

TC
YEDİTEPE UNIVERSITY
INSTITUTE OF HEALTH SCIENCES
DEPARTMENT OF PHYSIOTHERAPY AND REHABILITATION

**INVESTIGATION OF
PHYSICAL ACTIVITY LEVEL
AND
DEPRESSION
IN HEMIPLEGIA**

MASTER THESIS

ESİN ERTAŞ

ISTANBUL - 2021

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SUPERVISOR

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İSTANBUL – 2021

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Programme : Physiotherapy and Rehabilitation
Title of the Thesis : Investigation of Physical Activity and Depression in Hemiplegia
Owner of the Thesis : Esin ERTAŞ
Examination Date : 30.06.2021

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APPROVAL

This thesis has been deemed by the jury in accordance with the relevant articles of Yeditepe University Graduate Education and Examinations Regulation and has been approved by Administrative Board of Institute with decision dated and numbered

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DECLARATION

I hereby declare that this thesis is my own work and that, to the best of my knowledge and belief, it contains no material previously published or written by another person nor material which has been accepted for the award of any other degree except where due acknowledgment has been made in the text.

30.06.2021

Esin Ertaş



DEDICATION

I would like to dedicate my thesis to my lovely parents Sultan and Saffet ERTAŞ, and my brother Erdem ERTAŞ who always encourages me with his endless support, and my lovely sister Evrim KARATAŞ.



ACKNOWLEDGEMENT

First of all, I would like to present my deepest appreciation to my thesis advisor Prof. Rasmi Muammer for her persistent help and guidance.

I would also like to thank Prof. Hafize Sezer whose guidance and knowledge shed light on this process and provided me with the sincerest support.

And finally, I would like to present my sincere thanks and love to my dear family, who provided all the spiritual support without question.



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LIST OF SYMBOLS / ABBREVIATIONS

ACSM	American College of Sports Medicine
CDC	Centers for Disease Control and Prevention
PA	Physical Activity
BMI	Body Mass Index
mRS	Modified Rankin Scale
FAC	Functional Ambulation Scale
IPAQ	International Physical Activity Questionnaire
BI	Barthel Index
BDI	Beck's Depression Inventory
SIS	Stroke Impact Scale
VEM	Very Early Mobilisation
SCU	Stroke Care Unit
MET	Metabolic Equivalent of Task
MH	Mental Health
ADL	Activities of Daily Living
IADL	Instrumental Activities of Daily Living
LPAL	Low Physical Activity Level
MPAL	Moderate Physical Activity Level
HPAL	High Physical Activity Level

ABSTRACT

Ertas, Esin (2021). Investigation of Physical Activity and Depression in Hemiplegia. Yeditepe University, Institution of Health Sciences, Department of Physiotherapy and Rehabilitation, Master Thesis, Istanbul.

This study aimed to investigate the physical activity and depression in hemiplegia after stroke. This study was conducted with 29 (17 F, 12 M) ambulators and physically active participants between the ages of 29-83 and between May 2020 and May 2021. For the assessment; the Demographic Characteristics of Participants Form is used for the information of age, height, weight, the period after stroke, affected side and types of stroke. Modified Rankin Scale was used for identifying disability levels. Functional Ambulation Classification was used for ambulation evaluation. Stroke Impact Scale version 3.0 was used for multidimensional stroke outcomes evaluation. The short version of IPAQ was used to analyze physical activity levels. Beck's Depression Inventory was used to measure characteristic attitudes and symptoms of depression. Barthel Index was used to measure disability or dependence in activities of daily living in stroke patients. Beck's Depression Inventory was used to measure characteristic attitudes and symptoms of depression. At the end of the study, each scale's scores are compared. Statistical analysis was made using SPSS 26.0 (Statistical Package for the Social Sciences). Factors that affect PA was; disability level, ambulation level, communication skills, ADL, mobility and participation in activities ($p<0.05$). Factors that affect depression was; disability level, ambulation level, ADL, mobility and participation in activities and additionally to all these; strongly emotional state ($p<0.05$). Additionally, the results of this study show that there is a relationship between physical activity and depression in females and in hemorrhagic type of stroke. Additionally; disability level, ambulation level, activities of daily living, mobility and participation of activity have been found in association with physical activity and depression. ($p<0.05$).

Key words: stroke, hemiplegia, physical activity, depression

ABSTRACT (Turkish)

Ertaş, Esin (2021). Hemipleji Hastalarında Fiziksel Aktivite ve Depresyonun İncelenmesi. Yeditepe Üniversitesi, Sağlık Bilimleri Fakültesi, Fizyoterapi ve Rehabilitasyon Bölümü, Yüksek Lisans Tezi, İstanbul.

Bu çalışmanın amacı; inme sonrası hemipleji hastalarında fiziksel aktivite ve depresyonun incelenmesidir. Mayıs 2020-2021 tarihleri arasında, yaşları 29-83 arasında ambule ve fiziksel olarak aktif olan katılımcılarla yapılan çalışmaya toplam 29 katılımcı katılmıştır. Yaş, BMI, inmeden sonra geçen zaman, etkilenen taraf ve inme çeşidi bilgileri için Katılımcıların Demografik Özellikleri Formu kullanılmıştır. Disabilite seviyesini belirlemek için Modified Rankin Skalası, ambulasyon seviyesini tespit etmek için Fonksiyonel Ambulasyon Kategorisi, inmenin çok boyutlu parametrelerini değerlendirmek için İnme Etki Ölçeği v 3.0, fiziksel aktivite düzeyini belirlemek için Uluslararası Fiziksel Aktivite Anketi – Kısa Form, günlük yaşam aktivitelerini ölçmek için Barthel İndeksi, depresyon değerlendirmesi için Beck Depresyon Envanteri kullanılmıştır. Çalışmanın sonunda her bir skala skorları karşılaştırılmıştır. İstatistiksel analiz SPSS 26.0 programı ile yapılmıştır. Fiziksel aktiviteyi etkileyen faktörler disabilite seviyesi, ambulasyon düzeyi, iletişim becerisi, günlük yaşam aktiviteleri (GYA), mobilite ve aktiviteye katılımıdır ($p<0.05$) Depresyonu etkileyen faktörler ise disabilite seviyesi, ambulasyon düzeyi, GYA, mobilite, aktivite katılımı, ve bunlara ek olarak duygu durumudur ($p<0.05$) Bu çalışmanın sonuçları kadınlarda ve hemorajik tip inmede fiziksel aktivite ve depresyon arasında bir ilişkinin bulunduğunu göstermiştir ($p<0.05$) Disabilite seviyesi, ambulasyon düzeyi, günlük yaşam aktiviteleri, mobilite ve aktivite katılımı fiziksel aktivite ve depresyon ile ilişkilidir. ($p<0.05$)

Anahtar kelimeler: inme, hemipleji, fiziksel aktivite, depresyon

1. INTRODUCTION and PURPOSE

“Any bodily action produced by skeletal muscle that results in energy expenditure above a base level” is how physical activity is defined [1] and one of the top causes of mortality is stroke in the globe, as well as a primary cause of complex disability. [2] and depression which is usually ignored by patients is one of them. [3] Every year, 16 million people worldwide suffer from a stroke. While the number of people who die from a stroke has reduced in recent years, the number of people who are disabled as a result of a stroke has remained high. [4]. Physical activity is reduced after a stroke [5, 6] This could lead to additional activity restrictions and disability [7].

Physical inactivity affects 28.5% of men and 31.5% of women, and it gets worse as people get older and this is a percentage about 50% of those ages is older than 75 years [8]. In general, studies have found that increasing physical activity reduces the risk of stroke or mortality between 25% - 30% percentage [9]. According to growing studies, physical activity with greater levels before a stroke is connected to better results. [10-13].

And previous studies also found that a subgroup of PA such as fitness upgrades undesirable results after strokes, such as decreased self-confidence, faster movement patterns, and better tolerance [14]. Furthermore, stroke survivors should found one way to maintain their physical activity which is actually needed to protect the benefits of a training program [15] and this knowledge is trying to be placed into clinical practice with the growth of community movement after stroke services [16]. As a result, the ideal way is unknown about how to encourage people who suffer from stroke to enhance their PA levels. For all of these reasons, professionals involved in stroke care should be mindful and attentive to the role of PA in guiding stroke survivors. Specifically, mobility issues might cause a decrease in patients' PA levels after stroke. [17] Balance issues, loss or impairment of sensation, discomfort, and psychological and cognitive problems could contribute to a low physical activity level following a stroke. [18] Those who have suffered a disability as a result of a stroke are frequently offered rehabilitation. There are numerous rehabilitation programs available that contain physical exercise with the aim of assisting stroke survivors in fully participating in normal daily activities independently. [19]

Physical activity has been proven to minimize the negative consequences of unhealthy lifestyles, such as diseases that are affecting them as cardiovascular disease, or situations they experience as falls, and one of a situation which is affecting their health more than they are aware such as especially post-stroke depression. [20, 21] The most common affective situation and which is usually ignored by patients is the onset of depressive symptoms which is a consequence of a stroke. They are focusing more on physical inabilities, but they should also be aware of psychological conditions that are highly affecting their lifestyle as well as physiologic situations. Post-stroke depression that examined extensively, affecting in the range of 29% - 33% of stroke survivors [3, 22]. According to these knowledge; there should be some connections between physical activity, which is highly in communication with stroke and depression, which can be observed in patients after stroke. As a result, this study aims to investigate the link between physical exercise and depression in people who have hemiplegia. Two hypotheses were decided for this study:

H0: There is no relationship between physical activity level and depression in hemiplegia.

H1: There is a relationship between physical activity level and depression in hemiplegia.

2. GENERAL INFORMATION

2.1 Stroke

Stroke is defined as the sudden development of a focal neurological loss if the situation takes time more than 24 hours which is also called CVA (cerebrovascular accident). The primary first 24-hour timeframe of a stroke is termed an acute stroke. Stroke, which is in the category of cardiovascular disease; is the reason for 6.7 million of these deaths, and it is second to coronary cardiovascular disease. Stroke prevalence is 0.006 and when it is about people more than 65 years; this percentage becomes between %46.1 - %73.3 / 1000. People who suffer from a stroke which is more than 65 years old is %70. The mean age is 63 years old [23, 24]. Unmodifiable risk factors include; age, gender, race, family history, and unmodifiable risk factors: hypertension, diabetes mellitus, coronary heart diseases, hyperlipidemia, and tobacco use. [25]

TIA (transitory ischemic attack), a transient neurological dysfunction less than 24 hours in length (typically between less than 20 minutes, around between 5 min to 20 min, is also topical but outside the purpose of this discussion article.

Stroke is classed as ischemic (87%) or hemorrhagic (13%) [26]. Ischemic stroke is by blockage of an artery [atherosclerotic (50%) or thrombotic, embolic (25%) and micro artery blockage, "lacunar stroke" which means one of the small arteries deep within the brain becomes blocked (25%). The pathophysiology of hemorrhagic stroke occurs mostly in artery rupture or aneurysms; it can also occur as a result of trauma [27].

2.1.1 Ischemic stroke

The most prevalent type of stroke is ischemic stroke and is described as a neurological deficit resulting from a reduction in blood flow to a specific brain area. The neural clinical signs of an ischemic stroke typically develop suddenly, although they can also appear progressively. The typical appearance is the sudden presence of hemiparesis. Symptoms and characteristics vary depending on where the blockage is located and how much volume of collateral flow is present.

The blockage of an artery resulting in reduced blood flow and this situation brings us ischemia. If the blockage only ends a minute or less, such as seconds, the restoration is rapid and complete. Infarction can develop within minutes, based on the severity of the ischemia, causing irreversible damage even after blood flow is organized how it was before [28].

2.1.1.1 Thrombotic ischemic stroke

This kind of stroke accounts for 50% of all ischemic strokes. It develops as a result of the destabilization of atheroma plaques developing especially in extracranial vessels. The ischemia process is long in the thrombus, which is often seen in large vessels. Generally, the point is stenosis of 70-80% or more of the proximal arteries. The event occurs at night and therefore, strokes noticed in the morning are thrombolytic. [29]

2.1.1.2 Atherosclerotic ischemic stroke

The stroke type which is usually in the elderly population is atherosclerotic ischemic stroke. In more than 80% of patients, this form of stroke develops without warning. (TIA) can show itself in a few months before the stroke and it should be taken as a strong sign of the possibility to have a stroke. The occurrence is like ischemia; a blockage is triggering the accumulation of platelets and clotting of fibrin to produce the thrombus that blocks the artery. Fewer than 20% of cases do not develop the formation of accumulation. [30, 31].

2.1.1.3 Embolic ischemic stroke

It accounts for 20% of all ischemic strokes. The most important source of cerebral embolisms is emboli from an atherosclerotic plaque or emboli, which is coming from the heart. Atrial fibrillation is an essential factor in cardiac embolism. In embolic strokes, the clinical picture develops rapidly because the material causing the embolism blockage an artery with a smaller diameter than its diameter in the distal and causes a sudden interruption of blood flow distal to the vessel. The main findings are disorders that develop suddenly and often begin with an epileptic seizure, sometimes accompanied by loss of consciousness.[29]

Patients with atrial fibrillation are more likely to have this form of stroke (80%). Patients with myocardial infarction, or people with prosthetic valves, or patients who suffer rheumatic heart diseases and larger artery atheroma (accumulated fatty deposits and one of the risk factors for thrombosis) are more tend to experience this type of stroke (artery-artery embolus). The majority of emboli consists of a history of atherosclerosis and can partly or temporarily block cerebral arteries resulting in Transient Ischemic

Attacks. [32] Multifocal embolisms are common and may cause minor hemorrhages around the blockage.

2.1.1.4 Lacunar infarcts

This type, usually seen in older people with hypertension or diabetes, accounts for 25% of all ischemic strokes. Lacunar infarcts are defined as lesion areas smaller than 1.5 cm. Lacunar infarcts directly related to large vessels and involving small branches are found in the deeper layers of the brain, such as the brain stem, basal ganglia, and internal capsule. [29]

2.1.2 Hemorrhagic stroke

When a blood vessel in the brain is damaged, a hemorrhagic stroke develops and resulting in bleeding into the brain. This is a form of stroke that is a less common type of stroke. Despite the dangers of ischemic stroke, hemorrhagic stroke is a far more dangerous condition. Hemorrhagic stroke has a greater death rate in the hospital than ischemic stroke, ranging from 40% to 60%. Within 30 days after hemorrhagic case, the mortality rate is 50%, and for 80% of survivors, severe disability prevents from living independently within six months. [33]

Hemorrhagic stroke has two types: The first one is intracerebral hemorrhage which is mostly a result of hypertension. The second one is caused by subarachnoid hemorrhages resulting from aneurysm rupture. Other causes are rare, and in some hemorrhagic cases, the origin of the hemorrhage can not be determined. Advanced age, heavy alcohol intake and hypertension are major risk factors.

2.1.2.1 Intracerebral hemorrhage

Intracerebral hemorrhage (ICH) is a kind of bleeding that occurs mainly in the brain (cerebrum, cerebellum, brain stem). Intracerebral hemorrhage (ICH) is a kind of bleeding that occurs mainly in the brain (cerebrum, cerebellum, brain stem). This kind of cerebrovascular disease is characterized by advanced age, hypertension, cigarette use, and excessive alcohol use, previous ischemic stroke, and low blood cholesterol levels. [34]. The majority of intracerebral hemorrhagic strokes last 30–90 min. The implications of ICH have significantly severe consequences. Only 20% of acute patients can function independently in everyday life six months after the incident [35], and 50% of patients are lost within the first year [36]. The location plus size of the hemorrhage will determine the

symptoms. In ICH, clinical worsening is usually more rapid than in ischemic stroke; headache, nausea, and vomiting are more common [37].

2.1.2.2 Subarachnoid hemorrhage

This kind is a subtype of intracranial hemorrhage. Cerebral vasospasm is a common early complication of SAH and rebleeding or hydrocephalus can occur in 30% percent of cases in the first month, as a result; 60% of people face death. More than half of those who survive would have serious disabilities. The annual risk of aneurysm bleeding recurrence is 3%. Thus, in these patients, early surgical or intravascular treatment of aneurysm increases their outcomes in their time length [38].

2.2 Anatomy of Cerebral Circulation

In spite of the fact that the brain only makes about 2% of the entire body weight, it consumes nearly 50% of the glucose produced by the human body. This shows that the brain is the body's most energy-intensive organ [39] and one of the most oxygenated organs in the body. The anterior circulation, which is formed by internal carotid arteries, and the posterior circulation, is also known as vertebrobasilar circulation, which consists of vertebral arteries that provide this perfusion. These arteries give plenty of branches as they reach the cranium and supplying blood to the brain's deep and superficial parts. Any disruption in this blood supply, which may occur intracranially or extracranially, encourages the onset of cerebrovascular diseases; the stroke is the most severe and well-known of these. [40]

Anterior Circulation – from Internal Carotid

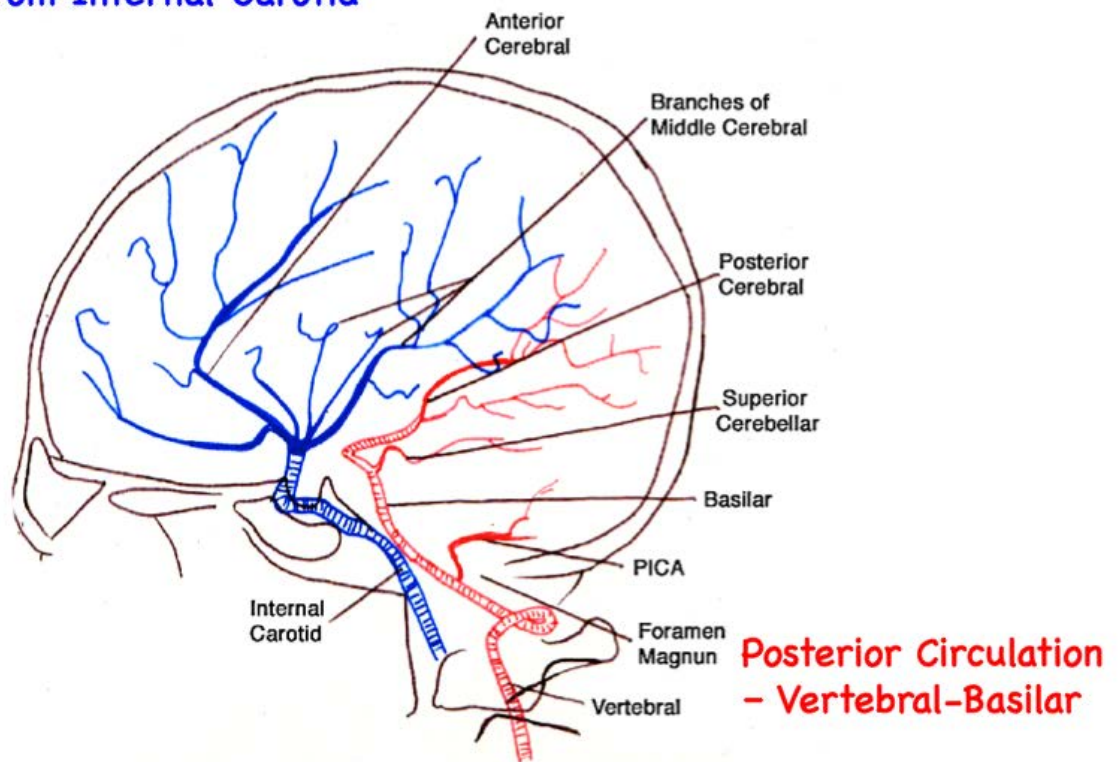


Figure 2.2.1 Anterior and Posterior Circulation

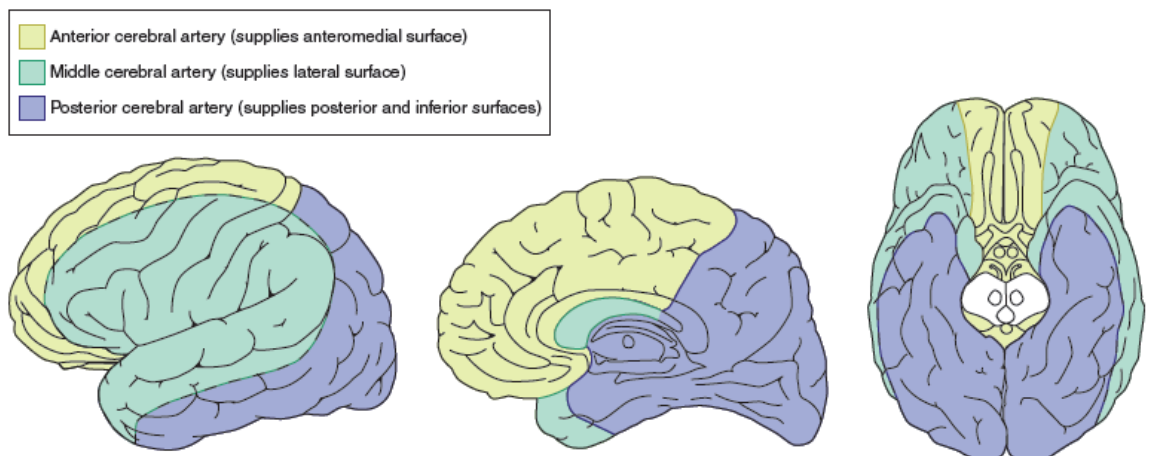


Figure 2.2.2 Cerebral Arteries

The cerebral circulation, like the rest of the body's circulation, begins in the left heart part and is carried out by the aorta. During systole, the left ventricular outflow of oxygenated means saturated blood into the aorta starts blood conduction.

Ascension of the aorta, the formation of the aortic arch, consists of three divisions.

First branch: The brachiocephalic trunk, which arises around behind the upper part of the sternum, and largest branch.

Second branch: The left common carotid artery, which originates or arises to the left of the brachiocephalic trunk.

Third branch: The left subclavian artery that ascends or arises with the left common carotid artery [41].

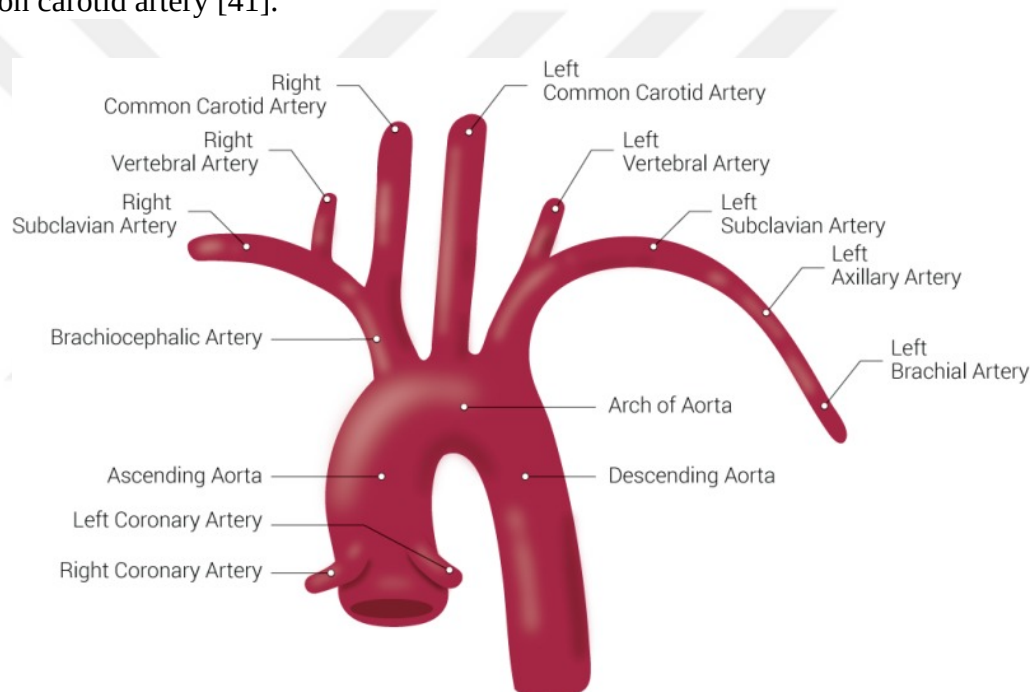


Figure 2.2.3 Brachiocephalic Trunk, Branches of Aorta

Internal carotid arteries (left-right ICA), and the vertebral arteries (left-right VA), provide the human brain's arterial blood supply. The internal carotid arteries primarily supply the cerebrum. The basilar artery is formed or shaped by two vertebral arteries distally. The cerebellum and brain stem are supplied by VA and BA divisions. Internal Carotid Arteries (right-left) are connected by the BA. Other communicating arteries are forming an anastomotic ring which is the circle of Willis that forms at the center of the brain, named after Sir Thomas Willis, who first identified. (1664).

The circle of Willis has three main parts; the anterior, middle and last one which is posterior cerebral arteries. They give branches to tiny arteries and arterioles that reach the surface until they saturate the brain tissue and making the blood supply to the areas in the cerebral cortex that they are responsible for. [42]

The Willis circle which is known that formed by the following vessels:

- Right- Left Anterior Cerebral Artery (ACA) and Anterior Communication Artery (AcomA), which links the connection of these two arteries.
- Right - Left Posterior Cerebral Artery (PCA) and Posterior Communication Arteries (PComP) which link Internal Carotid Artery (ICA) to Posterior Cerebral Artery.
- Basilar artery in the anterior middle part.

“Anterior Circulation/Carotid System”: ICAs (Internal Carotid Arteries), AcomA (Anterior Communicating Arteries), ACAs (Anterior Cerebral Arteries), and their divisions.

“Posterior Circulation/Vertebrobasilar System”: PCAs (Posterior Cerebral Arteries), PcomPs (Posterior Communicating Arteries), Vertebral Artery, Basilar Artery [43]

2.2.1 Anterior cerebral circulation

Anterior cerebral circulation consists of branches from ICA (Internal Carotid Artery). Branches of these arteries are pathophysiologically have importance, and those significant branches are ACA, MCA, AChA. Cerebral circulation of the anterior part is responsible for a massive percentage of the forebrain. The frontal lobe, parietal lobes, temporal lobes are other parts of these blood supply areas. Diencephalon and internal capsule are also in the anterior cerebral circulation. Anterior circulation ratio to total cerebral blood flow is 72% measured by MRI [46]

2.2.1.1 Anterior cerebral artery (ACA)

These are uncommon causes in series studies, accounting for around 0.3 – 4.4 percent of ischemic stroke cases. [47]

The anterior cerebral arteries (ACA/ left-right) are branches of carotid arteries (left-right), and they supply blood to the brain's frontal region. These are responsible for behavior and thoughts. This artery supplies the superomedial parietal lobes and some parts of the frontal lobes. However, this artery does not supply the medial occipital lobe. These are responsible for behavior and thoughts.

This vessel transports blood to the frontal lobe, which is located in the front of the brain. There are two types of ACAs: right-sided and left-sided. Infarction of the brain area supplied by the ACA causes contralateral hemiplegia, which is most noticeable in the distal lower extremities. Aphasia can be seen in the lesion of the region fed by ACA, and the reason for this is not known exactly. The disruption of the path from here to Broca's region as a result of a lesion of the supplementary motor region is assumed to be the cause of aphasia. [48, 49] Leg weakness or trouble thinking and making decisions can occur if a stroke occurs in this area. There may also be personality changes.

AcomA (Anterior Communicates Artery) forms anastomosis between right and left ACA. Despite its limited size, this artery is the most frequent location of cerebral aneurysms (36%) and therefore has immense pathological significance. [50]

The anterior cerebral artery is divided into 5 segments [51-53]

- 1) A1: Horizontal or pre-communicating segment
- 2) A2: Vertical, post-communicating or infracallosal segment
 - Orbitofrontal
 - Heubner Rekürren Arter
 - Frontopolar
- 3) A3: Precallosal segment
- 4) A4: Supracallosal segment
- 5) A5: Postcallosal segment

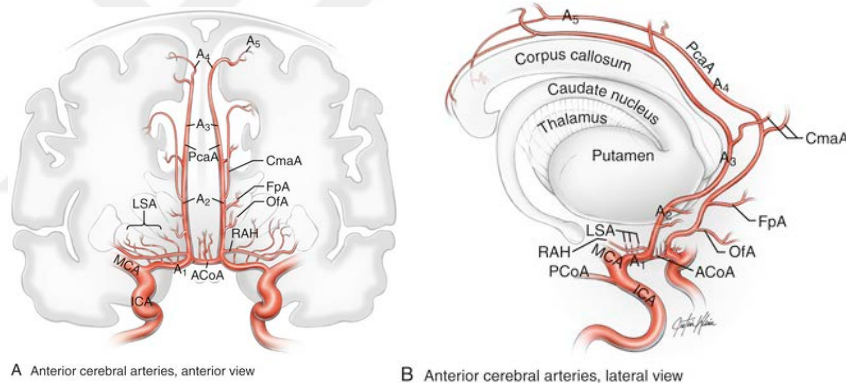


Figure 2.2.5 Anterior Cerebral Artery (ACA)

2.2.1.2 Anterior choroidal artery (AChA)

The AChA develop from the ICA, just before the MCA and ACA branches. [54] This vessel carries blood to brain structures that are vital for motor control and vision. However, several anatomical differences have been discovered, including AChA originating from the MCA or even the PCoA [55, 56]. Other variations, such as complete absence and duplication of AChA, have been noted, though they are uncommon. [57, 58]

Regardless of its route, the AChA produces both deep and superficial branches. The anterior choroidal artery provides blood to the following structures [59]

1. The temporal lobe's medial aspect
2. Visual (and auditory) system
3. Basal ganglia
4. Diencephalon
5. Midbrain

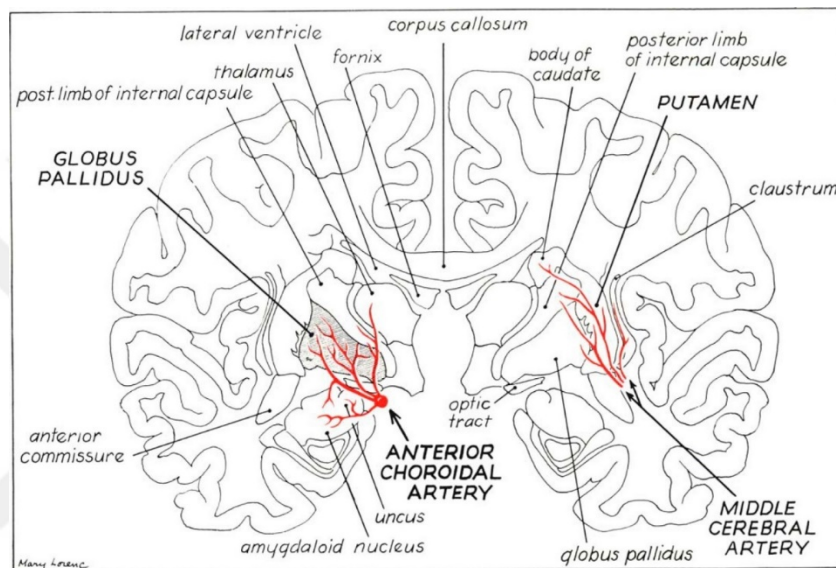


Figure 2.2.6 Anterior Choroidal Artery

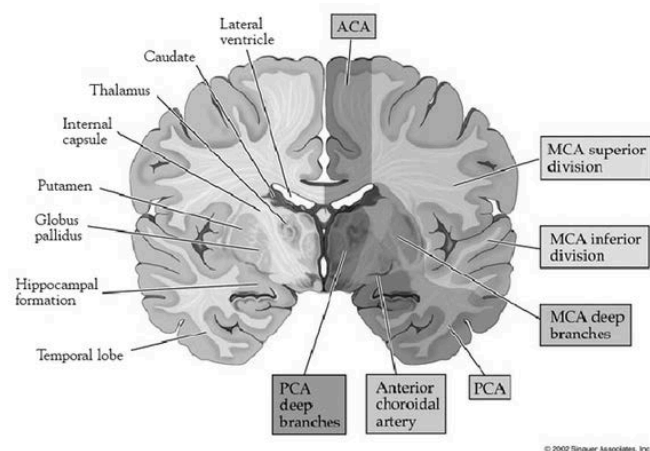


Figure 2.2.7 Anterior Choroidal Artery

2.2.1.3 Middle cerebral artery (MCA)

Middle cerebral arteries are formed by the left and right carotid arteries. The blood supply of MCA is responsible for areas of the brain that regulate movement. The MCA is the biggest and most widely divided cerebral vessel, saturating numerous vital cerebral structures along its long path.

Infarction of the brain areas supplied by the middle cerebral artery can cause contralateral hemiplegia, motor aphasia or structural apraxia, and spatial perception problem. The middle cerebral artery is supplied by the motor and sensory cortex, excluding the lower limbs, therefore hemiplegia/anesthesia is more obvious on the upper extremity and face. When an infarction occurs in the left hemisphere, the motor speech center is damaged, resulting in Motor Aphasia (Broca). When an infarction occurs in the right hemisphere; clinical findings include structural apraxia (difficulty drawing simple pictures), topographagnosia (weakening of the concept of direction), asomatognosia (inability to perceive body parts on one side), and inability to notice objects to the left of the midline of the body. [48, 49]

MCA is divided into 4 segments:

- 1)M1: Sphenoidal - Horizontal Segment
- 2)M2: Insular Segment
- 3)M3: Opercular Segment
- 4)M4: Cortical Segment

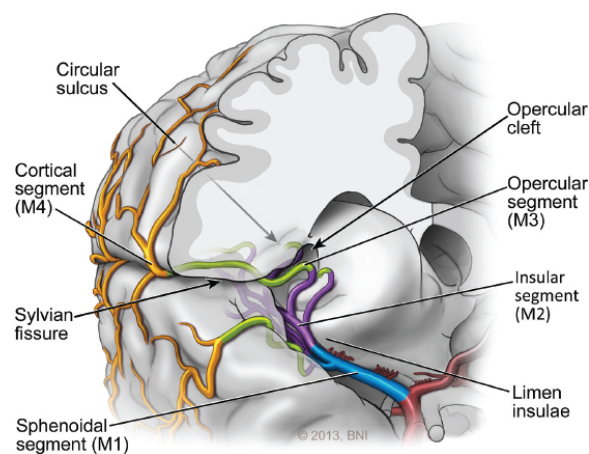


Figure 2.2.8 Middle Cerebral Artery

2.2.2 Posterior cerebral circulation

The posterior cerebral circulation is the blood flow area that includes the occipital lobes, as well as the cerebellum and additionally brainstem. PcomA is the bridge between anterior and posterior circulation, thanks to Willis' anastomotic circle.

The vertebral arteries (VA) that grow from the subclavian arteries provide posterior cerebral circulation. The basilar artery is formed when both VA connects intracranially (BA). The distal branches of BA are known as posterior cerebral arteries (PCA). Only PCoA has connected both parts of the arterial circle. [60]

The (VA), (BA), (PCA), and branches of these arteries make the posterior circulation. Although the vertebral arteries are usually derived from the subclavian arteries, they can also come straightly from the aortic arch. PICA is formed from it, supplying sections of the medulla oblongata and cerebellum. Furthermore, each V4 segment produces a single little branch that meets with its opposite part and generates the ASA. At the pontomedullary junction, two vertebral arteries combine to produce one single basilar artery (BA). Then BA runs along the anterior pons. Before separating into the right and left posterior cerebral arteries (PCAs) around the ponto-mesencephalic junction, it gives off several paramedian and short circumferential branches to the anterior inferior cerebellar artery (AICA), pons and the superior cerebellar artery (SCA). [61]

2.2.2.1 Vertebral arteries (VA)

The vertebral arteries (VA) are a pair of branches that have originated from the subclavian arteries. VA ascends in the neck and supplies the posterior fossa and occipital lobes. These arteries supply blood to the segmental vertebrae and spinal column.

These are symmetrical as right and left arteries originating from the subclavian vessels on either side of the body. They have been divided into four parts, just like the MCA, for organizational simplicity. The first three segments of these segments are extracranial. The V1 segment, which runs from the arteries' subclavian division, is the central location of vertebral artery infarction, together with the distal V4. [62] The V2 segment travels into the transverse foramen. V3, which has been known for its shortened versions' sensitivity to bleed, then enters the dura, circling the atlas at about the level of

C2. The arteries become V4 once they pass through the dura, which is the intracranial part of the vertebral arteries. This section performs a variety of vascular functions. It gives birth to two significant branches as soon as it enters the brain through the path to the foramen magnum and before anastomosis. The posterior inferior cerebral artery is the first of them (PICA) [58]. Second, each V4 produces a tiny branch that meets its contralateral counterpart to produce the descending path, become the midline anterior spinal artery, which is immediately proximal to the anastomosis. A set of posterior spinal arteries is also present. These can be generated by PICA or the vertebral arteries. PICA and ASA have a number of anatomical and functional characteristics that are worth discussing.

They are typically divided or give branches into four segments.

The first three segments run extracranially:

V1 – Preforaminal Segment: between origin and entrance to the transverse foramen,

V2 – Foraminal Segment: the path through the transverse foramina,

V3 – Atlantic – Extradural Segment: between a circle from C2 around the atlas and the dura.

The intracranial segment

V4 – Intradural – Intracranial Segment: between the dura and upper medulla or lower pons [61].

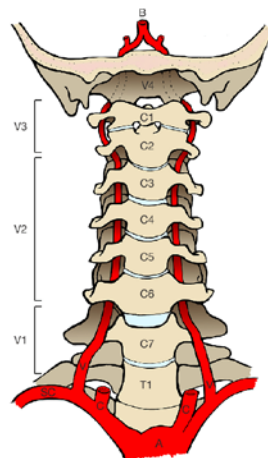


Figure 2.2.9 Vertebral Arteries

2.2.2.2 Posterior inferior cerebellar artery (PICA)

PICA typically branches off the vertebral artery (VA) [63, 64] The PICA, which is vertebral arteries's largest branch, is produced by the fourth segment of VA [65-67]

The SCA and AICA have multiple anastomoses with the PICA's cerebellar and choroidal branches. The medullary branches, on the other hand, have none. As a result, the ischemic zone of the PICA infarct that is most usually damaged is the dorsal lateral medulla, which is fed by the medullary branches. PICA lesions cause ipsilateral temperature sensation, loss of face pain, contralateral loss of the same in the body, cerebellar ataxia, and bulbar palsy, which are all symptoms associated with this distribution. The classical neurological condition known as Wallenberg's syndrome (Lateral Medullary Syndrome) [60] is produced by injury to the lateral section of the medullary oblongata as a result of vascular events.

LMS is the most typical kind of stroke in the posterior circulation ischemic stroke, and the most frequent occurrence of PICA area infarcts. The posterior circulation was responsible for higher than 20% of ischemic strokes, with 50% of situations showing like LMS, according to assessments.

PICA is a significant and critical part of the cerebellum's blood supply, and The PICA zone is the most common site of ischemic stroke in the cerebellum, accounting for 40% of all events [68].

The trunk of PICA is consist of 5 segments;

- 1.The Anterior Medullary Segment
- 2.The Lateral Medullary Segment
- 3.The Tonsillomedullary Segment
- 4.The Telovelotonsillar Segment
- 5.The Cortical Segment

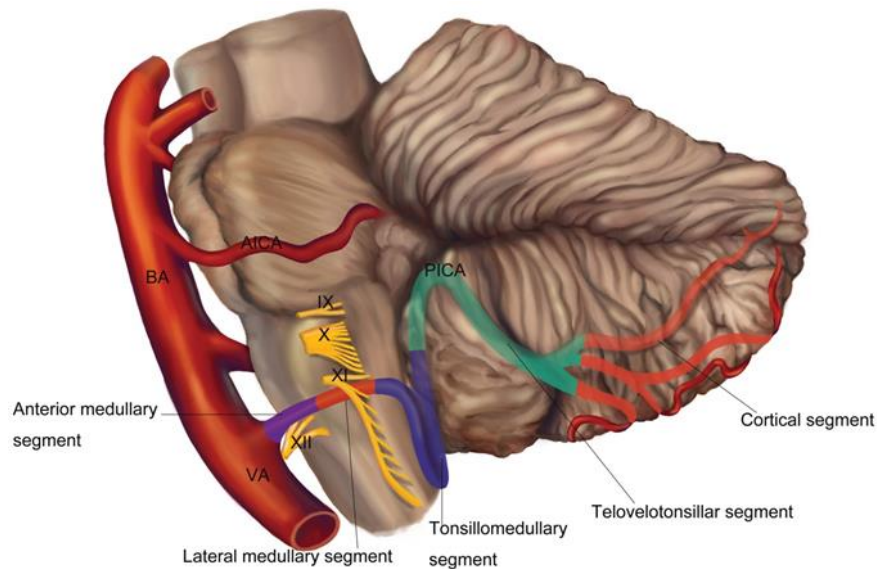


Figure 2.2.10 Posterior Inferior Cerebellar Artery

2.2.2.3 Anterior spinal artery (ASA)

ASA's blood supply is to anterior 2/3 of the spinal cord and 75% of the spinal cord's blood supply [69-71]

A midline anastomosis of two tiny vertebral artery branches creates the anterior spinal artery. The artery continues down the spinal cord's whole length from this anastomosis within the anterior median fissure. However, it rests on and supplies an area in the anterior medulla before doing so. As a result, anterior spinal artery lesions, like PICA, are linked with a specific neurological condition, with symptoms that are consistent with ischemia of the medullary regions that this vessel supplies typically [72]

The anterior spinal artery is the spinal cord's main blood supply. It continues along the anterior side of the spinal cord from the foramen magnum area. The artery interacts with additional branches that enter the spinal canal through the intervertebral foramen as it descends. The Adamkiewicz artery joins the anterior spinal artery, which feeds blood to the lower thoracic, lumbar, and sacral spinal cords. [73]

A vascular etiology, such as a stroke, can also result in spinal cord injury. A stroke of the anterior spinal artery causes a large section of the spinal cord to lose blood flow. Anterior spinal artery syndrome is the medical term for this condition. It's described as a

loss of motor function and sensations carried by the anterior columns of the spinal cord in the lower levels of injury (pain and temperature), but not dorsal column proprioception. The dorsal part's blood flow of the spinal cord is unaffected. [74]

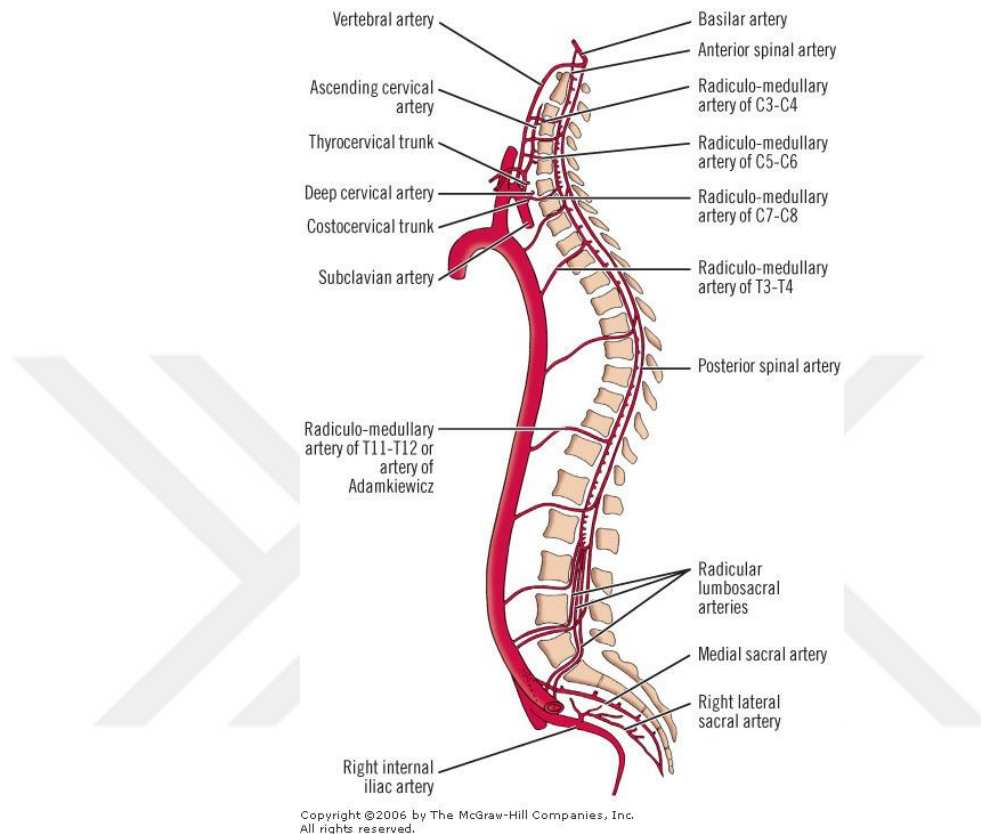


Figure 2.2.11 Anterior Spinal Artery

2.2.2.4 Basilar artery (BA)

The BA is a critical arterial that contributes and provides to the circulation of the posterior cerebral hemisphere. It originates and arises at the base of the pons, where the vertebral arteries which are divided as right and left, meet as they ascend to the base of the brain. Its primary or main function is to supply oxygen-rich blood to the cerebellum, brainstem, thalamus, occipital, and medial temporal lobes of the brain. [75]

Two VA create the BA that provides and supplies the essential parts of the brain and brainstem over the surface of the pons.

It can be split anatomically into 3 segments:

1. Proximal from the VA to the AICA
2. The middle path is between the AICA and the origin of SCA
3. And distal from the SCA to the terminal PCA [76].

The risk factors have similar to the well-known stroke risk factors. Hypertension is the most typical and up to 70% of all cases. Diabetes, people with coronary artery disease and peripheral vascular disease, cigarette smoking, and hyperlipidemia are all risk factors.

Because the posterior circulation (vertebrobasilar system) accounts for 20% of cerebral blood flow, it is easy to understand why posterior circulation blockage percentage is 1/5 of all kinds of strokes. Luckily, BI blockages are considered or thought to be responsible for only about 1% of all kinds of strokes. Basilar artery thrombosis may be the cause of up to ischemic strokes situation's 27% percentages in the posterior circulation. Males have a higher prevalence than females, with a 2:1 ratio. Patients after 60 years old are most likely to have occlusion due to atherosclerotic disease. [77-79]

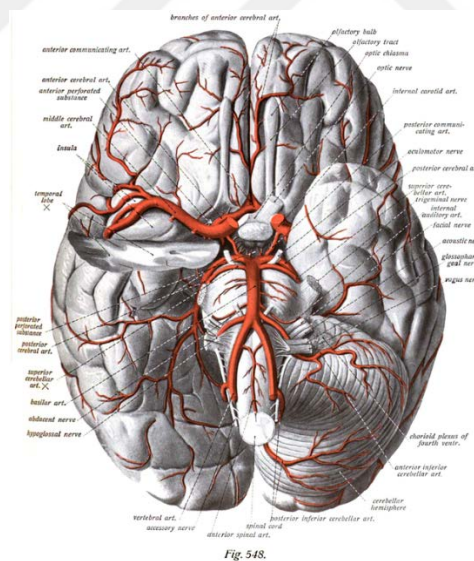


Figure 2.2.12 Basilar Artery

2.2.2.5 Anterior inferior cerebellar artery (AICA)

AICA is one kind of the basilar artery's lateral segments, supplying the cerebellum and pons, among other organizations in the posterior cranial fossa. The SCA and PICA are balanced with the AICA about blood supply organization. Therefore, their volumes

differ based on which artery supplies the cerebellar cortex. The internal auditory artery, also known as the labyrinthine artery, is most usually a segment of the AICA. However, it can also originate straight from the basilar artery.

Aneurysms in the posterior fossa account for between 8% - 12% of all total cerebral aneurysms. According to the literature, AICA aneurysms are around 1% - 2% of total aneurysms. [80, 81]

AICA infarction can be caused by either a cardio-embolic or an athero-embolic event (atherosclerotic/arteriosclerotic plaque rupture). [82]

The four segments of the anterior inferior cerebellar artery are as follows:

- 1) The anterior pontine (close to the abducent nerve),
- 2) Lateral pontine (close to the facial and vestibulocochlear nerves),
- 3) Flocculopeduncular,
- 4) Cortical segments.

The lateral pontine segment is separated into parts which are;

- a) Pre-meatal,
- b) Meatal,
- c) Postnatal segments are classified based on their connection with the internal auditory tract.

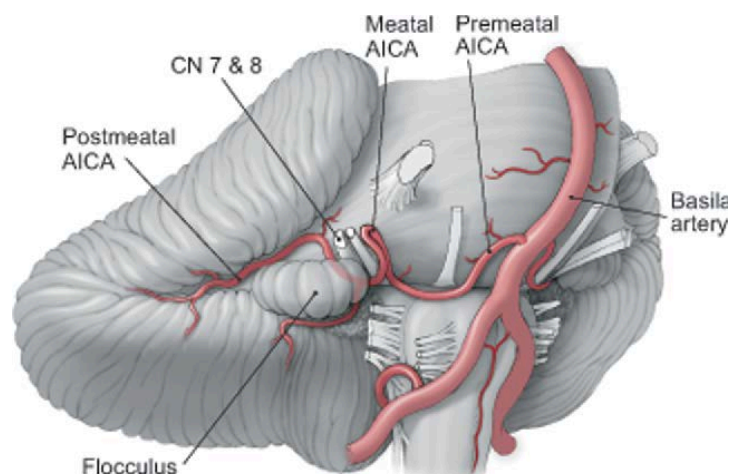


Figure 2.2.13 Anterior Inferior Cerebellar Artery

2.2.2.6 Superior cerebellar artery (SCA)

This artery can be considered as a PICA analog, similar to AICA. SCA is a nonterminal subdivision of the basilar artery that travels laterally over the superior cerebellar peduncle, feeding the peduncle and large portion of the superior level of the cerebellum by spreading medial and lateral branches. It also supplies a brainstem region next to the rostral pontine tegmentum, as well as deep nuclei embedded within the cerebellar white matter. [83-86]

SCA aneurysms are very uncommon abnormalities of the blood vessels and in posterior circulation aneurysms; it takes place about 15% percent and lower than 2% of total intracranial aneurysms (IAs). [87-89]

Trigeminal neuralgia is caused by a variety of factors and one of the most frequent causes of this impairment is compression or pressure of the trigeminal nerve (TN) by blood vessel abnormalities, which superior cerebellar artery is the most common artery. [90-93]

The Superior Cerebellar Artery is divided into 4 four segments:

- 1) S1: Anterior Pontomesencephalic Segment
- 2) S2: Lateral Pontomesencephalic Segment
- 3) S3: Cerebellomesencephalic Segment
- 4) S4: Cortical Segment

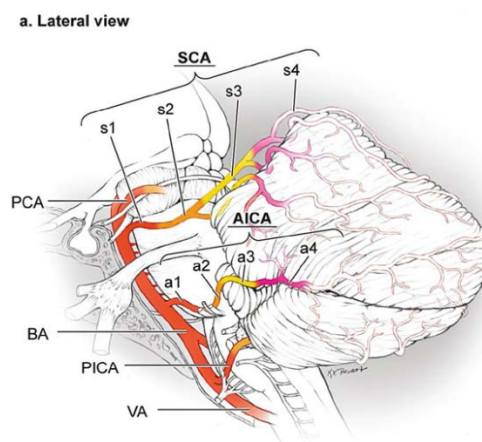


Figure 2.2.14 Superior Cerebellar Artery Branches

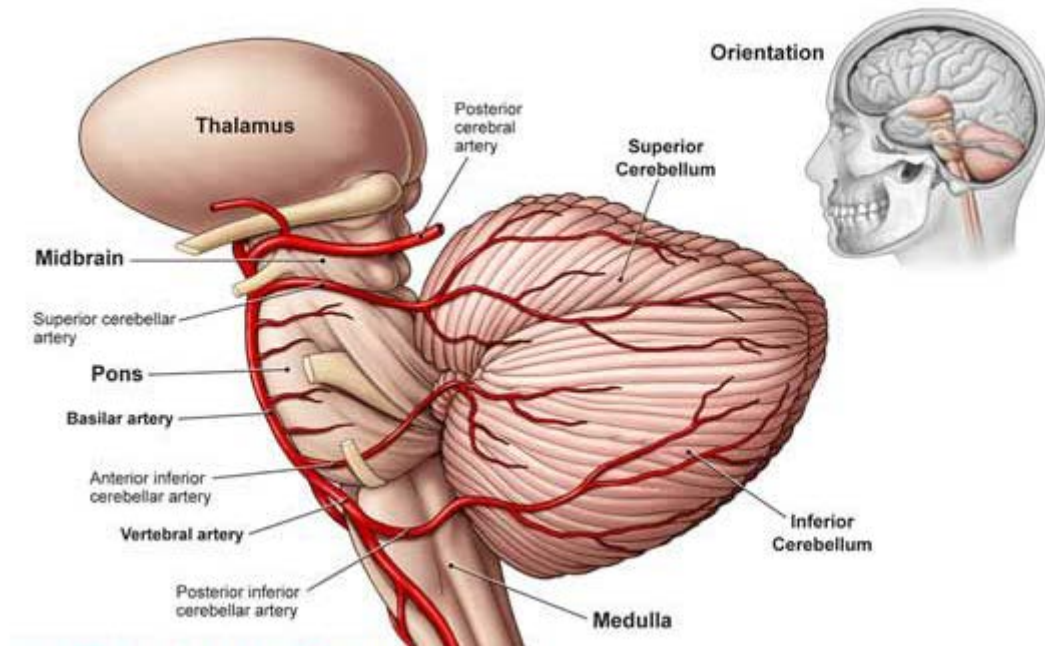


Figure 2.2.15 Cerebellar Arteries

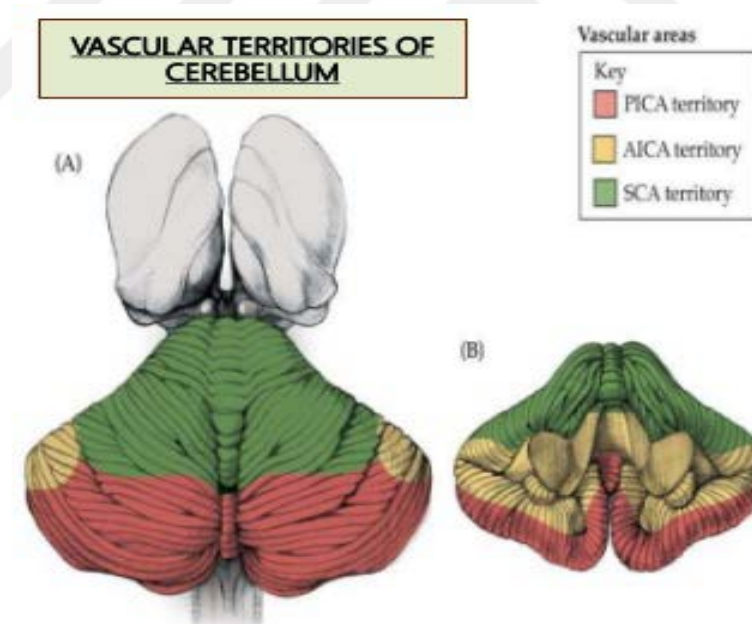


Figure 2.2.16 Vascular Territories of Cerebellum

2.2.2.7 Posterior cerebral artery (PCA)

The occipital lobes and posteromedial temporal lobe's blood supply are provided by the PCA, which are the BA's terminal branches.

The posterior parts of the brain are supplied with blood through these veins. It divided the right-left part of PCA. When a stroke develops in this section, patients may see or experience vision issues.

The PCA is split into four sections:

- 1) P1, pre communicating segment
- 2) P2, post-communicating segment
 - P2A, crural segment - anterior
 - P2P, ambient segment - posterior
- 3) P3, quadrigeminal segment
- 4) P4, calcarine segment – cortical segment

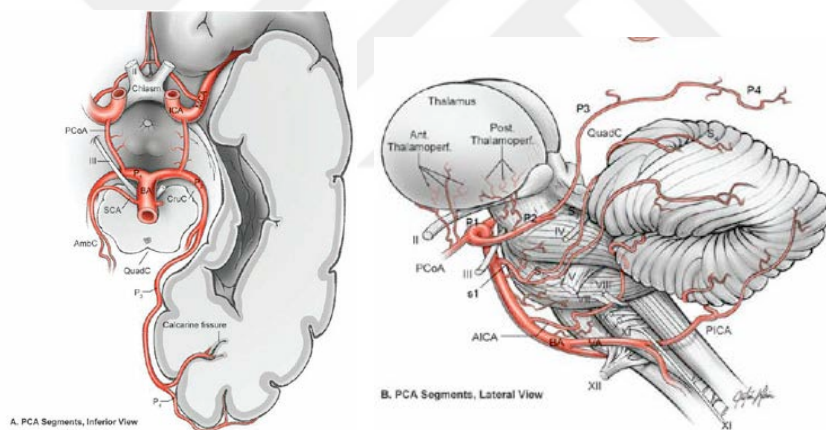


Figure 2.2.17 Posterior Cerebellar Artery Segments

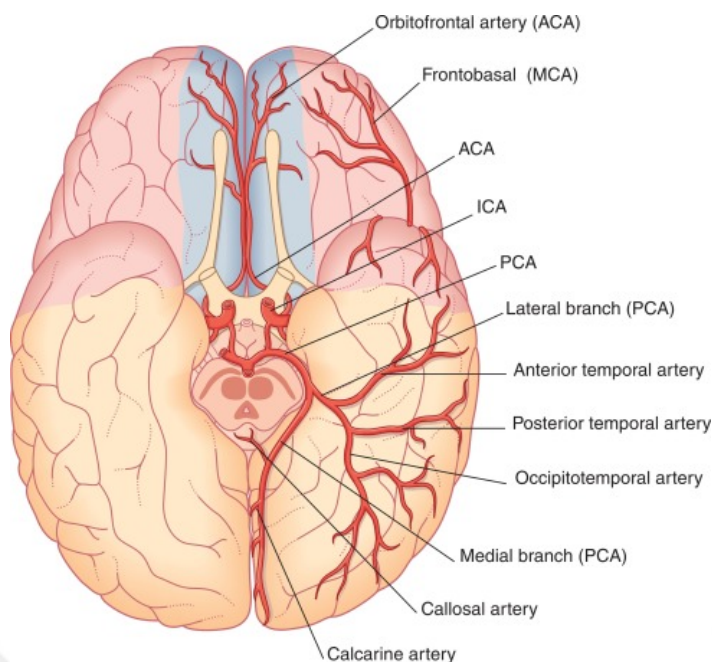


Figure 2.2.18 Posterior Cerebellar Artery Segments: Temporal – Occipital

2.3 Physical Activity After Stroke

The best time to start rehabilitation and physical activity after a stroke has yet to be determined; however, earlier rehabilitation has been linked to better outcomes [94]. Patients who are assisted to get out and move out of bed within the first 48 hours of admission or entrance and continue to do until discharge have positive outcomes [95, 96], and many guidelines encourage an early start to activity [97-99]. However, the practice is debatable [100, 101]. Physical activity which is increased or gained in the first six months after a stroke, has been shown to enhance functional outcomes [102], but the exact amount of physical exercise required to promote recovery after a stroke is still unknown. We know that stroke patients who get organized multidisciplinary care in a Stroke Care Unit (SCU) have lower death and dependence rates [103]. Patients who were treated in the SCU (and who received very early mobilization, or VEM) were 64% less likely to die or become impaired. VEM (very early mobilization), together with better blood pressure control, was discovered to be the most important determinant of a better outcome [95]. According to this study, VEM could provide for up to 78% of the SCU benefit. Starting mobilization (i.e., sitting up, standing, and walking) as soon as possible after a stroke and continuing it at periodic times until discharge may lower the patient's grade of impairment after a stroke and the number of patients who require nursing home care. [95] Physical activity tends to minimize the incidence of recurrent stroke, according to risk modeling

studies based on data or results from primary preventive research. [104]. Exercise of moderate or high intensity; lowers the risk of future ischemic or hemorrhagic stroke [105-107]; increases functional mobilization, walking speed [14, 108, 109] bone density, and muscle strength, and enhances the quality of life [110, 111]. Stroke, on the other hand, causes complex disability [112-114], makes participation in physical activity problematic, worsens cardiovascular deconditioning [115], and has a negative impact on well-being, disability, and functional independence [116, 117] as well as increasing the risk of secondary stroke [107]. Understanding the best way or how to support survivors in participating in regular physical activity is therefore critical for their health and well-being.

For stroke survivors, the American Heart Association (AHA) advises or recommends 20–60 minutes of moderate to high-intensity exercise (3–7 days per week) (expressed as 40–70% of heart rate reserve or peak oxygen uptake) [4].

Although these benefits, most survivors do not practice regular physical activity [6, 118, 119], and those who participate in limited physical activity are only about less than 30% [120]. Specifically, benefits from organized exercise programs for stroke survivors are frequently lost at keeping in track, signaling that stroke experienced people difficulties engaging in self-directed activity [15, 121, 122]. Interventions that address barriers to engagement and increase confidence and enjoyment are needed to encourage behavior change and support survivors' long-term participation in PA. [122, 123]. Low motivation and confidence because of physical inabilities, physical impairment and impairment in abilities, expense, poor access, insufficient support, and transportation are all barriers to PA [18, 124-126]. In sedentary and older persons, specialized treatments to focus on barriers and give assistance for changing patient's behavior have been shown to promote PA uptake and stability [127-131]. Stroke survivors may benefit from these approaches as well.

2.4 Depression After Stroke

A significant body of research backs up the link between stroke and depression. Stroke, cerebrovascular risk factors, disability, and depression are all linked in some way. Depression is a common stroke consequence that can block rehabilitation, recovery, quality of life, and caregiver well-being [132-135]. Stroke has a huge emotional impact on patients as the third largest cause of mortality and the most prevalent impairing

condition [136]. Depression is a common complication of stroke and has been proven or shown to affect recovery [132, 137-148]. Despite this, few population-based studies assessing the rate and degree of severity of depression in patients who have a stroke have been published [140, 147]. Emotional responses to stroke have been documented for some time [149, 150], and recent research [137, 138, 151, 152] has proven that depression affects 30-60% of all stroke patients. According to the best evidence which is available, in addition to worse long-term functional outcomes [153], depression after a stroke is linked to lower rehabilitation treatment efficacy [154], limitations in daily living activities [153, 155], cognitive impairment [134, 156], and a higher risk of recurrent stroke [157]. Furthermore, depression following a stroke has been linked to an association with a high risk of mortality [158].

Despite the fact that depression can affect recovery and outcome after a stroke, many, probably most of them, patients do not get appropriate treatment because their mood illness is misdiagnosed or undertreated [159-161]. This is partly by reason to difficulties in diagnosing a severe mood state in older persons with disabilities. Even in generally healthy people, detecting mood which can be found abnormal is difficult. Despite the severity and potential problems, data from the general population shows that only half of persons suffering from depression will receive professional care [162]. This could be in relation to the stigma attached to a diagnosis, people not understanding they are suffering from depression, or believing that their disease has no cure or as a natural aspect of aging or as a consequence of a stroke. Given the difficulties associated with diagnosis, the fact that patients who have a high risk of occurring or developing depression, and the inability to predict the benefit-risk ratio of treatment, there is interest in therapies that can be started early after a stroke to prevent abnormal mood and improve outcome [163].

There are studies that show that age, gender, affected hemisphere, previous strokes, hospital stay, and opposing opinions have no effect on post-stroke depression. Patients with left hemisphere involvement have been shown to have higher levels of depression than those with right hemisphere involvement, and the severity of depression is linked to the frontal region. In the acute time after a stroke, more than 70% of patients with left frontal lesions have diagnosable depression, while 15% of patients with right hemisphere lesions can be diagnosed. Between 6 months and 2 years, patients' depression levels increase. [164-168]

3. MATERIALS AND METHODS

3.1 Subjects

This study conducted in Yeditepe University and Atafiz Fizik Tedavi & Rehabilitasyon ve Tıp Merkezi in 2021. The identified participants were informed about what the study consists of and a signed consent form will be obtained from the participants who agree to participate in the study (Appendix 1). The study protocol was approved by the Yeditepe University Ethical Committee on the date of 10.09.2020 with the issue number of 37068608-6100-15-1950 (Appendix 2). 29 volunteers participated in this study, 58.6 % of all participants were female (n=17), and 41.4% of all participants were male (n=12).

Eligibility Criteria

Inclusion criteria were based on the following:

- Stroke survivors over 18 years of age.
- Diagnosis of stroke (> 6 months)
- The functional Ambulation Scale score is more than 0
- Modified Rankin Scale score is less than 5

Exclusion criteria were based on the following:

- Gait patterns, walking/activity capacity, ability to perform activities of daily living (e.g., Barthel's index) did not qualify the amount of physical activity.
- The functional Ambulation Scale score is 0
- Modified Rankin Scale score is 5 or 6
- Depression was not diagnosed exclusively before stroke admission

3.2 Study Protocol

Whole outcome measurements were applied by face-to-face interviews.

- 1) Demographic Characteristics of Participants Form was used to assess age, height, weight, BMI, affected side, comorbidities, and time period after stroke.
- 2) The degree of disability/dependence after stroke was evaluated by Modified Rankin Scale (mRS)
- 3) The ambulation ability of stroke patients was evaluated by Functional Ambulation Categories (FAC)
- 4) To evaluate multidimensional outcomes of stroke, which consist of strength, Activities of Daily Living / Instrumental Activities of Daily Living (ADL/IADL), hand function, mobility, emotion, communication, memory and thinking, and participation; Stroke Impact Scale v 3.0 was used. (SIS)
- 5) Physical activity level was evaluated by International Physical Activity Questionnaire. (IPAQ)
- 6) To measure characteristic features of depression; Beck's Depression Inventory (BDI) was used.
- 7) To evaluate functional independence in stroke patients for functional independence in stroke patients; The Barthel Index was used.

3.3 Evaluation

3.3.1 Demographic characteristics of participants

For demographic characteristics of participants information which includes age, BMI and time period after stroke, are evaluated by Demographic Characteristics of Participants form (Appendix 8.3)

3.3.2 Disability evaluation

Modified Rankin Scale (mRS) is a clinician-reported measure of global disability that has been widely applied for evaluating recovery from stroke. [169, 170]

The degree of dependency after stroke is commonly captured in stroke research with the modified Rankin scale (mRS). [171]

The mRS is a 7-point scale running from 0 (no symptoms at all) to 6 (death), and measures the degree of disability or dependence in patients' daily activities. [172] (Appendix 8.4)

- 1.No symptoms at all
- 2.No significant disability despite symptoms
- 3.Slight disability
- 4.Moderate disability
- 5.Moderately severe disability
- 6.Severe disability
- 7.Dead

3.3.3 Ambulation evaluation

To evaluate ambulation of patients; the Functional Ambulation Classification Form is used. (Appendix 8.5)

The FAC has excellent reliability, good concurrent and predictive validity, and good responsiveness in patients with hemiparesis after stroke. [173]

To use the FAC, an assessor asks the various subject questions [173] and briefly observes their walking ability to provide a rating from 0 to 5. [174]

- A score of 0 indicates that the patient is a non-functional ambulator (cannot walk);
- A score of 1, 2 or 3 denotes a dependent ambulator who requires assistance from another person in the form of continuous manual contact (1), continuous or intermittent manual contact (2), or verbal supervision/guarding (3)
- A score of 4 or 5 describes an independent ambulator who can walk freely on: level surfaces only (4) or any surface (5=maximum score) [175]

3.3.4 Multidimensional stroke outcomes evaluation

To assess multidimensional outcomes evaluation of patients; the Stroke Impact Scale is used. (Appendix 8.5)

The Stroke Impact Scale (SIS) is stroke-specific, was designed to assess multiple measurements about outcomes of stroke, including strength, Activities of Daily Living / Instrumental Activities of Daily Living (ADL/IADL), hand function, mobility, emotion,

communication, memory and thinking and participation. The SIS can be used in clinical and as well as in research context.

The SIS 3.0 contains 59 items and assesses 8 domains:

- 1) Strength – 4 items
- 2) Hand function – 5 items
- 3) ADL/IADL – 10 items
- 4) Mobility – 9 items
- 5) Communication – 7 items
- 6) Emotion – 9 items
- 7) Memory and thinking – 7 items
- 8) Participation/Role function – 8 items

Last part of this scale is a measurement of stroke recovery, which is asked to the client to rate on a scale from 0 – 100 according to how much the client feels that how much he or she has recovered from a stroke.

The SIS is a patient-based, self-report questionnaire. Each item is calculated by using a 5-point Likert scale. The patient rates his/her difficulty completing each item, where:

- 1 = an inability to finish the task
- 5 = no difficulty experienced at all.

Note: Scores for three items in the Emotion domain (3f, 3h, 3i) must be reversed before calculating the Emotion domain score (i.e., 1 » 5, 2 » 4, 3 = 3, 4 » 2, 5 » 1). When scoring, the SIS scoring database considers this change in scoring. To calculate the item score when manually scoring, use the formula for 3f, 3h and 3i: Item score = 6 – individual's rating.

A final single-item Recovery domain assesses the individual's perception of his/her recovery from stroke, measured in the form of a visual analog scale from 0-100, where:

- 0 = no recovery
- 100 = full recovery. [176]

The Turkish version of SIS 3.0 was confirmed to be reliable and valid; hence, we believe that it may be useful in the follow-up of stroke patients and in clinical research. [177]

3.3.5 Physical activity evaluation

The physical activity level of patients is evaluated by International Physical Activity Questionnaire. (Appendix 8.7)

The short form of the International Physical Activity Questionnaire (IPAQ) used in this survey has been shown previously to have an acceptable test-retest reliability and criterion validity [178]. (Appendix – IPAQ)

IPAQ was created to measure physical activity in various areas of life, including leisure, work, travel, and home tasks. Participants were asked to point the frequency and duration of walking, moderate-intensity, and vigorous-intensity activity that lasted at least 10 minutes per session on the IPAQ short form. IPAQ measures overall sitting time as well. By multiplying the number of days/week by the average daily length, weekly minutes of walking, moderate-intensity, and vigorous-intensity activity were computed individually. The metabolic equivalent (MET; multiples of resting energy expenditure) was used to assess each category's reported minutes per week.

There are eight questions in the IPAQ-Short Version. The following activities were recorded at four main intensity levels:

- 1)Vigorous-intensity activity
- 2)Moderate–intensity activity,
- 3)Walking
- 4)Sitting

For all activities, the number of days per week and minutes per day the patient continually performed the activity for ≥ 10 min for the last seven days was recorded. Total daily PA was calculated by adding the product of reported time within each item by a Metabolic equivalent (MET) value specific to each category of PA

Calculating results:

To calculate MET minutes a week multiply the MET value given (remember walking = 3.3, moderate activity = 4, vigorous activity = 8) by the minutes the activity was carried out and again by the number of days that activity was undertaken

Categorical Score

Three levels (categories) of physical activity are proposed:

- Category 1: Low Physical Activity Level

The lowest level of physical activity is in this category. Low/inactive people are those who do not match the criteria for groups 2 or 3.

- Category 2: Moderate Physical Activity Level

Any one of the three conditions listed below:

- 3 days or more of high-level activity (at least 20 minutes per day)
- 5 days of moderate level activity or 30 minutes of walking per day or more
- 5 days of any combination of walking, moderate or high-level exercises resulting in a weekly total of at least 600 MET-min

- Category 3: High Physical Activity Level

Any participant who meet the two criteria listed below:

- At least 3 days of high-level activity with a total of 1500 MET-minutes each week
- 7 days or more of any mixture of walking, moderate level, or high-level activities, totally at least 3000 MET-minutes each week

3.3.6 Depression evaluation

To evaluate depression levels of patients; Beck Depression Inventory is used. (Appendix 8.8)

The Beck Depression Assessment (BDI) is a self-report rating inventory with 21 items that assess depression-related attitudes and symptoms. [179] (Appendix – BDI)

Each item is given a score of 0 to 3 on a 4-point scale. The highest possible total score is 63.

Categorical Score

1-10	These ups and downs as considered normal
11-16	Mild mood disturbance
17-20	Borderline clinical depression
21-30	Moderate depression
31-40	Severe depression
Over 40	Extreme depression

3.3.7 Activities of daily living evaluation

To assess the activity of daily living; Barthel Index is used. (Appendix 8.9)

The Barthel Index measures independence in ADL; the maximum score is 100. [180] The Barthel Index has been used frequently in stroke research; Granger et al. found it reliable [181] and consistent with other stroke evaluations. [182]

The Barthel includes 10 personal activities: feeding, personal toileting, bathing, dressing and undressing, getting on and off a toilet, controlling the bladder, controlling bowel, moving from wheelchair to bed and returning, walking on a level surface (or propelling a wheelchair if unable to walk) and ascending and descending stairs.

Most items have a maximum of 10 points, scoring 0 for inability to perform the task, 5 points if any assistance is required, and 10 for total independence. The two items that have a maximum of 5 points are scored 0 for both inabilities, and for any assistance, with 5 points being given for complete independence. The two items that have a maximum of 15 points are scored 0 for inability, 5 or 10 points for assistance and 15 points for total independence. [183] (Appendix – BI)

Scoring:

- 0-20 Total dependency
- 21-60 Severe dependency
- 61-90 Moderate dependency
- 91-99 Slight dependency
- 100 Patient should be able to live independently

3.4 Statistical Analysis

SPSS (Statistical Package for Social Sciences) version 26 was used to evaluate the data obtained from the study. Mean, standard deviation (SD), median, minimum and maximum values were used for the presentation of continuous variables (quantitative variables) and frequency and percentage values were used for the presentation of categorical variables (qualitative variables). Kolmogorov – Smirnov and Shapiro Wilk test was used to investigate the suitability of quantitative variables to normal distribution. A Chi-Square and Fisher Exact Test test was used to compare categorical variables between groups. Independent Samples T-Test examined comparison between categorical variables and continuous variables for parametric variables and the Mann Whitney U-Test for nonparametric variables. Kruskal Wallis Analysis of Variance was used to analyze continuous data and categories which have more than three variable. In all statistical analyses, $p < 0.05$ was accepted as the level of significance.

4. RESULTS

4.1 General Results of Participants

4.1.1 The demographic characteristics of participants

The demographic characteristics of participants include, values of mean age, and body mass index (BMI) and time period after stroke has been shown in Table 4.1.1

Table 4.1.1 The Demographic Characteristics of Participants

	Mean	N	Std. Deviation	Minimum	Maximum
Age	58,52	29	12,40	29	83
BMI	28,431	29	4,84	16,6	38,2
Period	3,210	29	3,22	,5	16,0

A mean age, BMI and time period after stroke was $58,52 \pm 12,40$ years, $28,43 \pm 4,84$ kg/m² and $3,21 \pm 3,22$ years.

4.1.2 Frequency of gender

The frequency of gender has been shown in Table 4.1.2

Table 4.1.2 Frequency of Gender

	Frequency	Percent
Female	17	58,6
Male	12	41,4
Total	29	100,0

Percentage of participant's gender distribution were 17 females (%58,6) and 12 males (%41,4).

4.1.3 Frequency of affected side

Frequency of affected side has been shown in Table 4.1.3

Table 4.1.3 Frequency of Effected Side

	Frequency	Percent
Right	7	24,1
Left	22	75,9
Total	29	100,0

Participant's affected side percentage were 7 right-sided (%24,1) and 22 left-sided (%75,9)

4.1.4 Frequency of ischemic and hemorrhagic stroke values

The frequency of ischemic and hemorrhagic stroke values has been shown in Table 4.1.4

Table 4.1.4 Frequency of Ischemic and Hemorrhagic Stroke Values

	Frequency	Percent
Ischemic	20	69,0
Hemorrhagic	9	31,0
Total	29	100,0

Type of stroke category comprised of 20 ischemic (69,0) and 9 hemorrhagic (%31).

4.1.5 Frequency of comorbidity to stroke

The frequency of comorbidity to stroke has been shown in Table 4.1.5

Table 4.1.5 Frequency of Comorbidity to Stroke

	Frequency	Percent
None	7	24,1
Hypertension	11	37,9
Diabetes	3	10,3
Heart diseases	1	3,4
Hypertension, diabetes	3	10,3
Hypertension, diabetes, heart diseases	4	13,8
Total	29	100,0

Percentage of comorbidities were hypertension (%37,9), diabetes (%10,3), heart diseases (%3,4), hypertension with diabetes (%10,3), hypertension, diabetes and heart diseases together (%13,8).

4.1.6 Frequency of Modified Rankin Scale scores

The frequency of Modified Rankin Scale (mRS) scores has been shown in Table 4.1.6

Table 4.1.6 Frequency of Modified Rankin Scale (mRS) Scores

	Frequency	Percent
No symptoms	0	0
No significant disability despite symptoms	12	41,4
Slight disability	4	13,8
Moderate disability	8	27,6
Moderately severe disability	5	17,2
Dead	0	0
Total	29	100,0

Patient's mRS scores were of no significant disability despite symptoms (%41,4), slight disability (%13,8), moderate disability (%27,6), moderately severe disability (%17,2).

4.1.7 Frequency of Functional Ambulation Classification (FAC) scores

The frequency of FAC scores has been shown in Table 4.1.7

Table 4.1.7 Frequency of Functional Ambulation Classification Scores

	Frequency	Percent
No functional ambulation	0	0
Ambulator dependent level 2	5	17,2
Ambulator dependent level 1	8	27,6
Ambulator dependent supervision	1	3,4
Ambulator independent level surfaces	4	13,8
Ambulator independent	11	37,9
Total	29	100,0

Patient's FAC scores were ambulator dependent level 2 (%17,2), ambulator dependent level 1 (%27,6), ambulator dependent supervision (%3,4), ambulator independent level surfaces (%13,8) and ambulator independent (%37,9).

4.1.8 Frequency of IPAQ scores

The frequency of IPAQ scores has been shown in Table 4.1.8

Table 4.1.8 Frequency of IPAQ Scores

	Frequency	Percent
Inactive	20	69,0
Minimally active	8	27,6
Hepa active	1	3,4
Total	29	100,0

Patient's IPAQ scores consist of inactive (%69,0), minimally active (%27,6) and hepa active (%3,4).

4.1.9 Frequency of Barthel Index (BI) scores

The frequency of Barthel Index scores has been shown in Table 4.1.9

Table 4.1.9 Frequency of Barthel Index Scores

	Frequency	Percent
Total Dependency	1	3,4
Severe Dependency	5	17,2
Moderate Dependency	9	31,0
Slight Dependency	3	10,3
Fully Independent	11	37,9
Total	29	100,0

BI scores were total dependency (%3,4), severe dependency (%17,2), moderate dependency (%31,0), slight dependency (%10,3) and fully independent (%37,9).

4.1.10 Frequency of Beck Depression Inventory (BDI)

The frequency of Beck Depression Inventory scores has been shown in Table 4.1.10

Table 4.1.10 Frequency of Beck Depression Inventory (BDI) Scores

	Frequency	Percent
Normal	8	27,6
Mild mood disturbance	5	17,2
Borderline clinical depression	1	3,4
Moderate depression	8	27,6
Severe depression	5	17,2
Extreme depression	2	6,9
Total	29	100,0

BDI scores were no depression (%27,6), mild mood disturbance (%17,2), borderline clinical depression (%3,4), moderate depression (%27,6), severe depression (%17,2), extreme depression (%6,9).

4.1.11 Values of Stroke Impact Scale (SIS)

Mean, minimum – maximum and standard deviation of values of Stroke Impact Scale (SIS) has been shown in Table 4.1.11

Table 4.1.11 Values of Stroke Impact Scale (SIS)

	N	Mean	Minimum	Maximum	Std. Deviation
SIS Strength	29	50,00	25,00	80,00	15,75
SIS Memory Thinking	29	81,08	25,71	100,00	20,05
SIS Emotion	29	64,05	37,77	93,33	15,14
SIS Communication	29	86,99	40,00	100,00	20,73
SIS ADL	29	58,00	26,00	100,00	24,20
SIS Mobility	29	70,49	33,33	100,00	25,73
SIS Hand-Function	29	37,24	20,00	100,00	25,96
SIS Participation	29	43,27	20,00	100,00	25,24
SIS Recovery	29	51,38	20	90	18,07

Mean values of SIS were strength (50,00±15,75), memory-thinking (81,08±20,05), emotion (64,05±15,14), communication (86,99±20,73), ADL (58,00±24,20), mobility (70,49±25,73), hand function (37,24±25,96), participation (43,27±25,24) and recovery (51,38±18,07).

4.2 Comparison According to Gender

General Information About Results According to Gender

The results of this analysis are showing that; there is no statistical difference in groups which includes age, BMI values, SIS values (emotion and recovery) according to Independent Sample T-Test. ($p>0.05$)

It is also found that there is no statistical difference in groups which includes BMI categories, affected side, type of stroke, comorbidities, FAC scores, IPAQ scores, BDI scores according to Fisher Exact Test. ($p>0.05$)

Additionally; there is no statistical difference in groups which includes SIS values (strength, memory, communication, hand function) according to Mann Whitney U Test ($p>0.05$)

However; there is a statistical difference in the time period after stroke and SIS values (ADL, mobility, participation in activities) according to Mann Whitney U Test; and mRS scores, BI scores according to Fisher Exact Test. (**p<0.05**)

4.2.1 Comparison of demographic characteristics according to gender

The demographic characteristics of participants, which includes values of mean age, and body mass index (BMI), and time period after stroke between female and male patients has been shown in Table 4.2.1

Table 4.2.1 Demographic Characteristics According to Gender

Gender		N	Mean	Std. Deviation	Minimum	Maximum	t	p
Age	Female	17	62,18	11,18	41	83	1.987	0.057
	Male	12	53,33	12,65	29	73		
BMI	Female	17	29,77	5,08	21.8	38.2	1.846	0.076
	Male	12	26,53	3,94	16.6	31.3		
Period	Female	17	2,20	1,72	0.5	7	0.044	
	Male	12	4,63	4,28	0.6	16		

According to these findings, there was no statistical difference in groups in terms of age and BMI values between male and female patients according to Independent Samples T-Test ($p>0.05$)

However, there is a statistical difference in the time period after stroke between female and male patients according to Mann Whitney U Test ($p<0.05$)

4.2.2 Comparison of mRS scores according to gender

Comparison of mRS scores according to gender has been shown in Table 4.2.2

Table 4.2.2 Comparison of mRS Scores According to Gender

			No significant disability despite symptoms	Slight disability	Moderate disability	Moderately severe disability	Total	p
Gender	Female	Count	4	1	7	5	17	0.007
		%	23,5%	5,9%	41,2%	29,4%	100,0%	
	Male	Count	8	3	1	0	12	
		%	66,7%	25,0%	8,3%	0,0%	100,0%	
Total		Count	12	4	8	5	29	
		%	41,4%	13,8%	27,6%	17,2%	100,0%	

According to these findings, there is a statistical difference in groups according to Fisher's Exact Test. (**p<0.05**)

4.2.3 Comparison of BI scores according to gender

Comparison of BI scores according to gender has been shown in Table 4.2.3

Table 4.2.3 Comparison of BI Scores According to Gender

Barthel Category									
			Total dependency	Severe dependency	Moderate dependency	Slight dependency	Fully independent	Total	p
Gender	Female	Count	1	5	6	2	3	17	0.044
		%	5,9%	29,4%	35,3%	11,8%	17,6%	100,0%	
	Male	Count	0	0	3	1	8	12	
		%	0,0%	0,0%	25,0%	8,3%	66,7%	100,0%	
Total		Count	1	5	9	3	11	29	
		%	3,4%	17,2%	31,0%	10,3%	37,9%	100,0%	

According to these findings, there is a statistical difference in groups according to Fisher Exact test. (**p<0.05**)

4.2.4 Comparison of SIS values according to gender

Comparison of SIS values according to gender has been shown in Table 4.2.4

Table 4.2.4 Comparison of SIS Values According to Gender

SIS Values								
	Gender	N	Mean	Std. Deviation	Minimum	Maximum	t	p
SIS Strength	Female	17	47,64	16,49	25,00	80,00		0.218
	Male	12	53,33	14,66	30,00	80,00		
SIS Memory Thinking	Female	17	79,32	22,57	25,71	100,00		0.754
	Male	12	83,56	16,44	54,28	100,00		
SIS Emotion	Female	17	59,86	13,93	37,77	88,88	-1.849	0.075
	Male	12	69,99	15,35	46,66	93,33		
SIS Communication	Female	17	84,03	22,65	40,00	100,00		0.356
	Male	12	91,18	17,75	40,00	100,00		
SIS ADL	Female	17	47,29	24,67	26,00	100,00		0.006
	Male	12	73,16	13,33	40,00	100,00		
SIS Mobility	Female	17	59,47	25,35	33,33	100,00		0.013
	Male	12	86,10	17,21	46,66	100,00		
SIS Hand Function	Female	17	35,52	27,99	20,00	100,00		0.254
	Male	12	39,66	23,78	20,00	80,00		
SIS Participation	Female	17	35,58	23,34	20,00	80,00		0.039
	Male	12	54,16	24,68	20,00	100,00		
SIS Recovery	Female	17	50,59	14,77	30	80	-0.257	0.785
	Male	12	52,50	22,61	20	90		

According to these findings, there was no statistical difference in SIS strength, SIS memory thinking, SIS communication, SIS hand function according to Mann Whitney U Test. ($p>0.05$)

Also, there was no statistical difference in SIS emotion and SIS recovery according to Independent Sample T-Test. ($p>0.05$)

But there is a statistical difference in SIS ADL-IADL, SIS mobility and SIS participation according to Mann Whitney U Test. (**$p<0.05$**)

4.3 Comparison According to Affected Side

General Information About Results According to Affected Side

Results are showing that; there is no statistical difference in groups which includes age, BMI values, SIS values (emotion, ADL and recovery) according to Independent Sample T-Test. ($p>0.05$)

It is also found that there is no statistical difference in groups which includes BMI categories, gender, type of stroke, comorbidities, mRS scores, FAC scores, IPAQ scores, BI scores, BDI scores according to Fisher Exact Test. ($p>0.05$)

Additionally; there is no statistical difference in groups which includes time period after stroke, IPAQ values (LPAL, MPAL, HPAL, Total, and Sitting Time), and SIS values (strength, memory, communication, mobility, hand function and participation in activities) according to Mann Whitney U Test ($p>0.05$)

4.4 Comparison According to Reason

General Information About Results According to Reason

Results are showing that; there is no statistical difference in groups which includes age, BMI values, SIS values (memory, emotion and ADL) according to Independent Sample T-Test. ($p>0.05$)

It is also found that there is no statistical difference in groups which includes BMI categories, gender, comorbidities, mRS scores, FAC scores, IPAQ scores, BI scores, BDI scores according to Fisher Exact Test. ($p>0.05$)

Additionally; there is no statistical difference in groups which includes IPAQ values (LPAL, MPAL, HPAL, Total, and Sitting Time), and SIS values (strength, communication, mobility, hand function, participation in activities and recovery) according to Mann Whitney U Test ($p>0.05$)

However, there is statistical difference in at time period after stroke (**$p<0.05$**)

4.4.1 Comparison of demographic characteristics according to reason

The demographic characteristics of participants, which includes values of mean age, and body mass index (BMI) and time period after stroke according to types of stroke, has been shown in Table 4.4.1

Table 4.4.1 Demographic Characteristics According to Reason

		N	Mean	Std. Deviation	Minimum	Maximum	t	p
Reason		N	Mean	Std. Deviation	Minimum	Maximum	t	p
Age	Ischemic	20	60,70	12,51	29	83	1.439	0.162
	Hemorrhagic	9	53,67	11,33	39	73		
BMI	Ischemic	20	29,105	4,68	16,6	37,3	1.121	0.272
	Hemorrhagic	9	26,933	5,14	21,8	38,2		
Period	Ischemic	20	2,280	1,86	,5	7,0	0.024	
	Hemorrhagic	9	5,278	4,59	1,0	16,0		

According to these findings, there was no statistical difference in groups in terms of age and BMI between types of strokes according to Independent Samples T-Test ($p>0.05$)

However, there is a statistical difference in time after stroke between types of strokes according to Mann Whitney U Test. ($p<0.05$)

4.5 Comparison According to IPAQ

General Information About Results According to IPAQ Categories

Results are showing that; there is no statistical difference in groups which includes age, BMI values, time after stroke and SIS values (strength, memory thinking, emotion, hand function, recovery) according to Kruskal Wallis Analysis of Variance. ($p>0.05$)

It is also found that there is also no statistical difference in groups which includes BMI categories, gender, affected side, types of stroke, comorbidities, BI scores, BDI scores according to Fisher Exact Test. ($p>0.05$)

However, there is statistical difference in mRS scores and FAC scores according to Fisher Exact Test (**p<0.05**) and SIS values (communication, ADL, mobility and participation in activities) according to Kruskal Wallis Analysis of Variance (**p<0.05**)

4.5.1 Comparison of mRS scores according to IPAQ scores

Comparison of mRS scores according to IPAQ scores has been shown in Table 4.5.1

Table 4.5.1 Comparison of mRS Scores According to IPAQ Scores

			No significant disability despite symptoms	Slight disability	Moderate disability	Moderately severe disability		p
IPAQ Category	Inactive	Count	4	4	8	4	20	0.013
		%	20,0%	20,0%	40,0%	20,0%	100,0%	
	Minimally active	Count	7	0	0	1	8	
		%	87,5%	0,0%	0,0%	12,5%	100,0%	
	Hepa active	Count	1	0	0	0	1	
		%	100,0%	0,0%	0,0%	0,0%	100,0%	
Total		Count	12	4	8	5	29	
		%	41,4%	13,8%	27,6%	17,2%	100,0%	

According to these findings, there is statistical difference in groups according to Fisher's Exact Test. (**p<0.05**)

4.5.2 Comparison of FAC scores according to IPAQ scores

Comparison of FAC scores according to IPAQ scores has been shown in Table 4.5.2

Table 4.5.2 Comparison FAC Scores According to IPAQ Scores

			FAC Scores					p
			Ambulator dependent level 2	Ambulator dependent level 1	Ambulator independent level surfaces	Ambulator independent	Total	
IPAQ	Inactive	Count	4	8	4	4	20	0.045
		%	20,0%	40,0%	20,0%	20,0%	100,0%	
	Minimally active	Count	1	0	1	6	8	
		%	12,5%	0,0%	12,5%	75,0%	100,0%	
	Hepa active	Count	0	0	0	1	1	
		%	0,0%	0,0%	0,0%	100,0%	100,0%	
	Total	Count	5	8	5	11	29	
		%	17,2%	27,6%	17,2%	37,9%	100,0%	

According to these findings, there is a statistical difference in groups according to Fisher's Exact test. (**p<0.05**)

4.5.3 Comparison of SIS values according to IPAQ scores

Comparison of SIS values according to gender has been shown in Table 4.5.3

Table 4.5.3 Comparison of SIS Values According to IPAQ Scores

		N	Mean	Std. Deviation	Minimum	Maximum	P
SIS Strength	Inactive	20	47,00	14,36	25,00	80,00	0.282
	Minimally active	8	58,12	18,11	30,00	80,00	
	Hepa active	1	45,00	.	45,00	45,00	
	Total	29	50,00	15,75	25,00	80,00	
SIS Memory-Thinking	Inactive	20	77,42	21,44	25,71	100,00	0.109
	Minimally active	8	92,85	10,01	74,28	100,00	
	Hepa active	1	60,00	.	60,00	60,00	
	Total	29	81,08	20,05	25,71	100,00	
SIS Emotion	Inactive	20	62,32	15,62	37,77	93,33	0.542
	Minimally active	8	66,66	14,54	44,44	80,00	
	Hepa active	1	77,77	.	77,77	77,77	
	Total	29	64,05	15,14	37,77	93,33	
SIS Communication	Inactive	20	81,42	22,96	40,00	100,00	0.043
	Minimally active	8	99,28	2,02	94,28	100,00	
	Hepa active	1	100,00	.	100,00	100,00	
	Total	29	86,99	20,73	40,00	100,00	
SIS ADL	Inactive	20	47,60	17,69	26,00	86,00	0.005
	Minimally active	8	79,75	21,89	32,00	100,00	
	Hepa active	1	92,00	.	92,00	92,00	
	Total	29	58,00	24,20	26,00	100,00	
SIS Mobility	Inactive	20	62,43	24,60	33,33	100,00	0.023
	Minimally active	8	86,94	19,64	44,44	100,00	
	Hepa active	1	100,00	.	100,00	100,00	
	Total	29	70,49	25,73	33,33	100,00	
SIS Hand_Function	Inactive	20	29,80	17,76	20,00	76,00	0.112
	Minimally active	8	55,50	36,05	20,00	100,00	
	Hepa active	1	40,00	.	40,00	40,00	
	Total	29	37,24	25,96	20,00	100,00	
SIS Participation	Inactive	20	34,25	22,82	20,00	100,00	0.014
	Minimally active	8	61,87	19,07	20,00	80,00	
	Hepa active	1	75,00	.	75,00	75,00	
	Total	29	43,27	25,24	20,00	100,00	
Sis Recovery	Inactive	20	52,00	19,08	20	90	0.234
	Minimally active	8	53,75	13,02	30	70	
	Hepa active	1	20,00	.	20	20	
	Total	29	51,38	18,07	20	90	

According to these findings, there was no statistical difference in SIS strength, SIS memory thinking, SIS emotion, SIS hand function and SIS recovery according to Kruskal Wallis Analysis of Variance. ($p>0.05$)

But there is a statistical difference in SIS communication, SIS ADL, SIS mobility and SIS participation according to Kruskal Wallis Analysis of Variance. (**$p<0.05$**)

4.6 Comparison According to BDI

General Information About Results According to Gender

Results are showing that; there is no statistical difference in groups which includes age, BMI values, time after stroke and SIS values (strength, memory thinking, communication, hand function, recovery) according to Kruskal Wallis Analysis of Variance. ($p>0.05$)

It is also found that there is also no statistical difference in groups which includes BMI categories, gender, affected side, types of stroke, comorbidities, IPAQ scores according to Fisher Exact Test. ($p>0.05$)

However, there is statistical difference in mRS scores and FAC scores and BI scores according to Fisher Exact Test (**$p<0.05$**) and SIS values (emotion, ADL, mobility and participation in activities) according to Kruskal Wallis Analysis of Variance (**$p<0.05$**)

4.6.1 Comparison of mRS scores according to BDI scores

Comparison of mRS scores according to BDI scores has been shown in Table 4.6.1

Table 4.6.1 Comparison of mRS Scores According to BDI Scores

mRS Scores

			No significant disability despite symptoms	Slight disability	Moderate disability	Moderately severe disability	Total	p
Beck Category	Normal	Count	7	0	1	0	8	0.010
		%	87,5%	0,0%	12,5%	0,0%	100,0%	
	Mild mood disturbance	Count	3	1	1	0	5	
		%	60,0%	20,0%	20,0%	0,0%	100,0%	
	Borderline clinical depression	Count	1	0	0	0	1	
		%	100,0%	0,0%	0,0%	0,0%	100,0%	
	Moderate depression	Count	0	3	3	2	8	
		%	0,0%	37,5%	37,5%	25,0%	100,0%	
	Severe depression	Count	1	0	2	2	5	
		%	20,0%	0,0%	40,0%	40,0%	100,0%	
	Extreme depression	Count	0	0	1	1	2	
		%	0,0%	0,0%	50,0%	50,0%	100,0%	
Total		Count	12	4	8	5	29	
		%	41,4%	13,8%	27,6%	17,2%	100,0%	

According to these findings, there is a statistical difference in groups according to Fisher's Exact Test. (**p<0.05**)

4.6.2 Comparison of FAC scores according to BDI scores

Comparison of FAC scores according to BDI has been shown in Table 4.6.2

Table 4.6.2 Comparison FAC Scores According to BDI Scores

FAC

			Ambulator dependent level 2	Ambulator dependent level 1	Ambulator independent level surfaces	Ambulator independent	Total	p
Beck Category	Normal	Count	0	1	0	7	8	0.002
		%	0,0%	12,5%	0,0%	87,5%	100,0%	
	Mild mood disturbance	Count	0	2	0	3	5	
		%	0,0%	40,0%	0,0%	60,0%	100,0%	
	Borderline clinical depression	Count	0	0	0	1	1	
		%	0,0%	0,0%	0,0%	100,0%	100,0%	
	Moderate depression	Count	2	2	4	0	8	
		%	25,0%	25,0%	50,0%	0,0%	100,0%	
	Severe depression	Count	2	2	1	0	5	
		%	40,0%	40,0%	20,0%	0,0%	100,0%	
	Extreme depression	Count	1	1	0	0	2	
		%	50,0%	50,0%	0,0%	0,0%	100,0%	
Total		Count	5	8	5	11	29	
		%	17,2%	27,6%	17,2%	37,9%	100,0%	

According to these findings, there is a statistical difference in groups according to Fisher's Exact test. (**p<0.05**)

4.6.3 Comparison of BI scores according to BDI scores

Comparison of BI scores according to BDI scores has been shown in Table 4.6.3

Table 4.6.3 Comparison of BI Scores According to BDI Scores

Barthel Category

			Total dependency	Severe dependency	Moderate dependency	Slight dependency	Fully independent	Total	p
Beck Category	Normal	Count	0	1	0	1	6	8	0.018
		%	0,0%	12,5%	0,0%	12,5%	75,0%	100,0%	
	Mild mood disturbance	Count	0	0	1	0	4	5	
		%	0,0%	0,0%	20,0%	0,0%	80,0%	100,0%	
	Borderline clinical depression	Count	0	0	1	0	0	1	
		%	0,0%	0,0%	100,0%	0,0%	0,0%	100,0%	
	Moderate depression	Count	1	1	4	2	0	8	
		%	12,5%	12,5%	50,0%	25,0%	0,0%	100,0%	
	Severe depression	Count	0	2	2	0	1	5	
		%	0,0%	40,0%	40,0%	0,0%	20,0%	100,0%	
	Extreme depression	Count	0	1	1	0	0	2	
		%	0,0%	50,0%	50,0%	0,0%	0,0%	100,0%	
Total		Count	1	5	9	3	11	29	
		%	3,4%	17,2%	31,0%	10,3%	37,9%	100,0%	

According to these findings, there is a statistical difference in groups according to Fisher Exact test. (**p<0.05**)

4.6.4 Comparison of SIS values according to BDI scores

Comparison of SIS values according to BDI has been shown in Table 4.6.4

Table 4.6.4 Comparison of SIS Values According to BDI

		N	Mean	Std. Deviation	Minimum	Maximum	p
SIS Strength	Normal	8	60,62	17,81	40,00	80,00	0.173
	Mild mood disturbance	5	54,00	17,10	30,00	70,00	
	Borderline clinical depression	1	55,00	.	55,00	55,00	
	Moderate depression	8	46,25	12,17	35,00	70,00	
	Severe depression	5	37,00	10,36	25,00	50,00	
	Extreme depression	2	42,50	3,53	40,00	45,00	
	Total	29	50,00	15,75	25,00	80,00	
SIS Memory Thinking	Normal	8	90,35	17,00	54,28	100,00	0.327
	Mild mood disturbance	5	79,42	15,44	60,00	100,00	
	Borderline clinical depression	1	97,14	.	97,14	97,14	
	Moderate depression	8	75,71	18,76	42,85	100,00	
	Severe depression	5	79,99	31,42	25,71	100,00	
	Extreme depression	2	64,28	10,09	57,14	71,42	
	Total	29	81,08	20,05	25,71	100,00	
SIS Communication	Normal	8	90,35	20,93	40,00	100,00	0.353
	Mild mood disturbance	5	95,42	10,22	77,14	100,00	
	Borderline clinical depression	1	100,00	.	100,00	100,00	
	Moderate depression	8	80,71	21,80	45,71	100,00	
	Severe depression	5	88,57	22,49	48,57	100,00	
	Extreme depression	2	67,14	38,38	40,00	94,28	
	Total	29	86,99	20,73	40,00	100,00	
SIS Hand Function	Normal	8	52,50	35,03	20,00	100,00	0.346
	Mild mood disturbance	5	38,40	21,27	20,00	72,00	
	Borderline clinical depression	1	28,00	.	28,00	28,00	
	Moderate depression	8	30,00	18,88	20,00	76,00	
	Severe depression	5	32,00	26,83	20,00	80,00	
	Extreme depression	2	20,00	,00	20,00	20,00	
	Total	29	37,24	25,96	20,00	100,00	
SIS Recovery	Normal	8	62,50	12,81	50	90	0.112
	Mild mood disturbance	5	42,00	26,83	20	80	
	Borderline clinical depression	1	40,00	.	40	40	
	Moderate depression	8	50,00	13,09	30	70	
	Severe depression	5	40,00	14,14	30	60	
	Extreme depression	2	70,00	14,14	60	80	
	Total	29	51,38	18,07	20	90	

			Mean	Std. Deviation	Minimum	Maximum	p
SIS Emotion	Normal	8	74,72	9,71	60,00	88,88	0.001
	Mild mood disturbance	5	78,66	10,61	66,66	93,33	
	Borderline clinical depression	1	77,77	.	77,77	77,77	
	Moderate depression	8	57,77	7,96	48,88	66,66	
	Severe depression	5	43,99	3,65	37,77	46,66	
	Extreme depression	2	53,33	9,43	46,66	60,00	
	Total	29	64,05	15,14	37,77	93,33	
SIS ADL	Normal	8	75,00	17,46	40,00	94,00	0.007
	Mild mood disturbance	5	76,40	18,13	62,00	100,00	
	Borderline clinical depression	1	90,00	.	90,00	90,00	
	Moderate depression	8	41,25	11,99	28,00	66,00	
	Severe depression	5	43,20	23,22	28,00	84,00	
	Extreme depression	2	32,00	8,48	26,00	38,00	
	Total	29	58,00	24,20	26,00	100,00	
SIS Mobility	Normal	8	89,44	21,50	37,77	100,00	0.020
	Mild mood disturbance	5	83,10	23,75	46,66	100,00	
	Borderline clinical depression	1	95,55	.	95,55	95,55	
	Moderate depression	8	60,27	20,13	33,33	88,88	
	Severe depression	5	44,88	16,58	33,33	73,33	
	Extreme depression	2	55,55	15,71	44,44	66,66	
	Total	29	70,49	25,73	33,33	100,00	
SIS Participation	Normal	8	67,50	24,67	20,00	100,00	0.033
	Mild mood disturbance	5	45,50	27,06	20,00	75,00	
	Borderline clinical depression	1	55,00	.	55,00	55,00	
	Moderate depression	8	27,18	12,35	20,00	55,00	
	Severe depression	5	35,00	17,58	20,00	62,50	
	Extreme depression	2	20,00	,00	20,00	20,00	
	Total	29	43,27	25,24	20,00	100,00	

According to these findings, there was no statistical difference in SIS strength, SIS memory thinking, SIS communication, SIS hand function and SIS recovery according to Kruskal Wallis Analysis of Variance. ($p>0.05$)

But there is a statistical difference in SIS emotion, SIS ADL, SIS mobility and SIS participation according to Kruskal Wallis Analysis of Variance. ($p<0.05$)

4.7 Comparison between mRS and BI

Comparison of mRS and BI has been shown in Table 4.7.1

Table 4.7.1 Comparison of mRS and BI

			mRS					
			No significant disability despite symptoms	Slight disability	Moderate disability	Moderately severe disability	Total	p
Barthel Category	Total dependency	Count	0	0	0	1	1	0.00
		%	0,0%	0,0%	0,0%	100,0%	100,0%	
	Severe dependency	Count	0	0	1	4	5	
		%	0,0%	0,0%	20,0%	80,0%	100,0%	
	Moderate dependency	Count	1	1	7	0	9	
		%	11,1%	11,1%	77,8%	0,0%	100,0%	
	Slight dependency	Count	1	2	0	0	3	
		%	33,3%	66,7%	0,0%	0,0%	100,0%	
	Fully independent	Count	10	1	0	0	11	
%		90,9%	9,1%	0,0%	0,0%	100,0%		
Total		Count	12	4	8	5	29	
		%	41,4%	13,8%	27,6%	17,2%	100,0%	

According to these findings; there is a statistical difference between mRS and BI according to Fisher Exact Test. (**P<0.05**)

4.8 Comparison of gender between IPAQ and BDI

Comparison of gender between IPAQ and BDI has been shown in Table 4.8.1 and Table 4.8.2

Table 4.8.1 Comparison of Female Participants Between IPAQ and BDI

FEMALE			Beck Category						
			Normal	Mild mood disturbance	Moderate depression	Severe depression	Extreme depression		p
IPAQ	Inactive	Count	1	0	6	3	2	12	0.024
		%	8,3%	0,0%	50,0%	25,0%	16,7%	100,0%	
	Minimally active	Count	3	1	0	1	0	5	
		%	60,0%	20,0%	0,0%	20,0%	0,0%	100,0%	
Total		Count	4	1	6	4	2	17	
		%	23,5%	5,9%	35,3%	23,5%	11,8%	100,0%	

Table 4.8.2 Comparison of Male Participants Between IPAQ and BDI

MALE			Beck category						
			Normal	Mild mood disturbance	Borderline clinical depression	Moderate depression	Severe depression	Total	p
IPAQ Category	Inactive	Count	3	3	0	2	0	8	0.273
		%	37,5%	37,5%	0,0%	25,0%	0,0%	100,0%	
	Minimally active	Count	1	0	1	0	1	3	
		%	33,3%	0,0%	33,3%	0,0%	33,3%	100,0%	
	Hepa active	Count	0	1	0	0	0	1	
		%	0,0%	100,0%	0,0%	0,0%	0,0%	100,0%	
Total		Count	4	4	1	2	1	12	
		%	33,3%	33,3%	8,3%	16,7%	8,3%	100,0%	

According to these findings; there is a statistical difference in female participants between IPAQ and BDI ($p < 0.05$) but there is no statistical difference in male participants ($p > 0.05$) according to Fisher Exact Test.

4.9 Comparison of affected side between IPAQ and BDI

Comparison of affected side IPAQ and BDI has been shown in Table 4.9.1 and Table 4.9.2

Table 4.9.1 Comparison of Right Side Between IPAQ and BDI

RIGHT SIDE			Beck Category					p
			Normal	Mild mood disturbance	Moderate depression	Severe depression		
IPAQ Category	Inactive	Count	1	1	2	1	5	1
		%	20,0%	20,0%	40,0%	20,0%	100,0%	
	Minimally active	Count	1	0	0	1	2	
		%	50,0%	0,0%	0,0%	50,0%	100,0%	
Total		Count	2	1	2	2	7	
		%	28,6%	14,3%	28,6%	28,6%	100,0%	

Table 4.9.2 Comparison of Left Side Between IPAQ and BDI

			Beck Category							
LEFT SIDE					Borderline					
			Normal	Mild mood disturbance	clinical depression	Moderate depression	Severe depression	Extreme depression	Total	P
IPAQ Category	Inactive	Count	3	2	0	6	2	2	15	0.196
		%	20,0%	13,3%	0,0%	40,0%	13,3%	13,3%	100,0%	
	Minimally active	Count	3	1	1	0	1	0	6	
		%	50,0%	16,7%	16,7%	0,0%	16,7%	0,0%	100,0%	
	Hepa active	Count	0	1	0	0	0	0	1	
		%	0,0%	100,0%	0,0%	0,0%	0,0%	0,0%	100,0%	
Total		Count	6	4	1	6	3	2	22	
		%	27,3%	18,2%	4,5%	27,3%	13,6%	9,1%	100,0%	

According to these findings; there is no statistical difference in the affected side between IPAQ and BDI according to Fisher Exact Test. ($p>0.05$)

4.10 Comparison of types of strokes between IPAQ and BDI

Comparison of types of strokes between IPAQ and BDI has been shown in Table 4.10.1 and Table 4.10.2

Table 4.10.1 Comparison of Ischemic Stroke Between IPAQ and BDI

ISCHEMIC			Beck Category						
			Normal	Mild mood disturbance	Moderate depression	Severe depression	Extreme depression	Total	p
IPAQ	Inactive	Count	4	2	4	3	2	15	0.381
		%	26,7%	13,3%	26,7%	20,0%	13,3%	100,0%	
	Minimally active	Count	3	0	0	1	0	4	
		%	75,0%	0,0%	0,0%	25,0%	0,0%	100,0%	
	Hepa active	Count	0	1	0	0	0	1	
		%	0,0%	100,0%	0,0%	0,0%	0,0%	100,0%	
Total		Count	7	3	4	4	2	20	
		%	35,0%	15,0%	20,0%	20,0%	10,0%	100,0%	

0.381

Table 4.10.2 Comparison of Hemorrhagic Stroke Between IPAQ and BDI

HEMORRHAGIC			Beck Category					p
			Normal	Mild mood disturbance	Borderline clinical depression	Moderate depression	Severe depression	
IPAQ Category	Inactive	Count	0	1	0	4	0	5
		%	0,0%	20,0%	0,0%	80,0%	0,0%	100,0%
	Minimally active	Count	1	1	1	0	1	4
		%	25,0%	25,0%	25,0%	0,0%	25,0%	100,0%
	Total	Count	1	2	1	4	1	9
		%	11,1%	22,2%	11,1%	44,4%	11,1%	100,0%

0.048

According to these findings; there is a statistical difference in types of stroke between IPAQ and BDI according to Fisher Exact Test. (**p<0.05**)

5. DISCUSSION

The goal of this study is to investigate physical activity and depression in hemiplegic patients after a stroke. For this purpose; physical activity and depression are evaluated and compared. Statistical data supporting that physical activity and depression have a relation in female participants. The results also revealed that disability level and ambulation level affect physical activity and depression. In addition, the activity of daily living, mobility and participation have an association with physical activity and depression.

5.1 Participant's Demographic Characteristics

Participant's demographic characteristics which include age, BMI and period after stroke were compared according to gender, types of strokes which is ischemic or hemorrhagic, affected side which is left or right and there was no statistical difference according to gender and affected side. However, there was a difference in the time period after stroke according to gender and type of stroke. Female patients had less time period ($2,20 \pm 1.72$) after stroke than male patients ($4,63 \pm 4.28$) and hemorrhagic type of stroke ($5,27 \pm 4.59$) had more time period after stroke than the ischemic type of stroke ($2,28 \pm 1,86$).

5.2 Relationship According to Gender

When it was compared according to gender; results showed that male patients had better outcomes than female patients on disability level (mRS), activities of daily living (BI) and multidimensional outcomes of stroke (SIS) (ADL, mobility, participation) scoring. While disability conditions were getting lower, daily life scores, mobility ability, and participation of activities were also getting lower. These differences were not able to be explained by BMI, affected side, type of stroke which is ischemic or hemorrhagic or comorbidities. When it was analyzed according to disability level; while 66.7% of male patients had no significant disability despite symptoms; in female patients this percentage was only 23.5%. Additionally; none of the male patients had a moderately severe disability; but this percentage was 29.4% in female patients. It is showing that male patients had better percentage level than female patients on disability. Lower mRS scores and lower BI scores might be why female and male patients had significant differences in SIS outcomes, including ADL, mobility, and participation. These results directing that

might be related with the time period after stroke ($M 4.63 \pm 4.28$ and $F 2.20 \pm 1.72$) and can also be about the age of patients which females were older than males ($F 62.1 \pm 11.1$ and $M 53.3 \pm 12.6$). On the other hand, it might be related to social and family support differences between females and males because mobility ability is increasing by gaining ability for some activities that need support like climbing stairs or walking with assistance. Recovery time might also affect outcomes that are more in males than females. When comparing our results to those of older studies, according to Kapral et al., women were more likely to be hospitalized. They had a considerably lower functional ability at six months following a stroke than men [184]. Smurawska, L. T., et al. show the fact that men (82%) have significantly better family and social support than females (39%) [185]. When it was examined according to BI, while 66.7% of male patients were fully independent; in female patients this percentage was only 17.6%. Moreover, none of the male patients had total and severe dependency; 5.9% of female patients had a total and 29.4% of female patients had a severe dependency. When it is examined according to SIS values; male patients have better outcomes than female patients in the activity of daily living, mobility and participation. At a 3-month follow-up, the Swedish registry found a similar pattern of results in basic ADL (movement ability, toilet visits, and dressing); women were less likely to be independent according to statistics [186]. According to another study by Gargano et al., women's probabilities of obtaining ADL independence (classified as $BI > 95$) at follow-up were less than half that of men [187]. They said that the causes of this imbalance are unknown, but that factors such as sex-related variations in stroke features [188], degree of seriousness [189], quality of healthcare that they have [190], and depression [191] are all in consideration and suggested.

5.3 Relationship According to PA

When it was compared according to IPAQ; mRS scores, FAC scores and SIS (communication, ADL, mobility, participation) scores had a statistical difference. About the relationship between disability level and physical activity; it was recorded that while almost all of the minimally active (87.5%) and hepa active group patients had no disability; the inactive group had a difference in range of disability levels which consist of 20% had a slight disability, 40% had moderate disability, and 20% had moderately severe disability. Moreover, 87.5% of the minimally active group had no significant disability despite symptoms; in the inactive group this percentage was 20%. This is

showing that while level of physical activity increase; disability level condition are decreasing. This can be related to age which females had more age mean value than males or can be related with pre-stroke physical activity which might have direct relation of post-stroke physical activity. Similarly; these results go beyond the previous study that is according to Olsson O. A. et al., three significant predictor variables for being mainly inactive poststroke include functional dependency (mRS), age, and pre-stroke PA. [192] Results also indicated an association between physical activity level and ambulation grade, which naturally affected walking ability and mobility. About the relationship between ambulation level and physical activity; in comparison of IPAQ and FAC scores, results showed that while almost all of minimally active and hepa active group patients were ambulator independent; the inactive group had a different range of ambulator levels which consist of 20% ambulator dependent level 2, 40% ambulator dependent level 1, 20% ambulator independent level surfaces. Additionally, while 75% of minimally active and 100% hepa active group were ambulator independent; in the inactive group this percentage is only 20%. It is showing that while the patient's physical activity level increases; ambulatory level decreases. Better physical activity abilities require better mobility like walking speed, transfers such as from bed to chair, walking in balance, climbing stairs. A similar conclusion was reached by Matthew J. et al. in a systematic review on physical activity after a stroke; higher physical activity levels were generally associated with increased walking capacity, as determined by 6-minute and 2-minute walk tests, capacity to climb stairs, functional ambulation level, and walking speed [193]. In a comparison of IPAQ and SIS scores; results showed that the minimally active and hepa active group had greater better outcomes than the inactive group on communication, the activity of daily living, mobility ability and participation. These results directing us that while the physical activity level of patients increases; the mean value of SIS scores which consist of communication, ADL, mobility and participation increase also. Better physical activity ability requires better ADL like as dressing, getting the toilet on time, or some light or heavy household tasks, and better participation such as social activities, quiet recreation (like reading), doing sport, role as a friend/family member or spiritual-religious activities and better communication skills such as saying the name of someone that is in interaction with the patient, answering questions, accurately naming items, participating in a group chat, or calling a phone number properly, including selecting the correct phone number and dialing. As well as Wilkinson [194] also examined at 106 people in a study and found a strong link between BI and the Frenchay Activity Index

(FAI) which shows physical activity level at a 5-year average follow-up. As it is seen, these qualities might have a connection with perceptual skills closely. In the light of the study of Fullerton, et al. found a clear relationship between ADL difficulties and perceptual deficits using improved assessments of perceptual deficits and gross instruments for motor impairments. [195] Bernspang et al. reported that motor and perceptual problems had a similar influence on self-care skills 4-6 years after a stroke.[196]

5.4 Relationship According to BDI

When it was compared according to BDI; mRS, FAC, BI, and SIS (emotion, ADL, mobility and participation) had a statistical difference. (**p<0.05**) In the comparison of BDI and mRs scores; it is shown that 87.8% of patients who did not have any level of depression; had no significant disability despite symptoms. Patients who had moderate, severe or extreme depression; had different levels of disability. It shows that while disability levels increase; results show that patients start to have different levels of depression. The findings reveal that there is a relation between disability and depression. Aprile, I. et al. [197] also stated that higher disability is associated with depression. In comparing BDI and FAC scores; it is recorded that 87.5% of people did not have any level of depression; they were ambulator independent. Patients who had moderate, severe and extreme depression had different ambulatory dependency levels. It shows that while the ambulatory level was changing from independent to dependent; it was shown that depression level increases. Results are directing that depression also has a significant association with low ambulation. The findings are directly in line with previous findings likely Field, Matthew J. et al. [193] stated in the systematic review about physical activity after a stroke that low levels of physical activity have been linked to decreased mobility, walking ability, and depression. In the comparison of BDI and BI scores; it is shown that 75% of people who did not have any level of depression; were fully independent. Patients who had moderate, severe and extreme depression had a different range of dependency. It is showing that while the dependency range changes from fully dependent to severe dependency; depression level increases. Haghgoo, Hojjat Allah et al. [198] also point towards the idea that there was an important and significant association between ADL performances and ASD (after stroke depression), which means ADL has a strong relationship with the level of depression in patients with stroke. In the comparison of BDI

and SIS scores; it was recorded that while depression level changed from no sign of depression to extreme depression; mean values of ADL and mobility ability decreased. It is found that emotion and participation are other significant outcomes that are in association with depression ($p < 0.05$). Especially emotional state which is closely connected to depression includes points like does the patient feel sad, is there nobody that patient is close to, does he/she feel that patient is a burden to others, does she/he blaming himself/herself for mistakes that he/she made, does she/he enjoy from life, does she/he feel nervous or not, does he/she feel life is worth living or at least does he/she laugh at least once a day. In the light of these results, This is consistent with what has been found in the previous study conducted by Field, Matthew J. et al. stated that low mood could be a cause and consequence of depression. [193]

5.5 Relationship According to PA and BDI

5.5.1 Relationship according to gender between PA and BDI

When IPAQ and BDI are compared according to gender, affected side and types of strokes; it is recorded that gender and type of stroke had statistical differences in the case of being female and have a hemorrhagic type of stroke, but there was no statistical difference according to the affected side. According to gender; it is recorded that female patients have a statistical difference. Inactive female patients had a different range of depression which consist of moderate (50%), severe (25%) and extreme (16.7%) levels. It is observed those female patients who at least minimally active; mostly had no depression (60%). It shows a relation between physical activity level and depression in female patients ($p < 0.05$). One important key point is coming from Aneshensel, C.S et al.; Depressive symptoms, while showing some variation across sociodemographic subgroups, appeared to follow the same basic course among the different social strata. However, loss of event participation, role strains, and social support appeared to be differentially related to the occurrence of isolated-episode and recurrent-chronic cases of depressive symptoms [199]. Multiple studies have found that women with physical limitations are more likely to develop depressive symptoms compared to men. More women with impairments are thought to be depressed, and the percentage is between 30% [200] to 59% [201-203]. According to Healthy People 2010 [203], women with impairments were more likely than women without impairments to experience sadness, unhappiness, or depression, which stopped them from being active. It is already had been

proven that there is an association between disability level and physical activity and they have an effect on depression. The interaction impact of disability status and gender in terms of the relation with respondents' depression scores has been given by Noh, Jin-Won et al. [204]; females show a greater depression score than their male partners when it came to physical impairment status. These results were showing the association between physical disability status and females who had a higher depression score than their male counterparts. Kaplan et al. [205] investigated the influence of baseline depression on a change in physical activity level in 4025 population respondents in a 9-year longitudinal epidemiologic research. In women, baseline depression was found to be significantly connected to a future decrease in physical activity in women, but for males it was not enough to be significant. Female disability group depression symptoms may be related to females having less access to material and social situations than males [204]. Another study from Kessler et al. depressive disorders are more prevalent among women, with a lifetime prevalence of 21.3 percent for severe depressive symptoms compared to 12.7 percent for males. [206]. Also, according to Van de Velde, S. Bracke, P., & Levecque, K.; with huge datasets from 23 European nations, they estimate gender differences in depression, finding greater levels of depression in women than males in all nations. They also indicate a significant link between depression and sociodemographic characteristics in both men and women [207]

5.5.2 Relationship according to affected side between PA and BDI

When it is examined according to the affected side; it is found that there was no statistical difference according to the affected side. Patients who were inactive and right hemiplegic have different levels of depression as similar to left-sided hemiplegic patients. %20 of patients who were inactive; there was no depression and %40 of patients had moderate depression in both left and right hemiplegic. The distribution of patients according to the right or left hemiplegic had a similar pattern. Unlike our findings; Carson, A. J. et al. also stated that; multiple studies, particularly those carried between 3 and 12 months after a stroke, have failed to find a difference in depression prevalence rates between individuals with left- and right-hemispheric strokes [208]. Like our findings; Åström, M. point the difference like; GAD (generalized anxiety disorder) with depression was linked with left hemisphere lesion during the acute stage after stroke, whereas anxiety alone was associated with right hemispheric lesion, [146]. Robinson, R.

G., & Starkstein, S. E. explained the logic like; following a right hemisphere stroke, there is an increase in serotonin receptor binding, which is not seen after similar left hemisphere strokes. The lesser the serotonin binding inside the left brain, the more severe the depression. This shows that the right hemisphere, but not the left, may be able to enhance serotonin binding in non-damaged areas, resulting in a biochemical "compensation" for injury. This difference in metabolic reaction to trauma between the right and left hemispheres might help to explain why left hemisphere damage causes depression while right hemisphere injury causes mania [209]. Similar to our study also; Morris, P. L et al. stated that patients with left hemisphere prefrontal or basal ganglia lesions showed a higher rate of depressive disorder as 75% percent. Other people with other left hemisphere lesions showed 8%. In people with right hemisphere lesions, this percentage is %29 percent. Damage to brain networks in the left hemisphere's prefrontal or basal ganglia regions is linked to the depressed mood after a stroke [210]

5.5.3 Relationship according to type of stroke between PA and BDI

About hemorrhagic stroke and its effect on the connection between physical activity stage and depression; it is recorded that hemorrhagic type of stroke have difference statistically. Inactive patients who have the hemorrhagic type of stroke have mostly moderate depression (80.0%) and there are not any patients who do not have any level of depression. But half of the inactive patients who have an ischemic stroke (50%); are in the category of normal, which shows there is no depression level. It can be observed that minimally active patients who have the hemorrhagic type of stroke can have a lower level of depression than moderate depression (75.0%). But 75% of minimally active patients who have the ischemic type of stroke are in the category of do not have any level of depression. In the light of the study conducted by Zeng, Y.Y. et al. conducted; PSD was found to be considerably more prevalent (42.3%) in the ICH group than in the AIS group (22.9% ($p < 0.001$)). ICH patients have more common depressive symptoms consisting of tiredness, anxiety, sleeplessness, loss of interest were more common than AIS patients. [211] Biffi, Alessandro et al. [212] conducted research with ICH survivors who had never been depressed before. During a median follow-up time of 49.6 months, 271/695 ICH survivors (40%) experienced new-onset mood disorder, and they estimated a post-ICH depression incidence rate of 6.9% per year. Lower educational achievement level was one of the independent risk factors. Depression and dementia were co-

diagnosed in 135/214 individuals (63%). Depression preceded post-ICH dementia in 108/135 cases (80% $p=0.002$), with median anticipation of 17.5 months. Stern-Nezer, Sara, et al. [213] also explained that post-ICH depression was common and was linked to late disability worsening that was unrelated to the severity of the initial hemorrhage. Individual mRS scores were not statistically related to depression after 90 days or a year. However, the overall HDRS (Hamilton Depression Rating Scale) score increased considerably between mRS 0-1 and mRS 2 or greater. They also compared each patient's mRS at 90 days and one year to check whether there was any change; a higher percentage of participants who were depressed at one year had their mRS worsen between 90 days and one year. Furthermore, regardless of whether patients were classed as depressive, a higher total score on the HDRS was linked to a reduction of mRS between 90 days and one year.

5.6 Relationship Between Disability Level And dependency

When mRS and BI compared; results showed that while patients who had no disability despite symptoms were mostly fully independent, but patients who had moderate or moderately severe disability had total dependency or severe dependency. This shows a strong relationship between the severity of disability level and the dependency level of patients after stroke.

5.7 Study Limitations

The study's major disadvantage is the limited sample size. In addition, pre-stroke physical activity is not analyzed and it may have a direct effect on post-stroke physical activity. The general emotional state also can be added to outcomes and may fill the gap where the patient's status is not recorded as in depression which counts directly in non-depression. Another key point; this study was conducted only with patients who receive rehabilitation. It can show more realistic outcomes if further researches may include stroke survivors who do not have any kind of rehabilitation process and it is desirable for future work for managing all these limitations and conduct study with follow-up to years, and it can give another aspect of physical activity and depression determinants.

6. CONCLUSIONS

Physical activity had strong relationship with disability level, ambulation level and multidimensional outcomes of stroke which includes communication skills, ADL, mobility and participation to activities.

Depression was found in significant relationship with disability level, ambulation level, BI, multidimensional outcomes of stroke which contains amotional state, ADL, mobility and participation to activities.

Physical activity (PA) and depression together are associated with activities of daily living (ADL), mobility, and participation in an activity, which also means a role function in social life.

This study records that physical activity and depression have a relationship in female patients and hemorrhagic type of stroke.

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8. APPENDICES

8.1 Appendix 1 – Informed Voluntary Consent Form

	KLİNİK ARAŞTIRMALAR ETİK KURULU BİLGİLENDİRİLMİŞ GÖNÜLLÜ OLUR FORMU	TARİH: 01/07/2020 VERSİYON:
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Araştırmanın Adı: " Hemipleji Hastalarında Fiziksel Aktivite ve Depresyonun İncelenmesi "

Sayın Katılımcı,

Yukarıda adı yazılı araştırmaya katılmak üzere davet edilmiş bulunmaktasınız. Bu araştırmada yer almayı kabul etmeden önce, araştırmanın ne amaçla yapılmak istendiğini anlamanız ve bu bilgilendirme sonucunda kararınızı vermeniz gerekmektedir. Aşağıdaki bilgileri lütfen dikkatlice okuyunuz, sorularınız olursa sorunuz ve açık yanıtlar isteyiniz.

Bu araştırma ile hemipleji hastalarında fiziksel aktivite ve depresyonun incelenmesi amaçlanmıştır. Bu araştırma ile fiziksel aktivite ve depresyon arasında orantısız bir ilişki olup olmadığını anlamaya yarar sağlayacaktır. Araştırmaya sizin dışınızda 29 kişi katılacaktır. Sizden bu çalışmaya katılmanız, sadece bir kere fizyoterapist gözetiminde/eşliğinde testleri yapmanız istenecektir. Bu işlem yaklaşık 15 dakika sürecektir. Demografik bilgi formu, fiziksel aktivite için Uluslararası Fiziksel Aktivite Ölçeği (IPAQ), günlük yaşam aktiviteleri için Barthel İndeksi, depresyon için Beck Depresyon Envanteri testini tamamlamanız istenecektir. Bunun size ve yakınlarınıza hiçbir zararı olmayacaktır. Çalışmaya katılmakla parasal yük altına girmeyeceksiniz ve size de herhangi bir ödeme yapılmayacaktır.

Bu araştırmaya katılıp katılmamakta tümüyle özgürsünüz. Gerek duyduğunuz tüm bilgileri istemeye ve doğru, açık, anlaşılır bilgi almaya hakkınız vardır. Araştırmaya katılmayı istemezseniz burada size verilen hizmet olumlu veya olumsuz şekilde etkilenmeyecektir. Gerekli gördüğü takdirde araştırmanın herhangi bir kısmında katılımcı araştırmadan çekilebilir, araştırmacı çalışmayı sonlandırabilir. Araştırmanın tüm aşamalarında kimlik bilgileriniz gizli tutulacaktır. Araştırma kapsamında elde edilen bilgiler bilimsel amaçlarla kullanılabilir gizlilik kurallarına uyulmak kaydıyla sunulabilir ve yayınlanabilir.

Ulaşım ve sarf malzeme ücretleri araştırmacı tarafından karşılanacaktır. Bu formlardan elde edilecek bilgiler tamamen araştırma amacı ile kullanılacaktır. Araştırmada yapılan değerlendirmelerin sonuçları yalnızca araştırma kapsamındaki çalışmalarda ve sadece sorumlu araştırmacı tarafından kullanılacaktır. Kişisel bilgileriniz herhangi bir amaçla, kurum yöneticileri veya üçüncü kişilerle kesinlikle paylaşılmayacaktır. Bu çalışma için gönüllü katılımcıdan, özel ya da devlete ait sağlık ödeneklerinden hiçbir şekilde ücret talep edilmeyecektir.

Katılımlarınız için teşekkür ederiz.

" Hemipleji Hastalarında Fiziksel Aktivite ve Depresyonun İncelenmesi " adlı araştırmada katılımcıya/gönüllüye verilmesi gereken bilgileri okudum ve katılmam istenen çalışmanın kapsamını ve amacını, gönüllü olarak üzerime düşen sorumlulukları tamamen anladım. **Çalışma hakkında yazılı ve sözlü açıklamalar araştırmacı tarafından yapıldı.** Bu çalışmayı istediğim zaman ve herhangi bir neden belirtmek zorunda kalmadan bırakabileceğimi ve bıraktığım takdirde herhangi bir olumsuzluk ile karşılaşmayacağımı anladım.

Bu koşullarda söz konusu araştırmaya kendi isteğimle, hiçbir baskı ve zorlama olmaksızın katılmayı kabul ediyorum.

Gönüllünün Adı /Soyadı /İmzası /Tarih

Açıklama Yapan Kişinin Adı /Soyadı /İmzası /Tarih

Danışman Öğretim Üyesi: Prof. Dr. Rasmi MUAMMER

Araştırmacı: Fizyoterapist Esin ERTAŞ

8.2 Appendix 2 – Ethical Committee Approval



Sayı : 37068608-6100-15- 1950
Konu: Klinik Araştırmalar
Etik Kurul Başvurusu hk.

10/09/2020

İlgili Makama (Esin Ertaş)

Yeditepe Üniversitesi Sağlık Bilimleri Fakültesi Fizyoterapi ve Rehabilitasyon Bölümü Prof. Dr. Rasmi Muammer'in sorumlu araştırmacı olduğu **“Hemipleji Hastalarında Fiziksel Aktivite ve Depresyonun İncelenmesi”** isimli araştırma projesine ait Klinik Araştırmalar Etik Kurulu (KAEK) Başvuru Dosyası (1942) kayıtlı Numaralı KAEK Başvuru Dosyası, Yeditepe Üniversitesi Klinik Araştırmalar Etik Kurulu tarafından 09.09.2020 tarihli toplantıda incelenmiştir.

Kurul tarafından yapılan inceleme sonucu, yukarıdaki isim belirtilen çalışmanın yapılmasının etik ve bilimsel açıdan uygun olduğuna karar verilmiştir. (KAEK Karar No:1282)

Prof. Dr. Turgay Çelik

Yeditepe Üniversitesi
Klinik Araştırmalar Etik Kurul Başkanı

8.3 Appendix 3 – Demographic Characteristics of Participants

AGE	
HEIGHT	
WEIGHT	
BMI	
PERIOD AFTER STROKE	

	RIGHT	LEFT
EFFECTED SIDE		
DOMINANT		

	ISCHEMIC	HEMORRHAGIC
TYPE OF STROKE		

COMORBIDITIES	- - - -
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8.4 Appendix 4 – Modified Rankin Scale (mRS)

Modified Rankin Scale (mRS)

Purpose

The modified Rankin Scale (mRS) is a scale commonly used for measuring the degree of disability or dependence in the daily activities of individuals who have suffered a stroke, and it has become the most widely used clinical outcome measure for stroke clinical trials.

Choose the score that most appropriately describes the subject's current state:

Description	Score (select one)
No symptoms at all	0 ☐
No significant disability despite symptoms; able to carry out all usual duties and activities	1 ☐
Slight disability; unable to carry out all previous activities, but able to look after own affairs without assistance	2 ☐
Moderate disability; requiring some help, but able to walk without assistance	3 ☐
Moderately severe disability; unable to walk without assistance and unable to attend to own bodily needs without assistance	4 ☐
Severe disability; bedridden, incontinent and requiring constant nursing care and attention	5 ☐
Dead	6 ☐

8.5 Appendix 5 – Functional Ambulation Scale (FAC)

Appendix—Description of Functional Ambulation Category (FAC)

FAC	Ambulation Description	Definition
0	Nonfunctional ambulation	Subject cannot ambulate, ambulates in parallel bars only, or requires supervision or physical assistance from more than one person to ambulate safely outside of parallel bars
1	Ambulator-Dependent for Physical Assistance Level II	Subject requires manual contacts of no more than one person during ambulation on level surfaces to prevent falling. Manual contacts are continuous and necessary to support body weight as well as maintain balance and/or assist coordination
2	Ambulator-Dependent for Physical Assistance Level I	Subject requires manual contact of no more than one person during ambulation on level surfaces to prevent falling. Manual contact consists of continuous or intermittent light touch to assist balance or coordination
3	Ambulator-Dependent for Supervision	Subject can physically ambulate on level surfaces without manual contact of another person but for safety requires standby guarding on no more than one person because of poor judgment, questionable cardiac status, or the need for verbal cuing to complete the task.
4	Ambulator-Independent Level Surfaces only	Subject can ambulate independently on level surfaces but requires supervision or physical assistance to negotiate any of the following: stairs, inclines, or non-level surfaces.
5	Ambulator-Independent	Subject can ambulate independently on nonlevel and level surfaces, stairs, and inclines.

8.6 Appendix 6 – Stroke Impact Scale (SIS)

Stroke Impact Scale

VERSION 3.0

The purpose of this questionnaire is to evaluate how stroke has impacted your health and life. We want to know from **YOUR POINT OF VIEW** how stroke has affected you. We will ask you questions about impairments and disabilities caused by your stroke, as well as how stroke has affected your quality of life. Finally, we will ask you to rate how much you think you have recovered from your stroke.

Stroke Impact Scale

These questions are about the physical problems which may have occurred as a result of your stroke.

1. In the past week, how would you rate the strength of your....	A lot of strength	Quite a bit of strength	Some strength	A little strength	No strength at all
a. Arm that was <u>most affected</u> by your stroke?	5	4	3	2	1
b. Grip of your hand that was <u>most affected</u> by your stroke?	5	4	3	2	1
c. Leg that was <u>most affected</u> by your stroke?	5	4	3	2	1
d. Foot/ankle that was <u>most affected</u> by your stroke?	5	4	3	2	1

These questions are about your memory and thinking.

2. In the past week, how difficult was it for you to...	Not difficult at all	A little difficult	Somewhat difficult	Very difficult	Extremely difficult
a. Remember things that people just told you?	5	4	3	2	1
b. Remember things that happened the day before?	5	4	3	2	1
c. Remember to do things (e.g. keep scheduled appointments or take medication)?	5	4	3	2	1
d. Remember the day of the week?	5	4	3	2	1
e. Concentrate?	5	4	3	2	1
f. Think quickly?	5	4	3	2	1
g. Solve everyday problems?	5	4	3	2	1

These questions are about how you feel, about changes in your mood and about your ability to control your emotions since your stroke.

3. In the past week, how often did you...	None of the time	A little of the time	Some of the time	Most of the time	All of the time
a. Feel sad?	5	4	3	2	1
b. Feel that there is nobody you are close to?	5	4	3	2	1
c. Feel that you are a burden to others?	5	4	3	2	1
d. Feel that you have nothing to look forward to?	5	4	3	2	1
e. Blame yourself for mistakes that you made?	5	4	3	2	1
f. Enjoy things as much as ever?	5	4	3	2	1
g. Feel quite nervous?	5	4	3	2	1
h. Feel that life is worth living?	5	4	3	2	1
i. Smile and laugh at least once a day?	5	4	3	2	1

The following questions are about your ability to communicate with other people, as well as your ability to understand what you read and what you hear in a conversation.

4. In the past week, how difficult was it to...	Not difficult at all	A little difficult	Somewhat difficult	Very difficult	Extremely difficult
a. Say the name of someone who was in front of you?	5	4	3	2	1
b. Understand what was being said to you in a conversation?	5	4	3	2	1
c. Reply to questions?	5	4	3	2	1
d. Correctly name objects?	5	4	3	2	1
e. Participate in a conversation with a group of people?	5	4	3	2	1
f. Have a conversation on the telephone?	5	4	3	2	1
g. Call another person on the telephone, including selecting the correct phone number and dialing?	5	4	3	2	1

The following questions ask about activities you might do during a typical day.

5. In the past 2 weeks, how difficult was it to...	Not difficult at all	A little difficult	Somewhat difficult	Very difficult	Could not do at all
a. Cut your food with a knife and fork?	5	4	3	2	1
b. Dress the top part of your body?	5	4	3	2	1
c. Bathe yourself?	5	4	3	2	1
d. Clip your toenails?	5	4	3	2	1
e. Get to the toilet on time?	5	4	3	2	1
f. Control your bladder (not have an accident)?	5	4	3	2	1
g. Control your bowels (not have an accident)?	5	4	3	2	1
h. Do light household tasks/chores (e.g. dust, make a bed, take out garbage, do the dishes)?	5	4	3	2	1
i. Go shopping?	5	4	3	2	1
j. Do heavy household chores (e.g. vacuum, laundry or yard work)?	5	4	3	2	1

The following questions are about your ability to be mobile, at home and in the community.

6. In the past 2 weeks, how difficult was it to...	Not difficult at all	A little difficult	Somewhat difficult	Very difficult	Could not do at all
a. Stay sitting without losing your balance?	5	4	3	2	1
b. Stay standing without losing your balance?	5	4	3	2	1
c. Walk without losing your balance?	5	4	3	2	1
d. Move from a bed to a chair?	5	4	3	2	1
e. Walk one block?	5	4	3	2	1
f. Walk fast?	5	4	3	2	1
g. Climb one flight of stairs?	5	4	3	2	1
h. Climb several flights of stairs?	5	4	3	2	1
i. Get in and out of a car?	5	4	3	2	1

The following questions are about your ability to use your hand that was MOST AFFECTED by your stroke.

7. In the past 2 weeks, how difficult was it to use your hand that was most affected by your stroke to...	Not difficult at all	A little difficult	Somewhat difficult	Very difficult	Could not do at all
a. Carry heavy objects (e.g. bag of groceries)?	5	4	3	2	1
b. Turn a doorknob?	5	4	3	2	1
c. Open a can or jar?	5	4	3	2	1
d. Tie a shoe lace?	5	4	3	2	1
e. Pick up a dime?	5	4	3	2	1

The following questions are about how stroke has affected your ability to participate in the activities that you usually do, things that are meaningful to you and help you to find purpose in life.

8. During the past 4 weeks, how much of the time have you been limited in...	None of the time	A little of the time	Some of the time	Most of the time	All of the time
a. Your work (paid, voluntary or other)	5	4	3	2	1
b. Your social activities?	5	4	3	2	1
c. Quiet recreation (crafts, reading)?	5	4	3	2	1
d. Active recreation (sports, outings, travel)?	5	4	3	2	1
e. Your role as a family member and/or friend?	5	4	3	2	1
f. Your participation in spiritual or religious activities?	5	4	3	2	1
g. Your ability to control your life as you wish?	5	4	3	2	1
h. Your ability to help others?	5	4	3	2	1

9. Stroke Recovery

On a scale of 0 to 100, with 100 representing full recovery and 0 representing no recovery, how much have you recovered from your stroke?

_____	100	Full Recovery
—		
_____	90	
—		
_____	80	
—		
_____	70	
—		
_____	60	
—		
_____	50	
—		
_____	40	
—		
_____	30	
—		
_____	20	
—		
_____	10	
_____	0	No Recovery

8.7 Appendix 7 – International Physical Activity Questionnaire (IPAQ)

INTERNATIONAL PHYSICAL ACTIVITY QUESTIONNAIRE (August 2002)

SHORT LAST 7 DAYS SELF-ADMINISTERED FORMAT

FOR USE WITH YOUNG AND MIDDLE-AGED ADULTS (15-69 years)

The International Physical Activity Questionnaires (IPAQ) comprises a set of 4 questionnaires. Long (5 activity domains asked independently) and short (4 generic items) versions for use by either telephone or self-administered methods are available. The purpose of the questionnaires is to provide common instruments that can be used to obtain internationally comparable data on health-related physical activity.

Background on IPAQ

The development of an international measure for physical activity commenced in Geneva in 1998 and was followed by extensive reliability and validity testing undertaken across 12 countries (14 sites) during 2000. The final results suggest that these measures have acceptable measurement properties for use in many settings and in different languages, and are suitable for national population-based prevalence studies of participation in physical activity.

Using IPAQ

Use of the IPAQ instruments for monitoring and research purposes is encouraged. It is recommended that no changes be made to the order or wording of the questions as this will affect the psychometric properties of the instruments.

Translation from English and Cultural Adaptation

Translation from English is supported to facilitate worldwide use of IPAQ. Information on the availability of IPAQ in different languages can be obtained at www.ipaq.ki.se. If a new translation is undertaken we highly recommend using the prescribed back translation methods available on the IPAQ website. If possible please consider making your translated version of IPAQ available to others by contributing it to the IPAQ website. Further details on translation and cultural adaptation can be downloaded from the website.

Further Developments of IPAQ

International collaboration on IPAQ is on-going and an *International Physical Activity Prevalence Study* is in progress. For further information see the IPAQ website.

More Information

More detailed information on the IPAQ process and the research methods used in the development of IPAQ instruments is available at www.ipaq.ki.se and Booth, M.L. (2000). *Assessment of Physical Activity: An International Perspective*. Research Quarterly for Exercise and Sport, 71 (2): s114-20. Other scientific publications and presentations on the use of IPAQ are summarized on the website.

SHORT LAST 7 DAYS SELF-ADMINISTERED version of the IPAQ. Revised August 2002.

INTERNATIONAL PHYSICAL ACTIVITY QUESTIONNAIRE

We are interested in finding out about the kinds of physical activities that people do as part of their everyday lives. The questions will ask you about the time you spent being physically active in the **last 7 days**. Please answer each question even if you do not consider yourself to be an active person. Please think about the activities you do at work, as part of your house and yard work, to get from place to place, and in your spare time for recreation, exercise or sport.

Think about all the **vigorous** activities that you did in the **last 7 days**. **Vigorous** physical activities refer to activities that take hard physical effort and make you breathe much harder than normal. Think *only* about those physical activities that you did for at least 10 minutes at a time.

1. During the **last 7 days**, on how many days did you do **vigorous** physical activities like heavy lifting, digging, aerobics, or fast bicycling?

_____ **days per week**

☐ No vigorous physical activities → **Skip to question 3**
2. How much time did you usually spend doing **vigorous** physical activities on one of those days?

_____ **hours per day**
_____ **minutes per day**

☐ Don't know/Not sure

Think about all the **moderate** activities that you did in the **last 7 days**. **Moderate** activities refer to activities that take moderate physical effort and make you breathe somewhat harder than normal. Think only about those physical activities that you did for at least 10 minutes at a time.

3. During the **last 7 days**, on how many days did you do **moderate** physical activities like carrying light loads, bicycling at a regular pace, or doubles tennis? Do not include walking.

_____ **days per week**

☐ No moderate physical activities → **Skip to question 5**

SHORT LAST 7 DAYS SELF-ADMINISTERED version of the IPAQ. Revised August 2002.

4. How much time did you usually spend doing **moderate** physical activities on one of those days?

_____ **hours per day**

_____ **minutes per day**

☐ Don't know/Not sure

Think about the time you spent **walking** in the **last 7 days**. This includes at work and at home, walking to travel from place to place, and any other walking that you have done solely for recreation, sport, exercise, or leisure.

5. During the **last 7 days**, on how many days did you **walk** for at least 10 minutes at a time?

_____ **days per week**

☐ No walking → **Skip to question 7**

6. How much time did you usually spend **walking** on one of those days?

_____ **hours per day**

_____ **minutes per day**

☐ Don't know/Not sure

The last question is about the time you spent **sitting** on weekdays during the **last 7 days**. Include time spent at work, at home, while doing course work and during leisure time. This may include time spent sitting at a desk, visiting friends, reading, or sitting or lying down to watch television.

7. During the **last 7 days**, how much time did you spend **sitting** on a **week day**?

_____ **hours per day**

_____ **minutes per day**

☐ Don't know/Not sure

This is the end of the questionnaire, thank you for participating.

8.8 Appendix 8 – Beck Depression Inventory (BDI)

Beck's Depression Inventory

This depression inventory can be self-scored. The scoring scale is at the end of the questionnaire.

1.
 - 0 I do not feel sad.
 - 1 I feel sad
 - 2 I am sad all the time and I can't snap out of it.
 - 3 I am so sad and unhappy that I can't stand it.
2.
 - 0 I am not particularly discouraged about the future.
 - 1 I feel discouraged about the future.
 - 2 I feel I have nothing to look forward to.
 - 3 I feel the future is hopeless and that things cannot improve.
3.
 - 0 I do not feel like a failure.
 - 1 I feel I have failed more than the average person.
 - 2 As I look back on my life, all I can see is a lot of failures.
 - 3 I feel I am a complete failure as a person.
4.
 - 0 I get as much satisfaction out of things as I used to.
 - 1 I don't enjoy things the way I used to.
 - 2 I don't get real satisfaction out of anything anymore.
 - 3 I am dissatisfied or bored with everything.
5.
 - 0 I don't feel particularly guilty
 - 1 I feel guilty a good part of the time.
 - 2 I feel quite guilty most of the time.
 - 3 I feel guilty all of the time.
6.
 - 0 I don't feel I am being punished.
 - 1 I feel I may be punished.
 - 2 I expect to be punished.
 - 3 I feel I am being punished.
7.
 - 0 I don't feel disappointed in myself.
 - 1 I am disappointed in myself.
 - 2 I am disgusted with myself.
 - 3 I hate myself.
8.
 - 0 I don't feel I am any worse than anybody else.
 - 1 I am critical of myself for my weaknesses or mistakes.
 - 2 I blame myself all the time for my faults.
 - 3 I blame myself for everything bad that happens.
9.
 - 0 I don't have any thoughts of killing myself.
 - 1 I have thoughts of killing myself, but I would not carry them out.
 - 2 I would like to kill myself.
 - 3 I would kill myself if I had the chance.
10.
 - 0 I don't cry any more than usual.
 - 1 I cry more now than I used to.
 - 2 I cry all the time now.
 - 3 I used to be able to cry, but now I can't cry even though I want to.

- 11.
- 0 I am no more irritated by things than I ever was.
 - 1 I am slightly more irritated now than usual.
 - 2 I am quite annoyed or irritated a good deal of the time.
 - 3 I feel irritated all the time.
- 12.
- 0 I have not lost interest in other people.
 - 1 I am less interested in other people than I used to be.
 - 2 I have lost most of my interest in other people.
 - 3 I have lost all of my interest in other people.
- 13.
- 0 I make decisions about as well as I ever could.
 - 1 I put off making decisions more than I used to.
 - 2 I have greater difficulty in making decisions more than I used to.
 - 3 I can't make decisions at all anymore.
- 14.
- 0 I don't feel that I look any worse than I used to.
 - 1 I am worried that I am looking old or unattractive.
 - 2 I feel there are permanent changes in my appearance that make me look unattractive
 - 3 I believe that I look ugly.
- 15.
- 0 I can work about as well as before.
 - 1 It takes an extra effort to get started at doing something.
 - 2 I have to push myself very hard to do anything.
 - 3 I can't do any work at all.
- 16.
- 0 I can sleep as well as usual.
 - 1 I don't sleep as well as I used to.
 - 2 I wake up 1-2 hours earlier than usual and find it hard to get back to sleep.
 - 3 I wake up several hours earlier than I used to and cannot get back to sleep.
- 17.
- 0 I don't get more tired than usual.
 - 1 I get tired more easily than I used to.
 - 2 I get tired from doing almost anything.
 - 3 I am too tired to do anything.
- 18.
- 0 My appetite is no worse than usual.
 - 1 My appetite is not as good as it used to be.
 - 2 My appetite is much worse now.
 - 3 I have no appetite at all anymore.
- 19.
- 0 I haven't lost much weight, if any, lately.
 - 1 I have lost more than five pounds.
 - 2 I have lost more than ten pounds.
 - 3 I have lost more than fifteen pounds.

- 20.
- 0 I am no more worried about my health than usual.
 - 1 I am worried about physical problems like aches, pains, upset stomach, or constipation.
 - 2 I am very worried about physical problems and it's hard to think of much else.
 - 3 I am so worried about my physical problems that I cannot think of anything else.
- 21.
- 0 I have not noticed any recent change in my interest in sex.
 - 1 I am less interested in sex than I used to be.
 - 2 I have almost no interest in sex.
 - 3 I have lost interest in sex completely.

INTERPRETING THE BECK DEPRESSION INVENTORY

Now that you have completed the questionnaire, add up the score for each of the twenty-one questions by counting the number to the right of each question you marked. The highest possible total for the whole test would be sixty-three. This would mean you circled number three on all twenty-one questions. Since the lowest possible score for each question is zero, the lowest possible score for the test would be zero. This would mean you circles zero on each question. You can evaluate your depression according to the Table below.

Total Score _____ Levels of Depression

1-10 _____	These ups and downs are considered normal
11-16 _____	Mild mood disturbance
17-20 _____	Borderline clinical depression
21-30 _____	Moderate depression
31-40 _____	Severe depression
over 40 _____	Extreme depression



8.9 Appendix 9 – Barthel Index (BI)

THE BARTHEL INDEX

Patient Name: _____

Rater Name: _____

Date: _____

Activity	Score
FEEDING 0 = unable 5 = needs help cutting, spreading butter, etc., or requires modified diet 10 = independent	_____
BATHING 0 = dependent 5 = independent (or in shower)	_____
GROOMING 0 = needs to help with personal care 5 = independent face/hair/teeth/shaving (implements provided)	_____
DRESSING 0 = dependent 5 = needs help but can do about half unaided 10 = independent (including buttons, zips, laces, etc.)	_____
BOWELS 0 = incontinent (or needs to be given enemas) 5 = occasional accident 10 = continent	_____
BLADDER 0 = incontinent, or catheterized and unable to manage alone 5 = occasional accident 10 = continent	_____
TOILET USE 0 = dependent 5 = needs some help, but can do something alone 10 = independent (on and off, dressing, wiping)	_____
TRANSFERS (BED TO CHAIR AND BACK) 0 = unable, no sitting balance 5 = major help (one or two people, physical), can sit 10 = minor help (verbal or physical) 15 = independent	_____
MOBILITY (ON LEVEL SURFACES) 0 = immobile or < 50 yards 5 = wheelchair independent, including corners, > 50 yards 10 = walks with help of one person (verbal or physical) > 50 yards 15 = independent (but may use any aid; for example, stick) > 50 yards	_____
STAIRS 0 = unable 5 = needs help (verbal, physical, carrying aid) 10 = independent	_____
TOTAL (0–100):	_____

Provided by the Internet Stroke Center — www.strokecenter.org