Faculty of Medicine

University of Dhaka

EFFECTIVENESS OF BODY WEIGHT-SUPPORTED GAIT TRAINING ON BALANCE FUNCTION OF STROKE PATIENT

H.M KAYKOBAD

Bachelor of Science in Physiotherapy (B.Sc. PT)

DU Roll: 1106

Registration no - 8665

Session: 2017-18

BHPI, CRP, Savar, Dhaka-1343

Bangladesh Health Professions Institute (BHPI)

Department of Physiotherapy

CRP, Savar, Dhaka-1343

September

We the undersigned certify that we have carefully read and recommend to the faculty of Medicine, University of Dhaka, for acceptable this disseration entitled

EFFECTIVENESS OF BODY WEIGHT-SUPPORTED GAIT TRAINING ON BALANCE FUNCTION OF STROKE PATIENT

Submitted by **H.M Kaykobad,** for the fulfilment of the requirement for the degree of Bachelor of Science in Physiotherapy (B.Sc. in PT)

.....

Muhammad Millat Hossain
Associate Professor & Course Coordinator
Department of Rehabilitation Science
BHPI, CRP, Savar, Dhaka.
Supervisor

.....

Professor Md. Obaidul Haque
Vice Principal
BHPI, CRP, Savar, Dhaka.

.....

Dr. Mohammad Anwar Hossain, PhD
Associate Professor of Physiotherapy, BHPI
Senior Consultant & Head
Department of Physiotherapy
CRP, Savar, Dhaka

DECLARATION

I declare that the work presented here is my own. All sources used have been cited appropriately. Any mistakes or inaccuracies are my own. I also declare that for any publication, presentation or dissemination of the study. I would be bound to take written consent from the Department of Physiotherapy of Bangladesh Health Profession Institute (BHPI).

Signature: H.M Kaykobad Date: 18/11/2023

H.M Kaykobad

Bachelor of Science in Physiotherapy (B.Sc. in PT)

DU Roll no: 1106

Registration No: 8665

Session: 2017 – 2018

BHPI, CRP, Savar, Dhaka – 1343

CONTENTS

Acknowledgment

First and foremost, I would want to express my thankfulness to Almighty Allah for giving me the ability to accomplish this assignment on time. I would like to express my appreciation to my parents, who consistently supported me to pursue this research.

I also gratefully acknowledge my respected Supervisor **Muhammad Millat Hossain**, Associate Professor & Course Coordinator, Department of Rehabilitation Science, Bangladesh Health Professions Institute (BHPI) providing me with his time, his careful monitoring, and his superb direction without which I would not have been able to finish this project.

I am also very thankful to Prof. **Md. Obaidul Haque**, Professor & Vice Principal, BHPI; **Md. Shofiqul Islam**, Associate Professor & Head, Department of Physiotherapy, BHPI; **Dr. Mohammad Anwar Hossain,PhD,** Associate Professor & Head, Department of Physiotherapy, CRP for sharing his precious knowledge in class that helped me in various aspects of concerning this study.

My special thanks to the Neurology and Stroke Rehabilitation unit specially to **Md. Faruque Ahmed**, Junior Consultant; I would like to pay my highest gratitude to all my friends specially **Selim Raza** and my junior **Humaira Kabir** who has cooperated beyond my expectation. I am also thankful to my all seniors,classmates, and juniors who helped me to give advice and support a lot in my research journey. I am thankful to all the staff of BHPI Library for their cordial help to find out important books and journals. Above all I would like to give thanks to the participants of this study for their cooperation.

Lastly, I would like to convey my appreciation to everyone who has always been my well-wisher and stood by me as a friend without any expectation.

Acronyms

ROM	Range of motion
ADL	Activities of daily living
BWS	Body weight support
BBS	Berg Balance Scale
WHO	World Health Organization
COG	Center of gravity
BWSTT	Body-weight-supported treadmill training
RAGT	Robotic-assisted gait training
FES	Functional electrical stimulation
PBW	Partial body weight
PBWSTT	Partial bodyweight support treadmill training
CRP	Centre for the Rehabilitation of the Paralyzed
TUG	Time UP and Go
SPSS	Statistical Package for Social Science
BHPI	Bangladesh Health Professions Institute
BMRC	Bangladesh Medical Research Council

List of Tables

List of Figures

Abstract

Purpose: The aim of this study is to identify the effectiveness of body weight- supported gait training on balance function of stroke patients. **Objective:** To find out the effectiveness of body weight- supported gait training on balance function of stroke patients. **Methodology:** The study was designed a Quasi Experimental study design. From, April 2023 to July 2023, 30 people with stroke were participated in this study from Outdoor Neurology and Stroke Rehabilitation Unit, Department of Physiotherapy, Centre for the Rehabilitation of the Paralysed (CRP), Savar, Dhaka. Those 30 patients were allocated based on inclusion and exclusion criteria. The age range was under 65 years old. They received 12 sessions of treatment for 4 weeks. A structured questionnaire had used for socio-demographic information. The Berg Balance Scale (BBS) and the Time UP and Go test (TUG) were used in the study to see the effectiveness in the pretest and posttest values of balance. Descriptive statistics using SPSS software version 25.0 were used for data analysis. Inferential statistics has been performed through Wilcoxon tests. **Results:** The finding of the study was carried out by using Wilcoxon test, Microsoft Excel and scientific calculator. Gender distribution was male 63% and female 37%. The mean age among 30 participants was 46.40 years. Among 30 participants 63.3% had right side affected and 36.7% had left side. The mean score of Berg Balance Scale was 28.73±11.004 to 38.77±9.141 and mean difference was 10.04 (p=0.001) which was significant. Another result of the mean score of Time Up and Go test was 23.83±4.316 sec to 16.77±4.023 which was decreased and mean difference of was 7.06 Sec (p= 0.001) which indicated the result was significant and improvement of balance of stroke patient. **Conclusion:** The study concluded as body weight-supported gait training is effective in balance function of stroke patient. Small amount of sample was included in this study and time duration was also limited. For future studies, needs a plan to conduct Randomized Control Trial within two groups (Control & Trial group) and maintaining the double blinding procedure.

Keywords: Stroke, Balance, Berg Balance Scale, Physiotherapy

CHAPTER-I INTRODUCTION

1.1 Background

A stroke is the most common cause of long-term disabilities (Wolfe 2000, p.275). In Bangladesh, stroke is the third most common cause of death. The prevalence of stroke is 0.3% (Islam et al. 2013, p.211). Stroke continues to be a devastating neurological infection that frequently results in major physical disability or death (Mukherjee and Patil 2011, p.85). The cerebrum is a stimulating location in neurology because of its astounding capacity and variety of living things. Due diligence will be required at this point since as we age, the brain gets more vulnerable to harmful disorders in a complex existence. In this new millennium, the status of stroke is a major concern. Because it is not only a major murderer, but also one of the main causes of Bangladesh's failure to succeed internationally (Mohammad 2011).

Cardioembolism, cerebral small vessel disease, and major artery atherosclerosis-related thromboembolism account for about 85% of ischemic strokes. A deep or lobar intracerebral hemorrhage accounts for about 15% of strokes, cerebral small vessel disorders (deep perforator arteriopathy, cerebral amyloid angiopathy) are responsible for 80% of these. Over the past ten years, the incidence of ischemic and hemorrhagic stroke has increased to 85–94 per 100,000 persons, but it is substantially higher (1151–1216 per 100,000) among individuals over 75. Additionally, 87% of stroke-related disability-adjusted life-years and 85% of all stroke deaths take place in low-income nations (Murphy and Werring 2020, p.561).

Diabetes, high blood pressure, quitting smoking, exercise, obesity, old age, high cholesterol levels, thrombophilia, arb, posthumous (family history), and migraines before a stroke or heart attack all increase the risk of stroke attacks, which increases the risk of stroke 4 to 6 times (Sacco et al. 2013, p.2066). Adults 25 to 49 years old are responsible for around 10 to 15% of all stroke cases. Considerations for this population's stroke etiologies. Although common and crucial to take into account, extracranial carotid or vertebral dissection should be actively looked for throughout the history, physical examination, and neuroimaging. Younger persons who get unexplained strokes should

look for cardiac reasons, such as thrombophilias, recreational drugs, and endocarditis such as patent foramen ovale, rhythm abnormalities, and endocarditis (Murphy and Werring 2020, p.561).

Balance issues are thought to be widespread following stroke, and they have been linked to poor recovery of ADL and mobility, as well as an increased risk of falling. The terms "balance," "balance reactions," "postural reactions," "postural control," "posture," and "equilibrium" are used interchangeably, although there are no universally accepted definitions or consistency in how they are used. This issue makes it difficult to draw inferences from the literature or generalize the findings. The majority of research has focused on measuring balance impairments (such as postural sway, weight distribution, or related parameters) as opposed to balance disability (the kind of balance task that a subject can complete while remaining upright, such as static or dynamic sitting or standing balance), each of which is discussed below (Tyson et al. 2006, p.31).

Physical rehabilitation techniques after a stroke have been utilized to improve range of motion (ROM), muscular force, mobility, functional status, physical fitness, and quality of life while reducing pain and stiffness (Goljar et al. 2010, p.206). Walking and balance abilities in stroke patients are highly correlated (Bohannon and Leary 1995, p.994). Due to the fact that balance issues are frequently experienced after a stroke , therapy for balance issues remains the norm in stroke rehabilitation (Goljar et al. 2010, p.206). For stroke victims to walk independently, balance skills is a key aspect (Chung, Lee and Hwang 2014, p.313). Exercise therapy in the form of task-oriented exercise programs is now acknowledged as a new approach to improving the balance function of chronic stroke patients. Several weeks of functional training have shown significant improvements in functional mobility, walking speed and endurance, and clinical measures of balance (Titianova et al. 2003, p.780).

Rehabilitation researchers and clinicians work to determine the most efficient treatment modalities to improve balance performance in individuals after stroke because rehabilitation is frequently a key component of attaining functional recovery in these patients (Tyson et al. 2007, p.341). In contrast to a more conventional technique that stresses control of isolated components of walk while recent ambulation is ongoing, gait

preparation during actual walking supports far better, a much better improved a higher recovery of walking capacities (Winstein et al. 1989, p.756). Less than 50% of stroke survivors can walk around the neighborhood, and about 50% of stroke patients are somewhat limited in their ability to do activities of daily living (ADLs) (Schaechter 2004, p.62).

Many stroke patients lack a stroll that enables them to do all of their daily workouts. A few gait-training techniques have shown promise in advancing functional gait reeducation (Flansbjer et al. 2005, p.76). Recently, there has been a neglected method of walking preparation that involves emptying the lower extremities with the aid of herness or supporting the body weight halfway or fully (Rossignol, Barbeau and Julien 1986, p.325). In terms of endurance and agility or speed, lower extremity motor recovery and balance, several studies suggest that gait reeducation with bodyweight support (BWS) training is preferable to overground gait training. Retraining gait may be beneficial for improving overground walking speed and endurance, functional balance, and lower-limb motor recovery, according to studies. It also lessens the amount of physical assistance needed to walk (Wernig et al. 1995, p.824-825).

Bodyweight support (BWS) training provides symmetric weight bearing or emptying of both lower appendages tangling, producing a setting that should be able to detect the improvement of compensatory strategy in relation to preparation with methodology aids, which can result in a patient's weight bearing being off-balanced after a stroke (Visintin et al. 1998, p.1124). According to preliminary research, using Bodyweight support (BWS) training improves and speeds up the recovery of ambulation, as well as the amount of time it takes to walk and the amount of physical effort it requires (Hesse et al. 1995, p.978-979).

1.2 Rational

Stroke rehabilitation is primarily completed by a multidisciplinary team. This multidisciplinary team includes physiotherapy. Because physiotherapy is a new profession in Bangladesh, many people are unaware of its purpose. However, it is an important part of health care to prevent diseases as well as to improve or maximize independence in people with disabilities.

As a result, physiotherapy can play a critical role in the management of stroke patients, which is critical for the advancement of our profession. Other professionals and the general public will eventually become aware of this service, which will aid in the establishment of this profession at various institutions, hospitals, and clinics to meet the health care needs of patients. Balance dysfunction is a common feature of all stroke patients. Body weight support (BWS) training can be an effective approach to improve balance. It should be ensure continuous training before discharge. The BWS training protocol has a clinical advantage because it is simple and easy. In addition, BWS training is cost-effective because of the enhanced efficiency achieved by its use in combination with traditional methods.

Body weight support (BWS) training in particular has been proven to improve the strength, proprioception, balance ability and weight bearing ratio of the affected lower extremity of stroke patients. In this area there are a few researches published but no one research article has published on effectiveness of Body weight support (BWS) gait training on balance function.The results of the study may help to guide physiotherapists to give evidence based treatment in patient with chronic stroke patients, which will be beneficial for both the patient with chronic stroke and for developing the field of physiotherapy profession.

1.3 Research Question

What is the effectiveness of body weight supported gait training on balance function of stroke patients?

1.4 Aim of the study

Aim of this study is to identify the effectiveness of body weight-supported gait training on balance function of stroke patients.

1.5 Objectives of the study

General objective:

a) To find out the effectiveness of body weight-supported gait training on balance function of stroke patients.

Specific Objective:

a) To measure the improvement on balance function of a stroke patient before and after body weight-supported gait training.
b) To demonstrate percentage of the sitting & standing and dynamic balance of stroke patients using Berg Balance Scale (BBS) among stroke patients.
c) To measure the moblity improvement before and after weight-supported training.
d) To explore socio-demographic (age, sex, educational status, employment) characteristics of stroke patient.

1.6 Hypothesis:

Alternative hypothesis:

Body weight-supported gait training is effective on balance function of stroke patients.

(Ha > Ho)

Null hypothesis:

Body weight-supported gait training is not effective on balance function of stroke patients.

(Ho ≠ Ha)

Where,

Ho= Null hypothesis

Ha = Alternative hypothesis

1.7 Variables :

Table: 1

Independent variables	Dependent variable
Body weight-supported gait training	Balance function of stroke patient
Conventional therapy	
Age	
Sex	
Type of stroke	
Side of involvement	

1.7 Operational Definition

Stroke

The World Health Organization (WHO) definition of stroke is: “Rapidly growing clinical indications of focal (or global) disruption of brain function, with symptoms lasting 24 hours or more or resulting to death, with no clear explanation other than vascular origin” (Hossain et al. 2011, p.19).

Balance

The capacity to distribute your weight in such a way that you can stand or move without falling, or recover if you trip, is referred to as balance. Balance necessitates the coordination of various body parts, including the central nervous system, inner ear, eyes, muscles, bones, and joints. Any of these issues can have an impact on equilibrium.

Berg Balance Scale

The Berg balance scale is used to assess a patient's capability (or incapacity) to balance safely while performing a series of specified exercises. It is a 14-item list with each item consisting of a five-point ordinal scale ranging from 0 to 4, with 0 indicating the lowest level of function and 4 the highest level of function and takes approximately 20 minutes to complete. Gait analysis is not a part of it (Steffen, Hacker and Mollinger 2002, p.130).

Body weight-supported gait training

Body weight–supported training is a recent addition to walking exercises. Some systemic programmed exercises performed by such as supported by a harness and stands with his/her feet.

Conventional therapy

Conventional physiotherapy is a collection of chosen treatment modalities established by a physiotherapist based on research and utilized extensively globally for the management of particular diseases.

CHAPTER II LITERATURE REVIEW

Stroke is the second biggest cause of disability and death globally, with low- and middle-income nations bearing the majority of the disease's burden. Globally, 13.7 million new incident strokes occurred in 2016, and 87% of them were ischemic strokes (Vasan et al. 2023, p. 664). Stroke is the most common clinical manifestation of diseases of the cerebral blood vessels. It is a syndrome characterized by the acute onset of a neurologic deficit that lasts at least 24 hours, reflects focal involvement of the central nervous system, and is caused by a disruption in cerebral circulation (Ali et al. 2014, p. 36).

Stroke is a clinical syndrome that can be broadly classified into two groups that describe its pathophysiology:

1) Ischemic strokes, which account for 50% to 85% of all strokes worldwide, are brought on by cerebral embolism or thrombosis (Feigin et al. 2009, p. 8).

2) Hemorrhagic strokes, which account for 1%–7% and 7%–27%, respectively, of all strokes worldwide, are brought on by subarachnoid drain or intracerebral discharge (Feigin et al. 2009, p. 8).

Stroke is the most common cause of neurological damage, disturbance, and post-stroke disability in the world. About 50% of survivors will experience a major long-term disability. Between 15% to 30% of stroke survivors experience lifelong impairment, making strokes a major global contributor to serious long-term disability. These patients' major drawbacks stem from their motor impairments. The majority of stroke survivors continue to have physical irregularities, which can result in the emergence of habitat and, secondarily, in severe difficulties. This study shown that patients with stroke are frequently given rehabilitation services in fall environments. Researchers report falling between 23% and 50% for chronic stroke (stroke > 6 months later). This percentage is significantly greater than the reported rate for older communities, independent of stroke (11% - 30%), although it is lower than the anti-stroke rate (stroke within a month of a stroke - 25%). People with chronic stroke are more likely to be involved in accidents, which can lead to up to 28% of reported injuries (Kabir 2017, p.11).

The majority of strokes are ischemic, although around 15% of strokes are caused by subarachnoid or intra-cerebral hemorrhage. Stroke kills 15%–35% of its victims and leaves more individuals who survive with substantial disabilities than any other medical condition (Ali et al. 2013, p. 36). Balance is required for the locomotor system to operate properly and for the completion of numerous daily tasks (Blum and Korner 2008, p. 260). Balance problems which have been found to be the largest determinant of falling in people with chronic stroke, can result in restricted exercise and a sedentary lifestyle, which further impairs function and health condition (Lubetzky and Kartin 2010, p.128).

Balance problems are common after a stroke (Blum and Korner 2008, p. 260). Stroke-related hemiparesis frequently impairs balance-demanding tasks, reducing independence in ADL (Hammer, Nilsagård and Wallquist 2008, p. 165). Balance issues in hemiparetic individuals following stroke might have a variety of reasons (Chen et al. 2000, p. 340). Balance can be impacted in a variety of ways, including joint mobility restriction, weakness, and changed muscle tone (Deoliviera et al. 2008, p. 1216) as well as cognitive issues, neurological abnormalities, and vestibular deficiencies (Tyson and Connell 2009, p. 826).

Sensation loss, visual defects, proprioceptive defects, coordination deficiencies, and attention loss are all possible (Chen et al. 2002, p. 583). Due to the different balance abnormalities that can occur after a stroke, assessing balance is a crucial component of the evaluation of stroke patients (Pyoria et al. 2004, p. 129). Deficits in standing balance are frequent in people who have had a stroke (Barclay et al. 2005, p. 412).

Balance is a complex process that requires changes in both axial and limb muscle action to adjust for the effects of gravity, as well as changes in body posture and load center of gravity (COG) to keep the individual from falling (Cheng et al. 2001, p. 1653). A central integration mechanism combines information from the afferent and efferent pathways (Barclay et al. 2005, p. 412). Balance problems are typically associated with deficiencies in central integration of afferent signals (somatosensory, ocular, and vestibular) in individuals with stroke hemiparesis (Bayouk et al. 2006, p. 52). The visual and vestibular cortex, the posterior or parietal cortex, the dorsolateral prefrontal cortex, the basal

ganglia, the limbic system, the cerebellum, and the reticular system all appear to play a role in sensory integration (Chen et al. 2000, p. 340).

The ocular, vestibular, and somatosensory systems all play a role in balance regulation in healthy adult individuals and serve as the foundation for the body's postural control (Hammer, Nilsagard and Wallquist 2008, p. 165). For instance, healthy individuals typically use somatosensory data from the lower limbs (foot pressure receptors, ankle joint receptors, muscle proprioceptors) to construct the primary reference coordinates for balance while they are in the static standing posture (Viosca et al. 2005, p. 1239). When lower limb somatosensory feedback is insufficient (as with a compliant surface support situation), additional sensory systems are activated (Barclay et al. 2005, p. 412).

These patients, in particular, have significant difficulties performing tasks that require the integration of somatosensory information from the lower extremities (such as maintaining equilibrium under a compliant surface support condition), and, unlike normal adults, they have a disproportionately greater reliance on visual input to maintain balance when other input sources are reduced (Smania et al. 2008, p. 313-314). In these critical situations, the capacity to assess, compare, and choose relevant sensory information is vital in order to prevent falling (Cheng et al. 2001, p. 1653).

It is crucial to understand that attention deficiencies may affect the recovery of both postural symmetry and stability after stroke, given the potential impacts of attention on balance (Bayouk et al. 2006, p. 52). Patients who had hemi neglect did, in fact, show a significant amount of asymmetry. Reduced hemi neglect may result in balance restoration (Geurts et al. 2005, p. 268).

The rapid loss of neurological function caused by stroke cerebral blood flow problems. Treatment, changes in the sensitivity levels of various senses, and sensory, motor, cognitive, perceptual, and linguistic deficits. The degree of damage varies on the degree and region of stroke due to the incapacity of the stroke. In general, hemoglobin patients' capacity to minimize muscular dystrophy, which progressively develops at speeds and muscle weakening, may be noticed with probable restrictions of joint range of motion. Concerns about falling issues caused by the rate of walk and walking capacity, balance

impairment, changing balance, confidence, and diminished mobility have decreased. As a result, rehabilitation for chronic stroke patients is promoted in order to balance the development of an important focus and functional mobility (Cella et al. 2015, p. 14).

One of the most frequent medical problems following a stroke is falling, which occurs 73% of the time in the first year (Verheyden et al. 2013, p. 346). Fear of falling and balance confidence are two psychological aspects of balance impairment and falling that are related to it in addition to physical components (Batchelor et al. 2012, p. 484). After a stroke, patients have decreased stability when walking and are more likely to trip and fall to their paretic side. Walking, sitting, and standing activities all need balance, which is linked to functional capacities such as locomotor function. So, preventing falls and injuries is a crucial component of stroke therapy (Verma et al. 2012, p.18).

After a stroke, between 52% to 85% of patients may walk again, but their irregular gait pattern typically persists and is distinct from that of healthy persons (Pradon et al. 2013, p. 105). Peurala et al. (2005, p. 1563) determined that all patients over 6 months post-stroke improved their motor function over the 3-week gait-oriented therapy. They also claimed that regardless of the condition, gait speed, dynamic balance, and motor task performance improved. According to Michael et al. (2005, p. 1552) patients with the worst balance will have the lowest levels of ambulatory activity, and stroke survivors will have the lowest levels of ambulatory activity. Additionally, they made the case that balance-related therapies would enhance the ambulatory and cardiovascular fitness of chronic stroke patients.

In chronic patients, reaching exercises done while seated have been shown to enhance sitting balance, peak vertical force on the paretic foot, and gait speed (Dean et al. 2007, p. 97). Yang et al. (2007, p. 1237) demonstrated the viability and advantages of the dual-task training program to improve walking capacity in chronic stroke participants. In the chronic phase following stroke, severe gait training significantly increased involvement in living activities (Pundik et al. 2012, p. 2264).

Many different treatment options have been provided to help improve the gait. Overground gait training was the main strategy until recently, when the emphasis turned

to alternative types of locomotor training. This includes body-weight-supported treadmill training (BWSTT) and robotic-assisted gait training (RAGT) with or without functional electrical stimulation (FES) and manual direction. Despite early reports of encouraging effects from these sorts of locomotor training programs, it is unclear whether they are superior than overground gait training and other forms of physiotherapy (Mehrholz et al. 2017, p. 723-24).

Treadmill training with assistance from partial body weight (PBW) has been recommended for stroke victims to help with timing and coordination of lower extremity motor activities. It helps to promote symmetry, assist weight shifting, and manage posture while increasing weight bearing on the affected limb. Balance and safety are provided by the partial body weight (PBW) support, which enables good upright posture (Hassid et al. 1997, p.24).

Partial bodyweight support treadmill training (PBWSTT) allows for repeated, partially regulated step-taking with a sling providing body weight support to allow for greater mobility of movement. Active movement repetition has been shown to induce neuroplastic changes in the brain, which is in line with the motor learning theory that is currently gaining popularity in rehabilitation treatment (Morawietz and Moffat 2013, p.2298). Gait training on a treadmill with body weight–support (BWS) is a successful strategy since it improves locomotor ability. BWS training is a training method that is acceptable to stroke patients and is consistent with clinical rehabilitation procedures (Visintin et al. 1998, p.1126).

Danielsson and Sunnerhagen (2000, p.556) reported in a study, Patients with stroke who walked with 30% body weight–supported (BWS) had lower oxygen consumption than those who walked unsupported. Peurala et al. (2005, p.1562) demonstrated his study, walking on the gait trainer with body weight–supported (BWS) and walking overground improved motor performance in chronic stroke patients.

Hossain et al. (2018, p.1) showed that gait training accompanied by an overhead harness is helpful to improve their gait quality in terms of walking speed and balance. In their study, Fazal et al. (2022, p.3) obtained that both conventional overground training and

body weight supported treadmill training (BWSTT), also known as herness system training, have positive effects on recovery and have an impact on variables related to balance, mobility, and fear of falling in stroke patients. For people who have experienced a subacute stroke, BWSTT shows similar therapeutic results as overground walking training in terms of enhancing balance and lower extremity function. Gait pattern improvement and better hip joint motion when walking are connected.

According to Barbeau and Visintin (2003, p.1458), following a stroke persons who received more gait training while having their body weight supported had better walking and postural abilities than those who received less. Body weight support (BWS) training appears to have been most beneficial for stroke patients who were older and who also had more significant gait impairments. Trueblood (2001,p.141) showed that treadmill training with BWS in patients with chronic stroke could normalize gait and improve balance.

Patients with body weight supported (BWS) demonstrated a considerable improvement over non-BWS patients. During the early stages of recovery, body weight supported (BWS) provides task-specific gait training, allowing patients to increase their walking speed and improve their balance (Ullah et al. 2017, p. 1095). This can make up for their incapacity to walk forward in an upright position. Body weight support (BWS) training may enhance walking mobility in subacute stroke patients more than traditional therapy alone (Brunelli et al. 2019, p. 310).

CHAPTER III METHODOLOGY

3.1 Study design:

This study was designed to evaluate the effectiveness of body weight-supported gait training on balance function of stroke patients. This study was a quasi-experimental design. This study included the single group under the pre-test and post-test design. Here the group of patients is tested under one condition, take the data before (pre-test score) and after (post-test score) physiotherapy treatment. Thus, two scores were compared to see if there were any differences between them. This design did not have a control group to compare with the experimental group.

3.2 Study area:

The Researcher was conducted the patient with stroke at Outdoor Neurology and Stroke Rehabilitation Unit, Department of Physiotherapy, CRP, Savar, Dhaka-1343.

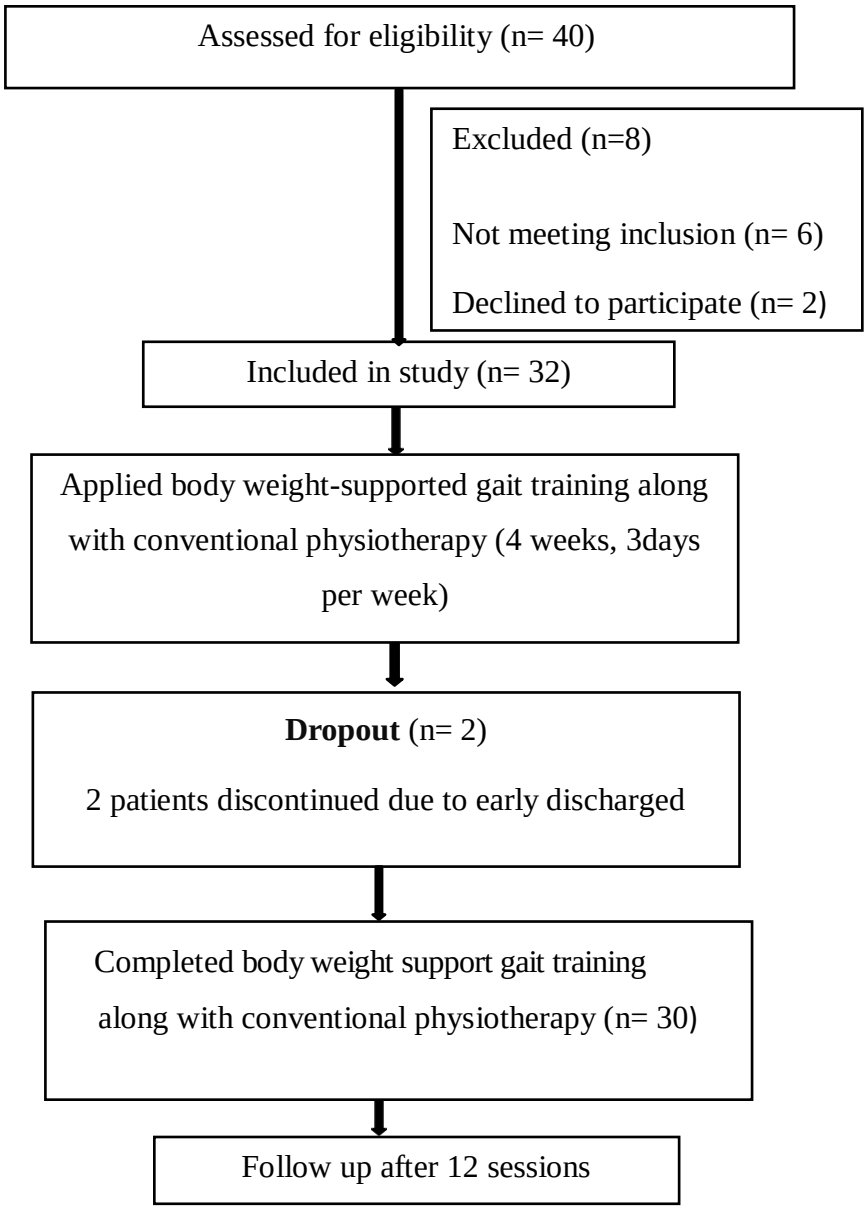
3.3 Study Population:

A population is defined as the complete group of persons who fulfill the researcher's criteria. The populations of this study were the stroke patients being treated at CRP.

3.4 Duration of data collection:

Data was obtained carefully and confidentially while conforming to all ethical considerations. The researcher provided a specific time for each participant to collect data. Data was collected from April 2023 to july 2023.

3.5 CONSORT framework



3.6 Sample selection:

Patients that meet the inclusion criteria are chosen as samples. 30 stroke patients were chosen from the outside Neurology and Stroke Rehabilitation Unit, Department of Physiotherapy, CRP, Savar, and then assigned to body weight-supported gait training by the physiotherapist. First, participants will be informed of the study's goal and reasoning, and their participation will be completely voluntary. Then we will invite them to an interview. Face-to-face interviews with participants and the data collector will be used to collect data. A single blinded study was conducted. The samples were assigned the numbers 1,2,3. To conduct the investigation, a total of 32 samples were included in one group. Meanwhile, two (2) patients withdrew from the research. Finally, 30 people took part in the study.

3.7 Sample Size:

The equation of the sample size calculation is given below:

$n = (\frac{z(1-\frac{a}{2})}{d})^2 \times pq$

Here,

$Z\ (1-\frac{a}{2}) = 1.96$

p = The reported prevalence of stroke in Bangladesh is 1.1% (Mondal et al. 2021).

q = 1-p

d = 0.05

Then, calculation is –

$n = (\frac{1.96}{0.05})^2 \times 0.011 \times 0.989$

$= 16.72$

So, effective sample size is 16.72

If we take 10% non-response rate, then final sample size is = effective sample size / (1 - non response rate anticipated).

Final sample size = $\frac{16.72}{1-0.10} = 18.19 \approx 19$

According to this equation the sample should be 19. But researcher took 30 participants from outdoor Neurology and Stroke rehabilitation unit, Department of Physiotherapy, CRP, Savar, Dhaka. Researcher took these 30 participants between April 2023 to july 2023.These 30 participants were in a single group for pre-test and post-test intervention.

3.8 Inclusion criteria:

a) More than 6-month post stroke (Peurala et al. 2005, p.1558).
b) Patient with ischemic stroke (Huber et al. 2023, p.3).
c) Patient age under 65 years (Peurala et al. 2005, p.1558).
d) Patients including both the male and female (Dhawale et al. 2018, p. 16).
e) The patient has slow or difficult to walking (Peurala et al. 2005, p.1558).

3.9 Exclusion Criteria:

a) Severe cognitive or communicative disorders (Peurala et al. 2005, p.1558).
b) Multiple stroke patients (Huber et al. 2023, p.3).
c) Significant joint malposition (Peurala et al. 2005, p.1558).
d) Psychological, Cognitive Dysfunction, and any other neuromuscular problem (Ullah et al. 2017, p.1094).
e) Unstable cardiovascular disease like Congenital heart disease, Deep vein thrombosis,coronary heart disease, previous history of Heart attack or Heart failure (Peurala et al. 2005, p.1558).

3.10 Method of data collection:

3.10.1 Data collection tools:

a) Data collection form
b) Consent Form
c) Structured questionnaire
d) Stop Watch, meter scale
e) Pen, Papers, Pencil

3.10.2 Questionnaire:

The questionnaire was created with the supervisor's advice and consent, following specific guidelines. There was the Berg Balance Scale (BBS) with fourteen (14) closed-ended questions and the Time UP and Go test (TUG) test with that were measured by the examiner and each question was constructed to determine the balance of the stroke patient.

3.11 Measurement tool:

Berg Balance Scale (BBS)

This questionnaire was designed to examine static and dynamic balance in stroke patients. The Berg Balance Scale (or BBS) is a commonly used clinical evaluation of a person's static and dynamic balance ability, named after one of the developers, Katherine Berg (Berg et al. 1989). The BBS is a 14-item scale that analyzes balance quantitatively. The items are rated on a scale of 0 to 4, with 0 representing inability to perform the job and 4 representing independent item achievement. A total score of 56 potential points is calculated. The points of Berg Balance Scale (or BBS) are-

1. Sitting to standing
2. Standing unsupported
3. Sitting with back unsupported
4. Standing to sitting

5. Transfers
6. Standing unsupported with eye closed
7. Standing unsupported with feet together
8. Reaching forward with outstretched arm while standing
9. Pick up object from the floor from a standing position
10. Turning to look behind over left and right shoulders while standing
11. Turn 360 degrees
12. Place alternative foot on step or stool while standing unsupported
13. Standing unsupported one foot in front
14. Standing on one leg

(Time Up & Go test):

Purpose - To assess mobility.

Equipment- Stopwatch

Direction- The patient wears their regular shoes and can utilize a walking aid if necessary. Begin by having the patient sit back in common position and identify a line meter or 10 fit away on the floor.

Adults who take more than 12 seconds to complete the TUG are at danger of falling.

1) Instruct the patient When I say "Go," I want you to:
    a) Stand up from the chair.
    b) Walk to the line on the floor at your normal pace.
    c) Turn.
    d) Walk back to the chair at your normal pace
    e) Sit down again.
2) On the word "Go," begin timing.
3) Stop timing after patient sits back down.
4) Record Time

3.12 Data collection procedure:

The data collector set the date and time, with his available time. After screening the patients at Neurology unit and Stroke rehabilitation unit, patients were selected for data collection according to the inclusion criteria. Patients were chosen for data collection after being screened at the Neurology unit and fulfilling the inclusion criteria. The data collector then provided the consent form to the participants and briefly explained the purposes and objectives of the associated research project. The patients who agreed to participate, then data collector did pretest. Data will be collected through face-to-face interview using a pretested semi-structured questionnaire and informed verbal consent will be taken prior to interview. Participant evaluated by Berg Balance test and Time Up & Go (TUG) test questionnaire form. All participant names have been properly defined to make sure confidentiality, and they have been diagnosed and referred by a trained physiotherapist. Each participant received physiotherapy to improve the balance of stroke patient.

The participant was treated as a regular patient in Neurology unit or Stroke Rehabilitation Unit of CRP. They continue their treatment according to plan. Each participant received treatment 3 days each week. The treatment program is scheduled for 4 weeks with 12 sessions. Every session lasted 30 minutes.. The researcher arranged treatment program with the permeation from that unit. After receiving intervention program, researcher was collected post test where subjective and objective information including balance and mobility measured by Berg Balance test and Time Up & Go test in questionnaire form.

3.13 Intervention:

Initially, a common intervention treatment known as conventional physiotherapy was started for the patients. The clinical Department of Physiotherapy provides conventional physiotherapy treatment for stroke patients, followed by various manual therapies and home counselling. The interventional process (treatment Strategy) is determined by the patient's state and the progression of the disease. The researcher collected opinions from staff members who were at least known as Clinical Physiotherapists. They viewed traditional physiotherapy as follows:

1) Positioning with postural correction
2) Functional activity
3) Neural connectivity exercise
4) Active facilitatory ROM exercise
5) Stretching for U/L and L/L-slow passive stretching
6) Co-ordination practice- Frenkel's exercise
7) Weight shifting and weight bearing
8) Trunk mobilization exercise with or without physio ball
9) Balance training both static and dynamic
10) Bed mobility
11) Strengthening program (Isometric & Isotonic)
12) Gait re-education
13) Proprioceptive exercise
14) Trunk control exercise
15) Soft tissue mobilization
16) Transitional movement Practice
17) Bridging exercise

Then the patients was participated gait training program included a body weight support gait system by a overhead harness in parallel bar. The patient was wore a harness with an adjustable belt around the back, pelvis, and thigh and an adjustable belt above to support their body weight. Participants were permitted to use the side railing of the parallel bar. The researcher monitored the patient walk the entire time. Initially, some patients required two assistants to direct the pelvic movement forward and to flex and extend the leg during the swing and stance stages of gait. The amount of body weight supported by the harness is determined by the needs of each patient. The body weight support was gradually reduced as the treatment progressed.

Then physiotherapy was given body weight supported gait training in 3 sessions per week for a total of 12 sessions of treatment over the course of 4 weeks.

Table 2: Body weight supported gait training exercise treatment protocol:

Category	Exercise	Duration/repetition
Gait training	Straight line walking	10 minute
	Side to side walking	5 minute
	Toe walking	5 minute
	Heel walking	5 minute
	Backward walking	5 minute

3.14 Data analysis

To ensure that the research have some values, the meaning of collected data has to be presented in ways that other research workers can understand. In other words, the researcher must make sense of the results. As the result came from an experiment in this research, data analysis was done by using the software named Statistical Package for Social Science (SPSS) version 25, Microsoft Excel version 2019, and a scientific calculator.

3.15 Statistical Test

Within group analysis of Berg Balance Scale (BBS) and Time UP and Go test (TUG) was analyzed by Wilcoxon signed rank test. The data was displayed in the form of a bar graph, a pie chart, and a table.

Wilcoxon Test:

This test is also known as the "Wilcoxon matched pair signed rank test," and it is an alternative to the paired t test. When the data is not normally distributed, the Wilcoxon test is necessary. When there are just two measures to compare from the same case, and the data are normally distributed or the sample size is large, we use a paired samples t test (also known as a related sample t test).

Wilcoxon Test for Large Samples (n>25)

In case of large sample sizes, ranks are assumed to be normally distributed. In this case, T is replaced by z statistic given as

$$Z = \frac{\mathrm{Ws} - \frac{\mathrm{n}(\mathrm{n}+1)}{4}}{\sqrt{\frac{n(n+1)(2\mathrm{n}+1)}{24}}}$$

Here,

n = number of pairs where differences is not 0

W_s = smallest of absolute values of the sum

Z= Value of Wilcoxon matched pair signed rank test

3.16 Significant level

In order to find out the significance of the study, the "P" value was calculated. The P values represent the probability of the experimental study's results. The term probability refers to the accurate of the results. P value of <0.05 was accepted as significant result for health service research. The results are considered significant if the P value is equal to or less than the significant level (Depoy and Gitlin, 2019, p.1).

3.17 Informed Consent

The researcher obtained consent to participate from every subject. A signed informed consent form was received from each participant. The participants were informed that they have the right to meet with outdoor doctor if they think that the treatment is not enough to control the condition or if the condition become worsen. The participants were also informed that they were completely free to decline answering any question during the study and were free to withdraw their consent and terminate participation at any time. Withdrawal of participation from the study would not affect their treatment in the physiotherapy department and they would still get the same facilities. Every subject had the opportunity to discuss their problem with the senior authority or administration of CRP and have any questioned answer to their satisfaction.

3.18 Ethical consideration

Research proposal was submitted for approval to the institution of Review Board (IRB) of Bangladesh Health Professions Institute (BHPI) and after defense the research proposal approval was taken from the IRB. Before collecting data, the participant gave their written or verbal consent. The World Health Organization (WHO) and Bangladesh Medical Research Council (BMRC) guideline was followed to conduct the study. Again, before beginning data collection, the researcher received authorization from the appropriate authorities to ensure the safety of the participants. To eliminate ethical issues, the subjects were allowed to continue receiving treatment for other purposes as usual. Before the study began, each participant was informed about it and provided signed consent.

CHAPTER IV RESULT

Socio-demographic Information

4.1 Age range of the participants:

Among the 30 participants, age ranges were distributed into 3 categories including 20-35 years were (n= 4) 13.3%, 36-50 years were (n=12) 40%, 51-65 years were (n=14) 46.7%. Here mean age was 46.40 years, maximum age was 65 years and minimum age was 27 years.

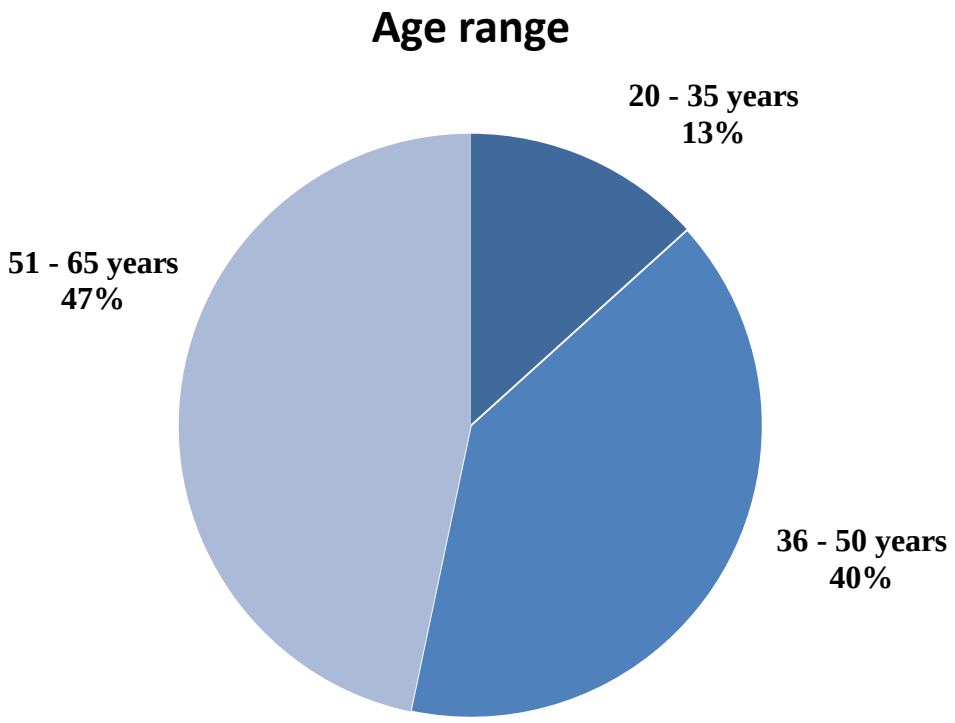


Figure-1: Age range of the participants

4.2 Gender of the participants (n=30)

In the study 30 participants were selected as sample, in between them n=24 participants were male and n=6 participants were female. In percentage male participants were 80% and female participants were 20%.

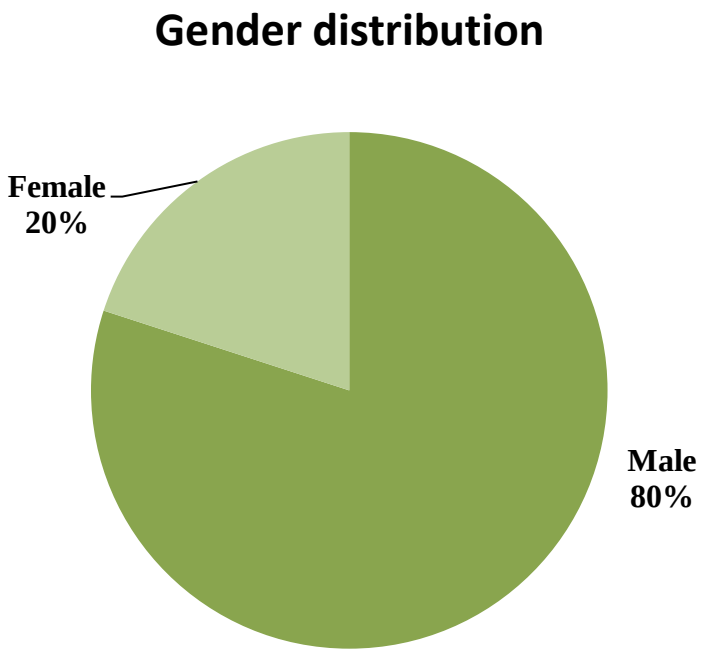


Figure 2: Gender distribution among participants

4.3 Weight range among the participants:

From the study it was founded that the mean weight of the participants was 63.97 kg. There were n=4 (13%) in between 45-55 kg, n=14 (46.7%) was 56-65 kg, n=9 (30%)was 66-75 kg and n=3 (10%) was 76-85 kg.

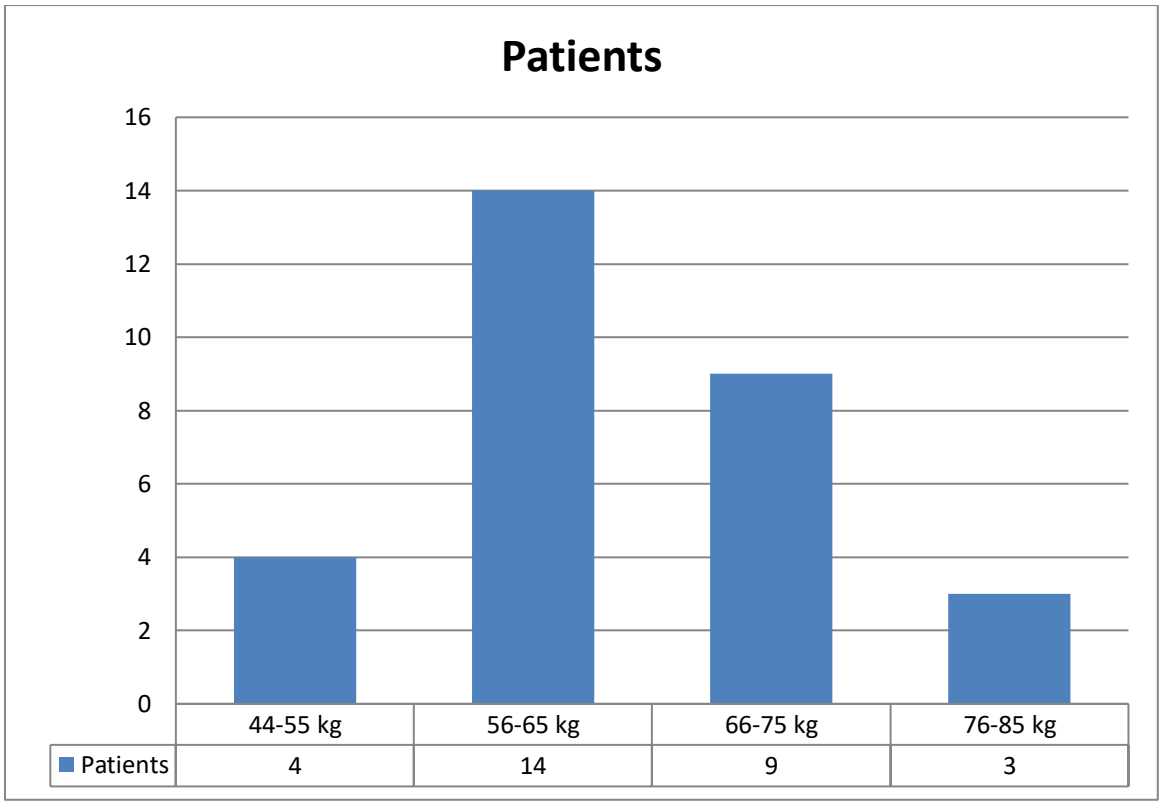
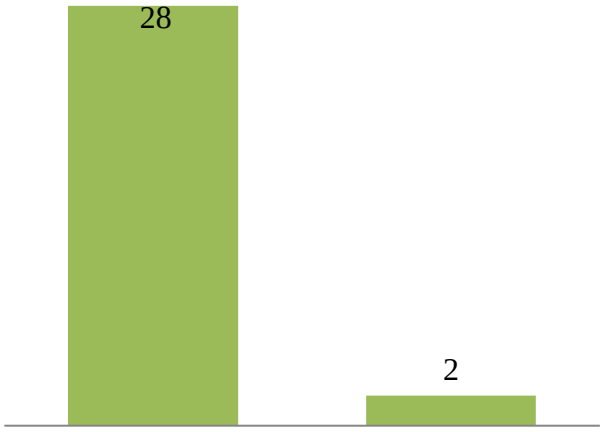


Figure 3: Weight range among the participants

4.4 Marital status of the participants:



Marital status	Married	Unmarried
	28	02

Figure 4: Bar chart of marital status of the participants

The chart revels that among the 30 participants, 93.3% (n=28) participants were married, 6.7% (n=2) participants were unmarried.

4.5 Living area of the participants:

The chart shows that among the 30 participants, 36.7% (n=11) participants were living in rural areas and 63.3% (n=19) participants were living in urban areas.

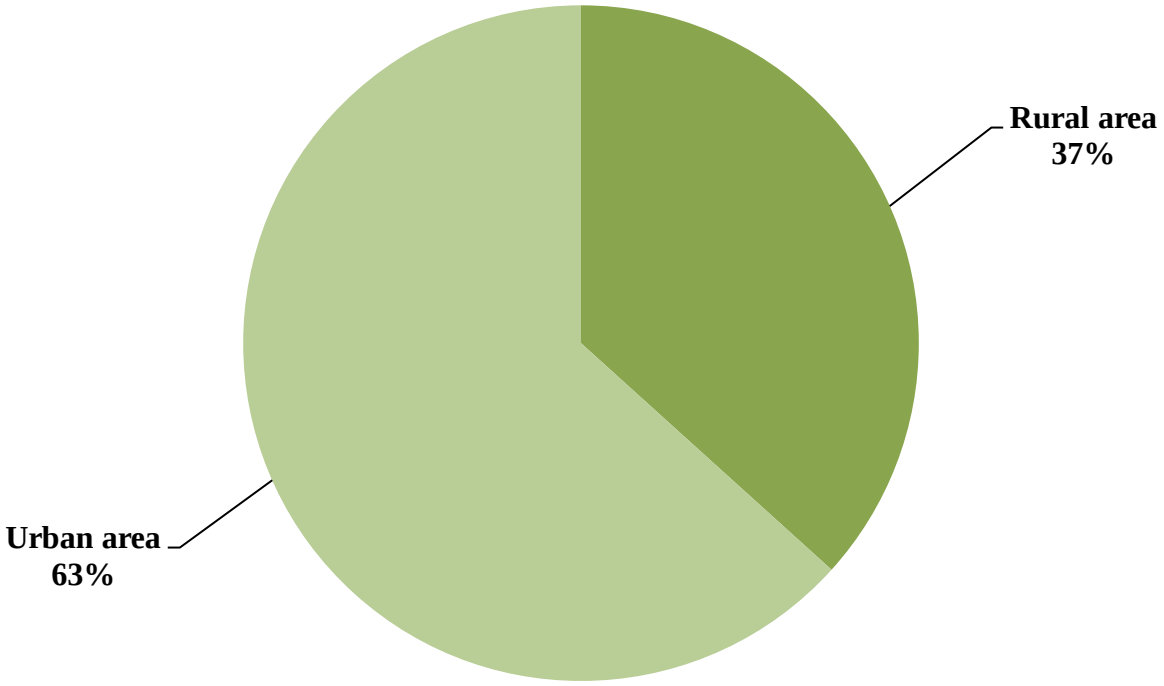
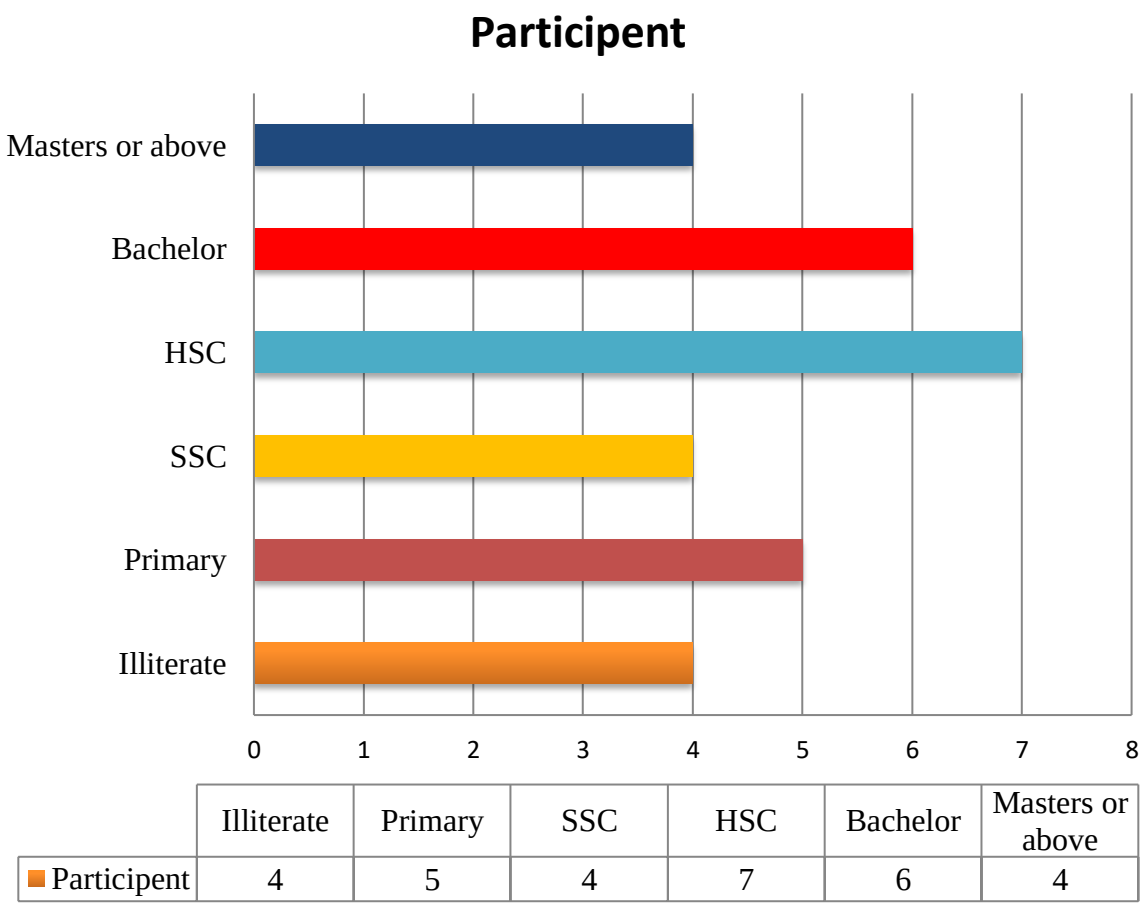


Figure 5: Pie chart of living area of the participants.

4.6 Educational status of the participants:



	Illiterate	Primary	SSC	HSC	Bachelor	Masters or above
Participent	4	5	4	7	6	4

Figure 6: Bar chart of educational status of the participants

The chart revels that among the 30 participants, 13.3% (n=4) participants were illiterate, 16.7% (n=5) participants were primary educated, 13.3% (n=4) participants were completed Secondary School Certificate (SSC), 23.3% (n=7) participants were Completed Higher Secondary Certificate (HSC), 20% (n=6) participants were completed Bachelor Degree, and 13.3% (n=4) participants were completed Masters or above.

4.7 Past hypertension history of the participants:

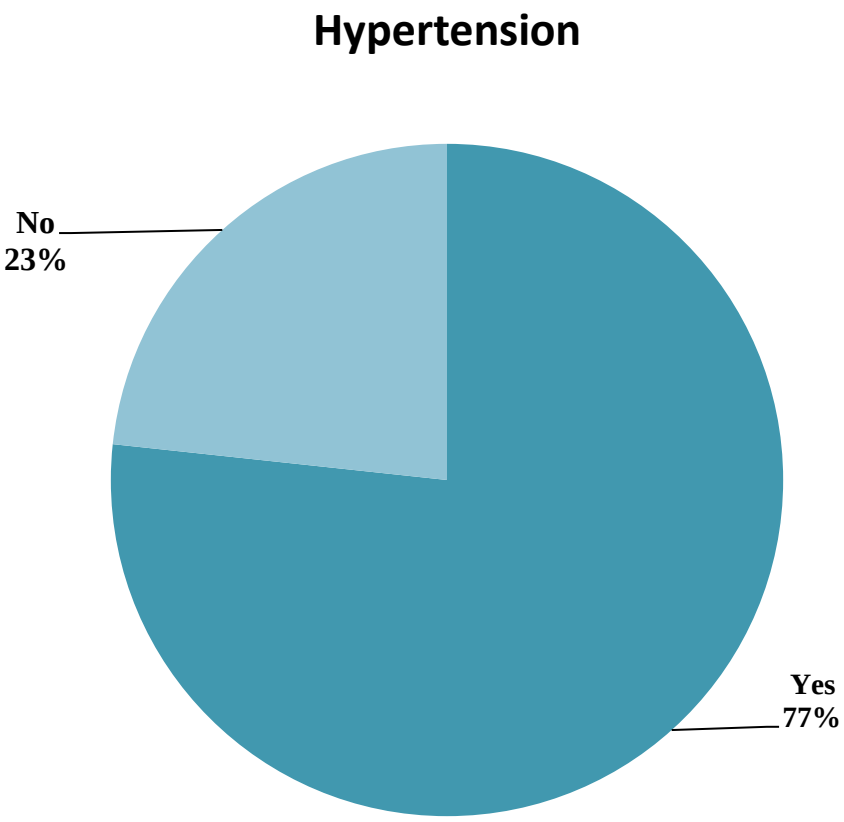


Figure 7: Pie chart of hypertension history of the participants

The chart showed that among the 30 participants, 76.7% (n=23) participants have Hypertension and 23.3% (n=7) participants have no hypertension in history.

4.8 Stroke type of participents:

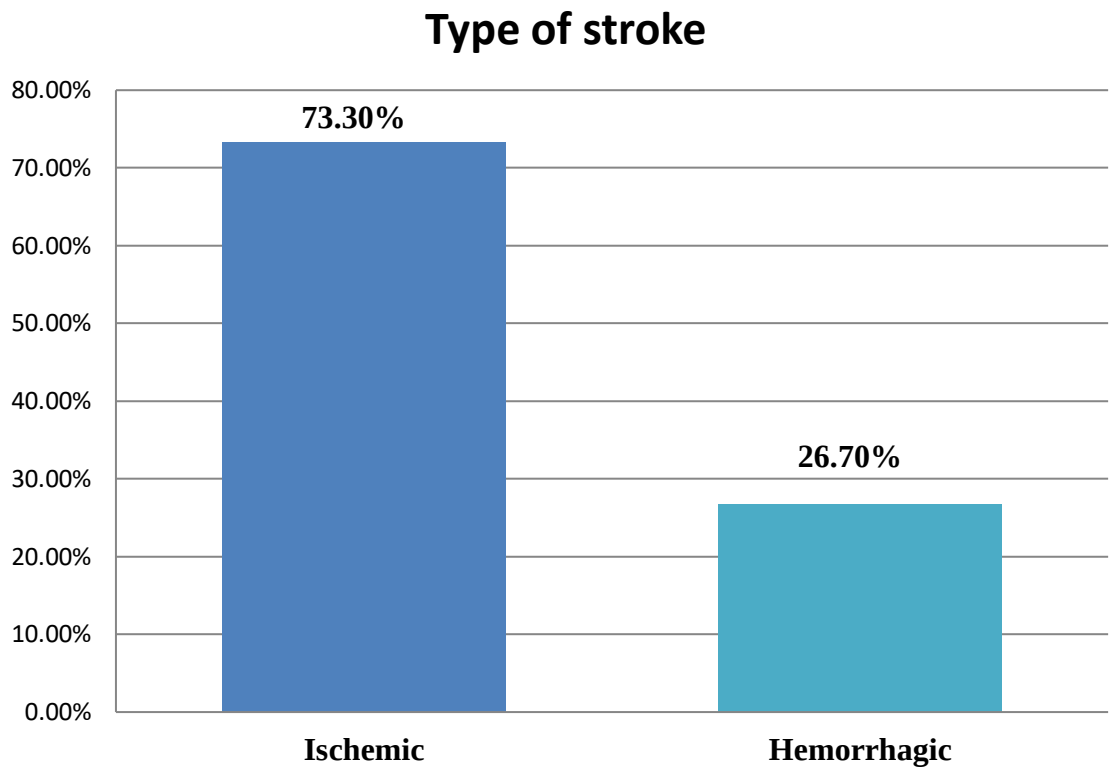


Figure 8: Chart of Type of stroke of the participants

In this study 30 stroke patient were included. Among them n=22 participants have ischemic type of stroke and n=8 have hemorrhagic type of stroke. In percentage 73.3% have ischemic and 26.7% have hemorrhagic.

4.9 Affected side:

In this study 30 stroke patient were included. Among them n=19 participants have right side involvement and n=11 have left side. In percentage 63.3% have right side affected and 36.7% have left side affected.

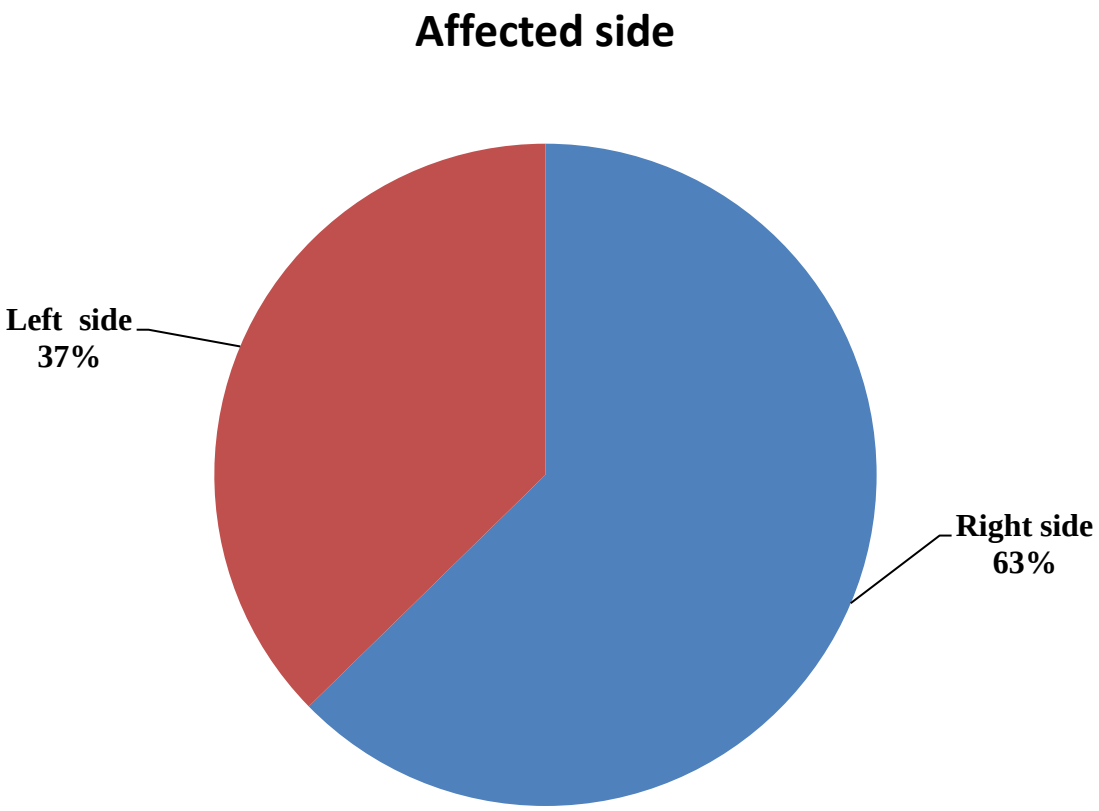


Figure 9: Chart of Affected side

4.10 Berg Balance Scale:

Item:1- Sitting to standing

The study found that during sitting to standing, mean between pre-test & post-test was 2.33 & 3.30. Mean difference between pre-test & post-test 0.97. Observe Wilcoxon Signed Ranks test P value is 0.001*. So, Null hypothesis was rejected and alternative hypothesis was accepted at 5% level of significant.

Table-3

Variable	**Pre-test (Mean)**	**Post-test (Mean)**	**Mean difference**	**Significant level**
Sitting to standing	2.33	3.30	0.97	0.001*

Item: 2- Standing unsupported

The study found that during, Standing unsupported mean between pre-test & post-test was 2.43 & 3.23. Mean difference between pre-test& post-test 0.80. Observe Wilcoxon Signed Ranks test P value is 0.001*. So, Null hypothesis was rejected and alternative hypothesis was accepted at 5% level of significant.

Table-4

Variable	Pre-test (Mean)	Post-test (Mean)	Mean difference	Significant level
Standing unsupported	2.43	3.23	0.80	0.001*

Item: 3- Sitting with back unsupported

The study found that during Sitting with back unsupported, mean between pre-test & post-test was 2.80 & 3.50. Mean difference between pre-test & post-test 0.70. Observe Wilcoxon Signed Ranks test P value is 0.001*. So, Null hypothesis was rejected and alternative hypothesis was accepted at 5% level of significant.

Table-5

Variable	Pre-test (Mean)	Post-test (Mean)	Mean difference	Significant level
Sitting with back unsupported	2.80	3.50	0.70	0.001*

Item: 4- Standing to sitting

The study found that during Standing to sitting, mean between pre-test & post-test was 2.57 & 3.33. Mean difference between pre-test & post-test 0.76. Observe Wilcoxon Signed Ranks test P value is 0.001*. So, Null hypothesis was rejected and alternative hypothesis was accepted at 5% level of significant.

Table-6

Variable	Pre-test (Mean)	Post-test (Mean)	Mean difference	Significant level
Standing to sitting	2.57	3.33	0.76	0.001*

Item: 5- Transfers

The study found that during transfers, mean between pre-test & post-test was 2.20 & 3.00. Mean difference between pre-test & post-test 0.80. Observe Wilcoxon Signed Ranks test P value is 0.001*. So, Null hypothesis was rejected and alternative hypothesis was accepted at 5% level of significant.

Table-7

Variable	Pre-test (Mean)	Post-test (Mean)	Mean difference	Significant level
Transfers	2.20	3.00	0.80	0.001*

Item: 6- Standing unsupported with eye closed

The study found that during Standing unsupported with eye closed, mean between pre-test & post-test was 2.17 & 2.97. Mean difference between pre-test & post-test 0.80. Observe Wilcoxon Signed Ranks test P value is 0.001*. So, Null hypothesis was rejected and alternative hypothesis was accepted at 5% level of significant.

Table-8

Variable	Pre-test (Mean)	Post-test (Mean)	Mean difference	Significant level
Standing unsupported with eye closed	2.17	2.97	0.80	0.001*

Item: 7- Standing unsupported with feet together

The study found that during Standing unsupported with feet together, mean between pre-test & post-test was 1.80 & 2.67. Mean difference between pre-test & post-test 0.87. Observe Wilcoxon Signed Ranks test P value is 0.001*. So, Null hypothesis was rejected and alternative hypothesis was accepted at 5% level of significant.

Table-9

Variable	Pre-test (Mean)	Post-test (Mean)	Mean difference	Significant level
Standing unsupported with feet together	1.80	2.67	0.87	0.001*

Item: 8- Reaching forward with outstretched arm while standing

The study found that during Reaching forward with outstretched arm while standing, mean between pre-test & post-test was 2.53 & 3.13. Mean difference between pre-test& post-test 0.60. Observe Wilcoxon Signed Ranks test P value is 0.001*. So, Null hypothesis was rejected and alternative hypothesis was accepted at 5% level of significant.

Table-10

Variable	Pre-test (Mean)	Post-test (Mean)	Mean difference	Significant level
Reaching forward with outstretched arm while standing	2.53	3.13	0.60	0.001*

Item: 9- Pick up object from the floor from a standing position

The study found that during Pick up object from the floor from a standing position, mean between pre-test & post-test was 1.17 & 1.17. Mean difference between pre-test& post-test 0.00. Observe Wilcoxon Signed Ranks test P value is 1.00. So, Retain the null hypothesis. Asymptotic significances are displayed.

Table-11

Variable	Pre-test (Mean)	Post-test (Mean)	Mean difference	Significant level
Pick up object from the floor from a standing position	1.17	1.17	0.00	1.00

Item: 10- Turning to look behind over left and right shoulders while standing

The study found that Turning to look behind over left and right shoulders while standing during, mean between pre-test & post-test was 2.27 & 2.80. Mean difference between pre-test& post-test 0.53. Observe Wilcoxon Signed Ranks test P value is 0.001. So, Null hypothesis was rejected and alternative hypothesis was accepted at 5% level of significant.

Table-12

Variable	Pre-test (Mean)	Post-test (Mean)	Mean difference	Significant level
Turning to look behind over left and right shoulders while standing	2.27	2.80	0.53	0.001

Item: 11- Turn 360 degrees

The study found that during Turn 360 degrees, mean between pre-test & post-test was 1.20 & 2.03. Mean difference between pre-test & post-test 0.83. Observe Wilcoxon Signed Ranks test P value is 0.001*. So, Null hypothesis was rejected and alternative hypothesis was accepted at 5% level of significant.

Table-13

Variable	Pre-test (Mean)	Post-test (Mean)	Mean difference	Significant level
Turn 360 degrees	1.20	2.03	0.83	0.001*

Item: 12- Place alternative foot on step or stool while standing unsupported

The study found that during Place alternative foot on step or stool while standing unsupported, mean between pre-test & post-test was 1.90 & 2.67. Mean difference between pre-test& post-test 0.77. Observe Wilcoxon Signed Ranks test P value is 0.001*. So, Null hypothesis was rejected and alternative hypothesis was accepted at 5% level of significant.

Table-14

Variable	Pre-test (Mean)	Post-test (Mean)	Mean difference	Significant level
Place alternative foot on step or stool while standing unsupported	1.90	2.67	0.77	0.001*

Item: 13- Standing unsupported one foot in front

The study found that Standing unsupported one foot in front during, mean between pre-test & post-test was 1.93 & 2.80. Mean difference between pre-test & post-test 0.87. Observe Wilcoxon Signed Ranks test P value is 0.001*. So, Null hypothesis was rejected and alternative hypothesis was accepted at 5% level of significant.

Table-15

Variable	Pre-test (Mean)	Post-test (Mean)	Mean difference	Significant level
Standing unsupported one foot in front	1.93	2.80	0.87	0.001*

Item: 14- Standing on one leg

The study found that during Standing on one leg, mean between pre-test & post-test was 1.43 & 2.33. Mean difference between pre-test & post-test 0.90. Observe Wilcoxon Signed Ranks test P value is 0.001*. So, Null hypothesis was rejected and alternative hypothesis was accepted at 5% level of significant.

Table-16

Variable	Pre-test (Mean)	Post-test (Mean)	Mean difference	Significant level
Standing on one leg	1.43	2.33	0.90	0.001*

Table 1- 14 showed that, this study found that by examining the Wilcoxon Signed Ranks test, it was discovered that for (n = 30) Wilcoxon Signed Ranks test table gives that within 14 tests, 13 tests results were found significant and one test (Pick up object from the floor from a standing position) was not found significant in case of balance, measured by Berg Balance Scale (BBS).

Mean Berg Balance Scale (BBS) score:

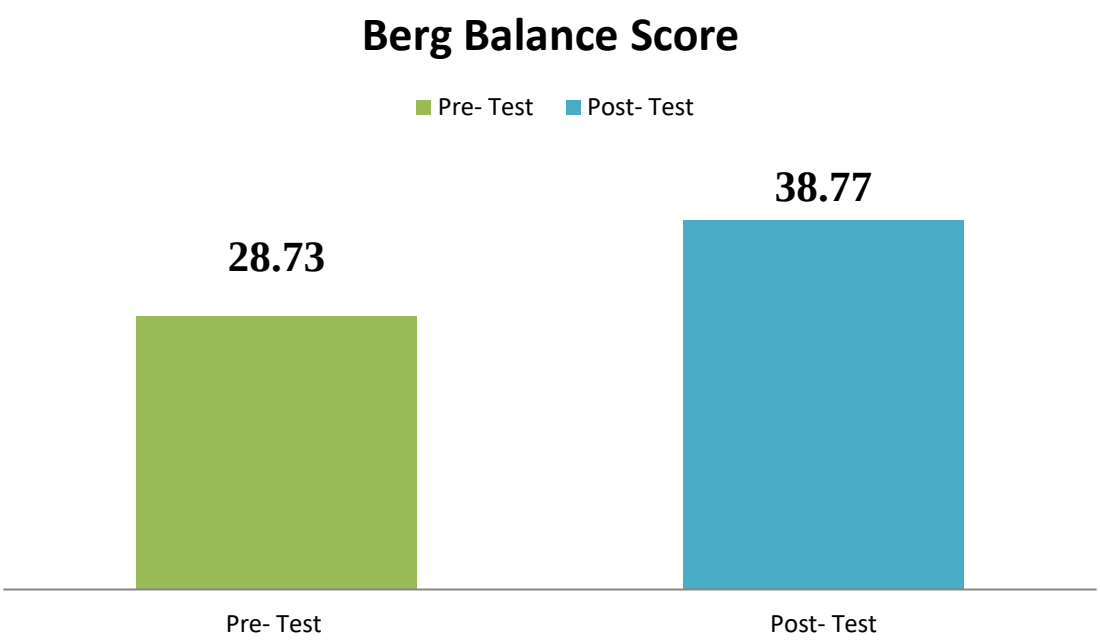


Figure 10: Chart of Mean different Berg Balance Scale (BBS) score

In above pre-test mean score was 28.73 and post-test mean score was 38.77. The difference between mean was 10.04. For this sample it may interpreted that post-test time was improve than pre-test time. It indicated that, the required 10.04 more than pre-test.

Table-17

Variable	Pres-test (n =30) X ± SD	Post-test (n =30) X ± SD	Mean different pre-test and post-test	Z	P value
Total Berg Balance Scale (BBS) score	28.73±11.004	38.77±9.141	10.04	-4.766	0.001*

Table 15 showed that, the comparison of the participant's before (pretest) and after (post-test) Berg balance test score. 30 participants had improved score in BBS test after the application of body weight-supported gait training. By examining the final test statistics portion of table by Wilcoxon signed-rank test it was discovered that, after 4 weeks of the treatment course it showed a statistically significant change in the score of BBS test (Z= -4.766, P= 0.001*). Where 0.001 is less than 0.05 (P<0.05) which indicated that it was significant among 30 participants. Moreover, Z= -4.766 which is less than -1.96 (Z<-1.96), so null hypothesis rejected and alternative hypothesis accepted which means that the results of Body weight supported exercise was found significant for improvements of balance, measured by Berg Balance Scale.

4.11 Time Up and Go (TUG) test:

In this study 30 participants were included. Time Up and Go Test is another measurement tool to measure the walking ability of stroke patient. In above pre-test mean score was 23.83 sec and post-test mean score is 16.77 seconds. The difference between mean was 7.06 seconds. For this sample it may interpreted that pot-test time is less than pre-test time. It indicated that, the required 7.06 seconds less time than pre-test.

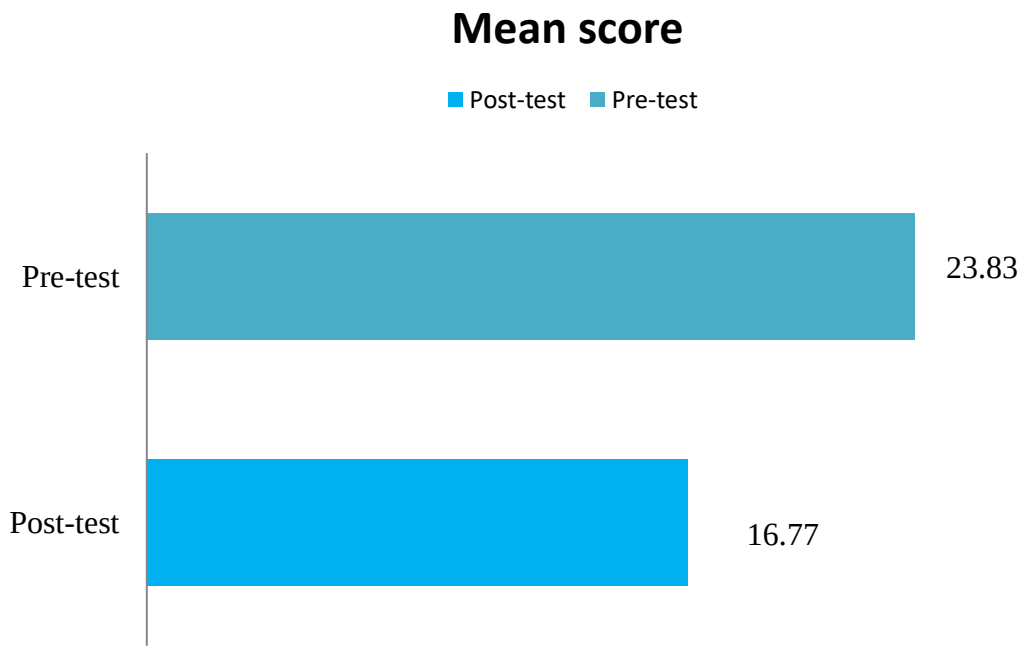


Figure 10: Chart of Mean different Time Up and Go test

Measurement of TUG Test using Wilcoxon Signed Rank test:

Table-18

Variable	Pre-Test(n =30) X ± SD	Post-Test(n =30) X ± SD	Mean different pre-test and post-test	Z	P value
Time up and go test	23.83±4.316	16.77±4.023	7.06	-4.209	0.001***

* = ≤ 0.05, ** = ≤ 0.01, *** = ≤ 0.001

The table showed that the patient have increased score of Time Up and Go (TUG) test after taking Body weight-supported gait training exercise. 30 participants had higher score in TUG test score before the intervention and the score reduced after the application Body weight-supported gait training exercise. By examining the final test statistics portion of table by Wilcoxon signed-rank test it was discovered that, after 4 weeks of the treatment course it showed a statistically significant change in the score of TUG test (Z= -4.209, P= 0.001*). Where 0.001 is less than 0.05 (P<0.05) which indicated that it was significant among 30 participants. Moreover, Z= -4.209 which is less than -1.96 (Z<-1.96), so null hypothesis rejected and alternative hypothesis accepted. Therefore, it can be said that body weight-supported gait training exercise improve balance function of stroke patient.

CHAPTER–V DISCUSSION

The purpose of this study was to determine the effectiveness of body weight-supported gait training on balance function of stroke patients. Stroke patients exhibit certain impairments as post-injury symptoms, such as impaired motor control, difficulty with coordination, balance problems, and irregular gait (Chung et al. 2014, p.314). In this experimental study 30 patients with stroke were enrolled who received specific physiotherapy intervention. They were received 12 sessions by the way of 3 session per week during a period of 4 weeks from the outdoor Neurology and stroke rehabilitation unit of CRP, Savar for the improvement.

The outcome of balance function and mobility was measured by Berg balance score and TUG test. In previous study researcher used Berg balance score (Mustafaoglu, 2018, p. 344) and TUG test to measure balance funtion of stroke patients (Ullah et al. 2017, p. 1094).

Age was one of variable in my study. In my study, the mean age was 46.40 years. Maximum age was 65 years and minimum age was 27 years. In a study by Peurala et al. (2005, p.1559) found that mean age was 52.3 years.

In my study, I had found that male participants were 80% and female participants was 20% among 30 participants. Peurala et al. (2005, p.1559) described that he was found that male participants were 73.33% and female were 26.67% among 15 participants. It was also be found my study that among all the participants about 63% of patients who were affected at the right side where 37% affected by left side. (Mustafaoglu, 2018, p.347) found among 15 participants 53.33 % had right side affected and 46.67% had left side affected in the study.

In this study 30 stroke patient were included. Among them n=22 participants had ischemic type of stroke and n=8 had hemorrhagic type of stroke. In percentage 73.3% had ischemic and 26.7% had hemorrhagic. Peurala et al. (2005, p.1559) described that he was found 53.33 had ischemic and 46.67% have hemorrhagic among 15 participants.

From my study it was founded that 13% in between 45-55 kg, 46.7% was 56-65 kg and 30% was 66-75 kg and 10% was 76-85 kg. It also found that the mean weight was 63.97 kilograms. In other study was showed the mean weight 79.4± 14.9 kilograms (Peurala et al. 2005, p.1559).

In Nigeria, a study showed that among 48 stroke survivors 10.4% had no formal education, 18.3% had primary education, 16.7% had secondary education, 54.6% had tertiary education (Onwudiwe et al. 2018, p.50). In this study among 30 participants, 13.3% was illiterate, 16.7% was primary passed, 13.3% was S.S.C. passed, 23.3% was H.S.C. passed, 20% was graduate, 13.3% were masters and above. 30 patients with stroke were included as sample of my study, among them almost 36.7% lived in rural and 63.3% lived in urban. Other study shows in Bangladesh, 54% participants lived in urban area and 46% participant lived in rural area (Hossain et al. 2011, p.20).

It was also found my study that (73.3%) had hypertension and (26.7%) had no hypertension. Another study showed that 63% of the stroke patients were suffering from hypertension and 37% had no hypertension (Hossain et al. 2011, p.21).

For the purpose, a total of 30 samples were taken one group. The study was done with them. Those patients were received body weight supported gait training treatment at last 30 minutes of a session. They were received 3 sessions per week for a total of 12 sessions of treatment over the course of 4 week. Then their results had been seen through assessment.

The study was shown the Berg Balance score in all items between (1- 14) was given Table (3- 16). In those 13 items were found good improvement also P value was (0.001) which was indicated the result was significant that indicated body wright supported gait training improvement on balance functon.

Here in , the mean of Berg balance score pre-test and post test was 28.73 and 38.77 which was improved and difference was 10.04 also the P value was (P= 0.001) which indicated the result was significant and improvement on balance function of stroke patient. In other study the before and after BBS scale for subject in body weight-supported

treadmill training (BWSTT) group showed a significant improved from 34.6± 3.6 to 42.9± 2.6 which was 8.2± 2.3 (Mustafaoglu, 2018, p.348-349).

In this study the researcher was found that, the mean score of TUG test between before and after the training program was 23.83 seconds to 16.77 which decreased and mean difference of was 11.07 seconds, (P= 0.001) which indicated the result was significant and improvement on balance function and improvement on mobility of stroke patient. In other study Mustafaoglu, (2018) found, the before and after TUG scores for subjects in the body weight-supported treadmill training (BWSTT) group showed a significant decrease, from 21.9 ±3.9 seconds to 16.6 ±7.2 seconds and (P= 0.043).

Ullah et al. (2017, p.1095) described that Patients with BWS showed significant improvement. There was a significant difference in patient gait and balance after gait training programme. According to study, develops in gait achieved during assisted locomotion can be maintained and train to full weight body over ground walking following a training method. This will eventually be more useful with improved balance and gait over ground walking speed. One of the primary benefits of using BWS is that it can deliver task-specific gait training to patients during the early stages of recovery. This may compensate for their failure to maintain an erect posture when walking forward.

In Wilcoxon test for BBS Test and TUG test, the both results were significant. It indicates that, improvement on balance function and mobility. By this test the results was found to be significant in Berg balance score (P=0.001) and TUG test (P=0.001). That actually means, body weight support gait traning is effective on balance of stroke patient.

5.1 Limitation of the study:

The study was conducted with 30 patients with stroke, which is a very small number of samples in and was not sufficient enough for the study to generalize the wider population. Due to time limitation the external validity of the study decreased but maintained internal validity during data collection. It is limited by the fact that daily activities of the subject were not monitored which could have influenced. The research was carried out in CRP, Savar, Dhaka such a small environment. However, the treatment was effective but it could not check the long-term effect. So, it was difficult to keep confidential the aims of the study for blinding procedure. Therefore, single blinding method was used in this study and it lacks the absolute minimization of physiotherapist's bias during delivering treatment So, it was difficult to keep the aim confidential for binding procedure. The male and female participant ratios were not equal also; therefore, for the correctness of the results, the male and female respondent ratios should be maintained in the future. The study time and the intervention period should also increase in future studies to determine the actual result.

There was no available research in this field in Bangladesh. As a result, relevant information about stroke with specific intervention for Bangladesh was relatively restricted in this study.

CHAPTER – V CONCLUSION AND RECOMMENDATION

Conclusion:

Stroke was one of the most devastating injuries in human history. Millions of people suffer from stroke each year. Bangladesh is a country that is changing. The majority of them come from low-income families with limited educational opportunities. In this country, there was also a lack of understanding about injuries. Government and non-government operations in the health sector are insufficient. Today's government health policy does not yet match the population's needs. Various private clinics and hospitals are attempting to deliver cutting- edge medical services to our country. For this purpose, this study was conducted to provide better treatment plan for stroke patients. The study used a quasi-experimental two group pre-test and post-test design to look the balance improvement after body weight-supported gait training exercise and the results showed that the difference was significant. The result of the current study indicated that the body weight-supported gait training exercise improve on balance and mobility of stroke patient. From this result researcher found the significant changes between pre-test and post-test to the selection of a well- defined population of stroke patients using specific inclusion and exclusion criteria. In this study also null hypothesis rejected and alternative hypothesis accepted. The treatment protocol has a clinical advantage because it is simple, easy and also cost-effective. Overall, participants in this research showed a greater benefit, which indicate that body weight-supported gait training improve on balance function of stroke patients.

Recommendation:

For people with stroke, physiotherapists should take on a broader role and use holistic treatment strategies. This is an area where physiotherapists need to polish up their knowledge. Patients should be involved in treatment by physiotherapists to improving their balance and funtion related problems. Physiotherapists should focus on this issue more during the treatment period. Aim of this study is to identify the effectiveness of body weight-supported gait training on balance function of stroke patients. The study had some limitations. Despite the study's limitations, the investigators suggested some further steps that maybe taken to improve the success of future research. The researcher provided 3 session per week total 12 sessions of treatment within 4 weeks which was very small duration for identifying improvement, so the duration should be expanded. In this study only one group is selected for the experiment but in future researcher should be selected control group and experimental group, so that this treatment can be more evidence based for this kind of the patients. Another treatment protocol should be added with body weight-supported gait training exercise for more specific result. Double blinding procedure should be maintained. Here researcher used only two measurement tools balance which was not enough, so further study will be needed with more measurement tools.

CHAPTER – V REFERENCES

Ali, SJ, Ansari, AN, Rahman, A, Imtiyaz S & Rashid, B 2014, 'Post-stroke hemiplegic gait: A review', *The Pharma Innovation*, vol.3, no. 8, p. 36.

Barbeau, H & Visintin, M 2003, 'Optimal outcomes obtained with body-weight support combined with treadmill training in stroke subjects', *Archives of physical medicine and rehabilitation*, vol. 84, no. 10, pp.1458-1465.

Barclay-Goddard, R, Stevenson, T, Poluha, W, Moffatt ME & Taback, SP 2005, 'Force platform feedback for standing balance training after stroke', *Stroke*, vol.36 no. 2 pp. 412-413.

Batchelor, FA, Mackintosh, SF, Said CM & Hill, KD 2012, 'Falls after stroke', *International Journal of Stroke*, vol. 7, no. 6, pp. 482-490.

Bayouk, JF, Boucher JP & Leroux, A 2006, 'Balance training following stroke: effects of task-oriented exercises with and without altered sensory input', *International Journal of Rehabilitation Research*, vol.29, no. 1, pp. 51-59.

Blum, L & Korner-Bitensky, N 2008, 'Usefulness of the Berg Balance Scale in stroke rehabilitation: a systematic review', *Physical therapy*, vol.88, no. 5, pp. 559-566.

Bohannon, RW & Leary, KM 1995, 'Standing balance and function over the course of acute rehabilitation', *Archives of physical medicine and rehabilitation*, vol. 76, no. 11, pp. 994-996.

Brunelli, S, Iosa, M, Fusco, FR, Pirri, C, Di Giunta, C, Foti C & Traballesi, M 2019, 'Early body weight-supported overground walking training in patients with stroke in subacute phase compared to conventional physiotherapy: a randomized controlled pilot study', *International journal of rehabilitation research*, vol.42, no. 4, pp. 309-315.

Cella, D, Hahn, EA, Jensen, SE, Butt, Z, Nowinski, CJ, Rothrock, N, & Lohr, KN 2015, *Patient-reported outcomes in performance measurement*, RTI Press, RTI Press pp.0014-1509.

Chen, IC, Cheng, PT, Chen, CL, Chen, SC, Chung CY & Yeh, TH 2002, 'Effects of balance training on hemiplegic stroke patients', *Chang Gung medical journal*, vol. 25, no. 9, pp. 583-590.

Chen, IC, Cheng, PT, Hu, AL, Liaw, MY, Chen, LR, Hong WH & Wong, MK 2000, 'Balance evaluation in hemiplegic stroke patients', *Chang Gung medical journal*, vol. 23, no. 6, pp. 339-347.

Cheng, PT, Wu, SH, Liaw, MY, Wong AM & Tang, FT 2001, 'Symmetrical body-weight distribution training in stroke patients and its effect on fall prevention', *Archives of physical medicine and rehabilitation*, vol. 82, no. 12, pp. 1650-1654.

Chung, E, Lee, BH & Hwang, S 2014, 'Core stabilization exercise with real-time feedback for chronic hemiparetic stroke: a pilot randomized controlled trials', *Restorative neurology and neuroscience*, vol. 32, no. 2, pp. 313-321.

Danielsson, A & Sunnerhagen, KS 2000, 'Oxygen consumption during treadmill walking with and without body weight support in patients with hemiparesis after stroke and in healthy subjects', *Archives of physical medicine and rehabilitation*, vol. 81, no.7, pp. 953-957.

Dean, CM, Channon, EF & Hall, JM 2007, 'Sitting training early after stroke improves sitting ability and quality and carries over to standing up but not to walking: a randomised controlled trial', *Australian Journal of Physiotherapy*, vol.53, no. 2, pp. 97-102.

DeOliveira, CB, De Medeiros, IR, Frota, NA, Greters ME & Conforto, A.B 2008, 'Balance control in hemiparetic stroke patients: main tools for evaluation', *J Rehabil Res Dev*, vol. 45, no 8, pp. 1215-1226.

DePoy, E & Gitlin, LN 2019, *Introduction to research E-book: understanding and applying multiple strategies*, Elsevier Health Sciences, Dutch academic.

Dhawale, T, Yeole, U & Pawar, A 2018, 'Effect of trunk control exercises on balance and gait in stroke patients-randomized control trial', *Age*, vol. 40, no.60, pp.15-18.

Fazal, Abdullah, Islam, Md, Waliul & Kibria, Md 2022, 'Effectiveness of Gait Training Using Body-Weight-Supported Treadmill among Patients with Stroke: A Review Study', *Int J Res Phys Med Rehabil* , vol.1, no.1, pp. 1-5.

Feigin, VL, Lawes, CM, Bennett, DA, Barker-Collo SL & 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.

Flansbjer, UB, Holmbäck, AM, Downham, D, Patten C & Lexell, J 2005, 'Reliability of gait performance tests in men and women with hemiparesis after stroke', *Journal of rehabilitation medicine*, vol. 37, no. 2, pp. 75-82.

Geurts, AC, De Haart, M, Van Nes IJ & Duysens, J 2005, 'A review of standing balance recovery from stroke', *Gait & posture*, vol. 22, no. 3, pp. 267-281.

Goljar, N, Burger, H, Rudolf M & Stanonik, I 2010, 'Improving balance in subacute stroke patients: a randomized controlled study', *International Journal of Rehabilitation Research*, vol. 33, no. 3, pp. 205-210.

Hammer, A, Nilsagård, Y & Wallquist, M 2008, 'Balance training in stroke patients–a systematic review of randomized, controlled trials', *Advances in Physiotherapy*, vol.10,no. 4, pp. 163-172.

Hassid, E, Rose, D, Commisarow, J, Guttry M & Dobkin, BH 1997, 'Improved gait symmetry in hemiparetic stroke patients induced during body weight-supported treadmill stepping', *Journal of neurologic rehabilitation*, vol.11, no. 1, pp. 21-26.

Hesse, S, Bertelt, C, Jahnke, MT, Schaffrin, A, Baake, P, Malezic M & Mauritz, KH 1995, 'Treadmill training with partial body weight support compared with physiotherapy in nonambulatory hemiparetic patients', *Stroke*, vol. 26, no. 6, pp. 976-981.

Hossain, AM, Ahmed, NU, Rahman, M, Islam, MR, Sadhya G & Fatema, K 2011, 'Analysis of sociodemographic and clinical factors associated with hospitalized stroke patients of Bangladesh', *Faridpur Medical College Journal*, vol. 6, no. 1, pp. 19-23.

Hossain, MA, Hossain, KMA, Hossain, M, Rahaman I & Taoheed, F 2018, 'Effectiveness of gait training supported by overhead harness in patients with spinal cord injury (SCI) at rehabilitation centre in Bangladesh', *Int J Neurorehabilitation*, vol.5, no. 332, pp. 2376-0281.

Huber, J, Elwert, N, Powell, ES, Westgate, PM, Hines E & Sawaki, L 2023, 'Effects of dynamic body weight support on functional independence measures in acute ischemic stroke: a retrospective cohort study', *Journal of NeuroEngineering and Rehabilitation*, vol.20, no.1, pp.1-6.

Islam, MN, Moniruzzaman, M, Khalil, MI, Basri, R, Alam, M.K, Loo, KW & Gan, SH 2013, 'Burden of stroke in Bangladesh', *International journal of stroke*, vol. 8, no. 3, pp.211-213.

Kabir, F 2017, 'Effect of unstable surface training to improve balance of stroke patients attended at CRP' Doctoral dissertation, Bangladesh Health Professions Institute, Faculty of Medicine, the University of Dhaka, Bangladesh.

Lubetzky-Vilnai, A, & Kartin, D 2010, 'The effect of balance training on balance performance in individuals poststroke: a systematic review', *Journal of neurologic physical therapy*, vol. 34, no. 3, pp. 127-137.

Mehrholz, J, Harvey, LA, Thomas S & Elsner, B 2017, 'Is body-weight-supported treadmill training or robotic-assisted gait training superior to overground gait training and other forms of physiotherapy in people with spinal cord injury'?, *A systematic review. Spinal cord*, vol.55, no. 8, pp. 722-729.

Michael, KM, Allen JK & Macko, RF 2005, 'Reduced ambulatory activity after stroke: the role of balance, gait, and cardiovascular fitness', *Archives of physical medicine and rehabilitation*, vol.86, no. 8, pp. 1552-1556.

Mohammad, QD, 2001, 'Stroke: prevention and treatment in the new millennium, *In 1st National Conference and scientific seminar, 1st Dhaka Sheraton Hotel, Bangladesh, 4th May, Soceity of Neurologist of Bangladesh*, Dhaka,Bangladesh.

Morawietz, C & Moffat, F 2013, 'Effects of locomotor training after incomplete spinal cord injury: a systematic review', *Archives of physical medicine and rehabilitation*, vol, 94, no.11, pp. 2297-2308.

Mukherjee, D & Patil, CG 2011, 'Epidemiology and the global burden of stroke', *World neurosurgery*, vol. 76, no. 6, pp. 85-90.

Murphy, SJ & Werring, DJ 2020, 'Stroke: causes and clinical features', *Medicine*, vol. 48, no. 9, pp. 561-566.

Mustafaoğlu, R, Erhan, B, Yeldan, İ, Hüseyinsinoğlu, BE., Gündüz B & Özdinçler, AR 2018, 'The effects of body weight-supported treadmill training on static and dynamic balance in stroke patients: A pilot, single-blind, randomized trial', *Turkish Journal of physical medicine and rehabilitation*, vol. 64, no. 4, p.344-352.

Onwudiwe, CO, Ezema, CI, Nweke, MC, Anukam GO & Okoy, GC 2018, 'Effects of core strengthening exercises on dynamic balance and gait speed in stroke survivors. International Journal of Basic', *Applied and Innovative Research*, vol.7, no 2, pp.47-54.

Peurala, SH, Tarkka, IM, Pitkänen K & Sivenius, J 2005, 'The effectiveness of body weight-supported gait training and floor walking in patients with chronic stroke', *Archives of physical medicine and rehabilitation*, vol. 86, no. 8, pp. 1557-1564.

Pradon, D, Roche, N, Enette L & Zory, R 2013, 'Relationship between lower limb muscle strength and 6-minute walk test performance in stroke patients', *Journal of Rehabilitation Medicine*, vol.45, no. 1, pp. 105-108.

Pundik, S, Holcomb, J, McCabe J & Daly, JJ 2012, 'Enhanced life-role participation in response to comprehensive gait training in chronic stroke survivors', *Disability and rehabilitation*, vol. 34, no. 26, pp. 2264-2271.

Pyöriä, O, Era, P & Talvitie, U 2004, 'Relationships between standing balance and symmetry measurements in patients following recent strokes (≤ 3 weeks) or older strokes (≥ 6 months)', *Physical therapy*, vol. 84, no. 2, pp. 128-136.

Rossignol, S, Barbeau, H & Julien, C 1986, 'Locomotion of the adult chronic spinal cat and its modification by monoaminergic agonists and antagonists', *Development and plasticity of the mammalian spinal cord*, vol.3, pp. 323-345.

Sacco, RL, Kasner, SE, Broderick, JP, Caplan, LR, Connors, JJ, Culebras, A, Elkind, M.S, George, MG, Hamdan, AD, Higashida, RT & Hoh, BL 2013, 'An updated definition of stroke for the 21st century: a statement for healthcare professionals from the American Heart Association/American Stroke Association', *Stroke*, vol. 44, no. 7, pp.2064-2089.

Schaechter, JD 2004, 'Motor rehabilitation and brain plasticity after hemiparetic stroke', *Progress in neurobiology*, vol. 73, no. 1, pp. 61-72.

Smania, N, Picelli, A, Gandolfi, M, Fiaschi A & Tinazzi, M 2008, 'Rehabilitation of sensorimotor integration deficits in balance impairment of patients with stroke hemiparesis: a before/after pilot study', *Neurological sciences*, vol. 29, pp. 313-319.

Steffen, TM, Hacker, TA & Mollinger, L 2002, 'Age-and gender-related test performance in community-dwelling elderly people: Six-Minute Walk Test, Berg Balance Scale, Timed Up & Go Test, and gait speeds', *Physical therapy*, vol. 82, no. 2, pp. 128-137.

Titianova, EB, Pitkänen, K, Pääkkönen, A, Sivenius J & Tarkka, IM 2003, 'Gait characteristics and functional ambulation profile in patients with chronic unilateral stroke', *American Journal of Physical Medicine & Rehabilitation*, vol. 82, no. 10, pp.778-786.

Trueblood, PR 2001, 'Partial body weight treadmill training in persons with chronic stroke', *NeuroRehabilitation*, vol.16, no.3, pp. 141-153.

Tyson, SF & Connell, LA 2009, 'How to measure balance in clinical practice.A systematic review of the psychometrics and clinical utility of measures of balance activity for neurological conditions', *Clinical rehabilitation*, vol. 23, no. 9, pp. 824-840.

Tyson, SF, Hanley, M, Chillala, J, Selley A & Tallis, RC 2006, 'Balance disability after stroke', *Physical therapy*, vol. 86, no. 1, pp.30-38.

Tyson, SF, Hanley, M, Chillala, J, Selley AB & Tallis, RC 2007, 'The relationship between balance, disability, and recovery after stroke: predictive validity of the Brunel Balance Assessment', *Neurorehabilitation and neural repair*, vol. 21, no. 4, pp. 341-346.

Ullah, MA, Shafi, H, Khan, GA, Malik AN & Amjad, I 2017, 'The effects of gait training with body weight support (BWS) with no body weight support (no-BWS) in stroke patients', *J Pak Med Assoc*, vol.67, no. 7, pp. 1094-1096.

Vasan, V, Hardigan, TA, Yeshoua, B, Downes, M.H, Ali, M, Devarajan, A, Rossitto, CP, Schuldt, BR, Odland, IC, Kellner CP and Fifi, JT 2023, 'Trends and in-hospital outcomes in patients with vocal fold paralysis after ischemic and intracerebral hemorrhagic stroke: a propensity matched 20-year analysis of the nationwide inpatient sample', *World Neurosurgery*, vol. 176, pp. 664-679.

Verheyden, GS, Weerdesteyn, V, Pickering, RM, Kunkel, D, Lennon, S, Geurts AC & Ashburn, A 2013, 'Interventions for preventing falls in people after stroke', *Cochrane database of systematic reviews*, vol.5, pp.332-438.

Verma, R, Arya, KN, Sharma P & Garg, RK 2012, 'Understanding gait control in post-stroke: implications for management', *Journal of bodywork and movement therapies*, vol.16, no.1, pp. 14-21.

Visintin, M, Barbeau, H, Korner-Bitensky N & Mayo, NE 1998, 'A new approach to retrain gait in stroke patients through body weight support and treadmill stimulation', *Stroke*, vol. 29, no. 6, pp. 1122-1128.

Wernig, A, Müller, S, Nanassy A & Cagol, E 1995, 'Laufband therapy based on 'rules of spinal locomotion'is effective in spinal cord injured persons', *European Journal of Neuroscience*, vol. 7, no. 4, pp. 823-829.

Winstein, CJ, Gardner, ER, McNeal, DR, Barto PS & Nicholson, DE 1989, 'Standing balance training: effect on balance and locomotion in hemiparetic adults', *Arch Phys Med Rehabil*, vol.70, no. 10, pp. 755-762.

Wolfe, CD 2000, 'The impact of stroke', *British medical bulletin*, vol. 56, no. 2, pp. 275-286.

Yang, YR, Wang, RY, Chen YC & Kao, MJ 2007, 'Dual-task exercise improves walking ability in chronic stroke: a randomized controlled trial', *Archives of physical medicine and rehabilitation*, vol.88, no.10, pp. 1236-1240.

APPENDIX A

Verbal Consent Form

Title: The effectiveness of body weight-supported gait training on balance function of stroke patients.

Assalamualaikum\ Namashker,

I am H.M Kaykobad, the 4th year B.Sc. (Hon's) in Physiotherapy student of Bangladesh Health Professions Institute (BHPI) under Medicine faculty of University of Dhaka. To obtain my Bachelor degree, I shall have to conduct research and it is a part of my study. The participants are requested to participate in the study after reading the following. My research title is " **The effectiveness of body weight-supported gait training on balance function of stroke patients**". Through this study I will find effectiveness of the of body weight-supported gait training on balance function of stroke patients. If I can complete the study successfully, the patients may get the benefits of improve neurology outpatients physiotherapy service. To implement my research project, I need to collect data from the patients. Therefore, you could be one of my valuable subjects for my study.

I am committed that the study will not pose any harm or risk to you. You have the absolute right to withdraw or discontinue at any time without any hesitation or risk. I will keep all the information confidential which I obtained from you and personal identification of the participant would not be published anywhere. If you have any query about the study, you may contact with the researcher H.M Kaykobad or supervisor of Muhammad Millat Hossain, Associate Professor & Course Coordinator, Department of Rehabilitation Science, BHPI, CRP, Savar, Dhaka-1343.

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

☐ Yes ☐ No

Signature of the participant & Date.....

Signature of the researcher & Date.....

APPENDIX B

Questionnaire (English Version)

This questionnaire is developed to measure balance function of stroke patient .In this portion will be filled by data collector using a black pen.

Please answer every section and mark in each section only the one box that applies to you. It is realized that you may consider two or more statements in any one section relate to you, but please just mark the box that most closely describes your problem.

Code No: Date:

Patient's name Patient ID No:
Mobile No: Address:
Date of test:

Part-1 : Socio- Demographic Information

No.	Questions	Response of the participant
1.1	Age (in year)	…….
1.2	Sex	1. Male 2. Female
1.3	Weight (Kg)	……
1.4	Marital status	1. Married 2. Unmarried 3. Divorced 4. Widow
1.5	Occupation	1. Housewife 2. Farmer 3. Shopkeeper 4. Business 5. Service holder 6. Day labor 7. Student 8. Unemployed 9. Other

1.6	Educational status	1. Illiterate 2. Primary 3. Secondary school certificate (SSC) 4. Higher secondary certificate (HSC) 5. Bachelor 6. Masters or above 7. Other
1.7	Living area	1. Rural 2. Urban
1.8	Do you have Hypertension ?	1. Yes 2. No
1.9	Other past medical history?	1. Yes 2. No
1.10	Do you have any malposition or fracture of joints ?	1. Yes 2. No
1.11	Do you have any communicative disorders ?	1. Yes 2. No
1.12	How often have you had stroke ?	1. 1 2. 2 3. More then 2
1.13	Duration type of Stroke	1. 4- 6 month 2. More then 6 month
1.14	What type of stroke did he have ?	1. Ischemic 2. Hemorrhagic
1.15	Affected Body Part	1. Right side 2. Left side 3. Both side

Part-2: Assessment of balance

Balance Information (This questionnaire has been designed to give us informationis a patient's ability or inability to balance during a series of predetermined tasks. It is a 14 item list with each item consisting of a five-point ordinal scale ranging from 0 to 4, with 0 indicating the lowest level of function and 4 the highest level of function.

No	Test	Pre-Test	Post-Test
2.1	**SITTING TO STANDING:***(Please stand up. Try not to use your hand for support)* (4) able to stand without using hands and stabilize independently (3) able to stand independently using hands (2) able to stand using hands after several tries (1) needs minimal aid to stand or stabilize (0) needs moderate or maximal assist to stand		

2.2	**STANDING UNSUPPORTED:** *(Please stand for two minutes without holding on)* (4) able to stand safely for 2 minutes (3) able to stand 2 minutes with supervision (2) able to stand 30 seconds unsupported (1) needs several tries to stand 30 seconds unsupported (0) unable to stand 30 seconds unsupported		
2.3	**SITTING WITH BACK UNSUPPORTED BUT FEET SUPPORTED ON FLOOR OR ON A STOOL:(***Please sit with arms folded for 2 minutes)* (4) able to sit safely and securely for 2 minutes (3) able to sit 2 minutes under supervision (2) able to sit 30 seconds (1) able to sit 10 seconds (0) unable to sit without support 10 seconds		
2.4	**STANDING TO SITTING:** *(Please sit down)* (4) sits safely with minimal use of hands (3) controls descent by using hands (2) uses back of legs against chair to control descent (1) sits independently but has uncontrolled descent (0) needs assist to sit		

2.5	**TRANSFERS:** *(Arrange chair for pivot transfer. Ask subject to transfer one way toward a seat with armrests and one way toward a seat without armrests. You may use a bed and a chair)* (4) able to transfer safely with minor use of hands (3) able to transfer safely definite need of hands (2) able to transfer with verbal cuing and/or supervision (1) needs one person to assist (0) needs two people to assist or supervise to be safe		
2.6	**STANDING UNSUPPORTED WITH EYES CLOSED:** *(Please close your eyes and stand still for 10 seconds)* (4) able to stand 10 seconds safely (3) able to stand 10 seconds with supervision (2) able to stand 3 seconds (1) unable to keep eyes closed 3 seconds but stays safely (0) needs help to keep from falling		

2.7	**STANDING UNSUPPORTED WITH FEET TOGETHER:** *(Place your feet together and stand without holding on)* (4) able to place feet together independently and stand 1 minute safely (3) able to place feet together independently and stand 1 minute with supervision (2) able to place feet together independently but unable to hold for 30 seconds (1) needs help to attain position but able to stand 15 seconds feet together (0) needs help to attain position and unable to hold for 15 seconds		
2.8	**REACHING FORWARD WITH OUTSTRETCHED ARM WHILE STANDING:** *(Lift arm to 90 degrees. Stretch out your fingers and reach forward as far as you can. Ask subject to use both arms when reaching to avoid rotation of the trunk)* (4) can reach forward confidently 25 cm (10 inches) (3) can reach forward 12 cm (5 inches) (2) can reach forward 5 cm (2 inches) (1) reaches forward but needs supervision (0) loses balance while trying/requires external support		

2.9	**PICK UP OBJECT FROM THE FLOOR FROM A STANDING POSITION:** *(Pick up the shoe/slipper, which is place in front of your feet)* (4) able to pick up slipper safely and easily (3) able to pick up slipper but needs supervision (2) unable to pick up but reaches 2-5 cm from slipper and keeps balance independently (1) unable to pick up and needs supervision while trying (0) unable to try/needs assist to keep from losing balance or falling		

2.10	**TURNING TO LOOK BEHIND OVER LEFT AND RIGHT SHOULDERS WHILE STANDING:** *(Turn to look directly behind you over toward the left shoulder. Repeat to the right. Examiner may pick an object to look at directly behind the subject to encourage a better twist turn.)* (4) looks behind from both sides and weight shifts well (3) looks behind one side only other side shows less weight shift (2) turns sideways only but maintains balance (1) needs supervision when turning (0) needs assist to keep from losing balance or falling		
2.11	**TURN 360 DEGREES:** *(Turn completely around in a full circle. Pause. Then turn a full circle in the other direction)* (4) able to turn 360 degrees safely in 4 seconds or less (3) able to turn 360 degrees safely one side only 4 seconds or less (2) able to turn 360 degrees safely but slowly (1) needs close supervision or verbal cuing (0) needs assistance while turning		

2.12	**PLACE ALTERNATE FOOT ON STEP OR STOOL WHILE STANDING UNSUPPORTED:** *(Place each foot alternately on the step/stool. Continue until each foot has touch the step/stool four times)* (4) able to stand independently and safely and complete 8 steps in 20 seconds (3) able to stand independently and complete 8 steps in > 20 seconds (2) able to complete 4 steps without aid with supervision (1) able to complete > 2 steps need minimal assist (0) needs assistance to keep from falling / unable to try		
2.13	**STANDING UNSUPPORTED ONE FOOT IN FRONT:** *(Place one foot directly in front of the other. If you feel that you cannot place your foot directly in front, try to step far enough ahead that the heel of your forward foot is ahead of the toes of the other foot. To score 3 points, the length of the step should exceed the length of the other foot and the width of the stance should approximate the subject's normal stride width)* (4) able to place foot tandem independently and hold 30 seconds (3) able to place foot ahead independently and hold 30 seconds (2) able to take small step independently and hold 30		

	seconds (1) needs help to step but can hold 15 seconds (0) loses balance while stepping or standing		
2.14	**2.14 STANDING ON ONE LEG:** *(Stand on one leg as long as you can without holding on)* (4) able to lift leg independently and hold > 10 seconds (3) able to lift leg independently and hold 5-10 seconds (2) able to lift leg independently and hold ≥ 3 seconds (1) tries to lift leg unable to hold 3 seconds but remains standing independently (0) unable to try of needs assist to prevent fall		
	Total Berg Balance Score		

Date of pre- test:- …….

Date of post- test:- ……

Time Up and Go test (TUG):

General instruction:

Purpose - To assess
mobility.
Equipment-
Stopwatch

Direction- Patient wears their regular footwear and can use a walking aid. If needed. Begin by having the patient sit back in a standard and identify a line meters, or 10 fit away on the floor.

An adult who takes >/12 seconds to complete the TUG is at risk for falling.

1. Instruct the patient

When I say "Go," I want you to:

- Stand up from the chair.
- Walk to the line on the floor at your normal pace.
- Turn.
- Walk back to the chair at your normal pace.
- Sit down again.

2.On the word "Go," begin timing.

3. Stop timing after patient sits back down.

4. Record Time

Time Up and Go test (TUG) (Second)	**Pre-test**	**Post-test**
Time measure		

APPENDIX C

সম্মতি পত্র (বাংলা)

শিরোনাম: স্ট্রোক রোগীদের ভারসাম্য কার্যক্রমের উপর শরীরের ওজন-সমর্থিত চলাচল প্রশিক্ষণের কার্যকারিতা।

আসসালামুয়ালাইকুম\ নমস্কার,

আমি এইচ এম কায়কোবাদ, ৪র্থ বর্ষ ,বিএসসি(অনার্স) ঢাকা বিশ্ববিদ্যালয়ের মেডিসিন অনুষদের অধীনে বাংলাদেশ হেলথ প্রফেশনস ইনস্টিটিউটের (বিএইচপিআই) ফিজিওথেরাপির ছাত্র। আমার ব্যাচেলর ডিগ্রীর অংশ হিসেবে আমাকে গবেষণা পরিচালনা করতে হবে এবং এটি আমার অধ্যয়নের একটি অংশ। অংশগ্রহণকারীদের নিম্নলিখিত পড়ার পরে গবেষণায় অংশগ্রহণের জন্য অনুরোধ করা হচ্ছে। আমার গবেষণার শিরোনাম হল " **স্ট্রোক রোগীদের ভারসাম্য কার্যক্রমের উপর শরীরের ওজন-সমর্থিত চলাচল প্রশিক্ষণের কার্যকারিতা**"। এই গবেষণার মাধ্যমে আমি স্ট্রোক রোগীদের ভারসাম্য কার্যক্রমের উপর শরীরের ওজন-সমর্থিত চলাচল প্রশিক্ষণের কার্যকারিতা খুঁজে পাব। যদি আমি অধ্যয়নটি সফলভাবে সম্পন্ন করতে পারি, তাহলে রোগীরা উন্নত নিউরোলজি বহির্বিভাগের ফিজিওথেরাপি পরিষেবার সুবিধা পেতে পারবে। আমার গবেষণা প্রকল্প বাস্তবায়ন করতে, আমাকে রোগীদের কাছ থেকে তথ্য সংগ্রহ করতে হবে। অতএব, আপনি আমার গবেষণায় অংশ নিতে পারেন।

আমি প্রতিশ্রুতিবদ্ধ যে অধ্যয়নটি আপনার কোন ক্ষতি বা ঝুঁকি তৈরি করবে না। কোনো দ্বিধা বা ঝুঁকি ছাড়াই যেকোনো সময় প্রত্যাহার বা বন্ধ করার অধিকার আপনার আছে। আমি আপনার কাছ থেকে প্রাপ্ত সমস্ত তথ্য গোপন রাখব এবং অংশগ্রহণকারীর ব্যক্তিগত পরিচয় কোথাও প্রকাশ করা হবে না। অধ্যয়ন সম্পর্কে আপনার কোন প্রশ্ন থাকলে, আপনি গবেষক এইচ এম কায়কোবাদ বা উনার সুপারভাইজার মুহাম্মদ মিল্লাত হোসেন, সহযোগী অধ্যাপক ও কোর্স সমন্বয়কারী, পুনর্বাসন বিজ্ঞান বিভাগ, বিএইচপিআই, সিআরপি, সাভার, ঢাকা-১৩৪৩-এর সাথে যোগাযোগ করতে পারেন।

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

হ্যাঁ / না

অংশগ্রহণকারীর স্বাক্ষর এবং তারিখঃ

গবেষকের স্বাক্ষর এবং তারিখঃ

APPENDIX D

লিখিত প্রশ্নাবলী (বাংলা সংস্করণ)

এই প্রশ্নাবলী স্ট্রোক রোগীর ভারসাম্য পরিমাপ করার জন্য তৈরি করা হয়েছে। এটি কালো কলম ব্যবহার করে তথ্য সংগ্রাহক দ্বারা পূরণ করা হবে।

অনুগ্রহ করে প্রতিটি বিভাগে উত্তর দিন এবং প্রতিটি বিভাগে শুধুমাত্র একটি বক্স চিহ্নিত করুন যা আপনার ক্ষেত্রে প্রযোজ্য।এখানে আপনার যেকোনো একটি বিভাগে দুটি বা ততোধিক বিবৃতি আপনার সাথে সম্পর্কিত বিবেচনা করতে পারেন, কিন্তু অনুগ্রহ করে কেবল সেই বাক্সটি চিহ্নিত করুন যা আপনার সমস্যার সাথে অতি কাছাকাছি মিলে যায়।

কোড নং-
রোগীর নামঃ
মোবাইল নং-
পরীক্ষার তারিখঃ

তারিখঃ
রোগীর আইডি নং-
ঠিকানা

পার্ট-১: সামাজিক-জনসংখ্যা সংক্রান্ত তথ্য

নং	প্রশ্নাবলী	অংশগ্রহনকারীর জবাব
১.১	বয়স (বছরে)	.....।
১.২	লিঙ্গ	১/ পুরুষ ২/ মহিলা
১.৩	ওজন (কেজি)	….....।
১.৪	বৈবাহিক অবস্থা	১/ বিবাহিত ২/ অবিবাহিত ৩/ তালাকপ্রাপ্ত ৪/ বিধবা
১.৫	পেশা	১/ গৃহিণী ২/ কৃষক ৩/ দোকানদার

		৪/ ব্যবসা ৫/ চাকরিজীবী ৬/ দিনমজুর ৭/ ছাত্র ৮/ বেকার ৯/ অন্যান্য
১,৬	শিক্ষাগত যোগ্যতা	১/ নিরক্ষর ২/ প্রাথমিক ৩/ মাধ্যমিক ৪/ উচ্চ মাধ্যমিক ৫/ স্নাতক ৬/ মাস্টার্স বা তার উপরে ৭/ অন্যান্য
১.৭	বাসস্থানের ধরন	১/ শহুরে ২/ গ্রামীণ
১.৮	আপনার কি উচ্চ রক্তচাপ আছে?	১/ হ্যাঁ ২/ না
১.৯	পূর্ব চিকিৎসা ইতিহাস	১/ হ্যাঁ ২/ না
১.১০	আপনার জয়েন্টগুলোতে কোন ভাঙ্গন আছে?	১/ হ্যাঁ ২/ না
১.১১	আপনার কি কোনো সংক্রামক ব্যাধি আছে?	১/ হ্যাঁ ২/ না
১.১২	আপনি কতবার স্ট্রোক করেছেন?	১/ একবার ২/ দুইবার ৩/ দুইবার এর বেশি
১.১৩	স্ট্রোকের সময়কাল	১/ তিন থেকে ছয় মাস ২/ ছয় মাস বা তার বেশি
১.১৪	আপনি কি ধরনের স্ট্রোক করেছেন?	১/ মস্তিস্কের রক্তসল্পতা ২/ মস্তিস্কের রক্তক্ষরণ
১.১৫	আক্রান্ত শরীরের অংশ	১/ ডান পাশ ২/ বাম পাশ ৩/ উভয় পাশ

পার্ট-২: ভারসাম্যের মূল্যায়ন

ভারসাম্য তথ্য (এই প্রশ্নপত্রটি একটি পূর্বনির্ধারিত কাজের সময়কালীন রোগীর ভারসাম্য বজায় রাখার সক্ষমতা বা অক্ষমতা সম্পর্কে তথ্য দেওয়ার জন্য ডিজাইন করা হয়েছে। এটি ১৪ টি তালিকা যেখানে ০ থেকে ৪ পর্যন্ত ৫ টি পয়েন্টেড স্কেল নিয়ে গঠিত। ০ সর্বনিম্ন স্তর এবং ৪ সর্বোচ্চ স্তর নির্দেশ করে।

নং	পরীক্ষা	পূর্ববর্তী যাচাই	পরবর্তী যাচাই
২.১	**বসা হতে দাঁড়ানোঃ** (দয়া করে উঠে দাঁড়ান। আপনার হাতের সহায়তা ছাড়া চেষ্টা করুন) (৪) হাত ব্যবহার না করে দাঁড়াতে এবং নিজে নিজে স্থিতিশীল হতে সক্ষম (৩) হাত ব্যবহার করে স্বাধীনভাবে দাঁড়াতে সক্ষম (২) বেশ কয়েকবার চেষ্টা করার পরে হাত ব্যবহার করে দাঁড়াতে সক্ষম (১)দাঁড়াতে বা স্থিতিশীল হতে ন্যূনতম সহায়তা প্রয়োজন (০) দাঁড়ানোর জন্য মাঝারি বা সর্বাধিক সহায়তা প্রয়োজন		
২.২	**সাহায্যব্যতীত দাঁড়ানোঃ** (দয়া করে দুই মিনিট দাঁড়ান ধরে রাখা ছাড়া) (৪) ২ মিনিট নিরাপদে দাঁড়াতে সক্ষম (৩) পর্যবেক্ষণ এবং দেখাশুনার মাধ্যমে ২ মিনিট দাঁড়াতে সক্ষম (২) ৩০ সেকেন্ড দাঁড়াতে সক্ষম (১) বেশ কয়েকটি চেষ্টার পর ৩০ সেকেন্ড দাঁড়াতে সক্ষম (০) ৩০ সেকেন্ড দাঁড়াতে অক্ষম		

২.৩	**পিঠের সাহায্য ছাড়া দাঁড়াবে স্কিন্তু পা থাকবে মেঝের উপর বা টুলের উপরঃ** (অনুগ্রহপূর্বক বাহু ভাঁজ করে রাখুন ২ মিনিট এর জন্য) (৪) ২ মিনিটের জন্য নিরাপদে বসতে সক্ষম (৩) পর্যবেক্ষণ এবং দেখাশুনার মাধ্যমে ২ মিনিট বসতে সক্ষম (২) ৩০ সেকেন্ড বসতে সক্ষম (১) ১০ সেকেন্ড বসতে সক্ষম (০) ১০ সেকেন্ড সহায়তা ছাড়া বসতে অক্ষম		
২.৪	**দাঁড়ানো থেকে বসাঃ** (অনুগ্রহপূর্বক বসে পড়ুন) (৪) বসতে পারে হাতের কিছুটা সহায়তা নিয়ে (৩) নিচে পরে যাওয়া নিয়ন্ত্রন করতে পারে হাতের সহায়তা নিয়ে (২) পায়ের পিছন দিক ব্যবহার করে নিচে পড়ে যাওয়া নিয়ন্ত্রন করতে পারে (১) নিজে নিজে বসতে পারে কিন্তু নিচে পড়ে যাওয়া নিয়ন্ত্রন করতে পারে না (০) বসতে সাহায্য লাগবে		
২.৫	**স্থানান্তর:** (স্থানান্তরের জন্য চেয়ারের ব্যবস্থা করুন। আপনি একটি বিছানা এবং একটি চেয়ার ব্যবহার করতে পারেন) (৪) হাতের সামান্য ব্যবহার করে নিরাপদে স্থানান্তর হতে সক্ষম (৩) হাতের যথাযথ ব্যবহার করে নিরাপদে স্থানান্তর হতে সক্ষম (২) মৌখিক ইঙ্গিত দ্বারা স্থানান্তর করতে সক্ষম (১) সহায়তা করার জন্য একজন ব্যক্তির প্রয়োজন (০) নিরাপদ থাকার জন্য সহায়তা দুইজনের প্রয়োজন		

২.৬	**সাহায্যব্যতীত দাঁড়ানো চোখ বন্ধ করেঃ**(অনুগ্রহপূর্বক চোখ বন্ধ করুন এবং দাঁড়িয়ে থাকুন ১০ সেকেন্ড) (৪) নিরাপদে ১০ সেকেন্ড দাঁড়াতে সক্ষম (৩) পর্যবেক্ষণ এবং দেখাশুনার মাধ্যমে ১০ সেকেন্ড দাঁড়াতে সক্ষম (২) ৩ সেকেন্ড দাঁড়াতে সক্ষম (১) ৩ সেকেন্ড চোখ বন্ধ রাখতে অক্ষম কিন্তু নিরাপদে থাকবে (০)সাহায্য প্রয়োজন পড়ে যাওয়া থেকে বাঁচতে		
২.৭	**একসাথে পা দিয়ে সাহায্যব্যতীত দাঁড়ানো:** (আপনার পা একসাথে রাখুন এবং দাড়িয়ে থাকুন ধরে রাখা ছাড়া) (৪) স্বাধীনভাবে পা একসাথে রাখতে এবং নিরাপদে ১ মিনিট দাঁড়াতে সক্ষম (৩) নিজে নিজে পা একসাথে রাখতে এবং ১ মিনিটের সাথে দাঁড়াতে সক্ষম পর্যবেক্ষণ এবং দেখাশুনার মাধ্যমে দ্বারা (২) নিজে নিজে পা একসাথে রাখতে সক্ষম কিন্তু ৩০ সেকেণ্ড এর জন্য ধরে রাখতে অক্ষম (১) অবস্থান ঠিক রাখতে জন্য সাহায্য প্রয়োজন কিন্তু ১৫ সেকেন্ড পা একসাথে করে দাঁড়াতে সক্ষম (০) অবস্থান ধরে রাখার জন্য সাহায্য প্রয়োজন এবং ১৫ সেকেন্ড ধরে রাখতে অক্ষম		
২.৮	**দাঁড়ানো অবস্থায় প্রসারিত বাহু সামনে নেওয়া:** (বাহু ৯০ ডিগ্রিতে উঠান। আপনার আঙ্গুলগুলি স্ট্রেচ করুন) (৪) আত্মবিশ্বাসের সাথে ২৫ সেমি (১০ ইঞ্চি) এগিয়ে যেতে পারে (৩) ১২ সেমি (৫ ইঞ্চি) এগিয়ে যেতে পারে (২) ৫ সেমি (২ ইঞ্চি) সামনে পৌঁছতে পারে (১) সামনে পৌঁছায় কিন্তু পর্যবেক্ষণ এবং দেখাশুনার প্রয়োজন (০) চেষ্টা করার সময় ভারসাম্য হারায়/বাহ্যিক সহায়তার প্রয়োজন		

২.৯	**দাঁড়ানো অবস্থায় মেঝে থেকে বস্তু তুলে নিনঃ** (জুতা তুলে নিন যা আপনার পায়ের সামনে রয়েছে) (৪) নিরাপদে এবং সহজে জুতা তুলতে সক্ষম (৩) জুতা তুলতে সক্ষম কিন্তু পর্যবেক্ষণের প্রয়োজন (২) তুলতে অক্ষম কিন্তু স্লিপার থেকে ২-৫ সেমি সামনে চলে যায় এবং স্বাধীনভাবে ভারসাম্য রাখতে পারে (১) তুলে অক্ষম কিন্তু চেস্টার সময় পর্যবেক্ষণ এবং দেখাশুনার প্রয়োজন (০) চেষ্টা করতে অক্ষম\ ভারসাম্য হারানো বা পড়ে যাওয়া থেকে রক্ষার জন্য সাহায্যের প্রয়োজন		
২.১০	**দাঁড়ানো অবস্থায় ডান এবং বাম কাঁধের পিছনে ঘুরে তাকানোঃ** (বাম কাঁধের দিকে সরাসরি পিছন ঘুরে তাকান্।ডান দিকে পুনরাবৃত্তি করুন) (৪) উভয় পাশ থেকেই পিছনে তাকাতে পারে এবং সাথে ভালোভাবে ওজন বিনিময় হয় (৩) এক পাশে তাকাতে পারে , আরেক পাশে কম ভার বিনিময় হবে (২) পার্শ্বমুখী হয়ে ঘুরতে পারবে কিন্তু ভারসাম্য বজায় রাখতে হবে (১) ঘুরার সময় পর্যবেক্ষণ এবং দেখাশুনার প্রয়োজন (০) ভারসাম্য হারানো বা পড়ে যাওয়া থেকে রক্ষার জন্য সহায়তা প্রয়োজন		
২.১১	**৩৬০ ডিগ্রী ঘুরাঃ** (একটি পূর্ণ বৃত্তে সম্পূর্ণভাবে ঘুরুন, বিরতি নিন, তারপর পূর্ণ বৃত্তটিতে অন্য দিক করে ঘুরুন) (৪) ৪ সেকেন্ড বা তার কম সময়ে নিরাপদে ৩৬০ ডিগ্রি ঘুরতে সক্ষম (৩) ৪ সেকেন্ড বা তার কম সময়ে নিরাপদে শুধুমাত্র এক দিকে ৩৬০ ডিগ্রি ঘুরতে সক্ষম (২) নিরাপদে ধীরে ধীরে ৩৬০ ডিগ্রি ঘুরতে সক্ষম (১) মৌখিক ইঙ্গিত প্রয়োজন (০) ঘুরার সময় সাহায্য প্রয়োজন		

২.১২	**সাহায্যব্যতীত দাঁড়ানোর সময় পদক্ষেপ দিয়ে বা টুলের উপর রেখে পা পরিবর্তিত করাঃ** (প্রতিটি পা পর্যায়ক্রমে পদক্ষেপ দিয়ে/টুলের উপর রেখে পরিবর্তিত করুন। প্রতিটি পা পদক্ষেপ দিয়ে/টুলের উপর চারবার করে ছোঁয়ার চেষ্টা করুন) (৪) স্বাধীনভাবে এবং নিরাপদে দাঁড়াতে এবং ২০ সেকেন্ডের মধ্যে ৮ টি পদক্ষেপ সম্পূর্ণ করতে সক্ষম (৩) স্বাধীনভাবে এবং নিরাপদে দাঁড়াতে এবং ২০ সেকেন্ডের বেশি সময়ে ৮ টি পদক্ষেপ সম্পূর্ণ করতে সক্ষম (২) পর্যবেক্ষণ ছাড়াই ৪ টি ধাপ সম্পূর্ণ করতে সক্ষম (১) কিছুটা সাহায্য দ্বারা ২ এর কম পদক্ষেপ দিতে পারবে (০) পড়ে যাওয়া থেকে রক্ষার জন্য সহায়তা লাগবে/ চেষ্টা করতে অক্ষম		
২.১৩	**এক পা সামনে নিয়ে সাহায্যব্যতীত দাঁড়িয়ে থাকাঃ** (এক পা সরাসরি সামনে এগিয়ে রাখুন। আপনি যদি মনে করেন যে আপনি পারবেন না , সেক্ষেত্রে আপনার পা পদক্ষেপ দিয়ে এগিয়ে নেওয়ার চেষ্টা করুন যাতে সামনের পায়ের গোড়ালি এর সামনে বরাবর অন্য পায়ের আঙ্গুল এগিয়ে যায়) (৪) স্বাধীনভাবে এক পা সামনে এগিয়ে স্থাপন করে এবং ৩০ সেকেন্ড ধরে রাখতে সক্ষম (৩) স্বাধীনভাবে পা এগিয়ে নিতে এবং ৩০ সেকেন্ড ধরে রাখতে সক্ষম (২) স্বাধীনভাবে ছোট পদক্ষেপ নিতে এবং ৩০ সেকেন্ড ধরে রাখতে সক্ষম (১) পদক্ষেপের জন্য সাহায্যের প্রয়োজন কিন্তু ১৫ সেকেন্ড ধরে রাখতে পার (০) পদক্ষেপ বা দাঁড়ানোর সময় ভারসাম্য রাখতে পারে না		

২.১৪	**এক পায়ে দাঁড়ানোঃ** (যতক্ষণ আপনি পারেন এক পায়ে দাঁড়িয়ে থাকুন ধরে না রেখে) (৪) স্বাধীনভাবে পা তুলতে এবং ১০ সেকেন্ড এর বেশি সময় ধরে রাখতে সক্ষম (৩) স্বাধীনভাবে পা তুলতে এবং ৫-১০ সেকেন্ড ধরে রাখতে সক্ষম (২) স্বাধীনভাবে পা তুলতে এবং ৩ সেকেন্ড বা তার কম সময় ধরে রাখতে সক্ষম (১) পা তুলে ৩ সেকেন্ড ধরে রাখতে অক্ষম কিন্তু স্বাধীনভাবে দাঁড়িয়ে থাকতে পারে (০) পড়ে যাওয়া থেকে রক্ষা করতে সহায়তার প্রয়োজন/ চেষ্টা করতে অক্ষম		
	মোট বার্গ ব্যালেন্স স্কোর		

পুর্ববর্তী যাচাই এর তারিখঃ

পরবর্তী যাচাই এর তারিখঃ

টাইম আপ অ্যান্ড গো টেষ্ট

সাধারণ নির্দেশ:

উদ্দেশ্য - গতিশীলতা মূল্যায়ন করা।

সরঞ্জাম- স্টপওয়াচ

দিকনির্দেশ -রোগী তাদের নিয়মিত জুতা পরবেন এবং দরকার হলে হাঁটার সরঞ্জাম এর সাহায্য নিতে পারবেন। রোগীকে একটি যথাযথ স্থানে বসিয়ে ১০ ফিট দূর পর্যন্ত মেঝেতে চিহ্নিত করে তারপর শুরু করবেন।

একজন প্রাপ্তবয়স্ক যিনি এটি সম্পূর্ণ করতে >১২ সেকেন্ড সময় নেন তিনি পড়ে যাওয়ার ঝুঁকিতে থাকেন।

১. রোগীকে নির্দেশ দেওয়া

যখন আমি বলবো ""যাও", আমি আপনার থেকে চাইবো যেঃ

• চেয়ার থেকে উঠে দাঁড়াবেন।

• আপনার স্বাভাবিক গতিতে মেঝের লাইন বরাবর হাঁটবেন।

• ঘুরে যাবেন।

• ঘুরে আবার আপনার স্বাভাবিক গতিতে চেয়ারে ফিরে যান।

• আবার বসে পরবেন ।

২. "যাও" শব্দটির থেকে সময় ধরা শুরু করা ।

৩. রোগী ফিরে বসার পরেই সময় বন্ধ করা।

৪. সময় রেকর্ড করা।

টাইম আপ অ্যান্ড গো টেষ্ট (সেকেন্ড)	**পূর্ববর্তী পরীক্ষা**	**পরবর্তী পরীক্ষা**
পরীক্ষার সময়		

APPENDIX E PERMISSION LETTER

Permission Letter

Date: 6 April, 2023

Head

Department of Physiotherapy

Centre for the Rehabilitation of the Paralysed (CRP)

Through: Head, Department of Physiotherapy, BHPI

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

Sir,

With due respect and humble submission to state that I am H.M Kaykobad, a student of 4th year B. Sc. in Physiotherapy at Bangladesh Health Professions Institute (BHPI). The Ethical Committee has approved my research project entitled: **"The effectiveness of body weight-supported gait training on balance function of stroke patients"** under the supervision of Muhammad Millat Hossain, Associate Professor & Course Coordinator, Department of Rehabilitation Science, BHPI, CRP, Savar, Dhaka-1343. I want to collect data for my research project from the Department of Physiotherapy at CRP. So, I need permission for data collection from the Neurological Unit and Stroke Rehabilitation Unit (SRU) of Physiotherapy Department at CRP (CRP, Savar, Dhaka-1343). I would like to assure that anything of the study will not be harmful for the participants.

I, therefore pray and hope that your honour would be kind enough to approve my dissertation proposal and give me permission to start data collection and oblige thereby.

Sincerely,
H. M. Kayko bad

Recommended for warded
06/04/23

H.M Kaykobad

4th professional B.Sc. in Physiotherapy

Roll: 40, Session: 2017-18, ID:112170373

BHPI, CRP, Savar, Dhaka-1343, Bangladesh.

Recommended
06.04.23
Md. Shoflqul Islam
Associate Professor & Head
Department of Physiotherapy
Bangladesh Health Professions Institute (BHPI)
CRP, Chapain, Savar, Dhaka-1343

Appoved
06/04/23
Dr. Mohammad Anwar Hossain, PhD
Senior Consultant & Head
Physiotherapy Department
Associate Professor, BHPI
CRP, Savar, Dhaka-1343

APPENDIX F **InstitutionalReview Board (IRB)**

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

BANGLADESH HEALTH PROFESSIONS INSTITUTE

Ref: CRP/BHPI/IRB/03/2023/721 Date: 13/03/2023

To
H.M Kaykobad
B.Sc. in Physiotherapy,
Session: 2017-2018, DU Reg. No: 8665
BHPI, CRP, Savar, Dhaka- 1343, Bangladesh

Subject: Approval of the dissertation proposal **"The Effectiveness of Body Weight-Supported Gait Training on Balance Function of Stroke Patients"** -by ethics committee.

Congratulations
Dear
H.M Kaykobad,
The Institutional Review Board (IRB) of BHPI has reviewed and discussed your application to conduct the above-mentioned dissertation, with yourself, as the Principal Investigator, Muhammad Millat Hossain, Associate Professor, Department of Rehabilitation Science, BHPI, as dissertation supervisor. The following documents have been reviewed and approved:

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

The purpose of the study is to explore the effectiveness of body weight-supported gait training on balance function of stroke patients at CRP. Should there any interpretation, type, spelling, grammatical mistakes in the title, it is the responsibilities of the investigator. Since the study involves questionnaire that takes maximum 20-30 minutes and have no likelihood of any harm to the participants. The members of the Ethics committee approved the study to be conducted in the presented form at the meeting held at 09:00 AM on January 9, 2023 at BHPI, 34th IRB Meeting.

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

Best regards,

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

সিআরপি-চাপাইন, সাভার, ঢাকা-১৩৪৩, বাংলাদেশ। ফোন: +৮৮ ০২ ২২৪৪৪৫৪৬৪-৫, +৮৮ ০২ ২২৪৪৪১৪০৪, মোবাইল: +৮৮ ০১৭৩০ ০৫৯৬৪৭
CRP-Chapain, Savar, Dhaka-1343, Bangladesh. Tel: +88 02 224445464-5, +88 02 224441404, Mobile: +88 01730059647
E-mail: principal.bhpi@crp-bangladesh.org, Web: bhpi.edu.bd

APPENDIX G Review and Ethical Approval

Date: 14th February 2023
The Chairman
Institutional Review Board (IRB)
Bangladesh Health Professions Institute (BHPI)
CRP, Savar, Dhaka-1343, Bangladesh

Subject: Application for review and ethical approval.

Dear sir,
With due respect, I am H.M Kaykobad, student of B.Sc. in physiotherapy program at Bangladesh Health Professions Institute (BHPI) the academic institute of Centre for the Rehabilitation of the Paralysed (CRP) under the Faculty of Medicine,University of Dhaka. As per the course curriculum, I have to conduct a dissertation entitled **"The effectiveness of body weight-supported gait training on balance function of stroke patients"** under the supervision of Muhammad Millat Hossain, Associate Professor & Course Coordinator, Department of Rehabilitation Science, BHPI.

The purpose of the study is to explore the effectiveness of body weight-supported gait training on balance function of stroke patients. The study involves face-to-face interview by using semi-structured questionnaire to explore the effectiveness of body weight-supported gait training on balance function of persons with stroke patients at CRP, Saver, Dhaka in Bangladesh that may take 20 to 30 minutes to fill in the questionnaire and there is no likelihood of any harm to the participants. Data collectors will receive informed consent from all participants and the collected data will be kept confidential.

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

Sincerely,
H.M. Kaykobad

H.M Kaykobad
4th Year B.Sc. in Physiotherapy
Session: 2017-2018 Student ID: 112170373
BHPI, CRP, Savar, Dhaka-1343, Bangladesh

Recommendation from the dissertation supervisor

Muhammad Millat Hossain
Associate Professor & Course Coordinator
Department of Rehabilitation Science, BHPI.

Dissertation presentation date: 9th January 2023

Shofiq 18.02.2023

Head, Department of Physiotherapy, BHPI

Md. Shofiqul Islam
Associate Professor & Head
Department of Physiotherapy
BHPI, CRP, Savar, Dhaka-1343