Sudan University of Science and Technology

College of Graduate Studies

Study of Cerebral Strokes using Computed Tomography in Sudanese People

دراسة السكتات الدماغيه بأستخدام التصوير المقطعي لدي السودانيين

A Thesis submitted for partial fulfillment of the requirement of M.Sc Degree in Diagnostic radiology

B y:

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Supervisor:

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2017

الاية

بسم الله الرحمن الرحيم

قَالَ تَعَالَىٰ:

﴿ هُوَ ٱلَّذِى يُصَوِّرُكُمْ فِى ٱلْأَرْحَامِ كَيْفَ يَشَآءُۚ لَآ إِلَٰهَ إِلَّا هُوَ ٱلْعَزِيزُ ٱلْحَكِيمُ ٦ ﴾

صدق الله العظيم

(آل عمران:6)

Dedication

With my love appreciation I dedicate this

Research to:

My father MR: Mohamed Musa

My mother MRS: Fadiah Fadol Allah

My husband MR: Anwar alsadat Babkir

My sisters and my brothers

My all friends, family and to all people those I love and respect.

Acknowledgement

Grateful thanks and grace to Allah for guiding and helping me finishing this research.

I would like also to express sincere thanks and gratitude to my supervisor Dr. Hussain Ahmed Hassan for her keen supervision, guidance, valuable comments and support the idea of this research until finishing.

Finally, thanks for all those who helped me in the preparation and improvement for this thesis specially my husband. Anwar Babkir Ali and my friendes: Almonzir Ahmed Mohamed and Mohamed Alfatih Arif .

Abstract

The stroke is a medical emergency in which the blood supply to any portion of the brain is interrupted or reduced, alternative names: Cerebrovascular accident/ disease (CVA), cerebral infarction, cerebral haemorrhage.

This study is a descriptive study and had been conducted at police hospital in a period from October 2016 to January 2017 with sample which was consisted from 50 patient CT brain images for patient having cerebral stroke.

The aim of this Research to study of cerebral stroke using CT scanning Sudanese people, identify appearance, site, size, determine signal intensity of ischemic stroke and identify (H S) & (I S).

The result of sample size of (50) pt was selected for detecting cerebral stroke and found that most (72%) were ischemic stroke, while (28%) of them were hemorrhagic stroke and non –significant difference between the mean hemorrhagic and ischemic stroke.

المستخلص

السكتة الدماغية هي حالة طبية طارئة حيث ينقطع وصول الدم الي أي جزء من الدماغ أو تخفيضه, أسماء بديلة: السكتة الدماغية الوعائية حادث, أحتشاء الدماغ و التزف الدماغي .

وهذه الدراسة هي دراسة وصفية وأجريت في مستشفي الشرطة في الفتره من أكتوبر2016 الي يانير 2017 من عينة تتألف من 50 مريض, ويجري التصوير المقطعي للمريض للمخ بعد السكتة الدماغية.

الهدف من هذه الدراسة البحثية من السكتة الدماغية بأستخدام التصوير المقطعي للسودانيين المبحوثين هو تحديد المظهر, و الموقع, و الحجم و تحديد أنواع السكته الدماغية.

تم أختيار النتيجه لحجم العينة من (50) عينه لتحديد السكتة الدماغية وجدت أن (72%) السكتة الدماغية الاقفارية و (28%) السكتة الدماغية النزيفية .

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List of Abbreviation

CBC	Complete Blood Count.
CS	Cerebral Stroke.
CT	Computed Tomography.
CVA	Cerebral Vascular Accident.
DPW	Diffusion Perfusion Weighted.
HS	Haemorrhagic Stroke.
ICH	Intra Cranial Haemorrhage.
ICS	Intra Cerebral Stroke.
IS	Ischemic Stroke.
IV	Inter Ventricle.
IVH	Intra Ventricle Haemorrhage.
MR	Magnetic Resonance .
MRI	Magnetic Resonance Imaging.
NIHSS	National Institutes of Health Stroke Scale.
NINDS	National Institute of Neurological Disorders and Stroke.
RT-PA	Recombinant Tissue Plasminogen Activator.
TIA	Transient is Ischemic Attack.
TIAs	Transient Ischemic Attacks.
TPA	Tissue plasminogen Activator.

Chapter One

Introduction

Chapter One
General Introduction

1.1 Introduction :

Stroke, is defined as abrupt onset of a focal neurological deficit lasting more than 24 hours. It is also called cerebrovascular accident (CVA) or apoplexy. An acute stroke refers to the first 24-hour- period of a stroke. Focal neurological deficit lasting less than 24 hours (usually 5–20 minutes) known as transient ischaemic attack (TIA) is relevant but beyond the scope of this discussion paper. (Andrew M. Demchuk et al 2005).

Stroke is classified on the basis of its aetiology as either ischaemic (80%) or haemorrhagic (20%) . **Ischaemic stroke** is produced by occlusion of a cerebral artery [thrombotic or atherosclerotic (50%), embolic (25%) and microartery occlusion, “lacunar stroke”, (25%)]. Haemorrhagic stroke is caused mainly by spontaneous rupture of blood vessels or aneurysms or secondary to trauma . (Andrew M. Demchuk et al 2005).

Neurological symptoms and signs of an ischaemic stroke usually appear suddenly, but less frequently, they occur in a progressive manner (stroke-in-progress) . Symptoms and signs vary depending on the location of the occlusion and the extent of the collateral flow. Atherosclerotic ischaemic stroke is commoner in the elderly, and occurs without warning in more than 80% of cases. A TIA a few months before the stroke is considered an important warning sign. The pathophysiology is similar to that of ischaemic heart disease; an atherosclerotic plaque in a cerebral artery ulcerates triggering the aggregation of platelets and coagulation of fibrin to produce the thrombus that occludes the artery. Fewer than 20% of cases do not evolve to ulceration, but progresses to cause gradual obstruction of flow and may manifest as TIAs. In hypertension-induced arteriosclerosis, small penetrating arteries of the deep white matter of the brain are affected producing small infarctions known as “lacunar infarcts”. In around 40% of elderly stroke patients no clear origin of the infarction can be found.· (Andrew M. Demchuk et al 2005).

There are two type of hemorrhagic stroke ; one resulting from intracerebral haemorrhage secondary to hypertension or cerebral amyloid angiopathy, degenerative arterial disease and the other secondary to subarachnoid haemorrhages caused by rupture of an aneurysm. The main risk factors are advanced age, heavy alcohol consumption and hypertension. Cocaine abuse is an important cause of cerebral haemorrhage in young people. (Andrew M. Demchuk et al 2005).

Cerebral vasospasm is an early complication and re-bleeding or hydrocephalus may be complications of SAH in 30% of cases during the first month, resulting in an extra 60% mortality.· (Andrew M. Demchuk et al 2005).

The investigations of stroke are crucial for effective management of acute stroke. Computerised tomography (CT) is widely available, fast and probably the most useful imaging method in identifying/differentiating cerebral haemorrhage from infarction. MR or CT angiography demonstrates the cerebral vasculature and may add further information such as aneurisms, segmental narrowing or complete blockage of blood vessels. Doppler ultrasonography of carotid and vertebral vessels in the neck add further information – and is particularly useful in recommending patients for endarterectomy endovascular procedures or intravascular thrombolysis treatment. Angiography performed by injecting a radio-opaque dye directly into cerebral arteries via a catheter carries a significant risk of complications according to age, the experience of the operator, etc (0.13-3% risk of complications). (Andrew M. Demchuk et al 2005).

None of these procedures is capable of accurately identifying 'ischaemic penumbra' the most important area of brain that is amenable to treatment in a patient with acute stroke . (Andrew M. Demchuk et al 2005).

1.2 Problem of the study :

Stroke is a life- threatening condition that needs urgent intervention and diagnosis, so it's important to characterize the type of the stroke to plan for treatment. Two types of stroke are common in all ages (ischemic and hemorrhagic) 83 % of them are hemorrhagic . Non-contrast CT of the brain remains the mainstay of imaging in the setting on an acute stroke .

1.3 Objective of study

1.3.1 General objective :

Study of cerebral stroke using computed tomography scans in Sudanese people .

1.3.2 Specific objectives :

1-Identify type of stroke .

2_Identify the appearance of ischemic and hemorrhagic stroke .

3_To determine signal intensity of ischemic and hemorrhagic (in correlation with patient age) .

4_Identify common sites of stroke .

5_Identify different sizes of stroke .

Chapter Two

Literature review and background studies

Chapter Two

Literature Review and background studies

2.1.3.1 Anatomy of the Brain :

The brain is the most complex part of the human body. The brain is the seat of intelligence, interpreter of the senses, initiator of body movement, and controller of behavior. The brain is the source of all the qualities that define our humanity. The brain is the crown jewel of the human body. (Gray's Anatomy 2000)

The brain is composed of three parts: cerebrum, cerebellum, and brainstem. The cerebrum is made up of the left and right cerebral hemispheres, separated by the falx cerebri. Each hemisphere has five lobes: the frontal lobe in the front, the temporal and parietal lobes on the sides, the occipital lobe in the back, and the insular lobe located between the temporal lobe and the frontal lobe. The cerebral cortex is the outer layer of the cerebrum. The surface of the cerebral cortex has folds, grooves, and clefts. The folds are called gyri, the grooves are sulci, and the clefts are called fissures. These features increase the surface area of the brain while still allowing into fitting into its bony vault. The cerebral hemispheres are connected by the corpus callosum, a band of nerve fibers that allows each side to communicate with the other. The cingulate gyrus is located superior to the corpus callosum. It helps coordinate emotions. The hippocampus and the amygdala are located in the temporal lobe and are important for memory. The cerebellum is the portion of the brain lying beneath the tentorium cerebelli in the posterior part of the cranium. It's made up of two hemispheres connected by the narrow wormlike part of the cerebellum called the vermis. The cerebellum controls balance, coordinates movement, and maintains muscle tone. The brainstem includes three parts: the midbrain is the most superior part, the pons is in the middle, and the medulla oblongata (medulla) is the most inferior portion and connects to the spinal cord. The brainstem controls your levels of alertness, arousal, respiratory rate, blood pressure, digestion, heart rate, and other autonomic functions .(Gray's Anatomy 2000)

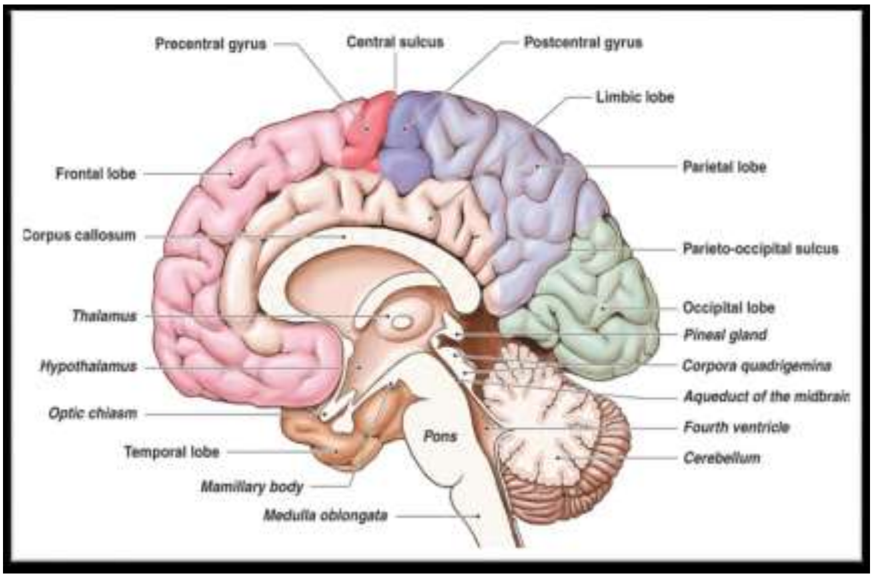

Figure 2.1: Anatomy of the brain .

2.1.3.2 Physiology of the Brain :

The cerebrum is the largest part of the brain and is composed of right and left hemispheres. It performs higher functions like interpreting touch, vision and hearing, as well as speech, reasoning, emotions, learning, and fine control of movement. The cerebellum is located under the cerebrum. Its function is to coordinate muscle movements, maintain posture, and balance. The brainstem 8 includes the midbrain, pons, and medulla. It acts as a relay center connecting the cerebrum and cerebellum to the spinal cord. It performs many automatic functions such as breathing, heart rate, body temperature, wake and sleep cycles, digestion, sneezing, coughing, vomiting, and swallowing. Ten of the twelve cranial nerves originate in the brainstem.(McGraw-Hill; New York: 2004).

2.1.3.3 Pathology of the Brain :

Neurological disorders are diseases of the central and peripheral nervous system. In other words, the brain, spinal cord, cranial nerves, peripheral nerves, nerve roots, autonomic nervous system, neuromuscular junction, and muscles. These disorders include epilepsy, Alzheimer disease and other dementias, cerebrovascular diseases including stroke, migraine and other headache disorders, multiple sclerosis, Parkinson's disease, neuroinfections, brain tumours, traumatic disorders of the nervous system such as brain trauma, and neurological disorders as a result of malnutrition.(Elsevier Mosby;St. Louis 2007).

2.1.1 Stroke:

Is defined as abrupt onset of a focal neurological deficit lasting more than 24 hours. It is also called cerebrovascular accident (CVA) or apoplexy. An acute stroke refers to the first 24-hour- period of a stroke. Focal neurological deficit lasting less than 24 hours (usually 5–20 minutes) known as transient ischaemic attack (TIA) is relevant but beyond the scope of this discussion paper.(Elsevier Mosby;St. Louis 2007)

2.1.2 Types of stroke :

Stroke is classified on the basis of its aetiology as either ischaemic (80%) or haemorrhagic (20%). **Ischaemic stroke** is produced by occlusion of a cerebral artery [thrombotic or atherosclerotic (50%), embolic (25%) and microartery occlusion, "lacunar stroke", (25%)]. **Haemorrhagic stroke** is caused mainly by spontaneous rupture of blood vessels or aneurysms or secondary to trauma. (Andrew M. Demchuk 2005).

2.1.4 Brain Stroke :

Strokes occur due to problems with the blood supply to the brain either the blood supply is blocked (Ischemic) or a blood vessel within the brain ruptures (Hemorrhagic). A stroke is a medical emergency, and treatment must be as quickly as possible. (Andrew M. Demchuk 2005).

2.1.4.1 Types of Stroke :

There are three main kinds of stroke; first type is Ischemic strokes happens when blood vessels are blocked by a clot or become too narrow for blood to get through to the brain, the reduced blood flow causes brain cells in the area to die from lack of oxygen, It accounts for more than 80% of all stroke cases, second 9 type is Hemorrhagic strokes it occurs when a weakened blood vessel ruptures, third type is Transient ischemic attacks (TIAs) also referred to as mini-strokes are caused by a temporary clot. (Schwamm et al 2005).

2.1.4.2 Sings and Symptoms of Stroke :

Strokes occur quickly, and as such their symptoms often appear suddenly without warning like sudden numbness, confusion, trouble seeing and severe headache. The acronym FAST is a way to remember the signs of stroke, and can help toward identifying the onset of stroke in someone, F for Face drooping Arm weakness Speech difficulty Time to look for help (Schwamm et al 2005).

2.1.4.3 Diagnose of Stroke :

There are several different types of diagnostic tests that can use in order to diagnose stroke including clinical examinations, lab test and imaging studies Clinical examinations: checking patient's symptoms, medical history, check blood pressure, listen to the carotid arteries in the neck and examine the blood vessels at the back of the eyes. Lab test is complete blood count (CBC) is a routine test to determine the number of red blood cells, white blood cells, and platelets in the body. Imaging modalities incudes CT, MRI, carotid ultrasound and cerebral angiogram (Schwamm et al 2005).

2.1.4.4 Treatment of Stroke :

As the two main different kinds of stroke, ischemic and hemorrhagic, are caused by different factors, both require different forms of treatment. Ischemic strokes are caused by arteries being blocked or narrowed and so treatment focuses on restoring an adequate flow of blood to the brain. Treatment can begin with drugs to break down clots and prevent further ones from forming. Aspirin can be 10given; injection of a tissue plasminogen activator (tPA) is very effective at dissolving clots (see figure 1.3) but needs to be injected within (3-4.5) hours of stroke symptoms manifesting themselves (Keith 2001).

Hemorrhagic strokes are caused by bleeding into the brain and so treatment focuses on controlling the bleeding and reducing the pressure on the brain that it is causing. Treatment can begin with drugs being given to reduce the pressure in the brain, overall blood pressure, prevent seizures and prevent sudden constrictions of blood vessels (Keith 2001).

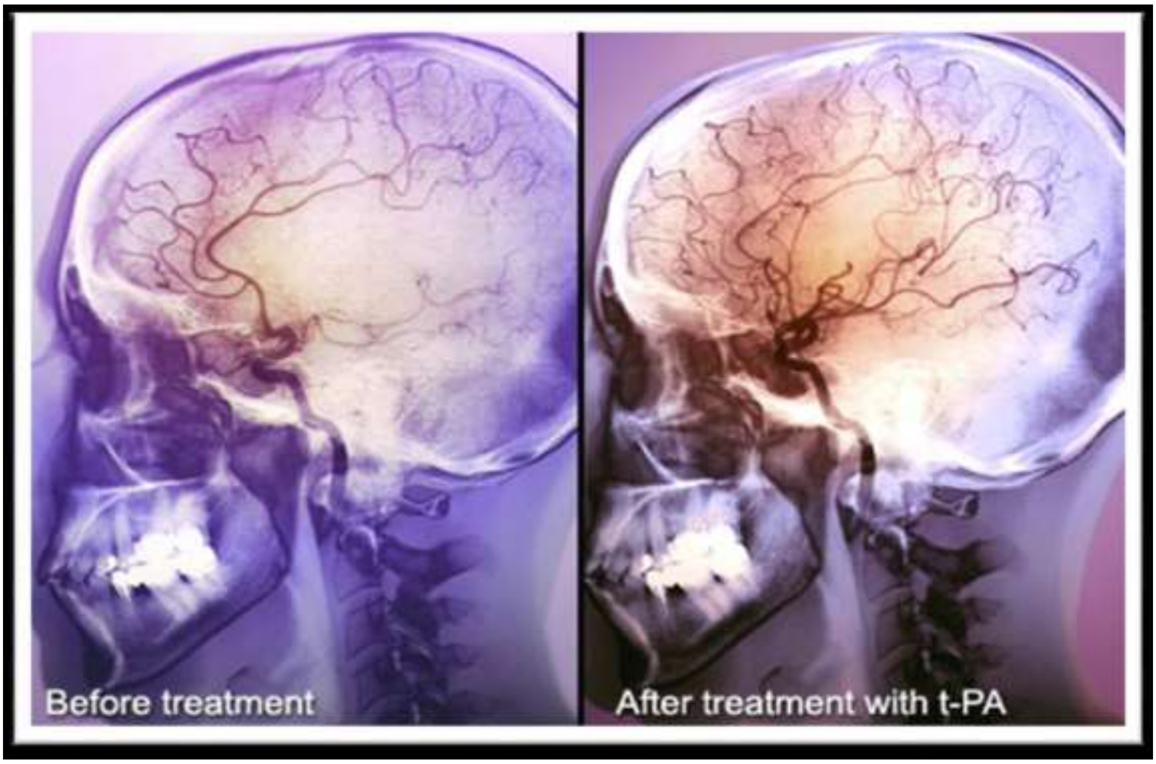

Figure 2.2: Digital subtraction angiogram of head before & after treatment of stroke with IV tPA (Saver et al 2010)

2.1.4.5 Complications of Stroke :

Stroke leave complications vary according to their strength and size, may lead to a significant hemiplegia (paralysis) in half the body and sometimes disorders in swallowing, breathing, and in the circulatory system, and may cause death in the first few hours or after several hours if not treated. (Fonarow et al 2007).

2.1.4.6 Stroke Risk Factors :

There are two types of risk factors controllable and uncontrollable, controllable factors are High blood pressure, atherosclerosis, heart disease, smoking, high cholesterol, diabetes, obesity and excessive alcohol intake. Uncontrollable factors are age, gender, race, family history, and artery abnormalities (Schwamm et al 2005).

2.1.5.1 Computerized Tomography CT :

Since its introduction in the 1970s, CT has become an important tool in medical imaging to supplement X-rays and medical ultrasonography. A CT scan makes use of computer-processed combinations of many X-ray images taken from different angles to produce cross-sectional (tomographic) images (virtual 'slices') of specific areas of a scanned object, allowing the user to see inside the object without cutting. Digital geometry processing is used to generate a three-dimensional image of the inside of the object from a large series of two-dimensional radiographic images taken around a single axis of rotation. Medical imaging is the most common application of X-ray CT. Its cross-sectional images are used for diagnostic and therapeutic purposes in various medical disciplines (Srinivasan et al 2006).

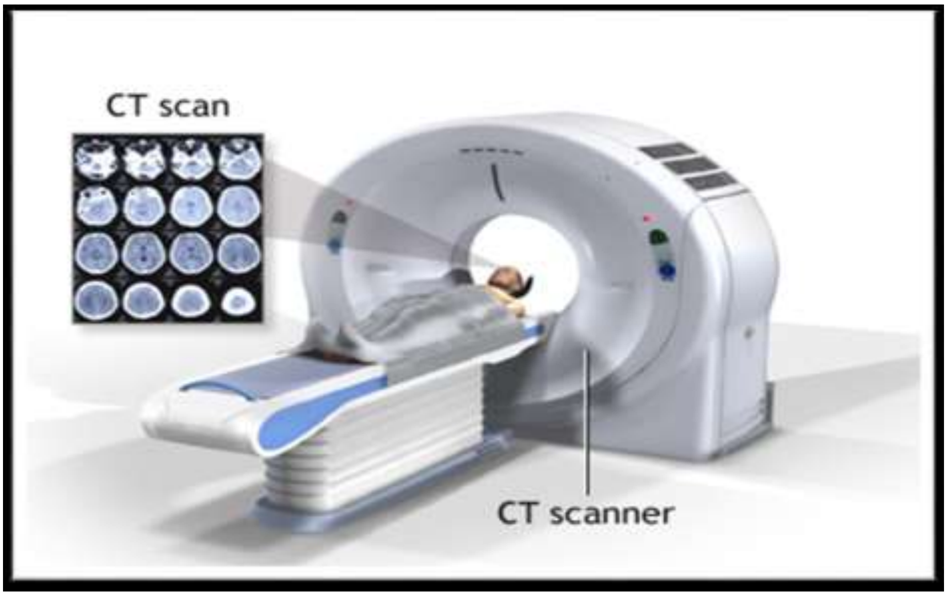

Figure 2.3: CT scanner (Srinivasan et al 2006)

2.1.5.2 CT Brain Stroke Protocol :

Non-contrast CT of the brain remains the mainstay of imaging in the setting on an acute stroke. It is fast, inexpensive and readily available. Its main limitation however is the limited sensitivity in the acute setting. Detection depends on the territory, the experience of the interpreting radiologist and of course the time of the scan from onset of symptoms. (Srinivasan et al 2006).

The goals of CT in the acute setting are to exclude intracranial hemorrhage, which would preclude thrombolysis; look for any "early" features of infarction and exclude other intracranial pathologies that may mimic a stroke, such as tumor (Srinivasan et al 2006).

CT angiography and CT perfusion also can help diagnose and evaluate blood vessel disease or related conditions, such as aneurysms or blockages, they requires more time than non-contrast CT brain (Srinivasan et al 2006) .

Previous studies :

Chalela et al (2007) studied :

The compared between MRI and CT in the assessment of suspected adult stroke . study was done in a single center by interpretation of for experts who were of clinical information of 356 patients, 217 of whom had a final clinical diagnosis of acute stroke, were assessed. MRI detected acute stroke (ischaemic or haemorrhagic), acute ischaemic stroke, and chronic haemorrhage more frequently than did CT ($p<0·0001$, for all comparisons). MRI was similar to CT for the detection of acute intracranial haemorrhage. MRI detected acute ischaemic stroke in 164 of 356 patients (46%; 95% CI 41–51%), compared with CT in 35 of 356 patients (10%; 7–14%). In the subset of patients scanned within 3 h of symptom onset, MRI detected acute ischaemic stroke in 41 of 90 patients (46%; 35–56%); CT in 6 of 90 (7%; 3–14%). Relative to the final clinical diagnosis, MRI had a sensitivity of 83% (181 of 217; 78–88%) and CT of 26% (56 of 217; 20–32%) for the diagnosis of any acute stroke.

Patel et al(2000) studied:

Determined the frequency and significance of EIC on baseline head CT scans in the National Institute of Neurological Disorders and Stroke (NINDS) rt-PA (recombinant tissue plasminogen activator) Stroke Trial

He isl study a randomized controlled trial, took place from January 1991 through October 1994 at 43 sites, during which CT images were obtained within 3 hours of symptom onset and prior to the initiation of rt-PA or placebo. For the current analysis, detailed reevaluation was undertaken after October 1994 of all baseline head CT scans with clinical data available pretreatment (blinded to treatment arm).

Patients Of 624 patients enrolled in the trial, baseline CT scans were retrieved and reviewed for 616 (99%).

Main Outcome Measures Frequency of EICs on baseline CT scans; association of EIC with other baseline variables; effect of EICs on deterioration at 24 hours (≥4 points increase from the baseline National Institutes of Health Stroke Scale [NIHSS] score); clinical outcome (measured by 4 clinical scales) at 3 months, CT lesion volume at 3 months, death at 90 days; and symptomatic intracranial hemorrhage (ICH) within 36 hours of treatment.

Results The prevalence of EIC on baseline CT in the combined rt-PA and placebo groups was 31% (n = 194). The EIC was significantly associated with baseline NIHSS score (ρ = 0.23; P<.001) and time from stroke onset to baseline CT scan (ρ = 0.11; P = .007). After adjusting for baseline variables, there was no EIC × treatment interaction detected for any clinical outcome, including deterioration at 24 hours, 4 clinical scales, lesion volume, and death at 90 days (P≥.25), implying that EIC is unlikely to affect response to rt-PA treatment. After adjusting for NIHSS score (an independent predictor of ICH), no EIC association with symptomatic ICH at 36 hours was detected in the group treated with rt-PA (P≥.22) .

Chapter Three

Materials and Methods

Chapter Three

Material and Methods

3.1 Materials

3.1.1 Patients

The study population consists of all the patients admitted in emergency department with suspected stroke and send to medical imaging department for CT brain for stroke during duration of study from October 2016 to January 2017.

3.1.2 Sample Size

The total number of patients admitted in ED and send to medical imaging department for CT brain for stroke was 50 patients as sample size during duration of study.

3.1.3 Research place :

The Study was conducted in police hospital (Sudan). It was chosen as the most appropriate place to conduct this type of study because there is an emergency department in the hospital with a capacity of more than 10 beds , the hospital contains a neusoft medical imaging 128 slices CT machine.

Study design :

Analytical study of the appearance of stroke , the difference in signal intensity and the differentiation of stroke types .

3.2 Methods :

3.2.1 Data collection:

Data were collected from electronic patient file of hospital information system (HIS) through data collection sheet (see appendix 1) which included patient number, gender , age , clinical symptoms , stroke type ,duration ,appearance , size and site .

Statistical Methods: the use of comparative analytical method using the SPSS statistical package based descriptive statistics and comparative and relationship hypothesis tests (0.05 sig. level), to demonstrate the differences in (**cerebral stroke**) with respect to (factors).

The used tests were (binary logistic regressions and t-test) to study the hypothesis which states there are significant differences in cerebral stroke with respect to age and stroke size.

Chapter Four

Results

Chapter Four

Results

Results

Table (1): Distribution of stroke type:

Stroke	Frequency	Percent
Hemorrhagic	14	28.0
Ischemic	36	72.0
Total	**50**	**100.0**

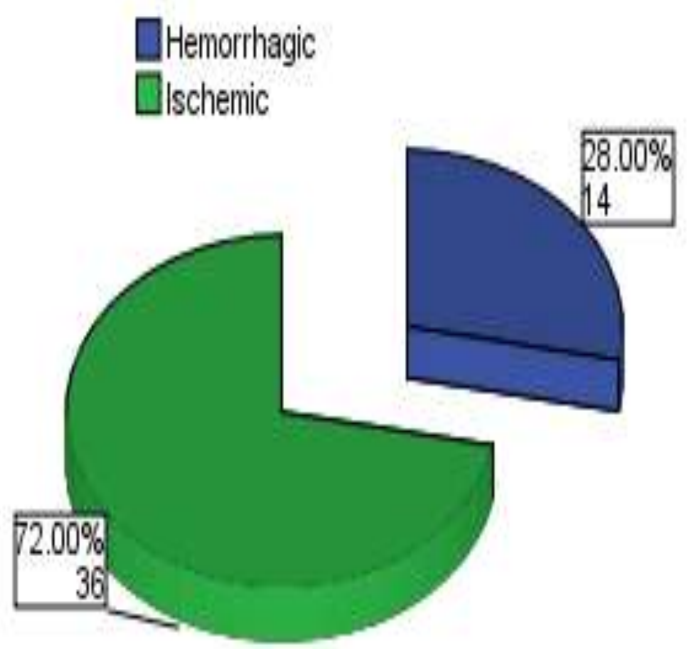

Figure (4.1): Distribution of stroke data

Table (2): Distribution of the appearance of strokes:

		Appearance					
		ISO		HYPO		HYPER	
		Count	N %	Count	N %	Count	N %
Stroke	Hemorrhagic	0	.0%	3	21.4%	11	78.6%
	Ischemic	1	2.8%	29	80.6%	6	16.7%

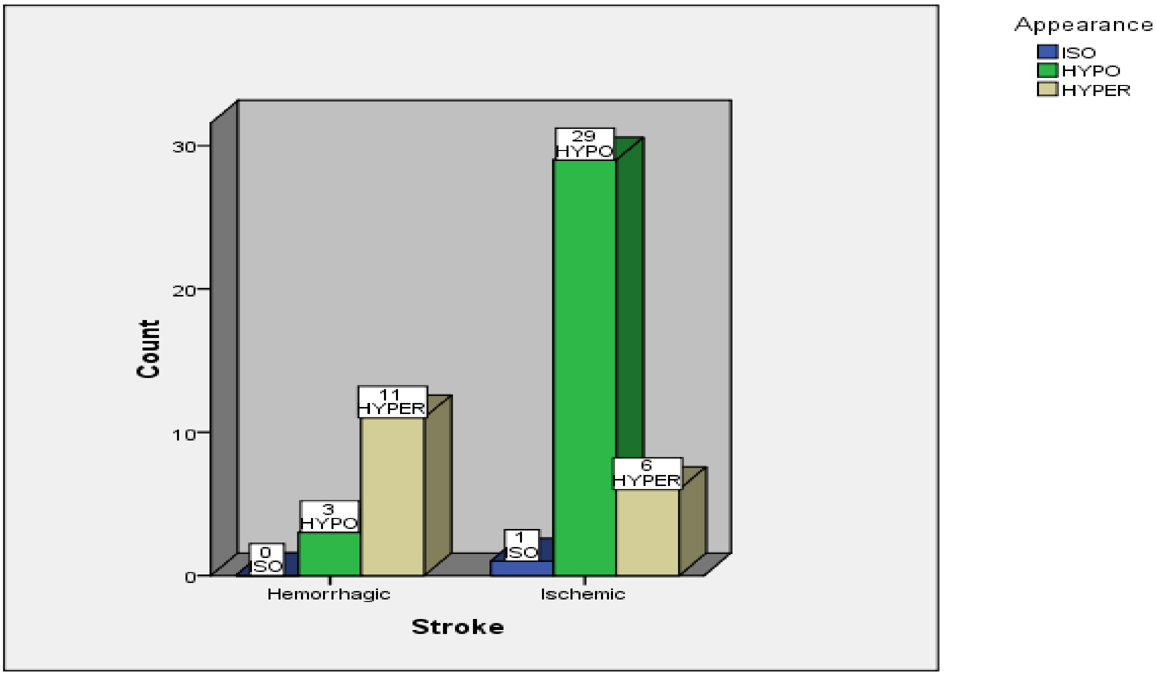

Figure (4.2): Distribution of stroke data

Table (3) Measures the effect of age to stroke:

Cox & Snell R Square	Nagelkerke R Square
.107	.155

Table (4) Logistic regression of stroke on age model coefficients test:

	B	S.E.	Wald	Df	Sig.	Exp(B)
Age	.059	.027	4.693	1	.030	1.061
Constant	-2.691	1.680	2.564	1	.109	.068

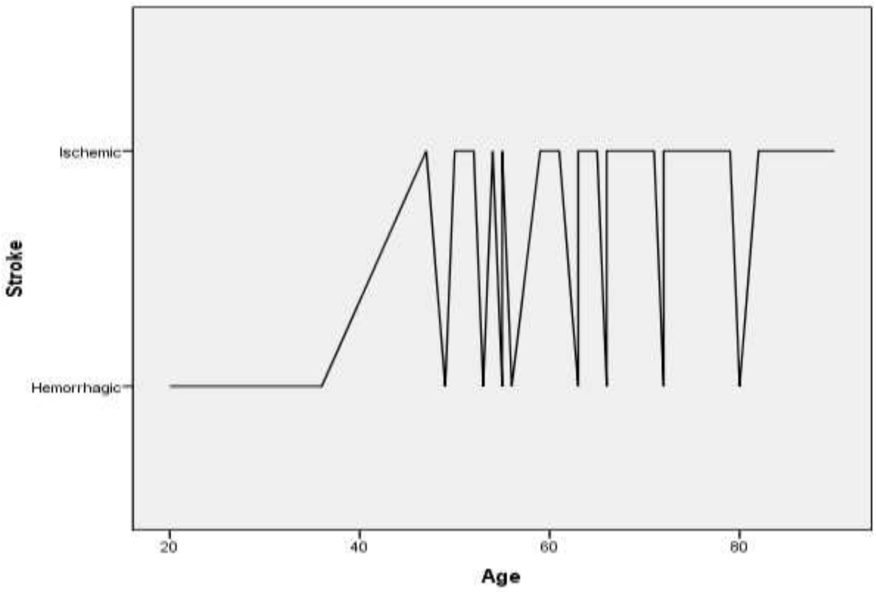

Figure (4.3): stroke shape with respect to age

Table (5): Distribution of Strokes' Site:

		Stroke			
		Hemorrhagic		Ischemic	
		Count	N %	Count	N %
Site	Basal ganging	2	14.3%	2	5.6%
	Cerebellar	0	.0%	3	8.3%
	Intra ventricle stroke	0	.0%	1	2.8%
	Infra tenteriom	0	.0%	1	2.8%
	Supra tentriom	0	.0%	3	8.3%
	Intra cerebral stroke	10	71.4%	26	72.2%
	Intra ventricle hemorrhagic	1	7.1%	0	.0%
	Cerebral	1	7.1%	0	.0%

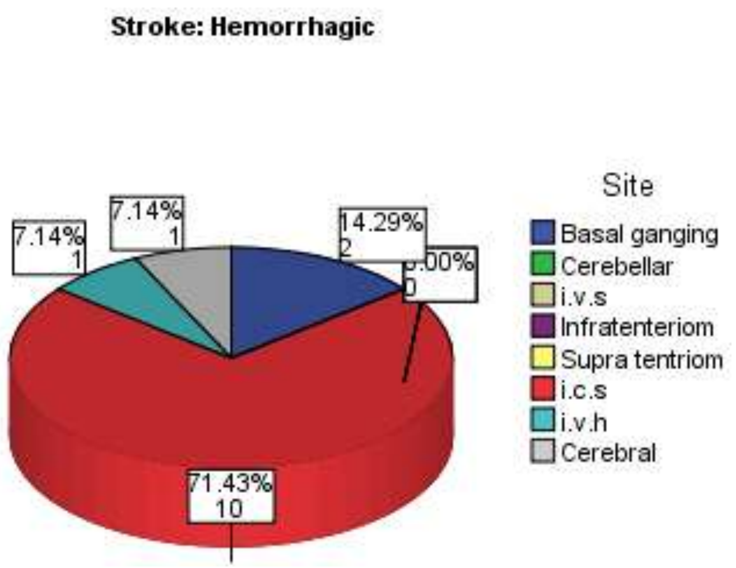

Figure (4.4): Distribution of Strokes' Site

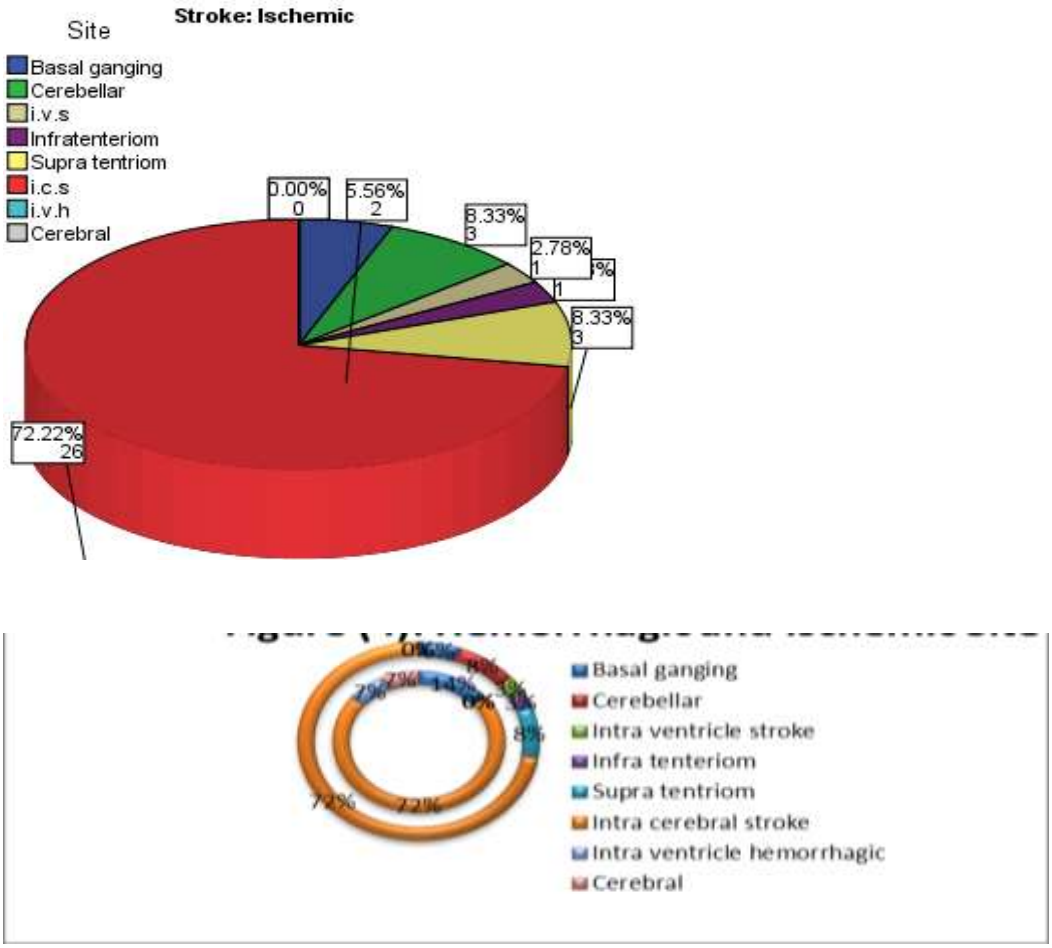

Figure (4.5): Hemorrhagic and Ischemic Site

Table (6): Distribution of strokes' size:

	Stroke	N	Mean	Standard Deviation
Size	Hemorrhagic	14	33.57	10.353
	Ischemic	36	34.64	9.015

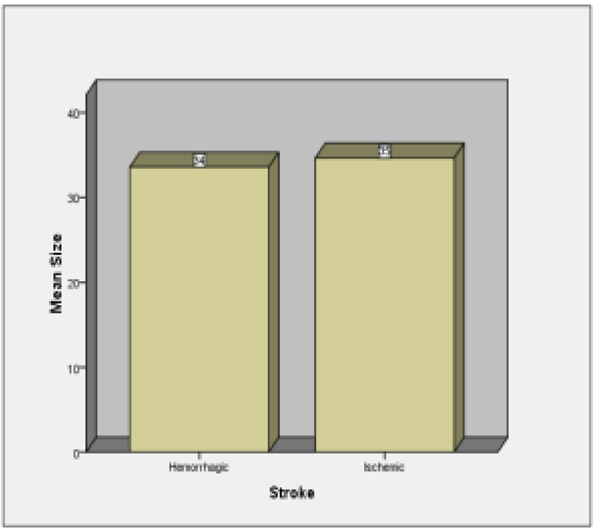

Figure (4.6): mean of strokes' size

Table (7): t-test for Equality of Means of two strokes in size:

		t-test for Equality of Means				
		T	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
Size	Equal variances assumed	-.361	48	.720	-1.067	2.959
	Equal variances not assumed	-.339	21.114	.738	-1.067	3.149

Chapter Five

Discussion, Conclusion and Recommendations

Chapter Five

Discussion, Conclusions and Recommendation

5.1 Discussion

Showed the distribution of stroke data , most (72%) of stroke were ischemic, while (28%) of them were hemorrhagic .Table (1).

Showed the distribution of the appearance of strokes, most (78.6%) of hemorrhagic stroke appeared as hyper followed by hypo (21.4%) while no ISO hemorrhagic stroke, since the most (80.6%) of ischemic stroke appeared as hypo followed by hyper (16.7%) while only (2.8%) of hemorrhagic stroke were ISO. Table (2).

Showed the measures of the effect of age to stroke , In this table consider the (Cox & Snell R Square and Nagelkerke R Square) values, which are both methods of calculating the explained variation; therefore, the explained variation in stroke based on age ranges from 10.7% to 15.5%. Table (3).

Showed the contribution of age to stroke and its statistical significance .
The Wald test ("Wald" column) is used to determine statistical significance based on "Sig." column. From these results we see that age (Sig = 0.03) added significantly to stroke. Therefore, we can predict that odds to be "Ischemic" are (1.061) time more than to "Hemorrhagic" based per one year of age. Table (4).

Showed the distribution of Strokes' Site, the most (72%) of both stroke were Intra cerebral stroke, followed by (14.3%) Basal ganging for hemorrhagic stroke, and (8.3%) Cerebellar or Supra tentriom for ischemic stroke. Table (5).

Showed the distribution of strokes' size, the mean size of hemorrhagic stroke is (33.57±10.353), since ischemic stroke is (34.64±9.015). T-test results will tell us whether the Means for the two stroks were statistically different (significantly different) in size or not.We can see that the group means are not significantly different because the values in "Sig. (2-tailed)" row (0.720 and 0.738) are more than 0.05. Looking at the Distributions of two groups table (6) above, we can conclude that there is no statistically significant difference between the mean hemorrhagic and ischemic stroke, or are of the mean size. Table (6).

Conclusions

A sample of size of (50) patient was selected for detecting cerebral stroke and found that the most (72%) of stroke were ischemic, while (28%) of them were hemorrhagic. the mean size of hemorrhagic stroke is (33.57±10.353mm), since ischemic stroke is (34.64±9.015mm). the most (78.6%) of hemorrhagic stroke in the sample appeared as hyper stroke, since the most (80.6%) of ischemic stroke appeared as hypo stroke were. 10.7% to 15.5% of variation in stroke based the age, Therefore, the odds to be "Ischemic" are (1.061) time significantly (*Sig* = 0.03) more than to "Hemorrhagic" based per.

The most (72%) of both stroke were Intra cerebral. The Mean size for both strokes were statistically the same size (**Sig.** 0.720 / 0.738), or statistically non-significant difference between the mean hemorrhagic and ischemic stroke.

Recommendation

More accurate signal intensity reading should be determined by using CT number.

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APPENDICES

Appendix (1)

Patient Data			Stroke Data			Appended			Size	Site
Gender	Age	Clinical Symptoms	Hemorrhagic	Ischemic	duration	ISO	HYPO	HYRQ		

Appendix (2)

Hemorrhagic stroke

Appendix (3)

Ischaemic stroke