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COGNITIVE IMPAIRMENT AMONG STROKE PATIENTS ATTENDED AT CENTRE FOR THE REHABILITATION OF THE PARALYSED (CRP)

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We the undersigned certify that we have carefully read and recommended to the Faculty of Medicine, University of Dhaka, for the acceptance of this dissertation entitled

COGNITIVE IMPAIRMENT AMONG STROKE PATIENTS ATTENDED AT CENTRE FOR THE REHABILITATION OF THE PARALYSED (CRP)

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Acronym

BHPI: Bangladesh Health Profession's Institute

CRP: Centre for the Rehabilitation of the Paralysed

IRB: Institutional Review Board

WHO: World Health Organization

SPSS: Statistical Package for the Social Sciences

MMSE: Mini-Mental State Examination

BMI: Body Mass Index

PSD: Post Stroke Dementia

BMRC: Bangladesh Medical Research Council

TIA: Transient Ischemic Attack

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ABSTRACT

Purpose: The purpose of the study was to find out the prevalence of cognitive impairment among stroke patients attended at CRP, Savar. ***Objectives:*** The objectives of this study were to evaluate the presence of cognitive impairment, severity level of cognitive impairment, to find out the odds of dementia, to know association between the cognitive impairment and odds of dementia with sociodemographic information like (age, gender, residential area, family type, frequency of comorbidities) and physical parameter related information. ***Methodology:*** The study design was cross-sectional. Total 54 samples were selected conveniently for this study from Centre for the rehabilitation of the paralyzed (CRP), Neurology unit, at Savar. Data was collected by using of questionnaire, cognitive performance was measured by Mini-Mental State Examination (MMSE) scale. The study was conducted by descriptive and inferential analysis through using SPSS software 20.0 version. ***Results:*** This study found the prevalence of cognitive impairment which was 31.5%, among them mild cognitive impairment was 47%, severe cognitive impairment was 53%, a significant association found between the presence of cognitive impairment and gender, also the association found between odds of dementia with gender. Not found any association between presence of cognitive impairment with other sociodemographic information and physical parameter related information such as age, residential area, body type, type of stroke, onset of stroke etc. ***Conclusion:*** Cognitive impairment is common following a stroke, and it can be a major factor in delayed functional recovery and return to previously sought activities. Due to its prevalence after stroke and association with poorer quality of life, cognitive impairment is a should be an essential rehabilitation target. Consequently, early detection and adequate therapy of this illness are essential throughout rehabilitation to prevent further complications and enhance the quality of life of stroke patients.

Key word: Cognitive impairment, stroke, odds of dementia, MMSE scale.

CHAPTER-I INTRODUCTION

1.1 Background

Stroke is a neurological condition in which blood arteries become blocked. Clots develop in the brain, which disrupts blood flow, block arteries, and cause blood vessels to burst, resulting in bleeding. After rupture of arteries, due to lack of oxygen brain cells die suddenly. Hemorrhagic stroke is caused by bleeding or leaky blood vessels, while ischemic stroke is caused by a lack of blood and oxygen flow to the brain. Around 85 percent of stroke patients suffer from ischemic occlusions (Kuriakose et al., 2020). Since ischemic strokes are caused by occlusion of major artery, the most common causes of large arterial occlusion are thrombosis and embolism, both of which are caused by atrial fibrillation. Small ischemic lesions in the basal ganglia and subcortical white matter are caused by occlusion of small arteries and arterioles (small vessel disease). Hemorrhagic stroke can occur in the brain substance (intraparenchymal hemorrhage) or the subarachnoid space (subarachnoid hemorrhage) (Idecola et al., 2020). Hemorrhagic stroke includes 10-15% of all stroke cases and has a significant mortality rate (Kuriakose et al., 2020). Specially in low- and middle-income countries, where mortality rates approach 80% (Idecola et al., 2020).

There are numerous modifiable and non-modifiable risk factors. Nonmodifiable risk factors (also known as risk markers) for stroke include age, gender, race/ethnicity, and genetics. Many traditional stroke risk factors, such as hypertension, diabetes, hyperlipidemia, and smoking, are well established as unmodifiable risk factors (Boehme et al., 2017). Despite significant advances in cardiovascular disease prevention and treatment, the lifetime risk of stroke increased from 22.8% in 1990 to 24.9% in 2016. Another troubling trend has been an increase in stroke incidence among younger generations, which has been linked to an increase in classical stroke risk factors such as hypertension, obesity, hyperlipidemia, smoking, and substance abuse (Idecola et al., 2020).

Stroke continues to be one of the most common and severe diseases currently affecting the world's population. Stroke is the second leading cause of death and long-term disability in the world (Idecola et al., 2020). In 2016, 80.1 million people worldwide had a stroke, with 41.1 million women and 39.0 million men. Stroke occurs in about 3% of adults aged 20 and up in the United States, accounting for 7 million strokes in the population. In India, the combined incidence of stroke has ranged from 105 to 152 per 100,000 people per year over the last decade, with the crude prevalence of stroke ranging from 44.3 to 559 per 100,000 people in various regions (Saini et al., 2021). Despite the fact that a stroke has been identified, The World Health Organization ranks Bangladesh 84th in the world for stroke mortality. Although no data on stroke incidence has been collected, Bangladesh has a reported stroke prevalence of 0.3 % (Islam et al., 2013).

After a stroke, cognitive impairment is a serious complication that is a major cause of physical disability (Gong et al., 2020). After neurological disease, stroke is the second most common cause of cognitive impairment. Stroke has been linked to a five to eightfold increase in the risk of cognitive impairment (Qu et al., 2015). Unlike physical disabilities, cognitive impairment has a greater impact on the patient's quality of life, as well as their families and informal caregivers (Kalaria et al., 2016). After a stroke, failure in any of the following cognitive domains is defined as poststroke cognitive impairment (PSCI): executive function, memory, language, visuospatial ability, visuo-constructional ability, or global cognitive function (Melkas et al., 2014). Any cognitive domain, including executive function, language, memory, visuospatial ability, and visuo-constructional ability, can be affected by a stroke. The impairment can, in fact, have an impact on overall or global cognitive function. Following a stroke, cognitive impairment is common, and it can delay functional recovery and the return to previously pursued activities (Almalki et al., 2018).

The prevalence of cognitive impairment following a stroke-ranges from 20-80% varies by country, race, socioeconomic status, occupation, and other factors (Sun et al., 2014). Recent reviews and meta-analyses found a pooled prevalence of 53.4 % post-stroke cognitive impairment and 36.4–38 and 16 % mild and major post-stroke cognitive impairment, respectively, measured within 1.5 years after the stroke (Aam et al., 2020). In the first year after a stroke, 26.5 % of stroke survivors have cognitive impairment with

dementia and 38 percent have cognitive impairment without dementia (Donnelly et al., 2020).

Cognitive impairment following a stroke is a common but underrated effect when compared to other neurological abnormalities such as sensory or motor impairment (Kalaria et al., 2016). There are numerous resources available for improving physical function following a stroke. However, studies on cognitive impairment following a stroke are few and far between. As a result, the single most important area of stroke research is widely recognized as understanding and treating cognitive damage following a stroke (Donnelly et al., 2020).

So according to the above study, cognitive impairment is a common sequel after stroke and has a great impact on quality of life and rehabilitation outcome. It is crucial to find out the cognitive impairment after stroke and adopt preventive measures as well as treatment. Considering these issues, the aim of the study is to explore the prevalence of cognitive impairment among stroke patients.

1.2 Rationale

Stroke is the second leading cause of death and cause major disability and a wide range of secondary complications develop after stroke which often remain underdiagnosed. Cognitive impairment frequently occurs after a stroke and can be a significant factor in delayed functional recovery and return to previously pursued activities. It is a common result of a stroke, regardless of country, race, or diagnostic criteria. Cognitive impairment and memory dysfunction are common symptoms that significantly affect the survivors' quality of life. Stroke affects the cognitive domain, which includes attention, memory, language, and orientation, and executive function. Cognitive impairment after a stroke leads to Post stroke dementia which includes all dementia types e.g. Alzheimer's diseases, vascular dementia or mixed type dementia. Cognitive impairment may lead decrease in functional capacity, therefore it affects rehabilitation outcomes in stroke patients, their activities of daily living and bring financial burden. Although all over the world, there have several researches based on this topic but, here I would like to mention that, there has no research have ever done upon regarding cognitive impairment among stroke patients in Bangladesh as well as in CRP. Thus this study would find out the cognitive impairment of stroke patients, so that physiotherapist can work on this by rehabilitation of post stroke cognitive impairment play significant role in preventing further complications e.g dementia, and get the optimum treatment outcome.

1.3 Research Question

What is the prevalence of cognitive impairment among stroke patients attended at CRP, Savar?

What is the severity level of cognitive impairment?

Is there any odds of dementia according to MMSE scale?

1.4 Study objectives

1.4.1 General Objective

To find out the cognitive impairment among stroke patients attended at CRP, Savar.

1.4.2 Specific Objectives

To observe the prevalence of cognitive impairment among participants.

To determine the severity of cognitive impairments among participants,

To find out the socioeconomic information of the participants (e.g., age, gender, educational qualification).

To explore the basic physical parameter (e.g., height, weight, BMI).

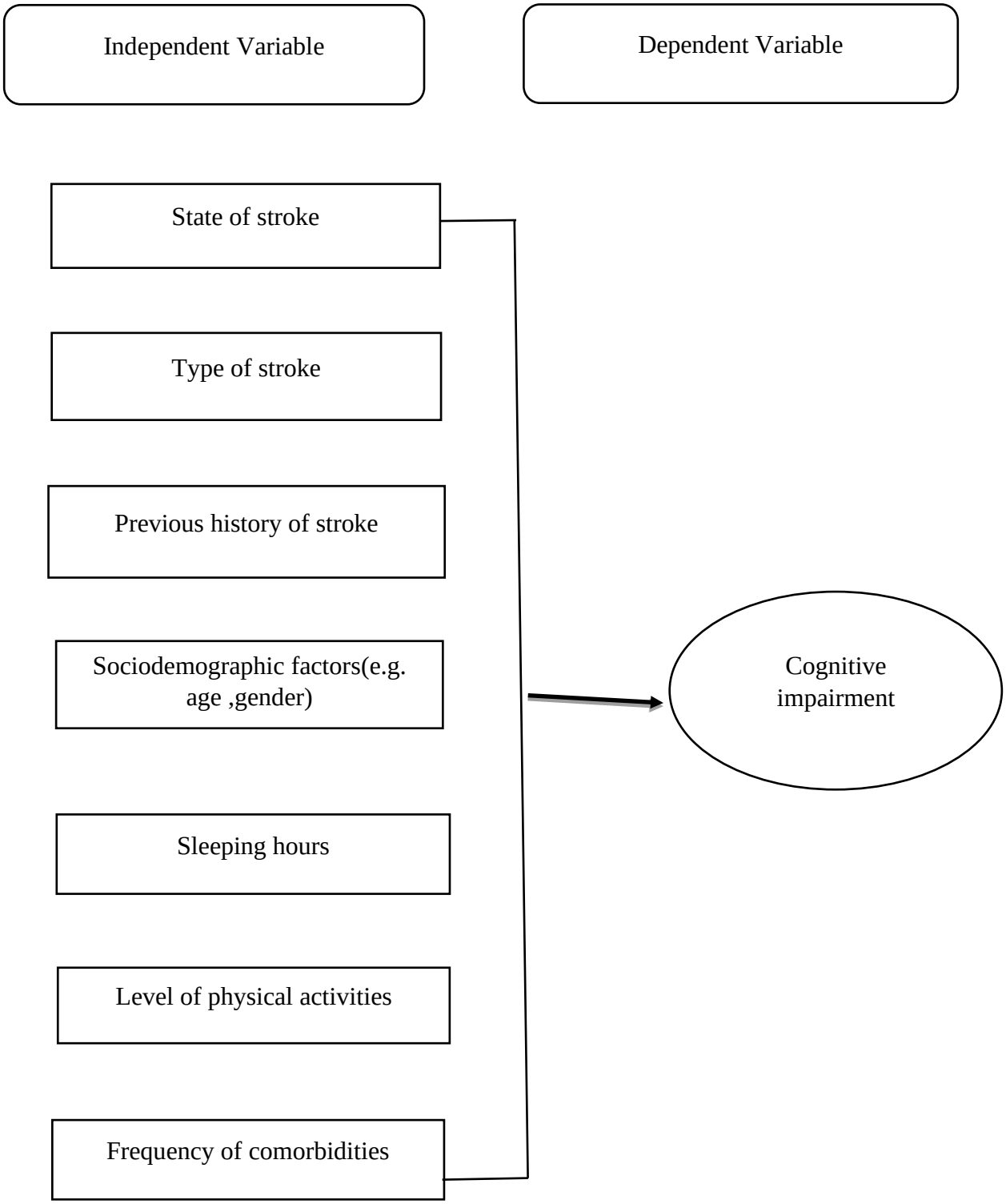
To identify which type of stroke shows more cognitive impairment.

To figure out the domain specific performance (e.g., orientation, registration, attention and calculation, language and praxis) according to MMSE scale.

To assess the odds of dementia according to MMSE scale.

To assess the relationship between sleeping hours and MMSE scores.

1.5 Conceptual Framework



1.6 Operational Definition

Stroke: The current World Health Organization definition of stroke (introduced in 1970 and still used) is "rapidly developing clinical signs of focal (or global) disturbance of cerebral function, lasting more than 24 hours or leading to death, with no apparent cause other than that of vascular origin

Cognitive Impairment: Cognitive impairment refers to problems people have with cognitive functions such as thinking, reasoning, memory, or attention.

MMSE: The Mini-Mental State Exam (MMSE) is a widely used test of cognitive function among the elderly; it includes tests of orientation, attention, memory, language and visual-spatial skills.

Early intervention: Early intervention refers to services that are provided within 2 weeks of stroke.

Late intervention: Late intervention refers to services that are provided after 2 weeks of stroke.

Ischemic stroke: An ischemic stroke occurs when the blood supply to part of the brain is interrupted or reduced, preventing brain tissue from getting oxygen and nutrients.

Hemorrhagic stroke: Hemorrhagic strokes include bleeding within the brain (intracerebral hemorrhage) and bleeding between the inner and outer layers of the tissue covering the brain (subarachnoid hemorrhage).

Balanced food: Food consisting of the proper quantities and proportions of foods needed to maintain health or growth.

CHAPTER-II LITERATURE REVIEW

Stroke

William Cole coined and introduced the term 'stroke' to medicine in the late 17th century, and it has remained a generic definition ever since. Physiologically Stroke is a vascular-related acute, focal injury to the central nervous system (CNS) that contributes to a local or systemic neurological insult. Technological advancements have greatly helped in determining the cause of the injury and determining whether it is a cerebral infarction, subarachnoid hemorrhage, or intracerebral bleed. Despite these advancements, the definition of stroke needs to be clarified (Puthenpurakal & Crussell, 2017).

Stroke is derived from the Greek word "apoplexia". Apoplexy is a term used to describe a condition in which all mental activities are suddenly suspended but respiration and pulse rate are maintained. Apoplexy is defined as sudden pain, loss of speech due to asphyxia, inability to move any body part, and loss of bowel control. However, this definition of stroke does not accurately express the modern definition of stroke (Coupland et al., 2017).

In 1970, the World Health Organization defined stroke as- ‘rapidly developed clinical signs of focal disturbance of cerebral function, lasting more than 24 hours or leading to death, with no apparent cause other than of vascular origin’. The World Health Organization definition, while also still widely used, is outdated, and according to American Heart Association and the American Stroke Association, due to significant advances in the 'nature, timing, clinical recognition of stroke and its mimics, and imaging findings that necessitate an updated definition (Sacco et al., 2013).

Transient ischemic attacks were once considered to be relatively short, focal neurological deficits caused by vascular disease that lasted less than 24 hours (an arbitrarily assigned endpoint). In 2009, the American Heart Association/American Stroke Association's Stroke Council eliminated time as a defining factor and endorsed their current definition of transient ischemic attack: "a transient episode of neurological dysfunction caused by focal brain, spinal cord, or retinal ischemia, without acute infarction" (Coupland et al., 2017).

Mortality

The most frequent causes of death are those related to blood vessels, with stroke ranking as the world's second greatest cause of death at the present time (Feigin et al., 2017). In the United States, stroke is one of the most common causes of long-term disability, particularly among the elderly population. 26% of the 795,000 new stroke sufferers are now unable to conduct basic daily activities (Framingham cohort), and 50% have limited mobility due to hemiparesis. These statistics are from the Framingham cohort (Katan & Luft, 2018).

Low- and middle-income nations were responsible for 63 percent of all ischemic strokes and 80 percent of all hemorrhagic strokes in the world in 2010. The global estimate for the number of strokes in 2010 was 11.6 million for ischemic strokes and 5.3 million for hemorrhagic strokes. In 2016, there were 13.7 million new strokes brought on by accidents, which is a significant rise from 2015. In the same year, 5.5 million people died all over the world as a result of having a stroke. Both ischemic and hemorrhagic strokes were responsible for a significant number of deaths (2.7 million and 2.8 million, respectively) (Saini et al., 2021). Between the years 1990 and 2010, there was an 84% increase in the number of people who suffered a stroke, and there was a 26% increase in the number of deaths that were caused by strokes. The incidence of strokes has been observed to be noticeably greater in countries with low and moderate levels of wealth. On the other hand, the number of strokes that occur in countries with higher incomes has significantly dropped over the same duration of time. However, the death rate that follows a stroke has decreased by up to twenty-five percent in high-income countries, twenty percent in low-income and middle-income countries, and thirty percent in developing countries (Feigin et al., 2014).

After coronary heart disease and different infectious diseases (such as influenza and pneumonia), stroke is the third largest cause of mortality in Bangladesh. The World Health Organization ranks Bangladesh as having the 84th highest stroke fatality rate worldwide. From 2006 to 2011, the stroke fatality rate climbed from 6.00 to 8.57 percent. In Bangladesh, the prevalence of stroke is 0.3%, with a male-to-female ratio of 3.44:2.41. The incidence rate, like the prevalence rate, has yet to be determined (Islam et al., 2013).

Clinical presentation of stroke

The clinical manifestations of hemorrhagic strokes are diverse, but the most common signs and symptoms are sudden onset headache, vomiting, and substantial elevations in blood pressure. These symptoms are followed by localized neurological indications that appear within a few minutes of the onset of the stroke. It's possible that the signs and symptoms of these people will start to show up gradually over the course of many hours, with varied degrees of severity. Some of the symptoms that might arise as a result of an ischemic stroke are paresis, ataxia, paralysis, vomiting, and eye gazing; however, the location of these symptoms relies on the brain area that is being supplied by vessels that are suffering damage (Ojaghihaghighi et al., 2017). Headache was recorded as the most prevalent clinical presentation by patients 75.0% of the time, followed by aphasia 60.3% of the time, and hemiparesis 0.5% of the time. (53.4%). The majority of individuals who had suffered an ischemic stroke appeared to have facial palsy (58.3%), aphasia (60.0%), and headache (71.7%). In a similar manner, headache has been found to be the most prevalent clinical manifestation among individuals who have suffered from a hemorrhagic stroke (78.6%), followed by aphasia (60.7%) and vomiting (57.1%) (Fekadu et al., 2019).

Diagnosis of stroke

Absolute neurological deficit is considered to be the cause of stroke. The signs that a stroke patient will exhibit are entirely dependent on the side of the brain that is affected. It will also be more specific if the blocked or ruptured artery is identified. Ischemia and hemorrhagic stroke have a number of similarities when it comes to diagnostic criteria. In the early stages of a stroke, an MRI or CT scan can help differentiate diagnoses (Musuka et al., 2015).

Risk factor

People are more prone to stroke for a variety of reasons, some of which are modifiable. Lack of exercise, a poor diet, smoking, and excessive alcohol consumption are all risk factors that can be counterbalanced with cost-effective patient education, and there is an important and urgent need for government-led health promotion activities.

Modifiable risk factors for stroke

1. High blood pressure – The leading cause of heart attack and the leading cause of stroke**.**

2.Abnormal blood lipids – High total cholesterol, low-density lipoprotein cholesterol and triglycerides, and low high-density lipoprotein cholesterol all raise the risk of coronary heart disease and ischemic stroke.

3.Smoking – Associated with an increased risk of cardiovascular disease, particularly in young and heavy smokers; passive smoking is also a factor**.**

4.Physical inactivity- Raises the risk of heart disease and stroke by 50%.

5.Obesity- Is a significant risk factor for coronary artery disease and diabetes**.**

6.Unhealthy diet – Low fruit and vegetable intake is thought to be responsible for about 31% of coronary heart disease and 11% of stroke globally; high saturated fat intake raises the risk of heart disease and stroke and 11% of stroke worldwide; high intake of saturated fat increases the risk of heart disease and stroke through its effect on blood lipids and thrombosis.

7.Diabetes – Major risk factor for coronary heart disease and stroke.

Non-modifiable risk factors for stroke

1.Age – The most powerful independent risk factor for cardiovascular disease; after the age of 55, the risk of stroke doubles every decade**.**

2. Heritage or family history – If a first-degree blood relative has had coronary heart disease or stroke before the age of 55 (if the relative is a man) or 65 (if the relative is a woman), the risk is increased (if the relative is a woman).

3. Sex – Men have higher rates of coronary heart disease than women in their premenopausal years; men and women have similar stroke risks**.**

4. Ethnicity – Strokes are more common in black, Hispanic-American, Chinese, and Japanese people; deaths from cardiovascular disease are higher in South Asian and black Americans (Puthenpurakal & Crussell, 2017).

The most common risk factors for hemorrhagic stroke onset are hypertension (HTN), myocardial infarction (MI), and thrombolytic use. Hypo-perfusion, embolism, and thrombosis are the three main causes of ischemic stroke, with thrombosis being the most common (Ojaghihaghighi et al., 2017).

Cognitive impairment after stroke

Cognition includes a wide range of higher-level brain activities, including computation, attention, memory, orientation, delayed memory, visuospatial disorder, executive function, and others. The term "cognitive impairment" refers to a spectrum of mental degeneration that can range from mild to severe cognitive functioning loss. Cognitive impairments can make it difficult for a person to solve issues, follow task instructions, or plan and initiate self-directed activities (Farokhi et al., 2019).

Following a stroke, one of the most common complications that may occur is known as post-stroke cognitive impairment. This subtype of vascular cognitive impairment is also one of the most common. Stroke has been associated to an increase in the risk of cognitive impairment that is anywhere from five to eight times greater (Kulesh et al., 2018). Along with the physical impairments, one third of stroke patients also have a severe loss in their cognitive abilities after the event. Lesions in important regions such as the hippocampus, white matter, and cerebral cortex play a role in the development of poststroke cognitive impairment (PSCI), despite the fact that the precise mechanism behind this type of cognitive impairment is unknown (Farokhi et al., 2019). Patients suffering from cognitive impairment as a result of post-stroke may have damage to one or more cognitive domains, with executive dysfunction being the most common form of this damage. (Zhang & Bi, 2020). Memory problems, difficulties concentrating, and decreased executive function are

the kind of cognitive impairments that are most frequently observed in people who have suffered a stroke. Patients who have suffered a stroke appear to have a more difficult time recovering motor function, activities of daily living, and other skills due to post-stroke cognitive impairment. It makes overall rehabilitation more difficult, prevents patients from returning to family and society, and, finally, places a heavy financial burden on them. An increasing number of studies have demonstrated that cognitive function can be used to predict functional outcome in stroke patients (Almalki et al., 2018). PSCI also increases the chance of recurrent strokes, further cognitive impairment, and increased mortality (Farokhi et al., 2019).

According to one study, the prevalence of post-stroke cognitive impairment ranges from 20% to 80%, resulting in slower physical recovery, increased mortality, and loss of employment and social abilities. Previous studies 47 have independently found a number of factors connected to post-stroke cognitive impairment, including advanced age, low education, vascular risk factors, and pre-stroke cognitive dementia (demographic factors); hypertension, diabetes mellitus (DM), atrial fibrillation, large intracerebral arterial occlusion, and recurrent stroke (clinical factors); acute non-lacunar infarct, chronic lacunar infarct, brain atrophy, medial temporal lobe atrophy, and white matter hyperintensity (Ding et al., 2019). 39% prevalence of cognitive impairment three months after a stroke in a UK study was reported while a similar study in India found cognitive impairment in 31.7% (52/164 patients) of patients three months after ischemic stroke (Almalki et al., 2018).

Cognitive domain

Here are several ways to conceptualize cognitive ability domains. These include classification by the general process involved, such as memory or attention, language, or executive functioning.

Executive functioning

Reasoning and problem solving are common terms for this cognitive domain. Executive functioning is a broad term that refers to a set of processes that manifest control over other cognitive abilities so that cognitive resources can be effectively used to solve problems and plan for the future. Problem solving, planning, maze manipulation, and other complex tasks that require the coordination of multiple cognitive abilities fall under the domain of executive functioning. Because effective use of simpler cognitive abilities is required for real-world adaptive success, executive functioning is the definitional set of top-down processes (Harvey, 2022).

Language skill

Receptive and productive abilities, as well as the ability to understand language, access semantic memory, name objects, and respond to verbal instructions with behavioral acts, are all examples of language skills. Fluency (e.g., name as many animals as possible), object naming, and responding to instructions are all used to assess language skills. Language abilities can be hampered by neuropsychiatric disorders, but they are much more frequently hampered by brain damage, stroke, or degenerative dementia. Language impairments may be linked to executive functioning deficits (e.g., the ability to successfully access semantic storage) or slowed processing speed in neuropsychiatric conditions. Cognitive slowing can have a negative impact on performance because fluency tasks are timed in terms of their instructions (Harvey, 2022).

Memory

The most complex and multifaceted cognitive domain is memory functioning. There are a number of subdomains.

1.Working memory

This refers to the ability to retain information in consciousness for adaptive purposes. This can include data from all sensory modalities, as well as verbal and nonverbal data. Furthermore, working memory is thought to have two distinct components: information maintenance and information manipulation.

2. Episodic memory

To encode, maintain, and retrieve information into and out of longer-term storage, this component of the memory system interacts with working memory storage processes. Memory information can come from a variety of sensory sources and can be verbal or nonverbal (Harvey, 2022).

3.Procedual memory

This is motor action or skill memory. Learning and remembering how to ride a bicycle, as well as typing and other similar actions, is an example of procedural memory. Individuals with amnesia who cannot recall essentially any verbal information can learn and retain procedural skills, which can be distinguished from episodic memory (Oudman et al., 2015).

4.Semantic memory

This is the process of storing verbal information for a long time, also known as long-term memory. Such data has been processed and stored using the declarative memory system. It's worth noting that semantic memory appears to last a lifetime and continues to accumulate new information even in old age.

5.Prospective memory

This is the ability to remember to perform tasks in the future, such as taking medication on time, performing sequences of functional activities such as meal preparation, and other sequential tasks that require timing and performance of tasks at specific time periods (Harvey, 2022). Prospective memory is divided into two types: event-based and time-based. Responses triggered by a stimulus make up event-based prospective memories. Prospective memory is divided into two types: event-based and time-based. Responses triggered by a stimulus make up event-based prospective memories. Remembering to "take the cake out of the oven when the timer sounds" is an example. Specific times, such as "take my medicine in the morning," trigger time-based procedural memories. Prospective memory is implicated in a variety of functional impairments in people with psychiatric conditions (Twamley et al., 2007).

6.Encoding

This is the process of extracting data from working memory and processing it for longer-term storage. Listening to a list of words or a story, or seeing (or copying) an object or a series of objects with the instructions to learn the information and the intent to recall it later are typical episodic memory tasks (Harvey, 2022).

Attention and concentration

Attention and concentration is a complex concept that can be broken down into two categories: selective attention and sustained attention (or vigilance). Sustained attention would be the general term for concentration. Selective attention is a term that can be used to describe divided attention. Executive functioning components are present in all of these attentional skills, as described below.

1.Selective attention

Selective attention is the capacity to amplify relevant signals and regulate distractions. The neurological bases and development of this ability are well-understood. In addition, selective attention appears to have an effect on language, reading, and mathematical skills. These effects are associated with particular neurological mechanisms. Additionally, selective attention can be trained for the better (Stevens & Bavelier, 2012).

2.Sustained attention

Vigilance is the ability to pay attention for a long period of time. The detection of simple stimuli, presented infrequently in the midst of a stream of other stimuli, is often required in vigilance tasks, with the prototypical task being variants of the continuous performance task (CPT) (Harvey, 2022).

MMSE (Mini Mental State Examination)

The MMSE is a widely used psychometric screening test for determining cognitive function levels (Ismail et al., 2009). It is intended for use in the diagnostic process of dementia evaluations, with the goal of making the assessment of progression and severity easier. The MMSE tests memory, attention, and language skills, among other things (Myrberg et al., 2020).

The MMSE scale ranges from 0 to 30, with 5 points for orientation to time, 5 points for orientation to place, 3 points for registration, 5 points for attention and calculation, 3 points for recall, and 9 points for language. The MMSE has a sensitivity of 85 to 92 percent and a specificity of 85 to 93 percent for detecting cognitive impairment using cut points of 23 or less or 24 or less (Patnode et al., 2020). The MMSE is a convenient measure that assesses seven cognitive domains, and it has been proven to have excellent test-retest reliability (0.80–0.95) (Baek et al., 2016). Significant research has established a link between cognitive impairment as defined by specific MMSE cutoffs and an increased risk of mortality (Kim et al., 2018). The relationships between the entire range of MMSE scores, MMSE domains, and all-cause mortality, on the other hand, are not well understood. Impairments in orientation to time, orientation to place, attention, calculation, and recall were significantly associated with cardiovascular mortality in a crude model, but similar relationships between MMSE domains and non-cardiovascular death were not statistically significant (O'Donnell et al., 2012).

CHAPTER-III METHODOLOGY

3.1 Study design

The purpose of the study was to find out Cognitive impairment among the stroke patients. The **cross-sectional** study was chosen to conduct and it was found to be an appropriate design to find out the objectives. Cross-sectional studies simultaneously examine exposure and health consequence in a specific population and geographic region at a given period. This study included the maximum portion of stroke patients who came for receiving treatment from March 2022 to April 2022 at the OPD of CRP. Moreover, this study was cost and time effective for the researcher compare to an experimental study.

3.2 Population and sample

Population: Population is the set of all observable items or occurrences on which the research is conducted.

Sample: A sample is a representative part of a population (Hannan, 2016).

The study population were stroke and selected from the neurology unit of Centre for the Rehabilitation of the Paralyzed (CRP), from March 2022 to April 2022. Sample size was 45 which were selected randomly.

3.3 Sampling technique

The study was conducted by using the convenient sampling technique. Due to the time limitation, it was selected and as it was the one of the easiest, cheapest and quicker method of sample selection. The researcher used this procedure, because, getting of those samples whose criteria were concerned with the study purpose.

3.4 Study site and study area

The researcher collected data from the Neurology unit of Centre for the Rehabilitation of paralysed (CRP), Savar, Dhaka. The study area was Neurological condition (stroke) of the patient.

3.5 Sample size calculation

The equation of finite population correction in case of cross -sectional study is:

n= $Z^2\ pq/d^2$

= $(1.96)^2 x\ 0.03\ x\ 0.97/\ (0.05)^2$ = 45

Here, Z (confidence interval)

P (prevalence) =3% (Avan et al., 2019) And, q= (1-p) = (1-0.3) =0.97 The actual sample size was, n= 44.7=45

3.6 Inclusion Criteria

1. Medically stable.

2. Both Ischemic and hemorrhagic stroke patients.

3. Both sexes.

4. Patient and caregiver who are willingly to join the study.

3.7 Exclusion criteria

1. Have other type of neurological disorder for example meningitis, Guillain-Barre syndrome, head injury patients.

2. Patient who have communication problem-aphasia, apraxia, visual disturbances, hearing loss.

3.8 Outcome measurement Tool

Mini-Mental State Examination scale.

3.9 Data collection tools

Questionnaire, consent forms, pen, papers, eraser, white paper, clip board, wrist watch.

3.10 Data collection procedure

A written consent was taken from the patients. A Questionnaire was used to accumulate data by face to face conversation. Before collecting data researcher clarified all the procedure of data collection to data collectors and trained up well before data collection. All the data were collected by the selective trained data collectors with the presence of researcher to avoid the errors. Every questionnaire was rechecked by researcher for missing information or unclear information.

3.11 Data Analysis

After completing the initial data collection, every answer was cross checked to find out mistakes or unclear information. Then data was inserted into SPSS version 20 to analyze the collected data. Microsoft word 19 was used to create most of the graphs and charts. Then data was analyzed through descriptive and interferential statistics. In descriptive part in case of parametric data the central tendency and the measure of dispersion was presented through mean and standard deviation. The categorical data was presented as frequency and percentage of proportion through different visualization tool such as pie chart, bar chart. To find out the relationship among sociodemographic, physical parameters and presence of cognitive impairment. odds of dementia, chi- square test for independence and Pearson's co-relation test was applied. In case of two categorical variable chi- square test and for two continuous variable pearson correlation test was applied. In this study the level of significance is considered as 5% ($p = <.05$).

3.12 Informed consent

In this study interested subjects were given consent forms and the purpose of the research and consent forms were explained to the subject verbally. They were told that participation is fully voluntary and they have the right to withdraw at any time. They were also told that confidentiality will be maintained. Information might be published in any presentations or writing but they will not be identified. The study results might not have any direct effects

on them but the members of Physiotherapy population may be benefited from the study in future.

3.13 Ethical consideration

Permission was taken from BHPI ethical committee for research project then permission was taken from physiotherapy department for data collection. The participants were explained the purpose and goals of the study. This study followed the World Health Organization (WHO) & Bangladesh Medical Research Council (BMRC) guidelines and strictly maintained the confidentiality. Meanwhile, it was purely observation research, so nothing was intervene through which the research is considered as limited ethical issue.

CHAPTER-IV RESULTS

Table-1: Socio-demographic information

SL no.	Variable	Type of variable	Mean/SD	Median	Frequency(n)/ Percentage(%)
1	Age	Continuous	Mean=52.33 ; SD=13.03		
2	Gender	Nominal			Male =42/77.8% Female = 12/22.2%
3	Educational qualification	Nominal			Illiterate = 6/11.1% lower educated =17/31.5% Higher educated =31/57.4%
4	Marrital status	Nominal			Married =52/96.3% Unmarried =2/3.7%
5	Monthly income	Continuous		25500	
6	Current treatment expenditure	Continuous		50000	
7	Residential area	Nominal			Urban= 31/57.4% Rural=23/42.6%
8	Number of family members	Discrete		5	
9	Family type	Nominal			Joint family =17/31.5% Nuclear family =37/68.5%
10	Occupation	Nominal			Unemployed=13/24.1 % Job=15/27.8% Business=13/24.1% Others=13/24.1%

11	Presence of any habbits	Nominal	Smoking=11/20.4% None=40/74.1% Others=3/5.6%

Table-1: Socio-demographic information

**Median value was considered in case of non-normally distributed continuous data.

1. Age:

Among the 54 participants in this study, minimum age was of participant 22 and the maximum age of the participant was 78. Their mean age was 53.11 and standard deviation was 11.57.

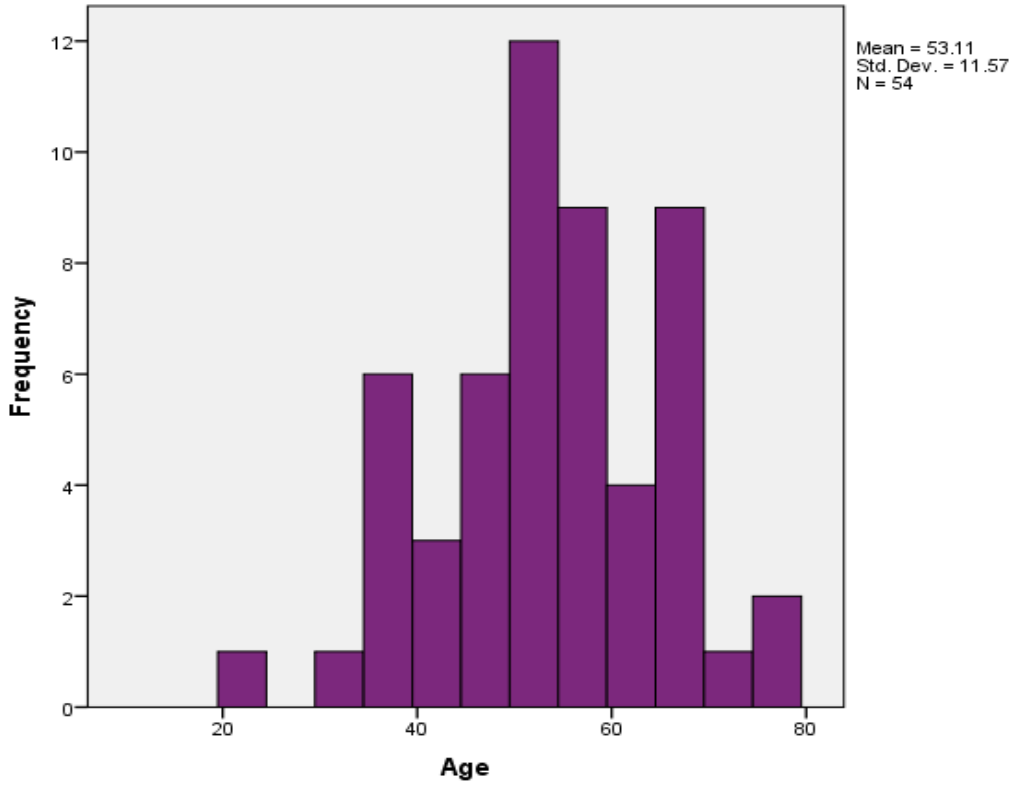


Fig 1: Age of the participant

2. Gender of the participants:

Among the 54 participants 77.8% (n=42) were male and 22.2% (n= 12) were female.

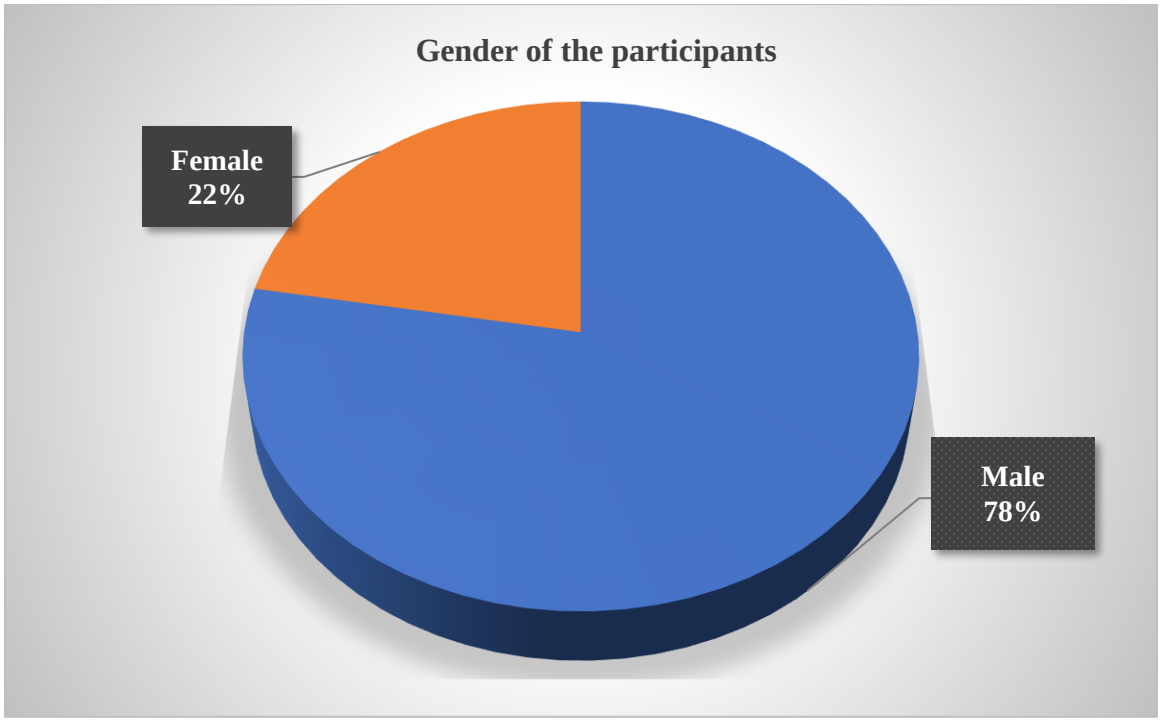


Fig 2: Gender of the participants

3. Educational qualification:

Among 54 stroke participants 11.1% (n=6) were illiterate, 31.5% (n=17) were lower educated, 57.4% (n=31) were higher educated.

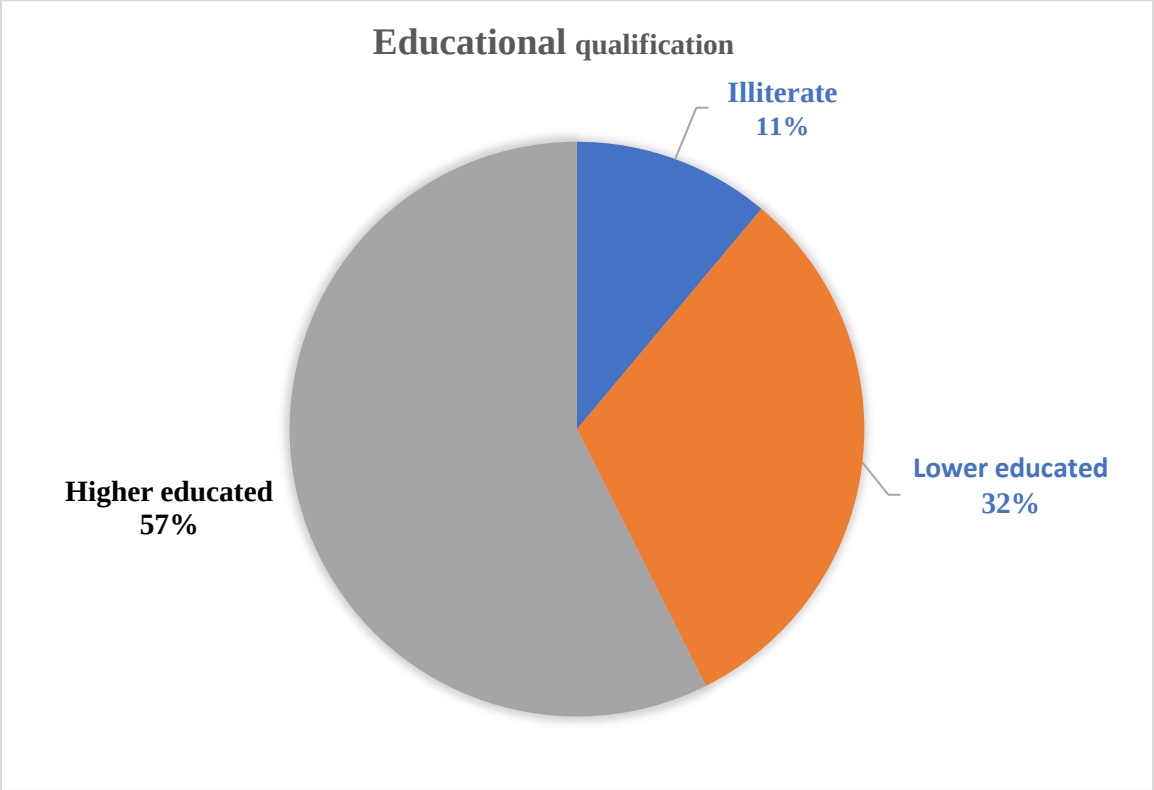


Fig 3: Educational qualification of the participants

4. Marital status:

Among 54 participants 96.3% (n=52) were married ,3.7% (n=2) were unmarried.

5. Monthly Income:

Among 54 participants their median value of the monthly income was 25500.

6. Current treatment expenditure:

Among 54 participants their Median value of current treatment expenditure was 50000.

7. Residential area:

Among 54 participants of stroke patients ,57.4% (n=31) lived in urban area and 42.6% (n=23) lived in rural area.

8. Number of family members:

Among 54 participants their median value of family number is 5.

9. Family type:

Among 54 participants 31.5% (n=17) lived in joint family and 68.5% (n=37) lived in nuclear family.

10. Occupation:

Among 54 participants 24.1% (n=13) are unemployed, 27.8% (n=15) were doing job, 24.1% (n=13) were doing business, and 24.1% (n= 13) were related with others profession. for example, teacher, worker, army, doctor etc.

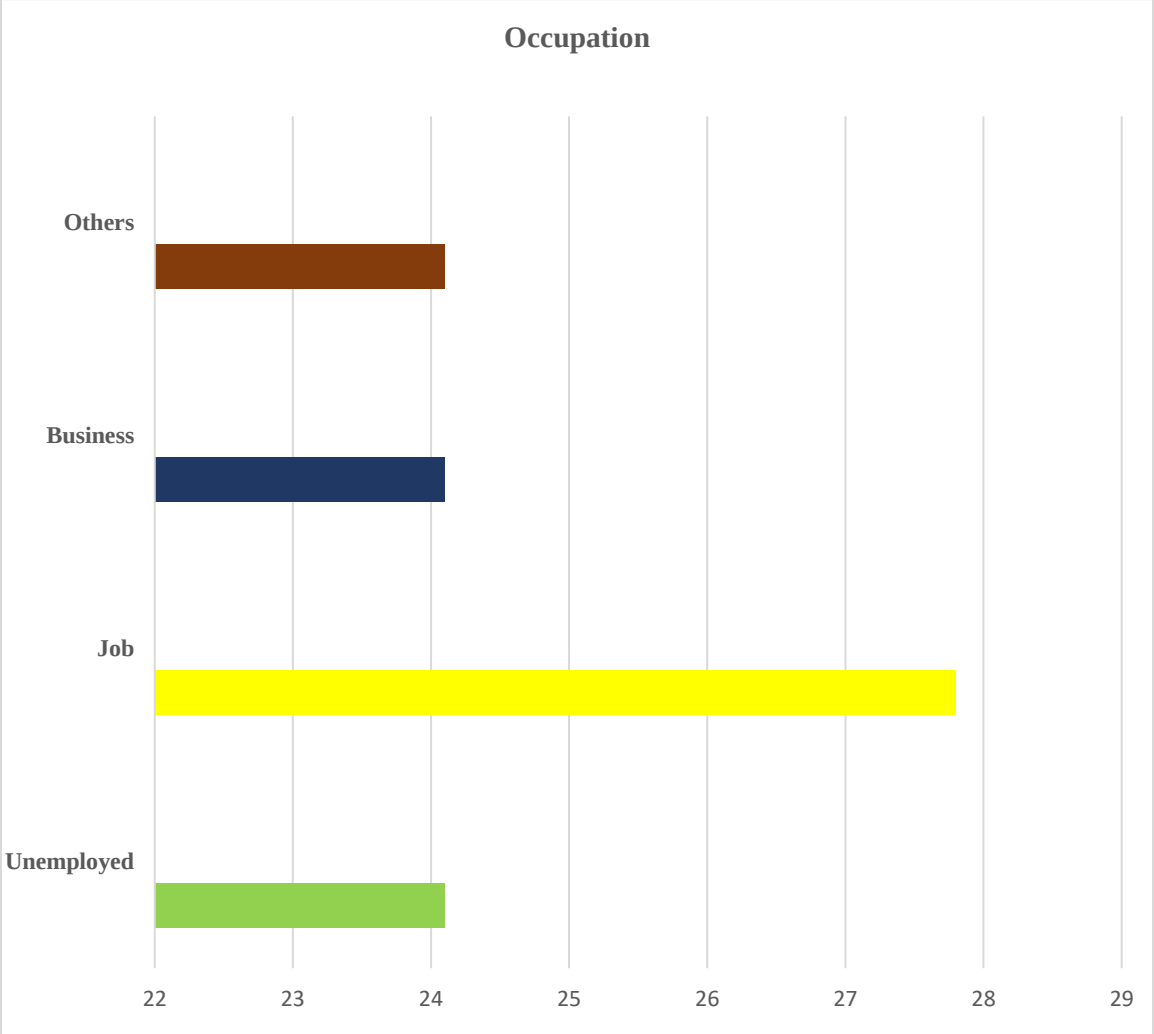


Fig 4: Occupation of the participants

11. Presence of any bad habbits

Among 54 participants other habbits such as smoking was present in 20.4% (n=11) patients, 74.1% (n=40) of them had no habbits, and 5.6% (n= 3) have other habbits such as, alcohol, drug addiction etc.

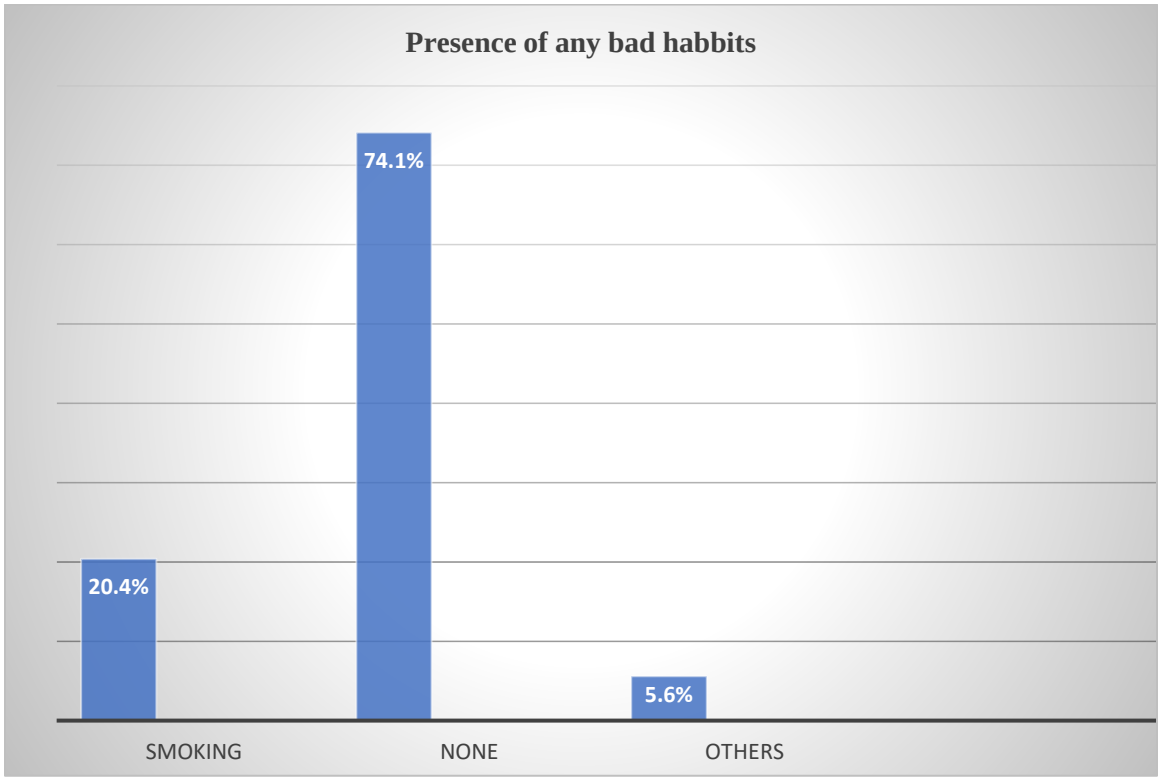


Fig 5: Presence of any bad habbits

Table 2: Physical Parameter:

SL no.	Variable	Type of variable	Mean/SD	Median	Frequency(n)/ Percentage(%)
1	Height	Continuous		164.54 cm	
2	Weight	Continuous		70 kg	
3	BMI	Continuous	Mean= 25.07 kg/m^2 SD=4.08		
4	Body type	Nominal			Thin =13/24.1% Fat=4/7.4% Medium=37/68.5%
5	Presence of cognitive impairment	Nominal			Absent=37/68.5% Present =17/31.5%
6	Cognitive impairment severity	Nominal			Mild cognitive impairment=8/47% Severe cognitive impairment=9/53%
7	Odds of dementia	Nominal			Increased=18/33.3% Decreased=36/66.7%
8	Type of stroke	Nominal			Ischemic =46/85.2% Hemorrhagic =8/14.8%
9	Onset of stroke	Nominal			Acute=4/7.4% Subacute=21/38.9% Early chronic=13/24.1% Chronic=16/29.6%

10	Starting time of intervention	Nominal	Early intervention=51/94.4% Late intervention=3/5.6%
11	TIA	Nominal	Yes =17/31.5% No =37/68.5%
12	History of stroke	Nominal	Yes=7/13% No=47/87%
13	Family history of stroke	Nominal	Yes = 27/50% No = 27/50%
14	Complication after stroke	Nominal	Memory loss=20/37% Depression=16/29.6% Memory loss +Depression=8/14.8% Others=10/18.5%
15	Frequency of comorbidities	Nominal	Single=28/51.9% Multiple=26/48.1%
16	Type of comorbidities	Nominal	Hypertension=16/29.6% Diabetes=12/22.2% Hypertension+ Diabetes=19/35.2% Hypertension+ Diabetes+ IHD=7/13%
17	Treatment received	Nominal	Medicine+ rehabilitation=43/79.6% Surgery+ rehabilitation+ medicine=3/5.6% Medicine+ Rehabilitation+ others=8/14.8%

18	Food habit	Nominal		Balanced=46/85.2% Junk food=8/14.8%
19	Level of physical activity	Nominal		Sedentary=25/46.3% Active=29/53.7%
20	Sleeping hours	Discrete	Mean=6.65 SD=2.378	
21	Medicine for sleeping	Nominal		Yes=26/48.1% No=28/51.9%
22	Presence of Other mental conditions	Nominal		Depression=12/22.2% Stress=6/11.1% Stress+ Depression=14/25.9% Stress+ Anxiety+ Depression=12/22.2% None=10/18.5%

Table 2: Physical Parameter

**Median value was considered in case of non-normally distributed continuous data.

1.Height:

The median value of height is 164.54.

2.Weight:

The median value of weight is 70.

3.BMI:

Minimum value of BMI is 17.00 and maximun value is 39.85. Mean value of BMI is 25.0752 and standard deviation is 4.080.

4.Body type:

Among 54 participants thin body types are 24.1% (n=13), fat 7.4%(n=4) and median is 68.5% (n=37).

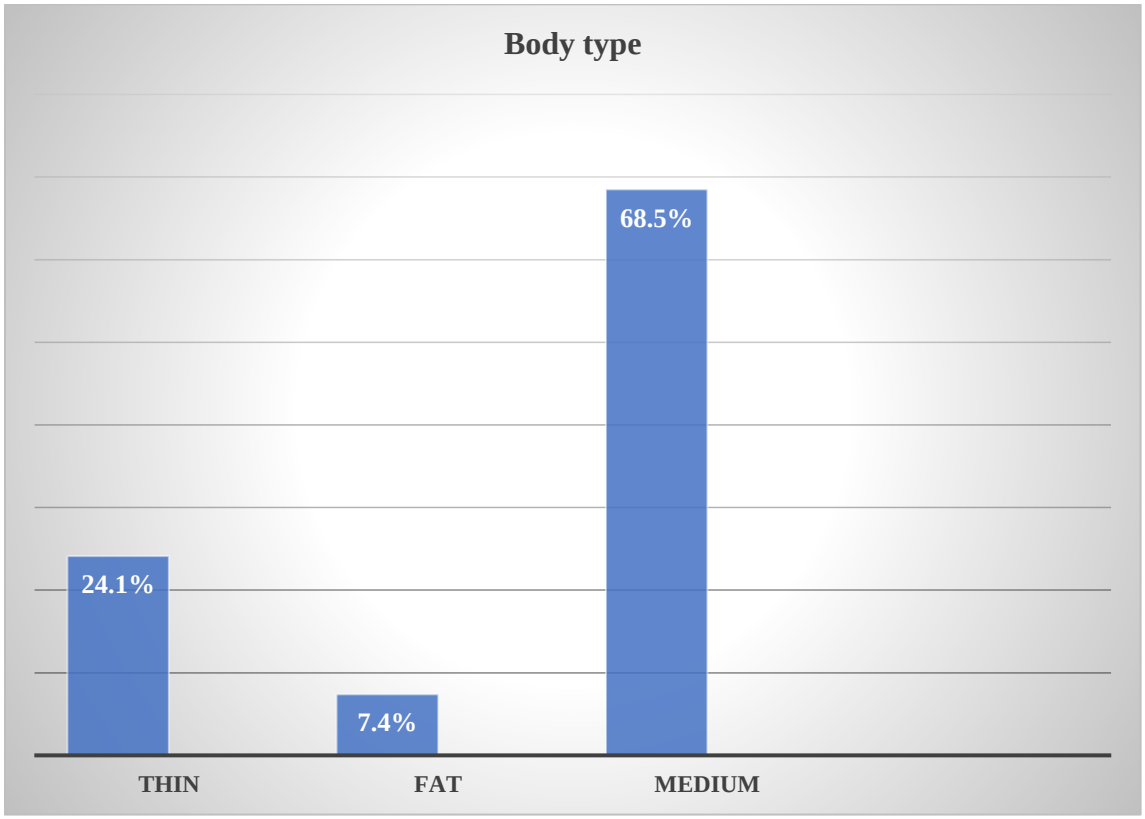


Fig 6: Body type of the participants

5. Presence of cognitive impairment:

Among 54 patients, 31.5% (n=17) participants had cognitive impairment, and 68.5% (n=37) had no cognitive impairment.

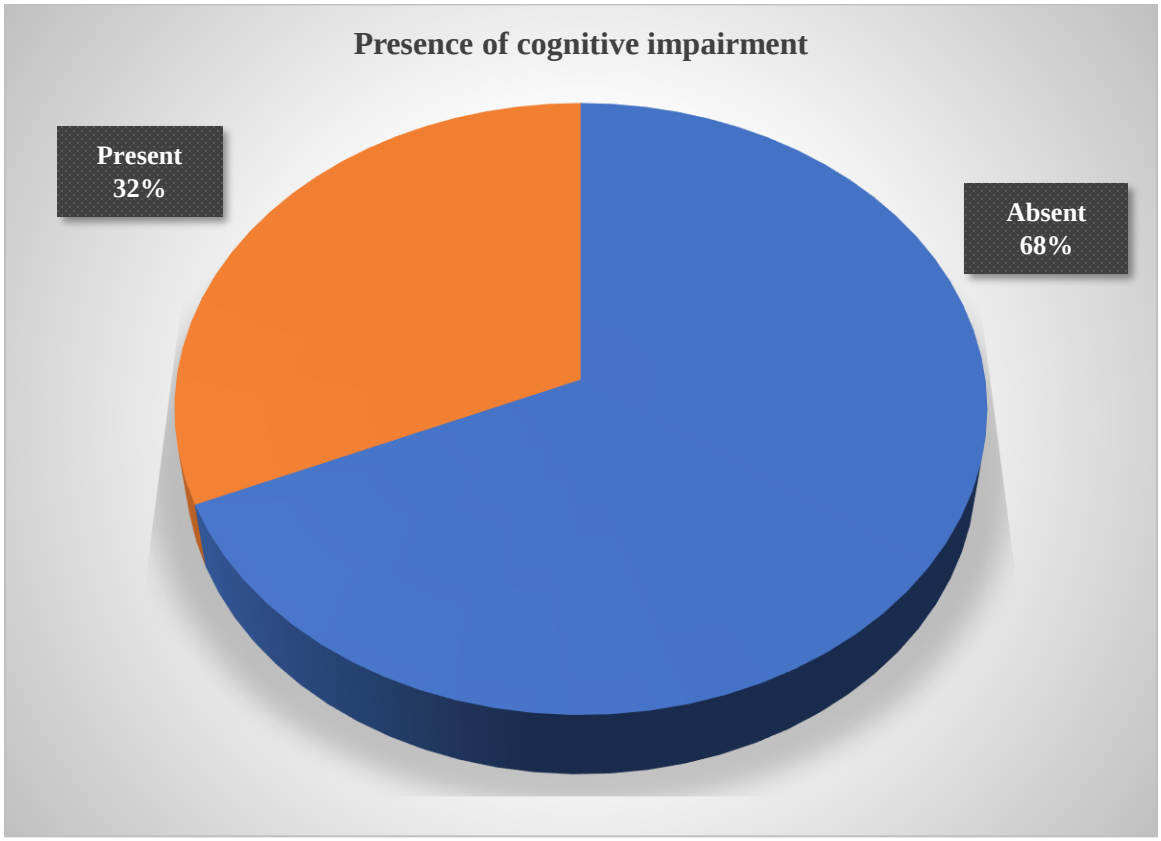


Fig 7: Presence of cognitive impairment

6. Cognitive Impairment Severity:

Among 17 cognitively impaired participants, Mild cognitive impairment was 47%(n=8), Severe cognitive impairment was 53%(n=9).

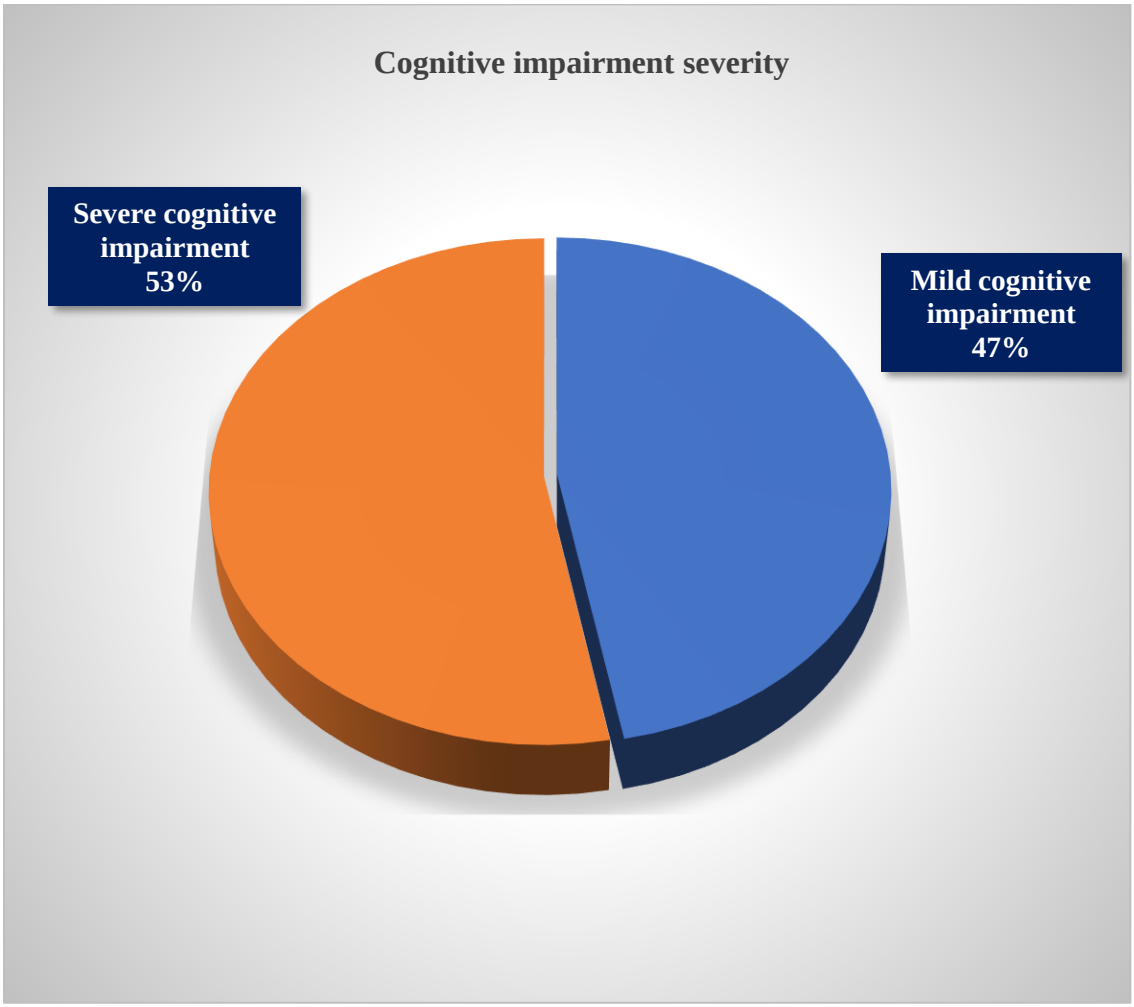


Fig 8: Cognitive impairment severity

7. Odds of dementia:

Among 54 participants odds of dementia increased about 33.3% (n=18) and decreased odds of dementia about 66.7% (n=36).

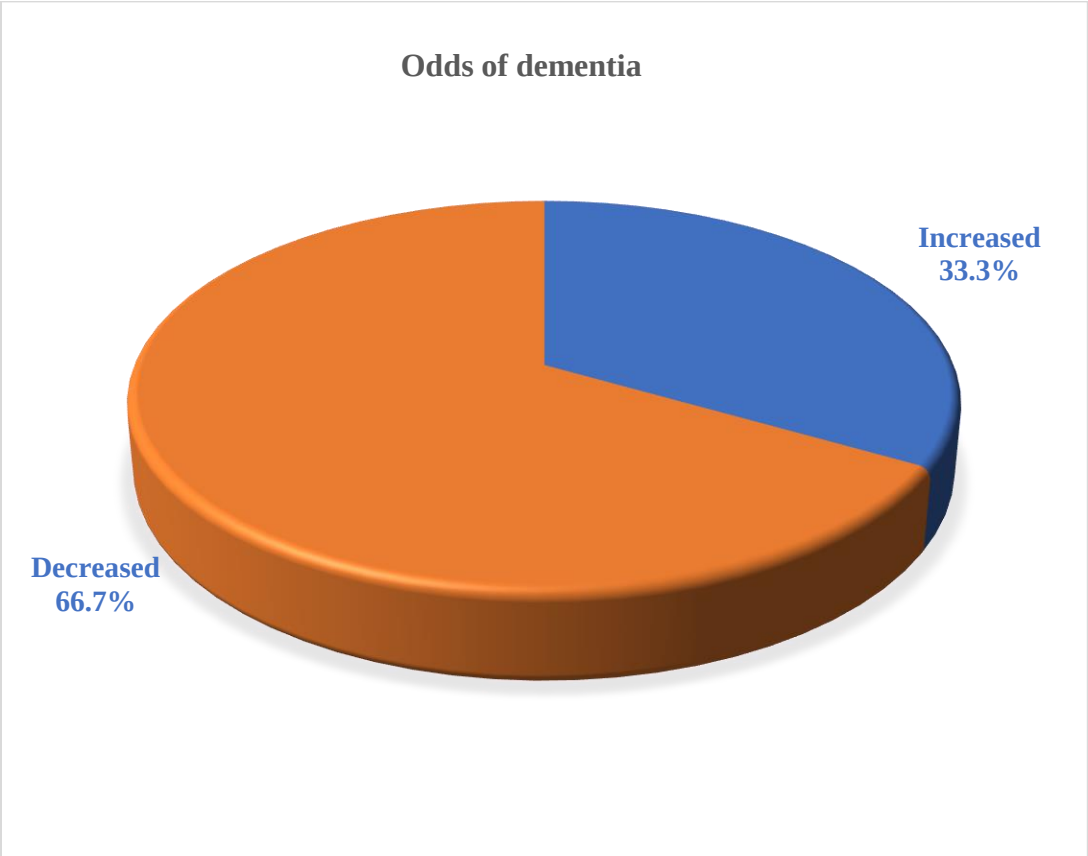


Fig 9: Odds of dementia

8. Type of stroke:

Among 54 participants ischemic stroke type is 85.2% (n=46), hemorrhagic is 14.8%(n=8).

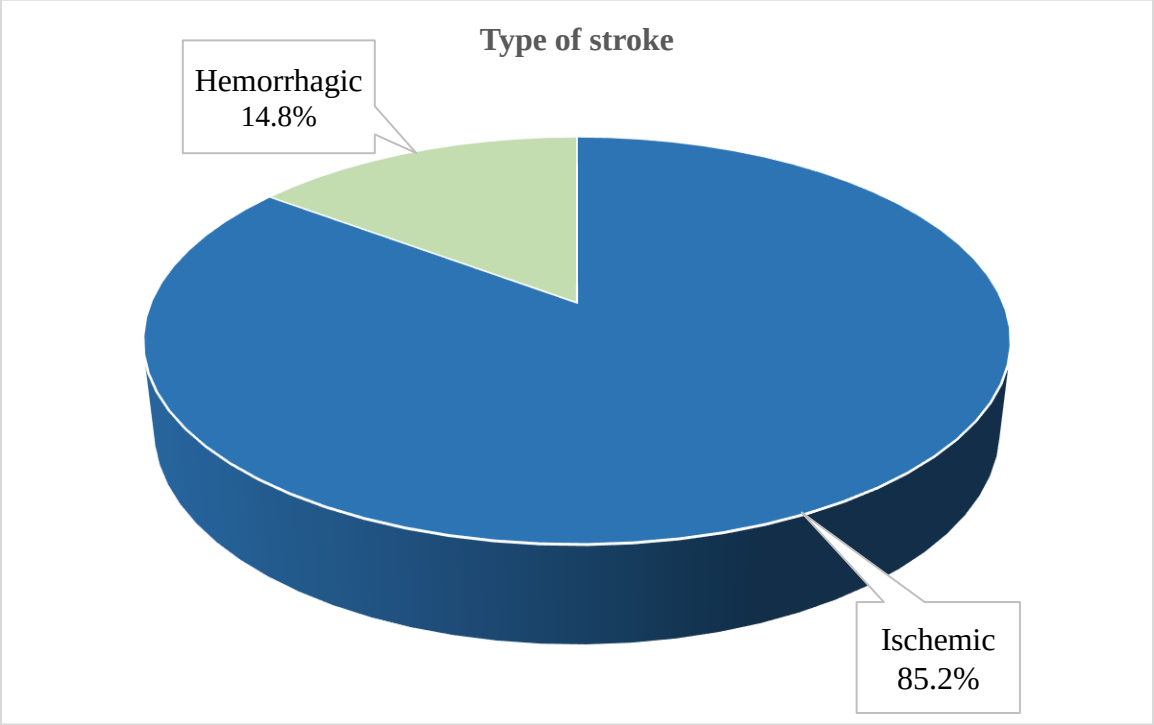


Fig 10: Type of stroke

9. Onset of stroke:

Among 54 participants acute cases are 7.4%(n=4), subacute cases are 38.9% (n=21), early chronic cases are 24.1%(n=13), chronic cases are 29.6%(n=16).

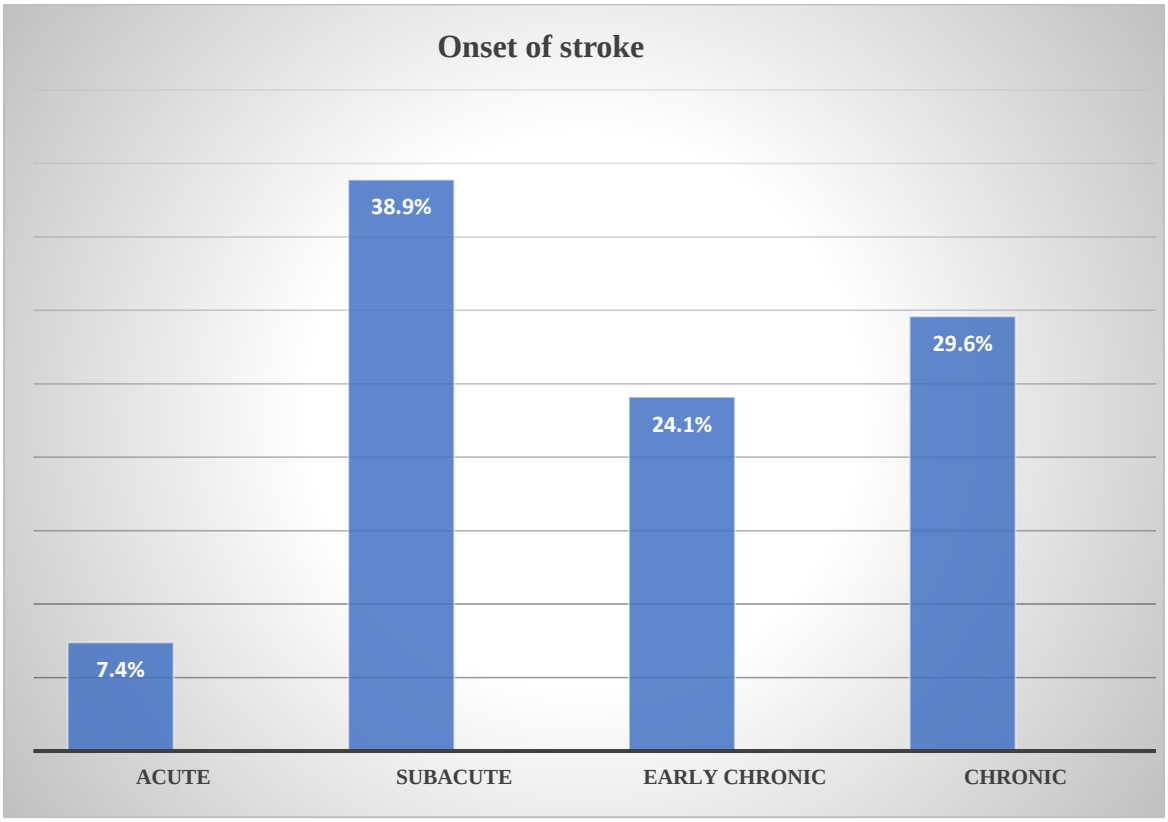


Fig 11: Onset of stroke

10. Staring time of overall intervention:

Among 54 participants 94.4% (n=51) got early intervented while 5.6% (n=3) got late intervention.

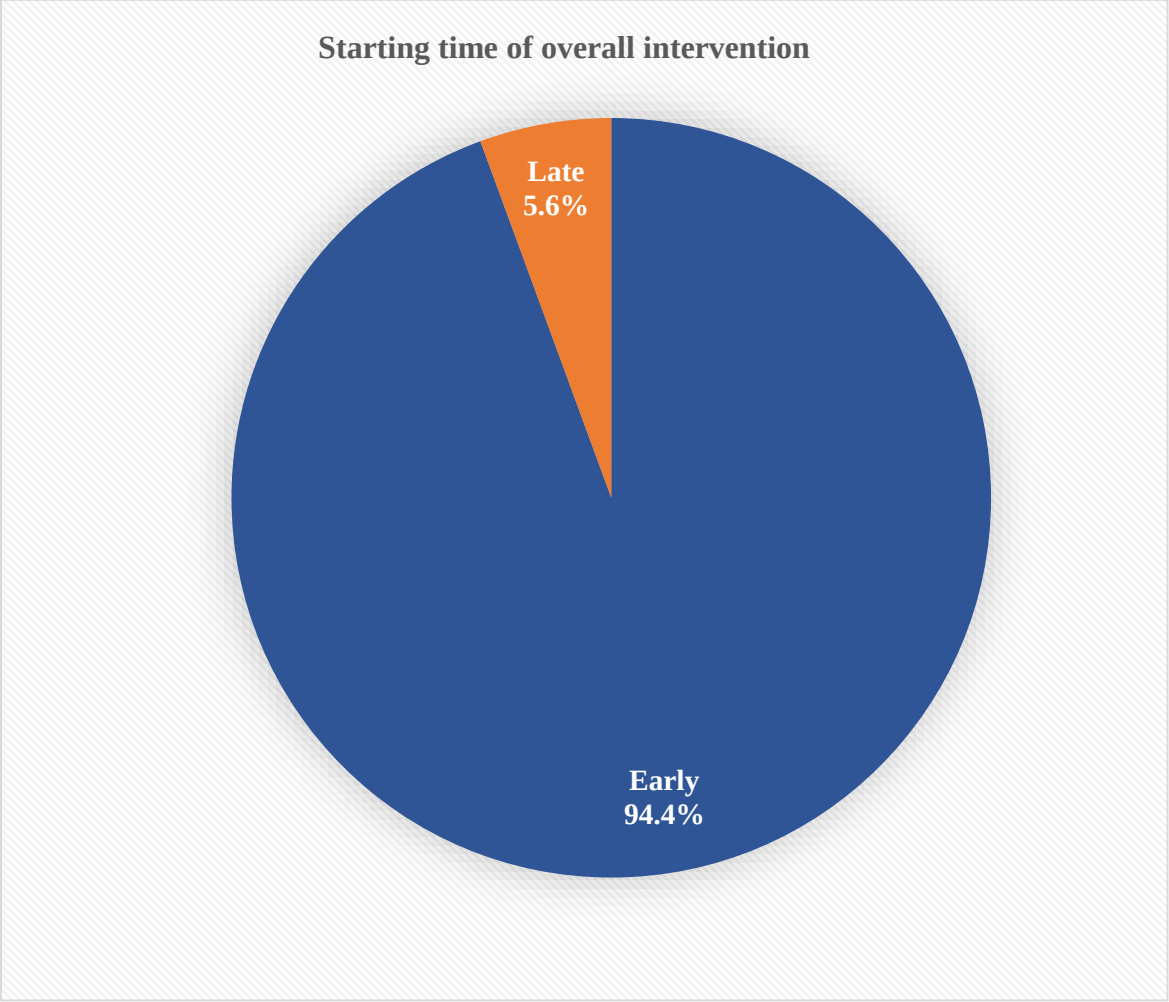


Fig 12: Starting time of overall intervention

11. TIA:

TIA was present in 31.5% (n=17) and absent in 68.5%(n=37) of 54 participants.

12. History of previous stroke:

Previous Stroke history was present in 13%(n=7) and absent in 87% (n=47) of 54 participants.

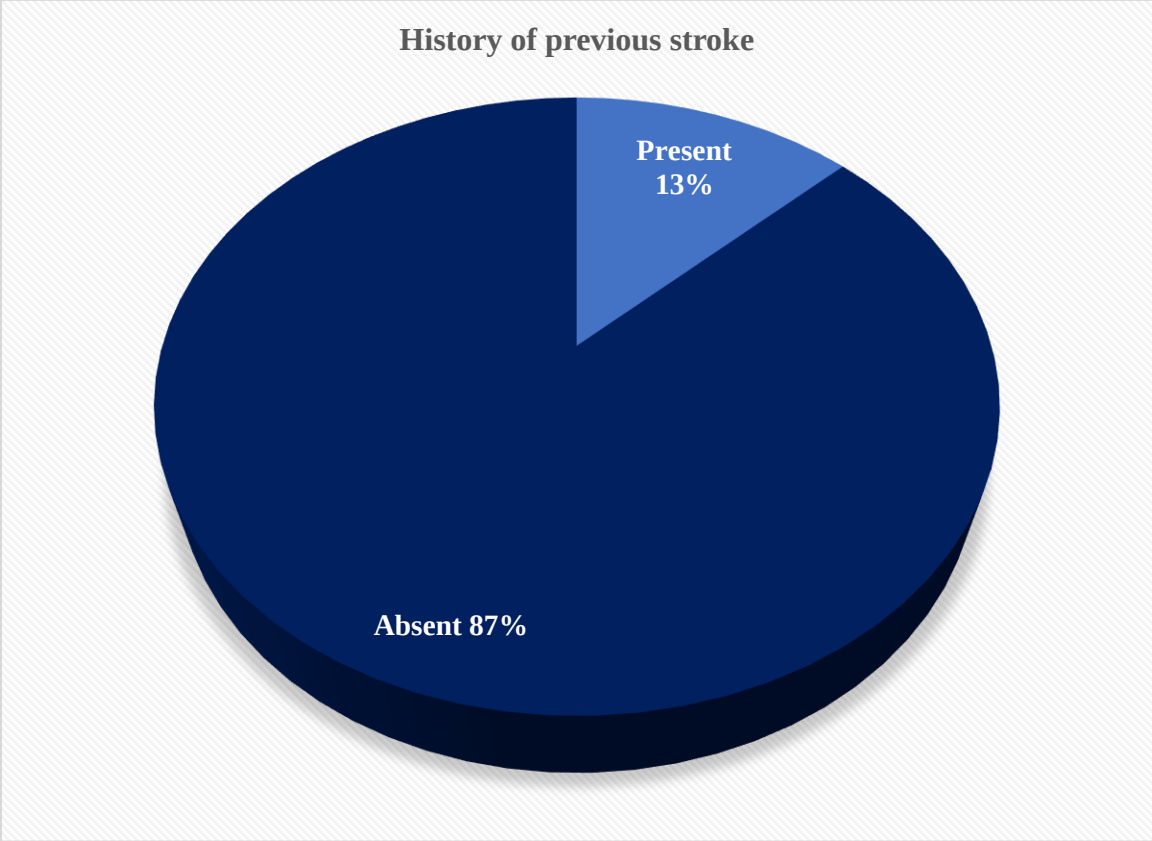


Fig 13: History of previous stroke

13. Family history of stroke:

Family history of stroke was present in 50% (n= 27) and absent in 50% (n=27) of 54 participants

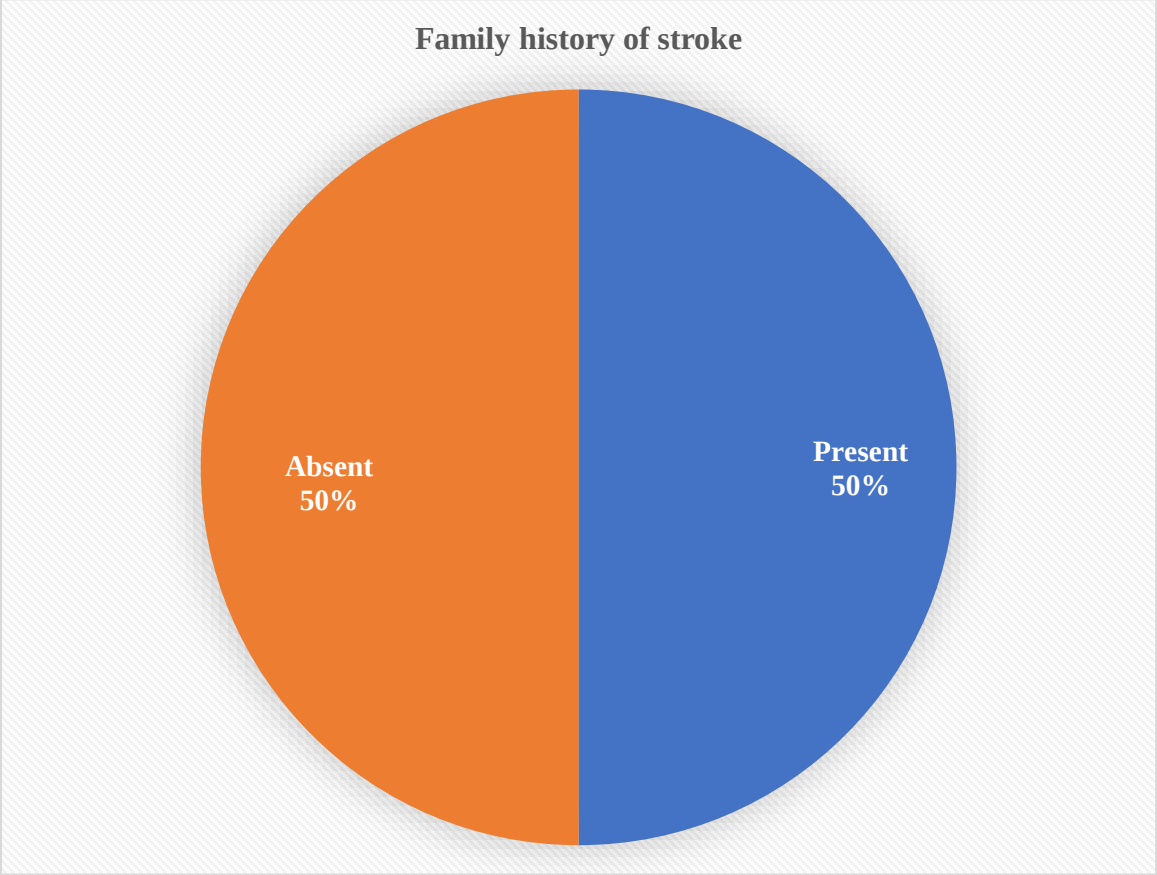


Fig 14: Family history of stroke

14. Complications after stroke:

Memory loss was present about 37% (n=20), depression was 29.6% (n=16), memory loss + depression was 14.8% (n=8%), and other type of complications such as body pain, pneumonia, chest pain was 18.5% (n=10).

15. Frequency of comorbidities:

Single comorbidities are present about 51.9% (n=28), multiple comorbidities were present about 48.1% (n=26).

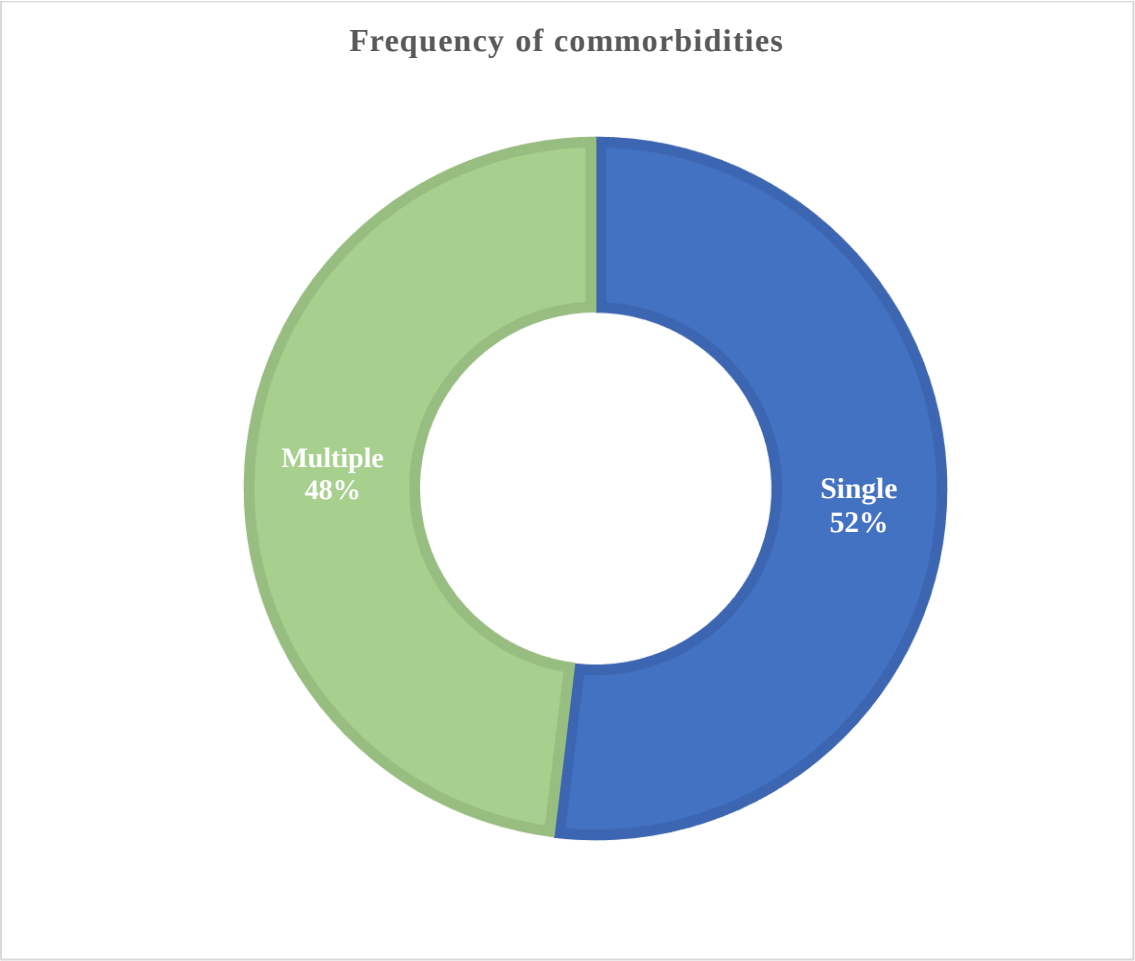


Fig 15: Frequency of commorbidities

16. Type of comorbidities:

In this study among 54 sample, hypertension was 29.6%(n=16), diabetes 22.2%(n=12), Hypertension with diabetes 35.2%(n=19), Hypertension, diabetes with IHD were 13% (n=7).

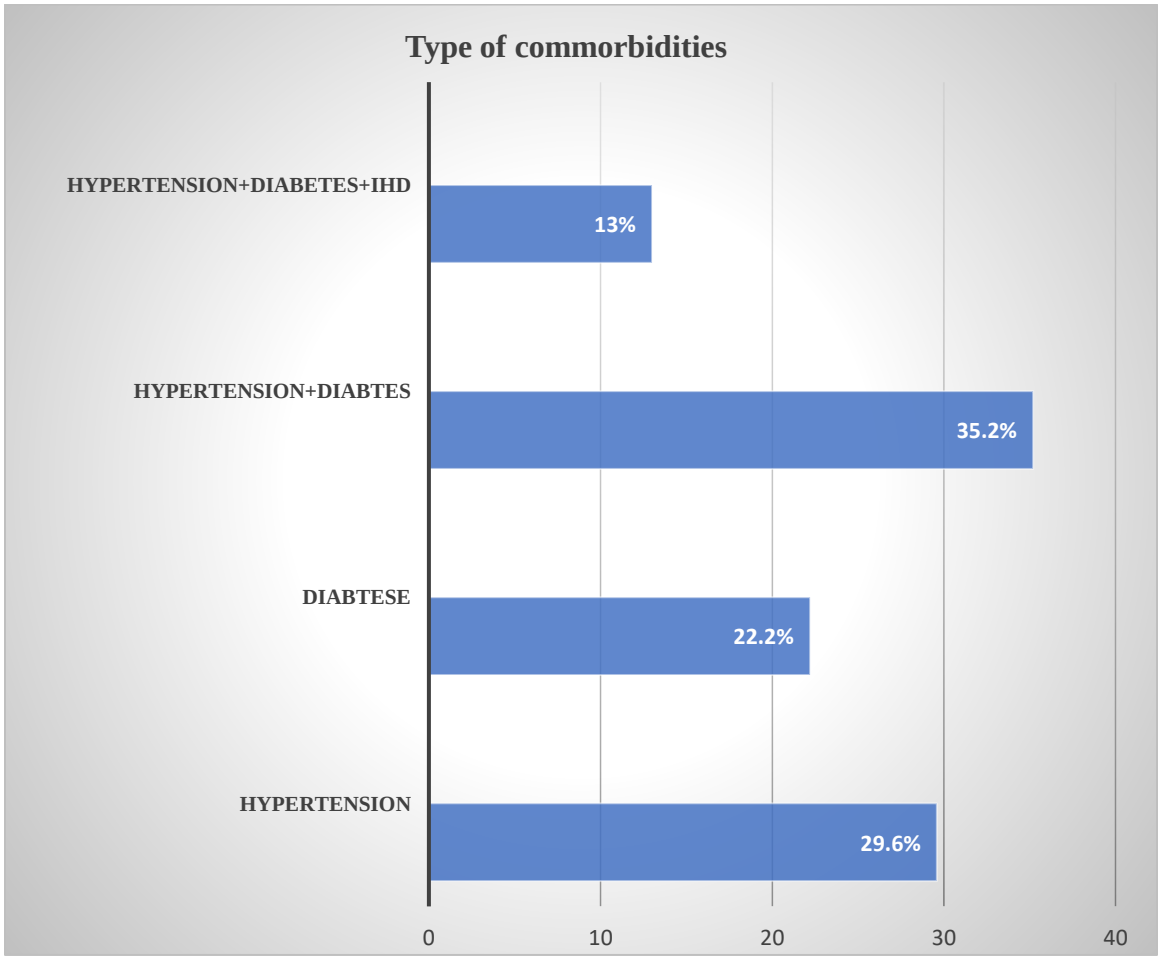


Fig 16: Type of commorbidities

17. Treatment received:

About 79.6%(n=43) took medicine with rehabilitation, 5.6% n(3) took surgery with rehabilitation and medicine 14.8% (n=8) took medicine with rehabilitation along with other treatment example traditional healer.

18.Food habit:

Among 54 participants 85.2% (n=46) was habitual in balanced food and 14.8% (n=8) was habitual in junk food.

19. Sleeping hours:

Mean value of sleeping hours is 6.65 and standard deviation is 2.378.

20. Medicine for sleep:

48.1% (n= 26) took sleeping medication, and 51.9% (n=28) didn't consummate any sleeping medication.

21. Level of physical activity:

Among 54 participants sedentary life leads about 46.3%(n=25), and active life leads about 53.7%(n=29).

22. Presence of other mental conditions:

Among 54 participants, depression was present about 22.2%(n=12), stress was 11.1%(n=6), stress with depression was 25.9%(n=14), stress with depression including anxiety was 22.2%(n=12), and 18.5% (n=10) had no type of mental conditions.

Table 3: MMSE Descriptive Analysis:

SL no	MMSE sub domain	Domain specific total score	Mean value (SD)/Median	Domain specific performance
1	Orientation	10	9	Poor=24/44.4% Good=30/55.6
2	Registration	3	3	Poor=7/13% Good=47/87%
3	Attention and Calculation	5	5	Poor=15/27.8% Good=39/72.2%
4	Recall	3	3	Poor=26/48.1% Good=28/51.9%
5	Language and Praxis	9	8	Poor=13/24.1% Good=41/75.9%
6		Total=30	Mean = 24(MMSE score) SD=7.413	

Table 3: MMSE Descriptive Analysis

1. MMSE score:

The mean value of MMSE score is 24 and standard deviation is 7.41. Which indicates that most of the populations doesn't have cognitive impairment.

2. MMSE orientation:

The median value of MMSE orientation was 9

.

3. MMSE registration:

The median value of MMSE registration was 3.

4. MMSE attention and calculation:

The median value for MMSE calculation was 5.

5. MMSE recall:

The median value for MMSE recall was 3.

6. MMSE language and praxis:

The median value for MMSE language and praxis was 8.

7. MMSE orientation performance:

Among 54 stroke participants, their MMSE orientation performance was poor about 44.4%(n=24), and was good about 55.6%(n=30). Our definition of good performance was indicated by a score which is equal to or greater than the median score (Guerrero et al., 2009).

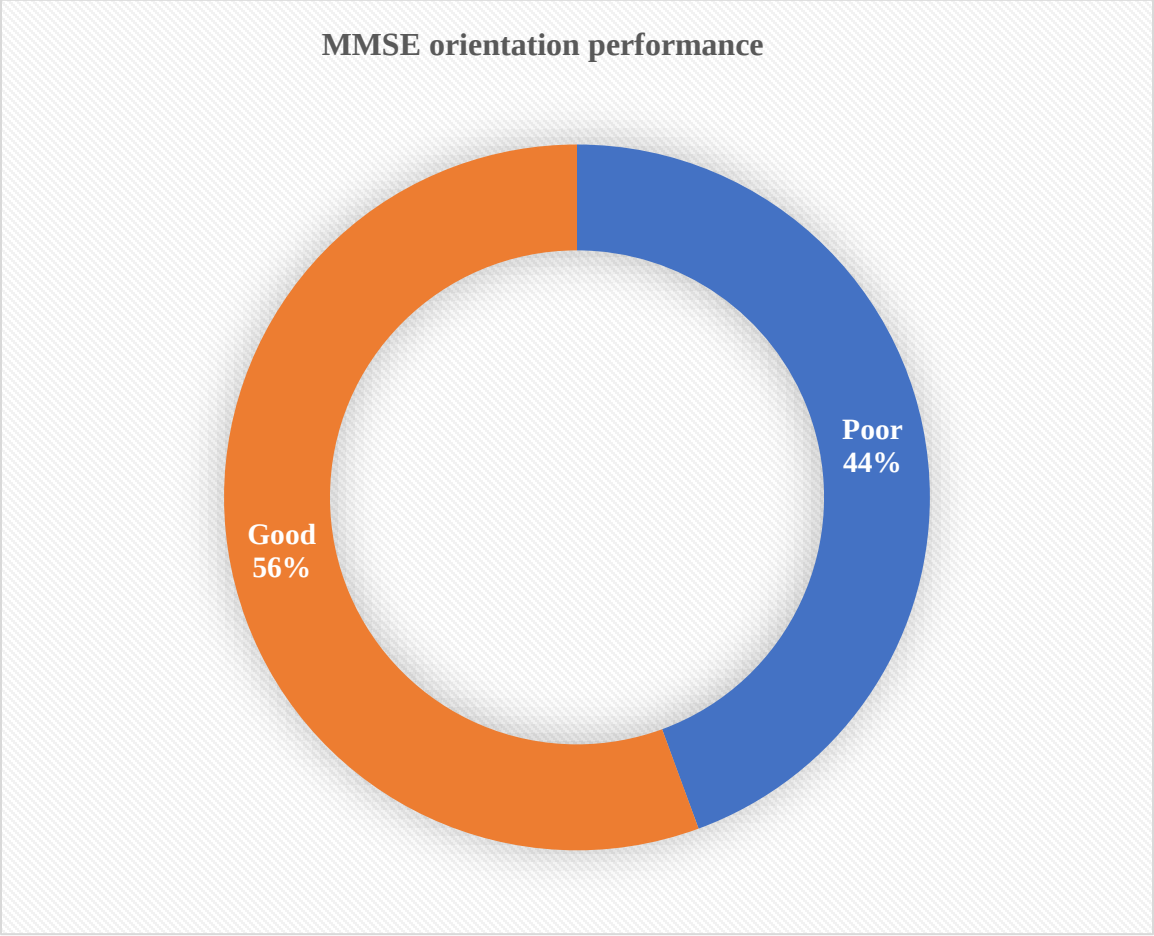


Fig 17: MMSE orientation performance

8. MMSE registration performance:

Among 54 participants, their MMSE registration performance was poor 13% (n=7),was good in 87%(n=47) participants. Our definition of good performance was indicated by a score equal to or greater than the median score (Guerrero et al., 2009).

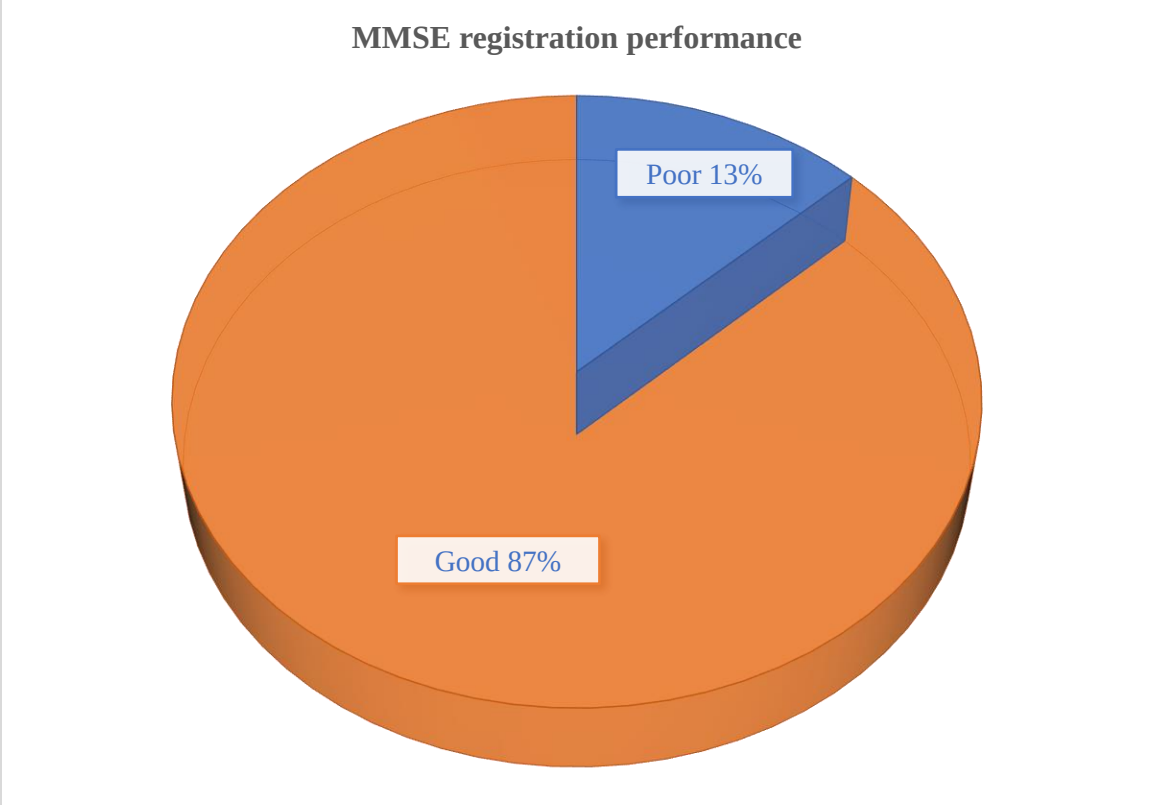


Fig18: MMSE registration performance

9. MMSE recall performance:

Among 54 participants MMSE recall performance was good in 51.9%(n=28), and poor in 48.1%(n=26) participants. Our definition of good performance was indicated by a score equal to or greater than the median score (Guerrero et al., 2009).

10. MMSE language and praxis performance:

Among 54 participants MMSE language and praxis performance was good in 75.9% (n=41), poor in 24.1%(n=13) participants. Our definition of good performance was indicated by a score equal to or greater than the median score (Guerrero et al., 2009).

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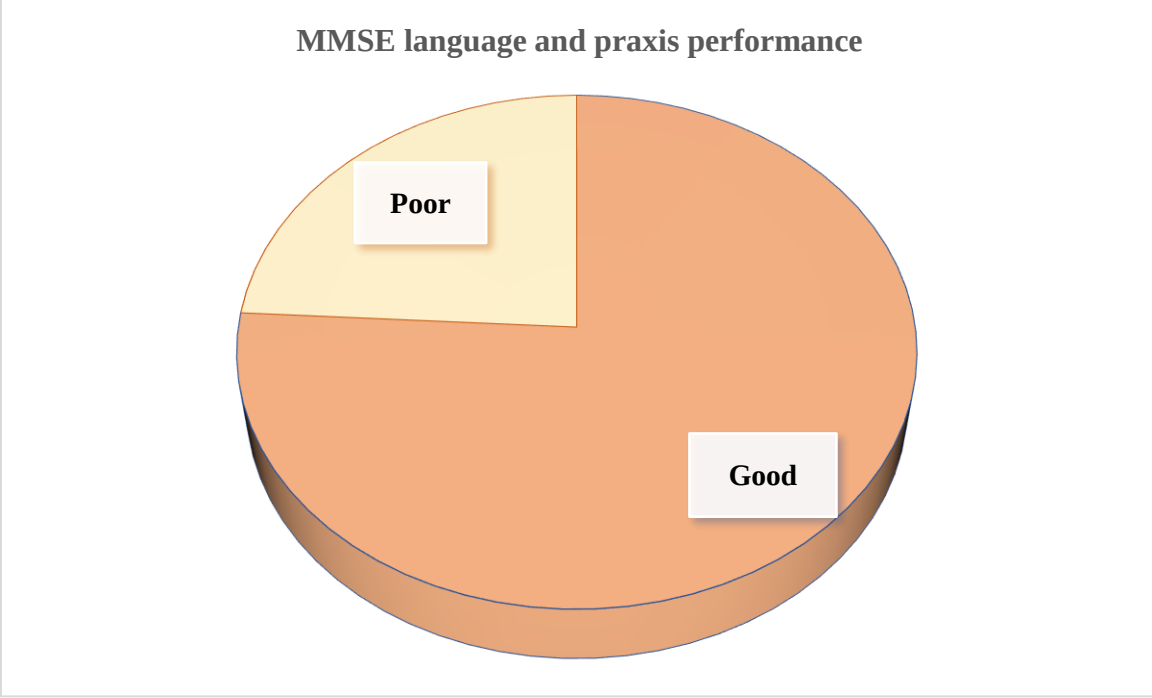

Fig 19: MMSE language and praxis performance

11. MMSE attention and calculation performance:

Among 54 participants, the MMSE attention and calculation performance was poor in 27.8%(n=15) and Good=72.2% (n=37) participants. Our definition of good performance was indicated by a score equal to or greater than the median score (Guerrero et al., 2009).

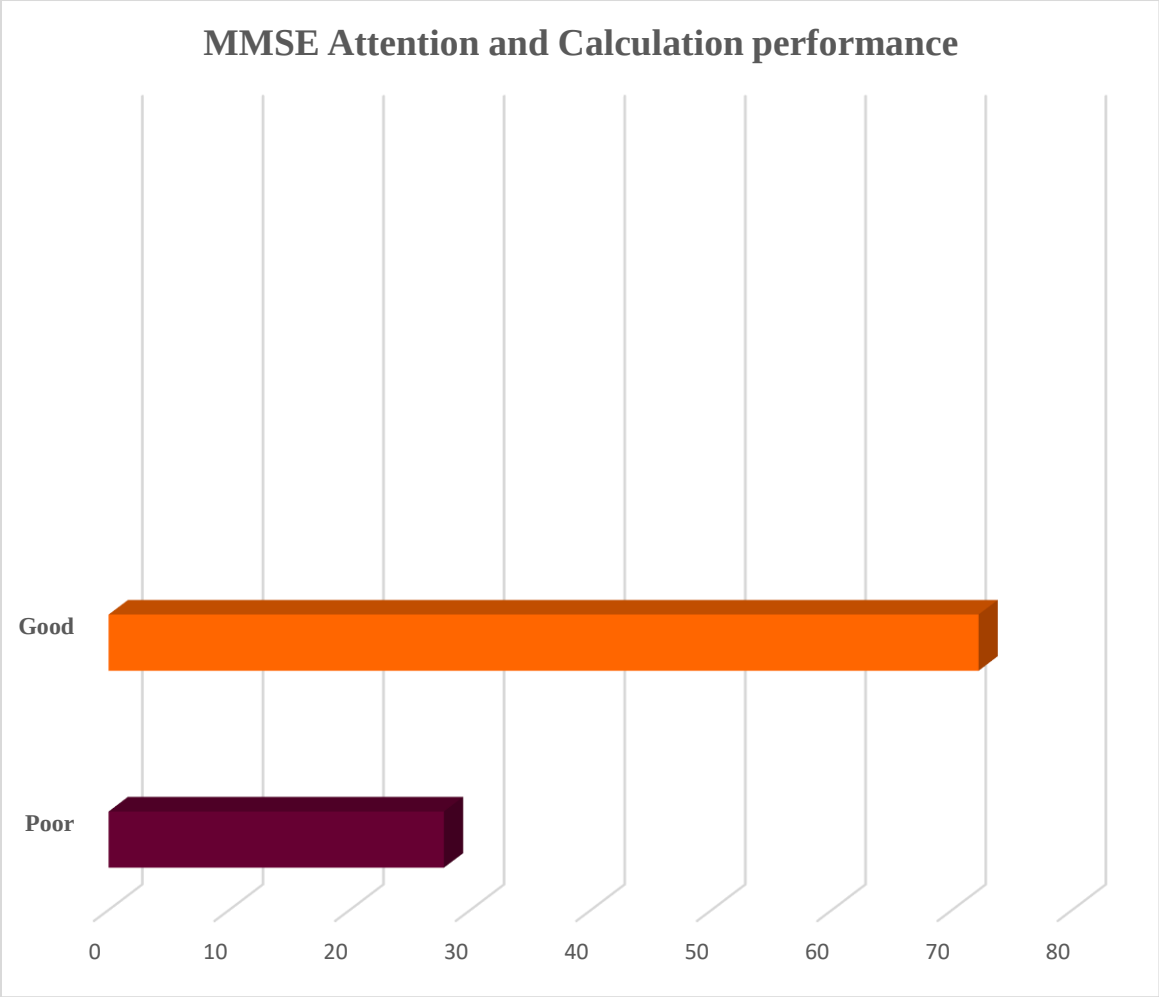

Fig 20: MMSE attention and calculation performance

Table-4: Caregiver information

SL.no	Variable	Type of variable	Frequency(n=54)/ Percentage(%)
1	Relation with patient	Nominal	Relative = 49/90.7% Non-relative = 5/9.3%
2	Care giving pattern	Nominal	Continuous care giving = 52/96.3% Intermittent care giving = 2/3.7%

Table-4: Caregiver information

In this study 54 participants with stroke were included. From the Table-1 it was found that among 54 patient's caregivers, 90.7% (n=49) was relative o and 9.3% (n=5) was non relative. Continuous caregiving pattern was 96.3% (n=52) and intermittent caregiving pattern was 3.7% (n=2).

Inferential statistical analysis:

Typically, inferential statistical analysis involves drawing inferences about a population based on data describing a sample (Lix et al., 2006). In this study associations were analysed between odds of dementia with sociodemographic information (e.g gender) and physical parameter related information (e.g type of stroke, state of stroke, previous history of stroke, level of physical activity etc.), age category with cognition related information and MMSE subdomains and presence of cognitive impairment with sociodemographic information and physical parameter related information. Co-relation was analyzed between sleeping hours with presence of cognitive impairment, odds of dementia, and age with BMI.

Table 5. Association between Odds of dementia with sociodemographic information (e.g: Gender) and Physical parameter related information (e.g: Type of stroke, state of stroke, previous history of stroke, level of physical activity, food habit).

Null (H0): There has no association between Odds of dementia with gender, Frequency of comorbidity, type of stroke, state of stroke, previous history of stroke, level of physical activity, food habit etc.

Alternative (HA): There has association between Odds of dementia with gender, Frequency of comorbidity, type of stroke, state of stroke, previous history of stroke, level of physical activity, food habit etc.

Test assumption:

In case of Pearson chi square,

1. Two categorical variables including two or more subcategory
2. 0-1 cells (0%-20%) have expected count less than 5.

In case of Fisher's exact test if

1. Expected frequency is <5 , cell count is > 20%

Level of significance (α value < .05)

Table 5. Association between Odds of dementia with sociodemographic information and Physical parameter related information.

Variable 1	Variable 2	Pearson Chi square co efficient value ($\chi 2$)	Fisher's exact co-efficient value	Significant level	Comment/ Discussion
Odds of dementia 1.Increased 2.Decreased	Gender 1.Male 2.Female		7.714	0.012	Significant association found/ Alternative hypothesis is accepted.
	Type of stroke 1.Ischemic 2.Hemorrhagic	0.000		1.00	No significant association found/Null hypothesis is failed to be rejected.
	State of stroke 1.Acute 2.Subacute 3.Chronic		.208	1.00	No significant association found/Null hypothesis is failed to be rejected
	Previous history of stroke 1.Yes		0.082	1.00	No significant association found/Null hypothesis is

	2.No				failed to be rejected
	Level of physical activity 1.Sedentary 2.Active	.596		.565	No significant association found/Null hypothesis is failed to be rejected
	Food habit 1.Balanced 2.Junk food		0.293	0.704	No significant association found/Null hypothesis is failed to be rejected
	Frequency of comorbidities 1.Single 2.Multiple	0.148		0.777	No significant association found/Null hypothesis is failed to be rejected.

** α value is 0.05. P value is statistically significant if it is less than α value and alternative hypothesis is accepted. If P value is greater than α value then null hypothesis is accepted.

Result: The table above showing result of association of Odds of dementia and gender, type of stroke, state of stroke, frequency of comorbidities, level of physical activities, food habbit, previous history of stroke. There was no association found between odds of dementia and frequency of co-morbidity, type of stroke level of physical activities,

previous history of stroke, state of stroke, food habbit. But a strong association found between Odds of dementia and gender. Bar graph 5(A) showing that females are more prone to have cognitive impairment.

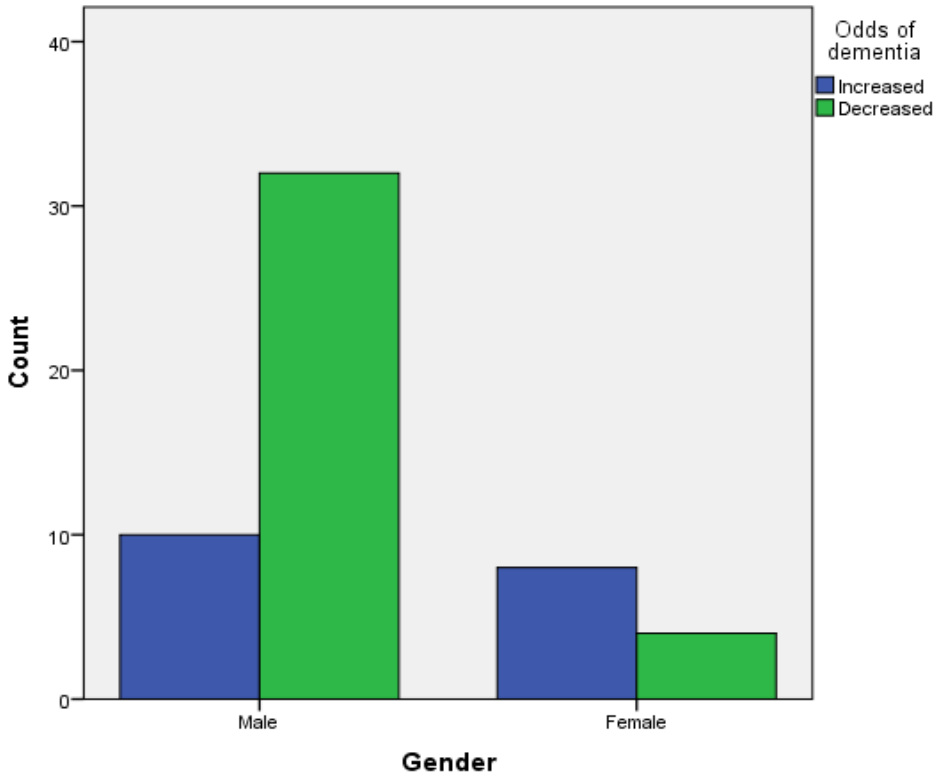

Fig 5(A): Association between odds of dementia and gender.

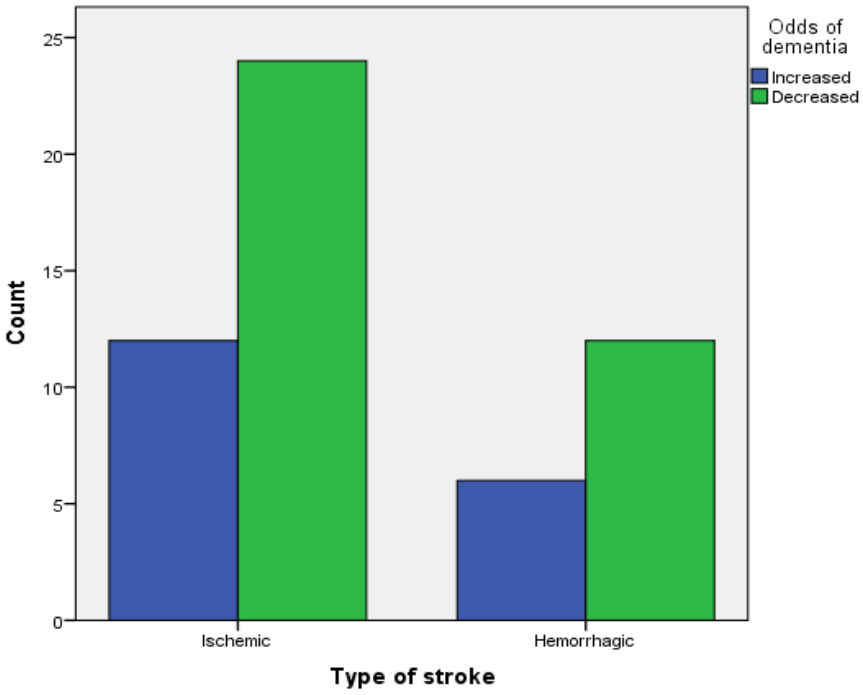

Fig 5(B): Association between odds of dementia and type of stroke.

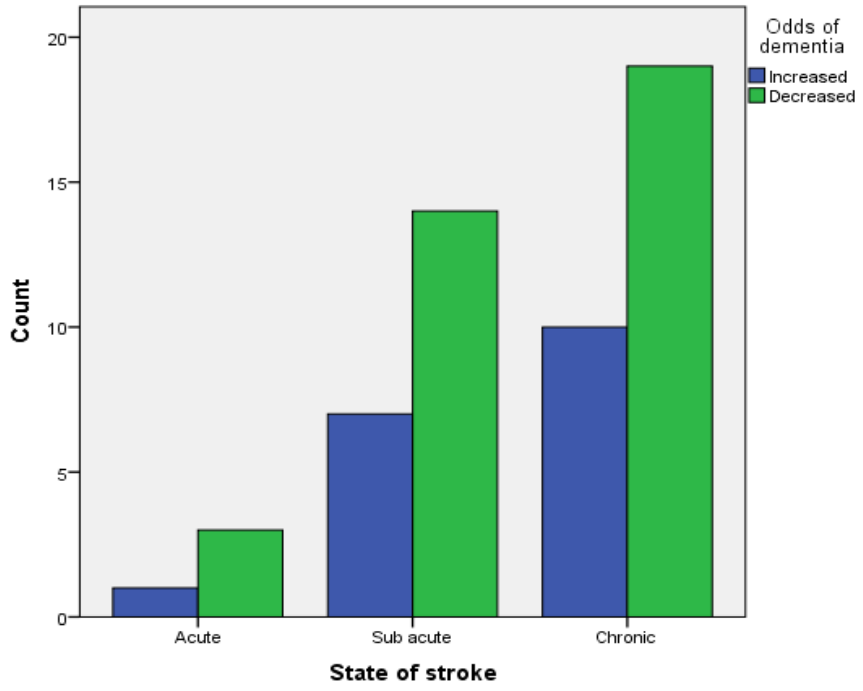

Fig 5(C): Association between odds of dementia and state of stroke.

Table 6: Association between Age category with Cognition related information

Null (H0):- There has no association between age category with odds of dementia, presence of cognitive impairment, frequency of commorbidities.

Alternative (HA):- There has association between age category with odds of dementia, presence of cognitive impairment, frequency of commorbidities.

Test assumption:

In case of Pearson chi square,

1. Two categorical variables including two or more subcategory
2. 0-1 cells (0%-20%) have expected count less than 5.

In case of Fisher's exact test if

1.Expected frequency is <5, cell count is more than 20%

Level of significance (α value < .05)

Table 6: Association between Age category with Cognition related information

Variable 1	Variable 2	Pearson chi square co efficient value ($\chi 2$)	Fisher's exact co-efficient value	Significant level	Comment/ Discussion
Age range 1.Relatively older 2.Relatively younger	Odds of Dementia 1.Increased 2.Decreased		3.653	0.077	No significant association found/Null hypothesis is failed to be rejected.
	Presence of cognitive impairment 1.Absent 2.Present		3.211	0.143	No significant association found/Null hypothesis is failed to be rejected
	Frequency of comorbidity 1.Single 2.Multiple	0.768		0.505	No significant association found/Null hypothesis is failed to be rejected

** Relatively Older: Participants whose age was over 40.

** Relatively Younger: Participants whose age was below 40.

** α value is 0.05. P value is statistically significant if it is less than α value and alternative hypothesis is accepted. If P value is greater than α value then null hypothesis is accepted.

Result: The table above showing result of association between age category relatively older (n=43), relatively younger (n=11) with odds of dementia, presence of cognitive impairment, and frequency of comorbidity. There was no association found between frequency of co-morbidity, odds of dementia, presence of cognitive impairment.

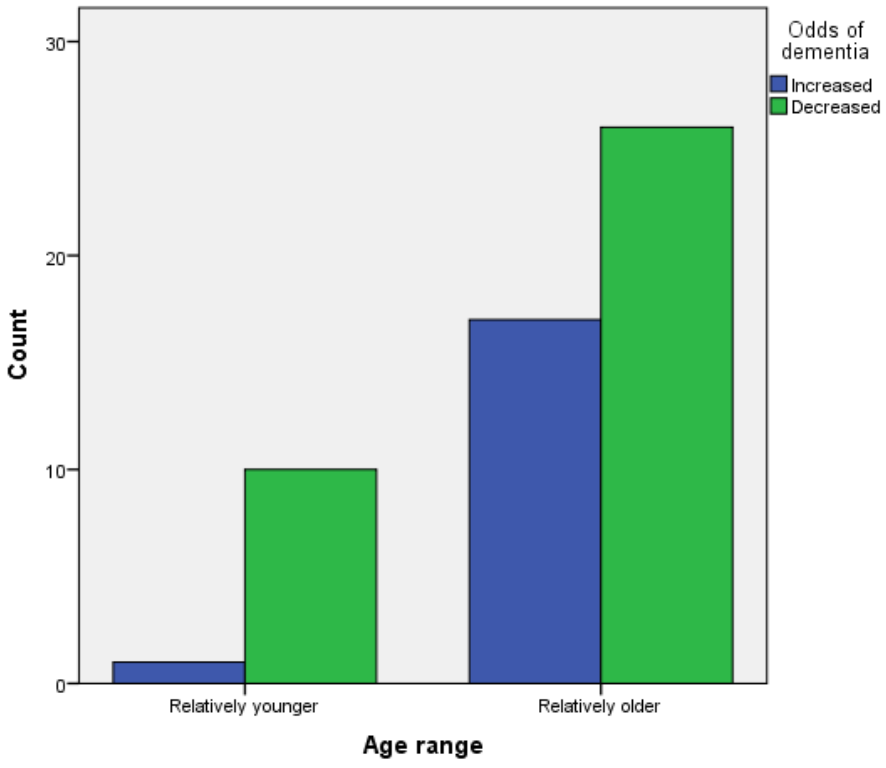

Fig 6(A): Association between Age range and odds of dementia

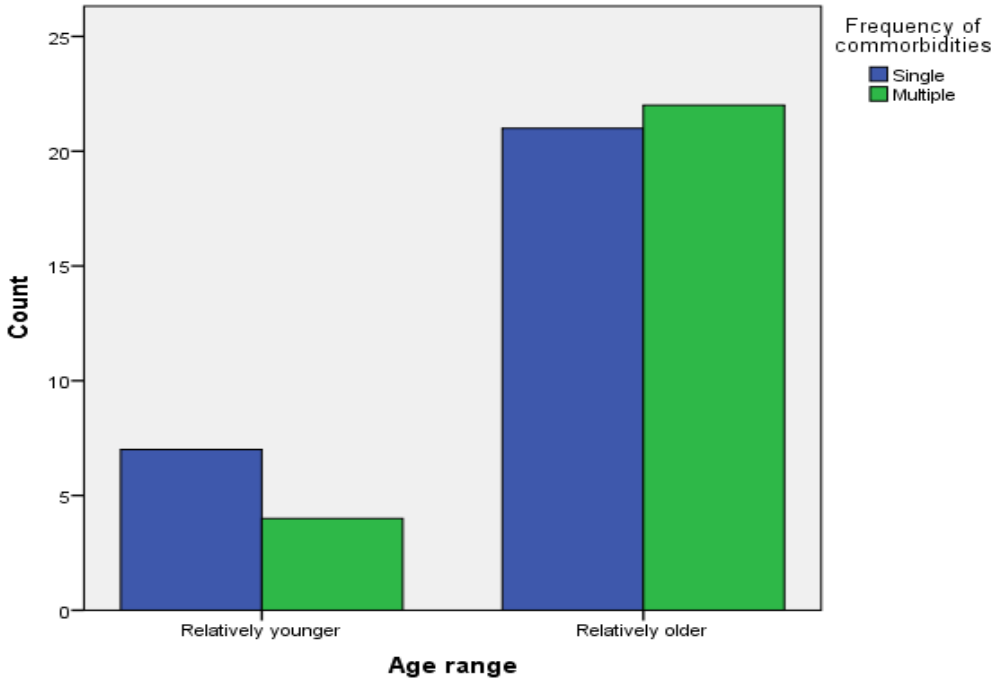

Fig 6(B): Association between age range and frequency of commorbidities

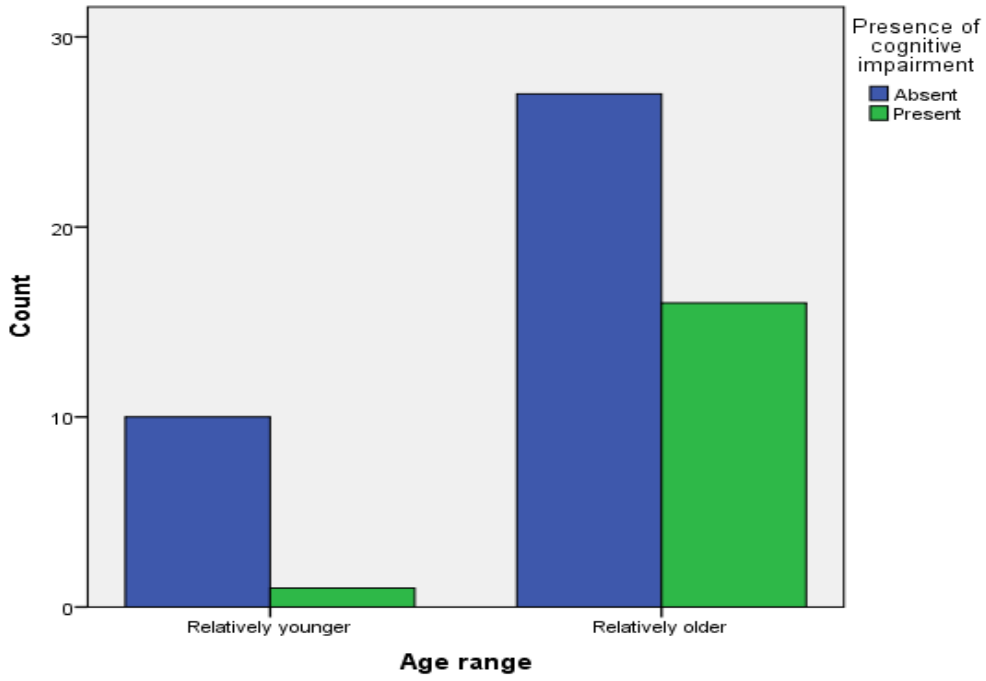

Fig 6(C): Association between age range and presence of cognitive impairment

Table 7: Association between Age category with Mini-Mental Scale Examination domains performance

Null (H0): There has no association between age category with orientation, registration, attention and calculation, recall, language and praxis performance

Alternative (HA):- There has association between age category with orientation, registration, attention and calculation, recall, language and praxis.

Test assumption:

In case of Pearson chi square,

1. Two categorical variables including two or more subcategory
2. 0-1 cells (0%-20%) have expected count less than 5.

In case of Fisher's exact test if

1.Expected frequency is <5, cell count is more than 20%

Level of significance (α value < .05)

Table 7: Association between Age category with Mini-Mental Scale Examination domains performance

Age Groups of the participant	MMSE domain performance	Pearson Chi square co efficient value ($\chi 2$)	Fisher's exact co efficient value	Significant value	Comment/ Discussion
Age range 1.Relatively older 2.Relatively younger	Orientation performance 1.Good 2.Poor		3.859	0.150	No significant association found/Null hypothesis is failed to be rejected.
	Registration performance 1.Good 2.Poor		2.057	.322	No significant association found/Null hypothesis is failed to be rejected.
	Attention & calculation performance 1.Good 2.Poor		0.634	0.708	No significant association found/Null hypothesis is failed to be rejected.
	Recall performance 1.Good 2.Poor	0.040		1.00	No significant association found/Null hypothesis is

					failed to be rejected.
	Language and praxis performance 1.Good 2.Poor		.262	1.00	No significant association found/Null hypothesis is failed to be rejected.

** Relatively Older: Participants whose age was over 40.

** Relatively Younger: Participants whose age was below 40.

** α value is 0.05. P value is statistically significant if it is less than α value and alternative hypothesis is accepted. If P value is greater than α value then null hypothesis is accepted.

Result: The table above showing result of association with age range relatively older (n=43), relatively younger (n=11) and orientation, registration, attention and calculation, recall, language and praxis performance There was no association found between age range and orientation, registration, attention and calculation, recall, language and praxis performance.

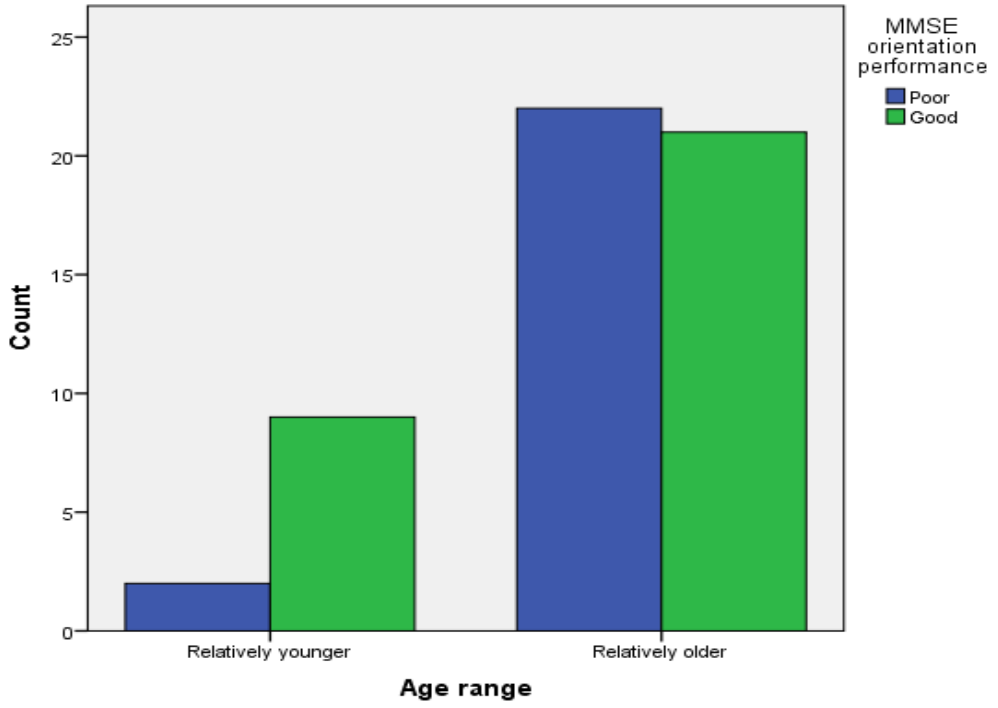

Fig7(A): Association between Age range and MMSE orientation performance

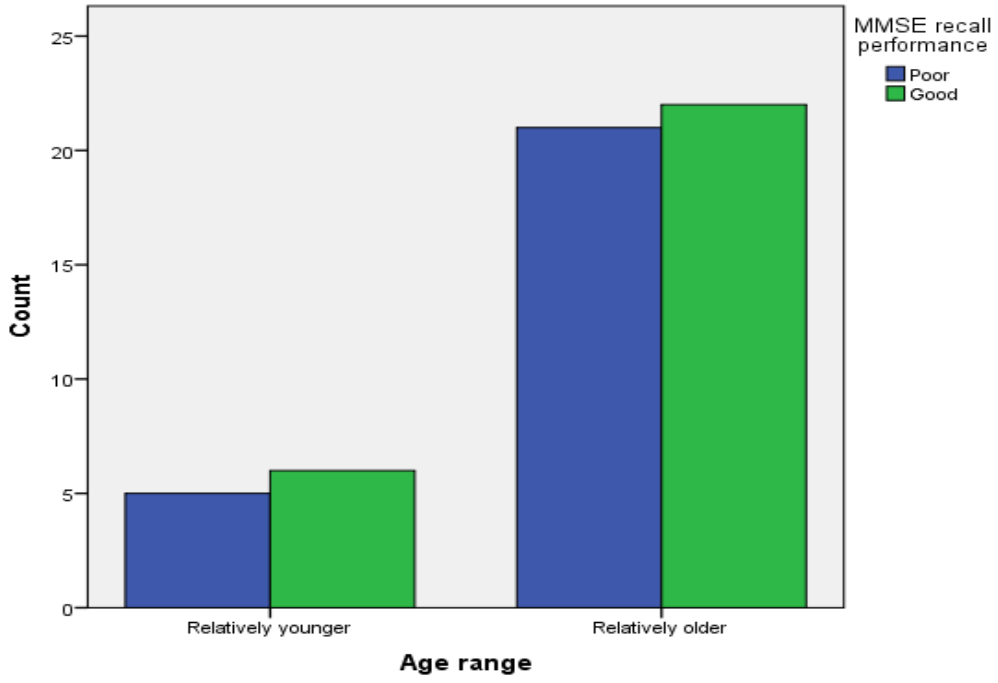

Fig 7(B): Association between age range and MMSE recall performance

Table 8: Association between Presence of cognitive impairment with sociodemographic information.

Null (H0): There has no association between Presence of cognitive impairment with gender, Residential area, family type, presence of any habbits.

Alternative (HA):- There has association between presence of cognitive impairment with gender, residential area ,family type, presence of any habbits.

Test assumption:

In case of Pearson chi square,

1. Two categorical variables including two or more subcategory
2. 0-1 cells (0%-20%) have expected count less than 5.

In case of Fisher's exact test if

1.Expected frequency is <5, cell count is more than 20%

Level of significance (α value < .05)

Table 8: Association between Presence of cognitive impairment with sociodemographic information.

Variable 1	Variable 2	Pearson Chi square co efficient value ($\chi 2$)	Fisher's exact co efficient value	Significant value	Comment /discussion
Presence of cognitive impairment 1.Present 2.Absent	Gender 1.Male 2.Female		5.157	0.035	Significant association found/ Alternative hypothesis is accepted.
	Residential area 1.Urban 2.Rural	1.087		0.379	No significant association found/Null hypothesis is failed to be rejected.
	Family type 1.Nuclear 2.Joint family	0.167		0.757	No significant association found/Null hypothesis is failed to be rejected.
	Presence of any habits 1.Present 2.Absent		0.885	0.507	No significant association found/Null hypothesis is failed to be rejected.

** α value is 0.05. P value is statistically significant if it is less than α value and alternative hypothesis is accepted. If P value is greater than α value then null hypothesis is accepted.

Result: Above the table showing result of association between Presence of cognitive impairment with sociodemographic information. There was no association found between residential area, family type, presence of any habbits. But a strong association found between Presence of cognitive impairment and gender. Bar graph 8(A) showing that females are more prone to have cognitive impairment.

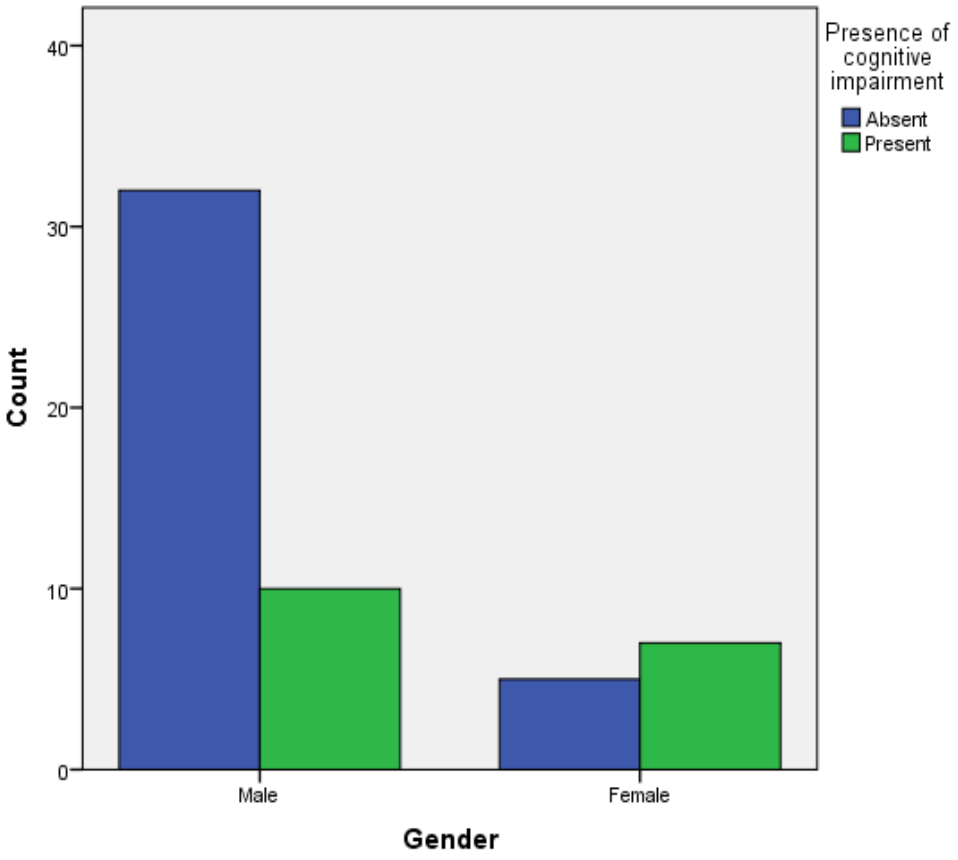

Fig 8(A): Association between Presence of cognitive impairment and Gender

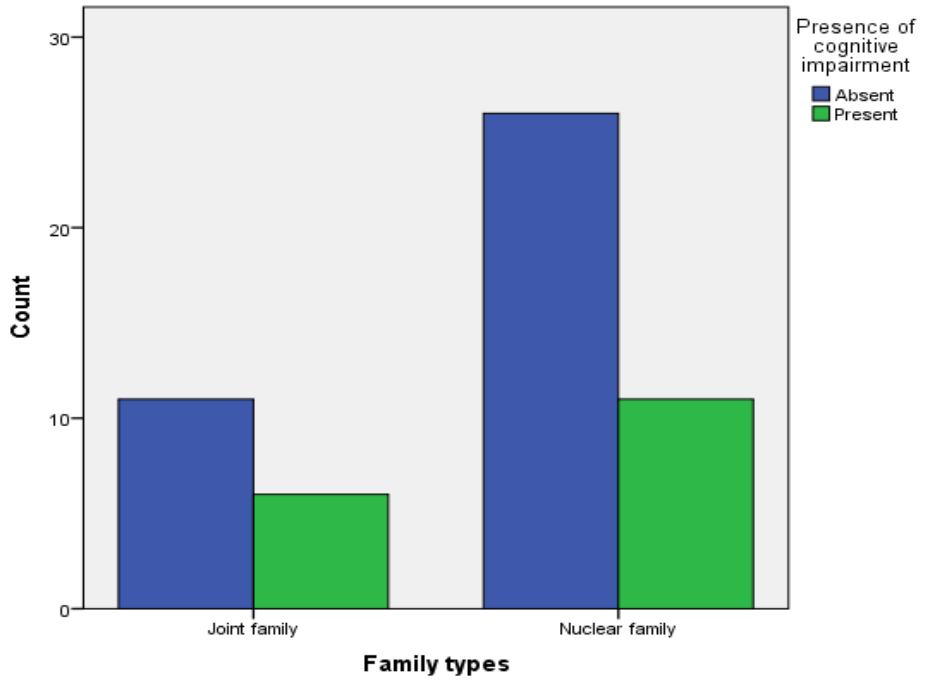

Fig 8(B): Association between Presence of cognitive impairment and Family types

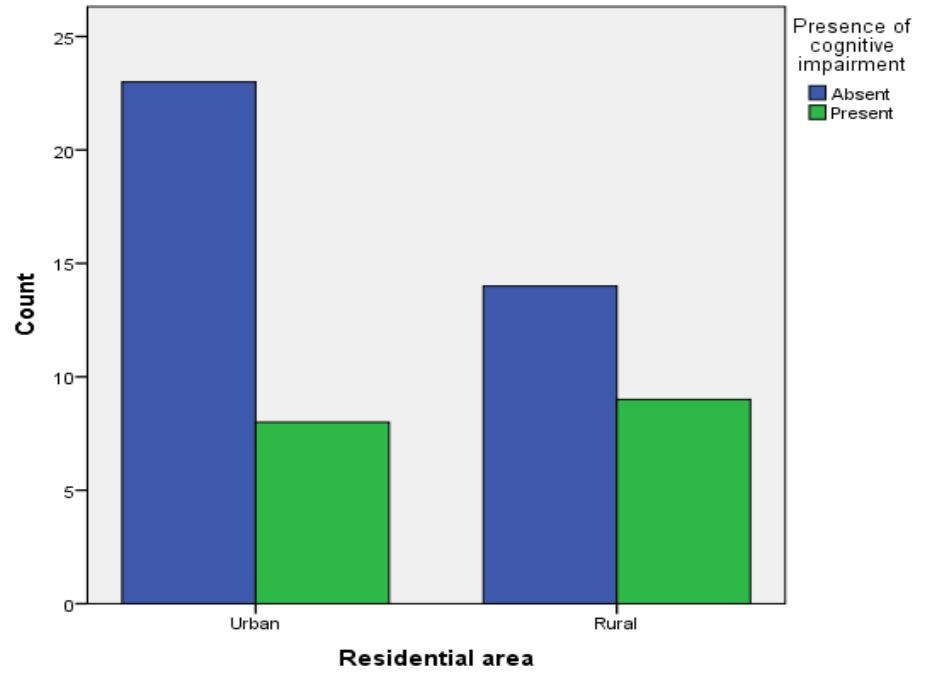

Fig 8(C): Association between Presence of cognitive impairment and Residential area

Table 9: Association between Presence of cognitive impairment with Physical parameter related information.

Null (H0): There has no association between Presence of cognitive impairment with Body type, type of stroke, state of stroke, previous history of stroke, family history of stroke, frequency of commorbidities, food habbit, level of physical activites.

Alternative (HA):- There has association between presence of cognitive impairment with body type, type of stroke, state of stroke, previous history of stroke, family history of stroke, frequency of commorbidities, food habbit, level of physical activites.

Test assumption:

In case of Pearson chi square,

1. Two categorical variables including two or more subcategory
2. 0-1 cells (0%-20%) have expected count less than 5.

In case of Fisher's exact test if

1.Expected frequency is <5, cell count is more than 20%

Level of significance (α value < .05)

Table 9: Association between Presence of cognitive impairment with Physical parameter related information.

Variable 1	Variable 2	Pearson Chi square co efficient value ($\chi 2$)	Fisher's exact co efficient value	Significant value	Comment/ Discussion
Presence of cognitive impairment 1.Absent 2.Present	Body type 1.Thin 2.Fat 3.Medium		0.562	.888	No significant association found/Null hypothesis is failed to be rejected
	Type of stroke 1.Ischemic 2.Hemorrhagic	0.043		1.00	No significant association found/Null hypothesis is failed to be rejected
	State of stroke 1Acute 2.Subacute 3.Chronic		0.212	1.00	No significant association found/Null hypothesis is failed to be rejected
	Previous history of stroke. 1.Yes 2.No		0.564	1.00	No significant association found/Null hypothesis is

					failed to be rejected
	Family history of stroke. 1.Yes 2.No	0.773		0.559	No significant association found/Null hypothesis is failed to be rejected
	Frequency of comorbidities 1.Single 2.Multiple	0.483		0.565	No significant association found/Null hypothesis is failed to be rejected.
	Food habbit 1.Balanced 2.Junk food		0.183	1.00	No significant association found/Null hypothesis is failed to be rejected
	Level of physical activity 1.Sedentary 2.Active	0.262		0.770	No significant association found/Null hypothesis is failed to be rejected

** α value is 0.05. P value is statistically significant if it is less than α value and alternative hypothesis is accepted. If P value is greater than α value then null hypothesis is accepted.

Result: The table above showing result of association between Presence of cognitive impairment with Physical parameter related information. There was no association found between body type, type of stroke, state of stroke, previous history of stroke, family history, frequency of comorbidities, food habit, level of physical activities. Because all of them had significant level more than .05. So, in that case the null hypothesis is failed to be rejected.

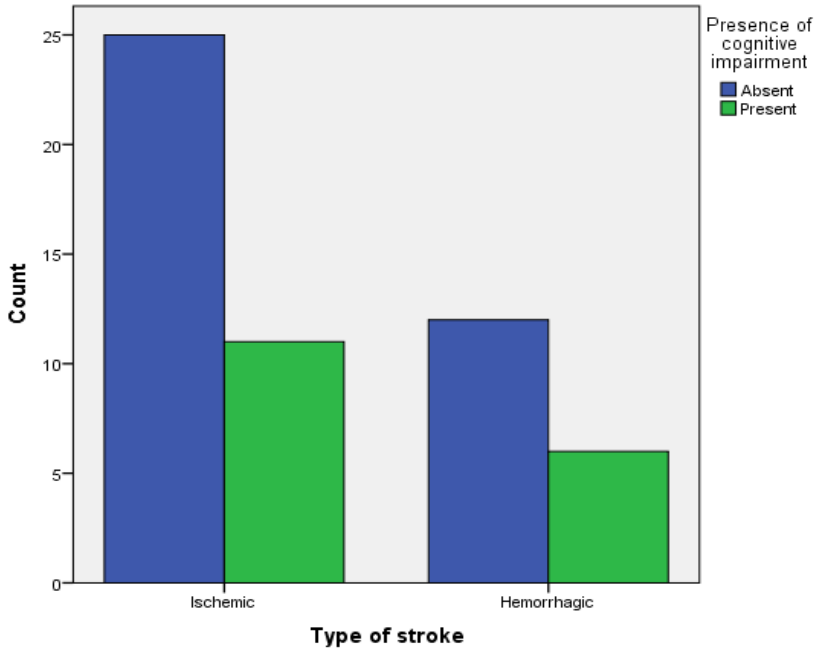

Fig 9(A): Association between Presence of cognitive impairment and Type of stroke

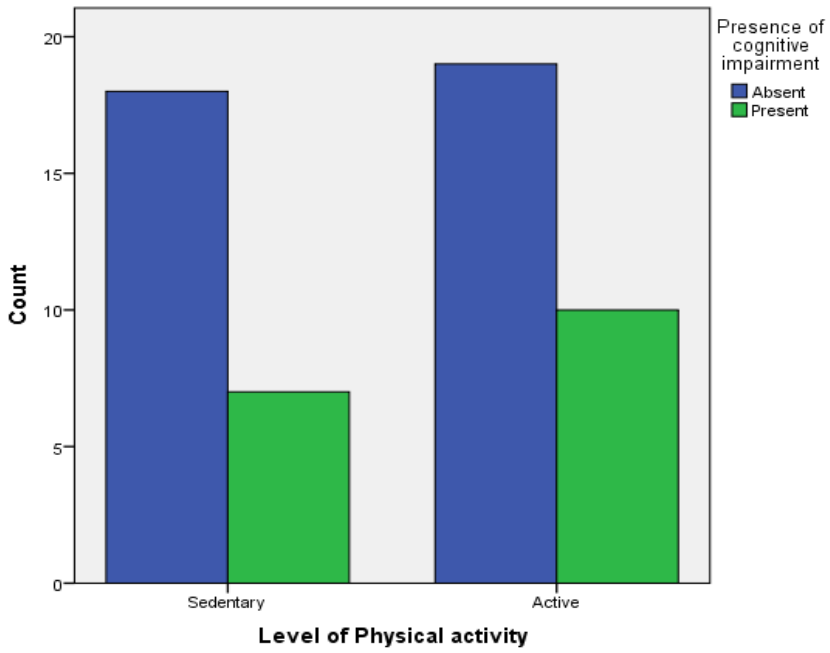

Fig 9(B): Association between Presence of cognitive impairment and Level of physical activity

Table 10: Co-relation between Sleeping hours with MMSE scores

Null (H0): There has no co relation between sleeping hours with MMSE scores

Alternative (HA): There has co-relation between sleeping hours with MMSE scores

Test assumption:

1. Two continuous variable.

2. Normally distributed.

3. Presence of linear association.

Level of significance (α value < .05)

Table 10: Co-relation between Sleeping hours with MMSE scores

Variable 1	**Variable 2**	**Pearson co-relation co-efficient value (r)**	**Significant value**	**Comment/Discussion**
Sleeping hours	MMSE scores	-.181	.191	No significant association found/Null hypothesis is failed to be rejected

** α value is 0.05. P value is statistically significant if it is less than α value and alternative hypothesis is accepted. If P value is greater than α value then null hypothesis is accepted.

Result: The table above, showing relation between sleeping hours with MMSE score. There found no statistically significant relationship between sleeping hours and MMSE scores.

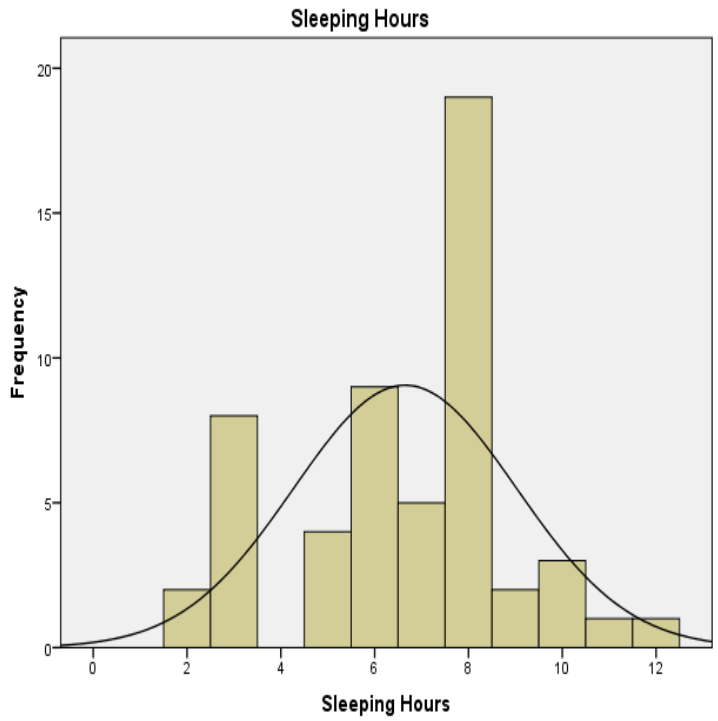

Fig 10(A): Histogram of sleeping hours

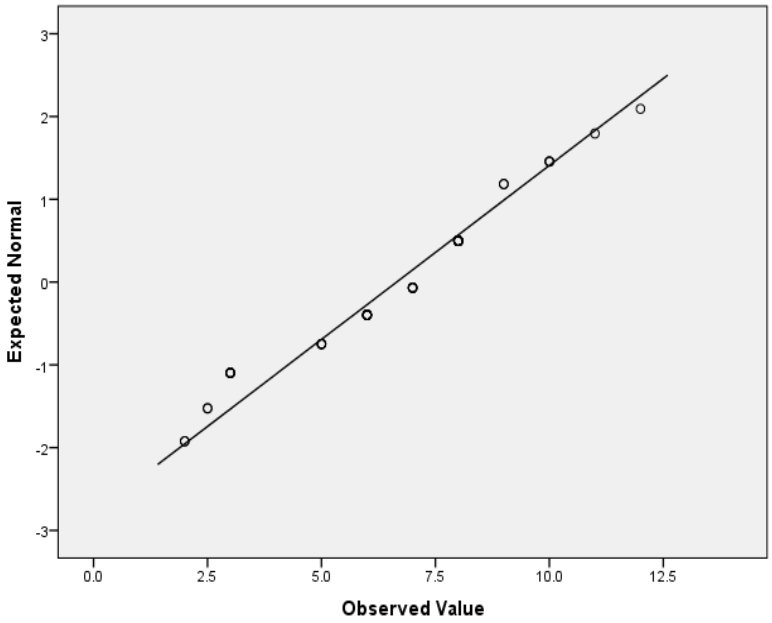

Fig 10(B): Normal Q-Q plot of sleeping hours

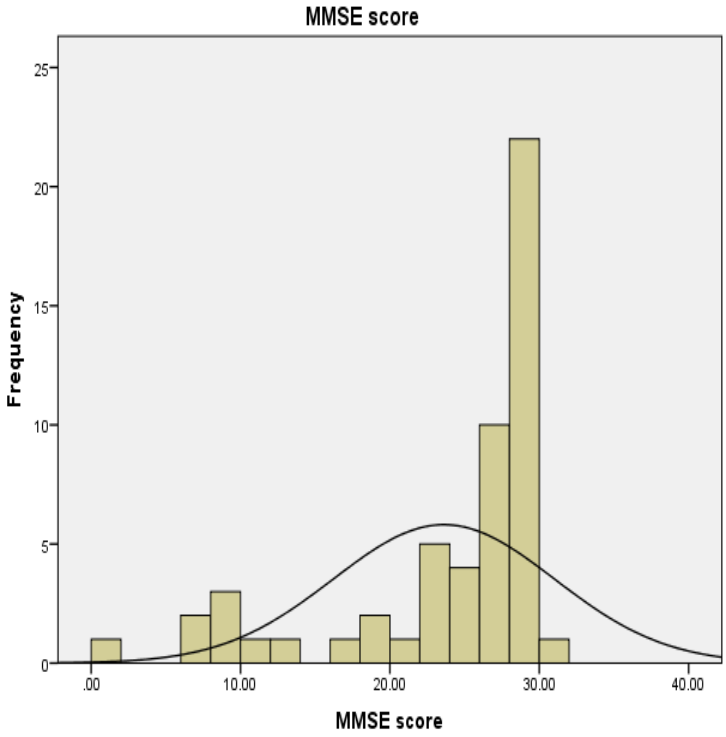

Fig 10(C): Histogram of MMSE score

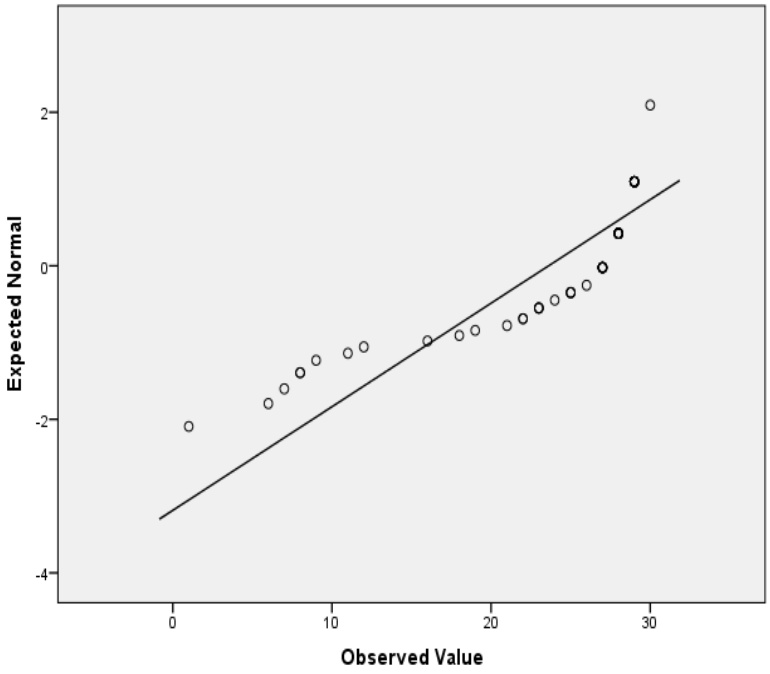

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Fig 10(D): Normal Q-Q plot of MMSE score

Table 11: Co-relation between age with BMI

Null H0 - there has no co relation between age and BMI.

Hypothesis (HA)- there has co-relation between age and BMI.

Test assumption:

1. Two continuous variable.

2. Normally distributed.

3. Presence of linear association.

Level of significance (α value < .05)

Table 11: Co-relation between age with BMI

Variable 1	Variable 2	Pearson co-relation co-efficient value (r)	Significant value	Comment /Discussion
Age	BMI	0.241	0.079	No significant association found/Null hypothesis is failed to be rejected.

Result: The table above showing relationship between Age and BMI. No co-relation relation found age with BMI, the significant value of BMI was (.079) which is more than (>.05). So, for BMI, the null hypothesis is failed to be rejected.

CHAPTER-V DISCUSSION

Stroke is a particular kind of disease that can be characterized by a wide variety of accompanying symptoms, some of which include pain, cognitive disorder, speech problem, visual equity, balance problem, and other similar issues. In addition to physical disability, stroke survivors frequently endure substantial cognitive and behavioral health problems, with negative consequences for stroke patients, their families, and the community. Currently identifying cognitive impairment among stroke patients has become a vital subject for conducting research.

In this study the responses were measured by the structured questionnaire including MMSE scale which consists of 5 domains. A descriptive and inferential statistical analysis have been conducted to find out the result. In the descriptive section the categorical variables were measured in percentage and have been showed in different bar diagrams, pie charts and tables. The continuous variable's central tendency and measure of dispersion was calculated through mean and standard deviation. In the inferential section, chi-square of independence and Pearson co-relation test were conducted to find out the association between different dependent and independent variables.

In this study, the result showed, the prevalence of cognitive impairment, its severity level, domain specific cognitive performance, and the odds of dementia according to MMSE scale.

The purpose of this cross-sectional study is to investigate the frequency of cognitive impairment. This study is modifiable as it is a cross-sectional study, and although it is considered an exploratory study, it does provide some relevant information regarding stroke and cognitive impairment.

Findings from this study indicate that 31.5% patient exhibit cognitive impairment after stroke, among them 47% were found mild cognitively impaired and 53% were found severely cognitively impaired. This finding is consistent with previously documented rates of cognitive impairment, which can range from around 30 % to 74 % depending on the follow up duration and the subtype of stroke that has occurred (Patel et al., 2003). The

prevalence of post-stroke cognitive impairment can range from around 20 % to 80 %, depending on the country, the race of the patient, and the diagnostic criteria (Sun et al., 2014). The results of the few previous prospective studies conducted in India showed that the prevalence of cognitive impairment among overall stroke survivors was ~20%. Recent research conducted in India on a sample of fifty people who had suffered strokes found that 72% of the patients exhibited some sort of cognitive decline. Another study used Mini-Mental State Examination (MMSE) score to measure cognitive decline and found its prevalence to be 31.7% among 164 patients (Sundar & Adwani, 2010). In contrast, another study revealed cognitive impairment was seen in 40 % of the 150 stroke survivors; among them, 30.67% had severe cognitive impairments and 9.33 % had mild cognitive impairments (Nayan et al., 2016).

The current study, increased odds of dementia is 33.3%. Leys et al. demonstrated in their review that was published in 2005 that the prevalence of PSD in community-based studies was approximately 30%, whereas the prevalence in hospital-based studies ranged from 6% to more than 32%. According to the findings of one study, the incidence of post-stroke cognitive impairment among Mexican Americans is higher than that in non-Hispanic whites, and around 31% of Mexican American stroke patients will suffer from post-stroke dementia (Lisabeth et al., 2014). Recently, a prospective community study in East India showed a prevalence rate of 13.88% for post-stroke dementia (Das et al., 2012). A meta-analysis of 30 studies that was carried out in 2009 found that the prevalence of dementia in symptomatic stroke patients went from 10 percent before the first stroke to 20 percent soon after the first stroke, and that more than a third had dementia following recurrent stroke (Pendlebury & Rothwell, 2009).

The mean age of the participants was 52.33 ± 13.03 among 54 participants, this is almost close to the findings of (Froes et al., 2011). They found the more affected mean age was 58.8±11.72 among 64 stroke survivors. Another study have found mean age of the study group was 59.9±13.7 and the study population was 147 (Sarfo et al., 2017). BMI was found in this study was 25.07±4.08. Also other study found that 27.7±19.2, which is almost similar (Jacquin et al., 2014).

In all participants, 77.8% were male, and 22.2% were female. In another study showed almost similar distributions where male was 66% and female were 34% (Tham et al., 2002).

This study findings shows about 57.4% participants live in urban area, and 42.6% participants live in rural area reported that 54% of stroke survivors lived in urban areas (Hossain et al., 2011).

In this study hemorrhagic stroke was 14.8% and ischemic stroke was 85.2% which is similar to the study, in which they found that hemorrhagic was 10.4%, ischemic was 86.5% among 599 participants (Qu et al., 2015).

The study found hypertension and diabetes rate 29.6% and 22.2% and another study found almost similar findings where hypertension and diabetes rate were 56.4% and 15% (Douiri et al., 2013).

In the present study, the odds of dementia has association with gender. Females are more prone to have odds of dementia rather male. While, in another study reported that females have a higher risk of developing dementia with the presence of diabetes, obesity, and hypertension more than males (Gannon et al., 2019). The current study found no association with type of stroke, state of stroke, previous history of stroke, level of physical acitivity, food habbit, frequency of comorbidities. The risk and severity of cognitive disturbances occurring after a stroke do not seem to be influenced by the stroke type (ischemic or hemorrhagic) (Barba et al., 2000). In contrast One study reported that, the incidence of dementia is significant among people with ischemic stroke, particularly in the presence of other medical conditions (Desmond et al., 2002).

Another findings of present study showed that, there has association between cognitive impairment and gender, females are more vulnerable than males. This study revealed that, Cognitive impairment was found to be prevalent in 40.0% of males and 45.1% of females. Females demonstrated significantly higher incidence beyond 75 years of age (Wang et al., 2020). Another china based study shows that among the oldest-old, women were twice as likely as men to suffer cognitive impairment (32.9 vs. 15.7%) (Miyawaki & Liu, 2019). Other demographic factors such as residential area, family types, presence of any habits showed no association. In contrast to other study showed residential impact on cognitive

status. This findings include at start, rural-to-urban and rural people possessed a greater degree of cognitive than urban residents. Cognitive function declined on average over the course of the study period. The cognitive function of rural-to-urban and rural residents declined more rapidly than that of urban residents (Xu et al., 2017).

The study findings indicated that there has no association between age category (relatively older, relatively younger) and odds of dementia, presence of cognitive impairment and presence of comorbidities. Several studies indicated that, increasing age is clearly a risk factor of Post stroke dementia (Henon et al., 2006). Also another study reveals that increased incidence of cognitive impairment associated with older aged population (Pais et al., 2020).

In this study there has been no association between cognitive impairment and other physical and stroke related information such as body type, type of stroke, state of stroke, family history of stroke, previous history of stroke, food habit, level of physical activities.

In contrast to other studies there has been association between cognitive impairments and state of stroke. It has been reported that 20–60% of stroke survivors show PSCI during the subacute phase during hospitalization (Mori et al., 2021). Another study their results revealed cognitive impairment present in approximately 60% of chronic stroke patients (Nakling et al., 2017). Cognitive impairment is common in the first weeks after stroke, with executive and perceptual disorders being the most frequent (Nys et al., 2007).

A study showed significant association of physical activities with cognitive impairment. Compared with no exercise, physical activity was associated with lower risks of cognitive impairment, Alzheimer disease, and dementia of any type (Laurin et al., 2001).

The relation between sleeping hours and MMSE score found no significant in present study while in a cross-sectional investigation of an elderly community cohort, longer sleep duration ($\geq$ 9 h) was related with lower MMSE scores. But short sleep duration ($<$ 6 h) was not substantially related to MMSE performance (Ramos et al., 2013).

5.1 Limitations

There may be some limitations to each study. This research also had a variety of restrictions and obstacles that may have affected its accuracy. For this research project, the first drawback was the tiny sample size, which was the result of a lack of subject flow and a brief study period. There were just 54 samples taken. Due to the short sample size, the prevalence of cognitive impairment among stroke patients could not be determined. If we had sufficient funds, we would have been able to expand our data collection area in order to meet the desired sample size. Importantly, this study effort was conducted by an undergraduate student conducting her first research; therefore, the researcher had limited familiarity with research methodologies and strategies. As this was the first survey conducted by the researcher, some errors may have been ignored by the supervisor and the honorable teachers.

CHAPTER-VI CONCLUSION AND RECOMMENDATION

Conclusion

Even though the study was conducted with a small sample size, it gives crucial information regarding the severity of cognitive impairment, whose prevalence is 31.5%. This study also assesses the rates of increased and decreased dementia risk. In addition, the study found a correlation between the presence of cognitive impairment and the risk of dementia, as influenced by sociodemographic factors, physical parameters, and stroke-related information. According to the study's findings, there is a strong link between the existence of cognitive impairment and the risk of dementia by gender, and these results are consistent among research of high quality.

Cognitive impairment is a crucial rehabilitation target due to its prevalence after stroke, correlation with reduced quality of life, and difficulty with motor and other forms of recovery intervention. There is an urgent need to educate staff members about the possibility of cognitive impairment so that cognitive impairments can be diagnosed and appropriate treatment methods undertaken. Along with improved awareness and appropriate counseling, the necessary measures should be done to lessen cognitive damage following a stroke in order to improve the affected individual's quality of life.

Recommendation

Because cognitive impairment can have an impact not only on day-to-day life but also on the outcome of rehabilitation, it is vital to pay this element an increasing amount of attention following a stroke. There have been a number of studies undertaken in relation to this topic, and furthermore, there should be studies conducted to recognize the dangers of cognitive impairment and the preventative actions that may be taken. If other authors want to pursue further similar research, then I urge that they conduct their research from the perspective of the entire country and with a larger sample size.

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APPENDIX

CONSENT FORM

(Please read out to the participants)

Assalamualaikum , my name is Sahana Chowdhury. I am 4th year student of B.Sc. in Physiotherapy program at Bangladesh Health Professions Institute (BHPI). For my study purpose I am conducting a study on stroke patients and my study title is "Cognitive impairment among stroke patients attended at CRP, Savar " This will take approximately 20-30 minutes. This is an academic study and will not be used for any other purpose. The researcher is not directly related to neurology unit, so your participation in the research will have no impact on your present or future treatment in neurology unit. Researcher will maintain confidentiality of all procedures. Your data will never be used without your permission. Your participation in this study is voluntary and any type of remuneration will not be provided. you may withdraw yourself after 1 week of data collection. No additional intervention will be provided.

If you have any query about the study or your right as a participant, you may contact with the researcher.

So, may I have your consent to proceed with the interview?

Yes / No

Signature of the Participant .....Date.....

Signature of the Interviewer ..... Date .....

Signature of the Researcher .....Date.....

Personal Information

Name:

Patient Id:

Contact no:

Address:

Caregiver Information

SL No.	Questions	Response
1.	Relation with patient	
2.	Caregiving time	1= Continuously 2=Intermittently

Socio-Demographic information

SL No.	Questions	Response
1	Age	Years
2	Gender	1= Male 2= Female 3=Others
3	Educational Qualification	2= Primary 3= Secondary 4= Higher Secondary 5= Graduate
4	Marital Status	1= Married 2= Unmarried
5	Monthly Income	Tk
6	Cost to continue current treatment	Tk
7	Residential Area	1= Urban 2= Semi Urban 3= Rural
8	Number of family members	

9	Family types	1= joint family 2= nuclear family
10	Occupation	
11	Any habits	1= Smoking 2= Alcohol 3= Drugs 4=None

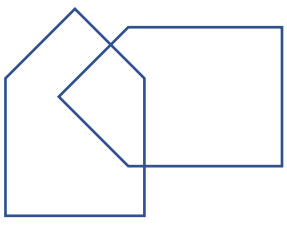
Physical Parameter

SL No.	Questions	Responses
12	Height	Cm
13	Weight	Kg
14	BMI	Kg/m^2
15	Body Type	1= Thin 2= Fat 3= Medium
16	Type of stroke	1= Ischemic 2= Hemorrhagic
17	Area of involvement in brain(Neuro Image)	
18	Onset of stroke	
19	Intervention Time	1= Early 2= Late
20	History of TIA	1= Yes 2= No
21	History of previous stroke	1=Yes 2=No
22	Family history of stroke	1=Yes 2=No
23	Complication after stroke	

24	Frequency of Comorbidities	1=Single 2=Multiple
25	Type of Comorbidities	(e.g: Hypertension, Diabetes, Heart disease)
26	Treatment received	1= Yes 2=No
27	Treatment received	1= Medicine 2=Surgery 3=Rehabilitations 4=Others (e.g traditional healer)
28	Food habbit	1=Balanced/Healthy 2= Junk Food
29	Level of Physical activity	1= Sedentary 2= Active
30	Hours sleeping	Hrs/day
31	Taking any sleeping pill	1= Yes 2= No
32	Other mental conditions	1= Schizophrenia 2= Bipolar disorder 3= Depression/ Anxiety/ Stress

Mini-Mental State Examination (MMSE)

Patient's Name: **Date:**

Maximum Score	Patient's Score	Questions
5		What is the year, month, day of the week, season (summer, rainy, winter)?
5		Where are we now? State, country, town/city, hospital, floor?
3		I will name 3 objects (banana, table, money). Now repeat the 3 objects. (Score 1 mark for each correct answer, now repeat the 3 objects name until the patients learns all of them)
5		What is the day before Friday? day before that? day before that? day before that? day before that?
3		Earlier I told you name of 3 things. Can you tell me what those are?
2		(Showing wristwatch) name this object, (Showing pen) name this object
1		Listen carefully what I say and then repeat them, "one shallow does not make summer"
3		Follow my instructions. "take the paper in your right hand, then fold it in half and give me it on my hand"
1		Follow my instructions and do what I do, "close your eyes for 2 seconds".
1		Say one line about what you see around you
1		Please copy next to the picture below. 
30		Total

অনুমতিপত্র

(অংশগ্রহণকারীকে পড়ে শোনাতে হবে)

আসসালামুআলাইকুম, আমি শাহানা চৌধুরী। বাংলাদেশ হেলথ প্রফেশনস ইন্সটিটিউটের ফিজিওথেরাপি বিভাগের বিএসসি প্রোগ্রামের ৪র্থ বর্ষের একজন শিক্ষার্থী। আমি একটি গবেষণা পরিচালনা করছি এবং গবেষণাটির টাইটেল হচ্ছে "সিআরপি, সাভারে উপস্থিত স্ট্রোক রোগীদের মধ্যে জ্ঞানীয় প্রতিবন্ধকতা"। এটার জন্য ২০-৩০ মিনিট সময় প্রয়োজন। এটি একটি একাডেমিক স্টাডি এবং এই তথ্য অন্য কোথাও ব্যবহৃত হবে না। গবেষকের সাথে নিউরোলজি ইউনিটের কোনো সম্পৃক্ততা নেই তাই আপনার চিকিৎসায় কোনো ধরণের প্রভাব পরবে না। গবেষক সকল প্রকার গোপনীয়তা অক্ষুণ্ন রাখবেন। আপনার অংশগ্রহণ সম্পূর্ণ ঐচ্ছিক

আপনার যদি কোনো প্রশ্ন থাকে তাহলে আপনি সরাসরি গবেষকের সাথে যোগাযোগ করতে পারেন এবং আপনি তথ্য গ্রহণের ১ সপ্তাহের মধ্যে আপনাকে এই গবেষণা থেকে সরিয়ে নিতে পারবেন।

তাহলে, আমি কি আপনার সাক্ষাৎকার শুরু করতে পারি?

হ্যাঁ / না

অংশগ্রহণকারীর সাক্ষর.....তারিখ.....

সাক্ষাৎকার গ্রহণকারীর সাক্ষর.....তারিখ.....

গবেষকের সাক্ষর.....তারিখ.....

ব্যক্তিগত তথ্য

নাম:

রোগীর রআইডি:

মোবাইল নাম্বার:

ঠিকানা:

দেখাশোনাকারীর তথ্য

সিরিয়াল নম্বর	**প্রশ্নাবলী**	**উত্তর**
১.	রোগীর সাথে সম্পর্ক	
২.	দেখাশোনার সময়	১= সবসময় ২= মাঝেমধ্যে

আর্থ-সামাজিক তথ্য

সিরিয়াল নম্বর	**প্রশ্নাবলী**	**উত্তর**
১	বয়স	বছর
২	লিঙ্গ	১= পুরুষ ২= মহিলা ৩= অন্যান্য
৩	শিক্ষাগত যোগ্যতা	১=প্রাথমিক ২= মাধ্যমিক ৩= উচ্চ মাধ্যমিক ৪= স্নাতক ৫=স্নাতকোত্তর
৪	বৈবাহিক অবস্থা	১= বিবাহিত ২= অবিবাহিত

৫	মাসিক আয়	টাকা
৬	বর্তমান চিকিৎসার খরচ	টাকা
৭	বসবাস এলাকা	১= শহর ২= মফস্বল ৩= গ্রাম
৮	পরিবারের সদস্য সংখ্যা	
৯	পরিবার প্রকার	১= একান্নবর্তী ২= একক
১০	পেশা	১= কর্মহীন ২= চাকুরী ৩= ব্যবসা ৪= শিক্ষকতা
১১	অন্যান্য অভ্যাস	১= ধূমপান ২= মদ্যপান ৩= নেশাদ্রব্য ৪= কোনো কিছু না

শারীরিক অবস্থা পরিমাপক

সিরিয়াল নম্বর	**প্রশ্নাবলী**	**উত্তর**
১২	উচ্চতা	সে.মি.
১৩	ওজন	কে.জি.
১৪	বিএমআই	কেজি/মি^{২}
১৫	শারীরিক গঠন	১= চিকন ২= মোটা ৩= মধ্যম
১৬	স্ট্রোকের প্রকারভেদ	১= রক্তের অভাবে

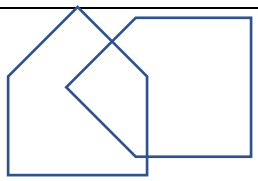
		২= রক্তক্ষরিক
১৭	মস্তিষ্কের ক্ষতিগ্রস্থ অংশ	
১৮	আপনি কতদিন আগে স্ট্রোক করেছেন?	
১৯	স্ট্রোকের কতদিন পর চিকিৎসা নিয়েছেন?	
২০	ট্রান্সিয়েন্ট ইসকেমিক অ্যাটাক এর পূর্ব ইতিহাস	১= হ্যাঁ ২= না
২১	পূর্ববর্তী স্ট্রোকের ইতিহাস	১= হ্যাঁ ২= না
২২	স্ট্রোকের পারিবারিক ইতিহাস	১= হ্যাঁ ২= না
২৩	স্ট্রোক পরবর্তী জটিলতা	
২৪	অন্যান্য রোগের উপস্থিতি	১= একক ২= একাধিক
২৫	অন্যান্য রোগব্যধী উদাহরণস্বরুপ (উচ্চরক্তচাপ, ডায়াবেটিস, হৃদরোগ)	
২৬	চিকিৎসা গ্রহণ	১= হ্যাঁ ২= না
২৭	যে ধরণের চিকিৎসা নেয়া হয়েছে	১= ঔষধ ২= অস্ত্রোপচার ৩= পুনরর্বাসন

		৪= অন্যান্য (কবিরাজি চিকিৎসা)
২৮	খাদ্যাভ্যাস	১= সুষম/স্বাস্থ্যকর ২= ফাস্টফুড
১৯	শারীরিক কাজের অবস্থা	১= গতিহীন ২= পরিশ্রমী
১৩	ঘুমের সময়কাল	ঘণ্টা/দিন
৩১	কোনো ঘুমের ঔষধ সেবন করা	১= হ্যাঁ ২= না
৩২	অন্যান্য মানসিক সমস্যা	১= সিজোফ্রেনিয়া ২= বাইপোলার ডিসঅর্ডার ৩= হতাশা/আতঙ্ক/মানসিক চাপ

"মিনি মেন্টাল স্টেট" পরীক্ষা

রোগীর নাম: **তারিখ:**

সর্বাধিক নম্বর	প্রাপ্ত নম্বর	প্রশ্ন
৫		এখন কোন (বছর), (মাস), (বার), (গরম/শীত/বর্ষাকাল)?
৫		আমরা কোথায়ঃ (দেশ), (জেলা), (শহর), (এই যায়গার নাম), (কোন তলা)?
৩		আমি তিনটি জিনিসের নাম বলবঃ (কলা, টেবিল, টাকা); এখন এই তিনটি জিনিসের নাম আপনি বলুন। *প্রতিটি উত্তরের জন্য ১ মার্ক দিন। এবার ঐ ৩টি জিনিসের নাম বারবার বলুন যতক্ষণ না রোগীর এগুলো মুখস্থ হয়।
৫		শুক্রবারের আগের বার কি? তার আগের বার কি? তার আগের বার কি? তার আগের বার কি? তার আগের বার কি?
৩		একটু আগে যে তিনটি জিনিসের নাম বলেছিলাম সেগুলোর নাম আবার বলুন।
২		(*ঘড়ি দেখিয়ে) এটা কি? (*কলম দেখিয়ে) এটা কি?
১		আমি এখন যা বলবো তা শুনুন এবং বলুনঃ শুনুনঃ "এক মাঘে শীত যায় না"। বলুন
৩		এখন আমি যা বলব তা আপনি করে দেখাবেনঃ "একটি কাগজ আপনার ডান হাতে নিন, এবার কাগজটি মাঝকখানে ভাঁজ করুন, এবার কাগজটি আমার হাতে দিন।
১		আমি এখন যা করবো তা আপনি করে দেখাবেনঃ * ২ সেকেন্ড চোখ বন্ধ রেখে খুলুন।
১		আপনার আশে পাশে যা দেখছেন তা সম্পর্কে এক লাইন বলুন (ইঙ্গিত দেয়া যেতে পারে)।
১		নিচের ছবিটির পাশে হুবহু ঐ রকম একটি ছবি আঁকুন।

		
৩০		সর্বমোট প্রাপ্ত নম্বর

Permission Letter

Date: March 10, 2022

Head

Department of Physiotherapy

Centre for the Rehabilitation of the Paralysed (CRP)

Chapain, Savar, Dhaka-1343

Through: Head, Department of Physiotherapy, BHPI.

Subject: **Request for seeking permission to collect data for conducting research project.**

Respected Sir,

With due to respect and humble submission to state that I am Sahana Chowdhury, a student of 4th year B.Sc. in physiotherapy at Bangladesh Health Professions Institute (BHPI). The Ethical committee has approved my research project entitled: **"Cognitive impairment among stroke patients attended at CRP, Savar"** under the supervision of Asma Islam, Assistant professor, Department of Physiotherapy, BHPI. I want to collect data for my research project from the Department of Physiotherapy at CRP from the month of March to June, 2022. So, I need permission for data collection from the Neurology Unit of Physiotherapy Department at CRP-Savar. Iwould like to assure that anything of the study will not be harmful for the participants and the department itself.

I, therefore pray and hope that you would be kind enough to grant my application and give mepermission for data collection and oblige thereby.

Yours faithfully,

Sahana Chowdhury
10.03.2022

Sahana Chowdhury

4th Year B.Sc. in Physiotherapy

Class Roll: 06; Session: 2016-17

Bangladesh Health Professions Institute (BHPI)

(An academic Institution of CRP)

CRP-Chapain, Savar, Dhaka-1343

Forewarded to HOD PT, BHPI
10/03/22

Recommended
Shofiq
12.03.22
Md. Shofiqul Islan
Associate Professor & Head
Department of Physiotherap
Bangladesh Health Professions Institute (B
CRP, Chapain, Savar, Dhaka-13

Approved
12/03/22
MOHAMMAD ANWAR HOSSAIN
Senior Consultant &
Head of Physiotherapy Dept
Associate Professor, BHPI
CRP Savar Dhaka-1343

বাংলাদেশ হেল্‌থ প্রফেশন্স ইনস্টিটিউট (বিএইচপিআই)
Bangladesh Health Professions Institute (BHPI)
(The Academic Institute of CRP)

Ref: Date:

CRP/BHPI/IRB/03/2022/568

02/03/2022

Sahana Chowdhury
4th Year B.Sc. in Physiotherapy
Session: 2016 – 2017
BHPI, CRP, Savar, Dhaka- 1343, Bangladesh

Subject: Approval of the research project proposal **"Cognitive Impairment among Stroke Patient attended at CRP, Savar"** by ethics committee.

Dear Sahana Chowdhury,
Congratulations.
The Institutional Review Board (IRB) of BHPI has reviewed and discussed your application to conduct the above-mentioned dissertation, with yourself, as the principal investigator and Asma Islam as thesis supervisor. The Following documents have been reviewed and approved:

Sr. No.	Name of the Documents
1	Dissertation Proposal
2	Questionnaire (English and Bengali version)
3	Information sheet & consent form.

The purpose of the study is to find out the cognitive impairment among stroke patient attended at CRP. Since the study involves questionnaire that takes maximum 20-30 minutes and have no likelihood of any harm to the participants, the members of the Ethics committee approved the study to be conducted in the presented form at the meeting held at 09:00 AM on 12th October, 2021 at BHPI (30th IRB Meeting).

The institutional Ethics committee expects to be informed about the progress of the study, any changes occurring in the course of the study, any revision in the protocol and patient information or informed consent and ask to be provided a copy of the final report. This Ethics committee is working accordance to Nuremberg Code 1947, World Medical Association Declaration of Helsinki, 1964 - 2013 and other applicable regulation.

Best regards,

Muhammad Millat Hossain
Assistant Professor, Dept. of Rehabilitation Science
Member Secretary, Institutional Review Board (IRB)
BHPI, CRP, Savar, Dhaka-1343, Bangladesh

CRP-Chapain, Savar, Dhaka-1343, Tel : 7745464-5, 7741404
E-mail : principal-bhpi@crp-bangladesh.org, Web: bhpi.edu.bd, www.crp-bangladesh.org

SPSS OUTPUT FILE

Table 5

Association between Odds of dementia and gender

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	7.714[a]	1	.005	.012	.009
Continuity Correction[b]	5.906	1	.015		
Likelihood Ratio	7.362	1	.007	.012	.009
Fisher's Exact Test				.012	.009
Linear-by-Linear Association	7.571[c]	1	.006	.012	.009
N of Valid Cases	54				

1 cells (25.0%) have expected count less than 5. The minimum expected count is 4.00.[a]

Computed only for a 2x2 table[b]

Association between Odds of dementia and type of stroke

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.000[a]	1	1.000	1.000	.616
Continuity Correction[b]	.000	1	1.000		
Likelihood Ratio	.000	1	1.000	1.000	.616
Fisher's Exact Test				1.000	.616
Linear-by-Linear Association	.000[c]	1	1.000	1.000	.616
N of Valid Cases	54				

0 cells (0.0%) have expected count less than 5. The minimum expected count is 6.00.

Computed only for a 2x2 table

Association between Odds of dementia and state of stroke

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.142[a]	2	.931	1.000	
Likelihood Ratio	.148	2	.928	1.000	
Fisher's Exact Test	.208			1.000	
Linear-by-Linear Association	.092[b]	1	.762	.824	.475
N of Valid Cases	54				

2 cells (33.3%) have expected count less than 5. The minimum expected count is 1.33.

Association between Odds of dementia and Previous history of stroke

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.082[a]	1	.775	1.000	.571
Continuity Correction[b]	.000	1	1.000		
Likelihood Ratio	.084	1	.772	1.000	.571
Fisher's Exact Test				1.000	.571
Linear-by-Linear Association	.081[c]	1	.777	1.000	.571
N of Valid Cases	54				

2 cells (50.0%) have expected count less than 5. The minimum expected count is 2.33.

Association between Odds of dementia and Level of physical activity

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.596[a]	1	.440	.565	.316
Continuity Correction[b]	.233	1	.629		
Likelihood Ratio	.600	1	.439	.565	.316
Fisher's Exact Test				.565	.316
Linear-by-Linear Association	.585[c]	1	.444	.565	.316
N of Valid Cases	54				

0 cells (0.0%) have expected count less than 5. The minimum expected count is 8.33.[a]

Association between Odds of dementia and food habbit

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.293[a]	1	.588	.704	.460
Continuity Correction[b]	.018	1	.892		
Likelihood Ratio	.306	1	.580	.704	.460
Fisher's Exact Test				.704	.460
Linear-by-Linear Association	.288[c]	1	.591	.704	.460
N of Valid Cases	54				

1 cells (25.0%) have expected count less than 5. The minimum expected count is 2.67.

Association between Odds of dementia and frequency of commorbidities

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.148[a]	1	.700	.777	.462
Continuity Correction[b]	.009	1	.923		
Likelihood Ratio	.149	1	.700	.777	.462
Fisher's Exact Test				.777	.462
Linear-by-Linear Association	.146[c]	1	.703	.777	.462
N of Valid Cases	54				

0 cells (0.0%) have expected count less than 5. The minimum expected count is 8.67.

Table 6

Association between age category with odds of dementia

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	3.653[a]	1	.056	.077	.054
Continuity Correction[b]	2.412	1	.120		
Likelihood Ratio	4.329	1	.037	.077	.054
Fisher's Exact Test				.077	.054
Linear-by-Linear Association	3.586[c]	1	.058	.077	.054
N of Valid Cases	54				

1 cells (25.0%) have expected count less than 5. The minimum expected count is 3.67**.**

Association between age category with presence of cognitive impairment

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	3.211[a]	1	.073	.143	.071
Continuity Correction[b]	2.039	1	.153		
Likelihood Ratio	3.806	1	.051	.086	.071
Fisher's Exact Test				.143	.071
Linear-by-Linear Association	3.151[c]	1	.076	.143	.071
N of Valid Cases	54				

1 cells (25.0%) have expected count less than 5. The minimum expected count is 3.46.

Association between age category with frequency of comorbidities

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.768[a]	1	.381	.505	.297
Continuity Correction[b]	.290	1	.590		
Likelihood Ratio	.778	1	.378	.505	.297
Fisher's Exact Test				.505	.297
Linear-by-Linear Association	.754[c]	1	.385	.505	.297
N of Valid Cases	54				

0 cells (0.0%) have expected count less than 5. The minimum expected count is 5.30.[a]

Table 7

Association between age category with orientation performance

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	3.859[a]	1	.049	.087	.049
Continuity Correction[b]	2.639	1	.104		
Likelihood Ratio	4.173	1	.041	.087	.049
Fisher's Exact Test				.087	.049
Linear-by-Linear Association	3.787[c]	1	.052	.087	.049
N of Valid Cases	54				

1 cells (25.0%) have expected count less than 5. The minimum expected count is 4.89.[a]

Association between age category with registration performance

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	2.057[a]	1	.151	.322	.182
Continuity Correction[b]	.868	1	.352		
Likelihood Ratio	3.447	1	.063	.207	.182
Fisher's Exact Test				.322	.182
Linear-by-Linear Association	2.019[c]	1	.155	.322	.182
N of Valid Cases	54				

1 cells (25.0%) have expected count less than 5. The minimum expected count is 3.67.[a]

Association between age category with attention and calculation performance

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.634[a]	1	.426	.488	.350
Continuity Correction[b]	.176	1	.675		
Likelihood Ratio	.677	1	.411	.488	.350
Fisher's Exact Test				.708	.350
Linear-by-Linear Association	.622[c]	1	.430	.488	.350
N of Valid Cases	54				

1 cells (25.0%) have expected count less than 5. The minimum expected count is 3.06.[a]

Association between age category with recall performance

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.040[a]	1	.841	1.000	.555
Continuity Correction[b]	.000	1	1.000		
Likelihood Ratio	.040	1	.841	1.000	.555
Fisher's Exact Test				1.000	.555
Linear-by-Linear Association	.039[c]	1	.843	1.000	.555
N of Valid Cases	54				

0 cells (0.0%) have expected count less than 5. The minimum expected count is 5.30

Association between age category with language and praxis performance

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.262[a]	1	.608	.715	.471
Continuity Correction[b]	.014	1	.907		
Likelihood Ratio	.275	1	.600	.715	.471
Fisher's Exact Test				1.000	.471
Linear-by-Linear Association	.258[c]	1	.612	.715	.471
N of Valid Cases	54				

1 cells (25.0%) have expected count less than 5. The minimum expected count is 2.65.[a]

Table 8

Association between presence of cognitive impairment and gender

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	5.157[a]	1	.023	.035	.030
Continuity Correction[b]	3.681	1	.055		
Likelihood Ratio	4.867	1	.027	.035	.030
Fisher's Exact Test				.035	.030
Linear-by-Linear Association	5.062[c]	1	.024	.035	.030
N of Valid Cases	54				

1 cells (25.0%) have expected count less than 5. The minimum expected count is 3.78.

Association between presence of cognitive impairment and residential area

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	1.087[a]	1	.297	.379	.227
Continuity Correction[b]	.557	1	.456		
Likelihood Ratio	1.081	1	.299	.379	.227
Fisher's Exact Test				.379	.227
Linear-by-Linear Association	1.067[c]	1	.302	.379	.227
N of Valid Cases	54				

0 cells (0.0%) have expected count less than 5. The minimum expected count is 7.24.[a]

Association between presence of cognitive impairment and family type

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.167[a]	1	.683	.757	.457
Continuity Correction[b]	.009	1	.926		
Likelihood Ratio	.165	1	.684	.757	.457
Fisher's Exact Test				.757	.457
Linear-by-Linear Association	.164[c]	1	.685	.757	.457
N of Valid Cases	54				

0 cells (0.0%) have expected count less than 5. The minimum expected count is 5.35.[a]

Association between presence of cognitive impairment and presence of any habbits

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.885[a]	1	.347	.507	.277
Continuity Correction[b]	.368	1	.544		
Likelihood Ratio	.929	1	.335	.507	.277
Fisher's Exact Test				.507	.277
Linear-by-Linear Association	.869[c]	1	.351	.507	.277
N of Valid Cases	54				

1 cells (25.0%) have expected count less than 5. The minimum expected count is 4.41.[a]

Table 9

Association between presence of cognitive impairment and body type

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.424[a]	2	.809	.888	
Likelihood Ratio	.418	2	.811	.888	
Fisher's Exact Test	.562			.888	
Linear-by-Linear Association	.280[b]	1	.597	.614	.355
N of Valid Cases	54				

3 cells (50.0%) have expected count less than 5. The minimum expected count is 1.26.[a]

Association between presence of cognitive impairment and type of stroke

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.043[a]	1	.836	1.000	.536
Continuity Correction[b]	.000	1	1.000		
Likelihood Ratio	.043	1	.836	1.000	.536
Fisher's Exact Test				1.000	.536
Linear-by-Linear Association	.042[c]	1	.837	1.000	.536
N of Valid Cases	54				

0 cells (0.0%) have expected count less than 5. The minimum expected count is 5.67.[a]

Association between presence of cognitive impairment and state of stroke

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.114[a]	2	.945	1.000	
Likelihood Ratio	.117	2	.943	1.000	
Fisher's Exact Test	.212			1.000	
Linear-by-Linear Association	.004[b]	1	.952	1.000	.573
N of Valid Cases	54				

2 cells (33.3%) have expected count less than 5. The minimum expected count is 1.26.

Association between presence of cognitive impairment and family history of stroke

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.773[a]	1	.379	.559	.279
Continuity Correction[b]	.343	1	.558		
Likelihood Ratio	.776	1	.378	.559	.279
Fisher's Exact Test				.559	.279
Linear-by-Linear Association	.758[c]	1	.384	.559	.279
N of Valid Cases	54				

0 cells (0.0%) have expected count less than 5. The minimum expected count is 8.50.[a]

Association between presence of cognitive impairment and frequency of 115omorbidities

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.483[a]	1	.487	.565	.345
Continuity Correction[b]	.161	1	.688		
Likelihood Ratio	.485	1	.486	.565	.345
Fisher’s Exact Test				.565	.345
Linear-by-Linear Association	.474[c]	1	.491	.565	.345
N of Valid Cases	54				

0 cells (0.0%) have expected count less than 5. The minimum expected count is 8.19.[a]

Table 10

Co relation between sleeping hours and MMSE score

Correlations

		MMSE score	Sleeping Hours
MMSE score	Pearson Correlation	1	-.181
	Sig. (2-tailed)		.191
	N	54	54
Sleeping Hours	Pearson Correlation	-.181	1
	Sig. (2-tailed)	.191	
	N	54	54

Table 11

Co relation between age and BMI

Correlations

		Age	BMI
Age	Pearson Correlation	1	.136
	Sig. (2-tailed)		.328
	N	54	54
BMI	Pearson Correlation	.136	1
	Sig. (2-tailed)	.328	
	N	54	54