Effectiveness of Balance Training Among Stroke Patients – A Randomized Controlled Trial

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Effectiveness of Balance Training Among Stroke Patients – A Randomized Controlled Trial

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DECLARATION

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

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

In case of dissemination the finding of this project for future publication, research supervisor will highly concern, it will be duly acknowledged as graduate thesis and consent will consent taken from the physiotherapy department of Bangladesh Health Professions Institute (BHPI).

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ACRONYMS

ABC Scale: THE ACTIVITIES SPECIFICS BALANCE (ABC) SCALE

BT: Balance Training

BWSTT: Body weight-supported treadmill training

DU: Dhaka University

FAC : Functional ambulation classification

HS: Hemorrhagic Stroke

IMUs: Inertial Measurement Units

NMA: Network Meta -Analysis

SCMST: Saic collage of Medical Science and Technology

TIA: Transients Ischemic Attack

WPPS: Wearable Planter Pressure Sensors

WS: Wearable Sensors

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Abstract

Background: Stroke is the second most common cause of death and major cause of long term disability worldwide.One of the main physical issues that stroke patients have that limits their ability to conduct everyday tasks and engage in social activities is balance impairment. The main objectives in the rehabilitation of stroke patients is the restoration of balance and an ideal gait.

Objectives: The objective of the effectiveness of balance training among stroke patients from selected physiotherapy center in Dhaka City and Manikganj.

Method: It was aRandomized Controlled Trial study conducted from 12 months from 1st July 2022 to 30th June 2023. ABC scale used for this stroke patients in this balance training. Data was analyzed by SPPS 25 was used for statistical analysis.

Result: The balance in different positions reduced in both group while comparing to the initial assessment but, between group comparisons showed not significant difference. Initial and after twelve session of intervention, the between group comparisons found that not significant change in ABC scale. The difference between pre and post test score in experimental group was found statistically within group comparison that highly significant in ABC scale in experimental group (*(t* = 18.013, *df* = 9, *p* = 0.000) and the difference between pre and post test score in control group was found statistically of highly significant *(t* = 32.928, *df*= 9, *p* = 0.000).

Conclusion: Balance training has significant effect on the management of stroke patients.

Key Word: Stroke, Balance training, Conventional therapy

CHAPTER – I INTRODUCTION

1.1 Background:

Stroke is the second most common cause of death and major cause of long term disability worldwide.Several elements have an effect on the useful independence in submit stroke period in which trunk manage and stability play a large role. Despite verification demonstrating the significance of trunk overall performance and stability after stroke, research comprising remedy aimed toward enhancing trunk control,stability and gait are limited (Raj et al., 2014).

Stroke is a main reason of long - time period disability, and impaired stability after stroke is strongly related to destiny characteristic and recovery. Until currently there was restricted evidence to assist using solidity schooling to increase stability overall showing on this population.Information around the optimal workout dosage has in addition been lacking. This asses evaluated current evidence associated with the impact and evidence education on stability overall showing amongst people post stroke all around the continuum of recovery .On the plan of this evidence ,we also offer advice for exercising prescription in such programs (Lubetzky-Vilnai, Kartin., 2010).

Stroke is a deadly medical syndrome with mortality price ranging as much as 25% Hypertension, Smoking and diabetes mellitus are unusual place preventable danger elements which might be related to severe final results. Objective of this take a look at became to decide the medical presentation, danger elements and final results of stroke (Masood et al., 2013).

According to global studies on stroke incidence, the incidence of stroke has increased in low-to middle-income nations by more than 100% while declining by 42% in high-income countries. Both high-income and low-to-middle-income countries have shown a decline in the fatality rate for early stroke cases. Despite an increase in the frequency of strokes, a decline in mortality rates results in a rise in the number of people who are disabled. As a result, stroke is the main factor in substantial, complex, and persistent adult impairment (Accessed Aug. 7, 2014).

Stroke in humans beneath Neath forty five years of age is much less common than in order populations however has a prime effect at the person and society (Griffiths, D. and Sturm, J., 2011.).

Cryptogenic strikes represent 20 to 30% of ischemic strokes, and maximum cryptogenic strokes are taken into consideration to be embolic and of undetermined source .An in advance randomized trial confirmed that rivaroxaban is not anyt any extra powerful than aspirin in stopping recurrent stroke after a presumed embolic stroke from an undetermined source. Whether dabigatran could be powerful in stopping recurrent strokes after this sort of stroke turned into unclear (Diener, et al., 2019).

Stroke is one of the leading causes of adult disability in today's society. According to World Health Organization figures, there are roughly 15 million new stroke patients each year, and one third of them have lifelong impairment (Lim & Lee, 2012).

Patients who have suffered a stroke frequently experience low self-esteem, sadness, and a decreased quality of life as a result of their difficulties doing daily activities (Kum & Shin, 2017).

One of the main physical issues that stroke patients have that limits their ability to conduct everyday tasks and engage in social activities is balance impairment (Ijmker et al., 2013).

Because their movement amounts are reduced, their body sway increases by around two times when compared to the static standing posture of healthy people, and their stability limits are lessened, stroke patients have trouble controlling their motions. This increased body sway in a static position causes the weight to be distributed unevenly over both lower limbs and impairs the ability to shift the center of gravity to the affected side, which results in gait instability, slows gait speed, and increases the risk of falling (Park et al., 2014).

Therefore, one of the main objectives in the rehabilitation of stroke patients is the restoration of balance and an ideal gait (Kim et al., 2015).

Trunk manage has been diagnosed as an critical early predictor of practical final results after stroke however there may be inadequate proof that proximal balance of the trunk is a pre-considered necessary for sitting and status balance, walking, and practical activities. (Canadas-Valdes, UrrutiaCuchi, and Bagur-Calafat, 2013).

Post-stroke healing advantages from structured,intense,challenging,and repetitive remedy. Exergames have emerged as promising to gain sustained remedy exercise and affected person motivation. This observe assessed the usability and results to exergames on stability and gait. (Wuestet al.2014).

People with stroke frequently have impaired stepping responses following stability perturbations,which will increase their danger of falling.Computer-managed movable structures are promising equipment for turning in perturbation-primarily based totally stability schoolingbeneath Neath secure and standardized circumstances. (Duijnhovenet al., 2018).

Physical hobby and workout interventions are beneficial in facilitating the practical restoration of these with continual stroke and, routinely, are gait-specific. While treadmill education has tested beneficial in gait overall performance healing post-stroke,it's efficacy on stability disorder has now no longer been systematically reviewed. (Tally et al.2017).

Trunk feature is critical for status balance, mobility, and useful final results after stroke, however few research have evaluated the results of physical games aimed toward enhancing middle balance in stroke patients. (Haruyama, Kawakami, and Otsuka 2017).

Stroke survivors face extreme issues affecting their mobility,Which includes stability impairments and an improved danger of falls.The major purpose of this look at turned into to quantify the consequences of 12 classes of Halliwick aquatic remedy for the remedy of stability in sufferers with continual stroke. (Cruz 2020).

Rhythmic auditory stimulation (RAS) improves gait velocity, cadence, and stride duration in hemiplegic stroke patients, but little is understood approximately the effectiveness of RAS on status balance. (Suh et al .2014)

Levels of bodily hobby and bodily health are low after stroke. Interventions to growth bodily health should lessen mortality and decrease incapacity via elevated function. (Saunders et al. 2020).

Stroke is a prevalent, severe, and incapacitating worldwide health issue, and a key component of patient care is rehabilitation. Research demonstrates that rehabilitation can be facilitated in well-run multidisciplinary stroke units or by early, well-supported discharge teams. Robotics and constraint-induced movement therapy are potential helpful therapeutic alternatives for arm motor rehabilitation. High-intensity therapy, repetitive task training, and fitness training are promising strategies that may help to improve aspects of gait.Stroke is a prevalent, severe, and incapacitating worldwide health issue, and a key component of patient care is rehabilitation. Research demonstrates that rehabilitation can be facilitated in well-run multidisciplinary stroke units or by early, well-supported discharge teams. Treatment methods that could be advantageous for the motor recovery of therobotics and constraint-induced movement therapy. High-intensity therapy, repetitive task training, and fitness training are promising strategies that may help to improve aspects of gait (Langhorne et al., 2011).

Similar risk factors exist for coronary heart disease and other vascular disorders as well as for stroke. Targeting the three main modifiable factors—diabetes, high cholesterol, and hypertension—is an effective preventative strategy. It is also possible to address the risks associated with certain lifestyle factors, such as smoking, inactivity, poor food, and abdominal obesity (Johnson el al., 2016).

1.2 Justification of the Study

A stroke, sometimes called a brain attack, occurs when something's blocks blood supply to part of the brain or when a blood vessel in the brain bursts. In either case, parts of the brain become damaged or die. A stroke can cause lasting brain damage, long-term disability, or even death. One of the most important exercise of stroke patients in balance training exercise. Balance training involves doing exercises that strengthen the muscles that help keep you upright, including your legs and core. These kinds of exercises can improve stability and help prevent falls. Examples of balance training included: One leg standing exercise, gym-ball therapy, taking objective from floor, sit to stand, etc. There are few studies done on movement balance training in sub-acute stroke patients to improve their balance, function and mobility. There are insufficient published evidences available for effects of manual movement exercises for sub- acute stroke patients, to improve their balance, function and mobility. Additionally, there is no such study has been done in Bangladesh population so far, so need of this study is to evaluate the effects of manual movement exercises in stroke patients to improve balance, function and mobility. This aim of the study is to compare the efficacy of balance training in the balance trainer, a newly developed mechanical device for training balance, with conventional balance training in sub-acute stroke patients. The purpose of the study is to compare the effectiveness of Wii fit balance training and progressive balance training methods, statistics and dynamic balance function, and to compare the effects of a neurodevelopmental treatment program on activity-specific balance confidence in chronic stroke patients in addition to activities of daily living.

This is why I want to do this research, I think of someone wants to research this topic in the future, my research will inspire him or herand he can learn a lot from this research.

1.3 Objectives of the study

1.3.1 General objective:

To assess the effectiveness of balance training among stroke patients from selected physiotherapy center in Dhaka City and Manikganj.

1.3.2 Specific objectives:

I. To assess the level of confidence on balance of the participants by using The Activities Balance Confidence (ABC) Scale.

II. To compare the effectiveness of balance training along with conventional methods between experimental & control group by using scores obtained from ABC scale.

III. To describe Socio – demographic information in study population.

1.4 Research Hypothesis:

1.4.1 Null Hypothesis(Ho):

Balance training is not more effective than conventional therapy in the treatment of stroke patients.

Null Hypothesis $Ho = \mu1 - \mu2 = 0\ or\ \mu1 = \mu2$,

1.4.2 Alternative hypothesis (Ha):

Balance training is more effective than conventional therapy in the treatment of stroke patients.

Alternative Hypothesis $Ha = \mu1 - \mu2 \neq o\ or\ \mu1 \neq \mu2$, the experimental group and control group initial and final differences is not same.

Where,

H0 =the null hypothesis

Ha =the alternative hypothesis

μ1 =the mean of population 1, and

μ2 =the mean of population 2

1.5 Operational definitions

Stroke: Stroke is defined by the World Health Organization as ‘a clinical syndrome consisting of rapidly developing clinical signs of focal (or global in case of coma) disturbance of cerebral function lasting more than 24 hours or leading to death with no apparent cause other than a vascular origin.

Balance Training:

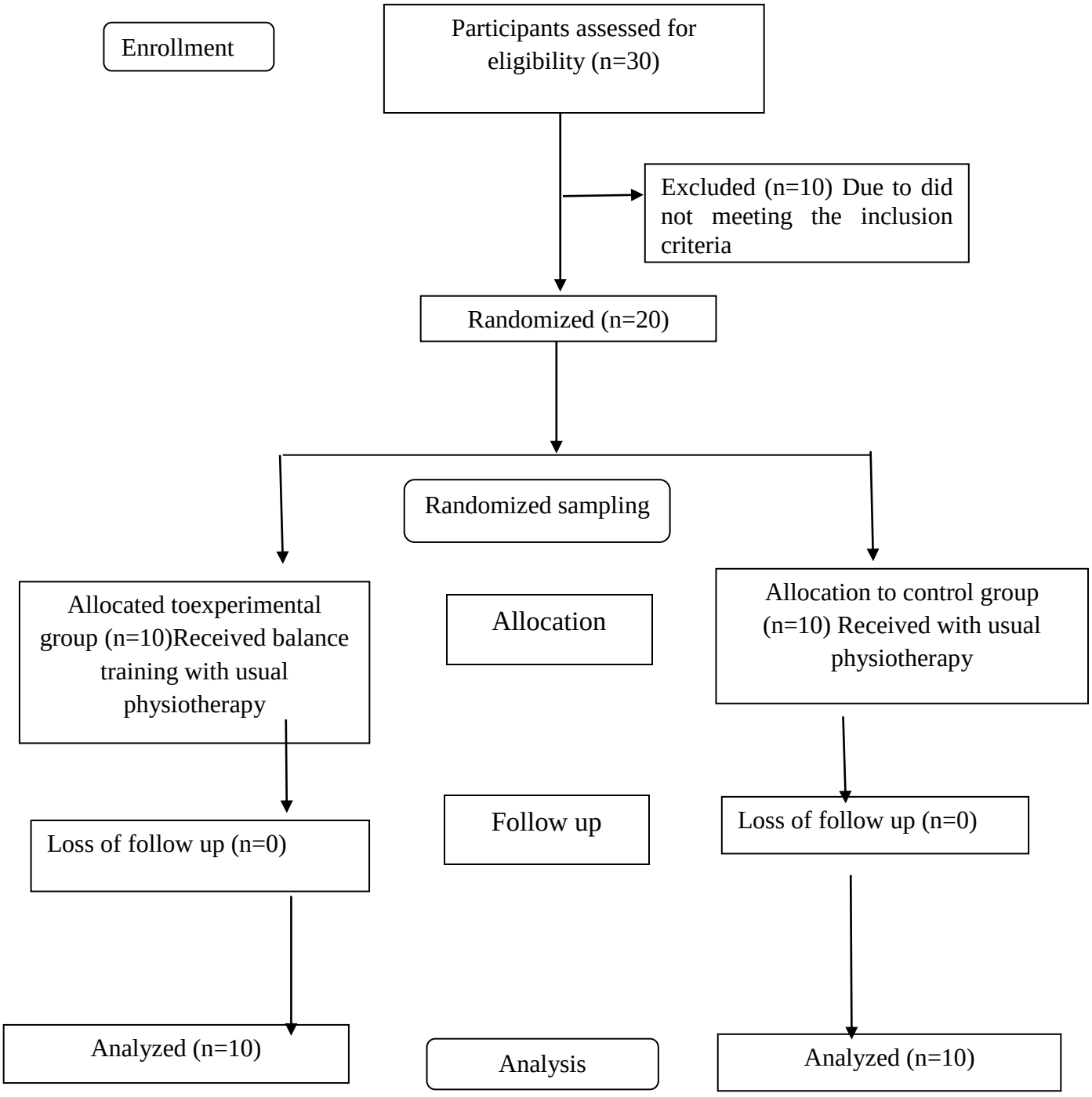
Balance training involves doing exercises that strengthen the muscles that help keep you upright, including your legs and core. Body balance control is a complex body function that involves regulating posture and movement. This training has been proven to improve reactive balance control in stroke patients.

Conventional Therapy:

Conventionalphysiotherapy is define as the treatment of movement disorders caused by impairment of joints and muscles that moves the joints.

1.6 CONSORT FLOW CHART:

Flow chart of the phases of Randomized controlled Trial



CHAPTER – II LITERATUR REVIEW

The World Health Organizations (WHO) definition of a stroke is as follows, A clinical syndrome characterized by the fast onset of clinical signs of a focal (or global, in the case of coma)impairment of brain function that last for more than 24 hours or results in death. With a vascular origin but no other apparent cause. According to there are numerous reasons why people who have had stroke struggle with lower extremity task, upper extremity work task, a balance issue, a postural issue, and a gait issue. Patients who had strokes experience stiffness, weakness, loss of balance, and righting reflexes, which frequently represented an asymmetrical posture of the trunk and reduce their capacity to work postural alignment and postural adjustment. Patients who have suffered strokes frequently experience loss of trunk control, which can impair upper and lower limb control (Zakaria et al., 2010).

A stroke is a quickly progressing loss of brain function brought on by a disruption in the brain's blood flow. This can be the result of a hemorrhage or ischemia brought on by a blockage (Sims & Muyderman., 2010).

Loss of balance and gait are among the stroke-related problems that can make daily tasks difficult and cause severe discomfort. Movement restriction brought on by muscle weakness on the stroke-affected side compromises balance and walking abilities.Therefore, maintaining strength and balance pose significant difficulties for patients recovering from a stroke (cohen et al., 2018).

Stroke is the most common cause of neurological damage, disturbance and post-stroke disability worldwide. About 50% of survivors will experience a major long-term disability.15% to 30% of stroke cases permanent disability is a key contributor to severe long-term impairment around the world. These patients' primary drawbacks result from motor weakness. The majority of stroke survivors continue to have physical irregularities, which can result in the emergence of habitat and, secondarily, in complicated difficulties. This study demonstrated that: Patients frequently receive rehabilitation services in waterfall environments after a stroke. Researchers report falling between 23% and 50% for chronic stroke (stroke>6 months later).This rate is significantly higher than the report rate for older populations,

regardless of stroke (11% -30%), but lower anti-stroke (stroke after1-6) periods -(25%).People with chronic stroke are more likely to be involved in accidents, which can lead to up to 28% of reported injuries (Raman, et al.,2012).

To the first-class of our knowledge, that is the primary look at to research the superiority and variables associated with despair amongst post-stroke sufferers in Bangladesh. Our findings reveal that extra than two-thirds of stroke patients (70%) skilled a few kind of melancholy symptoms, with 32% having extreme despair. Depression problems affected 25 to 79 percent of humans who had ,and the frequently of post –stroke main despair turned into to three to forty percent, in line with a current systemic analysis, that's much like our findings (Bartoli et al., 2013).

In the accompanying Lancet report, the traits of research protected within side the evaluation are outlined. In this research ,we checked out 119 papers(58 from high-profits nations and 61 from low-and middle –profits nations).In 2010,an expected 63 percentage of hemorrhagic strokes(80% in low –and middle –profits nations)occurred global wide, with three 038 763 human beings demise from ischemic stroke. In 2010,DALYs had been misplaced because of ischemic stroke(sixty four percentage in low and middle-profits countries)and hemorrhagic stroke(86 percentage in low-and middle-earnings countries) respectively (Krishnamurthi et al.,2013).

Stroke is the main reason of mortality and capacity global wide, especially in low-and middle-profits nations. We desired to recognize how essential probably modifiable hazard elements for stroke are in specific components of the world, in addition in unique demographics and stroke pathology sub-types. In every foremost location of the world, amongst ethnic groups, in guys and women, and in any respect ages,5 doubtlessly modifiable danger elements are together associated with approximately 90% of the stroke. However, we located good sized geographical variations with inside the relative relevance Between July 2001 and June 2003, a hundred stroke sufferers had been hospitalized for the primarily study. Patients made up of 76 percent men and 26 percent women suffered from 61 percent ischemic stroke (SI) and 39 percent hemorrhagic stroke, respectively (HS). A small majority of stroke patients (9%) have had a pervious stroke or transient ischemic attack (TIA) (3 percent).54 percent of the population lived in urban regions, 46 percent in rural areas, and 47 and 53 percent were from low –and middle income families, respectively,

according to the demographic data. The primary factor behind stroke (63%) was hypertension, which was then followed by heart disease (24%), diabetes mellitus (21%), and hyperlipidemia (20%) (Hossain et al., 2011).

Maximum of person stroke danger variables that can make contributions to international variances in stroke frequency and case mix. Our findings inspire theimprovement of world and nearby stroke prevention programmers (O' Donnell et al., 2016).

The abrupt loss of neurological function brought on by a stroke-related problem with cerebral blood flow. Treatment, adjustments to the sensitivity of different sense, and deficits in language, sensory perception, motor function, and cognitive function. Depending on the stroke because the area and degree of the strokes incapacity determine extent of the damage. In general, hemoglobin patients capacity to slow progression of muscular dystrophy, which manifests as muscle weakness and restrictions in joint range of motion, can be seen. Concerns regarding the aforementioned falling issues owing to walking speed and ability, balance, issues, altered equilibrium, lower confidence, and diminished mobility lessened. Therefore, it is encouraged to balance the development of an important focus and functional mobility during rehabilitation for chronic stroke patients (Hahn et al., 2015).

There are numerous risk factors for geriatric infection due to lack of age and lack exercise. The process of aging is characterized by a decline in the body's cell count and a gradual loss of physical adaptability in each cells activity, death, ultimately. Growth impairs elderly people' capacity to keep regularly and blocks their path, which has an impact on how they move throughout their daily lives. Therefore, the primary considerations in assessing a fitness program for the elderly should be what has to be done and whether it will effectively prevent folding and F-fact gate. Low-end muscular strength, weakening stomach reduction, reducing imbalance, and sun-ramping motor control are a few of the physical aspects that could be impacted. There are numerous preventive measures available. Such as physical activity, gate training, enhancing muscle strength with drugs, and information about prevention can reduce the risk of collapse. Among these, months-long fitness programs often focus on balance training and muscle strength strengthening. According to the findings of this investigation, both TUG team's motion speed and length considerably decreased once

interferences were removed. A low- speed compromise demonstrates that the PME groups following interruption. Compromised to the USSE Group.[conclusion]PME and USAAE have demonstrated a considerable impact on the stable and dynamic balance of issues pertaining to older women, which is helpful in preserving the balance of this group of subjects in these activities. Pilates mat movement, however, are seen to be safer than exercising on an unstable foundation of support (Hyun, et al., 2014).The locomotors system must work at its best in balance (Nayak et al .,2010).

Balance issues in people with chronic stroke have been found as the largest predictor of falling, especially when performing complex tasks. This may result in decreased activity and a sedentary lifestyle, which further disrupts daily living. Function and state of health (Vilnai and Kartin, 2010).

Balancing workout on an unstable floor is extra powerful than on a solid floor for enhancing stability capacity of stroke patients (Roh et al., 2011).

Intensive gait training produced a full-size development in existence function participation with inside the continual phase after stroke (Pundik et al., 2012).The ability to maintain balance while sitting is a predictor of function recovery, and as the center of mass is lowered while sitting compared to standing the trunk muscles play a crucial part in this process (Lee, Kim, and Jeon., 2015).

Recent research found that adding trunk movements to a regular workout routine has a substantial impact on balance, balance, functional condition, and body composition. Early-stage stroke patients who can walk (Buyukavci et al., 2016).

As it stabilizes pelvis and the spinal column, trunk control appears to be particularly crucial for balance. The trunk's muscles play a role in keeping the body balanced and in control. The weakening of trunk flexors has been documented in numerous researches. Post stroke, bilateral trunk rotators and extensor muscles. Additionally, a number of writers have emphasized the significance of evaluating trunk function in order to forecast the functional state of stroke patients after discharge (Cabanas-Vald'esa, Critat, &Bagur-Calafat, 2013).

Exercises that target trunk control specifically are crucial for stroke patient's effective rehabilitation. Through a targeted exercise program for trunk rehabilitation,

one can finally increase selective mobility by strengthening the muscles in the trunk .The result aids patients in learning basic daily living skills (Das et al., 2016).

An additional pre-post design revealed that the aquatic and land-based trunk workout program significantly increased stroke patients. Walking speed and cycle, stance phase and stride length of the affected side, and the symmetry index of the stance phase (Park et al., 2016).

25 chronic stroke patients were randomly divided into the VRT group (n=13) and the control group (n=12). Bothgroups participants engaged in a 30 minute session of a typical rehabilitation program. The VRRT group also engaged in a 30-minute VRRT session five times each week for four weeks. The control group underwent a standard rehabilitation program and a VRRT program with a placebo. The Berg Balance Scale (BBS),the Functional Reaching Test (FRT),the Timed UP and Go (TUG) test, the postural sway test (for static balance ability),and the 10 meter walking velocity (10 mWV) test were used as outcome measures ability of gait (In, Lee, and Song, 2016). Following a stroke, patients experience varying degrees of loss in motor, sensory, and higher brain cognitive capabilities, which impairs balance. A variety of interventions can help to improve balance. A total of 51 patients were involved in the experimental investigation, with 17 patients in each group, to evaluate the usefulness of dynamic balance in ambulatory stroke patients as well as to assess the effectiveness of individual training. For a total of four weeks, subjects were required to complete a set of exercises on five days per week. BBS and the Timed Up and Go test were used to carry out the pre- and post-intervention evaluation. The three therapies were all successful at improving balance. Following is a complete change for both outcome measures. After the four-week intervention period, with a p0.05. With p0.05, the third group had a significantly better balance than the other two groups. The wobble board with visual feedback was quite successful. There are, however, a relatively small number of studies that support the use of dynamic balancing training with visual feedback to enhance balance in ambulatory stroke patients. Therefore, the study's goals were to assess the efficacy of individual training in ambulatory stroke patients as well as the efficacy of wobble board training with and without visual feedback (Nouman, kumar, 2022).

This randomized controlled study with a blind observer enrolled sixty-eight stroke patients. While patients in the control group performed textual and graphical HEP, patients in the smart-rehab group underwent HEP with an AR system for four weeks. Three times—at the beginning of the HEP (T0), right away (T1), and four weeks later (T2)—balance and fear of falling were assessed. In the smart-rehab group compared to the control group, there was a considerably larger change in balance from T0 to T1 (p 0.017). In the smart-rehab group, the change in fear of falling from T0 to T1 and T2 was substantially higher than in the control group, respectively (p 0.017). Due to a transient ischemia episode that passed throughout the course of the study, one person with vertebral artery dissection in the smart-rehab group decided to stop participating (Lee et al., 2022).

24 CA patients participated in a two-arm, parallel-group, randomized-controlled trial that was assessor-blinded. Twelve participants were randomly assigned to undergo a Tai Chi intervention and twelve to receive standard care. The Berg Balance Scale (BBS), the Scale for the Assessment and Rating of Ataxia (SARA) balance subcomponent of the SARA (SARAbal), the Sensory Organization Test, and the Limits of Stability test were used to evaluate dynamic balance. The SARA and EuroQol visual analog scales were used to measure disease severity and health-related quality of life, respectively. Assessments were finished at the beginning of the 24-week follow-up period (week 36: T3), postintervention (week 12: T2), and baseline (week 0: T1). After 12 weeks of Tai Chi training, the experimental group showed improvement in dynamic balance as measured by the BBS (mean difference [MD]: 4, 95% confidence interval [CI]: 1.06 to 8.71]) and the SARAbal (MD: 1.33, 95% CI: 2.66 to 2.33). This was in comparison to the usual care control group. There was a wide range in the size of the effect. During the follow-up assessment after 24 weeks, the gains made were not maintained. Tai chi had no positive effects on this population's health-related quality of life or disease severity (Winser et al., 2022).

One of the main objectives of all rehabilitation programmers is to help stroke survivors regain their ability to walk. Who had employed the functional ambulation classification (FAC) discovered that whereas 45% of patients were discharged with persistent gait impairment, 55% of stroke survivors were able to walk independently after three months.Because of their motor weakness and balance issues, treating hemiplegic patients during the acute phase of a stroke with early locomotor therapy is

technically challenging.To get over these challenges, a revolutionary locomotor training called body weight-supported treadmill training (BWSTT) was created. BWSTT combines high repetitions of task-oriented practice.Early gait training initiation, the integration of weight-bearing activities, task-specific approach stepping and balance, and symmetrical gait pattern are all made possible by the usage of BWSTT. When compared to conventional training of the same period, BWSTT's effect on walking results was underwhelming, despite its theoretical potential to become an invaluable therapeutic tool. A motorised robotic driven gait orthosis was recently developed to help deliver brain-washing stem cell therapy (BWSTT). It offers several benefits over traditional BWSTT methods, such as requiring less effort from physiotherapists, longer session times, more physiological and repeatable gait patterns, and the ability to measure patient performance (Husemann et al., 2007).

Strength-based workouts can be a useful way to improve balance and can also be used to correct postural irregularities for a flexible and balanced body because they have a direct correlation to health.Based on these results, we postulated that Pilates exercise training could be a useful post-stroke rehabilitation technique to address the flexibility, sensorial loss, muscular strength, and balance impairments that stroke patients often experience (Shea S, Moriello G., 2014).

This study demonstrated how patients with chronic stroke might improve their static and dynamic balance with an 8-week exercise programme. These outcomes are achievable if Pilate's exercise that targets and improves the deeper abdominal muscles is continued for this amount of time. The goal of rehabilitation for patients who have had a persistent stroke is to restore the capacity to walk, and a Pilates programme can help achieve this goal provided these training parameters are applied in the clinic when the patient is ready. These findings suggest that Pilate's instruction should be taken into account as a rehabilitation strategy for patients who have had a chronic stroke in order to enhance their balance (Lim et al., 2016).

Age and a number of illnesses can have a negative impact on postural control. Poor balance is one of the main risk factors for falls and can have a significant negative impact on daily physical performance. Fall prevention is thought to benefit greatly from both balance and gait training.Numerous research works have exhibited the benefits of traditional exercise regimens for both gait and balance. It has been

suggested time and time again that integrating wearable sensors (WS) into training regimens could be a promising way to enhance balance and gait. Physiological (like muscle activity), biochemical (like blood composition), and motion sensing (like joint movement) systems are examples of WS capabilities.This review focuses on wearable plantar pressure sensors (WPS) or inertial measurement units (IMUs), which monitor the velocity, acceleration, and direction of body motions, to evaluate kinetic or kinematic motion data during balancing and/or gait training (GW Kim et al., 2019).

Which of these rehabilitation techniques is the safest, most comparative effective way to help stroke patients improve their ability to balance? In contrast to pairwise meta-analysis, network meta-analysis (NMA) may assess the relative effectiveness of many treatment comparisons and summaries both direct and indirect data. Furthermore, NMA has the ability to rank various treatment alternatives according to their efficacy. Therefore, NMA should be carried out to synthesize the evidence of various rehabilitation therapies and to determine the most effective rehabilitation therapy for post-stroke balance impairment in order to assist physiotherapists and patients in making better decisions for restoring balance (Juan et al., 2019).

CHEPTER–III METHODOLOGY

3.1 Study design: It was a Randomized Controlled Trial. RCT is appropriate for the comparison to the effectiveness of balance training among stroke patients.

3.2 Studyplace:

Data were collect from the outpatient services of physiotherapy unite of Saic Physiotherapy and Rehabilitation Services-Mirpur 14, Pain Paralysis Specialized and General hospital Manikganj, Unique Pain and Paralysis-Mirpur 11, Platinum Health Care –Mirpur 6, Nasir Uddin Health Care-Mirpur 2.

3.3 Study period:

The duration of the study was 12 months from 1st July 2022 to 30th June 2023.

3.4 Study Population: The patients with stroke attending in different physiotherapy center constituted the study population for the present study.

3.5 Sample size: The required sample size for the present study has been calculated by the following statistical formula.

$$\frac{\mathbf{2}\boldsymbol{SD}(\frac{\boldsymbol{Z\alpha}}{\mathbf{2}}+\boldsymbol{Z\beta})^{\mathbf{2}}}{\boldsymbol{d}^{\mathbf{2}}}$$

Here,

From Z table at type 1 error of 5%, $\frac{z\alpha}{2} = 1.96$

From Z table 80% power Zβ= 0.84

Effect size- difference between mean values, d= 3 (Danazumi, et al., 2021).

Standard deviation SD=16.42(Yatar, Yildirim., 2015).

Sample size n=?

The sample size calculation of clinical trail the following equation-

$$n=\frac{2SD(\frac{Z\alpha}{2}+Z\beta)^2}{d^2}$$

$$n=\frac{2\times16.42(1.96+0.84)^2}{3^2}$$

$$n=\frac{32.94(2.8)^2}{9}$$

$$n=\frac{32.94\times5.6}{9}$$

$$n=\frac{185.904}{9}$$

n=20.43

Total sample size n= 20.43

3.6 Sampling technique:

- As these patients attained in the sites randomly without the choice of various chamber authority or the research's choice, in a specific time period. So that, they may be considered as a random sampling.
- Then randomly allocated 10 into experimental group and 10 into control group by computer generated random number.

3.7Inclusion criteria:

- Age range between(30 - 70) years old
- Both male and female.
- Who are voluntarilyagreed to participate the study.

3.8 Exclusion criteria:

- Unconscious patient.
- Medically unstable.
- Who are not willingly participate?

3.9 Method of data collection:

Data was collected through the face to face interviews using an internally accepted questionnaire. The assessor was bilingual (Bengali and English), and the investigator did forward and backward translations of the questionnaire by different people and found the same meaning.

3.10 Instrument and tools of data collection Management of data:

A questionnaire was prepared according to the objectives and variables of the present study. The questionnaire contained both open-ended and closed-ended questions. The questionnaire has two parts. The first part contained questions on socio-demographic information (a structured questionnaire was used for socio-demographic information). The second part included questions of Active Specifics Balance (ABC) scale.

3.11 Procedure of data collection:

The researcher selected 30 patients with stroke from the out patients services in the department of physiotherapySaic Physiotherapy and Rehabilitation Services-Mirpur 14, Pain Paralysis Specialized and General hospital Manikganj, Unique Pain and Paralysis-Mirpur 11, Platinum Health Care-Mirpur 6, Nasir Uddin Health Care-Mirpur 2. The 10 patients were excluded on the basis of exclusion criteria. Then 22 patients were allocated into experimental and control group by randomization. Allocated to experimental group 11 patients received balance training with usual physiotherapy and Allocated to control group 11 patients received usual physiotherapy. Two patient in both groups did not complete 12 session of treatment. Ultimately the number of participants in experimental and control groups were 10 respectively. Information on balance training was collected. From both experimental and control groups before intervention. This information has been regarded as pre-test data. The intervention for the present study by balance training and conventional physiotherapy in experimental group. For control group only conventional physiotherapy was given. Both groups received similar 12 sessions. After completion of intervention information on balance training was collected. The information after intervention has been regarded as post test data among with 20 stroke patients.

3.12 Intervention protocol:

Experimental Group (45 minutes) (Task oriented Balance training with UPT)	**Control Group (45 minutes) (Usual Physiotherapy intervention)**
• Usual physiotherapy intervention	• Education about posture and home exercise
• Task oriented Balance training: Task oriented Balance training treatment was given 3-4 treatment sessions per week for 4 weeks. • Sitting balance practice with hand activities • Sitting balance practice with ball throwing • Standing balance practice with hand throwing • Standing balance practice with ball kicking	• Active facillatory exercise - 1 set of 10 rep performed • Stretching exercise – 1 set of 10 rep performed • Strengthening exercise – 1 set of 10 rep performed • Weight bearing exercise – 1 set of 10 rep performed • Registered exercise – 1 set of rep performed • Functional activities exercise – 1 set of rep performed

3.13 Data management:

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

3.14 Analysis of data:

Data were analyzed by SPSS version 25 using descriptive analysis for sociodemographic variables. A paired t-test was used to assess the pre-test and post-test interventions within the group, and an independent t-test was used to assess the differences between the groups pre- and post-intervention. Microsoft Excel 2019 was used for the bar diagram and chart.

3.15 Ethical consideration:

The investigator was obtained written permission from ethical review board (SCMST). Ethical review board informed by written document about aims and objectives of the study and that the patients of the study will not harmed or the clients name, address and personal information will be kept confidential by the investigator mentally and the data's will not share with others.

- Approval received from the **IRB** of **SCMST.**
- Data collection permission was taken from the head of the physiotherapy Department of SCMST.
- Confidently maintained strictly.
- Informed consent was taken from every participants.

3.16 Limitation of the study:

I The sample size was small and so the result cannot be generalized.

II. The study analyzed only the short term benefits with respects to balance training.

III. The researcher only shows the balance training. It was needed to show the other variables.Such as quality of life, neurological problem, psychological status.

IV. No follow-up study was included; it was quite important to take a follow-up session. The follow up of the participants could not be done due to shortage of time.

V. The researcher collected data from only five rehabilitation centers, but samples should be collected from large area.

CHAPTER–IV RESULT

The present study was carried out with the objective of assessing the effectiveness of balance training among stroke patients. Data were collected from the participants by ABC scale and pre tested questionnaire and analyzed by SPPS program. The findings of the study have been presented by frequency tables, charts, graphs and description of the related variables.

4.1 Baseline characteristics:

Table No 1: Baseline characteristics of the participant.

Variable	**Experimental group (n=10)**	**control group (n=10)**
Mean age (Years)± SD	59.00 ± 10.719	50.30 ± 11.275
Gender		
Male	7 (70.0%)	8 (80.0%)
Female	3 (30.0%)	2(20.0%)
Marital status		
Married	9(90.0%)	8(80.0%)
Unmarried	1(10.0%)	1(10.0%)
Widow	0 (00.0%)	1(10.0%)
Mean BMI ± SD	24.660 ± 2.4268	24.850 ± 2.3997
Living Area, n(%)		
Urban	7 (70.0%)	7 (70.0%)
Rural	3 (30.0%)	0 (0.00%)
Semi urban	0 (0.00%)	3 (30.0%)

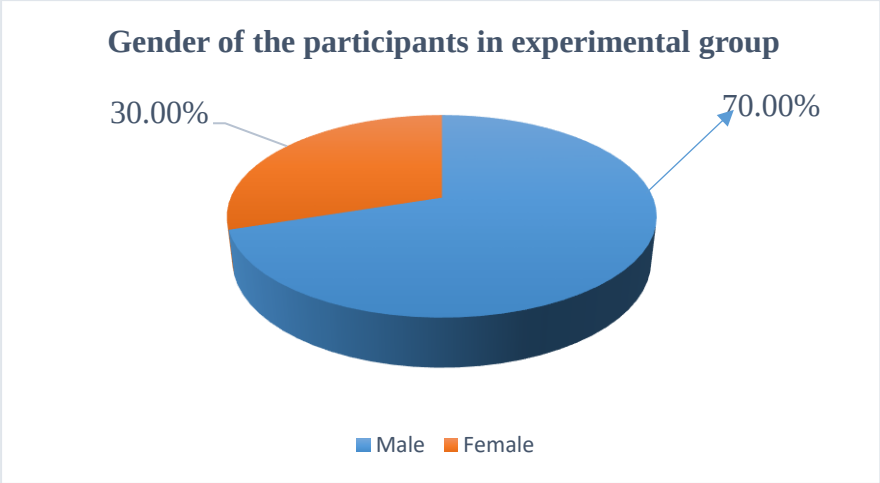
4.2.1: Age of the participants

Table No 2: Frequency distribution of the participants by age.

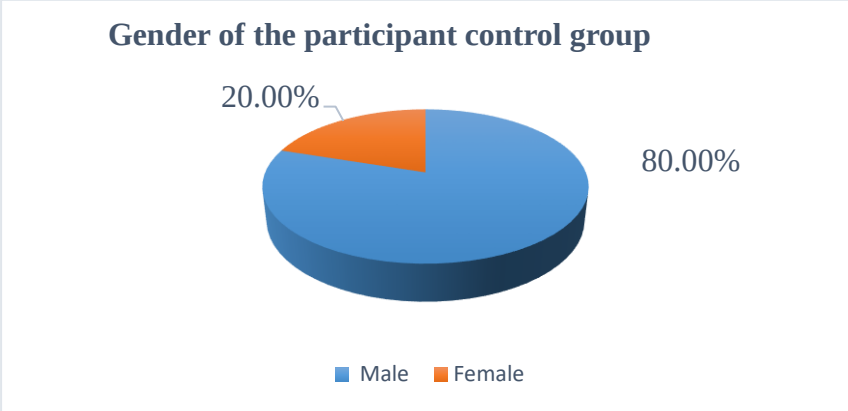
Data	**Experimental group**		**Control group**	
`Age group in years	N	%	N	%
Less than 40 years old	1	10.0	2	20.0
40 - 50 years old	2	20.0	3	30.0
51-60 years old	3	30.0	4	40.0
More than 60 years old	4	40.0	1	10.0
Total	10	100.0	10	100.0
Mean±SD	59.00 ± 10.719		50.30 ± 11.275	

Regarding frequency distribution of the participants, it was found that in experimental group 4 (40.0%) participants belonged to the age group of more than 60 years. It was also found 3 (30.0%) participants were in the age group of 51 - 60 years. In case of control group 4 (40.0%) participants were in the age group of 52-60 years and 3 (30.0%) participants belonged to the age group of 42-50 years (Table.no 1).

4.2.2: Gender of the participants



The study showed that in the experimental group, 7 (70.0%) participants were male and 3 (30.0%) participants were female (Figure.no 1).



The study showed that in control group 8 (80.00%) participants were male and 2 (20.00%) participants were female (Figure.no 2).

4.2.3: Living area of the participants

Table No 2: Frequency distribution of the participants by living area.

Living area	Experimental group		Control group	
	N	**%**	**N**	**%**
Urban	7	70.0	7	70.0
Semi-Urban	0	0.00	3	30.0
Rural	3	30.0	0	0.00
Total	10	100.0	10	100.0

About living area of the participants, it was found that in experimental group, 7(70.0%)participants were living in urban area and 3 (30.0%) participants were living in rural area. In case of control group of urban 7 (70.0%)participants, and semi-urban 3 (30.0%)participants in (Table.no 2).

4.2.4: Family of the participants

Table No 3: Frequency distribution of the participants by family.

Type of family	Experimental group		Control group	
	N	**%**	**N**	**%**
Nuclear	10	10.0	9	90.0
Joint	0	0.00	1	10.0
Total	10	100.0	10	100.0

The study showed that, in experimental group, 10 (100.0%) participants belonged to nuclear family. In control group, 9 (90.0%) participants came from nuclear family and 1(10.0%) participant from Joint family (Table no.3).

4.2.5: Educational level of the participants

Table No 4: Frequency distribution of the participants by educational level.

Education	Experimental group		Control group	
	N	%	N	%
Illiterate	1	10.0	0	0.00
Primary	4	40.0	4	40.0
secondary	0	0.00	1	10.0
Higher secondary	1	10.0	3	30.0
Graduate	2	20.0	1	10.0
Post graduate	2	20.0	1	10.0
Total	10	100.0	10	100.0

The study showed that, it was found that in experimental group 4 (40.0%) participants had primary education, 1 (10.0%) participants were higher secondary education, 2 (20.0%) participants were graduate, 2 (20.0%) participants had Post graduate, and (10.0%) participants were illiterate. In case of control group, 4 (40.0%) participants had primary education, 1(10.0%) participants had secondary education, 3

(30.0%) participants had the level of higher secondary education, 1(10.0%) participants had graduate, 1(10.0%) participants had post graduate (Table. no. 4).

4.2.6: Occupation of the participants

Table No 5: Frequency distribution of the participants by occupation.

Occupational	**Experimental group**		**Control group**	
	N	**%**	**N**	**%**
Student	0	000	0	000
Job holder	3	30.0	3	30.0
Business	0	000	5	50.0
Farmer	1	10.0	0	000
House wife	3	30.0	2	20.0
Others	3	30.0	0	000
Total	10	100.0	10	100.0

The study showed that in experimental group, 1 (10.0%) participants were in farmer, 3 (30.00%) participants were in job and 3 (30.00%) participants were in housewife. In case of control group, 5 (50.00%) participants were businessmen, 3 (30.00%) participants were in job and 2(20.0%) participants were in house wife (Table no 5).

4.2.7: BMI of the participants

Table no.6: Frequency distribution of the participants by BMI

BMI	Experimental group		Control group	
	N	%	N	%
<18.5 (Underweight)	1	10.0	0	000
18.5 - 24.9(Normal weight)	2	20.0	6	60.0
25 - 29.9 (Over weight)	7	70.0	3	30.0
>30 Obese	0	000	1	10.0
Total	10	100.0	10	100.0
Mean $\pm$ SD	24.660 ± 2.4268		24.850 ± 2.3997	

Regarding frequency distribution of the participants, it was found that in experimental group underweight 1 (10.0%) participant were normal weight 2 (20.0%)participants were overweight 7 (70.0%) participants. It also found that control group normal

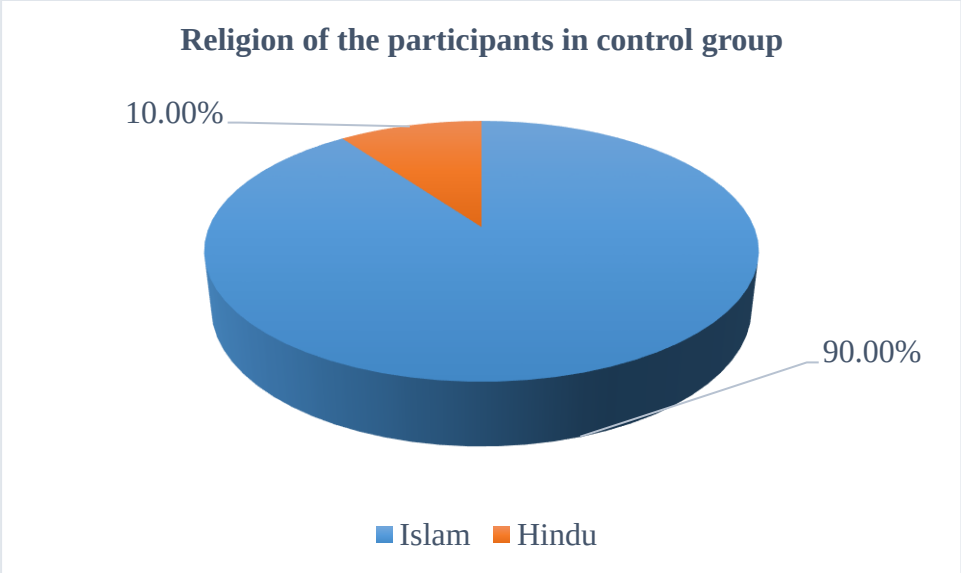
weight 6 (60.0%) participants were overweight 3(30.0%) participantswere obese 1(10.0%) participant(Table no 6).

4.2.8: Religion of the participants

Table.no 7: Frequency distribution of the participants by Religion

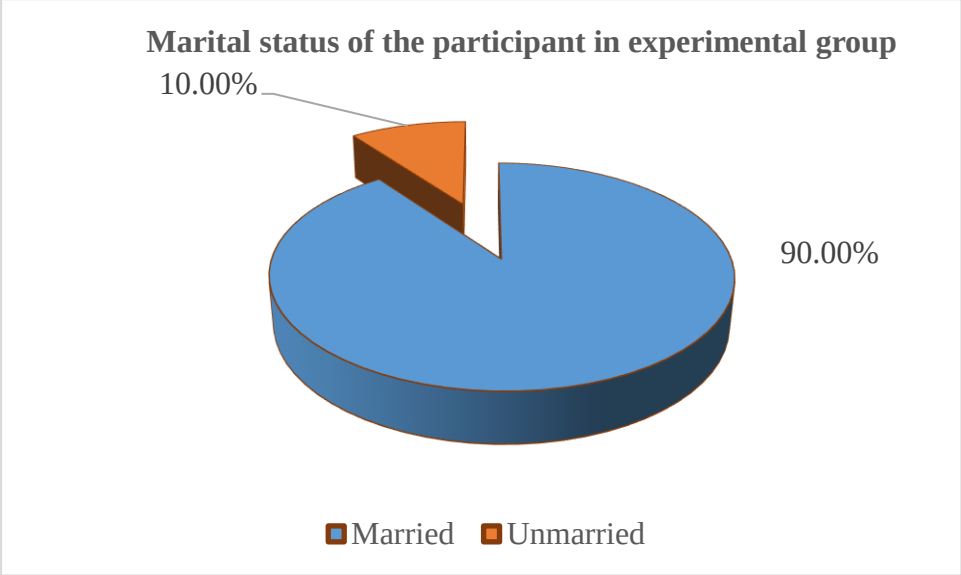
Religion	Experimental group	
	N	%
Total	**10**	**100.0**

The study showed that in experimental group all participants were Muslims (Table no.7).

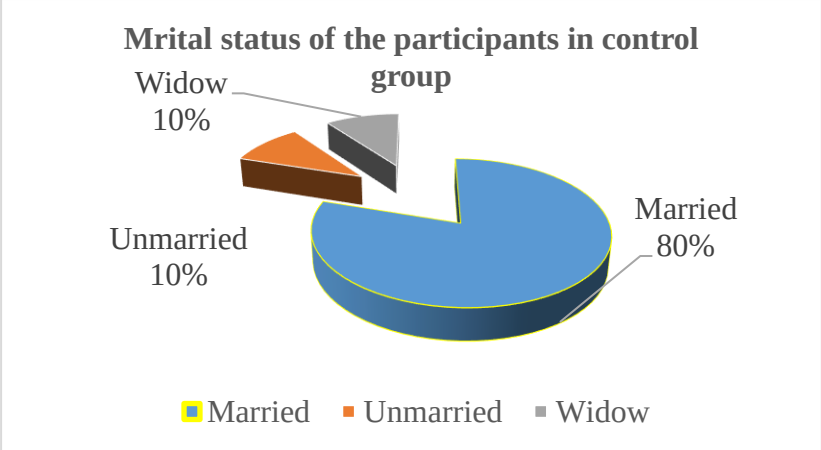


The study showed that in control group 9 (90.0%) participants were Muslims and 1(10.0%) participant were Hindu (Figure.no 3).

4.2.9: Marital status of the participants



The study showed that marital status of the participant. The experimental group was Married 9 (90.0%) participants and Unmarried 1 (10.0%) participant (Figure.no 4).



The study showed that marital status of the participant. The control group was widow 1 (10.0%) participant, unmarried 1 (10.0%) participant and married 8 (80.0%) (Figure.no 5).

4.2.10: Monthly income level of the participants

Table no.8: Frequency distribution of the participants by Monthly income

Monthly income	**Experimental group**		**Control group**	
	N	**%**	**N**	**%**
Less than Taka 30000	5	50.0	6	60.0
Taka 30000 – 60000	3	30.0	2	20.0
Taka 60000 – 90000	0	000	1	10.0
Taka 900001 – 1200000	1	10.0	0	000
More than 1200000	1	10.0	1	10.0
Mean ± SD	49200.00 ± 43547.675		43400.00 ± 144000	

The study showed that monthly income of the participants, it was found that in experimental group 5 (50.0%) participants had taka less than 30000, 3 (30.0%) participants had taka 30000 - 60000, 1 (10.0%) participant had taka 900001 – 1200000, 1(10.0%) participant had taka more than 1200000. The mean come was 49200.00 and the standard deviation was SD ± 43547.675. In case of control group 6 (60.0%) participants had taka less than 30000, 2 (20.0%) participants had taka 60000-90000, 1 (10.0%) participant had taka 60000 – 90000 and 1(10.0%) participant had taka more than 1200000. The mean come was 43400.00 and the standard deviation was SD ± 144000 (Table no. 7).

4.3: Effectiveness of Balance Training:

Before intervention that is balance training of the experimental group, ABC scale was used to collect baseline information from both experimental group and control group. This was regarded as pre-test data. Similarly data after intervention were collected from the experimental group. This was regarded as post-test data for experimental group. Control group received only conventional therapy.

For both pre-test and post-test the responses in the ABC Scale were given individual score and later on summed up as total score.

In order to assess the effectiveness of balance training paired samples '*t'* test was done between pre and post intervention of the experimental and control group.

In case of experimental group:

Mean of score of experimental group before intervention	Mean	N	Standard deviation (SD)	Standard error	*t*	*df*	*p*
	39.10	10	11.377	3.598	18.013	9	0.000
Mean of score of experimental group after intervention	88.70	10	12.867	4.069			

Interpretation: The difference between pre and post test score in experimental group was found statistically highly significant *(t*= 18.013, *df* = 9, *p* = 0.000).

In case of Control group:

Mean of score of control group	Mean	N	Standard deviation (SD)	Standard error	*t*	*df*	*p*

before intervention	36.50	10	10.146	3.208	32.928	9	0.000
Mean of score of control group after intervention	87.70	10	7.258	2.295			

Interpretation: The difference between pre and post test score in control group was found statistically highly significant *(t* = 32.928, *df*= 9, *p* = 0.000).

Mean difference of score between experimental and control group was done by Independent samples *t*test.

Mean of score of experimental and control group before intervention	Mean	N	Standard deviation (SD)	Standard error	*t*	*df*	*p*
	39.10	10	11.377	3.598	.538	18	0.596
Mean of score of experimental and control group before intervention	36.50	10	10.146	3.208			

Interpretation: The difference of mean score between experimental and control group was found statistically not significant (*t* = .538, *df*= 18, *p* = .596).

Mean of score of experimental and control group after intervention	Mean	N	Standard deviation (SD)	Standard error	*t*	*df*	*p*
	88.70	10	12.867	4.069	.214	18	o.833
Mean of score of experimental and control group after	87.70	10	7.258	2.295			

intervention							

Interpretation: The difference of mean score between experimental and control group was found statistically not significant (t = .214, *df*= 18, *p* = .833).

CHAPTER–V DISCUSSION

The objective of the study was to identify the effectiveness of balance training among stroke patients from selected physiotherapy center in Dhaka City and Manikganj. It was a randomized controlled trial carried out with a sample size 20. The study participants were allocated into experimental and control group by randomization. The participants in experimental group received balance training with other conventional therapy. On the other hand the control group received only conventional therapy. Pre and post intervention data were collected from the both groups by interviewer administered questionnaire. The collected data were analyzed with the Microsoft Office Excel 2016 withSPSS 25 version software program. The discussion of the result has been presented in the following section.

Regarding frequency distribution of the participants, it was found that in experimental group 4 (40.0%) participants belonged to the age group of more than 60 years. It was also found 3 (30.0%) participants were in the age group of 51 - 60 years. In case of control group 4 (40.0%) participants were in the age group of 52-60 years and 3 (30.0%) participants belonged to the age group of 42-50 years (Table.no 1).

In this study conducted by K. E. Laver et al, showed that the age range of 50 participants was 18 to 85 years. The mean age of the participants was 60.16 years and SD was 10.04 (K. E. Laver et al., 2011).

The study showed that in the experimental group, 7 (70.0%) participants were male and 3 (30.0%) participants were female (Figure.no 1). In case of control group 8 (80.0%) participants were male and 2 (20.0%) participants were female (Figure.no 2).

Koshiro et al found in their study that 3 (18.75%) participants of women and 13 (81.25%) participants of men in experimental group. In case of control group 4 (21%) participants of women and 12 (75%) participants of men (koshiro et al., 2017).

About living area of the participants, it was found that in experimental group, 7(70.0%)participants were living in urban area and 3 (30.0%) participants were living in rural area. In case of control group of urban 7 (70.0%)participants, and semi-urban 3 (30.0%)participants in (Table.no 2).About type of family, in experimental group, 10 (100.0%) participants belonged to nuclear family. In control group, 9 (90.0%) participants came from nuclear family and 1(10.0%) participant from Joint family (Table no.3).

The study showed that, it was found that in experimental group 4 (40.0%) participants had primary education, 1 (10.0%) participants were higher secondary education, 2 (20.0%) participants were graduate, 2 (20.0%) participants had Post graduate, and (10.0%) participants were illiterate. In case of control group, 4 (40.0%) participants had primary education, 1(10.0%) participants had secondary education, 3 (30.0%) participants had the level of higher secondary education, 1(10.0%) participants had graduate, 1(10.0%) participants had post graduate (Table. no. 4).

The study showed that in experimental group, 1 (10.0%) participants were in farmer, 3 (30.00%) participants were in job and 3 (30.00%) participants were in housewife. In case of control group, 5 (50.00%) participants were businessmen, 3 (30.00%) participants were in job and 2(20.0%) participants were in house wife (Table no 5).

Regarding frequency distribution of the participants by BMI, it was found that in experimental group underweight 1 (10.0%) participant were normal weight 2 (20.0%)participants were overweight 7 (70.0%) participants. It also found that control group normal weight 6 (60.0%) participants were overweight 3(30.0%) participantswere obese 1(10.0%) participant(Table no 6).

Dean CM et al., relaved that the BMI by height and weight of the 10 participants in experimental group of body mass 62.7 (8.2) kg and 10 control group of body mass 76.5 (5.3)kg .Height (m) in experimental group of 1.58 (3.1) and control group of 1.63 (2.4).For this BMI (kg/m^2) in experimental group of 19.4 (2.8) and control group of 22.4 (1.5) (Dean CM et al., 2009).

The study showed that marital status of the participant. The experimental group was Married 9 (90.0%) participants and Unmarried 1 (10.0%) participant (Figure.no 4).The study showed that marital status of the participant. The control group was widow 1 (10.0%) participant, unmarried 1 (10.0%) participant and married 8 (80.0%) (Figure.no 5).

The study showed that monthly income of the participants, it was found that in experimental group 5 (50.0%) participants had taka less than 30000, 3 (30.0%) participants had taka 30000 - 60000, 1 (10.0%) participant had taka 900001 – 1200000, 1(10.0%) participant had taka more than 1200000. The mean come was 49200.00 and the standard deviation was SD ± 43547.675. In case of control group 6 (60.0%) participants had taka less than 30000, 2 (20.0%) participants had taka 60000-90000, 1 (10.0%) participant had taka 60000 – 90000 and 1(10.0%) participant had taka more than 1200000. The mean come was 43400.00 and the standard deviation was SD ± 144000 (Table no. 7).

The study showed that, before intervention that is balance training of the experimental group, ABC scale was used to collect baseline information from both experimental group and control group. This was regarded as pre-test data. Similarly data after intervention were collected from the experimental group. This was regarded as post-test data for experimental group. Control group received only conventional therapy. For both pre-test and post-test the responses in the ABC Scale were given individual score and later on summed up as total score.In order to assess the effectiveness of balance training paired samples '*t*' test was done between pre and post intervention of the experimental and control group. Interpretation of the difference between pre and post test score in experimental group was found statistically highly significant *(t*= 18.013, *df* = 9, *p* = 0.000). The difference between pre and post test score in control group was found statistically highly significant *(t* = 32.928, *df*= 9, *p* = 0.000). Mean difference of score between experimental and control group was done by Independent samples *t*test.Interpretation of the difference of mean score between experimental and control group was found statistically not significant (*t* = .538, *df*= 18, *p* = .596).The difference of mean score between experimental and control group was found statistically not significant (t = .214, *df*= 18, *p* = .833).

Giovanni et al., said that for measurement of the Mean ± standard deviations are reported for age and time from stroke event, median and interquartile range are reported for Barthel Index, and between the squared brackets the ranges are reported. Statistical comparison for numerical continuous variables was carried out, the t-test. The tests showed an improvement between T0 and T1 for all the three scales scores in both groups ($P< 0.001$ for all of them). Between groups, at enrollment, there were no significant differences in the scores of all the scales administered (P = 0.330, 0.148, and 0.366 for BBS, BI, and FAC, resp.). At the end of the treatment, all the scale scores were significantly higher in Wii group, but FAC score was close to the borderline probability value (P= 0.004, 0.021, and 0.053, resp).Balance improvement was almost completely independent of the improvement in the ten-meter walking test (R = 0.147, P = 0.484). Analogous analyses performed on the control group showed that the improvement in the equilibrium was just partially correlated with that of the independent functional ambulation (R = 0.379, P = 0.082) and with the self-selected walking speed (R = 0.421, P = 0.051), but it was significantly correlated with that in BI score (R = 0.452, P = 0.035) (Giovanni et al., 2012).

CHAPTER– VI CONCLUSION

6.1 conclusion:

One of the main physical issues that stroke patients have that limits their ability to conduct everyday tasks and engage in social activities is balance impairment. Stroke is a deadly medical syndrome with mortality price ranging as much as 25% Hypertension, Smoking and diabetes mellitus are not unusual place preventable danger elements which might be related to severe final results. Objective of this take a look at became to decide the medical presentation, danger elements and final results of stroke. The study of general objective to assess the effectiveness of balance training among stroke patients from selected physiotherapy center. It study was a randomized controlled trial, study area was Manikganj and Mirpur area. Study period was 12 month from 1stjuly 2022 to 30thjune 2023 and study population were stroke patients. Total sample size was 20. Data were collected from the participants by ABC scale and pre tested questionnaire and analyzed by SPPS program. The findings of the study have been presented by frequency tables, charts, graphs and description of the related variables and data were analyzed by SPSS version 25 using descriptive analysis for sociodemographic variables. A paired t-test was used to assess the pre-test and post-test interventions within the group, and an independent t-test was used to assess the differences between the groups pre- and post-intervention. Microsoft Excel 2019 was used for the bar diagram and chart.The study participants were allocated into experimental and control group by randomization. The participants in experimental group received balance training with other conventional therapy. On the other hand the control group received only conventional therapy. Pre and post intervention data were collected from the both groups by interviewer administered questionnaire. The result of this study relaved that balance training along with other conventional therapy

intervention no effect has significant effect on balance but it showed significant effect on effectiveness after twelve session of treatment for patients with stroke. Considering the assessment, the balance in different positions reduced in both group while comparing to the initial assessment but, between group comparisons showed not significant difference. Initial and after twelve session of intervention, the between group comparisons found that not significant change in ABC scale. The difference between pre and post test score in experimental group was found statistically within group comparison that highly significant in ABC scale in experimental group ((t = 18.013, df = 9, p = 0.000) and the difference between pre and post test score in control group was found statistically of highly significant (t = 32.928, df= 9, p = 0.000).

So, further study is needed to improve the evidence based clinical practice, as well as knowledge and skill.

6.2 Recommendation:

- If that study was done with large sample size, better result were obtained.
- The researcher believed that better result were obtained if data collection was done by other scale or measurement tools in this type of study.
- In this study, if other variable was measured, better result were obtained.

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APPENDIXE-A

SAIC COLLEGE OF MEDICAL SCIENCE AND TECHNOLOGY

Approved by Ministry of Health and Family Welfare
Affiliated with Dhaka University

Ref : *Date : .....*

Ref.No: *SCMST/PT/ERB-2017-18/1-2023/15*

3rd January'2023

To

Nusrat Jahan Ananna

4th Professional B.Sc. in Physiotherapy

Saic College of Medical Science and Technology (SCMST)

Mirpur-14, Dhaka-1216.

Sub: Permission to collect data

Dear Ananna,

Ethical review board (ERB) of SCMST pleased to inform you that your proposal has been reviewed by ERB of SCMST and we are giving you the permission to conduct study entitled "Effectiveness of balance training to improve balance among stroke patients" and for successful completion of this study you can start data collection from now.

Wishing you all the best.

Thanking You,

11.1.'23

Head of ERB
Ethical Review Board
Saic College of Medical Science and Technology

11.01.23

Principal
Saic College of Medical Science and Technology
Mirpur-14, Dhaka-1216

Address: Saic Tower, M-1/6, Mirpur-14, Dhaka-1216.Mobile:01936005804
E-mail: simt140@gmail.com, Web:www.saicmedical.edu.bd

APPENDIXE-B

SAIC COLLEGE OF MEDICAL SCIENCE AND TECHNOLOGY

Approved by Ministry of Health and Family Welfare
Affiliated with Dhaka University

Ref.No: *SCMST/PT/ERB-2017-18/1-2023/15(b)*

Date : .....

27th February'2023

To

Managing Director

Pain Paralysis Specialized and General Hospital

Manikganj.

Sub: Permission to collect data.

Dear Sir,

Ethical review board (ERB) of SCMST pleased to inform you that Nusrat Jahan Ananna of final year B.Sc. in Physiotherapy student from Saic College of Medical Science and Technology doing a thesis entitle of "Effectiveness of balance training to improve balance among stroke patients" which has been reviewed by ERB of SCMST and we are giving permission to her to conduct this study. Her data collection area is within Dhaka, so she wants to take data from your department.

I hope you will give kind permission to collect data to complete her study successfully and oblige thereby.

Thanking You,

27.02.'23

Head of ERB

Ethical Review Board

Saic College of Medical Science and Technology

27.02.23

Principal

Saic College of Medical Science and Technology

Mirpur-14, Dhaka-1216

Allowed to Data collection

28/02/2023

Dr. Md. Shahidul Islam
Senior Consultant & Managing Director
Pain-Paralysis Specialised & General Hospital

Address: Saic Tower, M-1/6, Mirpur-14, Dhaka-1206. Mobile: 01936005804
E-mail: simt140@gmail.com, Web:www.saicmedical.edu.bd

SAIC COLLEGE OF MEDICAL SCIENCE AND TECHNOLOGY

Approved by Ministry of Health and Family Welfare
Affiliated with Dhaka University

Ref.No: *SCMST/PT/ERB-2017-18/1-2023/15(c)*

Date : .....

11th May-2023

To

Dr. Nasir Uddin Ahmed

Nasir Health Care

60, Monipur, Mirpur-2, Dhaka-1216.

Sub: Permission to collect data.

Dear Sir,

Ethical review board (ERB) of SCMST pleased to inform you that Nusrat Jahan Ananna of final year B.Sc. in Physiotherapy student from Saic College of Medical Science and Technology doing a thesis entitle of "Effectiveness of balance training to improve balance among stroke patients" which has been reviewed by ERB of SCMST and we are giving permission to her to conduct this study. Her data collection area is within Dhaka, so she wants to take data from your department.

I hope you will give kind permission to collect data to complete her study successfully and oblige thereby.

Thanking You,

11/5/'23

Head of ERB
Ethical Review Board
Saic College of Medical Science and Technology

11.05.23

Principal
Saic College of Medical Science and Technology
Mirpur-14, Dhaka-1216

Allowed to collect Data.

12.5.2023

Dr. Nasiruddin Ahmed
BPT, MSc(Physiotherapy), MPH
DMS(Ex.), DHMS

Address: Saic Tower, M-1/6, Mirpur-14, Dhaka-1206. Mobile: 01936005804
E-mail: simt140@gmail.com, Web:www.saicmedical.edu.bd

SAIC COLLEGE OF MEDICAL SCIENCE AND TECHNOLOGY

Approved by Ministry of Health and Family Welfare
Affiliated with Dhaka University

Ref :
Ref.No: *SCMST/PT/ERB-2017-18/1-2023/15*

Date : .....

16th February'2023

To

The Chairman

Unique Pain and Paralysis Centre

Mirpur-11, Dhaka-1216.

Sub: Permission to collect data.

Dear Sir/Mam,

Ethical review board (ERB) of SCMST pleased to inform you that Nusrat Jahan Ananna of final year B.Sc. in Physiotherapy student from Saic College of Medical Science and Technology doing a thesis entitle of "Effectiveness of balance training to improve balance among stroke patients" which has been reviewed by ERB of SCMST and we are giving permission to her to conduct this study. Her data collection area is within Dhaka, so she wants to take data from your department.

I hope you will give kind permission to collect data to complete her study successfully and oblige thereby.

Thanking You,

Head of ERB
Ethical Review Board
Saic College of Medical Science and Technology

16.02.23
Principal
Saic College of Medical Science and Technology
Mirpur-14, Dhaka-1216

Address: Saic Tower, M-1/6, Mirpur-14, Dhaka-1206. Mobile: 01936005804
E-mail: simt140@gmail.com, Web:www.saicmedical.edu.bd

SAIC COLLEGE OF MEDICAL SCIENCE AND TECHNOLOGY

Approved by Ministry of Health and Family Welfare
Affiliated with Dhaka University

Ref :
Ref.No: *SCMST/PT/ERB-2017-18/1-2023/15(a)*

Date : .....

19th February'2023

To

1.Consultant and Clinical Head, Saic Physiotherapy and Rehabilitation Services,Mirpur-13, Dhaka-1216.

2.Coordinator, Academy of Physiotherapy Pain and Rehabilitation Centre, Mirpur-10, Dhaka.

Sub: Permission to collect data.

Dear Sir,

Ethical review board (ERB) of SCMST pleased to inform you that Nusrat Jahan Ananna of final year B.Sc. in Physiotherapy student from Saic College of Medical Science and Technology doing a thesis entitle of "Effectiveness of balance training to improve balance among stroke patients" which has been reviewed by ERB of SCMST and we are giving permission to her to conduct this study. Her data collection area is within Dhaka, so she wants to take data from your department.

I hope you will give kind permission to collect data to complete her study successfully and oblige thereby.

Thanking You,

19/02/23
Head of ERB
Ethical Review Board
Saic College of Medical Science and Technology

19.02.23
Principal
Saic College of Medical Science and Technology
Mirpur-14, Dhaka-1216

Permission granted

Physio. Md. Jashidul Islam
BSPT, MSPT (DU)
Manual Therapy (India)
Consultant & Clinical Head
Saic Physiotherapy & Rehabilitation Services

Allowed to collect data

2023

ACADEMY OF PHYSIOTHERAPY
Since: 2012

Address: Saic Tower, M-1/6, Mirpur-14, Dhaka-1206. Mobile: 01936005804
E-mail: simt140@gmail.com, Web:www.saicmedical.edu.bd

APPENDIXE-C

Consent form

Assalamualaikum/ Namaskar,

I am Nusrat Jahan Ananna, Student of B.Sc. In physiotherapy program in the department of saic college of medical science and technology, which is affiliated Dhaka University. I am conducting a study entailed "Effectiveness of Balance Training among Stroke Patients" It is part of my B.Sc. in physiotherapy degree. Note that the following is a list of question paper required to conduct the study. This list has been Selected to give you information about this study. I would like to give you a description of this study and answer any of your questions. It is about 15-20 minutes.

My project is "Effectiveness of Balance Training among Stroke Patients"

During the interview period if you fell any emotional disturbance special and economic risk and any other discomfort physical risk please tell me, I will stop the interview risk immediately. I am committed that the study will not harmful or risk for you. Your participation in this study is voluntary and you may withdraw yourself at any time during this study without any negative consequences. You also have the right not to answer a particular question that you don't like or do not want to answer during interview. If you have any weary about the study or your right as a participant, you may contact with me or my supervisor Asst. prof. S M Mustafa Kamal, Mirpur, Dhaka. Do you have you have any question before I start?

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

YES …… NO……

Signature of the researcher…… Date……

Mobile No…….

Signature of the Witness……. Date……

Mobile No……

সম্মতি পত্র,

কোড নং-

আসসালামু আলাইকুম/নমস্কার,

আমি নুসরাত জাহান অনন্যা, সাইক কলেজ অফ মেডিকেল সায়েন্স এন্ড টেকনোলজি এর বিএসসি ইন ফিজিওথেরাপি বিভাগে শেষ বর্ষের ছাত্রী। আমি আমার শেষ বর্ষের পড়াশোনা শেষ করার জন্য একটি গবেষণা করছি যার শিরোনাম হচ্ছে "ষ্ট্রোক রোগীদের মধ্যে ভারসাম্য উন্নত করতে ভারসাম্যের প্রশিক্ষণের কার্যকারিতা" এটা আমার অধ্যয়নের একটা অংশ। উল্লেখ্য অধ্যয়ন পরিচালনার জন্য প্রয়োজনীয় কিছু প্রশ্নর তালিকা নিচে দেওয়া আছে। আপনাকে আমার গবেষণার জন্য নির্বাচন করা হয়েছে। এই গবেষণার জন্য আপনাকে কিছু প্রশ্ন করা হবে, যা ১৫-২০ মিনিটের মত লাগবে। সাক্ষাৎকার নেওয়ার সময় যদি আপনি কোন মানসিক অশান্তি সামাজিক ও অর্থনৈতিক ঝুঁকি অথবা অন্যকোন শারীরিক সমস্যা বোধ করেন তাহলে আমাকে বলবেন, আমি তাৎক্ষনিক সাক্ষাৎকার বন্ধ করে দিবো। আমি প্রতিশ্রুতি দিচ্ছি যে এইটা আপনার জন্য কোন ক্ষতি বা ঝুঁকির কারন হবে না। এই সাক্ষাৎকারে আপনার অংশগ্রহণ হচ্ছে আপনার নিজের ইচ্ছায় এবং আপনি যে কোন সময় চাইলে এইটা বন্ধ করতে পারবেন। সাক্ষাৎকার চলাকালীন সময় যদি আপনার কোন প্রশ্নের উত্তর দিতে ইচ্ছা না করে তাহলে আপনি আমার সুপারভাইজার সহকারী এবং অধ্যাপক জাহিদ বীন সুলতান নাহিদ এর সাথে যোগাযোগ করতে পারবেন মিরপুর, ঢাকা। সাক্ষাৎকার শুরু করার আগে কি আপনার কোন প্রশ্ন আছে?

- হ্যা ☐
- না ☐

আমি কি সাক্ষাৎকার শুরু করব?

- হ্যা ☐
- না ☐

গবেষকের স্বাক্ষর:..... তারিখ:.....

অংশগ্রহণকারীর স্বাক্ষর: ..... তারিখ:.....

মোবাইল নং: .....

স্বাক্ষীর স্বাক্ষর: ..... তারিখ:.....

স্বাক্ষীর মোবাইল নং.....

APPENDIX- D

QUESTIONNAIRE (English)

Effectiveness of balance training to improve balance among stroke patients.

Code no: Date:

Participant name :

……

Address……

Date……..

Mobile…….

Section :1. Sociodemographic information.

Q.N	Question	Answer
1.	What is your age?	
2.	What is your gender? 1.Male 2.Female 3.Others	
3.	Where do you live? 1.Urban 2.Semiurban 3.Rural	

4.	Type of your family? 1.Nuclear 2. Extended 3.Others	
5.	What is education level? 1.Illiterate 2.Primary 3.Secondary 4.Higer Secondary 5. Graduate 6.Post Graduate 7. Others	
6.	What is your occupation? 1.Student 2.Job 3.buissness 4.farmar 5.Housewife	
7.	What is your Weight? (kg)	
8.	What is your height? (feet)	
9.	What is your BMI ? (Body Mass Index)	

10.	What is your marital status? 1.married 2.unmarried 3. widow 4. Divorce	
11.	What is your religion? 1.Muslim 2.Hindu 3.Buddhist 4.Christian	
12.	What is Your Monthly Income?	

Section: 2. Activities-Specific Balance Confidence (ABC) Scale related information:

For each of the following activities, please indicate your level of self-confidence by choosing a corresponding number from the following rating scale:

0	1	2	3	4	5	6	7	8	9	10
no confidence									completely confident	

"How confident are you that you you will NOT lose your balance or become unsteady when you…..

Serial No	Question	Pre test	Post test	Out come
1.	…walk around the house?			
2.	**…**walk up down stairs?			
3.	...bend over and pick up a slipper from the front of a closet floor			
4.	**…**reach fro a small can off a shelf at eye level?			

5.	…stand on your tiptoes and reach for something above your head?			
6.	..Stand on a chair and reach for something**?**			
7.	….sweep the floor?			
8.	…walk outside the house to a car parked in the driveway?			
9.	…get into or out of a car?			
10.	..walk across a parking lot to the mall?			
11.	…walk up or down a ramp?			
12.	…walk in a crowded mall where people rapidly walk past you?			
13.	…are bumped into by people as you walk through the mall?			

14.	…step onto or off an escalator while you are holding onto a railing?			
15.	….step onto or off an escalator while holding onto parcels such that you cannot hold onto the railing?			
16.	Walk outside on icy sidewalks?			

Pre Test & Post Test Scores:

Pre Test	Post Test	Outcome

প্রশ্নপত্র (বাংলা)

স্ট্রোক রোগীদের মধ্যে ভারসাম্য উন্নত করতে ভারসাম্যের প্রশিক্ষণের কার্যকারিতা

কোড নম্বর: তারিখ.....

অংশগ্রহণকারী

নাম:.....

.....

ঠিকানা:.....

তারিখ:.....

মোবাইল:.....

বিভাগঃ ১। সামাজিক জনসংখ্যার তথ্য (অনুগ্রহপূর্বক খালিজায়গায় নম্বর লিখুন)

ক্রঃনংঃ	প্রশ্ন	উত্তর
১.	আপনারবয়স কত ?	.....বছর
২.	আপনার লিঙ্গ কি ? ১। পুরুষ ২। মহিলা ৩। অন্যান্য	
৩.	আপনি কোথায় বসবাস করেন ? ১। শহর ২। আধাশহর ৩। গ্রাম	
৪.	পরিবারের ধরন কেমন ? ১। একক পরিবার ২। যৌথ পরিবার ৩। অন্যান্য	
৫.	আপনার শিক্ষাগত যোগ্যতাকি ? ১। নিরক্ষর ২। প্রাথমিক ৩। মাধ্যমিক ৪। উচ্চ মাধ্যমিক	

	৫। স্নাতক ৬। স্নাতকোত্তর ৭। অন্যান্য	
৬.	আপনার পেশাকি ? ১। ছাত্র/ছাত্রী ২। চাকুরীজীবি ৩। ব্যবসা ৪। কৃষক ৫। গৃহিনী ৬। অবসর ৭। অন্যান্য	
৭.	আপনারওজন কত (কিলোগ্রাম) ?	
৮.	আপনার উচ্চতাকত (ফিট)?	
৯.	আপনারবিএম আইকত ?	
১০.	আপনার বৈবাহিক অবস্থা কি ? ১। বিবাহিত ২। অবিবাহিত ৩। বিধবা ৪। তালাকপ্রাপ্ত	
১১.	আপনার ধর্ম কি ? ১। মুসলিম ২। হিন্দু ৩। বৌদ্ধ ৪। খ্রিষ্টান	
১২.	আপনার পরিবারের মাসিক আয় কত ?	

বিভাগঃ ২ কার্যকলাপ-নির্দিষ্ট ভারসাম্য আত্মবিশ্বাস (এ বি সি) সম্পর্কিত তথ্য ঃ

প্রতিটি কার্যকলাপের জন্য, অনুগ্রহ করে নিম্নলিখিত রেটিং স্কেল থেকে একটি সংশ্লিষ্ট নম্বর বেছে নিয়ে আপনার আত্মবিশ্বাসের স্তর নির্দেশ করুন:

০	১	২	৩	৪	৫	৬	৭	৮	৯	১০
আত্মবিশ্বাসহীন										সম্পূর্ণ আত্মবিশ্বাস

"আপনি কতটা আত্মবিশ্বাসী যে, আপনি আপনার ভারসাম্য হারাবেন না বা অস্থির হয়ে উঠবেন না যখন আপনি....."

ক্রঃ নং	প্রশ্ন	পূর্বের পরীক্ষা	পরের পরীক্ষা	ফলাফল
১.	.....বাড়ির চার পাশে হাটবেন ?			
২.	.....সিড়ি বেয়ে উপরে বা নিচে উঠানামা ?			
৩.	.....বাঁকাহয়ে মেঝে থেকে জুতাটিতুলবেন ?			
৪.	.....চোখ বরাবর সেক্ষের দিকে পৌছাতে পারবেন ?			
৫.	.....আপনার পায়ের আঙ্গুলের ডগায় ভর দিয়ে দাড়িয়ে আপনার মাথার উপর কোন কিছুর দিকে তাঁকান ?			
৬.	.....চেয়ারের উপর দাড়িয়ে কোন কিছুর দিকে পৌছানোর চেষ্টা করুন ?			
৭.	..... মেঝেটি মুঝবেন ?			
৮.	.....বাড়ির বাহিরে ড্রাইভ ওয়েতে			

	পার্ক করা গাড়ির দিকে হাঁটবেন ?			
৯.	.....একটি গাড়ির ভিতরে প্রবেশ করবেন এবং বাহির হবেন ?			
১০.	.....একটি পার্কিংলট ধরে হেটেমলে যাবেন ?			
১১.	.....একটি র‍্যাম্পের উপরেবা নিচে হাঁটবেন ?			
১২.	.....কোন ভীড়পূর্ন মলেহাঁটুন যেখানে লোকেরা দ্রুত আপনার পাশ দিয়ে চলে যায় ?			
১৩.	..... আপনি মলের মধ্যে হেঁটে যাওয়ার সময় লোকেদের সাথে ধাক্কা খেয়েছেন ?			
১৪.	.....আপনি রেলিং ধরে রাখা অবস্থায়একটি চলমান সিঁড়িতে পা রাখবেন বা রাখবেন না ?			
১৫.	.....রেলিং ধরা ছাড়া অবস্থায় একটি চলমান সিঁড়িতে পণ্য বহনের সময় পা রাখবেন বা রাখবেন না ?			
১৬.	.....বাহিরে পিচ্ছিল রাস্তায় হাঁটুন ?			

পূর্বের পরীক্ষার এবং পরের পরীক্ষার যোগফল ঃ

পূর্বের পরীক্ষা	পরের পরীক্ষা	যোগফল

Appendix: E Gannt Chart

Activities/ Month	July 22	Aug 22	Sep 22	Oct 22	Nov 22	Dec 22	Jan 23	Feb 23	Mar 23	App 23	May 23	Jun 23
Proposal Presentation												
Introduction												
Literature Review												
Methodology												
Data collection												
Data Analysis												
Result												
1st progress presentation												
Discussion												
Conclusion and Recommendation												
2nd progress presentation												
Communication with supervision												
Final Submission												