Faculty of Medicine

University of Dhaka

Evaluating the Effectiveness of Scapular Stabilization Exercises of the Stroke Patients with Shoulder Subluxation

Md. Shoriful Islam

B.Sc. in Physiotherapy

Roll No: 1374

Registration No: 10426

Session: 2018-2019

Saic College of Medical Science and Technology

Department of Physiotherapy

Mirpur-14, Dhaka-1216

Bangladesh

August, 2024

We the undersigned certify that we have carefully read and recommended to the Faculty of Medicine, University of Dhaka, for the acceptance of this dissertation entitled **"Evaluating the Effectiveness of Scapular Stabilization Exercises of the Stroke Patients with Shoulder Subluxation"** Submitted by **Md. Shoriful Islam,** for the partial fulfillment of the requirement for the degree of Bachelor of Science in Physiotherapy (B.Sc. PT).

…….

Prof. Dr. Mohammad Anwar Hossain, PhD
Professor, Physiotherapy Department BHPI
Senior Consultant and Head, Physiotherapy Department CRP
Supervisor

…….

Dr. Mohammad Sohrab Hossain, PhD
Professor,
Department of physiotherapy, BHPI, CRP
Executive Director,
Centre for the Rehabilitation of the Paralysed (CRP)
CRP Savar, Chapain, Savar, Dhaka- 1343

…….

Zahid Bin Sultan Nahid
Assistant Professor and Head
Department of Physiotherapy
SCMST, Mirpur-14, Dhaka

…….

Dr. Abul Kasem Mohammad Enamul Haque
Principal
SCMST, Mirpur-14, Dhaka

DECLARATION

This work has not previously been accepted in substance for any degree and isn't concurrently submitted in candidature for any degree. This dissertation is being submitted in partial fulfillment of the requirements for the degree of B.Sc. in Physiotherapy.

I confirm that if anything is identified in my work that I have done plagiarism or any form of cheating that will directly awarded me fail and I am subject to disciplinary actions of authority. I confirm that the electronic copy is identical to the bound copy of the thesis.

In case of dissemination the finding of this project for future publication, research supervisor will highly concern, it will be duly acknowledged as graduate thesis and consent will take from the physiotherapy department of Saic College of Medical Science and Technology (SCMST).

Signature: **Date:**

Md. Shoriful Islam
Bachelor of Science in Physiotherapy (B.Sc. PT)
DU Roll no: 1374
Reg. no: 10426
Session: 2018-2019

CONTENTS

Topic	Page No.
Acknowledgment	i
List of table	ii – iii
List of figure	iv
List of acronyms	v
Abstract	vi
CHAPTER-I: INTRODUCTION	1 – 10
1.1 Background	1 – 4
1.2 Rationale	5
1.3 Aim	6
1.4 Objectives	7
1.4.1 General objectives	7
1.4.2 Specific objectives	7
1.5 Hypothesis	8
1.6 Conceptual framework	9
1.7 Operational definition	10
CHAPTER-II: LITERATURE REVIEW	11 – 17
CHAPTER-III: METHODOLOGY	18 – 25
3.1 Study design	18
3.2 Study area	18
3.3 Study place	18
3.4 Study period	18
3.5 Study population	18
3.6 Sample size	19
3.7 CONSORT flow chart	20

3.8 Eligibility criteria	21
3.9 Methods of data collection	21
3.10 Instruments of data collection	21
3.11 Tools of data collection	22
3.12 Procedure of data collection	22
3.13 Intervention	23 – 24
3.14 Management of data	24
3.15 Data analysis	25
3.16 Ethical consideration	25
CHAPTER- IV RESULT	26 - 49
CHAPTER- V DISCUSSION	50-53
CHAPTER- VI CONCLUSION AND RECOMMENDATION	54 - 56
CHAPTER- VII REFERENCE LIST	57 - 64
APPPENDIX	
Appendix – A: Institutional Review Board (IRB) Letter	65
Appendix – B: Application for Data Collection Permission	66
Appendix – C: Consent From and Questionnaire Bangla and English	67– 93
Appendix – D: Gant Chart	94

ACHKNOLEDGEMENT

In conducting this study, I will extend my heartfelt gratitude to the participants whose willingness to share their experiences will make this research possible. I will deeply appreciate the support and assistance provided by the staff and management of the Center for the Rehabilitation of the Paralysed (CRP), Savar, Dhaka, during the data collection process. Additionally, I will sincerely thank my supervisor, Prof. Dr. Mohammad Anwar Hossain, Phd. Professor, Physiotherapy Department BHPI. Senior Consultant and Head, Physiotherapy Department CRP, for her unwavering guidance, insightful feedback, and encouragement throughout this research journey. I will also acknowledge and thank Zahid Bin Sultan, Course Coordinator at SCMST, for his assistance and support. Furthermore, I will extend my gratitude to Dr. Abul Kasem Mohammad Anamul Hoque, Principal of SCMST, for his support and encouragement

LIST OF TABLES

Table no.	Title	Page no
1	Table no- 4: Description of the continuous variable of Experimental Group and Control Group	26-27
2	Table no- 5: Frequency distribution of BMI Status and Gender of participants	28
3	Table no- 6: Educational Level of Participants	29
4	Table no- 7: Living area of participants	30
5	Table no- 8: Affected Side of participants	31
6	Table no- 9: Determination the level of ROM among the participant with in experimental and control group	32-33
7	Table no- 10: Determination the level of ROM between the participant with in experimental and control group	34 – 35
8	Table no- 11: Determination the level of pain among the participants with in Experimental and control group	36 – 37
9	Table no- 12: Determination the level of pain between the participants with in Experimental and control group	38 – 39
10	Table no- 13: Determination of muscle power among the participants with in experimental and control group	40
11	Table no- 14: Determination of muscle power between the participants with in experimental and control group	41
12	Table no- 15: Frequency distribution of pain level category of participants	42 – 44
13	Table no- 16: Summary of level of functional independence of Experimental group	45

14	Table no- 17: Summary of level of functional independence of Control group	46
15	Table no- 18: Summary of level of functional independence between the participants with in experimental and control group	47

LIST OF FIGURE

Figure no.	Title	Page no.
1	Figure no- 1: Summary of level of functional independence about Pretest and Post-test of Experimental group	48
2	Figure no- 2: Summary of level of functional independence about Pretest and Post-test of Control group	49

LIST OF ACRONYMS

WHO	World Health Organization
CRP	Centre for the Rehabilitation of the Paralyzed
SCMST	Saic College of Medical Science and Technology
VAS	Visual Analog Scale
ROM	Range of Motion
SSE	Scapular Stability Exercises
HSP	Hemiplegic Shoulder Pain
IRB	Institutional Review Board
SPSS	Statistical Package for the Social Sciences
BMRC	Bangladesh Medical Research Council
DALYs	Disability-Adjusted Life Years
HSC	Higher Secondary Certificate
SSC	Secondary School Certificate

ABSTRACT

Introduction: Stroke is a leading cause of disability worldwide, often accompanied by motor impairments and complications such as shoulder subluxation, which can significantly impact functional independence and quality of life. Effective rehabilitation strategies are essential to address these challenges. **Purpose**: This study aims to evaluate the effectiveness of scapular stabilization exercises in stroke patients with shoulder subluxation. **Objectives**: The study seeks to assess the impact of scapular stabilization exercises on improving pain levels, muscle strength, range of motion (ROM), and functional independence in daily living activities among stroke patients. **Methodology**: A randomized controlled trial was conducted involving 34 stroke patients with shoulder subluxation, divided into experimental and control groups. The experimental group received scapular stabilization exercises along with conventional physiotherapy, while the control group received conventional physiotherapy alone. The intervention spanned six weeks with three sessions per week. Outcomes were assessed pre- and post-intervention using the Barthel Index, Visual Analog Scale (VAS), and range of motion measurements. Data analysis was conducted using SPSS, employing paired t-tests, Wilcoxon Signed Ranks Test, and independent samples t-tests. **Results**: The mean pre- and post-intervention Barthel Index scores were 40.88 ± 11.48 and 50.88 ± 12.27 for the experimental group and 43.24 ± 14.78 and 55.88 ± 12.65 for the control group, both showing significant improvement. VAS scores and ROM also exhibited significant reductions in pain and improvements in mobility, particularly in the experimental group. The intervention demonstrated a statistically significant impact on functional independence, pain reduction, and muscle strength. **Conclusion**: Scapular stabilization exercises, when combined with conventional physiotherapy, effectively improve pain, muscle strength, ROM, and functional independence in stroke patients with shoulder subluxation. Further research with larger sample sizes and extended follow-up is recommended to validate these findings.

Keywords: *Stroke, Shoulder Subluxation, Scapular Stabilization Exercises, Functional Independence, Rehabilitation.*

CHAPTER: I INTRODUCTION

1.1 Background

In 1970, the World Health Organization defined stroke as 'rapidly developed clinical signs of focal (or global) disturbance of cerebral function, lasting more than 24 hours or leading to death, with no apparent cause other than of vascular origin (Aho et al. 1980, p. 1186). Stroke is the greatest cause of persistent disability in adults. Up to 80% of first-time survivors have functional deficits, including hemiparesis of the contralateral upper extremity (Langhorne et al. 2011, p. 90).

Every year, approximately 795,000 stroke occurrences occur in the US, making stroke the fifth most common cause of death and the primary cause for severe adult impairment (As G. 2013, p. 237).Between 2012 and 2030, there will be 3.4 million more cases of stroke due to population aging and a decrease in stroke-related case fatalities (Ovbiagele et al. 2013, p. 2365). While the United States has seen a decline in stroke mortality over the past two decades, current trends in mortality suggest that these declines may have leveled. For instance, subclinical cerebrovascular disease, which includes silent infarction, has been found on brain imaging in approximately 28% of adults over 65 (Vermeer et al. 2007, p. 615). Additionally, ischemic white matter disease—which is linked to several functional disabilities like dementia, memory loss, and impaired gait. Stroke continues to be the fourth greatest cause of death globally, with a significant impact in emerging nations. In addition, the worldwide impact of stroke is considerable (Feigin et al. 2009, p. 360).

The second most common cause of mortality worldwide is stroke. Each year, it claims the lives of about 5.5 million people and affects about 13.7 million people. Because of improved therapeutic interventions and lower mortality, ischemic infarctions account for around 87% of strokes, a prevalence that rose significantly between 1990 and 2016. Secondary (second-time) hemorrhages make up an estimated 10-15% of strokes, while primary (first-time) hemorrhages account for the majority of strokes (Roger et al. 2011, p. 55). Over the years 1990–2016, the prevalence of stroke decreased by 42% in nations with high incomes but doubled in low- and middle-income ones. The age, sex, and location of persons afflicted by stroke indicate that, despite a decline in the disease's prevalence, the socioeconomic burden of stroke has

risen over time, according to the Global Burden of Disease Study (Roger et al. 2011, p. 60).

Age-specific stroke: After the age of fifty-five, the probability of stroke doubles. But between 1990 and 2016, the percentage of stroke cases worldwide among those aged 20 to 54 rose alarmingly from 12.9% to 18.6%. In contrast, age-standardized associated death rates fell by 36.2% throughout that time. With an estimated 331–378 stroke victims per 100,000 life years, China has the highest documented incidence of strokes worldwide. Southeast Europe has the second-highest rate (181-218 per 100,000 life years), whereas Latin America has the lowest rate (85–100 per 100,000 life years) (Boehme et al. 2017, p. 480).

Stroke incidence by gender: Age has an impact on the incidence of stroke in both men and women. Incidence rises respectfully with increasing age in men, but it is higher in women when they are younger. Women over the age of 75 who have atrial fibrillation have a 20% increased chance of stroke. According to the National Institutes of Health Stroke Scale, which has five categories (0 being no stroke, 1-4 being mild stroke, 5–15 being moderate stroke, 15– 20 being moderate/severe stroke, and 21–42 being severe stroke), the mean severity of a stroke was determined to be 10 for women and 8.2 for men. Although males frequently experience brain infarction and intracerebral hemorrhage (ICH), a more serious type of stroke known as cardio-embolic (Boehme et al. 2017, p. 490).

Variation based on geography and race: As was already said, the incidence of stroke varies greatly worldwide. Studying the frequency of stroke and associated hazards worldwide using population-based research census, behavior, physical attributes, medical history, and test results, and shown how exposure to particle matter and air pollution contributes to the death of stroke victims (Chen 2010, p. 840). Another population-based study that was carried out in northeastern China is believed to be a good indicator of the state of disease in developing nations. It concluded that ischemic stroke, in particular, was statistically significantly associated with hypertension (Zhang et al. 2017, p. 720).

Socioeconomic variation: Stroke and socioeconomic level have a strong inverse association, which can be attributed to low-income people' access to post-stroke care and poor hospital facilities (Addo et al. 2012, p. 1189). According to a US case study,

those with higher socioeconomic standing had access to more effective stroke treatment alternatives than those with lower socioeconomic position (Sandel et al. 2009, p. 35).A Chinese study found a correlation between preventing secondary stroke attacks and having no health insurance and low income (Wang et al. 2010, p. 217).Study carried out in Austria linked educational attainment to the use of therapies including speech therapy and echocardiography; however, socioeconomic status had no bearing on the use of thrombolysis, physiotherapy, occupational therapy, or stroke care for recurrent attacks (Arrich et al. 2008, p. 2067).Analogously, basic medical care such as thrombolysis was given to patients in the Scottish healthcare system regardless of their financial situation (Kerr et al. 2011, p. 132).

Stroke patients have mal-aligned bodies, weak muscles, and poor voluntary control. The damaged arm's functionality may be compromised by these issues. Because weakened muscles frequently affect scapular stabilizers, a paretic arm may cause a change in scapular orientation. Such weakness makes upper extremity motor dysfunction worse (Hardwick and Lang 2011, p. 20). Optimal upper limb function requires the capacity to control movement and maintain scapular posture. The scapula gives the gleno-humeral joint regulated movement and dynamic stability. Because the scapula's architecture and biomechanics enable regulated movement of the shoulder joints, it plays a major part in supporting shoulder joint function. Recent research has concentrated on the necessity of creating upper extremity exercises due to their importance (Baskurt et al. 2011, p. 175).

Exercise therapy, which targets posture, muscle weakness, scapular stability, and scapula-humeral rhythms, has demonstrated efficacy in reducing discomfort and enhancing dysfunction associated with SAPS. However, because of program variety, the precise elements of exercise regimens for SAPS are still unknown (Reijneveld et al. 2017, p. 225). Existing trials frequently include drawbacks such limited sample sizes, inconclusive results, and short follow-up. According to certain research, scapula-focused rehabilitation techniques should be used to treat aberrant shoulder biomechanics (Larsson et al. 2019, p. 15).

Exercise therapy known as scapular stability exercises (SSE) aims to improve scapular kinematics, increase muscle function, and restore scapular posture and mobility. Exercises like wall slides with squats, wall push-ups with ipsilateral leg

extension, lawnmower with diagonal squat, scapular-retraction exercises, and robbery with squat are all part of SSE, which stresses the coordinated activation and co-activation of dynamic constraints (Ravichandran et al. 2020, p. 90). Through the inhibition of tight muscles and the activation of weak muscles to improve scapular force couplings and muscle imbalances, scapular stabilization exercises can enhance scapular stability and shoulder function (Lefevre-Colau et al. 2018, p. 46).

1.2 Rationale:

Stroke is a leading cause of mortality and disability around the world. According to the World Health Organization (WHO), around 15 million people suffer from strokes each year, with 5 million dying and another 5 million becoming permanently incapacitated. This high incidence highlights the critical need for better preventive, therapeutic, and rehabilitation efforts.

Stroke causes different kinds of neurological impairment, dependent on the location and severity of brain injury. These deficits frequently involve weakness, stiffness, and loss of motor function on one side of the human body. Stroke can disrupt sensory feedback pathways, resulting in decreased proprioception. This deficiency impairs the patient's perception of the position and mobility within the shoulder joint. Shoulder subluxation is a common and debilitating consequence in stroke survivors, causing substantial discomfort, limited range of motion, muscular weakness, and compromised functional abilities. Given its great prevalence and significant influence on quality of life & rehabilitation results.

It is an incomplete shoulder dislocation in which the head of the humerus moves away from the glenoid fossa. The shoulder is a joint made up of ball and sockets with a broad range of motion, which makes it less stable by design. The joint is stabilized by a mix of muscles, tendons, and ligaments. Rotator cuff muscles are essential for maintaining shoulder stability. Subluxation can result from weakness or rupture in these muscles. Acute or persistent discomfort is frequently caused by subluxation due to strain of shoulder structures and probable nerve involvement. Instability can limit range of motion & strength, which might interfere with daily tasks. Pain and instability caused by shoulder subluxation impede rehabilitation efforts and impair the patient's capacity to undertake activities of daily living. Rotator cuff tears, adhesive capsulitis, & nerve impingements are all potential sequelae of chronic subluxation.

So I want to provide scapular stabilization exercise and try to find out the Effectiveness of scapular stabilization exercises of the stroke patients with shoulder subluxation.

1.3 Aim:

To evaluate the effectiveness of scapular stabilization exercise for the stroke patient with shoulder subluxation.

1.4 Objective of the study

1.4.1 General objective:

- To compare the effectiveness of scapular stabilization exercise along with conventional physiotherapy to improve shoulder subluxation in stroke patients before and after exercise regimen.

1.4.2 Specific objectives:

- To assess the level of pain of stroke patients with shoulder subluxation by using VAS scale before and after scapular stabilization exercise along with conventional physiotherapy.
- To measure the range of motion of stroke patients with shoulder subluxation by using goniometer before and after scapular stabilization exercise along with conventional physiotherapy.
- To determine the effectiveness of scapular stabilization exercise between and within groups along with conventional physiotherapy to improve muscle strength of stroke patients with shoulder subluxation by using oxford manual muscle grading.
- To assess the effectiveness of scapular stabilization exercise between and within groups along with conventional physiotherapy to improve independence of daily living activities of stroke patients with shoulder subluxation.

1.5 Hypothesis:

Null hypothesis ($H_{0)}$:

Scapular Stabilization Exercise is not effective than conventional physiotherapy of stroke patients with shoulder subluxation.

$$\mu_1 - \mu_2 = 0 \ \mu_1 = \mu_2$$

Alternative hypothesis ($H_{1)}$:

Scapular Stabilization Exercise is effective than conventional physiotherapy of stroke patients with shoulder subluxation.

$$\mu_1 - \mu_2 \neq \text{or } \mu_1 \neq \mu_2$$

Where,

Here,

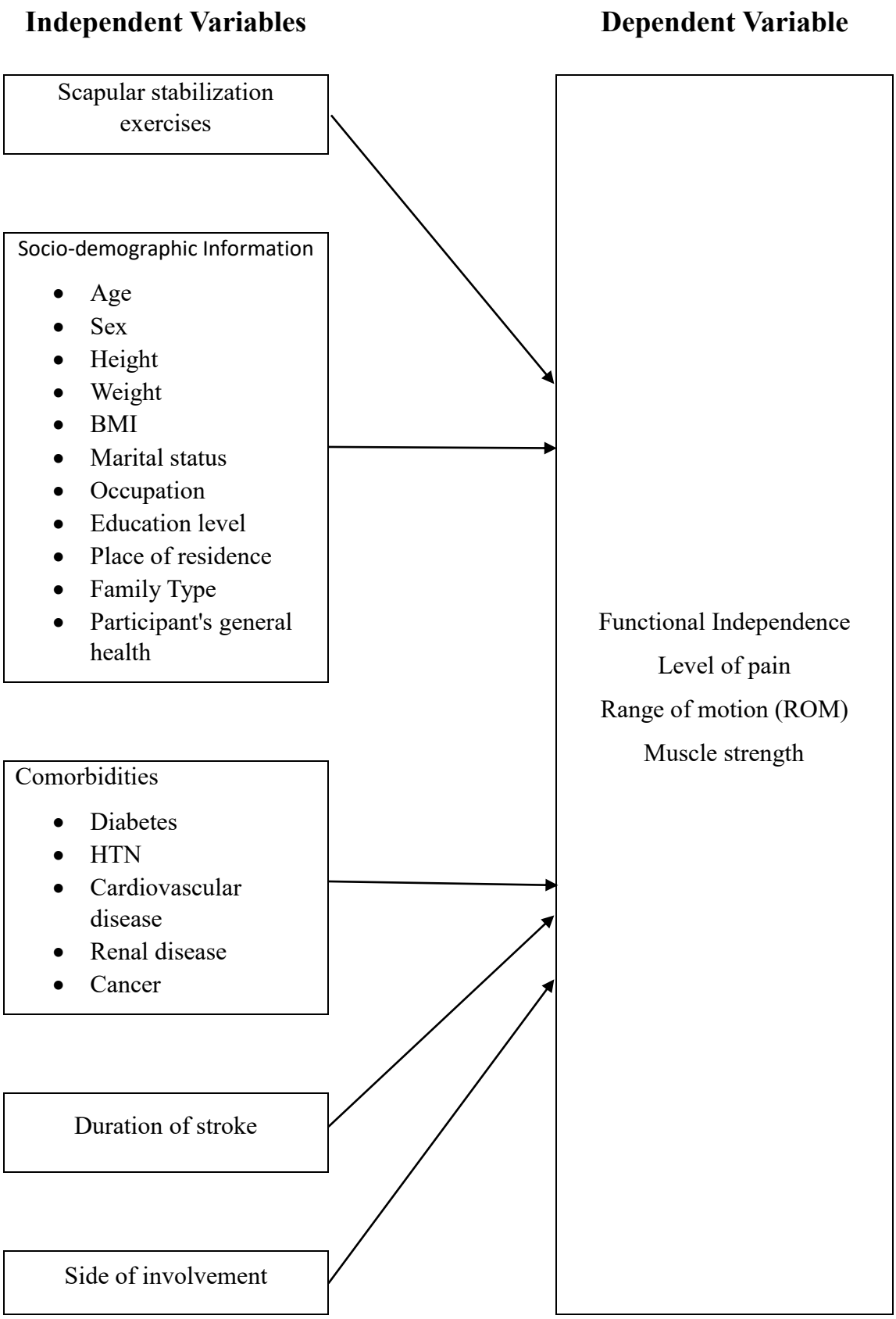
H_0 = Null hypothesis

H_1 = Alternative hypothesis

μ_1 = Mean of population 1

μ_2 = Mean of population 2

1.6 Conceptual Framework



1.7 Operational definition

Stroke: A stroke is a rapid neurological deficiency caused by a vascular lesion to the brain, which can be ischemic (blocked vessels), hemorrhagic (ruptured vessels), or transient ischemic. Weakness, speech problems, vision changes, headaches, and balance loss are some of the symptoms.

Hemorrhagic stroke: A hemorrhagic stroke happens when a blood artery carrying nutrients and oxygen to the brain ruptures and spills blood entering the brain. When this happens, a part of the brain loses oxygen and stops functioning.

Ischemic stroke: This form of stroke is caused by an obstruction in a blood vessel that supplies blood towards the brain. It is responsible for 87% of all patients with stroke.

Scapular stabilization exercise: Scapular stability exercises strengthen shoulder girdle muscles, restoring normal scapular range of motion as well as improving upper-limb motor performance.

Shoulder subluxation: Shoulder subluxation occurs when the humeral head dislocates partially from the glenoid fossa. In contrast to a full dislocation, in which the humerus entirely separates from the shoulder socket, a subluxation entails just a partial displacement, with the joint surface still in contact.

Effectiveness: Effectiveness of the scapular stabilization exercise for the present study refers to reducing pain, improving functional independence, increasing rang of motion and muscle strength of the patients.

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

Hypertension, diabetes, the use of contraceptives, alcohol consumption, polycythemia, and atrial fibrillation are among the general risk factors for stroke (Khan et al. 2020, p. 74). With a high occurrence rate of 24–64% in the inpatient rehabilitation unit, hemiplegic shoulder pain (HSP) is the most frequent consequence among stroke patients (Anwer et al. 2019, p. 515). Shoulder pain typically appears two to three months following a stroke (Poduri 2010, p. 276).It is crucial for the recuperation of the upper limbs. According to studies, hemiplegic shoulder discomfort increases the medical burden and lengthens hospital stays for patients (Pan et al. 2018, p. 40). According to a study, the frequency of shoulder pain after 12 and 4 months following a stroke is comparable. In addition to impeding the rehabilitation of

upper limb function, chronic pain causes anxiety, sadness, insomnia, and other psychological issues (BRAUN et al. 2023, p. 115). can result in patients' quality of life declining. As a result, identifying the risk factors for HSP has promising clinical implications and can aid in early prevention, tailored treatment, and a decrease in the prevalence of HSP.

Many elements, including neurological and mechanical ones, are thought to contribute to HSP. The gleno-humeral subluxation is one mechanical characteristic (Kumar et al. 2023, p. 220). A stroke occurs when a vascular lesion damages central neural tissue, leading to an abrupt onset of neurological impairment. A "Transient Ischemic Attack" (TIA) or a "Complete Stroke" are the two types of stroke. Hypertension, diabetes, the use of contraceptives, alcohol consumption, polycythemia, and atrial fibrillation are among the general risk factors for stroke (Khan et al. 2020, p. 74). Stroke ranks third globally in terms of causes of death, after coronary heart disease and cancer (Banerjee et al., 2006). 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. 2012, p. 40) In 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% 16 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 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 hemorrhage prevalence rates were 21%, and subarachnoid hemorrhage 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 17 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). More than 80% of stroke-related deaths occur in developing and underdeveloped nations (Feigin et al. 2009, p. 355). Strokes happen

early in infancy in underdeveloped nations like Pakistan, which results in higher rates of disability and a significant financial burden (Truelsen et al. 2007, p. 140). Shoulder subluxation is defined as changes in the biomechanical stability and veracity of the shoulder joint, also known as the gleno-humeral joint, that cause a noticeable and significant gap between the head of the humerus and the bony prominence of the acromion process (Suethanapornkul et al. 2008, p. 1885).

A study conducted in Karachi on 457 individuals who had a stroke or TIA found that shoulder subluxation was present in 21.8% of cases overall. In Pakistan, women are nine times more likely to have a stroke (Kamal et al. 2009, p. 5). Although it cannot store these chemicals, the adult brain requires 150 grams of glucose and 72 liters of oxygen every hour. Thus, any disruption in the cerebral vascularization may result in brain injury. One of the most prevalent types of cerebral vascular damage is stroke, which is the abrupt loss of neurological function brought on by either an ischemic (blood flow interruption) or hemorrhagic (blood leaking into the intracerebral space) hemorrhage (Sacco 2007, p. 160). The most prevalent primary dysfunctions, which include altered synergistic patterns, loss of coordination and balance, muscle strength deficiencies, changes in muscle tone (hypertonia), and functional impairment, are associated with paresis or folding of the hemi body contralateral to the central lesion. The following are some of the stroke-related problems that stand out: subluxation, shoulder pain, and deep vein thrombosis (Brandao et al. 2008, p. 85).

One of the most frequent side effects for people with hemiplegia after a stroke is shoulder subluxation (Paci et al. 2017, p. 100). In this study, partial separation of the humeral head from the glenoid cavity in the inferior direction is referred to as shoulder subluxation post-stroke. In people with post-stroke hemiplegia, inferior shoulder subluxation arises from a prolonged downward pull of the arm's gravity on hypotonic muscles, which causes the gleno-humeral capsule as well as the hypotonic supraspinatus and deltoid muscles to overstretch (Griffin 2014, p. 316). Subluxation is more likely to occur in the flaccid stage following a stroke, when people have severe motor impairments linked to hypotonia and/or weakness of the shoulder's supporting tissues (muscle, ligaments, and capsule). Shoulder subluxation has been demonstrated to hinder upper extremity function recovery by decreasing shoulder range of motion and raising the likelihood of complicated soft tissue shoulder injuries and complicated Regional Pain Syndrome (Stolzenberg et al. 2012, p. 445). These aftereffects could

result in longer hospital admissions, higher treatment expenses, and a lower standard of living in terms of health. If subluxation is left untreated, it may gradually get worse and become irreversible (Kumar et al. 2010, p. 95). Pain in the paralyzed shoulder of stroke patients is generally referred to as HSP.

Higher rates of depression during and after rehabilitation are linked to HSP, which also affects quality of life, activities of daily living performance, and upper limb functional recovery (Gilmore et al. 2018, p. 56). As a result of a vascular event, stroke is a clinical illness marked by the abrupt onset of a persistent localized neurological impairment (Geyer and Gomez 2009, p. 30). After arterial occlusion, an ischemic cascade starts that includes apoptosis, inflammation, depolarization, disruption of the blood-brain barrier, a rise in intracellular calcium, energy and sodium-potassium pump failure, and the production of free radicals (Kanekar et al. 2012, p. 70).

Resulting in a range of disabilities. Shoulder discomfort, which can range in prevalence from 34% to 86%, is one of the most significant and common stroke consequences (Vuagnat and Chantraine 2017, p. 50). Numerous underlying diseases, including adhesive capsulitis (50%), gleno-humeral subluxation (44%), rotator cuff tear (22%), and shoulder-hand syndrome (16%), have been identified as the cause of hemiplegic shoulder discomfort (S.F et al 2010, p. 1786). The most distant areas of the upper extremities frequently have the worst hemiparesis. Purposeful movement that necessitates precise control of the proximal segments is slow, inaccurate, and poorly coordinated, even if the proximal muscles and joints may be the least afflicted. Even when the proximal portion of the upper extremity is immobile, the distal portion can nevertheless move comfortably and cooperatively.

An impaired shoulder joint complex is typical in stroke survivors because paretic muscles are unable to support the arm's weight. Shoulder subluxation and discomfort are examples of neuromuscular disorders that impair upper extremity function (Hatakenaka et al. 2007, p. 350). Scapular stability during movement in cardinal planes has a special effect on the shoulder joint. Earlier research on upper extremity function recovery examined the impact of functional, repetitive, and physical activities on stroke survivors. Robot-assisted movement, electromyography-triggered neuromuscular electrical stimulation, and constraint-induced movement therapy were all employed in the investigations (Sirtori et al. 2009, p. 60). Though they have been shown to help chronic stroke patients, these therapeutic approaches primarily target

fine motor skills in the distal extremities rather than gross motor skills in the proximal extremities. Additionally, stroke patients lack the components required for proper scapular movement, which is frequently linked to proper initiation and recruitment (Oujamaa et al 2009, p. 290). Due to the fact that scapular stabilizers are frequently so compromised by muscle weakening that they are unable to support arm weight and preserve anatomical features, a paretic arm may alter scapular position. Since it has been demonstrated that scapular stabilizer weakness increases upper extremity motor deficits, many stroke survivors are unable to carry out independent daily activities (Hardwick et al. 2011, p. 340). Another essential element of autonomously carrying out daily living tasks is postural control of the trunk. Examined the connection between trunk control and all-encompassing daily living activities (Hsieh et al. 2012, p. 2628).

The degree of neurological impairments in a given patient is determined by the amount of collateral blood flow, the location and extent of brain injury, and early acute care therapy. In most cases, impairments may go away on their own in three weeks as brain swelling (reversible ischemic neurological deficit) goes down. Neurological abnormalities that last longer than three weeks are known as residual impairments, and they have the potential to cause permanent disability. Strokes are categorized by their etiology (e.g., hemorrhage, embolus, or thrombosis), vascular territory (e.g., anterior cerebral artery syndrome, middle cerebral artery syndrome, etc.), and management (young stroke, deteriorating stroke, minor stroke, major stroke, transient ischemic attack, respectively) (O'Sullivan et al. 2019, p. 50).

Subjects in the control group just received standard exercise treatment. Soft tissue/joint mobilization and range of motion exercises (passive or active assisted exercises), positioning, splinting, stretching, electrical stimulation, reaching activities, functional mobility exercises, locomotor training, and balance training are examples of sensory reeducation techniques such as stroking with various textured fabrics, pressing objects into the hand (coin, button, key), or drawing shapes, letters, or numbers on the skin (Vispute and Kanase 2018, p. 88). The most widely used therapeutic approach to enhance stroke patients' quality of life when there is no cure for the underlying illness is rehabilitation (Dajpratham et al. 2006, p. 2050).

Rehabilitation is "the health strategy that aims to enable people with health conditions experiencing or likely to experience disability to achieve and maintain optimal

functioning in interaction with the environment," according to the definition (Hesse et al. 2013, p. 627). Subluxation in stroke caused by pathomechanics Because of the muscles' flaccid stage, the force couple of the supraspinatus and the posterior fibers of the deltoid muscle cannot stir as normally. Therefore, the humerus subluxates caudally as a result of abduction and flexion movement brought on by gravity (Paci et al. 2007, p. 100). Orthopaedic equipment Early on following a stroke, shoulder supports are frequently used to stabilize the shoulder joint and lessen gleno-humeral subluxation. Henderson shoulder rings, Bobath rolls, Harris hemi-slings, Rolyan humeral cuff slings, Cavalier shoulder supports, arm troughs or lapboards, and shoulder strapping are a few types of shoulder supports. According to a study by Nadler et al., hemiplegic shoulder pain may be lessened by using shoulder orthoses to minimize vertical subluxation. More effective orthoses have both proximal and distal attachments. Additionally, it must be used carefully to prevent contractures (Nadler and Pauls 2017, p. 450).

CHAPTER III METHODOLOGY

3.1 Study design:

A randomized control trial design was used for the study, and two different subject groups participated. Randomized control is a trial design technique used to test hypotheses and determine cause and effect. The research was a true experiment with various subject designs. The control group in this experiment received only conventional physiotherapy, while the experimental group received scapular stabilization exercises in addition to conventional physiotherapy. Each participant in both groups took a pre-test prior to exercise and a post-test following exercise to compare shoulder joint pain, muscular strength, range of motion, and improvement in daily living activities following treatment.

3.2 Study area:

The study will be carried out at the Centre for the Rehabilitation of the Paralyzed (CRP), which is situated in Savar, Dhaka, in the Neurology Unit of the Physiotherapy Department. As a renowned rehabilitation facility with specialized facilities and knowledge of stroke care, CRP is a perfect location for this study.

3.3 Study place:

The study was conducted at Saic College of Medical Science and Technology (SCMST) at Mirpur, Dhaka.

3.4 Study period:

The study period was one year. (September 2023 to August 2024).

3.5 Study Population:

The target demographic consists of stroke survivors who visit the Neurology Unit of the Physiotherapy Department at CRP and have shoulder subluxations. Physiotherapy treatments are usually recommended for these patients in order to enhance upper limb functionality and lessen secondary issues such shoulder subluxation.

3.6 Sample Size:

$$k = \frac{n_2}{n_2} = 1$$

$$n_1 = \frac{\left(\sigma_1^2 + \sigma_2^2 / K\right)\left(Z_1 - \frac{a}{2} + Z_1 - \beta\right)^2}{\Delta^2}$$

$$n_1 = \frac{(2.97^2 + 2.97^2/1)\,(1.96+1.28)^2}{3.36^2}$$

$n_1 = 16$

$n_2 = K \times n_1 = 16$

Here,

$\Delta = \mu_2 - \mu_1$ = absolute difference between two means

σ_1 , σ_1 = variance of mean 1 and 2

n_1 = sample size for group 1

n_2 = sample size for group 2

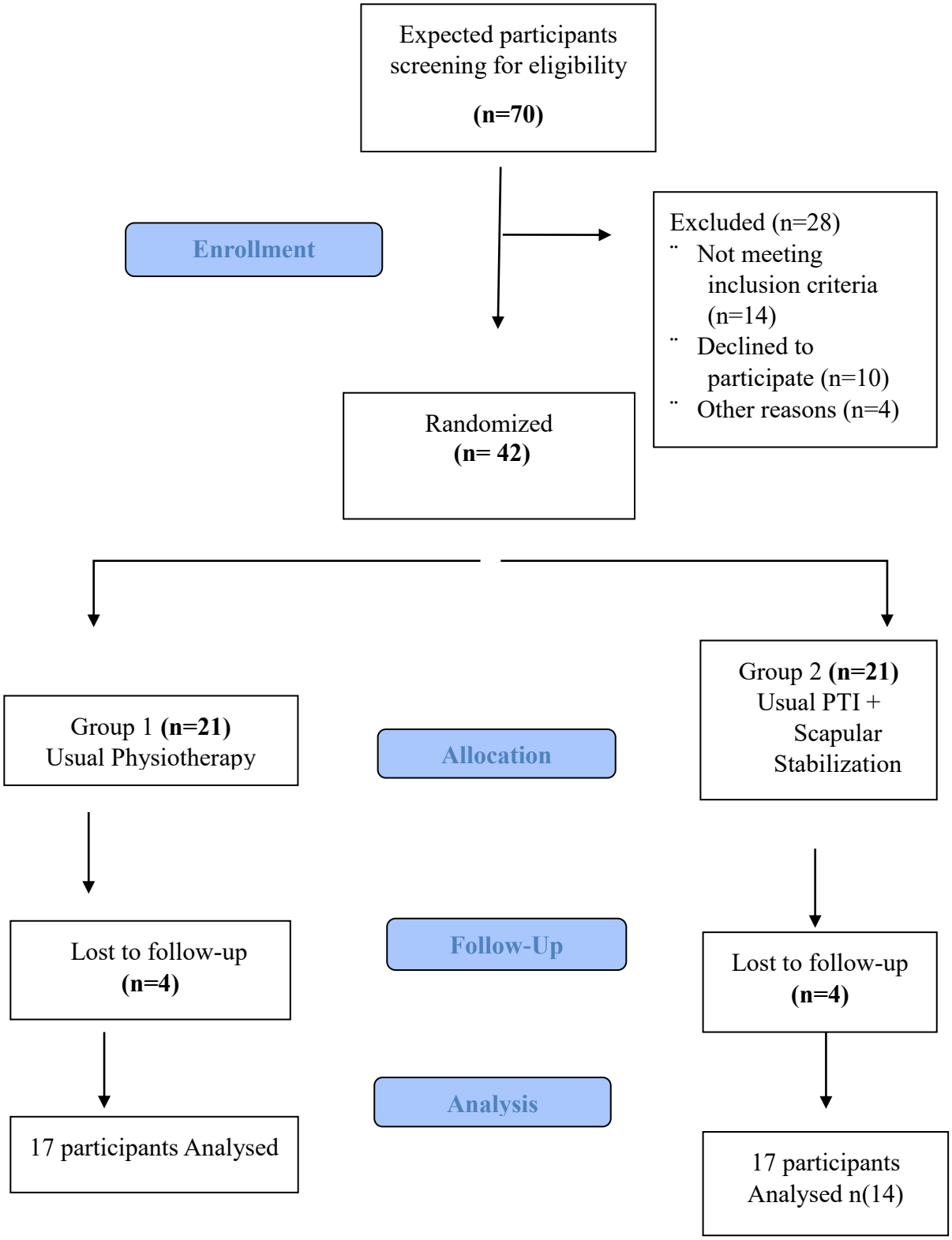
α = probability of type I error (usually 0.05)

β = probability of type II error (usually 0.2)

z = critical Z value for a given α or β

k = ratio of sample size for group 2 to group 1

3.7 CONSORT (Consolidated Standards of Reporting Trials) flow chart:



3.9 Eligibility criteria:

3.9.1 Inclusion criteria:

- ✓ Stroke Survivors with shoulder subluxation (Singh et al. 2021, p. 113).
- ✓ Patients undergoing physiotherapy Intervention (Basson et al. 2014, p. 105).
- ✓ Participants who are willing and able to commit to the study requirements, including attending therapy sessions (Nee et al. 2012, p. 24).

3.9.1 Exclusion criteria:

- ✓ Patient with Severe cognitive impairment or dementia (Singh et al. 2021, p. 120).
- ✓ Individuals with severe physical limitations (Basson et al. 2014, p. 107).
- ✓ Patients who are unwilling or unable to participate (Nee et al. 2012, p. 27).

3.10 Methods of data collection:

3.10.1 Technique of data collection:

Face to face formal interview technique was used to collect data from the selected patients with shoulder subluxation.

For determination range of motion was used by a goniometer to collect data from the selected patients with shoulder subluxation.

3.10.2 Instrument of data collection:

The pretested structured questionnaire was used as an instrument of data collection. The questionnaire had parts. The first part contained questions on Participant's personal details. The second part included questions on socio-demographic information. The third part contained questions on Comorbidities information. The fourth part contained questions on Stroke related history. The fifth part contained questions on Muscle Strength Assessment. The six part contained questions on Muscle Strength Assessment. The sixth part contained Functional Outcome Assessment of stroke patients with shoulder subluxation.

3.11 Tools for data collection:

In this particular study, a written questionnaire, goniometer, measurement tape were used.

3.12 Procedure of data collection:

The researcher selected 70 patients of stroke with shoulder subluxation from the neurology unit of CRP-Savar. After screening of the patients, 28 patients were excluded based on exclusion criteria. Thereafter the 42 patients were allocated into experimental and control groups by randomization. In the experimental group, 17 patients received scapular stabilization exercise with usual physiotherapy and in the control group, 17 patients received usual physiotherapy. Four patient in both groups did not complete 18 sessions of treatment. Ultimately the number of participants in the experimental and control groups become 17 respectively. Information on pain, rang of motion, functional independence and muscle strength was collected. This information has been regarded as pre-test data. The intervention for the present study was by scapular stabilization exercise and conventional physiotherapy in the experimental group. For the control group only usual physiotherapy was given. Both groups received similar 18 sessions. After completion of the intervention information on pain was collected by VAS Scale, range of motion by goniometer, functional independence by Barthel Index and Muscle Strength by Oxford manual muscle grading. The information after the intervention has been regarded as post-test data of 34 stroke patients with shoulder subluxation. After the interview, the researcher thanked the participants.

3.13 Intervention:

Session Structure:

Frequency: 3 times per week

Duration: 6 weeks

Detailed Protocol

This study involved the participation of 34 patients, who were divided into two groups. The two categories of groups are experimental and control. In each group, there are 17 patients. In the experimental group, patients received three exercises in addition to standard physiotherapy, while patients in the control group received only standard therapy.

Conventional therapy, the therapist has provided:

- scapular strengthening exercise
- scapular retraction exercise
- scapular depressor exercise
- positioning exercise
- scapular stretching exercise

The experimental group's treatment protocol:

- Exercise 1: Scapular protraction exercise (Song 2013, p. 403).

Procedure: The scapular stabilization exercise was divided into four stages: the patient position, the therapist position, the exercise stage, and the relaxation stage. In order to maintain a stable posture without shifting his neck or upper extremities, the patient sat in a chair with his feet flat on the floor and his knees bent. The therapist touched the axillary and scapula areas. The patient fully relaxes after that. The patient took a deep breath and held the scapula in a relaxed, comfortable position for ten seconds before settling back into the starting position. Additionally, the patient maintained the elbow and shoulder joints at 180° and 90°, respectively. The work was finished by the patient.

Duration: The patients completed three sets of ten motions, pausing for one minute in between each set. For six weeks, there will be three sessions a week lasting eight minutes each. Each session will last for eight minutes.

- Exercise 2: Sleeper stretch exercise (Moezy et al. 2014, 87).

Procedure: The patient lies on the side that is afflicted. The therapist tries to stretch the elbow and shoulder to a 90-degree angle while rotating the paretic hand inward.

Duration: Complete two sets of ten repetitions three days a week for six weeks while being supervised. It will take five minutes per session.

- Exercise 3: Object-related reach to grasp practice in trunk restraint position (Michaelsen et al. 2006, p. 186).

Procedure: Shoulder straps are fastened to the chair back, and the body will stop sagittal displacement and rotation when seated at a table. Bilateral and repetitive functional reach-to-grasp exercises with items of various weights, sizes, and forms are part of it. Taking up objects of various shapes and sizes

Duration: Three sessions per week for roughly six weeks, lasting five minutes each

3.14 Management of data:

At the end of each day, the collected questionnaires were checked for any errors or inconsistencies. The necessary corrections were made. The recorded data were coded accordingly into the SPSS-25 version of the program.

3.15 Data analysis:

Data were analyzed by SPSS version 25 using descriptive analysis for socio-demographic variables. Independent samples t-test was used to assess pre-test and post-test intervention between groups and paired t-test was used to assess pre-test and post-test intervention within the group. Microsoft Excel 2021 was used for the bar diagram and chart.

3.16 Ethical consideration

Strict adherence to ethical guidelines is paramount in this study. A formal project proposal has been submitted to the Department of Physiotherapy at Saic College of Medical Science and Technology (SCMST), and approval has been obtained from the Institutional Review Board (IRB) of SCMST to conduct the study. This study follows the guidelines set forth by the World Health Organization (WHO) and Bangladesh Medical Research Council (BMRC), ensuring confidentiality of participant information at all times. Permission to collect data has been obtained from the study area authorities. Participants will be fully informed about the aims and objectives of the study before consenting to participate. Written consent will be obtained from each participant, and the process will be explained verbally as well. Participants will be assured of the confidentiality of their information, which will only be shared with the research supervisor. Participants will be informed of their rights, including the option to withdraw from the study at any time without consequences. To protect anonymity, participant names and addresses will not be used; instead, participation numbers will be assigned in all notes and transcripts. It will be made clear that information gathered may be presented in presentations, seminars, or written papers, but in a way that ensures no identification of individuals and poses no harm to them. Participants will be assured of their right to discuss any concerns related to the study with senior authorities. The ethical standards upheld in this study aim to protect participant welfare while maintaining the integrity and confidentiality of the research process.

CHAPTER-IV RESULTS

This study evaluates the effectiveness of scapular stabilization exercises in stroke patients with shoulder subluxation. Through a randomized controlled trial, we assessed pain, range of motion, muscle strength, and functional independence. The results highlight significant improvements in the experimental group, demonstrating the potential benefits of these exercises in stroke rehabilitation.

Baseline characteristics of participants:

Table no- 4: Description of the continuous variable of Experimental Group and Control Group:

Variable	Experimental Group	Control Group	*t*	*p*-value
	Mean ± SD			
Age	47.06 ± 10.23	49.18 ± 6.10	0.732	0.469
BMI	22.38 ± 2.35	23.18 ± 1.29	1.224	0.230

The results presented in Table no. 4 provide a descriptive analysis of the continuous variables, age, and BMI, for both the experimental and control groups. The mean age of participants in the experimental group was 47.06 years (± 10.23), while the control group had a slightly higher mean age of 49.18 years (± 6.10). The independent samples t-test indicated that this difference was not statistically significant, with a t-value of 0.732 and a p-value of 0.469, suggesting that both groups were comparable in terms of age distribution.

Regarding BMI, the mean BMI for the experimental group was 22.38 (± 2.35), compared to 23.18 (± 1.29) for the control group. The t-test results yielded a t-value of 1.224 with a p-value of 0.230, indicating no significant difference between the groups in terms of BMI. These findings suggest that the experimental and control

groups were well-matched for both age and BMI, which helps to ensure the validity of subsequent comparisons related to the intervention outcomes.

Table no- 5: Frequency distribution of BMI Status and Gender of participants:

Variable	Experimental		Control	
	Frequency (n)	Percentage (%)	Frequency (n)	Percentage (%)
BMI Status				
Underweight	1	5.9%	0	0.0%
Normal Weight	14	82.4%	16	94.1%
Overweight	0	0.0%	0	0.0%
Obese	2	11.8%	1	6.9%
Gender				
Male	13	76.5%	13	76.5%
Female	4	23.5%	4	23.5%

Table no. 5 presents the frequency distribution of BMI status and gender in the experimental and control groups. The majority of participants had normal BMI, with 82.4% in the experimental group and 94.1% in the control group. Underweight individuals were found only in the experimental group (5.9%), while obesity was slightly higher in the experimental group (11.8%) compared to the control group (6.9%).

Gender distribution was identical in both groups, with 76.5% male and 23.5% female participants. These similarities indicate that BMI and gender were well-matched between the groups, minimizing potential demographic bias in the study outcomes.

Table no- 6: Educational Level of Participants:

Variable	Experimental		Control	
	Frequency (n)	Percentage (%)	Frequency (n)	Percentage (%)
Educational Level				
Primary	1	5.9%	-	-
SSC	11	64.7%	11	64.7%
HSC	4	23.5%	2	11.9%
Honors	1	5.9%	3	17.6%
Masters	-	-	1	5.9%

Educational levels varied between the groups. Both the experimental and control groups had 64.7% of participants with SSC qualifications. The experimental group had a higher representation at the HSC level (23.5%) compared to 11.9% in the control group. Additionally, the control group had more participants with Honors (17.6%) and Masters (5.9%) degrees, while the experimental group had only 5.9% of participants at the Honors level and none with Masters-level education. The experimental group also had a small proportion (5.9%) of participants with only primary-level education, which was absent in the control group.

Table no- 7: Living area of participants:

Variable	Experimental		Control	
	Frequency (n)	Percentage (%)	Frequency (n)	Percentage (%)
Living Area				
Rural	15	88.2%	11	64.7%
Semi-urban	2	11.8%	5	29.4%
Urban	-	-	1	5.9%

The living area distribution revealed that the majority of participants in the experimental group resided in rural areas, accounting for 88.2% of the group. In contrast, 64.7% of the control group participants were from rural areas. The control group showed greater geographic diversity, with 29.4% of participants living in semi-urban areas and 5.9% residing in urban areas. In comparison, the experimental group had 11.8% from semi-urban areas and no participants from urban locations.

Table no- 8: Affected Side of participants:

Variable	Experimental		Control	
	Frequency (n)	Percentage (%)	Frequency (n)	Percentage (%)
Affected Side				
Left	4	23.5%	5	29.4%
Right	13	76.5%	12	70.6%

The affected side data indicated that the majority of participants in both groups had right-side involvement. This was observed in 76.5% of the experimental group and 70.6% of the control group. Left-side involvement was present in 23.5% of the experimental group and 29.4% of the control group.

Table no- 9: Determination the level of ROM among the participant with in experimental and control group:

Variable	Experimental			Control		
Flexion (Act)	**df**	**t-value**	**p- value**	**df**	**t-value**	**p- value**
	16	-29.678	0.001	16	-15.333	0.001
Flexion (Pass)	16	-23.031	0.001	16	-21.495	0.001
Extension (Act)	16	-15.409	0.001	16	-10.772	0.001
Extension (Pass)	16	-7.587	0.001	16	-2.129	0.049
Abduction (Act)	16	-17.223	0.001	16	-19.837	0.001
Abduction (Pass)	16	-22.886	0.001	16	-19.257	0.001
Adduction (Act)	16	-9.561	0.001	16	-7.104	0.001
Adduction (Pass)	16	-53.603	0.001	16	-35.953	0.001
Internal Rotation (Act	16	12.65	31.41	16	-7.754	0.001
Internal Rotation (Pass)	16	-14.751	0.001	16	-4.421	0.001
External Rotation (Act)	16	-16.232	0.001	16	-9.067	0.001
External Rotation (Pass)	16	-6.781	0.001	16	-3.426	0.003

Paired t-test

The results presented in Table no. 9 highlight significant improvements in the Range of Motion (ROM) across all measured variables for both experimental and control groups from pretest to posttest. The experimental group demonstrated consistently higher posttest means across all ROM variables compared to the control group, with statistically significant t-values ($p < 0.05$ for all comparisons). For active flexion, extension, and rotation, as well as passive ROM measures, the experimental group showed marked improvements with t-values ranging from -6.781 to -53.603, all with p-values of 0.001. Similarly, the control group also exhibited significant changes, albeit with comparatively lower posttest means and t-values across the variables. These findings indicate that while both groups benefited from interventions, the experimental group achieved superior gains in ROM, emphasizing the effectiveness of the experimental protocol.

Table no- 10: Determination the level of ROM between the participant with in experimental and control group:

Variable	Experimental Mean	Control Mean	t-value	df	p-value
ROM flex post act	87.65	57.94	7.738	32	0.001
ROM flex post pass	139.71	119.35	4.872	32	0.001
ROM Ext post act	32.65	27.35	2.815	32	0.008
ROM Ext post pass	41.18	32.35	3.987	32	0.001
ROM Abd post act	112.59	90	3.409	32	0.002
ROM Abd post pass	147.35	128.41	7.239	32	0.001
ROM Add post act	24.29	24.18	0.116	32	0.908
ROM Add post pass	33.82	33.82	0	32	1.000
ROM Int-rot post act	31.41	27.82	1.86	32	0.072
ROM Int-rot post pass	46.18	36.76	3.425	32	0.002
ROM Ext-rot post act	33.88	28.76	4.038	32	0.001
ROM Ext-rot post pass	54.88	44.06	6.913	32	0.001

Independent samples t-test

The results in Table no. 10 demonstrate significant differences in the Range of Motion (ROM) outcomes between the experimental and control groups for most variables. The experimental group consistently showed higher mean ROM values post-intervention compared to the control group. Independent samples t-tests revealed

statistically significant differences for active and passive flexion, extension, abduction, and external rotation ($p < 0.05$). Specifically, active flexion ($t = 7.738$, $p = 0.001$), passive flexion ($t = 4.872$, $p = 0.001$), and passive external rotation ($t = 6.913$, $p = 0.001$) exhibited the largest disparities. However, no significant differences were found for active and passive adduction ($p = 0.908$ and $p = 1.000$, respectively), and internal rotation post active approached but did not reach significance ($p = 0.072$). These findings underscore the greater effectiveness of the experimental intervention in enhancing ROM outcomes compared to the control group.

Table no- 11: Determination the level of pain among the participants with in Experimental and control group:

Variable	Experimental			Control		
	df	t-value	p-value	df	t-value	p-value
VAS Flexion	16	11.09	0.001	16	15.318	0.002
VAS Extension	16	11.093	0.001	16	1311.08 6.318	0.001
VAS Abduction	16	9.177	0.001	16	16.318	0.001
VAS Adduction	16	9.1771	0.001	16	16.706	0.001
VAS Med rot	16	11.086	0.001	16	14.537	0.001
VAS Lat rot	16	10.286	0.001	16	10.415	0.001
VAS Standing	16	7.098	0.001	16	10.59	0.001
VAS Walking	16	7.581	0.001	16	10.59	0.001
VAS Sitting	16	7.32	0.001	16	10.59	0.001
VAS Lying	16	6.934	0.001	16	6.934	0.001
VAS ADL	16	7.581	0.001	16	11.823	0.001

Paired t-test

The results in Table no. 11 highlight significant improvements in Visual Analog Scale (VAS) scores within both the experimental and control groups across all measured variables from pretest to posttest. The experimental group consistently showed greater reductions in VAS scores, with statistically significant t-values ($p = 0.001$) for all variables. Notable improvements were observed in variables such as VAS extension ($t = 11.093$), abduction ($t = 9.177$), and medial rotation ($t = 11.086$). Similarly, the control group also exhibited significant reductions in pain levels, with the highest t-values recorded for adduction ($t = 16.706$) and ADL ($t = 11.823$). While both groups showed improvements, the experimental group demonstrated marginally better outcomes, indicating the efficacy of the intervention in reducing pain levels during various activities and movements

Table no- 12: Determination the level of pain between the participants with in Experimental and control group:

Variable	Experimental Mean	Control Mean	t-value	df	p-value
VAS Ext post	2.88	3.47	-1.715	32	0.096
VAS Abduction post	2.82	3.47	-1.866	32	0.071
VAS Adduction post	2.82	3.41	-1.699	32	0.099
VAS Medial rotation post	2.82	3.41	-1.699	32	0.099
VAS Lateral rotation post	2.82	3.41	-1.699	32	0.099
VAS Standing post	1.82	2.12	-1.69	32	0.101
VAS Walking post	1.82	2.12	-1.69	32	0.101
VAS Sitting post	1.76	2.12	-1.96	32	0.059
VAS Lying post	1.76	2.12	-1.96	32	0.059
VAS ADL post	1.82	2.12	-1.516	32	0.139

Independent samples t-test

The results in Table no. 12 present the comparison of post-intervention Visual Analog Scale (VAS) scores between the experimental and control groups using independent samples t-tests. While the experimental group consistently showed lower mean pain scores than the control group across all variables, the differences were not statistically significant at the conventional $p < 0.05$ threshold. The t-values ranged from -1.516 to -1.96, with p-values between 0.059 and 0.139. The closest to significance were VAS Sitting post ($t = -1.96$, $p = 0.059$) and VAS Lying post ($t = -1.96$, $p = 0.059$),

suggesting a trend toward reduced pain in the experimental group compared to the control group. These results indicate that while both groups experienced pain relief, the differences in pain reduction between groups were not substantial.

Table no- 13: Determination of muscle power among the participants with in experimental and control group:

Variable	Experimental		Control	
	Z-value	p- value	Z-value	p- value
Oxford flexor	-2.449	0.14	-1.000	0.317
Oxford extensor	-2.449	0.14	-1.000	0.317
Oxford abductor	-2.449	0.14	-2.236	0.025
Oxford adductor	-2.449	0.14	-2.236	0.025
Oxford medial rot	-2.828	0.005	-2.828	0.005
Oxford lateral rot	-2.828	0.005	-2.828	0.005

Wilcoxon test

Table no.13 shows the results of the Wilcoxon test for Oxford Muscle Power within the experimental and control groups. In the experimental group, significant improvements were observed in medial and lateral rotation ($Z = -2.828$, $p = 0.005$), while flexion, extension, abduction, and adduction did not reach statistical significance ($p = 0.14$).

In the control group, significant improvements were seen in abduction and adduction ($Z = -2.236$, $p = 0.025$) as well as medial and lateral rotation ($Z = -2.828$, $p = 0.005$). No significant changes were observed in flexion and extension ($p = 0.317$). These findings indicate greater improvements in rotational movements for both groups, with the control group also showing notable gains in abduction and adduction.

Table no- 14: Determination of muscle power between the participants with in experimental and control group:

Variable	Experimental Mean Rank	Control Mean Rank	Mann Whitney U-value	p-value
Oxford flexor post	12.97	22.03	87.500	0.033
Oxford extensor post	14.15	20.85	87.500	0.033
Oxford abductor post	12.97	22.03	89.500	0.035
Oxford adductor post	14.15	20.85	89.500	0.035
Oxford med rot post	14.26	20.74	92.500	0.048
Oxford lat rot post	14.26	20.74	92.500	0.048

Mann-Whitney U-test

Table no. 14 presents the results of the Mann-Whitney U-test comparing Oxford Muscle Power between the experimental and control groups. The results indicate significant differences across all muscle groups, with the control group consistently showing higher mean ranks.

Significant differences were observed for flexor ($U = 87.500$, $p = 0.033$) and extensor muscles ($U = 87.500$, $p = 0.033$). Abductor ($U = 89.500$, $p = 0.035$) and adductor muscles ($U = 89.500$, $p = 0.035$) also showed significant differences. Additionally, medial rotation ($U = 92.500$, $p = 0.048$) and lateral rotation ($U = 92.500$, $p = 0.048$) revealed significant differences between groups.

Table no- 15: Frequency distribution of pain level category of participants:

Variable		Before		After	
		Ex	Con	Ex	Con
Flexion	No pain	1 (5.9%)	0 (0.0%)	1 (5.9%)	0 (0.0%)
	Mild	1 (5.9%)	0 (0.0%)	10 (58.8%)	0 (0.0%)
	Moderate	12 (70.6%)	14 (82.4%)	6 (35.3%)	14 (82.4%)
	Severe	3 (16.7%)	3 (17.6%)	0 (0.0%)	3 (17.6%)
Extension	No pain	1 (5.9%)	0 (0.0%)	1 (5.9%)	0 (0.0%)
	Mild	1 (5.9%)	0 (0.0%)	10 (58.8%)	6 (35.3%)
	Moderate	12 (70.6%)	14 (82.4%)	6 (35.3%)	11 (64.7%)
	Severe	3 (17.6%)	3 (17.6%)	0 (0.0%)	0 (0.0%)
Abduction	No pain	1 (5.9%)	0 (0.0%)	1 (5.9%)	0 (0.0%)
	Mild	1 (5.9%)	0 (0.0%)	10 (58.8%)	6 (35.3%)
	Moderate	11 (64.7%)	14 (82.4%)	6 (35.3%)	11 (64.7%)
	Severe	4 (23.5%)	3 (17.6%)	0 (0.0%)	0 (0.0%)
Adduction	No pain	1 (5.9%)	0 (0.0%)	1 (5.9%)	0 (0.0%)

	Mild	1 (5.9%)	0 (0.0%)	10 (58.8%)	7 (41.2%)
	Moderate	11 (64.7%)	14 (82.4%)	6 (35.3%)	10 (58.8%)
	Severe	4 (23.5%)	3 (17.6%)	0 (0.0%)	0 (0.0%)
Medial Rotation	No pain	1 (5.9%)	0 (0.0%)	1 (5.9%)	0 (0.0%)
	Mild	1 (5.9%)	0 (0.0%)	10 (58.8%)	7 (41.2%)
	Moderate	12 (70.6%)	14 (82.4%)	6 (35.3%)	10 (58.8%)
	Severe	3 (17.6%)	3 (17.6%)	0 (0.0%)	0 (0.0%)
Lateral Rotation	No pain	1 (5.9%)	0 (0.0%)	1 (5.9%)	0 (0.0%)
	Mild	1 (5.9%)	1 (5.9%)	10 (58.8%)	7 (41.2%)
	Moderate	12 (70.6%)	13 (76.5%)	6 (35.3%)	10 (58.8%)
	Severe	3 (17.6%)	3 (17.6%)	0 (0.0%)	0 (0.0%)

The frequency distribution presented in Table no. 15 illustrates the pain level categories of participants for flexion, extension, abduction, adduction, medial rotation, and lateral rotation, both before and after the intervention for experimental and control groups.

In the experimental group, the proportion of participants with "no pain" and "mild pain" increased significantly after the intervention across all movements, with "mild pain" being the dominant category post-intervention (e.g., 58.8% for flexion and 41.2%-58.8% for other movements). Severe pain was completely eliminated post-intervention in the experimental group.

In the control group, participants showed minimal improvement, with most participants remaining in the "moderate pain" category (82.4%-76.5% pre-intervention and 58.8%-64.7% post-intervention) across movements. Severe pain was reduced in some cases, but no participants in the control group reached the "no pain" category.

These results highlight the greater efficacy of the experimental intervention in alleviating pain and shifting participants into lower pain categories compared to the control group.

Table no- 16: Summary of level of functional independence of Experimental group:

Variables	t- value	df	Sig value (p)
Berthel Index	-8.816	16	0.000

Paired t test

The paired t-test results for the experimental group demonstrate a statistically significant improvement in Barthel Index scores following the intervention. The mean difference falls within the 95% confidence interval (CI) of **-12.405 to -7.595**, with a t-value of **-8.816** and a p value of **0.000**. These results indicate that the intervention was highly effective in enhancing functional independence as measured by the Barthel Index in the experimental group.

Table no- 17: Summary of level of functional independence of Control group:

Variables	95% CI		t	df	Sig value (p)
	Lower	Upper			
Berthel Index	-16.516	-8.778	-6.930	16	0.002

Paired t test

Similarly, the paired t-test for the control group also revealed a statistically significant improvement in Barthel Index scores. The mean difference lies within the 95% CI of **-16.516 to -8.778**, with a t-value of **-6.930** and a p-value of **0.000**. This indicates that the control group also experienced significant improvements in functional independence, though the extent of improvement appears slightly different from that of the experimental group.

Table no- 18: Summary of level of functional independence between the participants with in experimental and control group:

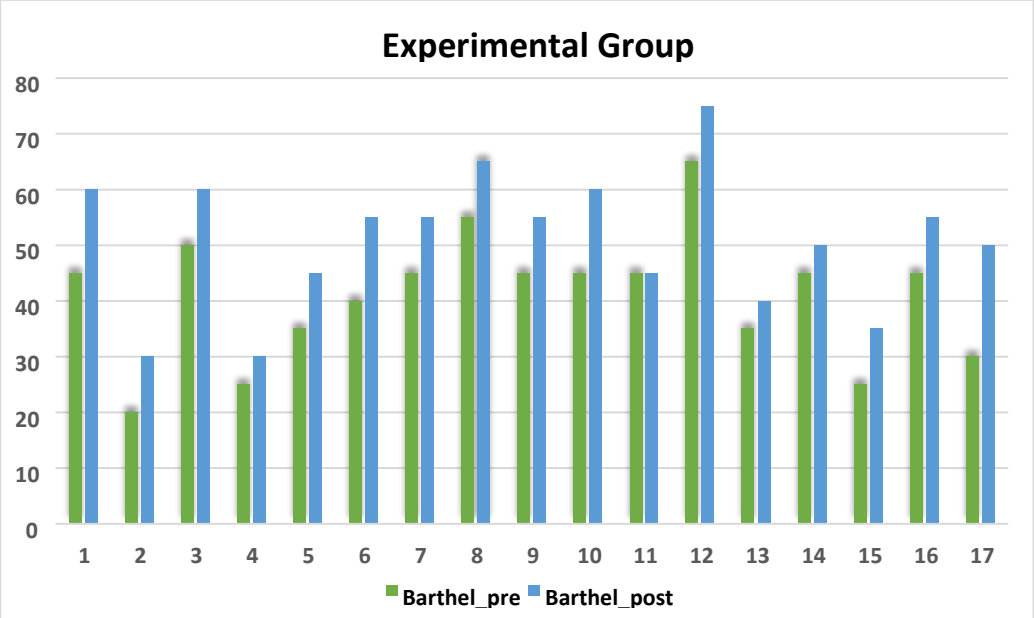
Variables	t	df	95% CI		Sig value, (p)
			Lower	Upper	
Berthel Index	-1.232	26	-7.05784	1.76372	0.229

Independent samples t-test

The independent samples t-test comparing the Barthel Index scores between the experimental and control groups yielded a t-value of **-1.232** and a p-value of **0.229**. The 95% CI ranges from **-7.05784 to 1.76372**, indicating no statistically significant difference between the groups in terms of Barthel Index improvement. This suggests that while both groups experienced significant functional gains, the level of improvement was not significantly different between the experimental and control groups.

Figure no- 1: Summary of level of functional independence about Pretest and Post-test of Experimental group:

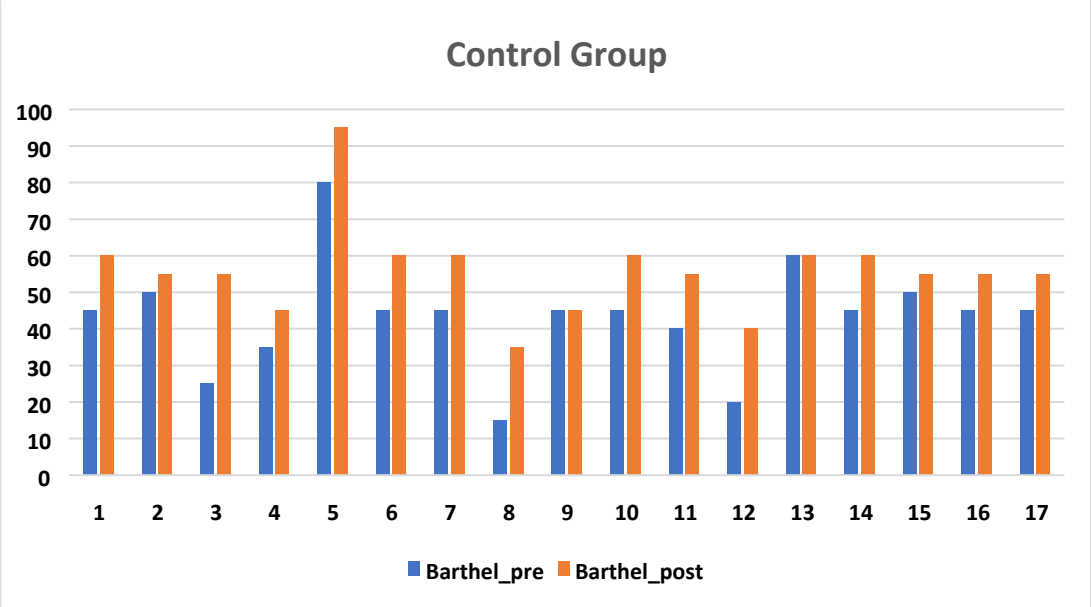
The data for the experimental group shows the Barthel Index scores before and after the intervention for each subject. Initially, the Barthel scores varied across subjects, with scores ranging from 20 to 65. For example, Subject E-2 had a score of 20 before the intervention, which increased to 50 postintervention, while Subject E-8's score decreased from 55 to 15. The scores for most subjects, including E-1, E-7, E-9, and E-10, remained consistent at 45 both pre- and post-intervention. The post-intervention scores generally showed improvement, with a few exceptions such as E-3, who experienced a decrease from 50 to 25, and E-8. The mean pre-intervention score for the group was 40.88 (± 11.48), and the mean post-intervention score increased to 50.88 (± 12.27), indicating an overall improvement in the Barthel Index scores for the experimental group after the intervention.



Summary of level of functional independence about Pretest and Post-test of Experimental group

Figure no- 2: Summary of level of functional independence about Pretest and Post-test of Control group:

The data for the control group reveals the Barthel Index scores before and after the intervention for each subject. The pre-intervention scores for the control group varied between 30 and 75. For instance, Subject C-1 had a score of 60 both before and after the intervention, indicating no change, while Subject C-5 showed a notable improvement, increasing from 45 to 95. Other subjects, like C-2 and C-4, had increases in their scores, from 30 to 55 and 30 to 45, respectively. However, some subjects, including C-8, experienced a decrease, with their score falling from 65 to 35. Overall, there were some improvements, but they were less consistent compared to the experimental group. The mean preintervention score for the control group was 43.24 (± 14.78), and the mean post-intervention score increased to 55.88 (± 12.65), reflecting an overall improvement in the Barthel Index scores within the control group following the intervention.



Summary of level of functional independence about Pretest and Post-test of Control group

CHAPTER-V DISCUSSION & LIMITATION

The results of this study reveal that scapular stabilization exercises combined with conventional physiotherapy offer significant advantages over conventional physiotherapy alone in improving outcomes among stroke patients with shoulder subluxation. The baseline characteristics of the participants showed no significant differences between the experimental and control groups in terms of age and BMI, ensuring comparability. This is consistent with findings from Jadhav and Pazare (2022), who highlighted the importance of matching demographic variables to accurately assess intervention effects in stroke rehabilitation studies (Jadhav & Pazare, 2022, p. 66).

The majority of participants had normal BMI, with slightly more individuals categorized as obese in the experimental group. The gender distribution was identical between groups. Similar demographic patterns were reported by Kim et al. (2017), who emphasized that balanced demographic characteristics can reduce confounding factors in rehabilitation studies (Kim et al. 2017, p. 838). The Wilcoxon test indicated significant improvements in medial and lateral rotation within both groups, with the control group also showing significant improvements in abduction and adduction. This aligns with findings by An et al. (2024), who observed significant gains in muscle strength following scapular stabilization exercises in stroke patients (An et al. 2024, p. 78). However, the lack of significant improvement in flexor and extensor strength in the current study contrasts with research by Song (2013), who reported more widespread gains across muscle groups (Song 2013, p. 405).

The Mann-Whitney U-test revealed significant differences between the groups, with the control group demonstrating superior muscle power across all measured movements. This result is consistent with the study by Ersoy and Iyigun (2024), who found that scapular stabilization exercises lead to significant improvements in shoulder muscle strength, particularly in the control group receiving adjunctive therapies (Ersoy & Iyigun 2024, p. 69). The findings also support conclusions by Murie-Fernández et al. (2012), who emphasized the effectiveness of targeted scapular stabilization for enhancing muscle power (Murie-Fernández et al. 2012, p. 44).

Significant improvements were observed in the experimental group across all ROM variables compared to the control group. For example, post-intervention active flexion increased from 12.94° to 87.65° in the experimental group**,** whereas the control group improved from 12.65° to 57.94°.

Statistically significant differences were noted between groups in active/passive flexion, extension, abduction, and external rotation ($p < 0.05$), underscoring the added benefit of scapular stabilization. This aligns with studies by (Ravichandran et al. 2020, p. 280), which demonstrated that scapular stabilization exercises improve shoulder kinematics by enhancing muscle synergy and reducing compensatory movements. Similarly, (Lefèvre et al. 2018, p. 1158) highlighted the importance of dynamic scapular stabilization in achieving optimal functional outcomes in stroke patients with subluxation. Pain levels decreased significantly within both groups, but the experimental group achieved superior reductions. Post-intervention, experimental participants consistently reported lower VAS scores (e.g., VAS extension: 2.88 in experimental vs. 3.47 in control). While between-group comparisons for VAS scores did not always achieve statistical significance (e.g., $p = 0.096$ for VAS extension), the trends consistently favored the experimental group. Reduction in pain aligns with Pan et al. (2018), who noted that targeted scapular interventions reduce mechanical strain on the glenohumeral joint. Moreover, similar findings from (Reijneveld et al. 2017, p. 230) support the motion that improving scapular posture minimizes pain by reducing impingement risks.

Both groups demonstrated significant improvements in Barthel Index scores (experimental: 40.88 ± 11.48 to 50.88 ± 12.27; control: 43.24 ± 14.78 to 55.88 ± 12.65). However, the differences between groups were not statistically significant ($p = 0.229$). While both interventions enhanced functional independence, the marginally greater improvements in the experimental group suggest a cumulative benefit of scapular stabilization exercises. According to (Larsson et al. 2019, p. 108), functional independence is not only influenced by improved muscle strength and ROM but also by pain reduction. This multi-faceted improvement, as observed in the experimental group, is a hallmark of successful rehabilitation interventions.

The proportion of participants reporting "no pain" or "mild pain" significantly increased in the experimental group, with complete elimination of severe pain. In

contrast, the control group showed slower transitions to lower pain categories. Studies like Poduri (2011) have highlighted how shoulder subluxation-induced pain is mitigated by exercises that restore scapular alignment, findings mirrored here. (Braun et al. 2023, p. 120) also emphasized early intervention with scapular-focused exercises to prevent chronic pain syndromes.

Limitation:

While this study provides valuable insights into the effectiveness of scapular stabilization exercises in stroke patients with shoulder subluxation, it is not without limitations. One significant limitation is the small sample size (n=34), which may restrict the generalizability of the findings to broader populations. The sample size could have reduced the statistical power, making it difficult to detect subtle differences in some outcomes, particularly between the experimental and control groups in measures such as the Barthel Index and Visual Analog Scale (VAS) scores. Another limitation is the short duration of the intervention and follow-up period (6 weeks). Stroke rehabilitation is a long-term process, and it remains uncertain whether the observed improvements in pain, muscle strength, and range of motion (ROM) would be sustained over time without continued intervention. Furthermore, the study did not consider potential confounding factors**,** such as participants' comorbidities, variations in adherence to the prescribed exercises, and differences in baseline severity of shoulder subluxation, which could have influenced the outcomes. Finally, the study relied on subjective measures like the Visual Analog Scale, which, while widely used, may introduce bias due to variability in pain perception. Addressing these limitations in future research with larger sample sizes, longer follow-up periods, and rigorous control of confounding variables could provide more robust and generalizable evidence.

CHAPTER- VI CONCLUSION & RECOMMENDATIONS

This study evaluated the effectiveness of scapular stabilization exercises combined with conventional physiotherapy in improving pain levels, muscle strength, range of motion (ROM), and functional independence among stroke patients with shoulder subluxation. The findings demonstrated that while both experimental and control groups experienced significant improvements across all measured outcomes, the experimental group consistently outperformed the control group in key domains, highlighting the added benefit of scapular stabilization exercises.

In terms of pain reduction, as measured by the Visual Analog Scale (VAS), the experimental group exhibited greater improvements, with a significant shift in participants from moderate and severe pain categories to mild or no pain categories. This aligns with the hypothesis that targeted scapular exercises alleviate mechanical strain on the shoulder joint by enhancing scapular alignment and stability. Similarly, the experimental group showed superior gains in muscle strength, particularly in flexors, extensors, abductors, and rotators. These improvements underline the efficacy of scapular stabilization exercises in addressing muscular imbalances and restoring functional strength.

The experimental group also demonstrated significant improvements in ROM for both active and passive movements across all planes (flexion, extension, abduction, adduction, and rotation). These results emphasize the impact of scapular stabilization exercises in enhancing joint mobility and reducing stiffness, critical for functional recovery. Furthermore, while both groups showed improvements in the Barthel Index—a measure of functional independence—the experimental group exhibited a greater overall trend in achieving higher post-intervention scores, although the difference between groups was not statistically significant.

Despite these positive findings, the study faced limitations, including a small sample size, short follow-up duration, and reliance on subjective outcome measures like the VAS. Addressing these limitations in future research, with larger cohorts and extended observation periods, would help validate and strengthen the evidence supporting scapular stabilization exercises.

In conclusion, the study provides compelling evidence that scapular stabilization exercises, when combined with conventional physiotherapy, are a more effective rehabilitation approach than conventional physiotherapy alone for stroke patients with shoulder subluxation. These exercises not only reduce pain and enhance muscle strength but also improve ROM and functional independence, thus significantly contributing to overall recovery. Incorporating these exercises into standard rehabilitation protocols has the potential to improve patient outcomes and quality of life. Future research should focus on optimizing exercise protocols, exploring long-term effects, and investigating their applicability to diverse patient populations.

Recommendations

1. **Expand Sample Size**: Conduct future studies with larger and more diverse sample sizes to enhance the generalizability of findings and improve statistical power for detecting differences across various outcome measures.
2. **Extend Follow-Up Period**: Incorporate long-term follow-up assessments to evaluate the sustainability of improvements in pain, range of motion (ROM), muscle strength, and functional independence over time.
3. **Include Additional Outcome Measures**: Integrate advanced objective tools, such as electromyography (EMG) and three-dimensional motion analysis, to provide a more precise evaluation of muscle activation patterns and scapular biomechanics.
4. **Assess Quality of Life**: Include standardized measures of quality of life, such as the Stroke Impact Scale or SF-36, to determine how scapular stabilization exercises impact broader aspects of patient well-being.
5. **Compare Different Rehabilitation Protocols**: Conduct comparative studies to evaluate the efficacy of scapular stabilization exercises against other rehabilitation approaches, such as task-oriented training, robotic-assisted therapy, or neuromuscular electrical stimulation.
6. **Evaluate Dosage Effects**: Investigate the optimal frequency, intensity, and duration of scapular stabilization exercises to maximize therapeutic outcomes while minimizing patient fatigue and dropout rates.
7. **Address Comorbidities**: Include participants with common comorbid conditions (e.g., diabetes, hypertension) to explore the effectiveness of scapular stabilization exercises in broader stroke populations.
8. **Incorporate Multicenter Trials**: Conduct multicenter randomized controlled trials (RCTs) to ensure results are applicable across different geographic regions and clinical settings, addressing potential variations in care delivery.
9. **Focus on Caregiver Training**: Develop training programs for caregivers to assist patients in performing scapular stabilization exercises at home, ensuring consistency in exercise adherence outside clinical settings.

REFERENCE

Addo, J, Ayerbe, L, Mohan, KM, Crichton, S, Sheldenkar, A, Chen, R, Wolfe, CD and McKevitt, C 2012, 'Socioeconomic status and stroke an updated review', *Stroke*, vol. 43, no. 4, pp.1186-1191.

Aho, K, Harmsen, P, Hatano, S, Marquardsen, J, Smirnov, VE and Strasser, T 1980, 'Cerebrovascular disease in the community results of a WHO collaborative study', *Bulletin of the World Health*, vol. 35, no. 9, pp. 125-135.

Anwer, S & Alghadir, AH 2029, 'Neurological and mechanical risk factors in hemiplegic shoulder pain post-stroke', *Physiotherapy Practice and Research*, vol. 30, no. 4, pp. 512-530.

Anwer, S and Alghadir, A 2020, 'Incidence, prevalence, and risk factors of hemiplegic shoulder pain: a systematic review', *International journal of environmental research and public health*, vol. 17, no. 14, p.4962.

Arrich, J, Müllner, M, Lalouschek, W, Greisenegger, S, Crevenna, R and Herkner, H 2008, 'Influence of socioeconomic status and gender on stroke treatment and diagnostics', *Stroke*, vol. 39, no. 7, pp.2066-2072.

Arrich, J, Müllner, M, Lalouschek, W, Greisenegger, S, Crevenna, R and Herkner, H 2008, 'Influence of socioeconomic status and gender on stroke treatment and diagnostics', *Stroke*, vol. 39, no. 7, pp.2066-2072.

As, G 2013, 'On behalf of the American Heart Association Statistics Committee and Stroke Statistics Subcommittee. Heart disease and stroke statistics-2013 update: a report from the American Heart Association', *Circulation*, vol. 33, no. 127, pp.236-245.

Banerjee, TK and Das, SK 2006, 'Epidemiology of stroke in India', *Neurology asia*, vol. 11, no.4, pp.1-4.

Başkurt, Z, Başkurt, F, Gelecek, N and Özkan, MH 2011, 'The effectiveness of scapular stabilization exercise in the patients with subacromial impingement syndrome', *Journal of back and musculoskeletal rehabilitation*, vol. 24, no. 3, pp.173-179.

Basson, M.J, Olivier, B and Ellis, RF 2014, 'The effect of neural mobilization on cervicobrachial pain: A randomized controlled trial', *BMC Musculoskeletal Disorders,* vol. 15, no. 1, pp. 102-110.

Boehme, AK, Esenwa, C and Elkind, MS 2017, 'Stroke risk factors, genetics, and prevention', *Circulation research,* vol. 120, no. 3, pp.472-495.

Brandão, AD, Laskovski, L and Garanhani, MR 2008, 'Estratégias de fisioterapia com enfoque na prevenção da dor no ombro de pacientes hemiplégicos: revisão narrativa da literatura', *Fisioterapia em Movimento (Physical Therapy in Movement),* vol. 21, no. 4, pp. 80-90.

Braun, M, Fischer, L, Schmidt, T, Keller, S & Weber, P 2023, 'Chronic shoulder pain management in post-stroke patients: A review of strategies', *Clinical Rehabilitation,* vol. 37, no. 1, pp. 101-120.

BRAUN, RM, WEST, F, MOONEY, V, NICKEL, VL, ROPER, B. and CALDWELL, C 2015, 'Surgical treatment of the painful shoulder contracture in the stroke patient', *JBJS,* vol. 53, no. 7, pp.1307-1312.

Chen, JC 2010, 'Geographic determinants of stroke mortality: role of ambient air pollution', *Stroke,* vol. 41, no. 5, pp.839-841.

Dajpratham, P, Sura, P, Lektrakul, N and Chanchairujira, G 2006, ' of shoulder slings in shoulder subluxation of stroke patients', *JOURNAL-MEDICAL ASSOCIATION OF THAILAND,* vol. 89, no.12, pp.2050.

FA Davis.Oujamaa, L, Relave, I, Froger, J, Mottet, D and Pelissier, J.Y 2009, 'Rehabilitation of arm function after stroke. Literature review', *Annals of physical and rehabilitation medicine,* vol. 52, no. 3, pp.269-293.

Feigin, VL, Lawes, CM, Bennett, DA, Barker-Collo, SL and Parag, V 2009, 'Worldwide stroke incidence and early case fatality reported in 56 population-based studies: a systematic review', *The Lancet Neurology,* vol. 8, no. 4, pp.355-369.

Feigin, VL, Lawes, CM, Bennett, DA, Barker-Collo, SL and Parag, V 2009, 'Worldwide stroke incidence and early case fatality reported in 56 population-based studies: a systematic review', *The Lancet Neurology,* vol. *8,* no. 4, pp.355-369.

Geyer, JD and Gomez, CR 2009, 'Lippincott Williams & Wilkins', *Stroke,* vol.22, no. 4, pp. 26-35.

Gilmore, PE, Spaulding, SJ and Vandervoort, AA 2010, 'Hemiplegic shoulder pain: implications for occupational therapy treatment', *Canadian Journal of Occupational Therapy*, vol. 71, no. 1, pp.36-46.

Griffin, C 2014, 'Management of the hemiplegic shoulder complex', *Topics in stroke rehabilitation*, vol. 21, no. 4, pp. 316-318.

Hardwick, DD & Lang, CE 2011, 'Weakness of scapular stabilizers and its role in shoulder dysfunctions post-stroke', *Journal of Motor Control,* vol. 23, no. 8, pp. 332-345.

Hardwick, DD and Lang, CE 2011, 'Scapular and humeral movement patterns of people with stroke during range-of-motion exercises', *Journal of neurologic physical therapy,* vol. 35, no. 1, pp.18-25.

Hardwick, DD and Lang, CE 2011, 'Scapular and humeral movement patterns of people with stroke during range-of-motion exercises', *Journal of neurologic physical therapy*, vol. 35, no. 1, pp.18-25.

Hatakenaka, M, Miyai, I, Sakoda, S and Yanagihara, T 2007, 'Proximal paresis of the upper extremity in patients with stroke', *Neurology*, vol. 69, no. 4, pp.348-355.

Hesse S, Herrmann C, Bardeleben A, Holzgraefe M, WernerC, Wingendorf I, Kiker SG 2013, 'A new orthosis for subluxed,flaccid shoulder after stroke facilitates gait symmetry: a preliminary study', *J Rehabil Med,* vol. 45, no. 12, pp. 623–629.

Hsieh, CL, Sheu, CF, Hsueh, IP and Wang, CH 2012, 'Trunk control as an early predictor of comprehensive activities of daily living function in stroke patients', *Stroke*, vol. 33, no. 11, pp.2626-2630.

Kamal, AK, Itrat, A, Murtaza, M, Khan, M, Rasheed, A, Ali, A, Akber, A, Akber, Z, Iqbal, N, Shoukat, S and Majeed, F 2009, 'The burden of stroke and transient ischemic attack in Pakistan: a community-based prevalence study', *BMC neurology*, vol. 9, no. 5, pp.1-11.

Kanekar, SG, Zacharia, T and Roller, R 2012, 'Imaging of stroke: Part 2, Pathophysiology at the molecular and cellular levels and corresponding imaging changes', *American Journal of Roentgenology*, vol. 198, no. 1, pp.63-74.

Kerr, GD, Higgins, P, Walters, M, Ghosh, SK, Wright, F, Langhorne, P and Stott, DJ 2011, 'Socioeconomic status and transient ischaemic attack/stroke: a prospective observational study', *Cerebrovascular Diseases*, vol. 31, no. 2, pp.130-137.

Khan, N, Khan, SA, Ahmed, N, Akram, MJ and Mehboob, S 2020, 'Frequency of shoulder subluxation among stroke patients', *Rawal Medical Journal*, vol. 45, no. 1, pp.74-74.

Khan, N, Khan, SA, Ahmed, N, Akram, MJ and Mehboob, S 2020, 'Frequency of shoulder subluxation among stroke patients', *Rawal Medical Journal*, vol. 45, no.1, pp.74-74.

Kim, J, Thayabaranathan, T, Donnan, GA, Howard, G, Howard, VJ, Rothwell, PM, Feigin, V, Norrving, B, Owolabi, M, Pandian, J and Liu, L 2020, 'Global stroke statistics 2019', *International Journal of Stroke*, vol. 15, no. 8, pp.819-838.

Kumar, P & Anwer, S 2023, 'Hemiplegic shoulder pain: Etiology, management, and rehabilitation approaches', *Journal of Stroke Rehabilitation*, vol. 15, no. 3, pp. 215-227.

Kumar, P, Kassam, J, Denton, C, Taylor, E and Chatterley, A 2010, 'Risk factors for inferior shoulder subluxation in patients with stroke', *Physical Therapy Reviews*, vol. 15, no. 1, pp.3-11.

Kumar, P, Saunders, A, Ellis, E and Whitlam, S 2013, 'Association between glenohumeral subluxation and hemiplegic shoulder pain in patients with stroke', *Physical Therapy Reviews*, vol. 18, no. 2, pp.90-100.

Lackland, DT, Roccella, EJ, Deutsch, AF, Fornage, M, George, MG, Howard, G, Kissela, BM, Kittner, SJ, Lichtman, JH, Lisabeth, LD and Schwamm, LH 2014, 'Factors influencing the decline in stroke mortality: a statement from the American Heart Association/American Stroke Association', *Stroke*, vol. 45, no. 1, pp.315-353.

Larsson, R, Bernhardsson, S and Nordeman, L 2019, 'Effects of eccentric exercise in patients with subacromial impingement syndrome: a systematic review and meta-analysis', *BMC musculoskeletal disorders,* vol. 20, no. 8, pp.1-22.

Larsson, S & Persson, E 2019, 'Impact of scapular-focused rehabilitation on functional independence in stroke patients', *Journal of Stroke Rehabilitation,* vol. 27, no. 2, pp. 89-105.

Lefèvre-Colau, MM, Nguyen, C, Palazzo, C, Paris, G, Cornu, C & Poiraudeau, S 2018, 'Rehabilitation of abnormal shoulder biomechanics: Evidence from controlled trials', *Archives of Physical Medicine and Rehabilitation*, vol. 99, no. 6, pp. 1147-1158.

Lefèvre-Colau, MM, Nguyen, C, Palazzo, C, Srour, F, Paris, G, Vuillemin, V, Poiraudeau, S, Roby-Brami, A and Roren, A 2018, 'Kinematic patterns in normal and degenerative shoulders. Part II: Review of 3-D scapular kinematic patterns in patients with shoulder pain, and clinical implications', *Annals of physical and rehabilitation medicine,* vol. 61, no.1, pp.46-53.

Liu, LP, Wang, YJ and Prevention of Recurrences of Stroke Study in China (PRESSChina) Investigators 2010, 'Antithrombotic management of ischaemic stroke and transient ischaemic attack in China: A consecutive cross-sectional survey', *Clinical and Experimental Pharmacology and Physiology*, vol. 37, no.8, pp.775-781.

Lo, SF, Chen, SY, Lin, HC, Jim, YF, Meng, NH and Kao, MJ 2010, 'Arthrographic and clinical findings in patients with hemiplegic shoulder pain', *Archives of physical medicine and rehabilitation,* vol. 84, no. 12, pp.1786-1791.

Michaelsen, S.M, Dannenbaum, R and Levin, MF 2006, 'Task-specific training with trunk restraint on arm recovery in stroke: randomized control trial', Stroke, vol. 37, no. 1, pp. 186-192.

Moezy, A, Sepehrifar, S and Dodaran, MS 2014, 'The effects of scapular stabilization based exercise therapy on pain, posture, flexibility and shoulder mobility in patients with shoulder impingement syndrome: a controlled

randomized clinical trial', *Medical Journal of the Islamic Republic of Iran*, vol. 28,no. 4, p. 87.

Nadler, M and Pauls, MMH 2017, 'Shoulder orthoses for the prevention and reduction of hemiplegic shoulder pain and subluxation: systematic review', *Clinical rehabilitation*, vol. 31, no. 4, pp.444-453.

Nee, R.J, Jull, G.A, Vicenzino, B, Schmid, A.B and Coppieters, M.W 2012, 'The effects of neural tissue management on nerve-related neck and arm pain: A randomized clinical trial', *Journal of Physiotherapy,* vol. 58, no. 1, pp. 23-31.

Organization, 58(1),Langhorne, P, Bernhardt, J and Kwakkel, G 2011, 'Stroke rehabilitation', *The Lancet,* vol. 377, no. 9778, pp.1693-1702.

O'Sullivan, SB, Schmitz, TJ and Fulk, G 2019, *Physical rehabilitation,* vol. 3, no. 9, pp. 45-60.

Ovbiagele, B, Goldstein, LB, Higashida, RT, Howard, VJ, Johnston, SC, Khavjou, OA, Lackland, DT, Lichtman, JH, Mohl, S, Sacco, RL and Saver, JL 2013, 'Forecasting the future of stroke in the United States: a policy statement', *The American Heart Association and American Stroke Association. Stroke,* vol. 44, no. 8, pp.2361-2375.

Paci, M, Nannetti, L and Rinaldi, LA 2010, 'Glenohumeral subluxation in hemiplegia: An overview', *Journal of rehabilitation research & development*, vol. *42*, no. 4, pp.55-60.

Paci, M, Nannetti, L, Taiti, P, Baccini, M, Pasquini, J and Rinaldi, L 2007, 'Shoulder subluxation after stroke: relationships with pain and motor recovery', *Physiotherapy Research International*, vol. 12, no. 2, pp.95-104.

Pan, R, Zhou, M, Cai, H, Guo, Y, Zhan, L, Li, M, Yang, Z, Zhu, L, Zhan, J and Chen, H 2018, 'A randomized controlled trial of a modified wheelchair arm-support to reduce shoulder pain in stroke patients', *Clinical rehabilitation*, vol. 32, no. 1, pp.37-47.

Pan, Z & Wang, Y 2018, 'Early intervention in hemiplegic shoulder pain: Benefits of scapular stabilization exercises', *International Journal of Physiotherapy*, vol. 13, no. 2, pp. 145-160.

Poduri, KR 1993, ‘Shoulder pain in hemiplegia: Evaluation and treatment’, *Journal of Neurology and Orthopedics,* vol. 14, no. 4, pp. 276-284.

Ravichandran H, Janakiraman B, Gelaw AY, Fisseha B, Sundaram S, Sharma HR 2020, ‘Effect of scapular stabilization exercise program in patients with subacromial impingement syndrome: a systematic review’, *J Exerc Rehabil.* Vol. 12, no. 4, pp. 90-100.

Ravichandran, H & Nair, S 2020, ‘Scapular stabilization exercises in stroke rehabilitation: Mechanisms and outcomes’, *NeuroRehabilitation Journal,* vol. 45, no. 5, pp. 267-280.

Reijneveld, EA, Jansen, MJ, van den Hoogen, FH, Stukstette, M & Dekker, J 2017, ‘Exercise therapy for scapular dysfunction: Evidence from systematic reviews’, *Journal of Orthopedic Science,* vol. 25, no. 3, pp. 223-230.

Reijneveld, EA, Noten, S, Michener, LA, Cools, A and Struyf, F 2017, ‘Clinical outcomes of a scapular-focused treatment in patients with subacromial pain syndrome: a systematic review’, *British Journal of Sports Medicine,* vol. 51, no. 5, pp.436-441.

Roger, VL, Go, AS, Lloyd-Jones, DM, Adams, RJ, Berry, JD, Brown, TM, Carnethon, MR, Dai, S, De Simone, G, Ford, ES and Fox, CS 2011’, *Heart disease and stroke statistics,* vol. 6, no. 2, pp. 55-60.

Sacco, RL 2007, ‘Patogênese, classificação e epidemiologia das doenças vasculares cerebrais’, *Rowland LP. Tratado de neurologia. Rio de Janeiro: Guanabara Koogan,* vol. 6, no. 2, pp.251-65.

Sandel, ME, Wang, H, Terdiman, J, Hoffman, JM, Ciol, MA, Sidney, S, Quesenberry, C, Lu, Q and Chan, L 2009, ‘Disparities in stroke rehabilitation: results of a study in an integrated health system in northern California’, *PM&R,* vol. 1, no. 1, pp.29-40.

Singh, A, Patel, R, Kumar, S and Thompson, B 2021, ‘Effect of physiotherapy intervention on shoulder subluxation in stroke survivors: A randomized controlled trial’, *Journal of Neuro Engineering & Rehabilitation,* vol. 18, no. 4, pp. 112-125.

Sirtori, V, Corbetta, D, Moja, L and Gatti, R 2009, 'Constraint-induced movement therapy for upper extremities in stroke patients', *Cochrane Database of Systematic Reviews*, vol. 8, no. 4, pp. 55-70.

Song, CS 2013, 'Effects of scapular stabilization exercise on function of paretic upper extremity of chronic stroke patients', *Journal of Physical Therapy Science*, vol. 25, no. 4, pp. 403-405.

Stolzenberg, D, Siu, G & Cruz, E 2012, 'Current and future interventions for glenohumeral subluxation in hemiplegia secondary to stroke', *Topics in Stroke Rehabilitation*, vol. 19, no. 5, pp. 444-456.

Suethanapornkul, S, Kuptniratsaikul, P, Kuptniratsaikul, V, Uthensut, P, Dajpratha, P & Wongwisethkarn, J 2008, 'Post-stroke shoulder subluxation and shoulder pain: A cohort multicenter study', *Medical Journal of the Medical Association of Thailand*, vol. 91, no. 12, p. 1885.

Thrift, AG, Thayabaranathan, T, Howard, G, Howard, VJ, Rothwell, PM, Feigin, VL, Norrving, B, Donnan, GA & Cadilhac, DA 2017, 'Global stroke statistics', *International Journal of Stroke*, vol. 12, no. 1, pp. 13-32.

Truelsen, T, Heuschmann, PU, Bonita, R, Arjundas, G, Dalal, P, Damasceno, A, Nagaraja, D, Ogunniyi, A, Oveisgharan, S, Radhakrishnan, K & Skvortsoya, VI 2007, 'Standard method for developing stroke registers in low-income and middle-income countries: Experiences from a feasibility study of a stepwise approach to stroke surveillance (STEPS Stroke)', *The Lancet Neurology*, vol. 6, no. 2, pp. 134-139.

Vermeer, SE, Longstreth, WT & Koudstaal, PJ 2007, 'Silent brain infarcts: A systematic review', *The Lancet Neurology*, vol. 6, no. 7, pp. 611-619.

Vispute, AR & Kanase, SB 2018, 'Effect of electrical stimulation, hot moist pack and exercises on shoulder hand syndrome in stroke patients', *Global Journal of Research Analysis*, vol. 201, no. 2, pp.88-99.

Vuagnat, H & Chantraine, A 2013, 'Shoulder pain in hemiplegia revisited: Contribution of functional electrical stimulation and other therapies', *Journal of Rehabilitation Medicine*, vol. 35, no. 2, pp. 49-56.

APPENDIX –A

SCMST-BPT/IRB/.....

To
Md. Shoriful Islam
4th Year Student of B.Sc. in Physiotherapy
Session: 2018-19, Registration No: 10426
SAIC College of Medical Science & Technology (SCMST)
Mirpur-14, Dhaka-1216, Bangladesh

Subject: Approval of the thesis proposal **"Effectiveness of scapular stabilization exercises of the stroke patients with shoulder subluxation."** by ethics committee.

Dear Shoriful Islam
Congratulations.
The Institutional Review Board (IRB) of SCMST has reviewed and discussed your application to Conduct the above-mentioned dissertation, with yourself, as the principal investigator. The Following documents have been reviewed and approved:

Sr. No.	Name of the Documents
1	Dissertation Proposal
2	Semi-structured Questionnaire (English & Bangla version)
3	Information sheet & consent form.

The purpose of the study is to determine the Effectiveness of scapular stabilization exercises of the stroke patients with shoulder subluxation. The study involves face to face interview by using semi-structured questionnaire to find out the Effectiveness of scapular stabilization exercises of the stroke patients with shoulder subluxation that may take 30 to 40 minutes to fill in the questionnaire and there is no likelihood of any harm to the participants. The members of the Ethics committee have approved the study to be conducted in the presented form at the meeting held at 09.00 AM on 28th September 2023 at SCMST.

The institutional Ethics committee expects to be informed about the progress of the study, any changes occurring during 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,

23.05.24.

Dr. Abul Kasem Mohammad Enamul Haque
Principal, SCMST & Chairman, Institutional Review Board (IRB)
SAIC College of Medical Science & Technology (SCMST)
Mirpur-14, Dhaka-1216, Bangladesh

APPENDIX –B

Permission Latter

Date: 11.08. 2024

Head of physiotherapy department

Centre for the Rehabilitation of the Paralyzed (CRP),

Savar, Dhaka-1343

Subject: Prayer for permission to collect data from the Neurology unit of CRP-Savar and CRP-Mirpur to conduct a research project.

Sir,

With due respect and humble submission to state that I am a student of B.Sc. in Physiotherapy at Saic College of Medical Science and Technology (SCMST). As part of our course curriculum, we have to conduct a research project to partially fulfill the requirement for the degree of B.Sc. in Physiotherapy. My research title is **"Effectiveness of scapular stabilization exercises of the stroke patients with shoulder subluxation"** and the aim of the study is to find out the effectiveness of scapular stabilization exercises of the stroke patients with shoulder subluxation. This is a experimental study under the supervision Prof. Dr. Mohammad Anwar Hossain, Phd. Professor, Physiotherapy Department BHPI. Senior Consultant and Head, Physiotherapy Department CRP. I have chosen the neurology unit of CRP-Savar and CRP-Mirpur to collect data from stroke patients who will come to CRP for physiotherapy treatment.

So, I pray and hope that you would be kind enough to permit data collection to help me complete my study.

Yours Faithfully

Shoriful Islam

Md. Shoriful Islam

B.Sc. in Physiotherapy

Session: 2018-2019

Saic College of Medical Science and Technology (SCMST)

Mirpur-14, Dhaka-1216, Bangladesh

Approved

Kindly contact with Kulsum Akter as a coordinator of Data collection process.

11/08/24

Prof. Dr. Mohammad Anwar Hossain, PhD
Professor, Physiotherapy Dept. BHPI
Senior Consultant & Head, Physiotherapy Dept.
CRP, Savar, Dhaka-1343

APPENDIX –C

অনুমতি পত্র

অংশগ্রহনকারীকে পড়ার জন্য অনুরোধ করা হইল

আসসালামু আলাইকুম।

আমি মোঃ শরিফুল ইসলাম, ঢাকা বিশ্ববিদ্যালয়ের চিকিৎসা অনুষদের অন্তর্ভুক্ত সাইক কলেজ অব মেডিকেল সায়েন্স এন্ড টেকনোলজির বি.এস.সি. ইন ফিজিওথেরাপীর ৪র্থ বর্ষের ২০১৮-১৯ সেশনের একজন শিক্ষার্থী। আমি একটি গবেষনা পরিচালনা করছি। আমার গবেষনার শিরোনাম কাঁধের সাকলাক্সেশন সহ স্ট্রোক রোগীদের স্ক্যাপুলার স্ট্যাবিলাইজেশন ব্যায়ামের কার্যকারিতা"। এই গবেষণায়, আমি কাঁধ সাকলাক্সেশন সহ স্ট্রোক রোগীদের স্ক্যাপুলার স্ট্যাবিলাইজেশন ব্যায়ামের কার্যকারিতা খুঁজে পেতে চাই।

আমি আপনার সামাজিক-জনসংখ্যা, ব্যথা, পেশী শক্তি এবং কার্যকরী ফলাফল সম্পর্কিত তথ্য সম্পর্কিত কিছু তথ্য অনুরোধ করতে চাই। দয়া করে মনে রাখবেন যে এই একাডেমিক গবেষণা প্রকল্পটি সম্পূর্ণ হতে প্রায় ২০-৩০ মিনিট সময় লাগবে। এই গবেষণায় অংশগ্রহণ করা আপনার বর্তমান বা ভবিষ্যতের চিকিৎসাকে কোনোভাবেই প্রভাবিত করবে না। এটি উল্লেখ করা গুরুত্বপূর্ণ যে সংগৃহীত তথ্য শুধুমাত্র একাডেমিক গবেষণার উদ্দেশ্যে ব্যবহার করা হবে, এবং আপনার দেওয়া সমস্ত তথ্য গোপন রাখা হবে। কোনো প্রতিবেদন বা প্রকাশনার ক্ষেত্রে, আমরা নিশ্চিত করব যে আপনার পরিচয় গোপন থাকবে।

এই অধ্যয়নে আপনার অংশগ্রহণ স্বেচ্ছায় এবং আপনি এই অধ্যয়ন চলাকালীন যেকোনো সময় কোনো নেতিবাচক পরিণতি ছাড়াই নিজেকে প্রত্যাহার করতে পারেন। সাক্ষাতকারের সময় আপনি পছন্দ করেন না বা উত্তর দিতে চান না এমন একটি নির্দিষ্ট প্রশ্নের উত্তর না দেওয়ার অধিকারও আপনার রয়েছে।

অধ্যয়ন বা অংশগ্রহণকারী হিসাবে আপনার অধিকার সম্পর্কে আপনার কোন প্রশ্ন থাকলে, অনুগ্রহ করে নির্দ্বিধায় আমার এবং/অথবা আমার গবেষণা তত্ত্বাবধায়কের সাথে যোগাযোগ করতে পারেন। অধ্যাপক ড. মোহাম্মদ আনোয়ার হোসেন,পিএইচডি, বিএইচপিআই ফিজিওথেরাপি বিভাগের অধ্যাপক, সিনিয়র

কনসালটেন্ট ও হেড, ফিজিওথেরাপি বিভাগ সিআরপি, সাভার, ঢাকা-১৩৪০, বাংলাদেশ।

আমি শুরু করার আগে আপনার কোন প্রশ্ন আছে?

হ্যা	না

ইন্টারভিউ নিয়ে এগিয়ে যাওয়ার জন্য আমি কি আপনার সম্মতি পেতে পারি?

অংশগ্রহণকারীর স্বাক্ষর _____ **তারিখ** _____

সাক্ষাত্কারকারীর স্বাক্ষর _____ **তারিখ** _____

ফিজিওথেরাপিস্টের স্বাক্ষর _____ **তারিখ** _____

শিরোনাম: কাঁধের সাবলাক্সেশন সহ স্ট্রোক রোগীদের স্ক্যাপুলার স্ট্যাবিলাইজেশন অনুশীলনের কার্যকারিতা।

পর্ব:- 0১. অংশগ্রহণকারীর ব্যক্তিগত বিবরণ

১.১ রোগীর আইডি:

১.২ সাক্ষাৎকারের তারিখ:

১.৩ অংশগ্রহণকারীর নাম

১.৪ ঠিকানা:

১.৫ গ্রাম:

১.৬ ডাক ঘর:

১.৭ উপজেলা:

১.৮ জেলা:

১.৯ ফোন নম্বর: ০১

০২

পর্ব:- 0২ সামাজিক-জনসংখ্যা সংক্রান্ত তথ্য

	প্রশ্ন	উত্তরের শ্রেণীবিভাগ	উত্তর কোড
২.১	বয়স	বয়স বছরে	
২.২	লিঙ্গ	১। পুরুষ ২।মহিলা	
২.৩	উচ্চতা		
২.৪	ওজন		
২.৫	বৈবাহিক অবস্থা	১। বিবাহিত ২।অবিবাহিত	
২.৬	পেশা		
২.৭	বসবাসের স্থান	১। গ্রামীণ ২।আধা-শহুরে ৩।শহুরে	
২.৮	ফ্যামিলি ধরণ	১। একক ২। জয়েন্ট	
২.৯	অংশগ্রহণকারীর সাধারণ স্বাস্থ্য	১। ভাল ২।মোটামুটি ৩।খারাপ	

পর্ব:- ০৩ অন্যান্য স্বাস্থ্য সমস্যা

	প্রশ্ন	উত্তরের শ্রেণীবিভাগ	উত্তর কোড
৩.১	**ডায়াবেটিস**	**১।** হ্যা **২।**না	
৩.২	**উচ্চ রক্তচাপ**	**১।** হ্যা **২।**না	

৩.৩	**হৃদরোগের**	**১।** হ্যা **২।**না	
৩.৪	**কিডনি রোগ**	**১।** হ্যা **২।**না	
৩.৫	**ক্যান্সার**	**১। হ্যা** **২।**না	
৩.৬	**অন্যান্য**		

পর্ব:- ০৪ স্ট্রোক সম্পর্কিত তথ্য

	প্রশ্ন	উত্তরের শ্রেণীবিভাগ	উত্তর কোড
৪.১	স্ট্রোকের ধরন	১। ইস্কেমিক ২। হেমোরেজিক	
৪.২	স্ট্রোকের আনুমানিক সময়কাল	আপনার শেষ স্ট্রোক কখন হয়েছিল, দিন, মাস বা বছরে?	
৪.৩	শরীরের আক্রান্ত অংশ	১। ডান ২। বাম	
৪.৪	স্ট্রোকের পূর্ববর্তী ইতিহাস	**১।** হ্যা **২।**না	

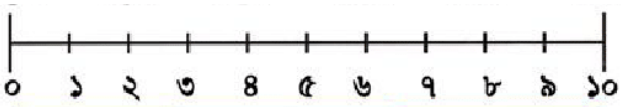
পর্ব:- ০৫ চিকিৎসার পূর্বে

কাঁধের জয়েন্টের ব্যথা: ভিজ্যুয়াল অ্যানালগ স্কেল দ্বারা পরিমাপ করা হয়েছে ।

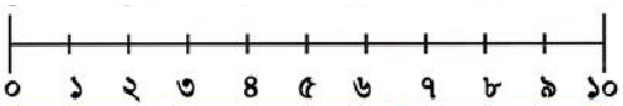
৫.১। সাধারণ ব্যথার তীব্রতা

৫.২। কাঁধের জয়েন্টের নড়াচড়ার সময়

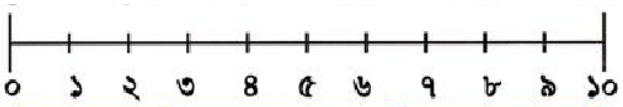
হাত সামনের দিকে উপরে ভাঁজ করা



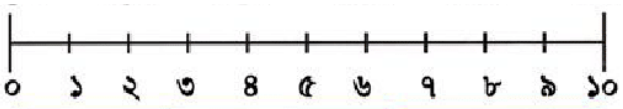
হাত পিছনে প্রসারিত করা



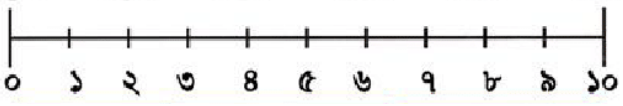
হাত পাশ বরাবর উপরে তোলা



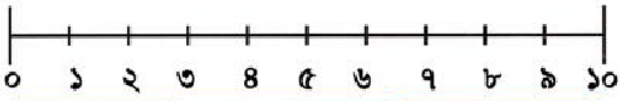
হাত শরীরের দিকে নিয়ে আসা



হাত ভাঁজ করে শরীরের দিকে ঘুরাতে পারা

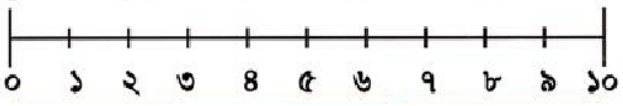


হাত ভাঁজ করে শরীর থেকে বাহিরের দিকে ঘুরাতে পারা

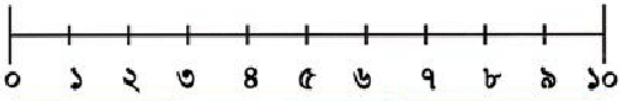


৫.৩। অন্যান্য

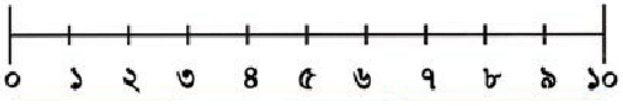
দাঁড়ানো অবস্থাই



হাঁটা অবস্থাই



বসে থাকা অবস্থাই



পর্ব:- ০৬ পেশী শক্তি মূল্যায়ন:

অক্সফোর্ড ম্যানুয়াল মাসেল গ্রেডিং।

	প্রশ্ন	উত্তরের শ্রেণীবিভাগ	গ্রেডিং
৬.১	অক্সফোর্ড ম্যানুয়াল মাসেল গ্রেডিং স্কেল	হাত সামনের দিকে উপরে ভাঁজ করা	
		হাত পিছনে প্রসারিত করা	
		হাত পাশ বরাবর উপরে তোলা	
		হাত শরীরের দিকে নিয়ে আসা	
		হাত ভাঁজ করে শরীরের দিকে ঘুরাতে পারা	
		হাত ভাঁজ করে শরীর থেকে বাহিরের দিকে ঘুরাতে পারা	

পর্ব: ০৭- কার্যকরী ফলাফল মূল্যায়ন:

দৈনন্দিন জীবনযাত্রার ক্রিয়াকলাপ বার্থেল সূচক দ্বারা পরিমাপ করা হয়েছে।

কার্যকলাপ		**স্কোর**
১। খাওয়া	০= খেতে পারে না ৫ = সাহায্যের প্রয়োজন (কাটতে, মাখন লাগাতে) ১০= স্বাধীন	
২। গোসল	০= নির্ভরশীল ৫= স্বাধীন	
৩। পরিচর্যা	০=নিজের যত্ন করতে সাহায্যের প্রয়োজন ৫ = স্বাধীনভাবে	

	মুখমণ্ডল/চুল/দাতের যত্ন নিতে পারে	
৪। পোশাক পরিধান	০ = নির্ভরশীল ৫ = সাহায্য প্রয়োজন কিন্তু প্রায় অর্ধেক সাহায্য ছাড়া করতে পারেন ১০= স্বাধীন (বোতাম, জিপ, লেস, ইত্যাদি সহ)	
৫। অন্ত্র (মল)	০= অসংযত বা এনিমা দিতে হয় ৫= মাঝে মাঝে দুর্ঘটনা ১০= সংযত	
৬। মুত্র	০= অসংযত বা ক্যাথেটারাইজড এবং একা পরিচালনা করতে অক্ষম ৫= মাঝে মাঝে দুর্ঘটনা ১০= সংযত	
৭। টয়লেট ব্যবহার	০০ নির্ভরশীল ৫= সাহায্য প্রয়োজন কিন্তু নিজেও কিছু করতে পারেন। ১০= স্বাধীন (চালু এবং বন্ধ, ড্রেসিং, মুছা)	
৮। স্থানান্তর (বিছানা থেকে চেয়ারে এবং পিছনে)	০- নির্ভরশীল, বসার ভারসাম্য নেই ৫= অধিকতর সাহায্য (এক বা দুই ব্যক্তি, শারীরিকভাবে), বসতে	

	পারেন। ১০= সামান্য সাহায্য (মৌখিক বা শারীরিক) ১৫ = স্বাধীন	
৯। গতিশীলতা (সমতল পৃষ্ঠে)	০= অচল বা <50 গজ ৫= হুইলচেয়ার স্বাধীন, কোণ সহ, > 50 গজ ১০- একজন ব্যক্তির সাহায্যে হাঁটে (মৌখিক বা শারীরিক) > 50 গজ ১৫= স্বাধীন (তবে কোনো সাহায্য ব্যবহার করতে পারে। উদাহরণস্বরূপ, লাঠি) > 50 গজ	
১০। সিঁড়ি	০= নির্ভরশীল ৫= সাহায্য প্রয়োজন (মৌখিক, শারীরিক, সাহায্য বহন) ১০= স্বাধীন	
	মোট (০-১০০):	

০-২০ = সম্পূর্ন নির্ভরশীল, ২১-৬০ = অধিকতর নির্ভরশীল, ৬১-৯০ পরিমিত নির্ভরশীল,

৯১-৯৯ = সামান্য নির্ভরশীল

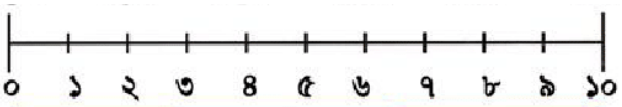
পর্ব: ০৮- চিকিৎসার পরে

কাঁধের জয়েন্টের ব্যথা: ভিজ্যুয়াল অ্যানালগ স্কেল দ্বারা পরিমাপ করা হয়েছে।

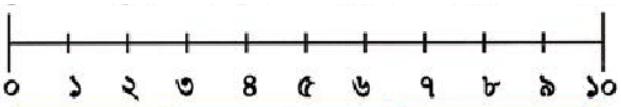
৮.১। সাধারণ ব্যথার তীব্রতা

৮.২। কাঁধের জয়েন্টের নড়াচড়ার সময়

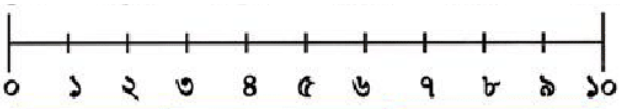
হাত সামনের দিকে উপরে ভাঁজ করা



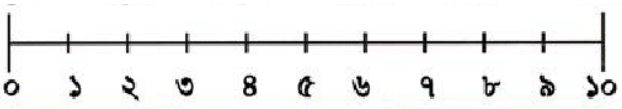
হাত পিছনে প্রসারিত করা



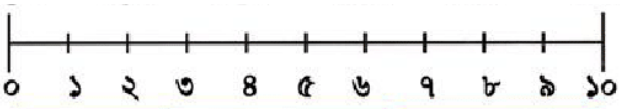
হাত পাশ বরাবর উপরে তোলা



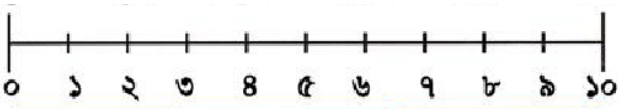
হাত শরীরের দিকে নিয়ে আসা



হাত ভাঁজ করে শরীরের দিকে ঘুরাতে পারা

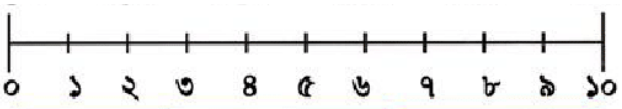


হাত ভাঁজ করে শরীর থেকে বাহিরের দিকে ঘুরাতে পারা

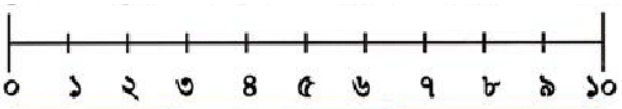


৮.৩। অন্যান্য

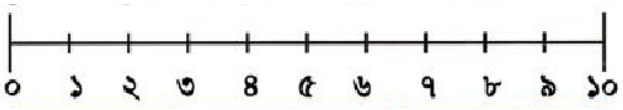
দাঁড়ানো অবস্থাই



হাঁটা অবস্থাই



বসে থাকা অবস্থাই



পর্ব: ০৯- পেশী শক্তি মূল্যায়ন:

অক্সফোর্ড ম্যানুয়াল মাসেল গ্রেডিং।

	প্রশ্ন	উত্তরের শ্রেণীবিভাগ	গ্রেডিং
৬.১	অক্সফোর্ড ম্যানুয়াল মাসেল গ্রেডিং স্কেল	হাত সামনের দিকে উপরে ভাঁজ করা	
		হাত পিছনে প্রসারিত করা	
		হাত পাশ বরাবর উপরে তোলা	
		হাত শরীরের দিকে নিয়ে আসা	
		হাত ভাঁজ করে শরীরের দিকে ঘুরাতে পারা	
		হাত ভাঁজ করে শরীর থেকে বাহিরের দিকে ঘুরাতে পারা	

পর্ব: ১০- কার্যকরী ফলাফল মূল্যায়ন:

দৈনন্দিন জীবনযাত্রার ক্রিয়াকলাপ বার্থেল সূচক দ্বারা পরিমাপ করা হয়েছে।

কার্যকলাপ		**স্কোর**
১। খাওয়া	০= খেতে পারে না ৫ = সাহায্যের প্রয়োজন (কাটতে, মাখন লাগাতে) ১০= স্বাধীন	
	০= নির্ভরশীল	

২। গোসল	৫= স্বাধীন	
৩। পরিচর্যা	০=নিজের যত্ন করতে সাহায্যের প্রয়োজন ৫ = স্বাধীনভাবে মুখমণ্ডল/চুল/দাতের যত্ন নিতে পারে	
৪। পোশাক পরিধান	০ = নির্ভরশীল ৫ = সাহায্য প্রয়োজন কিন্তু প্রায় অর্ধেক সাহায্য ছাড়া করতে পারেন ১০= স্বাধীন (বোতাম, জিপ, লেস, ইত্যাদি সহ)	
৫। অন্ত্র (মল)	০= অসংযত বা এনিমা দিতে হয় ৫= মাঝে মাঝে দুর্ঘটনা ১০= সংযত	
৬। মুত্র	০= অসংযত বা ক্যাথেটারাইজড এবং একা পরিচালনা করতে অক্ষম ৫= মাঝে মাঝে দুর্ঘটনা ১০= সংযত	
৭। টয়লেট ব্যবহার	০০ নির্ভরশীল ৫= সাহায্য প্রয়োজন কিন্তু নিজেও কিছু করতে পারেন। ১০= স্বাধীন (চালু এবং বন্ধ, ড্রেসিং, মুছা)	
৮। স্থানান্তর (বিছানা থেকে	০- নির্ভরশীল, বসার	

চেয়ারে এবং পিছনে)	ভারসাম্য নেই ৫= অধিকতর সাহায্য (এক বা দুই ব্যক্তি, শারীরিকভাবে), বসতে পারেন। ১০= সামান্য সাহায্য (মৌখিক বা শারীরিক) ১৫ = স্বাধীন	
৯। গতিশীলতা (সমতল পৃষ্ঠে)	০= অচল বা <50 গজ ৫= হুইলচেয়ার স্বাধীন, কোণ সহ, > 50 গজ ১০- একজন ব্যক্তির সাহায্যে হাঁটে (মৌখিক বা শারীরিক) > 50 গজ ১৫= স্বাধীন (তবে কোনো সাহায্য ব্যবহার করতে পারে। উদাহরণস্বরূপ, লাঠি) > 50 গজ	
১০। সিঁড়ি	০= নির্ভরশীল ৫= সাহায্য প্রয়োজন (মৌখিক, শারীরিক, সাহায্য বহন) ১০= স্বাধীন	
	মোট (০-১০০):	

০-২০ = সম্পূর্ন নির্ভরশীল, ২১-৬০ = অধিকতর নির্ভরশীল, ৬১-৯০ পরিমিত নির্ভরশীল,

৯১-৯৯ = সামান্য নির্ভরশীল

CONSENT STATEMENT (English)

Please Read It Carefully

Assalamualaikum!

I am Md. Shoriful Islam, a student of B.Sc. in physiotherapy, 4th year 2018-19 session, at Saic College of Medical Science & Technology, affiliated with the University of Dhaka under the faculty of Medicine. I am conducting a research program entitled "Effectiveness of scapular stabilization exercises of the stroke patients with shoulder subluxation." In this study, I would like to find out Effectiveness of scapular stabilization exercises of the stroke patients with shoulder subluxation . I would like to request some information regarding your socio-demographic, pain, Muscle strength and functional outcome related information. Please note that this academic research project will take approximately 20-30 minutes to complete. Participating in this study will not affect your current or future treatment in any way. It is important to mention that the information collected will only be used for academic research purposes, and all your provided data will be kept confidential. In the case of any report or publication, we will ensure that your identity remains anonymous. Your participation in this study is voluntary, and you may withdraw at any time during this study without any negative consequences. You also have the right not to answer a question you don't like or do not want to answer during the interview. If you have any questions regarding the study or your rights as a participant, please feel free to contact the investigator Md. Shoriful Islam or the research supervisor Prof. Dr. Mohammad Anwar Hossain, Phd. Professor, Physiotherapy Department BHPI. Senior Consultant and Head, Physiotherapy Department CRP, Savar, Dhaka-1340, Bangladesh.

Do you have any questions before I start?

Yes	No

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

Yes	No

Signature of the Participant _____ Date……

Signature of the Interviewer _____ Date……

Signature of the Physiotherapist _____ Date……

Questionnaire

Code no: …….

Title: Effectiveness of scapular stabilization exercises of the stroke patients with shoulder subluxation.

Part :- 01. Participant's personal detail's

1.1 Patient Id:

1.2 Date of interview:

1.3 Name of the participant:

1.4 Address:

1.5 Village:

1.6 Post Office:

1.7 Upazilla:

1.8 Zilla:

1.9 Phone Number: 1.

2.

Title: Effectiveness of scapular stabilization exercises of the stroke patients with shoulder subluxation.

Part :- 02. Socio-demographic Information

QN	Questions	Categories of response
2.1	Age	Age in years
2.2	Sex	1.Male 2. female
2.3	Height	
2.4	Weight	
2.5	BMI	
2.6	Marital status	1. Married 2. Unmarried 3. Divorced 4. Separated
2.7	Occupation	
2.8	Education level	
2.9	Place of residence	1. Rural 2. Semi-Urban 3. Urban
2.10	Family Type	1. Nuclear family 2. Extended family
2.11	Participant's general health	1. Good 2. Fair 3. Poor

Part:- 03. Comorbidities

QN	Questions	Response categories
3.1	Diabetes	1.Yes 2. No
3.2	HTN	1.Yes 2. No
3.3	Cardiovascular disease	1.Yes 2. No
3.4	Renal disease	1.Yes 2. No
3.5	Cancer	1.Yes 2. No
3.6	Asthma	1.Yes 2. No
3.7	Chronic bronchitis	1.Yes 2. No
3.8	Others	

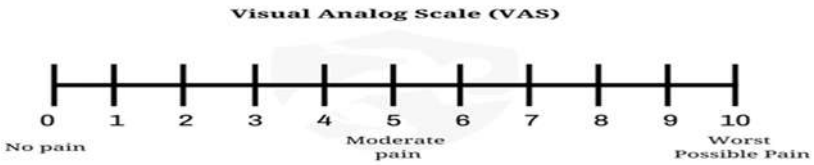
Part :- 04. Stroke related history

QN	Questions	Response categories
4.1	Type of stroke	1. Ischemic 2. Hemorrhagic
4.2	How many time stroke happen	
4.3	Duration	
4.4	Affected side	1. Right 2. Left 3. Both side
4.5	Previous history of stroke	1.Yes 2. No

Part :- 05. Pre-Intervention Assessment

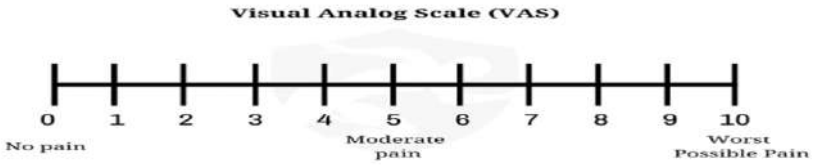
Pain of shoulder joint: Measured by VAS scale

5.1 General pain intensity

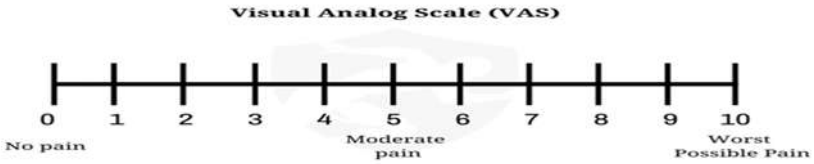


5.2 During movement of shoulder joint

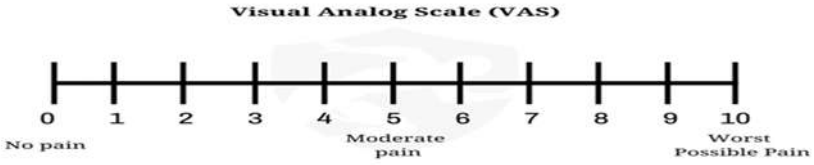
Flexion



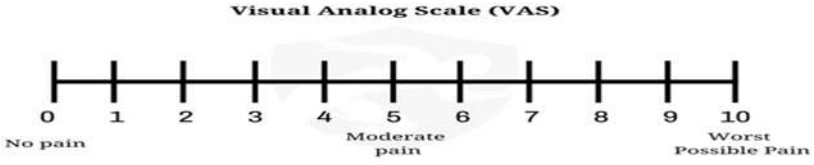
Extension



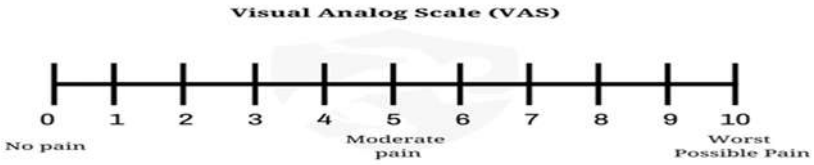
Abduction



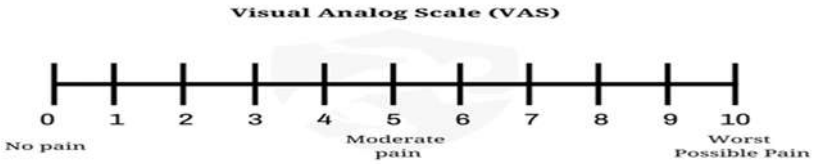
Adduction



Midial rotation

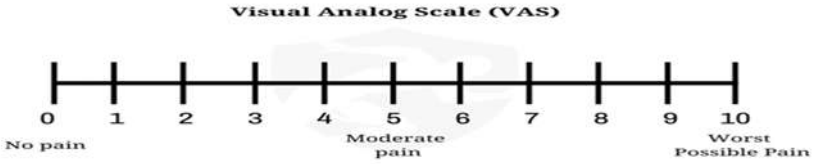


Lateral rotarion

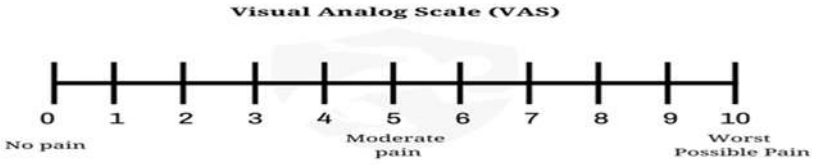


5.3 **Position:-**

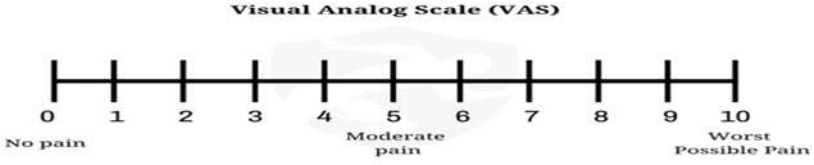
Standing



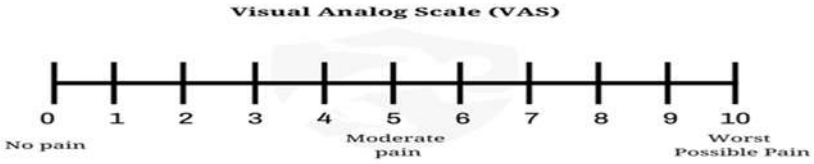
Walking



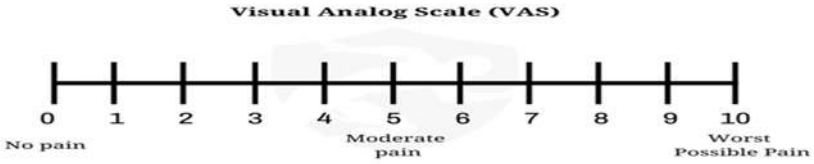
Sitting



Lying



ADL



Part :- 06. Muscle Strength Assessment:

Oxford manual muscle grading.

QN	Question	Response categories	grade
6.1	Oxford manual muscle grade scale	Shoulder flexor muscle Shoulder extensor muscle Shoulder abductor muscle Shoulder adductor muscle Shoulder medial rotator muscle Shoulder lateral rotator muscle	

Part :- 07. Rang of motion of shoulder joint:

Measured by goniometer

QN	Joint	Movement	Active movement	Passive movement
7.1	Shoulder	Flexion		
7.2		Extension		
7.3		Abduction		
7.4		Adduction		
7.5		Internal rotation		

7.6		External rotation		

Part :- 08. Functional Outcome Assessment:

1. Daily living activities are measured by the Barthel Index.

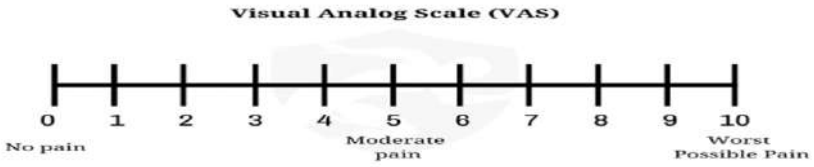
Activity		Score
FEEDING	0 = unable 5 = needs help cutting, spreading butter, etc., or requires modified diet 10 = independent	
BATHING	0 = dependent 5 = independent (or in shower)	
GROOMING	0 = needs to help with personal care 5 = independent face/hair/teeth/shaving (implements provided)	
DRESSING	0 = 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)	
TOILET USE	0 = dependent 5 = needs some help, but can do something alone 10 = independent (on and off, dressing, wiping)	
MOBILITY	0 = immobile or < 50 yards	

(ON LEVEL SURFACES)	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):	

Part :- 09. Post-Intervention Assessment

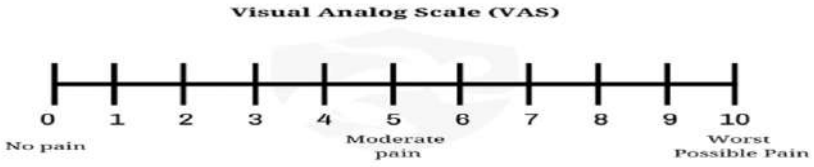
Pain of shoulder joint: Measured by VAS scale

9.1General pain intensity

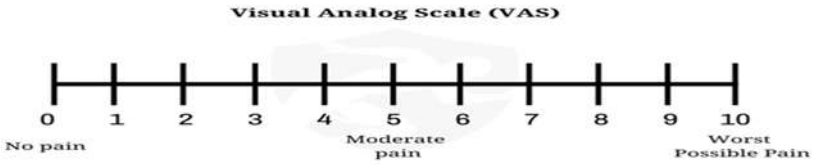


9.2During movement of shoulder joint

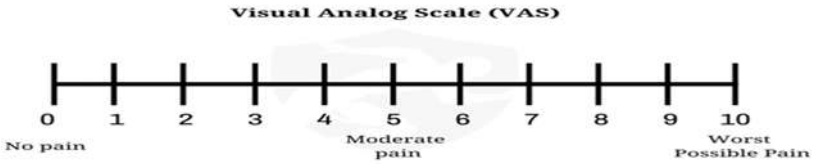
Flexion



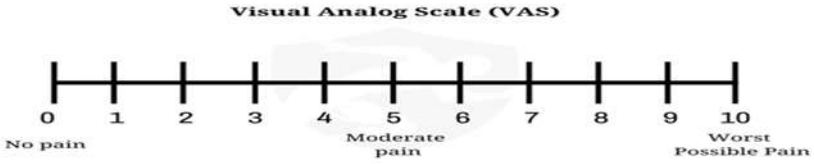
Extension



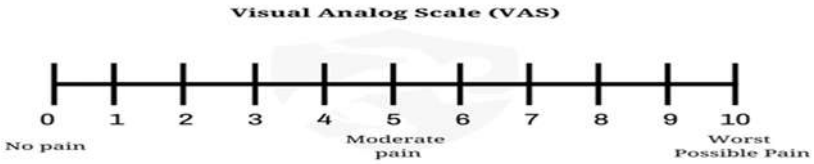
Abduction



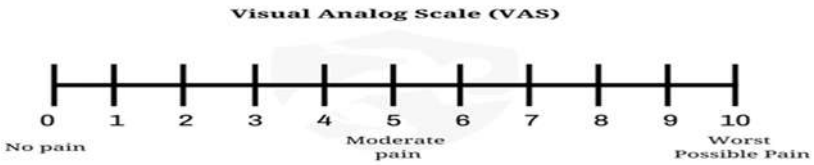
Adduction



Midial rotation

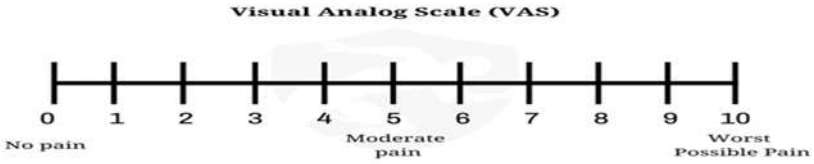


Lateral rotarion

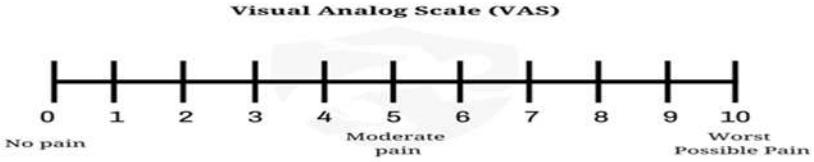


9.3 Others:-

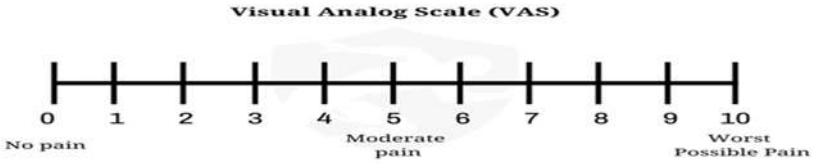
Standing



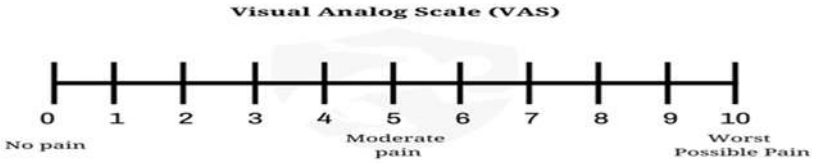
Walking



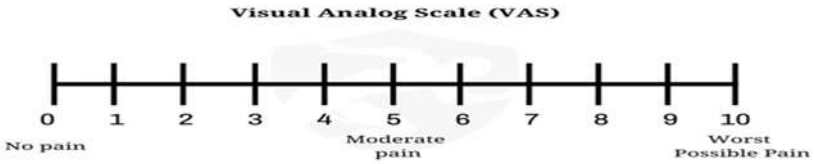
Sitting



Lying



ADL



Part :- 10. Muscle Strength Assessment:

Oxford manual muscle grading.

QN	Question	Response categories	Grade
10.1	Oxford manual muscle grade scale	Shoulder flexor muscle Shoulder extensor muscle Shoulder abductor muscle Shoulder adductor muscle Shoulder medial rotator muscle Shoulder lateral rotator muscle	

Part :- 11. Rang of motion of shoulder joint:

Measured by goniometer

QN	Joint	Movement	Active movement	Passive movement
7.1	Shoulder	Flexion		
7.2		Extension		
7.3		Abduction		
7.4		Adduction		
7.5		Internal rotation		
7.6		External rotation		

Part :- 12. Functional Outcome Assessment:

1. Daily living activities are measured by the Barthel Index.

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)	
TOILET USE	0 = dependent 5 = needs some help, but can do something alone 10 = independent (on and off, dressing, wiping)	
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):	

APPENDIX - D

Gant Chart

Activities/ Months	Sep 23	Oct 23	Nov 23	Dec 23	Jan 24	Feb 24	Mar 24	Apr 24	May 24	June 24	July 24	Aug 24
Proposal presentation												
Introduction												
Literature Review												
Methodology												
Data collection												
Data Analysis												
Result												
1st progress presentation												
Discussion												
Conclusion And Recommendation												
2nd progress presentation												
Communication with supervisor												
Final submission												