EFFECTIVENESS OF SCAPULAR STABILIZATION EXERCISE TO IMPROVE UPPER LIMB FUNCTION IN STROKE PATIENTS

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EFFECTIVENESS OF SCAPULAR STABILIZATION EXECISE TO IMPROVE UPPER FUNCTION IN STROKE PATIENTS

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DECLARATION

I am **Arnob Datta** ; want to declare that any single part of my research project will not be harmful to other. All the sources used in this study have been cited correctly. In that case all errors of this project is mine and I am only responsible for any mistake in the whole study.

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List of Acronyms

Abbreviation	Elaboration
AAC	Augmentative and alternative communication
BHPI	Bangladesh Health Professions Institute
CRP	Centre for the Rehabilitation of the Paralysed
SPSS	Statistical Package for Social Sciences

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ABSTRACT

Introduction: Stroke is a global health-care problem that is common, serious, and disabling. In most countries, stroke is the second or third most common cause of death and one of the main causes of acquired adult disability. Upper-limb dysfunction following a stroke is common, with up to 70% of people experiencing paresis in their upper limbs. Stroke is one of the primary causes of impairment in the elderly population onset of recovery . **Purpose:** The purpose of this study to explore the effectiveness of scapular stabilization exercise to improve upper limb function in stroke patients. **Objectives:** To evaluate the effectiveness of scapular stabilization exercise to improve the upper limb function in stroke patients. **Methodology:** This study was a randomized control trial quantative type of research which is single blinded . Total 40 patients were taken in this research on the basis of inclusion and exclusion criteria and divied into 2 groups. One group is control group and other group is experimental group.Each group has 20 patients. Both group were taken 12 sessions in 8 weeks.Control group were taken conventional physiotherapy and experimental group were taken scapular stabilization exercise with conventional physiotherapy. All subjects were evaluated by action arm research test, Barthel index scale and goniometer which tools measures the range of motion. **Results:** The findings of this study were carried out by independent t test and paired t test.Mean age of experimental group was 51.30 and the control group is 50.50.Gender distribution of this study were male 77% and female 23%. In range of motion maximum movement had improved and significant level is <005. In action arm research test grasp, grip, pinch and gross motor also significant and improve the upper limb function and also improve the Barthel index and p <0.05. **Discussion:** Song et al. conduct a study and suggest that scapular stabilization exercise can improve the function of the paretic upper extremity of individuals with chronic stroke. However, scapular stabilization exercise did not affect basic daily activities. **Conclusion :** This study concluded that scapular stabilization exercise improve the upper limb function, activity of daily living and range of motion. Small sample size and time duration is limited.Futher research should be done with enough time with large sample size.

CHAPTER-1 INTRODUCTION

1.1 Background

According to the American Stroke Association (2013), an acute cerebrovascular event resulting in death or neurological deficit for >24 hour or the presence of acute infarction demonstrated by brain imaging studies (American Heart and Stroke Association, 2013).

The greatest cause of disability worldwide is stroke. It is the second most common reason for death. An artery leading to the brain can get blocked or burst during a stroke, which is frequently brought on by risk factors that can be changed, such as smoking, insufficient exercise, and an unhealthy diet (WHO, 2019).

Stroke is a global health-care problem that is common, serious, and disabling. In most countries, stroke is the second or third most common cause of death and one of the main causes of acquired adult disability. Because most patients with stroke will survive the initial illness, the greatest health effect is usually caused by the long term consequences for patients and their families (Kwakkel et al. 2011 p. 1693).

American Stroke Association (2016) stated that, it is the approximately five number leading cause of death. It is also the leading cause of longer period disability as well as preventable cause of disability. African American people are more affected by stroke. As stroke affects the central nervous system especially when the brainstem, the vestibular system is more likely to affected and can cause dizziness, vertigo eventually imbalance. Among the stroke survivors about 40 percent approximately experienced falling over ground in 1 year of stroke. Women stroke patients have some

experience in difficulties to maintaining their balance during dressing were several times a day (American Heart and Stroke Association, 2016).

Stroke continues to be a major but preventable cause of morbidity and mortality in the West and will quickly approach epidemic levels in developing nations like those in Asia.The fact that people of South Asian descent in the United Kingdom experience mortality from ischemic stroke at least 1.5 times more frequently than the overall population4 is particularly alarming. Stroke is rare among South Asian migrants outside of those who reside in the United Kingdom, which is a startling finding among the South Asian diaspora worldwide (Gunarathne et al. 2015 p. 416).

50% of stroke survivors are anticipated to regain some functional usage compared to 82% who can expect to walk independently again which shows how poorly the upper limb recovers after a stroke. This discrepancy has been related to the fact that the upper limb receives little attention during rehabilitation, that the arm is not used spontaneously for function, and that the intricacy of upper limb function necessitates a higher recovery of motor control to achieve function. Although it has historically been assumed that recovery from a stroke happens during the first three months and is complete by twelve months, it has been demonstrated that further improvement occurs with intervention after that time frame (Barker et al. 2005 p. 1213).

Stroke is one of the main causes of death and disability in the world . Stroke is the second most prevalent cause of death in the world, accounting for 9.7% of all fatalities, after heart disease, killing 5.7 million people year .Stroke victims and their families frequently experience emotional and financial challenges as a result of the significant disabilities that it frequently leaves in its wake. Additionally, it burdens healthcare systems with substantial expenses .Over 85% of strokes are reported to

have occurred in poor nations, but these nations continue to receive little funding for prevention . According to a recent comprehensive study of trends in stroke incidence around the world, there has been a divergence over the past four decades between wealthy countries (42% decline) and developing countries (100% increase) (Amber et al. 2012 p. 124)

Upper-limb dysfunction following a stroke is common, with up to 70% of people experiencing paresis in their upper limbs. Stroke is one of the primary causes of impairment in the elderly population onset of recovery . The motor functions of the paretic upper limb have been demonstrated to be highly correlated with muscular deficits, which are the most persistent impairments associated with activity limits following stroke . Also, the use of the upper limb is essential for carrying out numerous everyday tasks, for sociability, and for the quality of life in terms of health. So, the ability of people with hemiparesis caused by a stroke to participate in many important and significant daily tasks may be compromised by upper-limb limitations (Rodrigues et al. 2012 p. 275).

Hemiplegic patients often present the abnormal gait patterns due to weakness in paretic side. Development of functional gait ability plays a crucial role in achieving functional independency for these patients. Many stroke patients cannot use their impaired upper limb properly despite long-term intensive therapy because damage to the upper limb after stroke is one of the most common and severe stroke side effects. The hand function of the upper limb is the most highly damaged one in brain-damaged patients. This is because betz cell is the most abundant cell in the cerebral cortex. It is responsible for the control of hand. Adjustment to a specific pattern is required for segments between the neck and the body to maintain the stability of the upper body during walking (Kim et al. 2019 p. 541).

A common cause of adult impairment is stroke. Acute hemiplegia of the arm occurs in more than 80% of first-time strokes (only infarctions).Limited functional use of the afflicted arm and restrictions on daily activities (ADL) are two examples of upper extremity motor function impairments in stroke patients.It has been observed that people who make a full recovery begin to feel better within the first month. By 28 days, patients are unlikely to regain any useful function, and this information may be used to make a decision about further therapy relatively early on, either in favor of more intensive treatment or in favor of accepting the lack of function, with adaptive training using the unaffected arm (Han et al. 2012 p. 76).

High correlations have been shown between significant shoulder subluxation, sensory alterations, and spasticity in hemiplegic patients' shoulder pain. The majority of post-stroke hemiplegic patients have spasticity as a general symptom. Shoulder pain is a result of increased muscular tone created by the traction of the tendon, a muscle-adhered area that develops as a result of the tightening and spasticity of the periarticular soft tissues. Previous studies using diagnostic ultrasonography to examine tendon characteristics typically assessed subject age and disuse, motor, and mechanical aspects of tendons under maximum muscular contraction3, 4). Current research has also discovered that stroke patients' affected tendon's thickness, length, biomechanical properties, stiffness, and hysteresis were higher than those of the unaffected tendon5). Fixed positions brought on by the soft tissue's immobilization

(Young et al. 2014 p. 491).

Shoulder dysfunctions in hemiplegic patients are caused by complex factors, including spasticity, capsulitis, and tendinitis. These studies also showed that management of spasticity is critical for improvement of function. Therefore,

stretching and joint stabilization exercises are an important therapeutic approach for improving shoulder function. This study was conducted with the expectation that this approach would decrease the muscle tone as a result of the change in length of the spastic muscle, improve the activity of the antagonistic muscle, and improve the activity of the tendon (Young et al. 2014 p. 491).

The most frequent type of paralysis, hemiplegia, affects the arm, leg, and occasionally the face on one side of the body. In a chronic hemiplegic, there are two types of issues with the shoulder girdle. (A) elevator and retractor spasticity, which causes the scapula to be pulled into a fixed raised and retracted position. (b) the depressors and protectors, the opposing set of scapular muscles, being weak. Taping is a way to maintain the scapula's position by giving the patient proprioceptive biofeedback. This prevents instability of the scapulothoracic joint, which results in reduced functional use of the upper limb. The purpose of this study is to examine how tape affects scapular stability and upper limb function in hemiplegics who are recovering (Shah et al. 2013 p.122).

A common impairment after a stroke is hemiparesis or hemiplegia, which is the loss of part or all voluntary muscle activity on one side of the body. the weakened mobility results in lengthy periods of immobility . The amount of time the upper extremity is resting in the lap is a critical concern for rehabilitation physicians. This posture can result in contractures and loss of range of motion in the shoulder and arm muscles, particularly the shoulder internal rotators and extenders and elbow flexors. 4 Range-of-motion (ROM) exercises are frequently recommended to persons with hemiparesis or hemiplegia in order to alleviate this issue. There is conflicting evidence about the effectiveness of ROM and stretching exercises in avoiding contractures and loss of motion following stroke **(**Hardwick et al. 2011 p. 18).

Stroke is the major leading cause of permanent disability among adults, and 70 − 80% of first-stroke survivors have functional disabilities, which frequently manifest as hemiparesis of the contralateral upper extremity. Approximately one third of all stroke survivors will have significant residual disability, with severity of upper extremity hemiparesis a significant determinant of post-stroke disability and quality of life. Upper extremity hemiparesis impairs the performance of many daily activities such as dressing, bathing, self-care, and writing, thereby resulting in reduced functional independence. Therefore, stroke survivors need to participate in rehabilitation programs to achieve functional independence (Song et al. 2013 p. 403).

The main objective of rehabilitation exercise programs relating to functional restoration of the injured shoulder is strength enhancement of the shoulder muscles. The glenohumeral and scapulothoracic muscles are constrained to act as a functional unit, play a significant role in the stability of the shoulder complex, and are required to ensure adequate range of motion during arm elevation, according to recent research, which suggests that strengthening programs for these muscles should be incorporated into rehabilitation intervention programs for the paretic upper limb. In order to alter the rehabilitation exercise regimens and help clinicians make decisions about patients' care, continual monitoring of strength changes is used (Rodrigues et al. 2012 p. 275).

The most distal areas of upper extremity hemiparesis frequently have the worst symptoms. Although the proximal muscles and joints may be the least impaired, deliberate movement necessitating accurate control of the proximal segments is slow, inaccurate, and disorganized. Despite the proximal portion of the upper extremity being immobile, the distal portion is also capable of smooth, coordinated movement. Because paretic muscles cannot support the weight of the arm, stroke survivors

frquently suffer a shoulder joint complex impairment. Shoulder subluxation and discomfort, which are due to neuromuscular issues, impair the function of the upper extremities **(**Song et al. 2013 p. 403).

The functions of the upper extremities are executed by proximal stability and distal functional movements. The muscles surrounding the scapula provide proximal stability for the upper extremity and act as a fix when the distal part is moving . The scapula also acts as an axis, transmitting the power and high energy of the lower extremities and trunk to the upper extremities . Therefore, the upper extremities which play an important role in functional performance of daily living activities , will work better when the stability of scapula is secured . Further, the scapula is connected to the humerus by the articular fovea (Yang et al. 2014 p. 599).

The International Classification of Functioning, Disability, and Health (ICF) mode states that impairments can be classified as changes or losses in the neuromusculoskeletal and movement-related function that significantly deviate from or impair normal bodily function either impairment of body structures, such as a considerable deviation in the nervous system's structure or impairment of body structures connected to movement, such as the arm and/or hand. Both kinds of deficits may result from a stroke (Raghban and MD 2015, p 1).

Heterogeneity characterizes the recovery from a stroke. The location and size of the first stroke lesion as well as the degree of healing that follows influence the long-term effects of stroke . Restitution (restoring the functionality of damaged neural tissue, substitution (reorganizing partially spared neural pathways to relearn lost functions), and compensation (improving the gap between the patient's impaired skills and the

demands of their environment) are just a few of the complex processes that likely occur during recovery (Kwakkel et al. 2011 p. 1693).

The most distal areas of upper extremity hemiparesis frequently have the worst symptoms. Despite the possibility that proximal muscles and joints are least impaired, purposeful movement necessitating accurate control of the proximal segments is slow, inaccurate, and disorganized. Despite the proximal portion of the upper extremity being immobile, the distal portion is also capable of smooth, coordinated movement. Because paretic muscles cannot support the weight of the arm, stroke survivors frequently have an impaired shoulder joint complex. Shoulder subluxation and discomfort, which are due to neuromuscular issues, impair the function of the upper extremities(Song et al. 2013 p. 403).

In the early stages of recovery, up to 70% of people who have had a stroke experience paresis, making stroke one of the most common causes of disability in the elderly population. Muscular weakness is the most persistent disability that results in activity restrictions after a stroke, and research has shown that it is highly correlated with the motor functions of the paretic upper limb. Additionally, the use of the upper limb is essential for carrying out numerous everyday tasks, for sociability, and for the quality of life in terms of health. Therefore, the ability of people with hemiparesis caused by a stroke to engage in many crucial and significant everyday tasks may be compromised by upper-limb limitations (Roudrigues et al. 2012 p. 279).

Patients who have had a stroke experience muscle weakness, imbalance, impaired voluntary control, and body malalignment. These issues could make the affected arm less capable. Due to the fact that scapular stabilizers are frequently compromised by muscle weakness, a paretic arm might alter scapular position. Such weakness

exacerbates upper extremity motor deficits. For the upper limbs to operate well, it is necessary to be able to control movement and maintain scapular position. At the glenohumeral joint, the scapula provides dynamic stability with restrained mobility. Due to the scapula's architecture and biomechanics, which permit the regulated movement of shoulder joints, it is crucial for the proper function of the shoulder joint. Recent investigations have concentrated on the requirement to develop upper extremity exercises due to its significance. Exercises for scapular stabilization may be useful for building muscle(Park et al. 2018 p. 190).

Up to 72% of individuals with hemiparesis experience hemiparetic shoulder pain, which has a wide range of potential etiologies .Exercises that increase range of motion (ROM) may be one reason causing shoulder pain brought on by changed scapular and humeral movement patterns. In order to retain suprahumeral space and avoid impingement of the rotator cuff tendons, precise scapulo-humeral coupling is required. Proper coupling entails external rotation of the humerus, as well as upturning and posterior tilting of the scapula.The timing and activation of the scapulothoracic and rotator cuff muscles may be thrown off by reduced voluntary brain drive brought on by the stroke.19 The humerus may be pushed into elevation angles higher than those that the person can actively produce without aid when support is given to move the arm during an exercise. When recommending ROM exercise as a preservative (Hardwick et al. 2011 p. 18).

1.2 Rationale

Stroke is the leading causes of death world wide also the primary causes of disability. Hemiplegia is the common of stroke patients. There are two types of stroke. one is ischemic and other is haemorrhagic stroke. In both cases upper motor neuron lesions occurs so that stoke patients has been suffered in high tone. Most of the stroke patients has problem with shoulder subluxation, loss of range of motion, balance problem, loss of midline, hemiplegic gait, pusher syndrome etc.

Upper limb is more affected than lower limb is because beta cell is affected which is the most abundant cell in the cerebral cortex. It is responsible for the control of hand so that upper limb motor function improvement delay rather than lower limb. Shoulder subluxation is the another causes delay improvement of upper limb in stroke patients.

Scapula is the vital part of shoulder joint. Rotator cuff muscle are originated from the scapula which are responsible for shoulder abduction, medial rotation, lateral rotation, adduction, flexion and extension. Due to stroke patients has lost the ability of the of shoulder so that it has an impact on activity of daily living and loss of motor and sensory function.

So I want to provide scapular stabilization treatment and try to find out the effectiveness of the scapular stabilization exercise and also find out motor function improvement on upper limb.

1.3 Operational Defination

Stroke **:** Stroke may be defined as rapidly developing of clinical signs which lasting more than 24 hours with no apparent cause of vascular origin or leading to death. It is a clinical syndrome.

Hemorrhagic stroke : A hemorrhagic stroke occurs when a blood vessel that carries oxygen and nutrients to the brain burst and spills blood into the brain. When this happens, a portion of the brain becomes deprived of oxygen and will stop functioning.

Ischemic stroke :This type of stroke occurs as a result of an obstruction within a blood vessel supplying blood to the brain. It accounts for 87 percent of all stroke cases.

Scapular Stabilization exercise : Scapular stabilization involves a set of exercises that strengthen the shoulder girdle muscles to restore normal scapular range of motion and improve motor function of upper limb.

Effectiveness : Effectiveness is the capability of producing a desired result. When something is deemed effective, it means it has an intended or expected outcome, or produces a deep, vivid impression.

1.4 Aim

To evaluate the effectiveness of scapular stabilization exercise along with conventional physiotherapy to improve the upper limb function in stroke patients.

1.5 Objectives

1.5.1General Objectives

1. To find out the effectiveness of scapular stabilization exercise along with conventional physiotherapy to improve the upper limb function in stroke patients physiotherapy to improve the upper limb function in stroke patients.

1.5.2 Specific Objectives

1. To find out the socio-demographic status and medical information of participants.
2. To evaluate the effectiveness of the scapular stabilization exercise between and within group along with conventional physiotherapy to upper limb function for patients with stroke.
3. To measure the effectiveness of the scapular stabilization exercise between and within group along with conventional physiotherapy to improve range of motion of upper limbs for patients with stroke.
4. To find out the effectiveness of scapular stabilization exercise between and within group along with conventional physiotherapy to improve independence of daily living activities of upper limb for patients with stroke.

1.6 Hypothesis

Null hypothesis ((H0)

Scapular stabilization exercise and conventional physiotherapy are no more effective than conventional therapy for treating patients with stroke.

Ho: μ1-μ2 =0 or μ1=μ2, where the experimental group and control group initial and final mean difference is same.

Alternative hypothesis

Scapular stabilization exercise along with conventional physiotherapy is more effective than only conventional therapy for the treatment of patients with stroke.

Ha: μ1-μ2 ≠ or μ1 ≠ μ2, where the experimental group and control group initial and final mean difference is not same.

CHAPTER : II LITERATURE REVIEW

Stroke definition according to the World Health Organization (WHO) , A clinical syndrome consisting of rapidly developing clinical signs of focal (or global in case of coma) disturbance of cerebral function lasting more than 24 hours or leading to death with no apparent cause other than a vascular origin".

Functional impairment of the upper limb is reported in approximately 85% of stroke survivors and affects participation in daily living activities and quality of life. Six months after onset, 30-60% of individuals do not regain functional use, and only 5-20% will achieve full recovery of arm function. Rehabilitation of severe arm paresis in chronic stroke survivors is, therefore, especially challenging. Useful reorganization of cortical areas involved in arm function occurs in response to active exercise and to motor and attentional inclusion of the affected arm in task oriented movements (Roberto et al. 2015 p. 5).

Stroke is the world's number one cause of death and disability . Stroke is the second most prevalent cause of death in the world, accounting for 9.7% of all fatalities, after heart disease, killing 5.7 million people year. Stroke victims and their families frequently experience emotional and financial challenges as a result of the significant disabilities that it frequently leaves in its wake. Also, the expenditures to healthcare systems are substantial (Avinav et al.2012In many nations, stroke is a leading cause of death and disability. According to reports, there were 6.5 million stroke deaths and roughly 25.7 million stroke survivors worldwide in 2013. 10.3 million new instances of stroke and 113 million DALYs (disability-adjusted life-years) lost to stroke. The bulk of stroke deaths and lost DALYs—75.2% of all stroke-related deaths and 81.0%

of all associated DALYs were seen in developing nations. Asia, which is home to more than 60% of the world's population and many of its "emerging" nations, has a particularly acute stroke problem. Asia has a higher stroke death rate than Western Europe, the Americas, or Australasia (Navaron et al. 2017 p. 286).

The incidence of stroke subtypes in different ethnic groups revealed notable variations in stroke type between the white and black populations. Due to the lack of adequate imaging resources in South Asian nations, the majority of stroke studies conducted in that region do not list the stroke classification or type of infarction. This may also be explained by the limited number of population-based studies because available information is not sufficient to allow an accurate diagnosis to be made. In one of the scant investigations that were conducted , ischemic stroke prevalence rates were 66%, intracerebral haemorrhage prevalence rates were 21%, and subarachnoid haemorrhage prevalence rates were 8.3%. 29 One study (conducted in India) also revealed a notable rise in prevalence (Gergory et al. 2015 p. 429).

70% of South Asians reside in rural areas and depend mostly on agriculture for their subsistence. To better understand and manage stroke and its risk factors in these countries, differences in rural-urban prevalence are of great importance. Coronary artery disease and stroke are more common in South Asian cities, according to research . Three studies that were conducted solely in rural regions were discovered during our screening process. Stroke prevalence in rural South Asian areas is claimed to be between 45 and 143 per 100,000, which is lower than the reported incidence of 147 to 471 per 100,000 in metropolitan areas (Amber et al. 2012 p. 126).

In comparison to other emerging nations, the age-adjusted incidence rates reported in South Asia are greater (145-262 per 100,000) . Stroke incidence has also been found

to be greater in studies of South Asian migrants in affluent nations. With intracerebral hemorrhage being the primary cause of the great majority of strokes, the incidence of stroke has been estimated to be 115-219 per 100,000 in nearby nations like China.Similar to other parts of the world, ischemic stroke is the most common stroke subtype in South Asia [22, 29]. According to epidemiological studies of age-adjusted prevalence in other nations, there are 500–800 strokes per 100,000 people [32–34]. Studies conducted in South Asia, however, indicate a lower age-adjusted frequency of 47-545 per 100,000 (Amber et al. 2012 p. 126).

Genes, advancing age, and male sex are unchangeable risk factors for stroke. Based on information from the WHO, the modifiable stroke risk factors . The most frequent lifestyle-related risk factors for stroke are current smoking and inactivity, whereas hypertension continues to be the most frequent medical risk factor for stroke. Most nations consistently exhibit high or low frequency of occurrence across all risk factors when compared to other nations. Each region has a variety of frequencies. In comparison to Korea and Singapore, Mongolia and Pakistan have high rates of hypertension, whereas these countries also have high rates of diabetes mellitus (Navaron et al. 2017 p. 288).

South Asian immigrants had significantly reduced prevalence rates of ischemic stroke in a UK health survey.(White Europeans: 2400 per 100 000 population, Indian: 1100, Pakistani: 1800, Bangladeshi: 1800) than the overall populace.These findings appear to be at odds with the greater frequency of coronary heart disease that has been noted in populations of migratory South Asians. Furthermore, the rates reported in the Indian studies also seem to be lower than the reported rates in other Asian34 and Western research. Although the causes of this gap may possibly be complex,

increased mortality rates and the ensuing underestimate of prevalence rates in the South Asian population play a role. (Gergory et al. 2015 p. 429).

A study was conducted in Bangladesh among the 288 patients and found that 79.7% (213) patients had an ischemic stroke, 15.7% (42) had haemorrhagic, and 4.6% (12) were diagnosed as subarachnoid haemorrhage. The majority of the stroke patients had hypertension (79.2%), followed by dyslipidaemia (38.9%), tobacco use in any form (37.2%), diabetes (28.8%), ischemic heart disease (20.1%) (Hasan et al. 2022 p. 564).

Non-communicable diseases (NCDs) account for 52% of all fatalities in Bangladesh, and cardiovascular illnesses alone account for 27% of those deaths.12 According to a national assessment on NCD risk factors conducted in Bangladesh in 2010, 4% of the population has diabetes, 18% is diabetic, and 18% is overweight.13 According to a systematic review, the prevalence of type 2 diabetes and hypertension, respectively, was 6.7% and 13.7%(Saha et al. 2018 p. 27).

Multiple factors, including age, gender, dependency in activities of daily living (ADL)/disability, social support, depression, institutionalization, and diabetes have been associated with poorer health related quality of life in stroke survivors (Nicholes et al. 2005 p. 1395).

A study conducted by Rodrigues et al (2011) showed statistically significant positive correlations between isometric HG strength, isokinetic peak torque, and work measurements generated by the glenohumeral and scapular muscles in people with persistent stroke. The results indicated that isometric HG strength measures might be utilized therapeutically to monitor shoulder stabilizer strength levels and to steer load progressions during strengthening therapies for people with chronic hemiparesis in the absence of isokinetic dynamometers (Roudriges et al. 2011 p. 279).

According to Harris et al. (2010) and Nakayama et al. (1994), stroke is one of the main causes of impairment in older people, and upper-limb dysfunction following a stroke is common, with up to 70% of people experiencing paresis in the early stages of recovery. The motor functions of the paretic upper limb have been demonstrated to be highly correlated with muscular deficits, which are the most persistent impairments associated with activity limits following stroke (Harris and Eng, 2007). Also, the use of the upper limb is essential for carrying out numerous everyday tasks, for sociability, and for the quality of life in terms of health. So, the ability of people with hemiparesis caused by a stroke to engage in many crucial and significant everyday tasks may be compromised by upper-limb limitations (Roudriges et al. 2011 p. 275).

Patients who have had a stroke experience muscle weakness, imbalance, impaired voluntary control, and body malalignment. These issues could make the impacted arm less effective. Due to the fact that scapular stabilizers are frequently compromised by muscle weakness, a paretic arm might alter the scapular position. Such weakness exacerbates upper extremity motor deficits. For the upper limbs to operate well, it is necessary to be able to control movement and maintain (kim et al. 2015 p. 190).

Kim conducted a case study and discovered strengthening exercises for the scapular stabilizers enhance function in the upper extremity in chronic stroke patients. Scapular posture and upper extremity function both improved. The scapula has an impact on the shoulder joint and is crucial in altering its position. Improvement in scapular position can therefore benefit the shoulder joint, leading to an improvement in the function of the upper extremities. Scapular position (kim et al. 2015 p.192).

CHAPTER:III METHODOLOGY

This study was a randomized control trail design to find out the effectiveness of scapular stabilization to improve upper limb function alone with conventional physiotherapy in stroke patients.

To identify the effectiveness of treatment regime, Action arm research test, Barthel index scale, Goniometer were used as a measurement tool for measuring the upper limb function caused by stroke.

All patients signed an informed consent form prior to their inclusion into the study.

3.1 Study design

The study was conducted using a quantitative randomized control trial design with two different subject groups .Randomized control; trial design method of testing hypothesis by which cause and effect can be established .The study was true experimental between different subject designs. In this experiment group received scapular stabilization exercise alone with conventional physiotherapy and the control group received the conventional physiotherapy only.

A pre-test (before exercise) and post-test (after exercise) was administrated with each subject of both groups to compare the range of motion of upper limb, improvement of upper limb function and activity of daily living after treatment.

3.2 Study Area:

The study area was Neurology unit and SRU of Physiotherapy Department of Centre for the Rehabilitation of the Paralysed (CRP), Savar, Dhaka.

3.3 Study Population

The study population was the patients diagnosed as stroke in the neurology Unit and SRU of Physiotherapy Department .

3.4 Data Collection Period

Study duration was April to June.

3.5 Sample Size

Approximate value of efficacy/cure rate for standard treatment (e.g., 60%) = P1

Approximate value of efficacy/cure rate for new drug (e.g., 70%) = P2

Effect size (i.e., difference in efficacy of control and experimental group, e.g., 20%) = (P2-P1)

Level of significance (usually 5%)

How high should the probability of obtaining

significant result be (“power,” e.g., 90%)

Here, P1 = 0.6, P2= 0.7

P = (0.6 + 0.8)/2=0.7

$\alpha = 0.10, \beta = 0.20$

$$n = \frac{[Z_{1-\alpha/2}\sqrt{2}\,P\,(1-P) + Z_{1-\beta}.\sqrt{\{P_1(1-P_1) + P_2\,(1-P_2)\}}]^2}{(P_1-P_2)^2}$$

where $P=(P_1+P_2)/2$

n = 352

Lack of time and study area were not large enough and lack of diagnostic tools and there were not enough clinical physiotherapist the reasearcher did not take this sample and choosen the 40 patients for this research.

In this study, 40 participants were selected according to inclusion and exclusion criteria.20

participants were in the experimental group and 20 participants in control group.

3.6 Sampling

Simple Random Sample Technique are used in this study. Subjects, who met the inclusion criteria, were taken as sample in this study.40 patients were selected from neurology unit of physiotherapy department of crp, savar and then 20 patients were assigned to Experimental group for the treatment approaches of scapular stabilization exercises alone with conventional physiotherapy and other 20 patients were assigned to control group for the treatment approaches of conventional physiotherapy treatment by computer generated random number using Microsoft Office Excel 2019 because it improves internal validity of experimental research. The samples were given numerical number C1, C2, C3 etc. for the control group and E1, E2, E3 etc. for experimental group. The study was a single blinded technique.

3.7 Inclusion criteria

- Patients had a diagnosis of stroke (hardwick et al, 2011)
- At least one and half months of post stroke ((Blennerhassett and Dite, 2004).
- Age limit 25 to 80 years (Han et al, 2012)
- Had muscular tone is less than 2 or 2 according to the modified Ashworth scale (Roudrigues et al, 2012)
- Both male and female will be included (Moon, Park, Kim and Na, 2018)
- Patients has ability to provide informed consent (hardwick et al, 2011).

3.8 Exclusion criteria

- Patients considered unable to participate in this study because of psychiatric problems (young et al, 2014).
- Hemiplegic patient having contractures of the upper limb(Shah et al, 2014).
- Hemiplegic patient who is having any associated history of trauma of hemiplegic upper extremity(Shah et al, 2014).
- Stroke patients with cognitive and perceptual disorders (Shah et al, 2014).

3.9 Data Collection Procedure

The study procedure was conducted through assessing the patient, initial recording, treatment and final recording. After screening the patient at department, the patients were assessed by qualified physiotherapist. Twelve sessions of treatment was provided for every subject. Forty subjects were chosen for data collection according to the inclusion criteria. The researcher divides all participants into two groups and coded C1 (20) for control group and E1 (20) for experimental group. The experimental group received the conventional physiotherapy with scapular stabilization exercise and control group received only conventional physiotherapy.

Data was gathered through a randomization, pretest, and intervention and post test procedure and by using a written questionnaire form which was formatted and

prepared by the researcher under the supervision of the supervisor which also includes the Action arm research test to measure function of upper limb, Barthel index scale to measure activity of daily living and goniometer tools to measure the range of motion. Pretest was performed before the intervention and the same procedure was performed to collect the post test data. The researcher collected the data both in experimental and control group in front of the qualified physiotherapist in order to reduce the biasness. At the end of the study, specific test was performed for statistical analysis.

3.10 Data Collection Tool

In this particular study, a written questionnaire, pen, paper and a Action and arm research machine, Goniometer, Barthel index scale we were used as a used data collection tools.

3.11 Questionnaire:

The questionnaire for this study was carefully developed under the constant observation, advice and permission of the supervisor following certain guidelines. There were close ended questionnaire with goniometer to measure the upper limb range of motion, Barthel index to measure the activity of daily living and arm action research test to find out upper limb function and the question was formulated to find out effectiveness of scapular stabilizilation to improve upper limb function in stroke patients.

3.12 Measurement tools:

3.12.1 Goniometer

Goniometer is a tools to measure range of motion of the joints.

3.12.2 Action arm research test

Action arm research test is a measurement tools to find out upper limb function. In the scale it has 4 part like grasp, grip,pinch and gross motor. In grasp patients has perform ball bearing in different size of cube,ball bearing,stone bearing. Total score is 18 .If the patients perform the thask fluently he will get 3,in medium perform he get 2 and

the patient just manupilate the object he get 1 and if the patient doesnot perform the task he get 0.

In grip 4 task patients will perform and total score is 12.Patients perform pour water form one glass to another glass. Grip the different size of tube and another task will perform.

In pinch 6 task will perform and total score is 18 and perform task in ball bearing in 2 fingers same as the marble.

Last one is gross motor and the total score is 9. In this test patients will perform touch the face in his,touch up to the head and back to the head.

3.12.3 Barthel index

Barthel index is a test to measure activity of daily living. It has 10 items which is closly related current ability of the patients.In every activity it has 2,3 or 4 category and the scoreing 0, 5, 10 and 15.the total score of Barthel index is 100.

3.13 Intervention

In this study 40 patients were participated and divide the patients into 2 groups. One is control group and other is experimental group. In each group has 20 patients. In experimental group patients had taken 3 exercise with conventional physiotherapy and the control group patients had taken only conventional therapy.

In conventional therapy therapist has given:

- scapular strengthing exercise
- scapular retraction exercise
- scapular drepressor exercise
- positioning exercise
- scapular stretching exercise

Treatment protocol of Experimental group:

Station 1: scapular protraction exercise (Chiang-Soon Song, 2013)	The scapular stabilization exercise was comprised of 4 stages: patient position, therapist position, exercise, and relaxation stages. The patient sat on a chair and maintained a stable posture without any neck or upper extremity movement while bending the knees with the feet flat on the floor. The therapist placed a hand on the scapula and axillary areas. The patient then relaxed the entire body. While breathing deeply and holding the shoulder and neck in a relaxed and comfortable posture, the patient held the shoulder joint flexion at 90° and the elbow joint at 180°, protracted the scapula for 10 seconds, and then returned to the starting position. patient performed.	Patients performed 3 sets of 10 movements, with 1 min breaks between sets . 8min per session, 2 days per week, for 8 weeks.it will take 8 minutes per session
Station 2 Sleeper stretch exercise (moezy azar et al, 2014).	Patients in side lying position in the affected side. The shoulder is flexed in 90 degree position and elbow flexes 90 degree and the therapists try to internal rotation of the paretic hand.	2 sets of 10 repetitions, , 3 days per week for 6 weeks under supervision. It will take 5 min per session

Station 3 Object-related reach to grasp practice in trunk restraint position (Michaelsen, Dannenbaum and Levin, 2006)	Sitting in a table and trunk movements (Sagital displacement and rotation will be prevented by body and shoulder belts attach to the chair back. It includes repetitive functional uni and bi manual reach to grasp task using objects varying size, weight and shape. Picking up objects of various size and shape	5 minutes per session, around 8 weeks; 3 times a week

3.14 Data analysis

To ensure that research had some values, the mean of collected data had to be presented in way that other researcher could understand.In other words researchers much made sence of the results.As the result came from an experiment in this results, data analysis was done by using software SPSS version 20. Independent t test were used to compare and analysis range of motion of upper limb,Barthel index and action arm research test before and after intervention and paired t test were taken compare in between the control and experimental group.

3.15 Informed consent

It is vital to obtain consent from the subjects before doing research with them (Baily, 1997). Every participant was given a consent form for this study, and the aim of the research and consent forms were orally explained to them. Participants were totally voluntary, according to the researcher, and they had the freedom to withdraw at any moment. The researcher assured them that their privacy would be respected. Information may have been published in the form of a presentation or a written document, but it was not identified. Although the study's findings may not have any immediate implications for them, members of the physiotherapy population may benefit from it in the future. They will not feel ashamed as a result of the research.

The researcher would be accessible to answer any more questions about the study at any time.

3.16 Ethical consideration

The research proposal was submitted for approval to the administrative bodies of the ethical committee of CRP and also had followed the Bangladesh Medical Research guideline (BMRC) and the World Health Organization (WHO) guideline. Again Before data collection, permission from the Ethical Committee of Bangladesh Health Professions Institute (BHPI) took and a requested letter hand over to the appropriate authority of the study area for taking permission and seeking assistance for smooth access to data collection with insurance of patient's safety. In order to eliminate ethical claims, the participants were set free to receive treatment for other purposes as usual. Each participant was informed about the study before beginning and given written consent. The researcher received verbal and signed an informed consent form to participate in this study from every subject. The participants were informed that they have the right to meet with an outdoor doctor if they think that the treatment is not enough to control the condition or if the condition becomes worse. The participants were also informed that they were completely free to decline to answer any question during the study and were free to withdraw their consent and terminate participation at any time. If the patients wanted to withdraw themself from the study, it would not affect their treatment in the physiotherapy department and they would still get the same facilities. Every subject had the opportunity to discuss their problem with the senior authority or administration of CRP and had any questioned answer to their satisfaction.

CHAPTER:IV RESULTS

Total 40 patients were taken in this study to find out the effectiveness of scapular stabilization to improve upper limb in stroke patients. In that case 20 patients were in control group and 20 patients in experimental group.The following paragraphs provide a summary of the investigation's findings.

Baseline characteristic

In experimental group among 20 patients mean age in experimental group mean age is 51.05 and the maximum age is 75 and the minimum age is 35.

Table 1: Age percentage in experimental group

Valid	Frequency	Percent
35	1	5.0
37	2	10.0
40	3	15.0
42	1	5.0
43	1	5.0
45	1	5.0
46	1	5.0
48	2	10.0
55	1	5.0
56	1	5.0
62	1	5.0
65	1	5.0
67	1	5.0
68	1	5.0
72	1	5.0
75	1	5.0

In control group age percentage : In control group among 20 patients the mean age is 50.50. In control group maximum age is 72 and the minimum age is 32.

Table 2: Age percentage of control group

Valid	Frequency	Percent
32	1	5.0
33	1	5.0
34	1	5.0
40	1	5.0
42	1	5.0
43	1	5.0
45	1	5.0
50	1	5.0
51	3	15.0
54	1	5.0
55	3	15.0
60	3	15.0
67	1	5.0
72	1	5.0

Gender : n=40 and in 40 samples 31 were male and 9 were female and the male percentage is 77% and the female percentage is 23%.

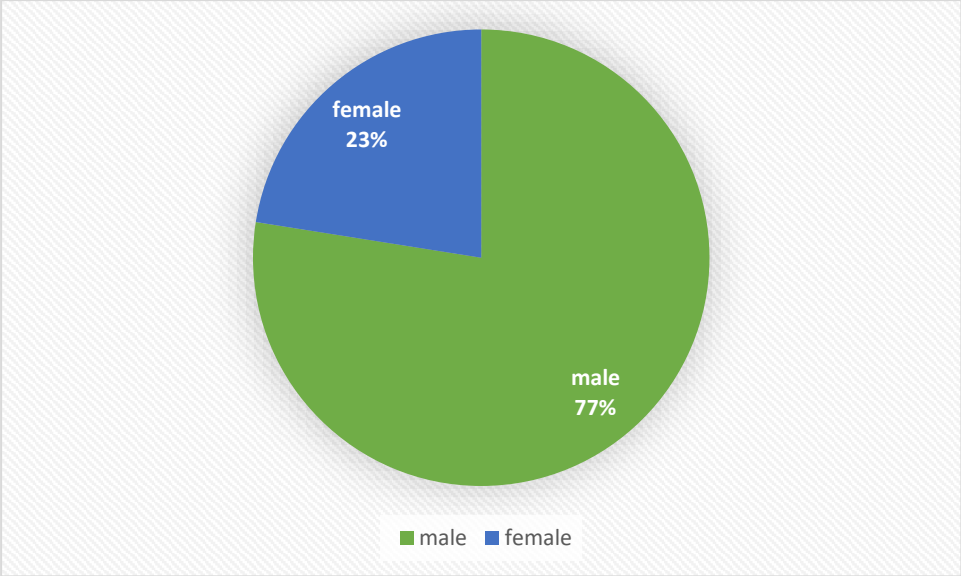

Figure 1 : Gender distribution among the participants

Types of stroke : Among 40 patients 34 patients had ischemic stroke and 6 patients has hemorrhagic stroke. In percentage ischemic patients percentage is 85% and hemorrhagic patient's percentage is 15 %.

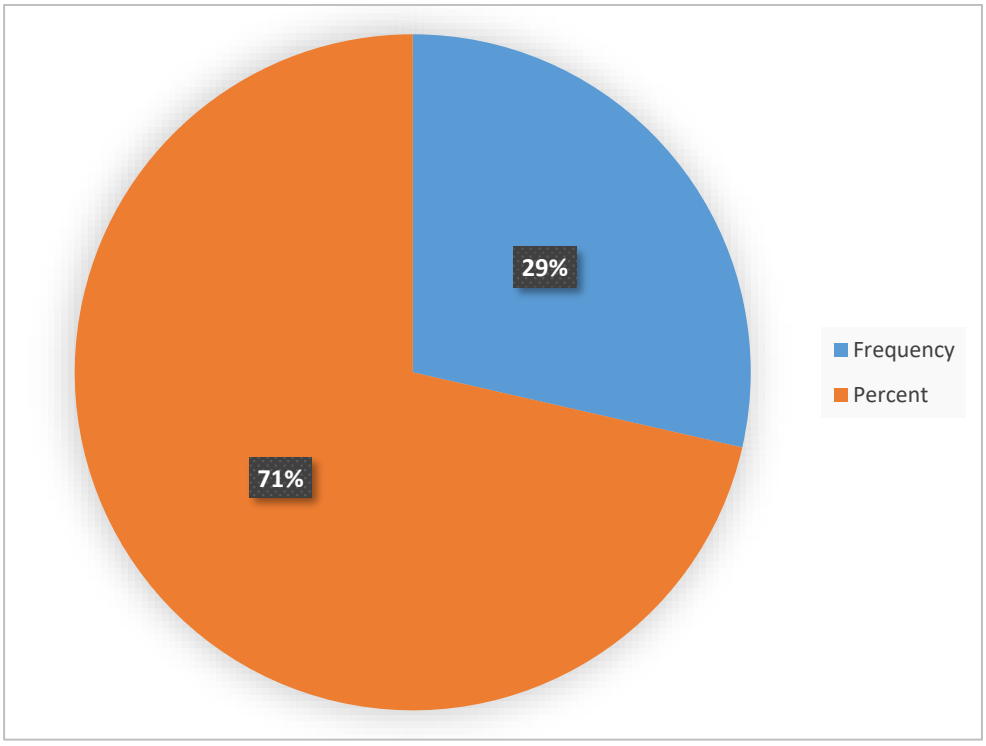

Figure 2 : Types of stroke among the stroke patients

Occupation: In total 40 patients 1 patients was teacher,5 patients were farmer, 9 patients were emigrants,16 patients were service holder and 1 person were labor.

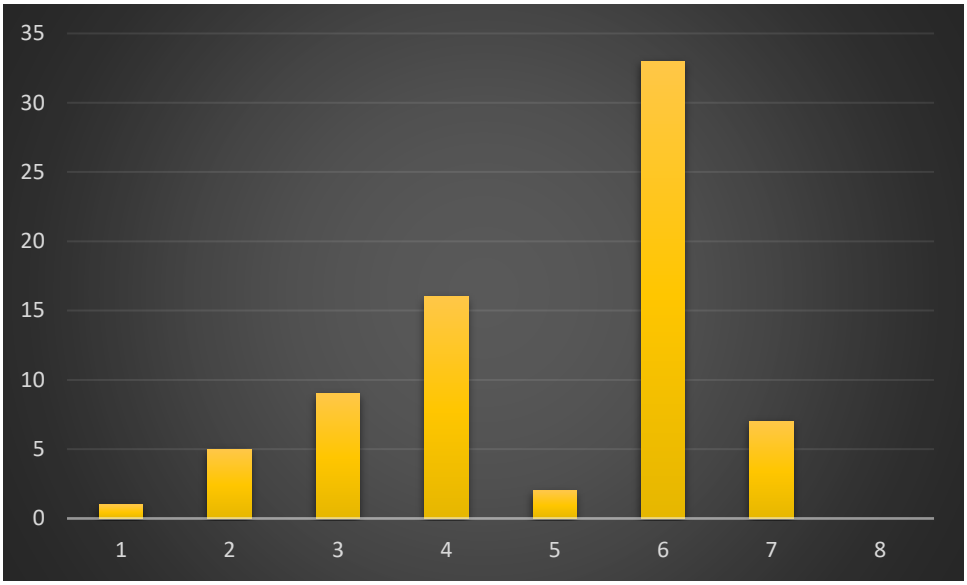

Figure 3 : Occupation among the participants

Duration of stroke : In total 40 patients 22 patients stroke duration one and half month to six months and 10 patients stroke duration six months to one year and 8 patients stroke duration more than one year.

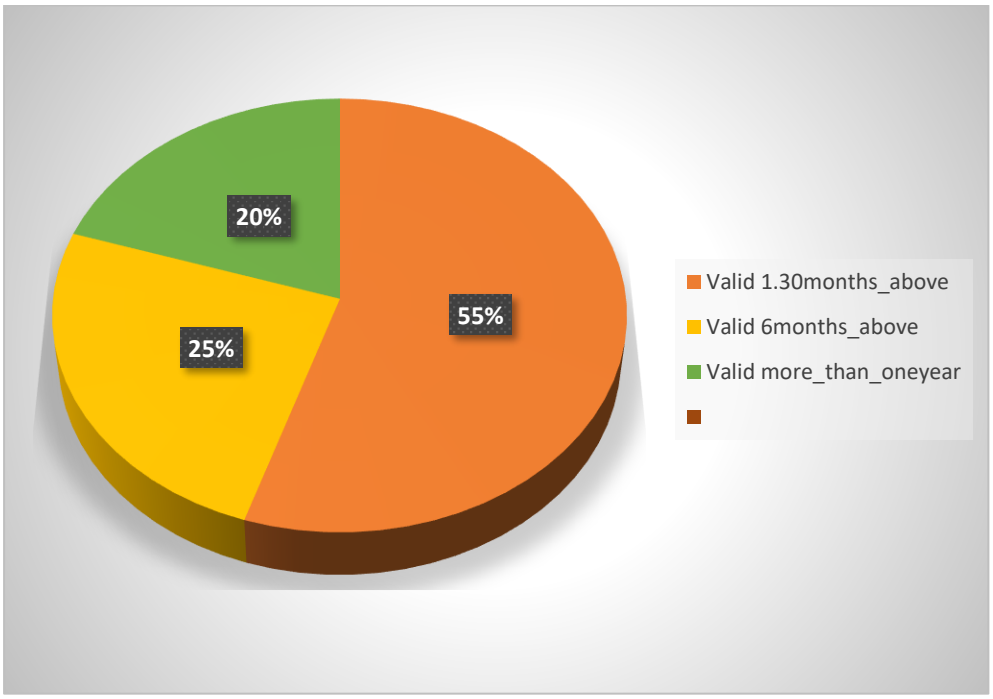

Figure 4:Duration of strokes among the participants

Associated disease with stroke : In total 40 patients 25 patients had high blood pressure, 8 patients had diabetes meleitus,5 patients had heart disease and 1 patients has PLID(Prolapse lumber inter vertebral disease).In percentage 62.5% stroke patients have high blood pressure, 20% have diabetes melluitus,5% patients have heart disesase and 2.5% patients have prolapsed lumber intervertebral disease.

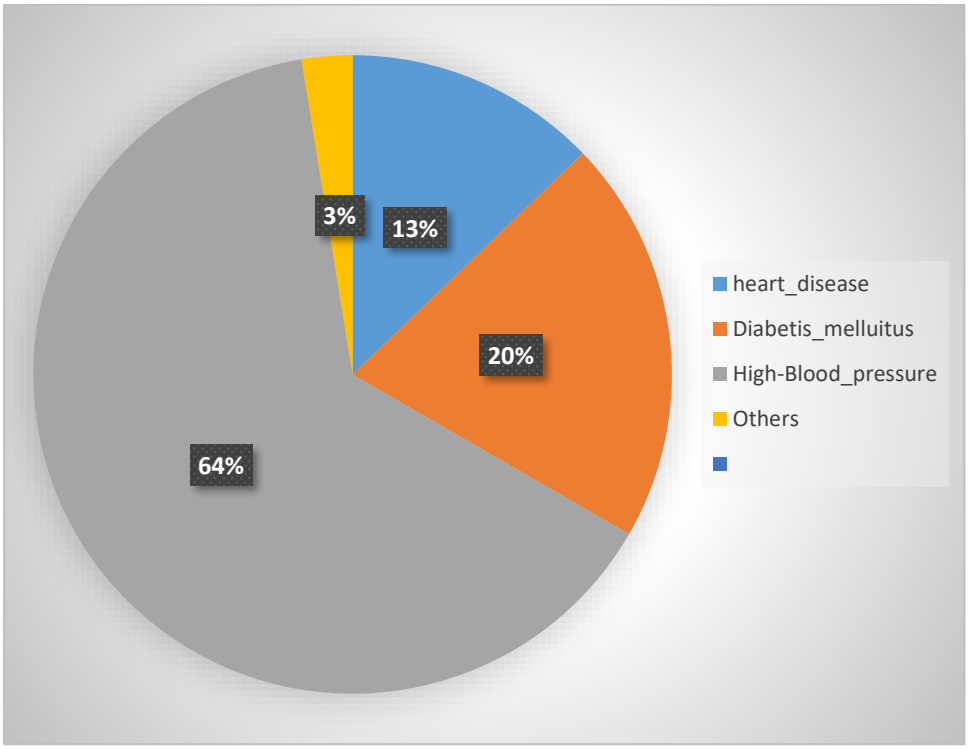

Figure 5 : Co morbidities among the participants

Comparisons between pre test and post test in range of motion

Variable	t	df	p value
Shoulder flexion pretest	1.296	38	.203
Shoulder flexion posttest	1.884	38	.067
Shoulder extension pretest	.065	38	.949
Shoulder extension posttest	.994	38	.326
Shoulder abduction pretest	1.115	38	.272
Shoulder abduction posttest	1.662	38	.105
Shoulder adduction pretest	.777	38	.442
Shoulder adduction posttest	1.578	38	.123
Shoulder external rotation pretest	.382	38	.705
Shoulder external rotation	1.403	38	.169
Shoulder internal rotation pretest	1.067	38	.293
Shoulder internal posttest	1.0909	38	.05
Elobow flexion pretest	1.321	38	.194
Elbow flexion posttest	2.474	38	0.01
Wrist flexion pretest	1.83	38	0.073
Wrist flexion posttest	2.22	38	0.06
Wrist extension pretest	.669	38	.503
Wrist extension posttest	1.787	38	.08

Finger flexion pretest	1.535	38	.133
Finger flexion posttest	1.9292	38	.05
Finger extension pretest	.258	38	.798
Finger extension posttest	.614	38	.534

In this table it was described about the pre and post test of range of motion in stroke patients. In independent t test compare between pretest and post test .In range of motion all movements of upper limb is not significant whereas in post test very few range of motion is significant. Before starting intervention pretest were taken and after finishing the intervention post test were taken . In independent t test we seen that every movements mean control and mean experimental are different .Mean experiment are higher than mean control.Most of the movement range of motion are insignificant because their p value is more than 0.05. In shoulder region shoulder internal rotation are significant because p value 0.05 and other movement like shoulder flexion, extension ,abduction, adduction and external rotation is not significant. In elbow joint elbow flexion is moderate significant here p value 0.01 .On the other hand wrist flexion and wrist extension is not significant but finger flexion is significant where as the finger extension is in significant. Finger flexion p value is 0.05.

So in the independent t test shoulder internal rotation, elbow flexion and finger flexion are significant.

Comparisons between pre test and post test in upper limb function

variable	t	df	P valve
Arat grasp pretest	2.880	38	0.06

Arat grasp posttest	3.008	38	0.04
Arat grip pretest	1.998	38	0.06
Arat grip post test	2.102	38	0.05
Arat pinch pretest	2.710	38	0.04
Arat pinch posttest	3.8065	38	0.02
Arat gross pretest	1.796	38	0.080
Arat gross posttest	1.966	38	0.06

The table had shown that describe the pre and post test action arm research test.In action arm research test we measure the function of upper limb in stroke patients. This test divided into 4 types. This are grasp, grip, pinch and gross motor. In grasp test p value is 0.004 that means test is significant. In grip test p value is 0.004. That means p value is significant in grip test.The most difficult test in arat is pinch which is moderate significant and p value is 0.01.Arat gross motor test p value is 0.06 which is not significant.

Comparisons between pre and post test in activity of daily living

variables	t	df	P value
Barthel index pretest	1.881	38	0.07
Barthel index posttest	3.333	38	0.002

Basically Barthel index used to measure activity of daily living in stroke patients .Independent t test p value of Barthel index is 0.002 which is moderate significant.so after 2 months treatment stroke patients has massive improve in activity of daily living.

comparisons range of motion between control and experimental group

variables	t	df	P value
Shoulder flexion	13.583	19	0.01
Shoulder extension	11.343	19	0.02
Shoulder abduction	16.967	19	0.000
Shoulder adduction	12.104	19	0.01
Shoulder external rotation	15.049	19	0.03
Shoulder internal rotation	13.323	19	0.000
Elbow flexion	17.29	19	0.000
Wrist flexion	7.828	19	0.06

Wrist extension	14.32	19	0.08
Finger flexion	13.23	19	0.000
Finger extension	10.19	19	0.103

In this table it had shown that the paired t test of range of motion of upper limb in experimental group. It has 4 coloums. first coloum shows variables,2nd coloum shows score of t ,3rd coloum shows value of df and 4 th coloum shows p-value. In shoulder flexion p value 0.01 which is significant, in shoulder extension p value is 0.02 which also significant, in shoulder abduction p value is 0.000 which is highly significant. In shoulder adduction p value is 0.01 which also significant. In internal rotation p value is 0.000 which is highly significant and the external rotation p value is 0.03 whish also significant. Elbow flexion and finger flexion p value is 0.000 which is highly significant . Wrist flexion,wrist extension and finger extension p value is 0.0,0.08, and 0.103 which means wrist flexion ,wrist extension and finger extension is insignificant.

Variable	t	df	P value
Shoulder flexion	13.145	19	.07
Shoulder extension	10.45	19	0.02
Shoulder abduction	13.56	19	0.01
Shoulder adduction	10.34	19	0.04
Shoulder external rotation	7.193	19	0.06
Shoulder internal rotation	10.193	19	0.02
Elbow flexion	11.50	19	0.000
Wrist flexion	13.43	19	0.330
Wrist extension	7.190	19	0.09

Finger flexion	12.360	19	0.05
Finger extension	9.918	19	0.102

In this table shows the paired t test of range of motion of upper limb in control group.20 patients were participated in this control group. First coloum shows the variables 2nd coloum shows the t score , 3 rd coloum shows the score of df ,4th coloum shows the value of p to determine level of significancy . From this table we shows that all the movement of the upper which I selected to test for range of motion .In shoulder flexion p value is 0.07 that determine that it is insignificant.In shoulder extension p value is 0.02 which is significant and shoulder abduction and adductions p value is 0.01 and 0.04 both movement are significant. Shoulder external rotation p value is 0.06 which is in significant.In shoulder internal rotation p value is 0.02 which is significant.elbow flexion p value 0.000 which is highly significant . In finger flexion p value is 0.05 which is significant. Wrist flexion,wrist extension and finger extension p value is .330,0.09,.102 which is insignificant.

Comparisons between control and experimental group in upper limb function

variables	t	df	P value
Arat grasp	18.24	19	0.000
Arat grip	13.45	19	0.000
Arat pinch	21.56	19	0.000
Arat gross	10.384	19	0.000

In action arm research test measures upper limb function like grasping, griping, pinch and the gross motor function . In paired t test in experimental group grasp, grip, pinch and gross motor p value is 0.000 that's means it is highly significant.

variables	t	df	P value
Arat grasp	19.222	19	0.001
Arat grip	23.43	19	0.01
Arat pinch	22.76	19	0.04
Arat gross motor	13.272	19	0.01

In this table it shows the paired t test of action arm research test to measure improvement of upper limb function in control group . In the paired t test grasp p value 0.001 which is significant, grip p value is 0.01 whish also is significant. In arat pinch p value is 0.04 which is significant and arat gross p value is 0.01 which also significant.

Comparisons between control and experimental group in activity of daily living

Variable	t	df	P value
Barthel index	2.2	19	0.01

In experimental group Barthel index p value 0.01 which is significant.

Variables	t	df	P value
Barthel index	2.22	19	0.08

In this table it shows that paired t test of Barthel index in control group and in this test p value is 0.08 which is not significant.

Basically my research topic is effectiveness of scapular stabilization exercise to improve upper limb function in stroke patients . To measure the effectiveness of scapular stabilization exercise by choose some objectives and set the scale and tools on the basis of the objectives. I had taken goniometer tools to measure the range of motion,action arm tools to measure the upper limb function and Barthel index scale to measure the activity of daily living.

.Researcher had taken pre and post test before after intervention. For the analysis researcher had taken independent t test and paired t test because my data is continuous data . In independent t test in range of motion researcher had shown compare between before and after range of motion . In that case most of the movement of the upper limb are insignificant .Very few movement like shoulder internal rotation,elbow flexion and finger .Here mean control and mean experiment are different in every movement . Mean experiment are much more higher than mean control in independent t test. As like in shoulder flexion post test mean control is 82 and mean experiment is 95.There are difference between 13. On the other hand post test mean

control and experiment are much more higher then pre test mean control and mean experiment.

In independent t test researcher had shown the compare between pre test and post test of arat test. Without pinch pretest other pretest were insignificant and post test of grasp, grip, pinch are significant where as the gross motor are insignificant. Barthel index in independent are significant.

In paired t test researcher had shown the difference between control and experimental group. In paired t test control group shoulder flexion p value is 0.07 and in experiment group p value is 0.01 . It is interpreted that shoulder flexion in experimental group is significant. In shoulder extension both group p value is 0.02 both group is significant. In shoulder abduction in both group p value is 0.01 .It is interpreted that shoulder abduction is both group is significant.

Shoulder adduction is both group p value 0.4 which both are same and interpreted that both group is equally significant. In control group shoulder external rotation p value is 0.03 which is significant and the the control group shoulder external rotation p value is 0.06 which is not significant so it is interpreted that shoulder external rotation in experiment group is significant. In shoulder internal rotation in experiment group p value is 0.000 and in control group p value is 0.02 and it is interpreted that shoulder internal rotation is much more significant in experimental group. In elbow flexion both group p value is 0.000 which is highly significant in both group . In finger flexion in experimental group p value 0.000 and control group p value is 0.05 so it is interpreted that finger flexion is much more significant in experimental group. In both group wrist flexion, wrist extension and finger extension is not significant.

In arat test all the variables (grasp ,grip ,pinch and gross motor) in experimental group is highly significant where as in control group grasp p value is 0.001 ,grip p value is 0.01, pinch value is 0.04 and gross motor p value is 0.01 which all is significant but experimental group is higher significant rate than control group.

In Barthel index experiment group p value is 0.01 and control group p value 0.08 . So it is interpreted that Barthel index is moderate significant in experiment group and not significant in control group. In experiment group shoulder abduction, internal rotation , elbow flexion and finger flexion p value is 0.000 which is highly significant .

CHAPTER:V DISCUSSION

The research title is effectiveness of scapular stabilization exercise to improve upper function in stroke patients.40 patients were taken in this research . 20 patients in control group and 20 patients in experimental group . In experimental group patients has taken new 3 exercise with conventional physiotherapy and the control group has taken conventional therapy.12 session has given to the patients in 8 weeks and the therapy was given by the physiotherapist.

In experimental group n=20 and the mean age is 51.05 and the minimum age in the experimental group is 35 and the maximum age is 75 and 40 to 60 years person(n=12) mostly affected in stroke in this research. In control group n= 20 and the mean age is 50.50 and the minimum age is 32 and the maximum age is 72 and as like the experimental group in between 40 to 60 years person mostly affected .

In sex in 40 patients 31 person are male and 9 person are female and the percentage is male is 77% and the female is 23%. So it is interpreted that male are highly affected in stroke in female. In total 40 patients 34 patients has ischemic stroke and 6 patients has hemorrhagic stroke and the percentage is 85% is ischemic stroke and 15% is hemorrhagic stroke. In occupation in total 40 patients 1 patients was teacher,5 patients were farmer, 9 patients were emigrants,16 patients were service holder and 1 person were labor most of the person were living in the rural areas. In total 40 patients 25 patients had high blood pressure, 8 patients had diabetes meleitus,5 patients had heart disease and 1 patients has PLID(Prolapse lumber inter vertebral disease). In this research I had found most of the stroke patients had high blood pressure ,few has diabetes mellites and few has heart disease and 1 has other disease and most of the person had taken drugs for their comorbidities. In this research I had found duration of stroke one and half to six month in 22 patients out of 40 patients . six months to one year in 10 patients and rest of 8 patients one to more than one years.

In this research to find out effectiveness researcher had chosen three scale and tools on the basis of the objectives. The test are Goniometer to measure the range of motion upper limb, action arm research test to find out the improvement of upper limb function and Barthel index to measure activity of daily living and for the analysis

researcher had used independent t test and paired t test. In independent t test here compare between pre and post test . In independent t test in range of motion most of the variables are not significant like shoulder flexion, shoulder extension ,shoulder abduction, shoulder adduction, shoulder external rotation, wrist flexion, wrist extension, finger extension where as the elbow flexion, shoulder internal rotation and finger flexion p value is 0.01, 0.05 and 0.05 which is significant.

In independent t test in arat the variables like grasp, grip, pinch p value is 0.05, 0.02 and 0.05 which is significant on the other hand gross motor p value is 0.08 which is not significant . In Barthel index p value is 0.02 which is also significant. In paired t test researcher had done where compare between control and experimental group. In experimental group shoulder flexion 0.01 and the control group shoulder flexion is 0.07 . So the shoulder flexion in experimental group is significant. Shoulder extension in both group p value is 0.02 which are same and significant. Shoulder abduction, internal rotation, elbow flexion, finger flexion all the variables p value is 0.000 which are highly significant where as in control group elbow flexion is highly significant and internal rotation p value is 0.02, abduction is 0.01 and finger flexion p value is 0.05 all are significant but experiment group significant level is very high. Shoulder adduction is significant in both group but shoulder external rotation is significant in experiment group but not significant in control group. Wrist flexion, wrist extension and finger extension is not significant in both group.

In arat test in experiment group all the variables is highly significant where in control group arat test variables grasp p value is 0.001, grip 0.01,arat pinch 0.04 and arat gross motor 0.01 which all significant but experiment group significant level much higher. In Barthel in index in experiment group p value 0.01 where as control group p value 0.08 which is significant in experiment group.

Han et al. conduct a study and found that age mean in experimental group 53.40 and control group is 52.70 where as this study researcher had found mean age is experimental is 51.30 and control group is 50.50 which is nearly similar. Song et al. 2013 conduct a study and he found that in 11 patients in his 8 were male and 3 were female in percentage 72% were male and 28% were female where as my study in 40 patients 31(77%) male and 9 (23%) were female which is nearly similar.

Gunarathne et al. conduct a study in Pakistan and found that ischemic stroke 66.66% occurs and hemorrhagic stroke 33.34% occurs and in this study the percentage of ischemic stroke is 85% and hemorrhagic stroke is 15% which is not similar. Gunarathne et al. also added that patients who have hypertension and diabetes mellites have higher change to affect in stroke. He found that 70% stroke patients have high blood pressure and 10% to 15% have diabetes mellites disease. In this study 62 % stroke patient had high blood pressure and 20 % is diabetes mellites disease which is quite similar to this study.

Song et al. conduct a study and suggest that scapular stabilization exercise can improve the function of the paretic upper extremity of individuals with chronic stroke. However, scapular stabilization exercise did not affect basic daily activities. In this study researcher had found that scapular stabilization exercise improve the upper limb function and the p value of arat test is less than 0.05 which is similar to the song et al. study but also found the improvement in activity of daily living which is not similar to song et al. study.

Hardwick et al. conduct a study and suggested that strength training for the glenohumeral and scapulothoracic regions improves the functionality of the paretic upper extremities which is similar to my research but harwrick et al. also found that there is no improvement in range of motion but researcher found the improvement in both group and experiment group are more significant.

Young et al. conduct a study and found that stretching and stabilization exercise improve the upper limb function rather than traditional physiotherapy exercise and my study are similar to this study.

Yang et al. conduct a study scapular protraction exercise improve griping and function of upper limb and increase the muscle activation surrounding the shoulder joint where as my study in experimental group gripping is highly significant and also improve the upper limb function.

Han et al. conduct a study in 33 patients in 3 groups and found that improve the upper limb function and the p value of arat test in experimental group is less than 0.05 and the Barthel index p value is more than 0.05 which is not significant. In my study arat test p value is in experimental group is less than 0.05 and it is significant and it is

similar to the han et al. study but Barthel index in this study is significant which is not similar.

Park et al. conduct a case study and found that scapular stabilization exercise improve the muscle strength and function of upper limb in stroke patients which is similar to this study. Shah et al conduct a study in 37 patients and found that scapular taping is effective in improving stability of the scapula and also in improving functional motor performance in hemiplegic upper extremity in recovering hemiplegic patients along with traditional physiotherapeutic exercises.

Limitations of the study :

. In this research researcher had limited tools like action arm research tools and goniometer so that researcher had faced some difficulties . On the other hand researcher did not get enough time for this study and location is crp savar only. Sometimes patients had fever and other post stroke complication so that therapy did not continue fluently . In neurology unit of crp all the physiotherapist were not the same skillful so that's it might effects in results. In crp patients sometimes did not get sedeule for taken their therapy so sometimes they did not maintain the regularity. Very few patients stop therapy for their personal reason and got back crp after few days later , so this case did not maintain continuity of therapy.

CHAPTER:VI **Conclusion and Recommendation**

Conclusion

The result of this study had shown the effectiveness of scapular stabilization exercise to improve upper limb function in stroke patients alone with conventional physiotherapy. It was a single blinded randomized control trial. In this study total 40 patients were participate and selected on the basis of inclusion and exclusion criteria . Patients were randomly selected in control and experimental group and each group had 20 patients. In control group patients had taken conventional therapy and the experimental group patients had taken 3 new exercise which is not practiced before in crp with conventional therapy . Both group had taken 12 session in 8 weeks . After the treatment in both group found that in range of motion of upper limb very few movement are is not significant but rest of movement are significant and $p < 0.05$. In control group range of motion half of movement of upper limb is not significant but rest of movement is significant . So it is interpreted that range of motion improvement in experimental group and control group but experimental group is more significant than control group. In experimental group Barthel index test $p < 0.05$ which is significant and the control group Barthel index $p > 0.05$ which is not significant. So it is interpreted that activity of daily living has improved in experimental group . In experimental group action arm research test $p=0.000$ which is highly significant and control group $p < 0.05$ which is also significant.so it is interpreted that upper limb function has improved in both group but improvement is higher in experimental group than control group. The study had shown that scapular stabilization exercise improve range of motion of upper limb, function of upper limb and also improve activity of daily living of the patients.

Recommendation

In this study it had shown that effectiveness of scapular stabilization exercise to improve upper function, range of motion and activity of daily living. In this study tone was the major problem during treatment time and the researcher did not show any impact of exercise on tone of upper limb. In future research of this study recommended that to work on this area and find out relation between in exercise and tone. In this study sample size were small and area was savar crp. It is recommended that in this future study to do the large population and increase the study area . In this study researcher has limited tools to asses the patient and faced problem during research and the this research is single blinded research. In future study it will be recommended that ensure enough tools during the research and to do the double and triple blinded research. In this study all physiotherapists who were participate in this research were not same skillful . So it will be recommended that to focuses in this area in further study this type of research. In this study did not focuses about muscle strength of upper limb so I will strongly recommended that focuses on the muscle strength of upper limb and find the relation between exercise and muscle strength.

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APPENDIX

Consent Form

(Please read out to the participants)

Assalmu alaikum!

I am Arnob Datta, a student of the B.Sc. in Physiotherapy course, Session 2017-2018, at Bangladesh Health Profession Institute, under the Faculty of Medicine, University of Dhaka. I must complete a thesis to earn my B.Sc. in physiotherapy degree. My thesis title is "Effectiveness of scapular stabilization exercise to improve upper limb function in stroke patients". The study aims to investigate the efficacy of scapular stabilization exercises for stroke patients' rehabilitation of upper limb functions. In order to ask you some questions about this thesis, I will meet with you twice: once before the intervention and again after completion. I am assuring you that the treatment provided to you would not cause any damage. Besides, physiotherapists will provide the treatments. The information you provide will be kept confidential and will only be used for thesis purposes. You have the right to terminate your participation at any time. Moreover, if you feel uncomfortable answering any question you can skip that question. The questionnaire will take 20 to 30 minutes to fill up. Please give me the correct answers to the questions and enable the data collector to evaluate your health. Contact my supervisor if you have any questions. Farjana Sharmin Lecturer of BHPI, Consultant & OPD in charge Department of Physiotherapy, BHPI, CRP . If you would kindly give your consent, we can start.

□ Yes □ No

Thank you for your participation as well as the information.

Participant's signature…….

Date…….

Data collector's signature……..

Date……

Researcher's signature……

Date……....

Questionnaire (English)

Title: "Effectiveness of Scapular Stabilization exercise to Improve Upper limb function in stroke patients"

Patient Information

Patient Id:	
Date of interview:	
Name of the participant	
Code:	
Address:	Vill: Post Office: Upzilla: zilla:
Phone Number:	1. 2.

Part-1: Socio-demographic Information

QN	Questions	Categories of response	Code of response
1.1	Age	Age in years	
1.2	Sex	1. Male. 2. Female.	
1.3	Marital status	1. Married. 2. Unmrried.	
1.4	Level of Education		
1.5	Religion of practice	1. Islam 2. Hinduism 3. Christianity 4. Buddhism	
1.6	Place of residence	1. Rural 2. Semi-Urban 3. Urban	
1.7	Occupation		
1.8	Family Type	1. Joint 2. Nuclear	
1.8	Number of family members	Total number of family members	
1.9	Number of earning	Total number of earners	

	members		
1.10	The average income of the family	Average total income in taka per month	

1.11	The average expenditure for treatment	The average total expense in taka per month	
1.12	General Health of the participant	1. Good 2. Fair 3. Poor	

Part 2: Information about patients' comorbidities

	Questions	Categories of Response	Code of response
2.1	Type of stroke	1. Ischemic 2. Hemorrhagic	
2.2	Time frame for the stroke?	How many days/months/years ago did you have the last stroke?	
2.3	Do you suffer from any of these conditions? (Answer may be multiple)	1. Stroke 2. Diabetes mellitus 3. High blood pressure 4. Heart disease 5. Other related diseases (Specify).....	
2.4	Do you take any medicine for these conditions?	1. Yes 2.NO	

Part-3: Range of motion of affected limbs: ROM was measured by Goniometer

QN	Joint	Movement	Range
3.1	Soulder	Flexion	
3.2		Extension	
3.3		Abduction	

3.4		Adduction	
3.5		External Rotation	
3.6		Internal Rotation	
3.7	Elbow	Flexion	
3.8		Extension	
3.9	Wrist	Flexion	
3.10		Extension	
3.11	Fingers	Flexion	
3.12		Extension	

Part-4:Upper Extremity Motor performances (coordination, dexterity, and functioning) are measured by Action Research Arm Test.

Four subsets of arm function are evaluated, (grasp, grip, pinch, and gross movement)each with a series of items and arranged in order of decreasing difficulty, with the most difficult task examined first, followed by the least difficult task. The patient is required to pick up each item and is rated according to the following

0=Can perform no part of the test

1=Perform test partially.

2=Complete the test, but takes an abnormally long time or has difficulty.

3=Perform the test normally.

Instructions:

- If the subject passes the first, no more need to be administered and he scores top marks for that subset.
- If the subject fails the first and fails the second, he scores zero, and again no more tests need to be performed on that subject
- Otherwise, be needed to complete all tasks within the subject.

Subset	Item	Score

Grasp	1. Block, wood, 10-cm cube (if score=3, total=18 and proceed to grip) Pick up a 10 cm block 2. Block, wood, 2.5 cm cube (if score=0, total=0 and proceed to grip) Pick up a 2.5 cm block 3. Block, wood, 5 cm cube 4. Block, wood, 7.5 cm cube diameter 5. Ball(cricket), 7.5-cm diameter 6. Stone 10 x 2.5 x 1cm Subtotal	/18
Grip	1. pour water from glass to glass (if score=3,total=12 and proceed to pinch) 2. Tube 2.25 cm (if score=0, total=0 and proceed to pinch 3. Tube 1 cm x 16 cm 4.Washer(3.5 cm diameter) over bolt Subtotal	/12
Pinch	1. Ball bearing, 6 mm, 3rd finger, and thumb (if score=3, total=18 and proceed to gross movement) 2. Marble, 1.5cm, index finger, and thumb (If score=0, total=0 and proceed to gross movement) 3. Ball bearing, 2nd finger, and thumb 4. Ball bearing, 1st finger, and thumb 5. Marble, 3rd finger, and thumb	

	6. Marble, 2nd finger and thumb Subtotal	/18
Gross movement	1. place hand behind the head (if score =3, total=9 and finish or if score=0,total=0 and finish) 2. Place hand on top of the head 3. Hand to mouth Subtotal	 /9

Part-5: Activities of daily living are assessed by Barthel Index

Choose the scoring points for the statement that most closely corresponds to the patient's current level of ability for each of the following 10 items. Record actual, not potential, functioning. Information can be obtain from the patient's self report, from a separate party who is familiar with the patient's abilities (Such as a relatives), or from observation.

Activity	Score
FEEDING 0 = Unable 5 = Needs help cutting, spreading butter, etc., or requires modified diet 10 = Independent	
BATHING 0 = Dependent 5 =Independent (or in shower)	

GROOMING 0 = Needs to help with personal care 5 = Independent face/hair/teeth/shaving (implements provided)	

DRESSING 0 = Dependent 5 = Needs help but can do about half unaided 10 = Independent (including buttons, zips, laces, etc.)	
BOWELS 0 =Incontinent (or needs to be given enemas) 5 = Occasional accident 10 = Continent	
BLADDER 0 =Incontinent, or catheterized and unable to manage alone 5 = Occasional accident 10 = Continent	
TOILET USE 0 = Dependent 5 = Needs some help, but can do something alone 10 =Independent (on and off, dressing, wiping)	
TRANSFERS (BED TO CHAIR AND BACK) 0 = Unable, no sitting balance 5 = Major help (one or two people, physical), can sit 10 = Minor help (verbal or physical) 15 = Independent	
MOBILITY (ON LEVEL SURFACES) 0 = Immobile or < 50 yards 5 = Wheelchair independent, including corners, >50 yards 10 = Walks with help of one person (verbal or physical)> 50 yards 15 = Independent (but may use any aid; for example, stick)> 50 yards	
STAIRS 0 = Unable 5 = Needs help (verbal, physical, carrying aid) 10 = Independent	
Total(0-100)	

অনুমতি পত্র

(অংশগ্রহণকারীকে পড়ার জন্য অনুরোধ করা হলো)

আসসালামু আলাইকুম!

আমি অর্ণব দত্ত, ঢাকা বিশ্ববিদ্যালয় এর চিকিৎসা অনুষদের অন্তর্ভুক্ত বাংলাদেশ হেলথ প্রফেশন্স ইন্সটিটিউট এর বিএসসি ইন ফিজিওথেরাপি কোর্সের ২০১৭-২০১৮ সেশনের শিক্ষার্থী। বিএসসি ইন ফিজিওথেরাপি ডিগ্রী অর্জনের জন্য আমাকে একটি থিসিস সম্পূর্ণ করতে হবে। আমার থিসিসটির শিরোনাম হল "স্ট্রোক রোগীদের ঊর্ধ্বাঙ্গের কার্যকারিতা উন্নত করতে স্ক্যাপুলার স্ট্যাবিলাইজেশন এক্সারসাইজের কার্যকারিতা"। এই থিসিসটি অধ্যয়নের মূল লক্ষ্য হচ্ছে স্ট্রোক রোগীদের ঊর্ধ্বাঙ্গের ফাংশনগুলির পুনর্বাসনের জন্য স্ক্যাপুলার স্ট্যাবিলাইজেশন অনুশীলনের কার্যকারিতা নিরূপণ করা। এই থিসিস সম্পর্কিত আপনাকে কিছু প্রশ্ন জিজ্ঞাসা করার জন্য আমি আপনার সাথে দুইবার দেখা করব, একবার হস্তক্ষেপের আগে এবং আবার সমাপ্তির পরে। আপনাকে আশ্বস্ত করছি, দক্ষ ফিজিওথেরাপিস্টরা আপনাকে চিকিৎসা দেবেন, অতএব আপনাকে দেওয়া চিকিৎসার ফলে আপনার কোনোরূপ ক্ষতি হবে না। আপনার দেওয়া তথ্য গোপন রাখা হবে এবং শুধুমাত্র থিসিসের উদ্দেশ্যে ব্যবহার করা হবে। যে কোনো সময় এই থিসিসে আপনার অংশগ্রহণ বন্ধ করার অধিকার রয়েছে।পাশাপাশি আপনি যদি কোন প্রশ্নের উত্তর দিতে অস্বস্তি বোধ করেন তবে আপনি সেই প্রশ্নটি এড়িয়ে যেতে পারেন। প্রশ্নাবলী পূরণ করতে ২০ থেকে ৩০ মিনিট সময় লাগবে। অনুগ্রহ করে আমাকে প্রশ্নগুলির সঠিক উত্তর দিন এবং আপনার স্বাস্থ্যের মূল্যায়ন করতে ডেটা সংগ্রহকারীকে যথাসাধ্য সহযোগিতা করুন। আপনার কোন প্রশ্ন থাকলে আমার সুপারভাইজারের সাথে যোগাযোগ করতে পারেন। ফারজানা শারমিন, বিএইচপিআই এর প্রভাষক, কনসালটেন্ট ও ওপিডি (ইনচার্জ), ফিজিওথেরাপি ডিপার্টমেন্ট, বিএইচপিআই, সিআরপি। আপনি যদি অনুগ্রহপূর্বক আপনার সম্মতি দেন, তবে আমরা শুরু করতে পারি।

· হ্যাঁ · না

ধন্যবাদ আপনার অংশগ্রহণের পাশাপাশি প্রশ্নগুলোর যথাযথ উত্তর দিয়ে সহযোগিতা করার জন্য।

অংশগ্রহণকারীর স্বাক্ষর …….. তারিখ …….

তথ্য সংগ্রহকারীর স্বাক্ষর…….. তারিখ ……

গবেষকের স্বাক্ষর……

তারিখ……....

প্রশ্নাবলি (বাংলা)

শিরোনাম: "স্ট্রোক রোগীদের ঊর্ধ্বাঙ্গের কার্যকারিতা উন্নত করতে স্ক্যাপুলার স্ট্যাবিলাইজেশন এক্সারসাইজের কার্যকারিতা"

রোগীর তথ্যাবলি

রোগীর আইডি:	
সাক্ষাৎকারের তারিখ:	
অংশগ্রহণকারীর নাম:	
কোড:	
ঠিকানা:	গ্রাম: পোস্ট অফিস: উপজেলা: জেলা:
ফোন নাম্বার:	১. ২.

পার্ট-১: সামাজিক-জনতাত্ত্বিক তথ্য

নং	প্রশ্ন	প্রতিক্রিয়া বিভাগ	প্রতিক্রিয়া কোড
১.১	বয়স	বয়স (বছরে)	
১.২	লিঙ্গ	১। পুরুষ ২। মহিলা	
১.৩	বৈবাহিক অবস্থা	১। বিবাহিত ২। অবিবাহিত	
১.৪	শিক্ষাগত যোগ্যতা		
১.৫	ধর্ম	১। ইসলাম ২।সনাতন	

		৩।খ্রিস্টান ৪।বৌদ্ধ	
১.৬	বসবাসের স্থান	১। গ্রাম ২। মফস্বল ৩। শহর	
১.৭	পেশা		
১.৮	পরিবারের ধরণ	১। যৌথ ২। একক	
১.৯	পরিবারের সদস্য সংখ্যা	পরিবারের মোট সদস্য সংখ্যা	
১.১০	উপার্জনক্ষম পরিবারের সদস্য সংখ্যা	উপার্জনকারীদের মোট সংখ্যা	
১.১১	পরিবারের গড় আয়	প্রতি মাসে গড় মোট আয়	

১.১২	চিকিৎসার জন্য গড় খরচ	প্রতি মাসে গড় মোট খরচ (টাকায়)	
১.১৩	অংশগ্রহণকারীর সাধারণ স্বাস্থ্য	১। ভাল ২। মতামত	

পার্ট-২ : রোগীর অন্যান্য রোগ সংক্রান্ত তথ্যাবলি

	প্রশ্ন	প্রতিক্রিয়া বিভাগ	প্রতিক্রিয়া কোড
২.১	স্ট্রোকের ধরণ	1. Ischemic 2. Hemorrhagic	
২.২	স্ট্রোকের জন্য সময় কাঠামো	সর্বশেষ স্ট্রোকটি কত দিন/মাস/বছর আগে সংগঠিত হয়েছিল?	
২.৩	আপনি কি এই অবস্থার কোনটিতে ভুগছেন? (উত্তর একাধিক হতে পারে)	১। স্ট্রোক ২। ডায়াবেটিস ম্যালাইটাস ৩। উচ্চ রক্তচাপ ৪। হৃদ রোগ ৫। অন্যান্য রোগ (বর্ণনা করুন).....	

২.৪	আপনি এই অবস্থার জন্য কোন ঔষধ গ্রহণ করেন?	১।হ্যাঁ ২।না	

পার্ট-৩: আক্রান্ত অঙ্গের গতির পরিসর: গনিওমিটার দ্বারা ROM পরিমাপ করা হয়েছিল

নং	জয়েন্ট	মুভমেন্ট	রেঞ্জ
৩.১	কাঁধ	ফ্লেক্সন	
৩.২		এক্সটেনশন	
৩.৩		এবডাকশন	
৩.৪		এডাকশন	
৩.৫		এক্সটারনাল রোটেশন	
৩.৬		ইনটারনাল রোটেশন	
৩.৭	কুনুই	ফ্লেক্সন	
৩.৮		এক্সটেনশন	
৩.৯	কব্জি	ফ্লেক্সন	
৩.১০		এক্সটেনশন	
৩.১১	আঙ্গুল	ফ্লেক্সন	
৩.১২		এক্সটেনশন	

পার্ট-৫:একশন আর্ম রিসার্চ টেস্ট

বিষয়	আইটেম	স্কোর
গ্রাস্প	১. ব্লক, কাঠ, ১০ সে মি কিউব (যদি স্কোর =৩, সর্বমোট=১৮ এবং গ্রিপ এ চলে যান) একটি ১০ সেমি কিউব উঠান ২. ব্লক, কাঠ, ২.৫ সেমি কিউব (যদি স্কোর=০, সর্বমোত=০ এবং গ্রিপ এ চলে যান) একটি ২.৫ সেমি ব্লক ৩. ব্লক, কাঠ, ৫ সেমি কিউব ৪. ব্লক, কাঠ, ৭.৫ সেমি কিউব ৫. ক্রিকেট বল, ৭.৫-সেমি ডায়মিটার ৬. পাথর ১০ x ২.৫ x ১ সেমি সর্বমোট	/১৮
গ্রিপ	১. এক গ্লাস থেকে আরেক গ্লাস এ পানি ঢালুন (যদি স্কোর=3, মোট=১২ এবং পিঞ্চ এ চলে যান) ২. টিউব ২.২৫ সেমি (যদি স্কোর=০, মোট=০ এবং পিঞ্চ এ চলে যান) ৩. টিউব ১ সেমি x ১৬ সেমি ৪.বল্টুতে ওয়াশার লাগান (৩.৫ সেমি ডায়মিটার) সর্বমোট	/১২
পিঞ্চ	১. বল বিয়ারিং, ৬ মিমি, ৩য় আংগুল, এবং বৃদ্ধাঙ্গুলি (যদি স্কোর=3, মোট=১৮ এবং গ্রস	

	মুভমেন্ট এ চলে যান) ২. মার্বেল, ১.৫ সেমি, তর্জনি, এবং বৃধাঙ্গুলি (যদি স্কোর=০, মোট=০ এবং গ্রস মুভমেন্ট এ চলে যান) ৩. বল বিয়ারিং, মধ্যাঙ্গুলি এবং বৃদ্ধাঙ্গুলি। ৪.বল বিয়ারিং, তর্জনি এবং বৃদ্ধাঙ্গুলি ৫. মার্বেল, ৩য় আংগুল, এবং বৃদ্ধাঙ্গুলি ৬. মার্বেল, মধ্যাঙ্গুলি এবং বৃদ্ধাঙ্গুলি। সর্বমোট	/১৮
গ্রস মুভমেন্ট	১. হাত মাথার পেছনে রাখুন (যদি স্কোর=৩, মোট=৯ এবং সমাপ্তি করুন, যদি স্কোর=০, মোট=০ এবং সমাপ্তি করুন) 2.মাথার পেছনে হাত রাখুন ৩. হাত মুখের কাছে নিন। সর্বমোট	/৯

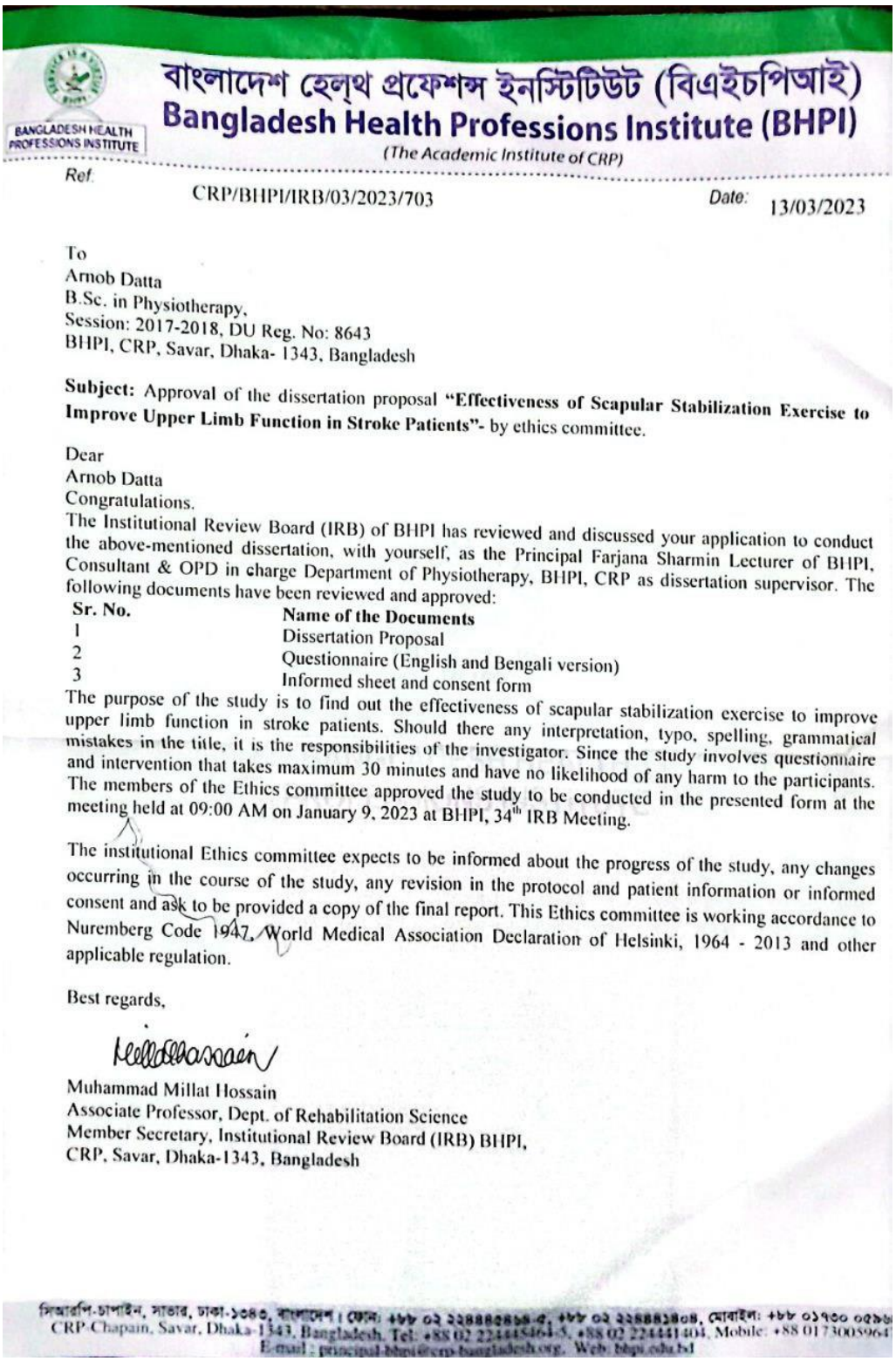
পার্ট-৬বার্থেল ইন্ডেক্স

কার্যক্রম	স্কোর
খাদ্য গ্রহন ০ = অপারগ ৫ = কাটতে ও মাখন ছড়াতে সাহায্য লাগে, কিংবা পরিবর্তিত ডায়েট প্রয়োজন হয়। ১০= স্বাধীন	
গোসল ০ = পরনির্ভরশীল ৫ = স্বাধীন	

সাজসজ্জা ০ = ব্যক্তিগত যত্নে সাহায্য করা প্রয়োজন ৫ = স্বাধীন মুখ/চুল/দাঁত/শেভিং (প্রদত্ত সরঞ্জাম)	
পোশাক পরিধান 0= নির্ভরশীল ৫ = সাহায্যের প্রয়োজন কিন্তু প্রায় অর্ধেক সাহায্য ছাড়াই করতে পারে। ১০ = স্বাধীন (বোতাম, জিপ, লেইস, ইত্যাদি সহ)	
বাওয়েল ০ = ধরে রাখতে পারে না ৫ = হঠাত করে হয়ে যাওয়া ১০= ধরে রাখতে পারা	
ব্লাডার ০= ধরে রাখতে না পারা বা ক্যাথেটার ব্যবহার করা	

৫ = হঠাত করে হয়ে যাওয়া ১০ = ধরে রাখতে পারা	
টয়লেট ব্যাবহার ০= নির্ভরশীল ৫ = কিছু সাহায্য প্রয়োজন, কিন্তু একা কিছু করতে পারেন ১০ = স্বাধীন (চালু এবং বন্ধ, পোশাকআশাক,মুছা)	
স্থানান্তর (বিছানা থেকে চেয়ারে যাওয়া এবং ফেরা) ০ = অক্ষম, কোন সিটিং ব্যালেন্স নেই। ৫ = প্রধান সাহায্য (এক বা দুই জন ব্যক্তি, শারীরিক), বসতে পারেন ১০ = সামান্য সাহায্য (মৌখিক বা শারীরিক) ১৫ = স্বাধীন	
গতিশীলতা (সমতল স্থানে) ০ = অচল বা <50 গজ ৫ = হুইলচেয়ার স্বাধীন, কোণা সহ, > ৫০গজ ১০ = একজন ব্যক্তির সাহায্যে হাঁটে (মৌখিক বা শারীরিক)> ৫০ গজ ১৫ = স্বাধীন (তবে কোনো সাহায্য ব্যবহার করতে পারে, উদাহরণস্বরূপ,লাঠি) > ৫০ গজ	
সিড়ি ০ = অপারগ ৫ = সাহায্য লাগে (মৌখিক, শারীরিক, বহনে সাহায্য) ১০= স্বাধীন	
সর্বমোট(০-১০০)	

APPENDIX



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

BANGLADESH HEALTH PROFESSIONS INSTITUTE

Ref. CRP/BHPI/IRB/03/2023/703 Date: 13/03/2023

To
Arnob Datta
B.Sc. in Physiotherapy,
Session: 2017-2018, DU Reg. No: 8643
BHPI, CRP, Savar, Dhaka- 1343, Bangladesh

Subject: Approval of the dissertation proposal **"Effectiveness of Scapular Stabilization Exercise to Improve Upper Limb Function in Stroke Patients"**- by ethics committee.

Dear
Arnob Datta
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 Farjana Sharmin Lecturer of BHPI, Consultant & OPD in charge Department of Physiotherapy, BHPI, CRP as dissertation 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	Informed sheet and consent form

The purpose of the study is to find out the effectiveness of scapular stabilization exercise to improve upper limb function in stroke patients. Should there any interpretation, typo, spelling, grammatical mistakes in the title, it is the responsibilities of the investigator. Since the study involves questionnaire and intervention that takes maximum 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 January 9, 2023 at BHPI, 34th 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
Associate Professor, Dept. of Rehabilitation Science
Member Secretary, Institutional Review Board (IRB) BHPI,
CRP, Savar, Dhaka-1343, Bangladesh

সিআরপি-চাপাইন, সাভার, ঢাকা-১৩৪৩, বাংলাদেশ। ফোন: +৮৮ ০২ ২২৪৪৫৪৬১-৫, +৮৮ ০২ ২২৪৪১৪০৪, মোবাইল: +৮৮ ০১৭০০ ০৫৯৬৪
CRP-Chapain, Savar, Dhaka-1343, Bangladesh. Tel: +88 02 224445461-5, +88 02 224441404, Mobile: +88 01730059647
E-mail : principal.bhpi@crp-bangladesh.org, Web: bhpi.edu.bd

Date: 19th February 2023
The Chairman
Institutional Review Board (IRB)
Bangladesh Health Professions Institute (BHPI),CRP.
Savar, Dhaka-134,Bangladesh.

Subject: Application for review and ethical approval.

Dear sir,

With due respect, I am Arnob Datta, student of B.Sc. in physiotherapy program at Bangladesh Health Professions Institute (BHPI) the academic institute of Centre for the Rehabilitation of the Paralysed (CRP) under the Faculty of Medicine,University of Dhaka.As per the course curriculum, I have to conduct a dissertation entitled "**Effectiveness of Scapular Stabilization exercise to improve the upper limb function in stroke patients"** under the supervision of Farjana Sharmin Lecturer of BHPI,Consultant & OPD in charge Department of Physiotherapy,BHPI,CRP.

The purpose of the study is to explore the effectiveness of scapular setting to improve the upper limb function in the stroke patients. The study involvesscapular stabilization exercise and face-to-face interview by using semi-structured questionnaire to explore the effectiveness of the exercise at CRP, Savar, that may take 30 minutes per session. Data collectors will receiveinformed consent from all participants andthe collected data will be kept confidential.

Therefore, I look forward to having your kind approval for the dissertation proposal and to start data collection. I can also assure you that I will maintain all the requirements for study.

Sincerely,
Arnob Datta

Arnob Datta
4th Year B.Sc. in Physiotherapy
Session: 2017-2018 Student ID: 112170388
BHPI, CRP, Savar, Dhaka-1343, Bangladesh

Dissertation presentation date: 9th January,2023

Head, Department of Physiotherapy,

Md. Shofiqul Islam
Associate Professor & Head
Department of Physiotherapy
Bangladesh Health Professions Institute (BHPI)
CRP, Chapain, Savar, Dhaka-1343

Recommendation from the dissertation supervisor
Farjana Sharmin
Farjana Sharmin
Lecturer of BHPI
Consultant & OPD In-charge
Department of Physiotherapy
BHPI,CRP,Savar,Dhaka

Date: 10 April 2023

To

Head

Department of Physiotherapy

Centre for the Rehabilitation of the Paralyzed (CRP)

Through: Head, Department of Physiotherapy, BHPI

Subject: Prayer for seeking permission to collect data for conducting a research project.

Sir,

With due respect and humble submission to state that I am Arnob Datta, a student of 4th year B. Sc. in Physiotherapy at Bangladesh Health Professions Institute (BHPI). The Ethical Committee has approved my research project entitled: **"Effectiveness of scapular Stabilization Exercise to Improve Upper Limb Function in Stroke Patients"** under the supervision of . Farjana Sharmin Lecturer of BHPI Consultant & OPD in charge Department of Physiotherapy, BHPI, CRP. Conducting this research project is a partial fulfillment of the requirement for the degree of B.Sc. in Physiotherapy. I want to collect data for my research project from the Department of Physiotherapy at CRP. So, I need your kind permission for data collection at the Neurology unit of CRP at Savar, Dhaka. I would like to assure you that anything of the study will not be harmful to the participants.

I, therefore, pray and hope that your honor would be kind enough to grant my application and give me permission for data collection and oblige thereby.

Sincerely

Arnob Datta

Arnob Datta

4th-year B.Sc. in Physiotherapy

Class Roll: 22

Session: 2017-18

Bangladesh Health Professions Institute (BHPI)

(An academic institution of CRP)

Chapain, CRP, Savar, Dhaka-1343

Farjana Sharmin
Consultant, PT
10.04.2023

Recommended
Shofiq
10.04.2023

Approved
11/04/23
Dr. Mohammad Anwar Hossain, PhD
Senior Consultant & Head
Physiotherapy Department
Associate Professor, BHPI
CRP, Savar, Dhaka-1343

Shofiqul Islam
Professor & Head
Department of Physiotherapy
Bangladesh Health Professions Institute (BHPI)
CRP, Chapain, Savar, Dhaka-1343