A Dissertation On

"EFFECT OF SCALP ACUPUNCTURE & *LIANQUAN* (REN-23) AND *TONGLI* (HT-5) & *XUANZHONG* (GB-39) IN APOPLECTIC APHASIA – A COMPARATIVE STUDY"

"Submitted by

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LIST OF ABBREVIATIONS

ACU	Acupuncture Point	ACTH	Adreno Corticotropic Hormone
BMI	Body Mass Index	CBLT	Cognition Behavioural Language Therapy
CT	Computed Topography	CNS	Central nervous system
CV	Conceptional Vessel	CVA	Cerebral Vascular Accident
TCM	Traditional Chinese Medicine	EA	Electro Acupuncture
EAS	Electro Acupuncture Stimulation	EBM	Evidence Based Medicine
FIM	Functional Independence Measure	fMRI	Functional Magnetic Resonance Imaging
GABA	Gamma Amino Butyric Acid	GB	Gall Bladder
GV	Governing Vessel	HT	Heart
LMN	Lower Motor Neuron	LHA	Left Hemiplegic Aphasia
MAST	Mississippi Aphasia Screening Test	MRI	Magnetic Resonance Imaging
PSA	Post Stroke Aphasia	RCT	Randomized controlled trial
REN	Ren Mai	SD	Standard Deviation
SPSS	Statistical Package for the Social Sciences	UMN	Upper Motor Neuron
SA	Scalp Acupuncture	WHO	World Health Organization

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ABSTRACT

Background:

Aphasia after stroke is the acquired language disorder in which language modalities are affected. It usually results from lesions in the language relevant areas of the frontal, Temporal & parietal lobe of brain and neural pathway between them. A stroke in the brain is the most common cause of aphasia. Acupuncture, originating in China more than 3,000 years ago, is one of the most popular sensory stimulation therapies. Scalp acupuncture is the contemporary acupuncture technique has similar effect as body acupuncture. Both scalp acupuncture and Body Acupuncture Produced significant result in improvement of aphasia. But combining both techniques expected to produce more results. This study is aimed at comparing the effect of specific acupuncture point *Lianquan* (REN- 23) & scalp acupuncture and *Tongli* (HT-5) & *Xuanzhong* (GB-39) on speech improvement in apoplectic aphasia

Materials and methods:

A comparative study performed among 80 patients with post stroke aphasia with age ranging between 30-55 years from IP and OP dept. of Govt. yoga and naturopathy medical college, Arumbakkam. They were randomly assigned into two groups. Experimental group (n=40) and control group (n=40) after satisfying the inclusion and exclusion criteria. Experimental group was given acupuncture needling in Scalp acupuncture 3rd speech area and REN-23 *(Lianquan*). Control group received acupuncture on HT-5 *(Tongli*) and GB-39 *(Xuanzhong*). Both groups were assessed at baseline and end line by MAST scale

Results:

The results showed a significant increase in MAST scale score in both the groups. However, there is no significant difference between the groups.

Conclusion:

Results suggest that both scalp acupuncture & acupuncture at *Lianquan* (REN-23) and *Tongli* (HT-5) & *Xuanzhong* (GB-39) are effective in improving apoplectic aphasia

1. INTRODUCTION:

Aphasia is an acquired language disorder in which loss or impairment of language due to brain damage especially the areas responsible for ability to comprehend and produce speech. It is due to injury or lesion in the dominant cortical centres of speech and language and its relevant neurological pathways connecting between them. It is mainly caused by any brain damage but CVA is the most common in the world. [1]Stroke is a typical reason for harm to these regions that prompts aphasia. Stroke is a significant reason for inability and mortality overall. In 2013, stroke was the second most regular reason for death (11.8% of mortal rate) worldwide when the frequency of stroke was 3.28 million in women and 3.62 million in men. [2]. Stroke ranks second in leading cause of mortality and ranks third in causing prolonged disability. Incidence of stroke has doubled in low-income countries in the last 4 decades where it has decreased by 42% in high-income countries. Post stroke mortality rate was higher in developing countries. [3]Post stroke Aphasia generally result from injuries to the dominant hemisphere of the brain. Aphasia affects up to 38% of stroke survivors. It induces the limitation in the social participation and quality of life because lack of communication leads to social isolation. A variety of patient-related (gender, handedness, age, education, socioeconomic status, and intelligence) and stroke-related indices (first severity, lesion site, and lesion size) were explained as potentially influential factors in post stroke aphasia recovery. Initial severity of aphasia emerged as the most predictive cause of long-term aphasia recovery. Other influential factors relevant to post stroke language recovery are

lesion site and size, Aphasia severity, communication and activity limitations, emotional distress, other medical problems, and social factors affect health-related quality of life in patients. [4]In general stroke recovery, there is no concrete evidence yet. For instance, the first impairment of stroke, old age, urinary and bowel incontinence, visuospatial deficits and first Functional Independence Measure [FIM] scores below 60 have all been explained as negative prognostic indicators for general post-stroke function. The specific factors responsible for predicting the complete stroke recovery is yet to emerge. Even though having this many predicting reason, Aphasia recovery is another challenging cause for the clinicians. The recovery is depending upon accurate prediction about the course of a disease or condition based upon experience, intuition and evidence-based information. To estimate the correct prognosis in aphasia requires consideration of inter-related variables both patient-specific and stroke-specific expected to incite the functional effect for people with aphasia. Patient-related variables include: age, handedness, gender, educational level, intelligence, self-motivation, depression, family support, beliefs and attitude of health care, and access to medical treatment. At the same time, stroke-related indices include: site of lesion, size of lesion, aphasia type and pattern of recovery, and first aphasia severity. So, finding the correct mode of Treatment bound to a challenging step in aphasia recovery [5]

Meanwhile, evidence-based research shows that efficacious speech treatment for aphasia following stroke is now available. It is unsuccessful that the available speech treatment methods for aphasia following stroke are not providing an importance on the cognitive and behavioural aspects of the patients. The inability to

communicate effectively in Aphasia patients, it is possible to have relation with cognition and behaviour, However, aphasia following stroke in adults is much less responsive to the speech therapies. Cognitive behavioural language program, involving speech restructuring appears evidence-based treatment for aphasia following stroke in adulthood still not satisfactory. [6]

Acupuncture is a system of medicine in which small needles are pricked in the specific points in the body. This treatment system originated from traditional Chinese medicine (TCM), with strong basic philosophical principles associated with Confucianism and Taoism. Under this ideology, health sprouts from free flow of qi, which means “vital energy” and encompasses the yin/yang dichotomy that flows through all over the universe. Five elements act as the basis of the theory of qi: wood, water, fire, earth, and metal. A blockage, excess or deficient of any disrupts the natural flow vital energy. Acupuncture aims to open the blockage or remove the excess of qi flowing through specific channels in the body, known as meridians. Based on TCM, health is not only the disease free-state, but rather normal functioning of interconnection between the yin and yang. Balancing the qi restores the interconnectedness, thus restoring wellness [7] Acupuncture is an important treatment in traditional Chinese medicine for over 3000 years fin treating all kinds of disorders. One among them is scalp acupuncture its action based on the functional areas of brain. By stimulating different scalp zones with needles improves certain nerves through reflex action. [8]Evidence-based medicine [EBM], insists that existing goal and scientific evidence combined with physician first-hand experience

give the greater recovery to the patient. Knowledge of empirical evidence and the scientific evidence is necessary for the treatment protocol to the patients [9]

Recent studies proved that acupuncture has better effect on the speech improvement, particularly in post stroke aphasia where the conventional medical treatment was inadequate, although speech therapy is reliable it is not up to the mark.[10] Scalp Acupuncture combined with body acupuncture supposed to show more desired effects. [11] Though there are many studies in scalp acupuncture and body acupuncture on speech improvement in aphasia but nowhere there is a study comparing the effectiveness of scalp combined body acupuncture and specific body acupuncture points in apoplectic aphasia.

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2. LITERATURE REVIEW:

2.1 Stroke:

Stroke, defined as an acute focal injury of the central nervous system (CNS) or cerebral cortex. It was caused due to impaired vascular to brain such as cerebral infarction, intracerebral haemorrhage, or subarachnoid haemorrhage, "swiftly developing clinical signs of main (or global) disturbance of cerebral function, lasting more than 24 hour or leading to death, with no deceptive cause other than that of vascular origin".

In 2013, stroke ranked second-leading global cause of death after ischemic heart disease, representing 11.8% of total deaths worldwide. The burden ischemic and haemorrhagic stroke increased much between 1990 and 2010.

Depending on the causes, classified in to two. They are

1. Ischemic stroke [80 %]
2. Haemorrhagic Stroke [20 %] [12]

Stroke affects 15 million people around the world, one-third (35%) of stroke survivors left with aphasia in the chronic stage. Besides, post-stroke aphasia has much negative impacts on quality of life and has a more negative effect than any other common diseases such as cancer, Alzheimer's and Parkinson's disease.[13]

2.1.1 Aphasia:

Aphasia is defined as an acquired communication disorder caused by brain damage that impairs a person's ability to understand, produce and use language' (p. 2) [14]. Aphasia caused from the variety of nervous system related disease especially but. This condition is usually caused by CVA i.e., stroke, degenerative brain disease such as Alzheimer's disease, chronic traumatic encephalopathy, brain tumour, brain injury and it leads to difficulties in speaking, understanding, reading and writing. Stroke prevails as the major cause for Aphasia. [15]

Almost 21–38% of acute stroke patients have aphasia. They bound have associated with high short and long-term morbidity, mortality and expenditure. Initial severity of aphasia appeared as the most foretelling reason of long-term aphasia recovery. [16]

According to National Aphasia Association, It is severe to the point that communication with the patient becomes nearly difficult. Sometimes communication with the patient is possible but much. Further, aphasia can affect a single aspect of language use like the ability to retrieve the names of objects; the ability to build sentences; or the ability to read. [17, 18]

It specified that almost all aspects of communication were compromised when aphasia is diagnosed. Therefore, aphasia can lead to a range of

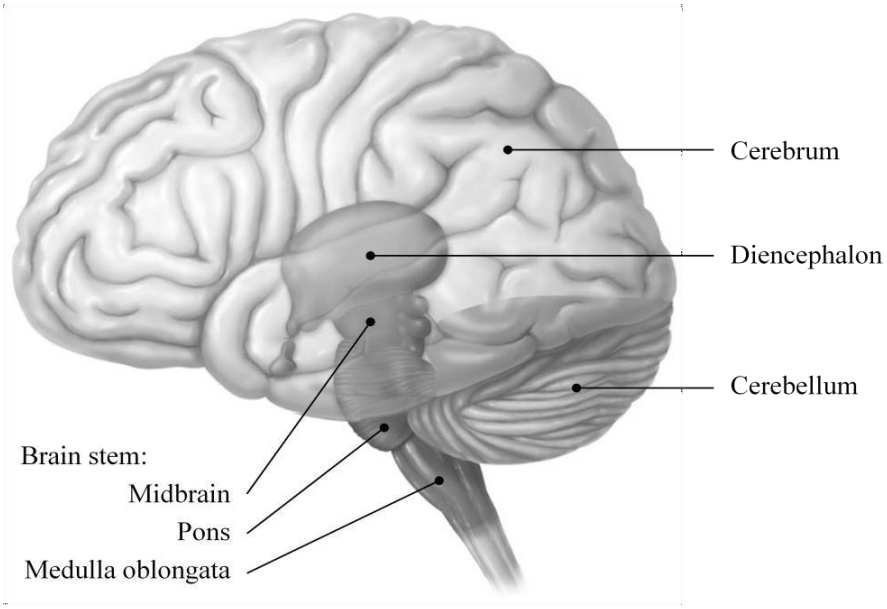
communication deficits, such as language comprehension and language expression, reading, writing, attention, memory, and other cognitive function. [19]

2.2 Anatomy and physiology:

2.2.1 Brain:

The brain is one of the most amazing organs in the process of evolution, with incredible number of discoveries, there are still many unresolved questions about its structure and function. Anatomy and physiology of the nervous system represent a boundless field of research. The knowledge of the human brain has passed through several distinct levels of analysis, from anatomical dissection to philosophical questioning, from histological analyses to psychological theories, from artistic representation of its anatomical structures to modern Neuro-imaging.

Figure 1: General anatomy of the human brain Marieb & Hoehn (Human Anatomy and Physiology, 9th ed.) – Figure 12.2



2.2 Structure of brain:

An anatomical understanding of the brain cannot prescient from its role. The high complexity of brain anatomy, associated with a myriad of new terms, is often made easier by the understanding of the direct association of each distinct anatomic structure and its specific neurologic function. Moreover, anatomical structures (i.e., how the structures were related to each other) can help to understand the normal physiological functions so that we can find the pathological change and the repair, recovery from the injury or any pathology. The brain is consisting three parts:

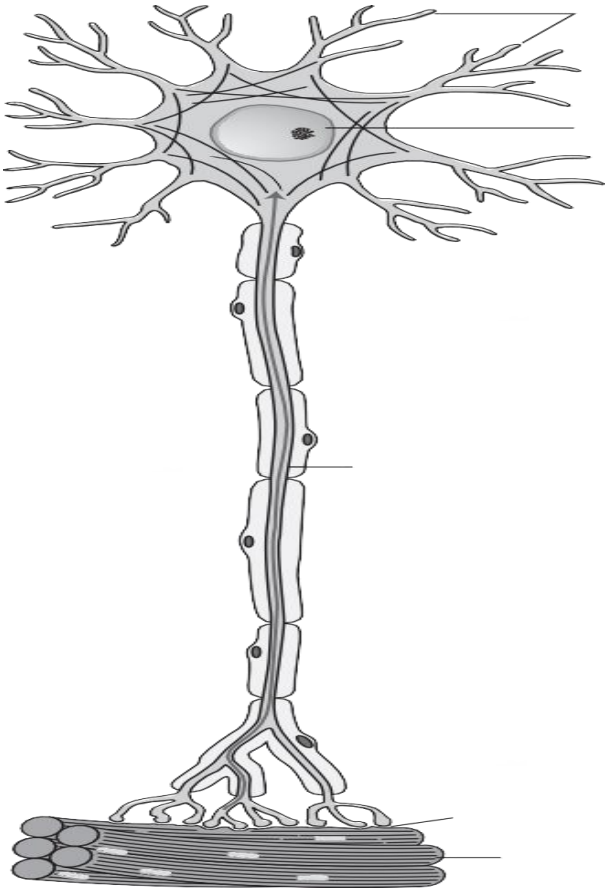
- The cerebrum,
- Cerebellum
- Brain stem,

All present inside the cranial vault. [20]

2.2.3 Neuron:

This is the basic and functional unit of nervous system. Neuron or nerve cell consists of nerve cell body, dendrites and axon. Dendrites are many short projections responsible for carrying neural impulses to the cell body. The axon is carrying neural impulses away from the cell body. The neuron can transmit neural impulses to other neurons, glands or muscles.

Figure 2 Neuron with its cell body, dendrites and axon synapsing at myoneural junction of the muscle. (Source: Neuroscience for the study of communicative disorder 3rd edition by Williams & Wilkins)



Based on morphological-functional aspect, the regions of the brain are:

i. Telencephalon:

   Cerebral hemispheres (cerebrum), with the phylogenetically most recent cortex

ii. Diencephalon:

The zone “between” the brain, formed by thalamus, meta-thalamus, hypothalamus (telencephalon and diencephalon together constitute the prosencephalon)

iii. Mesencephalon:

Formed by the Tectal plate, tegmentum, and cerebral peduncles-

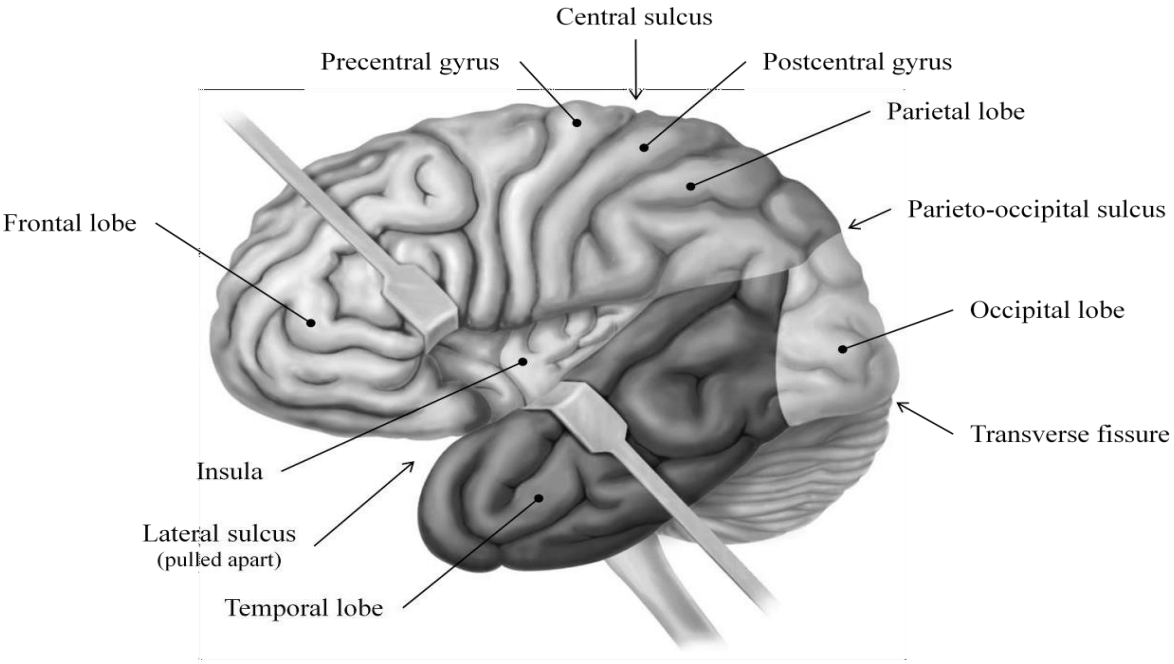
Rombencephalon: including metencephalon (pons and cerebellum) and myelencephalon (medulla oblongata).

2.2.4 Cerebrum:

The cerebrum is the largest region of the human brain it covers for ~ 85% of total brain mass. The cerebrum forms the superior part of the brain, covering and obscuring the diencephalon and brain stem similar to the way a mushroom cap covers the top of its stalk

Elevated ridges of tissue, called **gyri** were separated by shallow groves called **sulci** present nearly the entire surface of the cerebral hemispheres. Deeper groves, called **fissures**, separate large regions of the brain. [21]

Figure 3: Lobes, sulci, and fissures of the cerebral hemispheres (longitudinal fissure not pictured) Marieb & Hoehn (Human Anatomy and Physiology, 9th ed.) – Figure 12.4



The cerebrum is composed of two hemispheres,

- Right cerebral hemisphere
- Left cerebral hemisphere

Which was separated by the longitudinal fissure and connected with each other mainly by the corpus callosum.

Each hemisphere, consists of three surfaces

- Lateral Surface
- Medial Surface
- Basal Surface

By viewing from the outer surface, it has three poles,

- Frontal pole
- Temporal pole
- Occipital pole.

All of the cerebrum is involved in the processing of somatic sensory and motor information with all conscious thoughts and intellectual functions. The outer cortex of the cerebrum is made up of **gray matter** – billions of neuronal cell bodies and unmyelinated axons arranged themselves in six discrete layers. Although only 2 – 4 mm thick, this region comprised for ~ 40% of total brain mass. The inner region is made up of **white matter** – tracts of myelinated axons. Deep inside the cerebral white matter is a third basic region of the cerebrum, a group of sub-cortical gray matter called **basal nuclei**. These nuclei, the caudate nucleus, putamen, and Globus pallidus, are act as the regulators of skeletal muscle movement. [22]

The identification of the main sulci on the surface of the cerebrum allows us to distinguish the cerebral lobes:

1. Frontal lobe
2. Parietal lobe
3. Temporal lobe
4. Occipital lobe

As well as the insular lobe, hidden in the depth of the sylvian fissure. The cerebral lobes take their names from the overlying bones of the skull.

The frontal pole relates to the frontal bone, lying below its vertical portion, on the orbital roof. The occipital pole is related to the occipital bone, lies above the tentorium... The temporal pole lies in the middle cranial fossa, and relates to the posterior wall of the orbit. The gentle splitting of the two hemispheres in a lateral direction allows for the visualizing the corpus callosum.

The brain has protective coverings called meninges. The cerebral falx is a small portion in dura mater running in the depth of the longitudinal fissure, separating the two hemispheres, except in its more anterior part, where the medial faces of the frontal lobes (cingulate gyri) face each other.

2.2.4.1 The Frontal lobe:

The frontal lobe is bounded in the back by the central sulcus and underneath by the lateral fissure. The central sulcus divides the brain into anterior and posterior regions. Within the frontal lobe is the pre-central gyrus, which present closely anterior to the central sulcus. The precentral gyrus is also known as the primary motor cortex, it commands all voluntary muscular movement on the contralateral side of the body. The neurons in the primary motor cortex looks like a pattern of a person standing upside down known as “homunculus,” or “little man”. Neurons responsible for motor movements in the face and neck area are found near to the lateral fissure, and neurons dedicated to motor movements of the toes and leg

are present near to the longitudinal cerebral fissure. Certain parts of the body need fine motor movement, while other parts need less precise motor movement. There is a large group of neurons dedicated to the small muscles of the larynx, palate, tongue, jaw, and face than to the arm or leg. The number of neurons assigned for voluntary movement of a body part is characteristically not proportionate with its size. A lesion in the primary motor cortex within areas involving movements of the lips, tongue, or larynx, ends with certain types of dysarthria. Situated in front of the precentral gyrus are the premotor and supplementary motor areas. It receives information from other regions of the brain. Its main purpose is to integrate, improve, and plan or program motor speech output (e.g., a lesion in the premotor areas can result in certain types of dysarthria, or if in the dominant hemisphere, an apraxia of speech).

Broca's area is found in the third frontal gyrus of the dominant hemisphere, plays a vital role in motor speech programming and links to other parts of the brain involved with speech and language (e.g., a lesion in Broca's area result in apraxia of speech, commonly seen non-fluent aphasia).

2.2.4.2 The Parietal lobe:

The parietal lobe is bounded in the front by the central sulcus and located underneath by the back end of the lateral fissure. Postcentral gyrus is present with in the parietal lobe which is located in back of the central sulcus. The postcentral gyrus is a copy image to the motor area of the frontal lobe and it is known as primary sensory cortical area mainly responsible for temperature, pain, touch,

and proprioception. Proprioception (which comprises the senses of movement, vibration, pressure, position, equilibrium, and deep pain) allows one to understand the exact location of the individual parts of the body, and the relationship of one body part to another (e.g., tongue in relation to the alveolar ridge in the production of lingua-alveolar sounds). This somatosensory cortex found in the dominant hemisphere seems to play a part in motor speech programming, particularly in the integration of sensory information to prepare for the motor activity (e.g., a lesion of this area results in apraxia of speech). In account with, Damasio (1994) has distinguished that the somatosensory cortex in the right hemisphere helps in maintaining reasoning and decision making, emotion, and feelings, with a special importance in the social and personal domain.

The parietal lobe in the dominant hemisphere also has supramarginal gyrus and the angular gyrus. The supramarginal gyrus curves around the back end of the lateral fissure and is accountable for the formulation of written language and mainly for phonological storage (lesion in this area can result in aphasia). The angular gyrus presents directly behind the supramarginal gyrus and plays a vital role in reading comprehension (lesion in this area can result in aphasia with deep dyslexia).

2.2.4.3 The Temporal Lobe:

The temporal lobe, the lateral fissure bounds at the upper end and the front border of the occipital lobe is at the back. Three important areas in the temporal lobe of the dominant hemisphere are

1. Heschl's gyrus,
2. Wernicke's area,
3. Insula (or the Island of Reil).

2.2.4.3.1 Heschl's gyrus (or primary auditory cortex)

It is located on the lateral fissure, 2/3rd in the upper surface of the temporal lobe it is the higher centre for hearing, responsible for identifying the meaning of sound (lesion in this area results in auditory processing problems, leads to auditory comprehension deficit).

2.2.4.3.2 Wernicke's area (an auditory association area)

It is located in the dorsal aspect of the superior temporal gyrus and plays a key role in auditory comprehension and other language abilities (lesion in this area can result in aphasia).

2.2.4.3.3 The Insula:

It can be seen underneath lateral fissure (the two borders of the lateral fissures are pulled apart), the Para limbic area. The function of the insula is not clearly defined, yet a lesion in it can produce aphasia or apraxia of speech.

2.2.4.4 The Occipital lobe:

The occipital lobe is found at the backside of the cerebral hemisphere. It is bounded in the front by the parietal and temporal lobes and in back by the longitudinal fissure. The primary visual cortex and visual association areas are

located in the occipital lobe. The primary visual cortex is responsible for basic vision (lesion in this area can cause degrees of blindness). The visual association area is required for integrating and consolidating incoming visual stimuli (lesion here can result in visual perception problems, also influence in reading comprehension).

2.2.4.5 The Limbic lobe:

The limbic lobe is found on the medial surface of the cortex and contains the orbital frontal region, the cingulate gyrus, and the medial portions of the temporal lobe. The limbic system regulates emotions and behaviour (lesion in this system can affect pragmatic abilities)

2.2.4.6 The Association areas:

There are primary centres for motor, sensory, hearing, and visual functioning. These centres are associated with one another and to other parts of the brain with the help of association areas. The association areas are accountable for higher mental functioning, including language, in the lobes of each hemisphere.

The frontal association area is in charge for initiation and integration of purposeful behaviour and for planning and carrying out sequences of volitional movement.

The parietal association area, is in charge for the discrimination and integration of tactile information.

The temporal or auditory association area is required for the discrimination and integration of auditory information.

The visual association area is in control for the discrimination and integration of visual information.

A lesion in an association area of the dominant hemisphere results in aphasia, a lesion in a pathway connecting one association area with another results in aphasia

E.g., as in the case of the arcuate fasciculus which connects the association area of the temporal lobe with that of the frontal lobe. Lesion in arcuate fasciculus results in aphasia. [23]

2.2.5 Blood supply to the brain:

The Blood comprises of plasma, red corpuscles, white corpuscles, and platelets. Red corpuscles, are formed in the bone-marrow, which carry oxygen from the lungs to various parts of the body. For the normal functioning and growth, the brain needs oxygen and other elements from the blood. If the blood supply to the brain renders for five minutes or longer, cell death occurs. Arteries carry oxygenated blood away from the heart, veins carry deoxygenated blood towards the heart, and capillaries link the arteries to the veins.

The blood supply to the brain is as follows, the heart pumps blood into the aorta (major artery), which then divides into four main arteries known as

1. common carotid arteries (one on the left side and one on the right side)
2. Common subclavian arteries (one for each side).

The two common carotid arteries ascend into the brain, where they branch off into two,

1. internal carotid artery (on each side)
2. external carotid artery (on each side)

The external carotid branch supply blood to the face area and the internal carotid branch further divides into

1. the anterior Cerebral arteries
2. middle cerebral arteries

2.2.5.1 Anterior cerebral arteries:

The anterior cerebral artery supplies to the superior and anterior frontal lobes, corpus callosum, the medial surfaces of the hemispheres, and portions of the subcortical areas

2.2.5.2 Middle cerebral arteries:

The middle cerebral artery gives blood supply to the most of the lateral surfaces of the hemispheres and portions of the subcortical areas.

The two common subclavian arteries have branches are known as the vertebral arteries, which ascend into the brain at the dorsal side. The vertebral artery branches (one from each side) join together to form the basilar artery.

The basilar artery then goes up and divides into two posterior cerebral arteries (one for each hemisphere) which supply blood to the inferior lateral surface of the temporal lobe, and the lateral and medial surfaces of the occipital lobe. The basilar artery also supplies certain parts of the spinal cord, medulla, pons, midbrain, and cerebellum.

The circle of Willis formed in the brainstem by connecting two internal carotid arteries and the two vertebral arteries. The disruption of the blood supply below the circle of Willis may not cause as much as damage than above. The intention is that other undamaged blood channels can be employed to give all the arteries below the circle. If any disruption occurs above the circle, not many alternative blood channels available, and this can lead to more severe problems (e.g., CVA above the circle of Willis in the middle cerebral artery leads to aphasia). Collateral circulation via the circle of Willis appears to work more proficiently in men than in women. [24]

Figure 4 Blood supply to the brain. Sean et all, Vertebro-basilar disease, New England journal of medicine

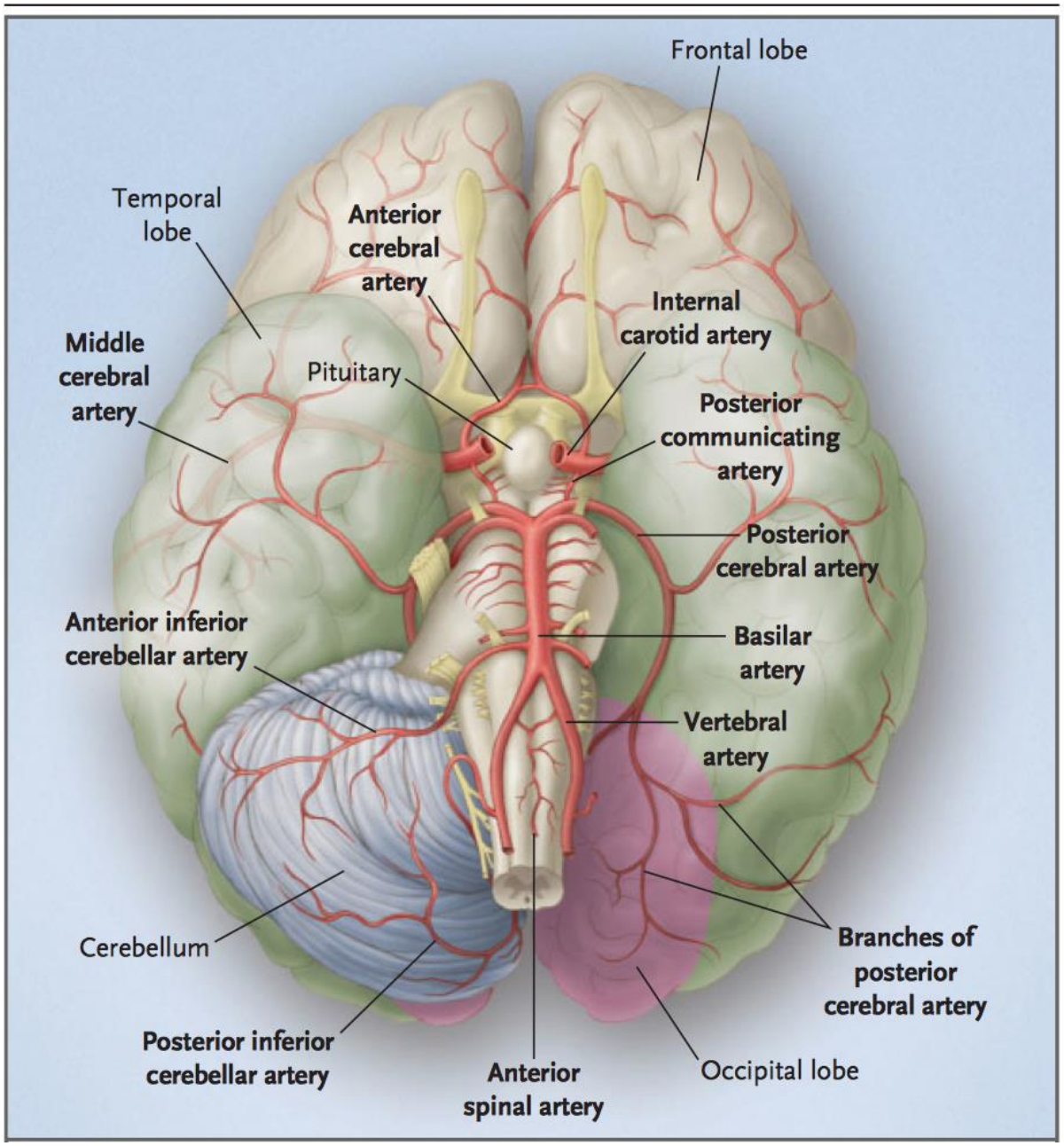
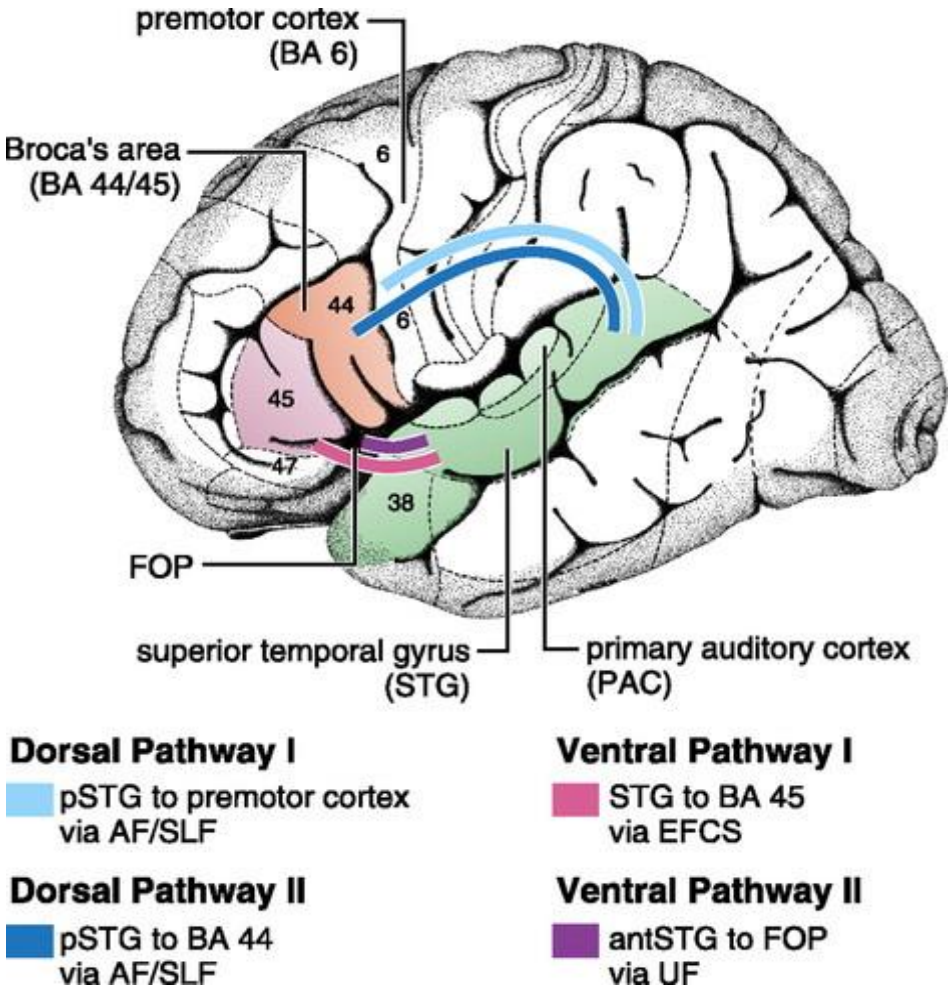


Figure 5 Brain basis of language processing. (Source – Brain basis for language processing: from structure to function. American physiological society.)



2.2.6 The motor system for speech:

The neural motor pathways for the controller of speech exist in at all levels of the human nervous system and consist of the pyramidal system and the extra-pyramidal system. The pyramidal system (or direct motor system) consists of

the corticospinal tract and the corticobulbar tract; both tracts are in charge for skilled voluntary motor movement. The Corticospinal controls skilled voluntary movements of the limbs and trunk, begins in the motor cortex or in the premotor cortex, which is a reservoir for incoming information from various cortical and subcortical locations. The primary involved area is the precentral gyrus of the frontal lobe, occasionally the premotor area of the frontal lobe and the postcentral gyrus in the parietal lobe. The bilateral corticospinal tracts descend from the cortex converge to form the subcortical structure known as internal capsule. From the internal capsule, the tracts descend through the midbrain, the pons, and the medulla, and then to different levels of the spinal cord, synapse with the spinal nerves of the peripheral nervous system.

Before reaching the spinal nerves, nearly 85–90% of the corticospinal tracts cross over to the other side of the body in the form of pyramidal structure called the upper medullary pyramid. (A lesion above the crossover point of the medullary pyramids results in paralysis of a limb that is contralateral [opposite side] to the site of the lesion. A lesion below the crossover point results in paralysis of a limb ipsilateral [same side] to the site of the lesion. The 85–90% of the corticospinal tracts which cross over are called the lateral corticospinal tracts, and remaining 10–15% that do not cross over are called the anterior corticospinal tracts

The Corticobulbar Tract controls the skilled voluntary movements of the speech muscles (except those used for respiration). The tract starts in the same area as the corticospinal tract and go down to the motor nuclei of the cranial nerves, are located in the pons and the medulla. The corticobulbar tract has many ipsilateral and

contralateral fibres, with crossover taking place at various levels of the brainstem. Because of the bilateral innervation that the corticobulbar tract produces, most of the midline structures which work in bilateral symmetry (e.g., a unilateral lesion to the corticobulbar tract can result in a mild dysarthria because of help from the intact muscles of the other side). The Extrapyramidal System is comprised of two major components— the indirect activation pathway and the control circuit areas. [25]

2.2.6.1 The upper and lower motor neurons:

The UMN pathways are bound to present in the CNS, and their role is to activate the lower motor neuron (LMN). Damage to the UMN results in a spastic paralysis, characterized by hypertonia (extreme tension of the muscles), hyperreflexia (an exaggeration of deep tendon reflexes), little or no atrophy (loss of muscle bulk) of the musculature, and no fasciculation (fine muscle twitches). These features lead to diminished skilled movements, weakness, slowness, and restricted range of movement of the speech musculature

2.2.6.2 The cranial nerves:

There are 12 pairs of cranial nerves (on each side), only the 7 pairs of cranial nerves most relevant for speech and hearing. The 7 cranial nerves involved leave the pons or the medulla and conduct sensory &motor impulses to and from both periphery and CNS. Motor communications signals sent from the CNS (corticobulbar tracts) to the cranial nerve nuclei in the pons and the medulla, and then sent to the musculature of the speech mechanism and other portions of the head,

neck, shoulders, and the abdominal and thoracic viscera. Sensory messages from the periphery will go to the cranial nerve nuclei sited in the pons and the medulla, then forwarded to the thalamus. In turn, the thalamus propels the messages to the sensory cortex (postcentral gyrus) for evaluation [26]

2.3 Epidemiology:

There is a high Incidence of aphasia in the recent years. For instance, there are 180,000 cases of aphasia per year reported in United States. A study explained that about 100,000 stroke patients are diagnosed with aphasia. According to the National Aphasia Association, the incidence of aphasia is estimated to reach 180,000 in the year 2020. In one another study specified that 15% of people under the age of 65 experience aphasia after following stroke. The percentage increases to 43% for people 85 years of age and older.

It is reported that in Nigerian population 96% of stroke patients experienced aphasia irrespective of their involvement in the cerebral cortex [Right & Left].

Ekeh et al, reported that there are four cases of Post Stroke Aphasia [PSA] was reported within a week. Studies proven that the alarming rise of PSA in Nigeria.

Studies have also recognised that PSA is associated with increased risk of death, reduced chance of returning to normal life, and shrunk of functional recovery, in comparison with non-aphasic stroke patients.

Persisting communication difficulties in PSA patients result in social isolation and limitations in social participation also financial problem among PSA patient alarmingly increasing. The cost of treating PSA is substantially higher due to the recurrent long-term need for rehabilitative treatment to recover communication abilities. In all countries especially in developing countries quality of life in PSA patients is very poor. Thus, a need for intervention programs is in need among the aphasia patients in these countries in order to help them recover their communication and social skills.

However, aphasia following stroke in adults is much less reactive to the speech therapies. Cognitive-behavioural language program, involving speech restructuring appeared as evidence-based treatment for aphasia following stroke in adulthood. [27]

2.4 Etiology and classification:

The cause for PSA has categorized into two broad groups. They are

1. Cerebrovascular accidents
2. Degenerative disease

Aphasia caused by cerebrovascular accidents has sudden onset and display maximal impairment at that time. The primary lesion is relatively constrained and associated with a complete loss of neuronal function at the lesion site. These are ‘classic’ aphasias where comparatively negligible relationships between lesion site and aphasia pattern.

Aphasia caused by neurodegenerative diseases have a slow onset and persistent progression so that the symptoms change over time. The neuronal loss within the areas comprised by the neurodegeneration is partial and involvement of multiple areas considered, the distinct clinical pattern is less obvious.

2.4.1 Aphasia of cerebrovascular origin:

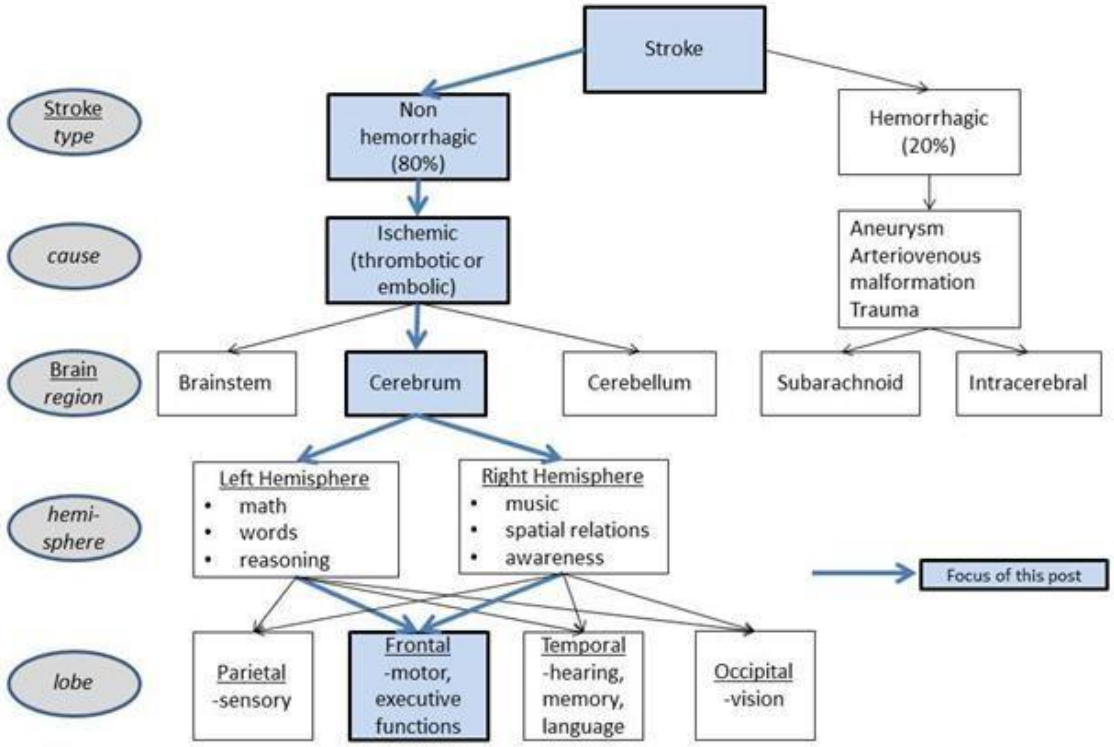
Aphasia of cerebrovascular origin can divide based on central syndromes, resulting from the damage to the epicentre of the language network (Broca's and Wernicke's areas), and disconnection syndromes, arising from lesions that interject the functional connectivity of these centres with each other and other components of language network.

2.4.1.1 Wernicke's aphasia

In Wernicke's aphasia, the comprehension is compromised for spoken and written language. Language output may be fluent but is highly paraphasic and circumlocutions. The tendency for paraphasic errors may be so pronounced that it leads to strings of buzz word, which form the basis jargon aphasia. Speech has large numbers of function words (e.g., prepositions, conjunctions) but few substantive nouns or verbs that has specific actions. The output is quantitative but unproductive. The patient does not realize that his language is incomprehensible and may get angry and will get impatient when other person fails to decipher the meaning of the sentence. This aphasia has expressive and receptive components, naming, repetition reading, and writing are also

compromised. The lesion site most commonly accompanying with Wernicke's aphasia is in the posterior part of the language network and be likely to take in at least parts of Wernicke's area.

Figure 6 Etiology and classification of stroke
(Source: Course: RSOT513/2010W2/CVA .University of British Colombia



2.4.1.2 Broca's aphasia

In Broca's aphasia, speech is not fluent, laboured, broken up by many word-finding pauses, and usually dysarthric. Abnormal word order and the inappropriate deployment of bound morphemes (word endings used to denote tenses, possessives, or plurals) lead to agrammatism. Output may be reduced to a grunt or single word ('yes' or 'no'), which has produced with dissimilar intonations.

In addition to fluency, naming and repetition are also impaired. Comprehension of spoken language is intact. But others are negligible.

2.4.1.3 Global aphasia

In global aphasia, speech output is not fluent, and comprehension of spoken language is strictly impaired. Naming, repetition, reading, and writing are also compromised.it represents the joint dysfunction of Broca's and Wernicke's areas and strokes that involve middle cerebral artery in the left hemisphere.

2.4.1.4 Conduction aphasia

In conduction aphasia, the output speech is fluent but paraphasic, comprehension of spoken language is whole, and repetition is severely impaired. Naming and writing are also impaired. Reading aloud is impaired, but reading a comprehension is well-maintained. The lesion sites not involve Broca's and Wernicke's areas but the functional disconnection has affected.

2.4.1.4 Non-fluent transcortical aphasia (Transcortical motor aphasia)

The characteristics of non-fluent transcortical aphasia are similar to Broca's aphasia, but repetition is intact and agrammatism may less pronounced. The lesion site disconnects the intact language network from prefrontal areas of the brain and generally involves the anterior watershed zone lies between anterior and middle cerebral artery territories or the supplementary motor cortex supplied by the anterior cerebral artery.

2.4.1.5 Fluent transcortical aphasia (Transcortical sensory aphasia)

The clinical features of fluent transcortical aphasia are similar to those of Wernicke's aphasia, but repetition is intact. The lesion site separates the intact core of the language network from other tempero parietal association areas. Infarction in the posterior watershed zone are common causes.

2.4.1.6 Isolation aphasia isolation aphasia

A rare syndrome, are of combination of the two transcortical aphasias. Comprehension is severely impaired, and there is no useful speech output. This condition signifies the pathologic function of the language network. Broca's and Wernicke's areas not involved, but there is a damage in surrounding frontal, parietal, and temporal cortex. Patchy lesions associated with anoxia, carbon monoxide poisoning, or complete watershed zone infarctions.

2.4.1.7 Anomic aphasia

Anomic aphasia considered to have the 'minimal dysfunction' syndrome of the language network. Articulation, comprehension, and repetition are intact, but confrontation naming, word finding, and spelling have impaired. Language output is fluent but paraphasic, circumlocutions, and uninformative. The lesion sites may be inside the left hemisphere language network, including the middle and inferior temporal gyri.

2.4.1.8 Pure word deafness

In pure word deafness, the lesions are commonly present in either bilateral or left-sided in the superior temporal gyrus. Patients have no difficulty understanding written language and can express themselves well in spoken or written language. They have no trouble in interpreting and reacting to environmental sounds. But Patients cannot repeat spoken language with no strain in naming objects.

2.4.1.9 Pure alexia without agraphia

Pure alexia without agraphia is the visual equivalent of pure word deafness. The lesions interfere the flow of visual input into the language network. [28]

2.4.2 Factors affecting the stroke recovery:

To show the prognosis of aphasia multitude of inter-related patient-specific and stroke-specific variables alleged to influence functional outcomes for people with aphasia.

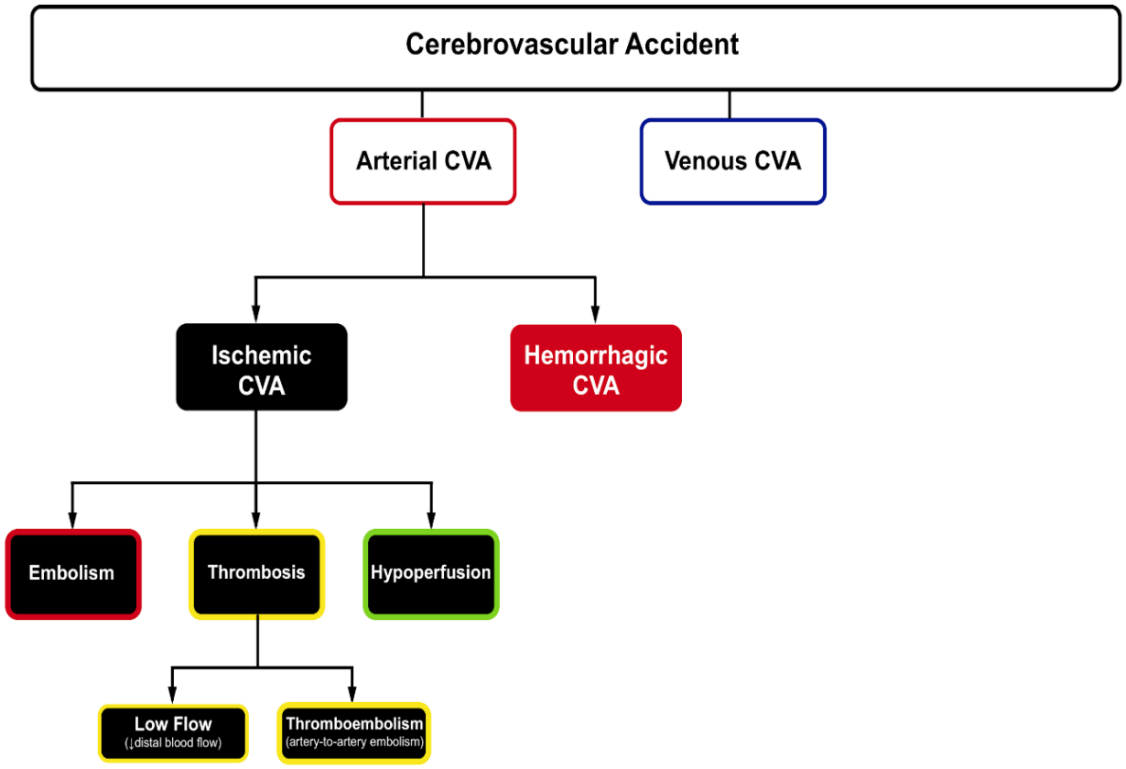
2.4.2.1 Patient-related factors

1. Age
2. Handedness
3. Gender
4. Educational Level
5. Intelligence
6. Motivation
7. Depression
8. Family Support
9. Beliefs and Attitude On Health Care
10. Access to Medical Treatment.

2.4.2.2 Stroke-related factors

1. Site of Lesion
2. Size of Lesion
3. Aphasia [29]

Figure 7 Pathophysiological classification of cerebrovascular accidents. (Source: Shahriar lahouti's Update on management of acute ischemic stroke in the emergency department. RECAPEM



2.5 Pathophysiology of stroke:

The ischemic cascade is a varied phenomenon, in which one event follows many other events. The first event in 85–90% of acute strokes have impaired vascular supply to the brain, results in ischemia (because of low respiratory reserve and dependence on aerobic metabolism). The degree of damage depends on the severity, duration, and site of ischemia [30]. Macroscopic changes in the brain tissue and magnetic resonance imaging (MRI) or computed tomography (CT) or

changes through the course of a stroke guide us to classify the development time from the start of the symptoms into three stages [31]:

a. Acute (up to 48 h);
b. Subacute (48 h to weeks);
c. Chronic (weeks to months).

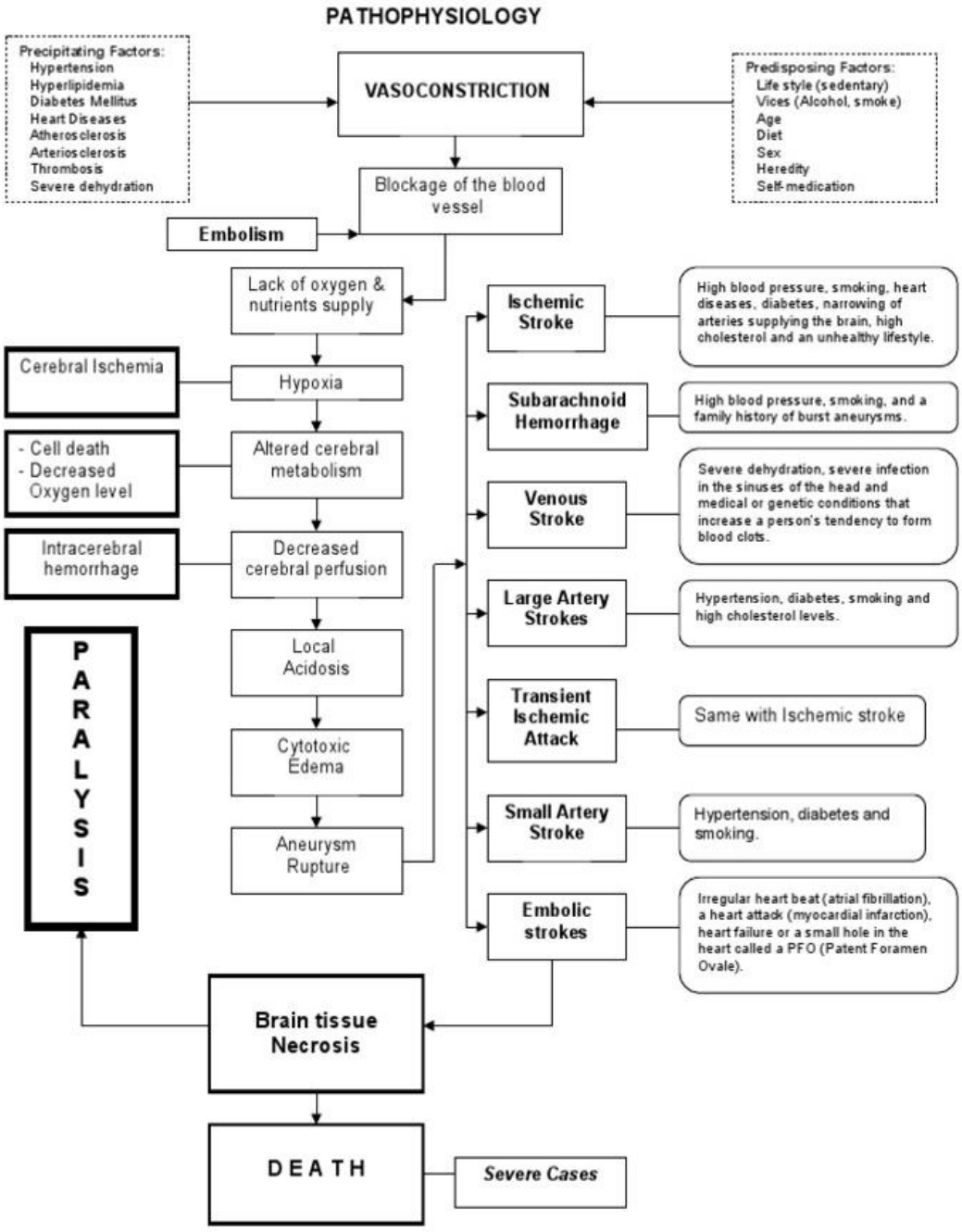
Within minutes to hours, the local reduction of oxygen and glucose will cause:

1. Disturbance of the ion gradient, results in cytotoxic oedema and releases excitatory neurotransmitters (e.g., glutamate from the astrocytes)
2. A switch from aerobic metabolism to anaerobic metabolism, resulting to metabolic acidosis these primary cascades of events lead to acute necrosis or cell death [32].

During the subacute stage of stroke, an upregulation gene mechanism and stress signals from injured cells induce apoptosis and activate the inflammatory cascade. At one go, neuroprotective mechanism have been activated by Akt pathways and neurotrophic factors [33].

The chronic stage encompasses processes for recovery and repair, where neurogenesis, angiogenesis, and synaptogenesis prevail. [34]

Figure 8 Pathophysiology-Flow chart (Source: Pathophysiology of stroke. Scribd)



2.6 Clinical examination

The clinical examination of language should include the following assessment

- Naming
- Spontaneous speech
- Comprehension
- Repetition
- Reading
- Writing

A deficit of **Naming** (anomia) is commonly seen in aphasic patients. When questioned to name common objects (e.g., a pencil or wristwatch), the patient may unable to answer or coming up with description of the word (‘the thing for writing’), or say wrong word (paraphasia). If the patient often has the naming error is known as a semantic paraphasia; if it is phonetically inaccurate (‘plentil’ for ‘pencil’), the error is known as a phonemic paraphasia.

Spontaneous speech explained as fluent if it maintains proper output volume, phrase length, and melody or as non fluent if it is sparse and halting and if average utterance length is less than four words. The examiner should also note whether the speech is paraphasic or circumlocutions; whether it shows a relative paucity of substantive nouns and action verbs compared to other function words

(prepositions, conjunctions); and whether word order, tenses, suffixes, prefixes, plurals, and possessives are used appropriately.

Comprehension, tested by assessing the patient's ability to follow the conversation, by asking yes/no questions ('Can a dog fly,' 'Does it snow in summer?'), or by asking the patient to point to right objects ('Where is the source of illumination in this room?'). Statements with embedded clauses or passive voice construction (if a tiger ate by a lion, which animal will stay alive?') help to assess the patient's ability to comprehend complex syntactic structure.

Commands to close or open the eyes, stand up, sit down, or roll over are not used to assess overall comprehension since appropriate responses for such axial movements are preserved in patients who otherwise have profound comprehension deficits.

Repetition is by asking the patient to repeat single words, short sentences, or strings of words such as 'No ifs, ands, or buts.' The testing of repetition with tongue-twisters such as 'hippopotamus' or 'Irish constabulary' provides a better assessment of dysarthria than aphasia. Aphasic patients may have little difficulty with tongue-twisters but have a particularly hard time repeating a string of function words. It is necessary to make sure that the number of words does not exceed the patient's limit. Otherwise, the failure of repetition becomes a reflection of the narrowed attention span (verbal working memory) and not the sign to aphasia

Reading, assessed for deficits in reading aloud as well as comprehension.

Writing, assessed for spelling errors, word order, and grammar. Alexia describes an inability to read or comprehend written words; agraphia (or dysgraphia) used to describe an acquired deficit in the spelling or grammar of written language. [28]

Table 1.Diagnostic methods for stroke

Test Imaging	Indication
CT (Non-contrast)	To distinguish haemorrhagic infarct from ischemic infarct; perform urgently to tri-age for intravenous tissue plasminogen activator
CT angiography	To detect arterial vascular abnormalities (e.g., cerebral aneurysm; if detection is likely, use conventional cerebral angiography), carotid disease, intracranial stenosis, aortic atheroma, or dissection
CT venography	To detect venous vascular abnormalities (e.g., cerebral venous thrombosis)
MRI	Use apparent-diffusion-coefficient sequence of diffusion-weighted imaging to detect an acute ischemic infarct; T; weighted or fluid-attenuated inversion recovery sequence to detect chronic emboli or small-vessel disease; T,-weighted sequence, with and without contrast enhancement, to detect a space-occupying lesion; and susceptibility weighted imaging to detect micro haemorrhage related to remote hypertensive bleeding or cerebral amyloid angiopathy
Magnetic resonance angiography	Use fat-saturation sequence to detect dissection, carotid disease, or intracranial stenosis

Magnetic resonance venography	To detect venous vascular abnormalities (e.g., cerebral venous thrombosis)
Carotid ultrasonography	To assess flow and degree of stenosis
Transcranial Doppler ultrasonography	To monitor intracranial stenosis, assess progression of carotid stenosis (e.g., reversal of ophthalmic-artery flow), or detect vasospasm associated with subarachnoid haemorrhage; perform with the injection of agitated saline to screen for patent foramen ovale
Dynamic transcranial or extracranial Doppler ultrasonography	To assess blood flow with respect to head and neck movement or to detect Cerebral embolus
Hematologic Lipid panel and thyroid screening	To determine the risk of atherosclerosis and cardiac arrhythmia
Glycated haemoglobin (goal, <6.5%) or fasting glucose	To determine the risk of diabetes
Cardiac enzyme	Chest pain or abnormal electrocardiogram
Vitamin B,,, folate, and homocysteine	To determine nutritional status (i.e., risk of gastric bypass or malnutrition, presence of ethanol)

Erythrocyte sedimentation rate, C-reactive protein, or blood culture	To detect endocarditis
Toxicological screening of blood and urine	To identify use of cocaine, marijuana, or other vasospastic or illicit drugs
D-dimer, partial-thromboplastin time, and activated partial-thromboplastin time	To determine coagulation status (anti—factor Xa, thrombin time, and Ecarin clotting time may be measured in patients taking factor Xa inhibitors or thrombin inhibitors)
Protein C, protein S , lupus anticoagulant, antiphospholipid antibodies, prothrombin gene mutation, and anti-thrombin Ill	Ischemic stroke; use to determine venous hypercoagulability in order to identify pregnancy, use of oral contraceptives, smoking status, and risk of paradoxical embolism
Homocysteine and lipoprotein(a)	Ischemic stroke: use to determine arterial hypercoagulability as risk factor for diffuse intracranial or extracranial stenosis
Fibrillin•1 (F8N1), collagen type me (Cr:	Ischemic stroke; use to detect spontaneous dissection with high suspicion for collagen vascular disease (i.e., Marfan's

N. 1AI). collagen type II (COLIA2), and GLA	syndrome, osteogenesis imperfecta, Ehlers-Oanlos syndrome) or Fabray's disease (deficiency in a galactosidase A)
Partial. Thromboplastin time, activated partial thrombo plastin time, and von Will brand factor	General workup for haemorrhagic stroke: perform tests for other clotting factors if abnormality is detected
Cardiac Electrocardiography	To detect myocardial infarction and arrhythmia
Hotter monitoring or extended cardiac monitoring	To detect cardiac arrhythmia, especially atrial fibrillation
Transthoracic echocardiography	To assess ejection fraction (40%) and left atrial size (as a risk factor for atrial fibrillation; 'AO mm anteroposterior) and to screen for patent foramen ovale (as risk factor for paradoxical embolism; features include atrial septa) ones. perform with the injection of agitated saline
Trans oesophageal echocardiography	Likelihood of endocarditis (or other valvular lesions) or atrial thrombus
Other	

Pulmonary sleep studies	To detect obstructive sleep apnoea
Peripheral Vascular Renal-artery stenosis	Younger patients with hypertensive haemorrhage
Doppler ultrasonography of the legs	To detect deep vein thrombosis as risk factor for paradoxical embolism
Pelvic magnetic resonance venography or CT venography	To detect May-Turner features as risk factor for peripheral venous compression
Subclavian CT angiography or magnetic resonance angiography	To detect subclavian steal syndrome, which causes transient ischemic attack

2.7 Conventional management:

The diagnosis of PSA is usually part of a complex evaluation, the clinical examination mentioned above will be taken into consideration and the conventional treatment programme should be formulated based on the origin of the symptom. [35]

The speech therapy is expected to be the major management of the PSA along with guidance was given to the patients to improve the strength of the muscle in throat and face to facilitate smooth speech development. [36]

Cognitive behavioural language therapy was widely used in now a days research studies shows that e CBLT intervention was effective in helping the PSA patients to improve their communication abilities. Their degree of aphasia was considerably reduced in recent trails. [37]

2.8 Acupuncture:

Acupuncture is one of the best known of complementary and alternative therapies. Acupuncture is a treatment method has long history, more than 3,000 years ago in China and practising in all around the world. Acupuncture is a one of the treatment modalities in Traditional Chinese medicine. TCM works on the basis of Yin & Yang theory, five element theories etc., Apart from Traditional theories the recent research studies Showed that it is more promising and more evidence based than the other alternative medicines. The method is commonly practiced as a routine treatment in Asian countries such as China, Japan, Korea, and Taiwan, and since the late 1970s TCM gained popularity in the United States as well as other parts of the Western world. [38]

Its application in humans in varied clinical conditions requires explanation. The practice of acupuncture comprises of inserting fine, solid needles (usually 32 to 36 gauge) into particular body locations (acupuncture points). Classic

manuscripts describe 365 points located in organized fashion on meridians or “channels of energy flow” that are lies onto the surface of the body. Key principles in traditional Chinese medicine (TCM) are that both wellness and illness is the result of an imbalance of yin and yang. Yin denotes to the feminine aspect of life, inside, receptive, protective, soft, nourishing, lower, cool, deficient, and yielding. Yang denotes male counterpart: hot, excessive, outside, creative hard, dominant, energetic, upper, the interaction between these opposite forces, called Qi, is considered to be the crucial element in the healing system of TCM. It says that a vital force that flows continuously through the meridians, or energy channels of the body. Imbalances in the flow of Qi among the meridians, organs, and five elements is the cause of disease, pain, and liability to illness. Balancing the external factors as heat, cold, dampness, dryness, in both exterior and interior domains are managed by TCM practitioners as well as medical acupuncturists by inserting at specific points along these meridians. Other treatment modalities included in the TCM system include medicated diet, herbal medicine, cupping therapy, moxibustion (the heating of an acupuncture point or needle with a mouldering herb), massage (Tui Na), Tai Chi exercise, and meditation. [39]

Endorphin hypothesis, said to explain the mechanisms of action of acupuncture. Needling affects cerebrospinal fluid levels of endorphin and enkephalin, and such effects have been blocked by the opiate antagonist naloxone.it also influence the components of interstitial fluids. It explains the production of endogenous opioids. [40]

The presence of acupuncture needle likely to stimulate vascular and immunomodulatory factors, including locally circulating inflammatory mediators. Measurements of adrenocorticotropic hormone (ACTH) higher after acupuncture treatments, telling that adrenal activation and release of endogenous corticosteroids, result from acupuncture. [41]

2.8.1 Scalp acupuncture:

Scalp acupuncture was emerged as an independent and whole system in early 1970 s. it has its basis on the theory of neuro anatomy, neuro physiology, and bio-holography principles of modern medicine. Body acupuncture has TCM basis and treatment depends on pathology of yin and yang, five elements and Qi flow disruption in the meridian. SA is different from the body acupuncture.

In SA by needling, stimulate specific scalp areas, such as the motor area, the sensory area, and the praxis area. Jiao's scalp areas, the locations lie correspond to the functional locations of the cerebral cortex, used to stimulated areas in scalp acupuncture for the treatment of diseases. [42]

According to Prof. Fang Yun Peng, the scalp consists of seven zones and twenty-one acupoints. Prof. Tang Songyan's scalp acupuncture and Prof. Zhu Mingqing's scalp acupuncture used different scalp acupoints based on its site.

A Standard Nomenclature of Scalp Acupuncture was propagated by the World Health Organization (WHO) in 1989, modern SA came into practise from that day on. [43]

The selection of scalp acupoints depends on functional localization of the cerebral cortex. [44]

2.9 Apoplectic aphasia and TCM:

In Traditional Chinese Medicine (TCM), cerebrovascular accidents are generally attributed to a combinative Excess of endogenous Wind, Liver Yang rising, and Phlegm. But there is often associated with deficiency of Qi and Blood, mainly in elderly patients, which may clear until sometime later after the stroke.

There are at least two phases when considering the management:

- Immediate (1–3 months, mostly for Excess)
- Delayed (post 3 months, mostly for Deficiency).

Patients often seek acupuncture in the latter phase in which their likely energetic pattern will be a combination of Qi Deficiency, Blood Stagnation, and varying amounts of Phlegm [45]

Also, in TCM, language impairment is mainly caused by imbalances in the Heart energy meridian. According to the Five Elements Theory, Heart opens at the tongue. The Heart, in TCM, is not an isolated organ, but connected with other organs of energy. [46].

The causative factors for stroke are mostly on emotional disturbance, overwork, physical strain, improper diet and poor rest. These lifestyle disorders exhaust the body's vital energy which leads to accumulation of Phlegm and or Wind. Prolonged accumulation of external wind will result in stroke. Phlegm inside is due to the weakness of Spleen caused by poor diet and or mental and physical strain. The accumulation of Phlegm disturbs the normal flow of Qi within the body and results in disarranged thinking, poor concentration and limb disorders. Stagnation of phlegm causes the formation of phlegm-heat, which rise to the head and cause a stroke.

Wind is the main pathologic external factor often causes trouble when the person experience emotional, mental strain coupled with poor sleep and improper dietary habits. Excessive stress in life can devour the Liver and kidney yin so that the Wind will move up and cause stroke and other symptoms such as HTN, headaches, emotional issues, etc.

2.9.1 Theory of TCM for wind stroke:

Wind stroke refers to a condition manifested by sudden loss of consciousness with paralysis and dysphasia, numbness, unilateral weakness, or to a disorder manifested by sudden onset of facial paralysis and unilateral paralysis without experiencing unconsciousness.

Because of its acute onset, rapid alterations and multiple symptoms arises, it is similar to wind characteristics such as migrating, shifting dispersing, constant moving. These collective characteristics are called wind-stroke in TCM.

2.9.2 The Etiology and pathogenesis of hemiplegia

1) Improper Diet: functional loss of spleen energy leads to stagnation of phlegm which blocks the free flow of qi to the heart.
2) The Emotional Stress: Excessive emotional stimuli affect both heart (housing shen spirit) and liver. Intense emotions affect the spirit and Heart fire flares upward. In the same way liver yang (internal wind)move upward and Jointly aggravate each other, both will cause sudden upward movement of qi and blood leading to unconsciousness
3) Prolonged Exhaustion: chronic disorders, aging, weak constitution and excessive exertion can cause Liver and kidney deficiency.[47]

2.9.3. Pattern differentiation

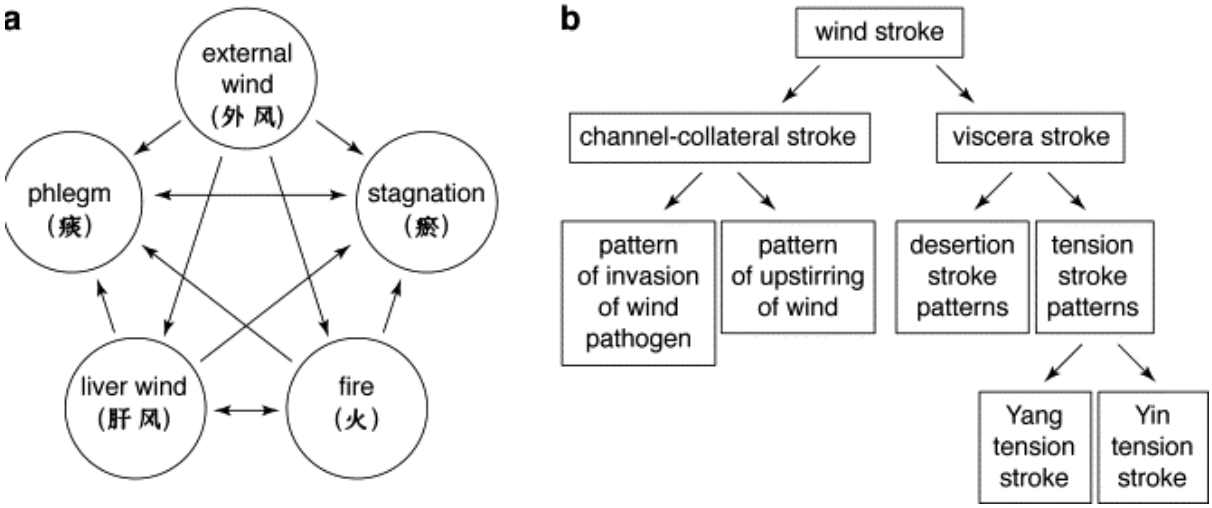
Table 2 stroke classification according to TCM

S. no	Pattern	Manifestation	Symptoms	Pulse	Tongue
1.	Exterior wind invading into the unsolicited channels	Sudden weakness and numbness of the extremities, slurred speech, facial paralysis, drooling or hemiplegia	Fever, aversion to wind, pain and soreness in the joints	floating and rapid	thin, white coat
2.	Wind yang disturbing upwards with liver and kidney yin deficiency	Sudden occurrence of facial paralysis, aphasia or slurred speech, heavy sensation and numbness of the extremities and hemiplegia	Headache, vertigo and tinnitus, dizziness, dream-disturbed sleep, dry throat, constipation and scanty dark urine, soreness and weakness of the lower back and knees,	wiry, Thready and rapid, or wiry and slippery	red tongue with scanty or greasy coat

3.	Heat type of closed disorder rigid	Limbs, sudden loss of consciousness with locked jaws, and faecal and urinary retention as well as red face and fever, clenched fists	Tachypnea, bad breath, restlessness or agitation, excessive sputum or rattling sound in the throat. Possible contractions and hiccoughs	Wiry, slippery and forceful	red tongue with yellow greasy coat
4.	Cold type of closed disorder	Sudden loss of consciousness with locked jaws, rigid limbs, clenched fists, and faecal and urinary retention as well as pale complexion and dark lips	Cold extremities, quiet and still, excessive sputum and distention and fullness in the abdomen.	deep, slippery and decelera ting	white, greasy coat
5.	Abandon disorder		sudden loss of consciousness with flaccid extremities,	Thready ,	. Flaccid tongue

			opened mouth, closed eyes, faecal and urinary incontinence		
	Hemiplegia associated with qi deficiency and blood stasis	Unilateral weakness, fatigue and lassitude, numbness or oedema of the extremities and facial paralysis, loss of sensory and motor coordination	Sallow complexion, poor appetite, loose stool and slurred speech	Thready, choppy and weak	Dark purple tongue with petechial and white coat
6.	Hemiplegia associated with yin deficiency and yang rising	unilateral contracture of the affected extremities, headache, and red flush on the face	Tinnitus, dysphasia, agitation, dizziness, and numbness of the extremities	Wiry and forceful	: red tongue with thin yellow coat

Figure 9 Schematic diagram for wind stroke. (Source: Effect of scalp acupuncture on upper extremity functional recovery in chronic hemiplegia: A randomized control study.)



2.9.4 Clinical research in acupuncture on PSA:

Gangue and colleagues punctured nearby the area of the scalp shown by CT to parallel to the focus of aphasia due to stroke, and found to have better therapeutic effect than traditional scalp acupuncture [48]

According to TCM, acupuncture at specific acupoints is able to treat certain types of diseases. Zhang et al. have verified that electro acupuncture stimulation (EAS) at two pairs of acupoints in the same spinal segment arouses specific responses in brain images obtained with fMRI [49]

Yan, et al proven that the stimulation of real acupoints activated and deactivated specific brain areas compared with the responses to stimulation at sham acupoints innervated by the same spinal segments.[50]

The latest journal in 2016 has specified that acupuncture was demonstrated to be a favourable tool for improving functional recovery in stroke patients [51]

In Jin's 3 needles acupuncture, 3 needles are inserted on specific acupoints depending on the symptom such as slurred speech, aphasia, difficulty swallowing, spastic paralysis, etc. [52]. Zhang et al. and Wu et al. done a meta-analyses of studies where acupuncture as a treatment in post-stroke rehabilitation and found that acupuncture provided better benefits in stroke rehabilitation. [53, 54] The Ottawa Panel evidence-based clinical practice guidelines also find acupuncture as one of the major treatment choices for post-stroke rehabilitation [55].

Litscher, et al, after monitoring cerebral oxygen saturation in 12 subjects during and after acupuncture have presented that cerebral oxygen saturation increased from 69.9% before to 70.3% during and 70.2% after acupuncture ($p < 0.01$). [56] Studies in animals and humans have proven the efficacy of scalp acupuncture in cultivating neurologic deficits by altering hormone levels in circulation and blood flow in the brain [57].

In the CNS, endogenous opioids are the principal biological mediators of the therapeutic actions of the Acupuncture (Endorphin hypothesis). Recently,

several classes of molecules, such as neurotransmitters (catecholamine, serotonin acetylcholine, glutamate, and γ-aminobutyric acid [GABA]), neuropeptides, cytokines, and growth factors have been recognised as possible mediators for specific acupuncture effects [58]

Chang et all, confirmed the relationship between linguistic features and TCM syndrome and the long-term efficacy of treatment for PSA can depend on the Acupuncture. But more RCT are needed. [59] Similar studies were executed to investigate the effect of scalp acupuncture (or electronic scalp acupuncture or a combination of scalp and body acupuncture) plus language rehabilitation training; all of their outcomes demonstrate that the combined therapy was more operational than simple language training in cultivating basic language skills such as spontaneous speech, auditory comprehension, repetition, object naming and communication ability. [60]

A randomized controlled clinical trial with 160 participants performed by Ming et al indicated that electronic scalp acupuncture therapy was more useful than body acupuncture, [61]

Shengxiu proven that puncturing scalp areas increased the amount of blood flow to the cerebral cortex and improved the hypoxic condition, which result in functional recovery of the cortex. Puncturing scalp acupoints also enabled the formation of collateral circulation to the affected part and the reconstruction of neural pathways. [62]

Hongxing and Tangfa confirmed that scalp acupuncture synchronised the neuroendocrine system and its systolic and diastolic functions of blood vessels by stimulating the cerebral cortex in-order to reduce the amount of plasma endothelin released by nerve and endothelial cells, improving blood flow in the affected parts and helping the functional recovery of brain cells, thereby supporting language rehabilitation.[63]

Xin sheng and colleagues discovered that acupuncture significantly improved most haematological indices in patients with aphasia after acute stroke, saying that lowering of blood viscosity was the possible mechanism [64]

Thirty-three relevant articles were published between 1991 and 2000, whereas from 2001 to 2010 the number almost doubled, rising to 65. Moreover, more scientific designs were applied and more participants were involved. From 1991 to 2000, eight CT were performed, including three randomized controlled trials, whereas 39 controlled trials were directed between 2001 and 2010, of which 34, or almost 90%, were randomized.

Many clinical research studies have confirmed acupuncture to be an efficient adjuvant therapy in language training in the management of apoplectic aphasia. [65]

Clinical research shows that scalp acupuncture on motor area could expand cerebral blood vessels, increase cerebral blood flow, reduce infarct, and

promote the formation of cerebral collateral circulation to recover motor function in ischemic stroke. [66]

The mechanism likely to be stimulation of the reflex somato-topic system, the bioelectric effect is conducted to the cerebral cortex via meridians and nerves to change the excitability of cerebral cortical nerve cells and hasten the creation of cerebral collateral circulation [67]

A recent study justifies that the selection of points based on the TCM concept proved to be effective in the PSA. It explains that GV 15 and GV 16 are the throat energy center in the dorsal aspect of the body which regulates speech and communication. CV 22 and CV 23 are the throat energy centres in the front side of the body. GV 15 and GV 16 provide the link between the brain and speech. HT 5 regulates communication by giving mental clarity and rapid thinking, which form the basis of communication. This point also helps to flawless thinking by calming the mind and emotions. HT 5 also controls the Tongue thereby increasing the lingual fluency. [68]

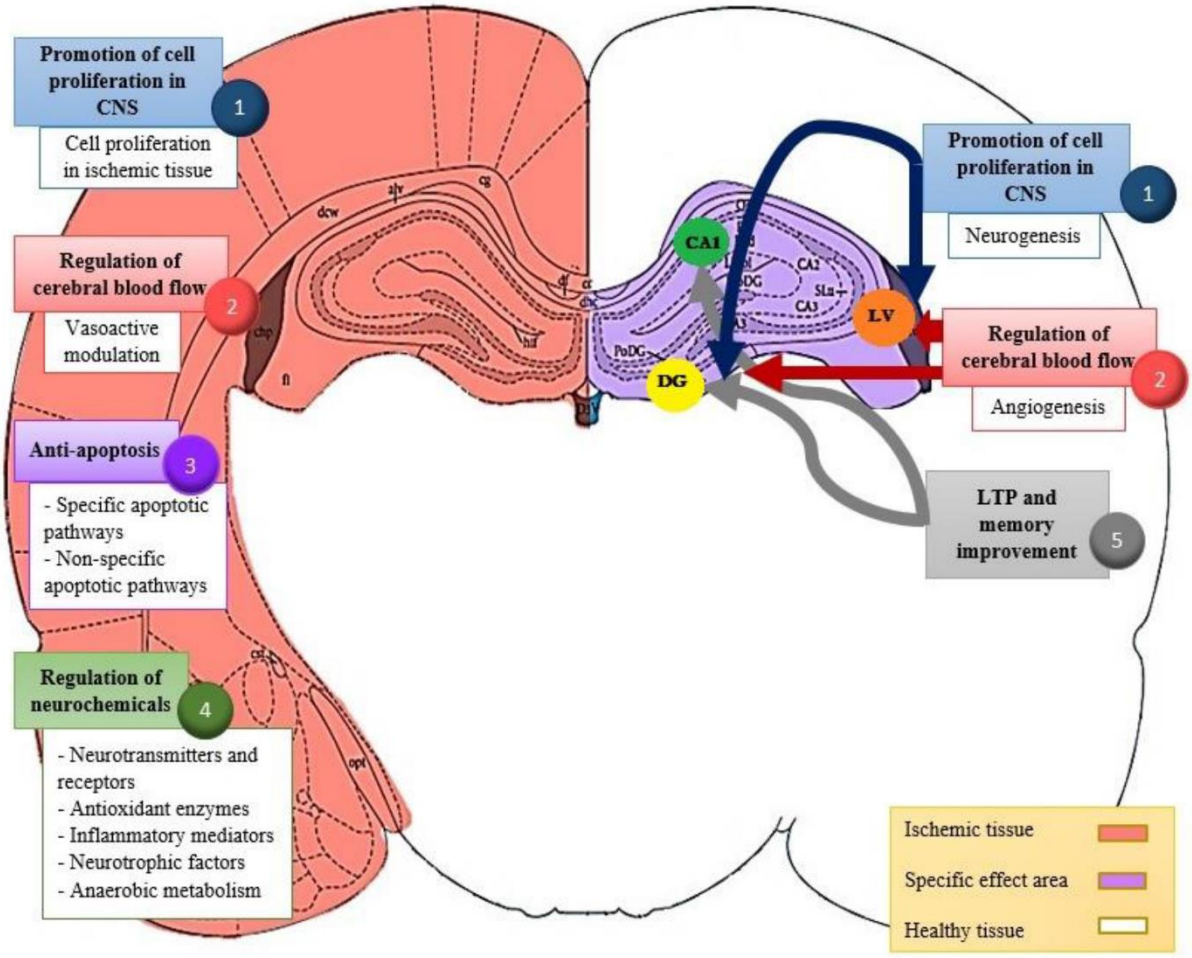
Chang, et al observed the changes in the linguistic scale and the instigation of brain function, before and after needling HT 5 and GB 39, in patients with sub-cortical aphasia. The results indicated that there was activation of the linguistic brain area after EA at HT 5 and GB 39, and also activation of the bilateral temporal cortex. Significant improvement in linguistic scale and the language function of the patients delivered objective evidence for the treatment of aphasia

with acupuncture at HT 5 and GB 39. Current research on acupuncture reliability and specificity is assessed by using fMRI technology. [69]

Kong, et al have demonstrated that the fMRI signal can precisely reflect the specificity of acupuncture in different individuals by using HT -5 and GB -39.[70]

Chinese scalp acupuncture is the contemporary acupuncture technique integrating traditional Chinese needling methods with western medical knowledge of representative areas of cerebral cortex. It is proven to be effective in treating acute and chronic central nervous system disorder. Scalp acupuncture often produces remarkable results with just a few needles and usually brings about immediate improvement, sometimes taking only several seconds to a minute. This effective therapy combined with body acupuncture were said to be having more desired effects mainly in Post Stroke Aphasia [71]

Figure 10 Mechanisms of Acupuncture Therapy in Ischemic Stroke Rehabilitation by Lina ET all, Mechanisms of acupuncture therapy in ischemic stroke rehabilitation: a literature review of basic studies, International journal of molecular sciences



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3. AIM AND OBJECTIVE:

3.1 Aim:

To evaluate the effect of scalp acupuncture & *Lianquan* (REN-23) and *Tongli* (HT-5) & *Xuanzhong* (GB-39) in apoplectic Aphasia

3.2 Objectives:

To compare the effect of scalp acupuncture & *Lianquan* (REN-23) and *Tongli* (HT-5) & *Xuanzhong* (GB-39) on speech improvement in apoplectic Aphasia.

4. HYOPTHESIS:

4.1 Null hypothesis (H_0):

Scalp acupuncture & REN-23(*Lianquan*) and HT-5 (*Tongli*) & GB-39(*Xuanzhong*) may have similar effect on MAST Score in patients with apoplectic aphasia.

4.2 Alternate hypothesis (Ha):

Scalp acupuncture & REN-23(*Lianquan*) and HT-5 (*Tongli*) & GB-39 (*Xuanzhong*) may not have similar effect MAST Score in patients with apoplectic aphasia.

5. MATERIALS AND METHODS

5.1 Study Design

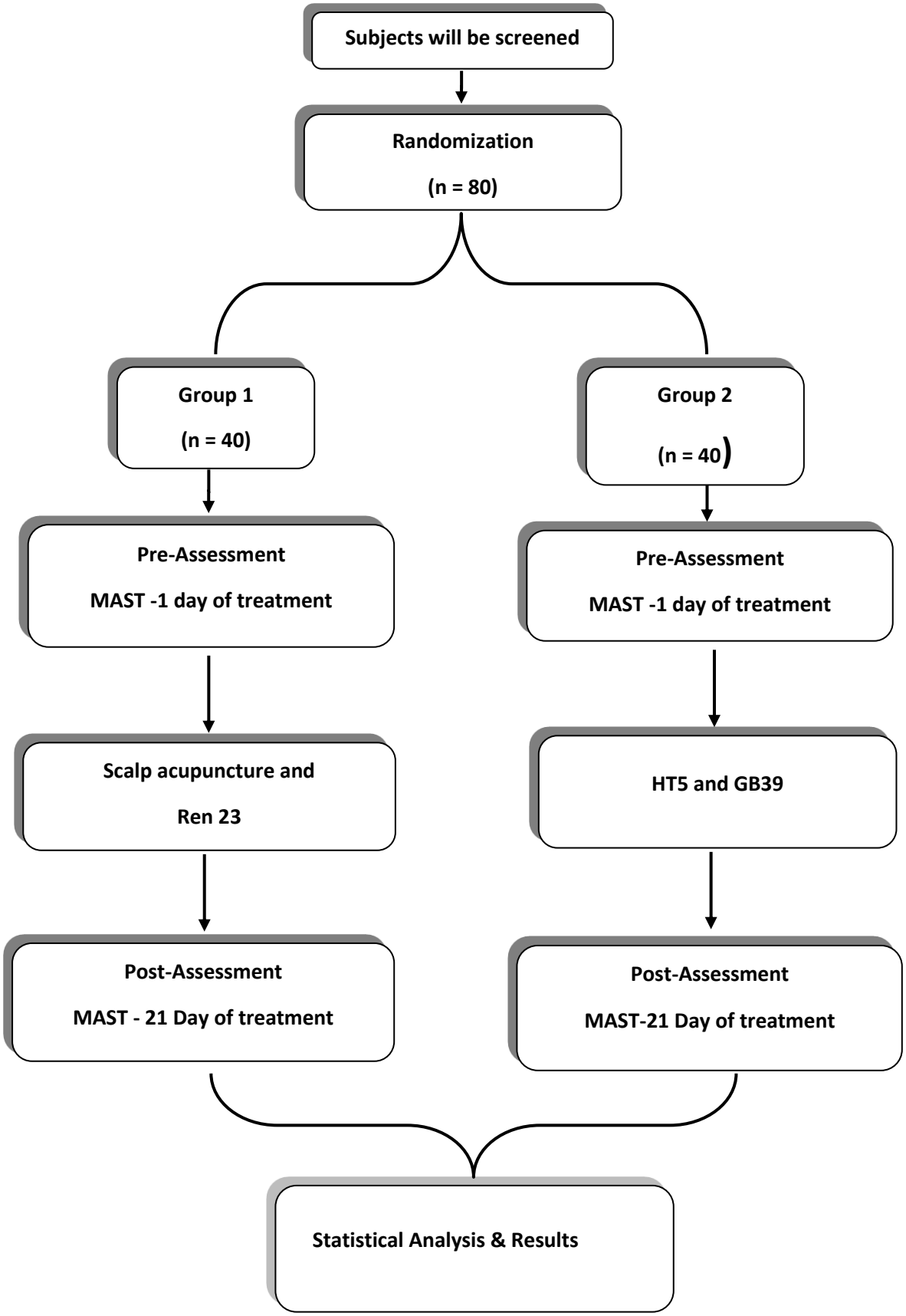
The study design adopted here was a comparative study. Eighty patients who are satisfying inclusion and exclusion criteria are selected and they were divided into group 1 and group 2 by using computer generated randomisation lottery method. Mississippi Aphasia screening test were assessed from the patients. Pre assessment was taken at the first day of the intervention.

Group-1 received the scalp acupuncture third speech area & *Lianquan* (Ren- 23) by penetration needling method at the depth of 1 cun horizontally and obliquely without stimulation for the duration of 20 minutes in 5 Days a week for 3 weeks.

Group-2 received *Tongli* HT-5 and *Xuanzhong* (GB-39), with the depth of 1 cun perpendicularly without any stimulation for the duration of 20 minutes in 5 Days a week for 3 weeks. The results will be then analysed. Then acupuncture needles removed from the acupuncture points gently from the site of insertion by using cotton swab. Then Mississippi aphasia screening test was taken from the patient. Then the post assessment was recorded.

5.2 Illustration of study plan

Figure 11 Illustration of study plan



5.3 Selection of study population

Total sample size N = 80 Subjects were recruited from Government Yoga and Naturopathy Medical College and Hospital, Arignar Anna Hospital of Indian Medicine & Homeopathy, Chennai – 106.

Subjects who satisfied the following inclusion & exclusion criteria were recruited for the study.

5.3.1 Inclusion criteria:

- Age group:30 to 55 years
- All Genders
- People who are ready to give their consent
- People who are having Stroke for more than Three months
- People who are under Medication

5.3.2 Exclusion criteria:

- Pregnancy
- Lactation
- Skin Ulcers
- Children
- Old age
- People who are having Stroke more than 5 years

5.3.3 Withdrawal criteria:

All subjects were free to withdraw from participation in the study at any time, for any reason, specified or unspecified, and without prejudice to further treatment. Subjects who are withdrawn from the study was not replaced.

5.4 Ethical considerations

Subjects who full fill the inclusion criteria were appraised about the purpose of the study and their rights as research subjects. Informed consent form was administered in English. Adequate time was given to the participants to go through the information sheet and their queries were answered. Their rights to withdraw anytime from the study and the need for willingness to participate voluntarily in the study were explained. All the subjects expressed their willingness to participate in the study by giving a signed informed consent. (A sample information sheet and consent form were enclosed in Annexure) Ethical clearance was obtained from the Institutional Ethical Committee prior to the start of the study and the approval for the same was granted.

5.5 Assessment

Speech improvement was assessed by Mississippi Aphasia Screening Test. Base line data was taken on the day of initiation of acupuncture therapy and the end line data was taken on the day at the completion of therapy. MAST scale contains two subscale that is expressive subscale and receptive subscale.

The Mississippi Aphasia Screening Test (MAST) was developed as a short-term, repeatable screening test to measure the impaired communication/language skills. Such a brief measure may be beneficial for individuals with severe language impairments. So, they will not become impatient or over stress by taking longer time to

assess the Aphasia. The MAST was designed to use as a serial assessments to detect changes in language abilities over time.

The MAST was developed by a team of experienced neuropsychologists, physiatrists, and speech-language pathologists. The current MAST has nine subtests which range from 1 to 10 items per subscale. The time duration taken by MAST ranging from 5 to 15 minutes. The subtests include naming, automatic speech, and repetition, and yes or no question, recognition, responding to commands and writing Studies shows that it is very effective tool to grade the expense of post stroke aphasia. [72]

The MAST scale consists of nine subtests for assessing

Expressive subscale (subtests 1–3 and 8–9:

1. Naming,
2. Automatic Speech,
3. Repetition,
4. Verbal Fluency
5. Written/Spelling to Dictation subtest)

Receptive language (subtests 4–7:

1. Yes/No Accuracy,
2. Object Recognition from Field of Five,
3. Following Verbal Instructions,
4. Reading Instructions subtest).

Two points are given for each correct answer and zero points for each incorrect answer. The only exception is the Verbal Fluency subtest in which the scoring is different (0 points given for 0–5, 5 points for 5–10, and 10 points for 11 and more intelligible verbalizations). There are two possibilities for analysing patients' performance:

i. to write all words that the patient verbalizes and code unintelligible utterances with a dash;
ii. To tape the patients' response and transcribe it afterward.

Each subtest adds up to 10 points, except for the fourth subtest (Yes/No Accuracy), which adds up to 20. The sum of subtests 1–3 and 8–9 scores form the MAST-E (range 0–50), while the subtests 4–7 form the MAST-R (range 0–50), and the sum of all subtests forms the MAST-T (range 0–100). The MAST-T helps to explain the presence of aphasia and its severity. By comparing MAST-E and MAST-R, it is possible to get a primary impression of which language domain is more damaged: expressive or receptive language.

In the original version of MAST, there is a possibility to give optional ratings (presence or absence), such as dysarthria, paraphasia, perseveration, and orientation. These do not affect the MAST-T. Stimulus materials include one photograph, five written instructions (each instruction on a separate page) and five common everyday objects (e.g., pen, keys, watch). In the subtests Object Recognition from Field of Five and Written/Spelling to Dictation, a table or hard folder is needed.

The MAST has become an extensively used screening tool for assessing stroke patients with aphasia. The original English version of the MAST was issued in 2002 (Nakase-Thompson et al., 2002) and validated in 2005 (Nakase-Thompson et al., 2005). The test has been validated in the varied languages such as Czech, Spanish, Telugu, and Persian languages, (Khatoonabadi, Nakhostin-Ansari, Piran, & Tahmasian, 2015; Kostalova et al., 2008; Nagendar & Ravindra, 2012; Romero et al., 2012).

In one study The MAST score was administered in 50 left hemisphere stroke patients with aphasia (LHA+ group) in the acute phase after the stroke and 126 healthy volunteers in a control group (CG), stratified by age and level of education. Nonparametric tests were used to get normative values, compare the values of the MAST scores between the LHA+ group and the CG, in order to assess the discriminant validity, sensitivity, internal consistency and specificity of the MAST total score. (MAST-T), expressive score (MAST-E), and receptive score (MAST-R) correlated with age and educational level, and the normative values were accustomed accordingly. The LHA+ group exhibited more impairment than the CG in all subtests and summary scores. The internal reliability of the MAST score was higher for the whole sample and LHA+ group. The sensitivity and specificity of the MAST using the 5th percentile were 74% and 94%. So, MAST test is more reliable in assessing aphasia in early stroke. [72]

5.6 Intervention

5.6.1 Group 1:

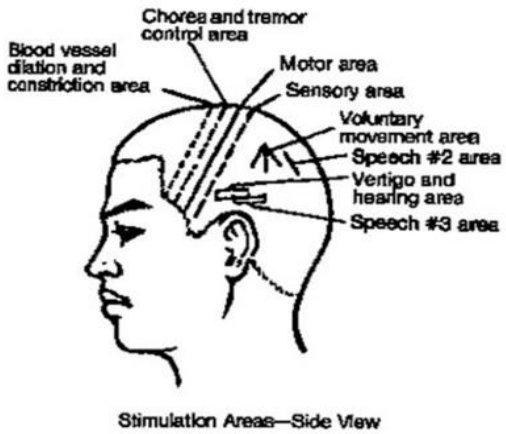
Group 1 received the combination of scalp acupuncture and body acupuncture, Sterile Acupuncture needle was inserted with penetration needling Horizontally 1 cun along the Skin in the Scalp Speech Area 3 and 1 cun obliquely along the skin in REN 23 (*Lianquan)*. The needle was kept without manual or electrical stimulation for the Duration of 20 minutes (5 days/week) for 3 weeks. Utmost care was given to the patient during the treatment.

5.6.1.1 Scalp acupuncture third speech area:

Location: A parallel line overlaps half of the Vertigo and Hearing Area, starting from the midpoint of the Vertigo and Hearing Area and continues 4cm posteriorly. 4 cm backwards from the midpoint of the vertigo and hearing area and 1.5 cm from the apex of the ear

Needling: Horizontal insertion from anterior to posterior up to 1-1.5 cun.

Figure 12 Scalp 3rd speech area, (Source: Scalp acupuncture by H.B.Kim)



5.6.1.2 Ren mai 23 or Conceptional vessel 23 or Lianquan (meaning pure spring)

Location: On the mid-line, in the angle between the throat and the chin, above the Adam's apple, just superior to and in the depression above the hyoid bone. Another way of locating it is that it usually lies midway between the tip of the cricoid cartilage and the border of the mandible (i.e., the chin bone) – but you've still got to locate the cricoid cartilage which is the cartilage inferior to the laryngeal prominence, the Adam's apple

Needling: Oblique insertion toward tongue root 1 – 1.5 cun.

Figure 13 Ren mai 23, (Source: Clinical Acupuncture)

5.6.2 Group - 2:

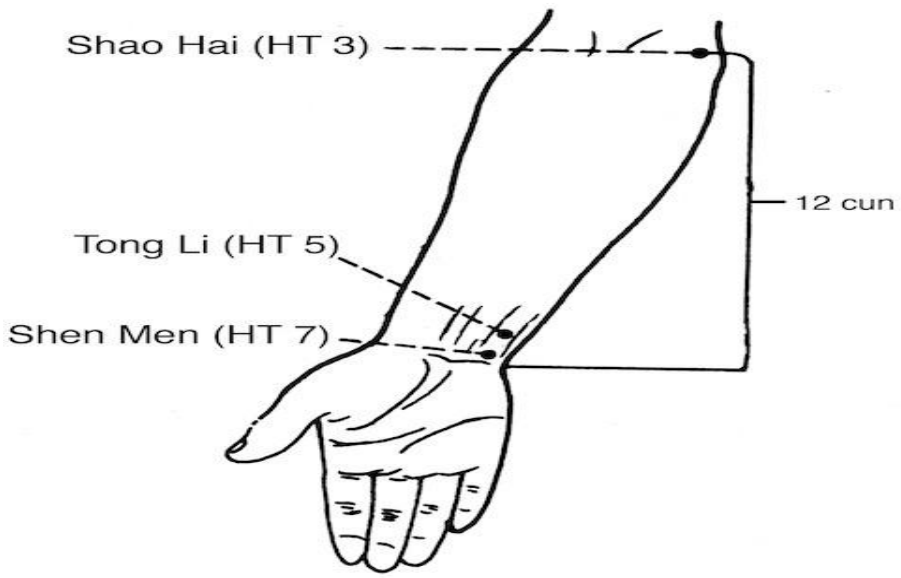
Group 2 received two body acupuncture points, Sterile Acupuncture needle was inserted with penetration needling perpendicularly 1 cun along the Skin in HT-5 and obliquely on GB-39 for the Duration of 20 minutes (5 days/week) for 3 weeks. Utmost care was given to the patient during the treatment.

5.6.2.1 Heart -5 or Tongli (meaning Inner communication)

Location: When the palm faces upward, the point is on the radial side of the tendon of m. flexor carpi ulnaris, 1 cun above the transverse crease of the wrist.

Needling: O.5 cun -1 cun perpendicularly

Figure 14 Heart -5, (source: Clinical acupuncture)



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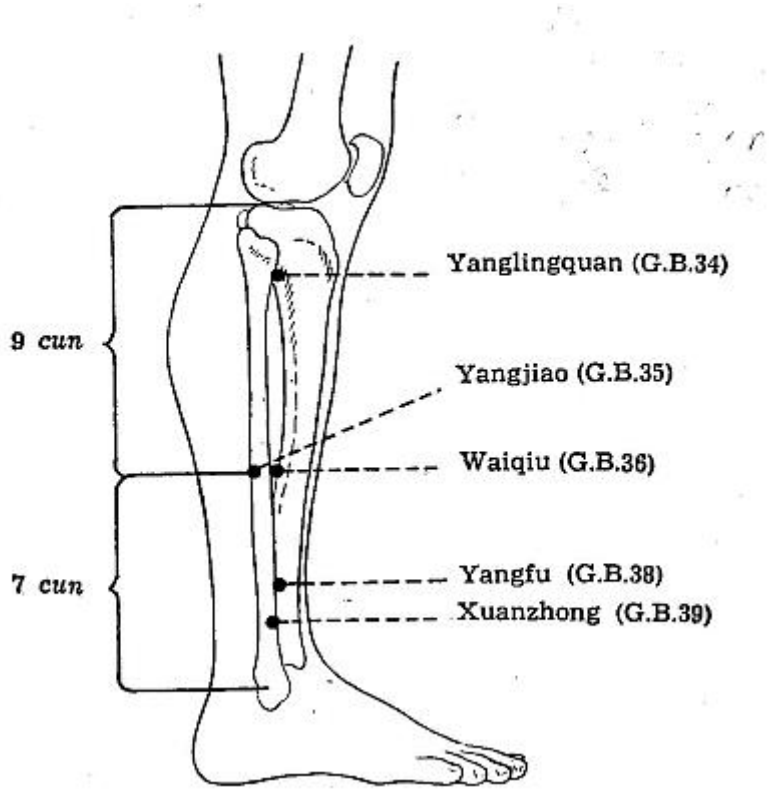
5.6.2.2 Gall bladder 39 or Xuanzhong (meaning hanging bell):

Location: 3 cun above the tip of the external malleolus, in the depression between the posterior border of the fibula and the tendons of muscle peroneus longus and brevis.

Needling: 0.5-1 cun obliquely

Figure 15 Gall bladder -39, (Clinical Acupuncture)



5.7 Data analysis:

Within group analysis was done using paired samples-t-test and between group analyses was done using independent samples test with the use of statistical package for the social sciences, version 16.

6. RESULTS

By comparing the difference between scalp acupuncture & REN -23 and HT -5 &GB 39, and the result shows the value of p <0.185 which is not significant.

Both group 1 and group 2 have significant result in post stroke aphasia however, when comparing between the groups the result is not significant.

Table 3 Demographic details between groups

Variables	Group 1	Group 2	p.value
Age(years)	44.15 ±7.72	46.95 ±6.10	0.076
Gender	Female n =3 Male n =37	Female n =1 Male n =39	
Marital status	Married =35 Unmarried =5	Married =40 Unmarried =0	
Height(m)	1.62 ± 0.10	1.63 ±0.09	0.568
Weight(kg)	57.84 ±11.53	64.13 ± 9.67	0.010
BMI(Kg/m2)	22.07 ±4.01	24.08 ±2.97	0.000

Note:

BMI =Body Mass Index

Table 4 pre-test and post-test assessment of group 1 and group 2

Variables		Group 1	Group 2	P.Value
Total Expressive Subscale	Pre test	21.35 ±11.55	19.55 ± 11.66	0.490
	Post test	32.85 ±8.42	30.55 ±7.96	0.213
Total Receptive Subscale	Pre test	30.13 ±12.06	30.33 ±10.13	0.936
	Post test	36.10 ±9.18	33.05 ±8.97	0.137
Total MAST Scale score	Pre test	51.05 ±22.75	49.90 ±20.55	0.813
	Post test	68.45 ±17.09	63.60 ±15.32	0.185

Note:

MAST=Mississippi Aphasia Screening Test

Values are expressed in Mean ± Standard Deviation

By observing the mean within group analysis of group 1 both expressive subscale and receptive subscale shows significant difference between pre and post data. This shows that the Scalp combined with body acupuncture point REN-23 proven to be effective in apoplectic aphasia.

Table 5 Pretest and Posttest assessment of group 1:

Variables	Pre Test	Post test	P.Value
Expressive subscale	21.35 ±11.55	32.85 ±8.42	<0.001
Receptive Subscale	30.13 ±12.06	36.10 ±9.18	<0.001
Total MAST score	51.05 ±22.75	68.45 ±17.09	<0.001

Note:

MAST=Mississippi Aphasia Screening Test

By observing the mean within group analysis of group 2 both expressive subscale and receptive subscale shows significant difference between pre and post data. This shows that the Selective body acupuncture points HT-5 and GB-39 proven to be effective in apoplectic aphasia.

Table 6 Pretest and posttest assessment of group 2:

Variables	Pre Test	Post test	P.Value
Expressive subscale	19.55 ± 11.66	30.55 ±7.96	<0.000
Receptive Subscale	30.33 ±10.13	33.05 ±8.97	<0.000
Total MAST score	49.90 ±20.55	63.60 ±15.32	<0.000

7. DISCUSSION

The present study results showed that combination of scalp acupuncture point 3rd speech area and the body acupuncture point Ren -23 (Lianquan) has given significant improvement in the speech and comprehension in the patients with post stroke aphasia. The radical combination of body acupuncture points HT-5 (Tongli) and GB-39 (Xuanzhong) also gave similar effect in language fluency and speech production.

Scalp acupuncture is a special acupuncture method emerged in recent decades. It is an innovative treatment modality by integrating traditional Chinese meridian theory and the reflex somatotopic system organized on the surface of the scalp in Western medicine. It is based on both TCM and Western medicine concept by inserting acupuncture needles subcutaneously into specific area on the scalp corresponding to the cortical areas of the cerebrum liable for central nervous system functions such as motor function, sensory input, speech, hearing, and balance, [73] it could function in therapeutic effect for treating acute and chronic central nervous system disorders.

In scalp acupuncture the point third speech area lies above the temporal aspect of the brain. It lies in accordance with major speech centres and its association centres. The mechanism behind its action is the reflex excitatory stimulus increases the blood circulation to the cortical areas thereby increasing the collateral formation. The ischemic areas will be vascularized.

In some studies, explains the stimulation leads to the release of excitatory neurotransmitters and regulates the normal functioning of the cerebral cortex may be possible mechanism underlying the Scalp Acupuncture. [74]

According to the theory of energetics of living systems applied to acupuncture, post stroke aphasia is caused by a disruption of the Kidney and the Spleen, creating Deficiencies of Qi, Blood, and Yin. According to TCM, These Deficiencies cause the body to be overwhelmed by Wind, Phlegm, Fire, and Stasis.

Ren 23 is the point lies directly below the tongue act as crossing point of yin Wei channel and it also represented as the throat centre in ren mai meridian. This point is indicated for slurred speech, sore throat in both classic texts and modern control studies [75]

The theory of TCM holds that advanced cognition is closely related to the human brain, and it is specified in the Compendium of Materia Medica (Ben Cao Gang Mu), written by LI Shi-Zhen, in the Ming Dynasty, that "Primordial spirit comes from the brain." In the Zangxiang theory of CM, the physiology and pathology of the brain are thoroughly connected to the Xin (Heart), one of the five zang organs: "The Xin is the major organ among five zang and six Fu organs and the residence of the spirits." Hence, advanced cognitive activity is strictly related to the brain and the Xin. HT 5 is the Luo-connecting point of the Heart Meridian of Hand-Shao yang. Through a collaterals path (named Luo-Mai in TCM), HT 5 is closely associated to the tongue. Meanwhile, language is a part of cognition and rest on a flexible tongue. Since TCM holds "the Xin dominates the mind activity" and "the tongue body movement and language expression function depend on the Xin," HT 5 is closely related to language

function. GB 39 is a point in the Gall bladder Meridian of Foot-Shao yang. The Gall bladder dominates judgment and decision in mental activity. Integrating syndrome differentiation of Zangxiang theory and meridian theory, HT 5 and GB 39 have been selected for research in order to identify the underlying mechanisms of acupuncture efficacy on aphasia based on fMRI study showed that by puncturing HT-5 and GB-39 influences the complex network of language processing of frontal, parietal and temporal lobes.it is suggesting that this point may have effect on recovery from post stroke aphasia. [76]

During the course of study both the groups showed improvement in speech and language fluency. Over all the results showed that 3rd speech area of scalp acupuncture and REN-23 (Lianquan) as well as HT-5 (Tongli) and GB-39 (Xuanzhong) has significant role in recovery of language communication and comprehension in Apoplectic Aphasia but when compared between the group one group is not more significant than other.

7.1 Strength of the study:

The pricking of acupuncture needle on the point was pricked exactly for all the patient by well experienced certified doctor. Probably this could be the first comparative study documented about the effect of Scalp Acupuncture & *Lianquan* (REN-23) And *Tongli* (HT-5) & *Xuanzhong* (GB-39) in apoplectic aphasia.

7.2 Implications:

i. For Early intervention and to prevent the lifelong deformity and economic loss for individual family and country Mass screening is essential.
ii. Along with speech therapy, family and community support and motivation is also necessary for the PSA patients
iii. The quality of life of the post stroke patients should be improved so that the psychological burden for the patient and their family will be spared so that it will not implicate more on the illness of the patient.

7.3 Limitations:

The current study was done with a minimum number of subjects with the treatment of three week and further follow up was not done in the study. The outcome variable (MAST) used in the study is subjective one.

7.4 Recommendations for future study:

The same study can be conducted on a larger population and longer duration with suitable study design and some objective kind of outcome variables could be included to validate the current results.

More study should be conducted on both quantitative and qualitative aspect so that lifelong disability will be alleviated from chronic aphasia patients.

8. CONCLUSION

The present study showed that 3 weeks of treatment of Scalp acupuncture & *Lianquan* (REN-23) And *Tongli* (HT-5) & *Xuanzhong* (GB-39) had significant improvement in the post stroke aphasia. When comparing both groups, both have similar improvement not more difference between them. So, this is more effective method than other conventional therapies.

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ANNEXURE –I

SCREENING FORM

Govt. Yoga and Naturopathy Medical College & Hospital,

Arumbakkam, Chennai- 600106

TITLE OF THE STUDY: Effect of scalp acupuncture & *Lianquan* (REN-23) and *Tongli* (HT-5) & *Xuanzhong* (GB-39) in apoplectic aphasia: A comparative study

DEMOGRAPHIC DETAILS:

Screening ID No: Date:

Name of the participant: Contact number:

Gender: Age (years):

Address:

1. ELIGIBILITY CRITERIA

Inclusion criteria:

Are you willing to give written informed consent?	Yes	No
Is your age between 30 and 55 years? Are you having Aphasia after Stroke for more than three months?	Yes Yes	No No
Are you taking any medications?	Yes	No
Are you willing to participate in the procedure?	Yes	No

Exclusion criteria:

Are you currently participating in any other clinical trial in the same hospital or other site?	Yes	No
Do you have any of the following conditions or other conditions that would prevent participant completing the trail?	Yes	No
• Skin Ulcers	Yes	No
• Pregnant or lactating (for women)	Yes	No
• Very old age	Yes	No
Do you have stroke for more than Five years?	Yes	No

Note: Based on the eligibility criteria the subject is **Eligible**/**Not eligible** to participate in the study

2. RANDOM ALLOCATION (for eligible Subjects only)

Subject is allocated to Group 1 (Scalp acupuncture & REN-23)/ Group 2 (HT-5 & GB-39) using simple random method

Principle investigator's signature: Date:

ANNEXURE – II

INFORMED CONSENT FORM

Government Yoga and Naturopathy Medical College,

Arumbakkam, Chennai-600106

TITLE OF THE STUDY: Effect of scalp acupuncture & *Lianquan* (REN-23) and *Tongli* (HT-5) & *Xuanzhong* (GB-39) in apoplectic aphasia: A comparative study

PRINCIPAL INVESTIGATOR (PI): Dr. L. Anto Princy

PARTICIPANT'S NAME :

I have been invited to participate in the research study titled **"**Effect of scalp acupuncture & *Lianquan* (REN-23) and *Tongli* (HT-5) & *Xuanzhong* (GB-39) in apoplectic aphasia: A comparative study". I understand that it will involve the treatment of Acupuncture, which may be useful for my well-being. I have been informed that pre and post assessments of my Speech condition will be analyzed using standardized Questionnaire called Mississipie Aphasia Screening Test.

I am aware that there may be no benefit to me personally and that I will not be compensated whatsoever.

I had given the opportunity to ask questions about the study and the questions what I asked have been answered to my satisfaction.

I understand that I have the right to withdraw from the research at any time without

affecting my medical care or legal rights.

Hereby, I confirm that I have understood the above study. I myself consciously give consent to participant in this study.

Date: **Patient's Signature:**

I have accurately read or witnessed the accurate reading of the consent form to the potential participant, and the individual has given opportunity to ask questions. I confirm that the individual has given consent consciously.

Date: **PI's Signature:**

ANNEXURE – III

PROFORMA

Government Yoga and Naturopathy Medical College,

Arumbakkam, Chennai-106

TITLE OF THE STUDY: Effect of scalp acupuncture & *Lianquan* (REN-23) and *Tongli* (HT-5) & *Xuanzhong* (GB-39) in apoplectic aphasia: A comparative study

DEMOGRAPHIC DETAILS:

Subject Code: Name:

Gender: Age (years): Marital status:

Education: Occupation:

Address (PIN): Residing at: Urban/Rural

Height (meter): Weight (kg): BMI (kg/m^2):

OUTCOME MEASURES:

Date of assessment		
Parameter	Pre test	Post test
Mississipie Aphasia Screening Test score		

ANNEXURE – IV

MS APHASIA SCREENING TEST

NAMING (2 points each; present object and ask .*What is this called*?)

1) _____ Pen

2) _____ Hand *(point to both sides of your hand)*

3) _____ Thumb

4) _____ Watch

5) _____ Ceiling *(also accept light)*

AUTOMATIC SPEECH (2 = correct; 0 incorrect; for items 3-5 say .*Finish these sentences for me*...)

1) _____ Count to ten (1 = cueing required)

2) _____ Tell me the days of the week (1 = cueing required)

3) _____ three strikes and you.re _____.

4) _____ I pledge allegiance to the _____.

5) _____ the phone is off the _____.

REPETITION (2 points correct; 0 = incorrect; Say .*Repeat these words*.)

1) _____ pot

2) _____ carrot

3) _____ alphabet

4) _____ under the old wooden bridge

5) _____ the silver moon hung in the dark sky

YES/NO RESPONSES (2 pts; .y. =yes; .n. = no; *.I'm going to ask some questions; just tell me yes or no*.)

1) _____ is your name *Johnson* (change if last name is Johnson)

2) _____ is your name _____? (Insert correct last name)

3) _____ Do you live in *Rhode Island*?

4) _____ Do you live in _____? *(Insert correct state)*

5) _____ Do you wear a glove on your foot?

6) _____ Am I touching my eye (clinician touches his/her nose)?

7) _____ does Monday come before Tuesday?

8) _____ does summer come after spring?

9) _____ is a chicken bigger than a spider?

10) _____ Do you put your shoe on before your sock?

OBJECT RECOGNITION IN A FIELD OF FIVE (2 pts each; last 3 objects can use following possible items: Book, paper, pen, photo, coin, name badge, and cup)

_____Watch _____ ( ) *.I want to show you some things, point to them as I call them out...*

_____ Keys _____ ( )

_____ ( )

Following Instructions (2 points each)

1) _____Point to your nose

2) _____Open your mouth

3) _____With your left hand, point to your right eye.

4) _____Point to the floor, then point to your nose.

5) _____Before opening your mouth, touch your ear.

Name: _____

Date: _____ DOB: _____

Handedness: _____

Education: _____

Date of Onset: ____/____/_____ *Side 1*

MS APHASIA SCREENING TEST

Reading Instructions (2 points each h)

1) _____Open your mouth *(.Read this aloud and do what it says.)*

2) _____ Make a fist *(Now read the next few silently to yourself and do what it says.)*

3) _____Point to the floor, then point to the ceiling.

4) _____With your right hand, point to your left knee.

(Alternative: With your left hand, point to your right knee)

5) _____Point to your left ear after you make a fist.

VERBAL FLUENCY DICTATION: [SIDEWALK] write all words that the patient verbalizes and code unintelligible utterances with a dash (. ! .); OR TAPE PT RESPONSE AND TRANSCRIBE AFTERWARDS

INSTRUCTION: Show the photo (10 seconds) and say, .*Look at this picture for a while (pause) Now tell me everything that you can about this picture; keep talking until I tell you to stop.* , immediately start timing for 10 seconds...

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

Number of Intelligible Verbalizations

Subscale score Conversion: 0-5 intelligible verbalizations = 0; 5 - 10 = 5; 11+ = 10 points.

Writing/Spelling (2 points each) .*Now I would like for you to write some words for me, spell* ___.

1 _____sit

2 _____twist

3 _____airplane

4 _____ computer

5 _____ under the black bridge

EXPRESSIVE INDEX RECEPTIVE INDEX TOTAL INDEX

Naming _____ /10 Yes/No Accuracy _____ /20 Expressive _____ /50

Automatic Speech _____ /10 Object Recognition _____ /10 Receptive _____ /50

Repetition _____ /10 Following Instructions _____ /10

Writing _____ /10 Reading Instructions _____ /10

Verbal Fluency _____ /10

Expressive Subscale _____/50 Receptive Subscale _____/50

Total Score _____/100

Optional Ratings (indicate presence. +. Or absence.-.)

Dysarthria: _____ Paraphasic: _____

Perseveration: _____ Oriented: _____

Name: _____

Observations: _____

_____

Side 2