of stroke?**

- Non-modifiable:
  - Age >40
  - Gender(M>F)
  - Heredity
  - Previous vascular event such as MI, stroke or peripheral embolism

- Modifiable:
  - Hypertension
  - Cigarette smoking
  - Diabetes mellitus
  - Hyperlipidemia
  - Heart failure
  - Atrial fibrillation
  - Myocardial infarction
  - High alcohol intake
  - Positive family history
  - Oral contraceptive
  - Polycythemia

10. What are the symptoms presented by the patient?

- Sensory affection: tingling, numbness, loss of superficial sensations
- (pain, temperature, fine touch) loss of deep sensation (proprioception, vibrations, joint position, tension pressure)
- Motor affection: weakness, loss of voluntary movement
- Headache
- Vision loss: partial or complete
- Convulsion, coma, personality changes
- Loss of cortical sensation
- Urinary incontinence
- Ataxia, vertigo, mild amnesias
- Photophobia, neck stiffness

11. What is the first symptom the patient has experienced?

12. What was the first action the patient took after getting the first symptoms?

13. Did you ambulate yourself?

	Yes	No
○ Who ambulated you?	☐	☐

14. Mode of transportation:

☐ ambulance ☐ private car ☐ public transport ☐ others

15. Admission unit:

emergency room ☐ operation room ☐ intensive care unit ☐ others ☐

16. Diagnostic method:

☐ MRI ☐ CT scan ☐ blood pressure ☐ routine investigation
☐ others

17. Availability and ease of getting hospital services?

☐ good ☐ bad ☐ excellent ☐ acceptable

18. Were emergency medications freely available in the hospital upon the patient arrival?

☐ Yes ☐ No

19. How long did the patient need since the first symptom to reach the hospital?

……. hour

- Did the patient arrive at the golden hours (3-4 hours)?

☐ Yes ☐ No

- In case of No what were the causes?

20. How long was the time to get diagnosed after arrival?

……. hour

21. How long was the time to get started of treatment after the diagnosis?

……. hour

22. From whom have you got the information's?

☐ patient ☐ attendant ☐ doctor

23. Question to the attendant (are you aware of symptoms of stroke)?

☐ Yes ☐ No

- **What are they:**
- Sensory affection: tingling, numbness, loss of superficial sensations
- (pain, temperature, fine touch) loss of deep sensation (proprioception, vibrations, joint position, tension pressure)
- Motor affection: weakness, loss of voluntary movement
- Headache
- Vision loss: partial or complete
- Convulsion, coma, personality changes
- Loss of cortical sensation
- Urinary incontinence
- Ataxia, vertigo, mild amnesias
- Photophobia, neck stiffness

24. Type of stoke:

- Ischemic stroke ☐
- Hemorrhagic stroke ☐
- Others ☐

25. Past history:

Number	Question	Options
25-1	**Previous stroke**	yes no
25-2	Are you using medication	yes no
25-3	Medication regularity	regular irregular
26-1	**HTN**	yes no
26-2	Are you using medication	yes no
26-3	Medication regularity	regular irregular
27-1	**DM**	yes no
27-2	Are you using medication	yes no
27-3	Medication regularity	regular irregular
28-1	**MI**	yes no
28-2	Are you using medication	yes no
28-3	Medication regularity	regular irregular
29-1	**Congestive heart failure**	yes no
29-2	Are you using medication	yes no
29-3	Medication regularity	regular irregular
30-1	**Atrial fibrillation**	yes no
30-2	Are you using medication	yes no
30-3	Medication regularity	regular irregular
31-1	**Obesity**	yes no
31-2	Are you using medication	yes no
31-3	Medication regularity	regular irregular

32. Family past history:

☐ Yes ☐ No

ملخص البحث باللغة العربية:

المقدمة:

السكتة الدماغية هي حالة طوارئ عصبية شائعة تنطوي على اعتلال ووفيات كبيرة. ويتزايد حاليا معدل الإصابة بالسكتة الدماغية بين سكان البلدان المنخفضة والمتوسطة الدخل. السكتة الدماغية هي عبئ صحي كبير لأنها سبب رئيسي للإعاقة الجسدية لدى البالغين وثاني أكثر أسباب الوفيات شيوعا بعد أمراض القلب. وفقا لأحدث بيانات منظمة الصحة العالمية المنشورة في عام 2020، وصل الموت بالسكتة الدماغية في اليمن إلى 13570 او 8.72% من إجمالي الوفيات. معدل الوفيات المعدل حسب العمر هو 127.49 لكل 100.000 من السكان في اليمن رقم 32 في العالم.

قد يكون للتأخير في الحصول على التدخل الطبي عواقب وخيمة للغاية ويمكن ان يكون ذلك بسبب العديد من العوامل مثل الوعي بعلامات وأعراض السكتة الدماغية، وإدراك أهمية العرض المبكر للعلاج ، والمعتقدات الدينية والثقافية ، والمستوى التعليمي، وإمكانية الوصول الجغرافي والعوامل التقنية مثل توفر مرافق التشخيص والعلاجات.

الأهداف:

قيمت دراستنا الأسباب المتعلقة لتأخير وصول المريض إلى المستشفى ، والتحديات والحواجز التي تحول دون التشخيص المبكر والعلاج ، ومستوى توعية المرضى أو أقاربهم بالسكتة الدماغية.

منهجية الدراسة:

دراسة مقطعية أجريت في عدة قطاعات في العديد من المستشفيات المختارة عشوائياً في مدينة صنعاء ، من إبريل الى مايو 2023 ،وشمل 250 مريضاً.

تم تصميم استبيان لجمع البيانات حول المتغيرات الاجتماعية الديموغرافية وعوامل الخطر المعدلة والمتغيرات الأخرى بين المشاركين.

النتائج:

أظهرت الدراسة أن (129)51,6% من مجموع (250) حالة ، وصلت في الساعات الذهبية ، بينما البقية (121) 48,4%حاله ; وصل المرضى بعد الساعات الذهبية بسبب العديد من العوامل مثل عدم المعرفة ،نقص وسائل النقل ، بعد المسافة من المستشفى ،نقص الوعي بأهمية الوصول المبكر الى المستشفى لعلاج السكتة الدماغية ، البحث عن الطب البديل للتخفيف من الاعراض و الاقامة الريفية ، عدم وجود علاج انحلال الخثرة في المستشفيات القريبة والإحالة من المستشفيات المحلية.

الاستنتاج:

في الختام يقدم هذا البحث رؤى قيمة حول أسباب وعوامل الخطر لمرضى السكتة الدماغية اليمنيين.

يقدم توصيات للمرضى واقاربهم ، مقدمي الرعاية الصحية ، لتحسين الوقاية من السكتة الدماغية وادارتها بين المرضى.

من خلال تنفيذ هذه التوصيات ، يمكننا العمل على تقليل عبئ السكتة الدماغية ومضاعفاتها على المرضى اليمنيين وتحسين نتائجهم الصحية الشاملة.