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EFFECTIVENESS OF PHYSIOBALL WITH BED EXERCISES TO IMPROVE GAIT OF STROKE PATIENT

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

EFFECTIVENESS OF PHYSIO BALL WITH BED EXERCISES TO IMPROVE GAIT OF STROKE PATIENT

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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 decline that same any publication, presentation or dissemination of information of the study. I would bind to take consent from the department of Physiotherapy of Bangladesh Health Profession Institute (BHPI).

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CONTENTS

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Acronyms

ADL	Activity of Daily Living
BHPI	Bangladesh Health Professions Institute.
BMRC	Bangladesh Medical Research Council
CRP	Centre for the Rehabilitation of the Paralyzed.
CVA	Cerebrovascular accident
ICH	Intracranial Hemorrhages
ROM	Range of Motion
SAH	Subarachnoid Hemorrhages
SPSS	Statistical Package for Social Science
TIA	Transient Ischemic Attack
6 (MWT)	6 Minute Walk Test
WHO	World Health Organization
10 (MWT)	10 Meter Walk Test

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ABSTRACT

Introduction: Stroke is the third leading cause of dealth in Bangladesh. It is the most common clinical manifestation of diseases which occurs motor, sensory, perceptual or cognitive deficiency and has serious impact on independence, functioning and quality of life of the stroke survivors. **Purpose:** The purpose of this study is to explore the effectiveness of physio-ball with bed exercise to improve gait of stroke patient. **Objectives:** To find out the effectiveness of physio-ball with bed exercise to improve gait of stroke patient. **Methodology:** This was Quasi-experimental quantitative type of study which was used in this study and that was Single blinded; this research was conducted with total 30 stroke patients who were listed from Neurology and Stroke Rehabilitation Unit of CRP, Savar, Dhaka. The subjects of the trial group performed bed and physio-ball exercise 3 days per week of total 12 session within 4 weeks. All subjects were evaluated with a 10-meter walk and 6 minute walk test. **Results**: The finding of the study was carried out by using Wilcoxon test, Microsoft Excel and scientific calculator to find out the result. The mean age among 30 participants was 51.17. Gender distribution was male 76.7% and female 23.3%. Among 30 participants 56.67% were right side affected and 43.33% were left side. The mean score of 10 MWT was 41.11 to 29.80 sec and mean difference was 11.31 sec (p=0.000, Z= 4.784) which was significant. Another result of the mean score of 6 MWT test was 95.14 meter to 134.17 which was decreased and mean difference of was 39.03 meter (p= 0.000, Z= 4.783) which indicated the result was significant and improvement of gait of stroke patient. **Discussion:** Sharma & Kaur, 2017 suggested that core muscle strengthening exercise combined with pelvic PNF was effective for improving trunk impairment, balance and gait of chronic stroke patients. **Conclusion**: The study concluded as bed and physio-ball exercise is effective to improve gait of stroke patient. Small amount of sample is included in this study and time duration was also limited. Further study should be done with RCT study design for more specific result.

Keywords: *Stroke, Gait, Bed and physioball exercise.*

INTRODUCTION

1.1 Background

Stroke the sudden death of brain cells due to lack of oxygen when the blood flow to the brain is lost by blockage or rupture of an artery to the brain (Owolabi et al., 2015). A stroke is the rapidly developing loss of brain function due to a disturbance in the blood supply to the brain. This can be due to ischemia caused by blockage or due to a hemorrhage. After a stroke, motor, sensory, perceptual, or cognitive deficits may occur, and these impairments can have various impacts on individual functioning through generation of disabilities and affect rehabilitation potential (Sims & Muyderman, 2010).

Stroke is responsible of severe disabilities in adults. Disability rate of stroke is 50 to 65%. After a successful rehabilitation program about 70% patients walk independently. It appears a small number of patients are able to walk functionally in the community (Mudge et al., 2009). By occurring stroke cognitive, psychological and physical function has been lost. It responsible for long-term disability (Rabin et al., 2012).

Stroke is the second/third leading cause of death worldwide. It caused an estimated 5.7 million deaths in 2005, and the global number of deaths is projected to rise to 6.5 million in 2015 and 7.8 million in 2030 (Strong et al., 2007). Modifiable risk factors are the same for both younger and older age groups. However, the prevalence of these risk factors is not the same in these two age groups. Hypertension, heart disease (including atrial fibrillation), and diabetes mellitus are the most common risk factors among the elderly (Smajlovic et al., 2013). In contrast, among 1,008 young stroke patients in Finland, the most common vascular risk factors were dyslipidemia (60%), smoking (44%), and hypertension (39%) (Putaala et al., 2009). In another study, Putaala et al. (2012) investigated the distribution of vascular risk factors in 3,944 young stroke patients from three distinct geographic regions in Europe. The three most frequent risk factors

were current smoking (49%), dyslipidemia (46%), and hypertension (36%).16 Furthermore, among 990 young stroke patients with first-ever ischemic stroke, those without well documented risk factors had less frequent recurrent ischemic strokes and non cerebrovascular arterial events, as well as lower long-term mortality rates than those with one or more risk factors (Pataala et al., 2012). The investigators concluded that numbers of risk factors add independent prognostic information regarding non cerebrovascular events and mortality in young adults.

Cervicocephalic arterial dissection is the second most common lesion of the cervical arteries after atherosclerosis, and rank first or second with regard to all etiologies of ischemic stroke in young adults (up to 25% of cases) (Tancredi et.al.,2013). Moyamoya disease affects mainly Asian people (representing 6%–15% of cases of non atherosclerotic vasculopathy), but is described throughout the world. The link between migraine and ischemic stroke has been known for years. The risk is particularly pronounced among young women having migraine with aura, and is multiplied among smokers and those using oral contraception (Bousser & Welch, 2005). Inherited coagulation disorders do not have a significant role in stroke among the young, with the exception of anti phospholipid antibody syndrome. In one systematic review, anti phospholipid antibodies, particularly lupus anticoagulant, were an independent risk factor for ischemic stroke in young adults in five of six studies (Brey, 2005).

Rare genetic and hereditary diseases, such as Fabry disease, cerebral autosomal dominant arteriopathy with subcortical infarcts and leukoencephalopathy (CADASIL), and mitochondrial encephalopathy with lactic acidosis and stroke-like episodes (MELAS), must be considered in the differential diagnosis of young patients with ischemic stroke. Vasculitides of the central nervous system are complex diseases and often reminded when differential diagnosis of stroke in young adults is discussed. Primary cerebral angiitis is twice as common in middle-aged men than in women and vasculitis related to infection is more common in developing countries and in regions with a higher prevalence of human immunodeficiency virus (Onwuchekwa et al., 2009).

Approximately, 600.000 individuals incur a stroke each year and stroke is the leading cause of long term disability in the United States (Mozaffarian et al., 2013). In the western world ranking stroke is currently the second leading cause of death after heart diseases and before cancer and causes 10% of deaths worldwide (Braunwald et al., 2003).

In previous studies it has been demonstrated that, Stroke survivors have some deficiencies including muscle weakness, spasticity and loss of equilibrium on the affected side cause loss of postural adjustment and maintain postural alignment. Also found that the hemiplegic patients have shifted their body weight on the unaffected side more than on the affected side, as a result trunk asymmetry may appears which is the central key point of the body and for this the body may not in upright position (Zakaria et al., 2010). Following stroke, there is paralysis or weakness has been occurred in one side of the body but trunk muscles are affected on both the sides leading to asymmetrical weight shifting, insufficient trunk rotation, difficulty in maintaining balance and gait (Shinde & Ganvir, 2014).

After a stroke in the first week only a third of persons are able to walk unassisted but at 3 weeks or at hospital discharge 50–80% of survivors can walk unassisted and by 6 months around 85% of stroke survivors are able to walk independently without physical assistance from another person (Balasubramanian et al., 2014). The ability to walk of stroke patients can be affected by various neurological deficits. These include impaired neuromuscular control, altered sensation, neglect (i.e. failure to respond to stimuli on the affected side) and visual deficits, thus increasing the risk for falls leading to subsequent injuries (Bouyok et al., 2006). The ability to walk at the speed and distance are absolutely essential components for activity of daily living (ADL) at home and community. Six months after stroke, walking speed of stroke patients with persistent hemiparesis gait almost a third of normal adults and only perform 40% of the walking distance from healthy people of the same age (Pohl et al., 2004). Stroke survivors generally have a reduced stance phase and a prolonged swing phase on the paretic side. In addition, the walking speed decreases and the step length become shorter (Li et al., 2018). These gait

abnormalities and balance impairment situated stroke survivors at high risk of falling (Batchelor et al., 2012). While some patients may regain gait function, but many stroke patients still have the disability of decreased gait speed and endurance and that limit the independent transfer in the home and in society (Chen & Patten, 2006).

Gait dysfunction is common in people with neurological disabilities, resulting for not only from impairments accompanying with the injury, but also from the secondary cardiovascular and musculoskeletal disuse and physical inactivity. Muscle weakness and paralysis, poor motor control and soft tissue contracture contribute significantly to gait dysfunction after stroke (Balaban & Tak, 2014).

Hemiparesis is one of the most common impairments after stroke and contributes significantly to decrease gait performance. The main components in stroke rehabilitation are to improve that reduced gait performance by retraining of locomotor skills (Flansbjer et al., 2005). Post stroke stroke hemiparesis has been reported to intensely decrease muscle mass which is available for contraction during physical activity and weakness in the lower limb impaired mobility, especially gait function (Lexell & Flansbjer, 2008).

Previous studies have shown about two-thirds of stroke survivors have remaining neurological deficits that compromise functional activities, with about half they are left with a number of physical restrictions which making them dependent on others for most activities of daily living (Onwudiwe et al., 2018). After stroke physical limitation in walking and other uses of the extremities is an essential element of overall quality of life. Up to 75% of stroke survivors have been reported to have the capability to climb stairs, walk distances at speeds necessary for independent community life (Balasubramanian et al., 2014).

Stability of the spine is dependent on muscular strength as well as proper sensory input which alerts the central nervous system about interaction between the body and the environment, providing continuous response and permitting modification of movement. larger ‘‘prime mover’’ muscles, such as the abdominal obliques and quadratus lumborum

provide stability to the spine. It gives a coordinated contraction of all deep and superficial core muscles is needed for optimal spinal stabilization (Akuthota et al., 2008). These muscles have been used for the training of athletes and low back pain patients (Akuthota & Nadler, 2004).

The core stability exercises are bridge exercise with one leg raise, curl-ups with straight reaching, curl-ups with diagonal reaching, bird and dog exercise, side bridge, abdominal curl-ups cat and camel exercise (chung et al., 2013). Sharma & Kaur (2017) reported that, core stabilization program with pelvic PNF would help in improving trunk control and controlled mobility for improving balance, gait and functional ability in stroke patients. chung et al. (2013) suggested that the effect of core stabilization exercise on dynamic balance and gait functions in stroke patients.

Lower limb can be used effectively due to the contribution of a stable and strong trunk (Willson et al., 2005). Selective upper and lower trunk distortion in supine and sitting positions using either a stable support or an unstable support is included in trunk exercises. Standard physiotherapy was using additional trunk exercises to enhance trunk function in pre-stage stroke (Sorinola et al., 2014). There is believable proof that trunk performance is a significant predictor of functional result after stroke (Verheyden et al., 2009).

Stroke is a common, serious and disabling health condition in worldwide. After stroke, a patient may frequently suffer severe limitations and disability in daily activities. Postural abnormality is one of the major problems in stroke patients which is related with an increased risk of falling (Ko et al., 2016). Postural control means normal upright position of the body that are controlled or stabilized by lower back and hip. It is very important for activities of daily livings and instrumental activities of daily livings (Merkert et al., 2011).

Hemiparetic stroke causes trunk imbalance due to paralysis of the limb, trunk and proprioceptive sensory impairment (Perlmutter et al., 2010). Unilateral stroke can result

both side or one side muscle problem of trunk. There are many articles of post-stroke patients about trunk control and postural control problems as well as standing and sitting (Ko et al., 2016).

The recovery of walking ability is one of the most relevant functional targets after a stroke, but this goal is generally obtained by only 50–60% of patients (Teasell et al., 2003). To improve the walking ability various studies have been conducted, as recovery of walking ability is a rehabilitation goal for most stroke patients (Borel et al., 2011). Only up to 74% of chronic stroke survivors regain sufficient walking ability to walk outside their homes (Van de Port et al., 2008).

Post-stroke physical rehabilitation interventions have been used to reduce pain and spasticity, as well as to increase range of motion (ROM), muscle force, mobility, walking ability, functional status, physical fitness, and quality of life (Goljar et al., 2010).

Walking is an indispensable element for their self-reliance in hemiplegia patients that will make them independent from others when they perform daily living activities and is something that must be emphasized in treatment processes for these patients (Kim, 2006). Walking and balance in stroke patients ability are very closely related. Therefore, walking training is considered to greatly affect the locomotion of stroke patients (Bohannon et al., 2015).

RATIONALE

Stroke is a medical condition in which poor blood flow to the brain results in cell death. There are two main types of strokes, one is ischemic which is due to lack of blood flow and other one is hemorrhagic which is due to bleeding. Day by day the stroke incidence is increasing in our country. Common risk factors for stroke are high blood pressure, smoking, diabetes, high blood cholesterol levels, alcohol, salt intake, high fat diet, lack of exercise with gender, age, family history. Physiotherapy treatment is very important for improving gait and functional improvement of stroke patient. From previous study impairment after stroke may interfere with the person's activity of daily living (ADL's) & recreation and insists the financial cost on the community. So, it is very important to manage the cases of stroke with walking and functional impairment.

There are many physiotherapy techniques happen for the treatment and rehabilitation of stroke patient and some researches recommends that bed and physio-ball exercise is one of the important interventions for this condition which can help on walking function of stroke. Most of the studies have shown the effects of core muscle strengthening program on balance ability of stroke patient but a little research article has published on effectiveness of physio-ball with bed exercise on lower extremity function, especially walking performance for independent living in the community of chronic stroke patients. So, the purpose of this study is to compare the effectiveness of physio-ball with bed exercises with conventional physiotherapy to improvement of gait ability.

Physio-ball with bed exercises can be an effective method to ensure continuous training after discharge. The physio-ball with bed exercises has a clinical advantage because it is simple and easy. 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 Aim:

Aim of this study is to identify the effectiveness of physio-ball with bed exercises to improve gait of stroke patient.

1.4 Objectives of the study:

General objective:

i)To find out the effectiveness of bed and physio-ball exercises on improvement of gait stroke patient.

Specific Objectives:

i)To find out the socio-demographic characteristics of stroke patient.

ii) To measure the improvement of walking ability of a stroke patient before and after physio-ball with bed exercise with conventional physiotherapy.

iii) To measure the improvement of gait of a stroke patient before and after physio-ball with bed exercise with conventional physiotherapy.

1.5 Hypothesis:

Alternative hypothesis:

Physio-ball with bed exercise combined with conventional therapy is effective on improvement of gait of stroke patients.

(Ha>Ho).

Null hypothesis:

Physio-ball with bed exercise combined with conventional therapy is not effective on improvement of gait of stroke patients.

(Ho≠Ha)

1.6 Variables of the study:

Independent variables	Dependent variable
Bed and physio-ball exercise	Improvement of gait of stroke patient
Conventional therapy	
Age	
Sex	
Duration of stroke	
Side of involvement	

1.7 Operational Definition:

Stroke

Stroke is defined by the World Health Organization as 'a clinical syndrome consisting of rapidly developing clinical signs of focal disturbance of cerebral lasting more than 24 hours or leading to death with no apparent cause other than a vascular origin' (Hossain et al., 2011).

Core Strengthening:

Core strengthening has referred to the active component to the stabilizing system including deep/local muscles that provide segmental stability (e.g.transversusabdominis, lumbar multifidus) and/or the superficial/global muscles (e.g. rectus abdominis, erector spinae) that enable trunk movement/torque generation and also assist in stability in more physically demanding tasks (Akuthota et al., 2008).

Gait cycle:

It is a complex motor activity consisting of a number of components including step length, stride length, step width, foot angle which are measured by different reliable and valid method (Hobart et al., 2003).

CHAPTER-II LITERATURE REVIEW

Stroke is a synonym with cerebro-vascular accident (CVA). A stroke or cerebro-vascular accident (CVA) occurs when the blood supply into the vessel of the brain is suddenly intermittent. Brain cells die from lack of oxygen and glucose in the blood or there is sudden bleeding in or around the brain. This can be due to ischemia caused by blockage (Sims & Muyderman, 2010).

A stroke or cerebro-vascular accident occurs when a blood vessel in the brain bursts or when the blood supply to part of the brain is suddenly interrupted. Stroke leads to spilling blood into the spaces surrounding brain cells. Lack of oxygen and nutrients from the blood or there is sudden bleeding into or around the brain causes cells die of the brain (National institute of neurological disorder and stroke, 2004). Stroke is a leading cause of long-term disability which results from brain cell damage due to either an interruption of the blood supply to the brain or hemorrhage into the brain tissue. Globally, 70% strokes and 87% of both stroke related deaths and diability adjusted life years occur in low and middle income countries (Feigin et al., 2010).

Over the last four decades, the stroke incidence in low- and middle-income countries has more than doubled. During these decades stroke incidence has declined by 42% in high-income countries (Feigin et al., 2010). On average, stroke occurs 15 years earlier in – and causes more deaths of – people living in low- and middle-income countries, when compared to those in high-income countries (Owolabi et al., 2015). Strokes mainly affect individuals at the peak of their productive life. Despite its enormous impact on countries' socio-economic development, this growing crisis has received very little attention to date. The risk factors for stroke are similar to those for coronary heart disease and other vascular diseases. Effective prevention strategies include targeting the key modifiable factors: hypertension, elevated lipids and diabetes. Risks due to lifestyle factors can also

be addressed: smoking, low physical activity levels, unhealthy diet and abdominal obesity (Johnston et al., 2009). Combinations of such prevention strategies have proved effective in reducing stroke mortality even in some low-income settings (Xavier et al., 2010)

There are two forms of stroke: ischemic and hemorrhagic (National institute of neurological disorder and stroke, 2004). Ischemic stroke or cerebral infarct (80% of strokes) occurs due to blockage or a reduction of blood flow in artery that supplies brain. They are caused either by a clot which blocks the blood vessel or by the buildup of plaque often due to cholesterol within the arteries which narrows vessel resulting in a loss of blood flow. Hemorrhagic stroke are due to the rupture of an artery within the brain triggering an intra cerebral hemorrhage (15% of strokes) or to the rupture of aneurysm or AVM entailing sub arachnoids hemorrhage (5% of strokes) (Braunwald et al., 2003). Stroke is most common medical emergency. The annual incidence of stroke between 180 and 300 per 100000. In many developing countries the incidence raises sequent with age due to adopting of less healthy life style. Stroke is the second commonest cause of death. The average incidence of stroke is 2:1,000. After the age of 50 the incidence rate doubles every decade (Choo et al., 2009).

Each year in United States, approximately 730,000 people have stroke. And nearly 400,000 survive with some level of neurology impairment and disability. Each year in China, there were about 1.5-2.0 million new stroke patients. It has been a major public health problem in China. The clinical factors would not be the same in ischemic and hemorrhagic stroke. The pathogenesis of ischemic stroke is different from that of hemorrhagic stroke. In East China, a study showed that 78% ischemic patient and 22% hemorrhagic patients. The incidence rate of ischemic stroke was higher than that of hemorrhagic stroke (Zhang et al., 2011).

There is a positive and negative association between stroke and obesity. The outcome of stroke is associated with body weight. In a study showed that BMI is associated with stroke but the direction and strength of association depend on stroke subtype. Increased risks for both ischemic stroke and hemorrhagic stroke among men with BMI above the reference range (22 to 23 kg/m2) (Song et al., 2004). Obese stroke patient have lower prognosis. In stroke, obesity can lead to death Obesity is an independent risk factor for cardiovascular events. In Asia-Pacific region, the prevalence of obesity and overweight is much among stroke patient (Choo et al., 2009).

The impact of stroke in socio-economic condition is always considerable, both in industrialized and non-industrialized countries of the world. Furthermore, as most guidelines are based on high-income country data, uncertainty remains regarding best management of stroke of unknown type in low- and middle-income countries. For example, in low- and middle-income countries, 34% of strokes (versus 9% in high-income countries) are of haemorrhagic subtype and up to 84% of stroke patients in low- and middle-income countries (versus 16% in high income countries) die within three years of diagnosis (Owolabi et al., 2015). Stroke seems an increasing impact in terms Of media attention, patient and career knowledge, service developments and research . The sequence of stroke varies and it's depending on the part of the brain injured, the severity of the injury and the person's general health. The symptoms of a stroke include sudden numbness or weakness, especially on one side of the body; sudden confusion or trouble speaking or understanding speech; sudden trouble seeing in one or both eyes; sudden trouble with walking, dizziness, or loss of balance or coordination; or sudden severe headache with no known cause (National institute of neurological disorder and stroke, 2004).

Stroke can affects the areas of cognitive, psychosocial and physical functioning. It is the leading cause of serious and long-term disability. Cognitive impairments post stroke are largely dependent on area of lesion of the brain. Depression is also

common vulnerable neuro-cognitive functions that occur after stroke. Post-stroke hemiplegic may result in unilateral upper extremity weakness, reduced active range of movement and arm function, and consequently, diminished independence in performing activities of daily living (ADLs). (Rabin et al., 2012). About 80% motor function loss completely or partially after stroke. In North of England, a study estimated that the prevalence of stroke was 46.8 per 10,000. Cognitive impairment (33%), problems with lower limbs (30%) and speech difficulties (27%) were the most common residual impairments (Wolfe, 2000).

Recovery after stroke is related to the site of lesion, extent and nature of the lesion, the integrity of the collateral circulation and the pre morbid status of the patient (Braunwald et al., 2003).

CT scan or MRI usually done for confirm ischemic or hemorrhagic stroke. Current guidelines for the management of acute stroke recommend a course of treatment based on the diagnosis of ischaemic stroke (versus haemorrhagic stroke) made using computed tomography (CT) scanners. These investigations also help to confirm other vascular lesion. Lumber puncture usually done for confirm diagnosis of sub arachnoids hemorrhage. Along with full blood count, blood glucose level, cholesterol level, ESR is investigating that help to know about risk factor Owolabi et al., 2015). CT scan is important to differentiate between cerebral infarction and intra cerebral hemorrhage. CT scan of brain can performed to confirm the clinical diagnosis and type of stroke (Amanullah et al., 2009).

Depending on its location, stroke can cause many permanent disorders, such like paralysis on one side of the body and loss of speech. The clinical manifestations of stroke are highly variable because of the complex anatomy of the brain and its vasculature (Longo et al., 2012). Ali et al. (2013) mentioned in their article, Stroke kills 15%–35% of its victims and causes serious disability in more adults who survive than any other medical disease and most strokes are ischemic, but approximately 15% of strokes are caused by subarachnoid or intra-cerebral haemorrhage.

Initial walking function is impaired in two-thirds of the stroke population and this impairment is the greatest contributor to post stroke functional disability (Teixeira-Salmela et al., 2001). Ali et al. (2013) mentioned in their study, gait disorders are systematically identified as a greatest risk factor for falls and injury.

Eng et al. (2007) stated that improved walking ability is one of the most often stated goals by people with stroke undergoing rehabilitation and with those individuals living with stroke in the community. They also suggested that impairments resulting from stroke, such as muscle weakness, in coordination, poor endurance, pain, spasticity and poor balance lead to persistent difficulties with walking.

Gait recovery is a major objective in the rehabilitation of patients who experience stroke. A wide range of walking ability is present after stroke that is dependent upon the severity of sensori-motor impairment. After stroke, 50% of patients initially are unable to walk, 12% can walk with assistance, and 37% can walk independently. At the end of 11 weeks of stroke rehabilitation, 18% of patients still are unable to walk, 11% can walk with assistance, and 50% can walk independently (Balaban et al., 2014).

The primary goals of rehabilitation of people with stroke include being managed to perform daily activities and to walk independently and rehabilitation programs for post stroke patients mainly focus on gait training, at least for sub-acute patients (Jette et al., 2005).

Jaffe et al. (2004) stated that 60% of the stroke survivors recover independent walking after 3 months, several have continuing problem with mobility due to impaired balance, motor weakness and decreased walking velocities.

Viosca et al. (2005) showed that post-stroke walking recovery was observed throughout the first year after a stroke.

Walking ability is an important element for independent post stroke patients (Bang et al., 2014). Self-paced gait speed is the most common outcome measure for gait training strategies and reflects the ability to transport the body from one place to another in a time (Eng el al., 2007).

Walking ability improvement is one of the highest priorities for people living with a stroke. Gait retraining through different types of exercise is the most common approach to improving walking ability. Intensive mobility training which incorporates functional strengthening, balance and aerobic exercises and practice on a variety of walking tasks improves gait ability both in sub-acute and chronic stroke patients (Eng et al., 2007).

Lower-limb strengthening alone failed to show significant effects on gait speed and walking distance (Van de Port et al., 2008).

In the study, Peurala et al. (2005) all patients over 6 months post stroke, improved their motor performance during the 3-week gait-oriented rehabilitation. They also said that the gait speed, dynamic balance, and motor task performance improved irrespectively.
The physiotherapist plays a major role in the physical management of stroke using skills acquired during education and professional development, to identify and manage problems of stroke using scientific principles (Carr & Shephered, 2003).The physiotherapist is able to identify and measure the disorders of movement and to design, implement and evaluate appropriate therapeutic strategies. This process includes dealing with the social and psychological factors which affect the stroke patient. Stroke is one of the major causes of morbidity, mortality and a socioeconomic challenge. This is obviously true for developing countries like Bangladesh, where health support system especially the rehabilitation system is poor and beyond reach from general people (Hossain et al., 2011).

In several prospective cohort studies, showed that approximately 85% of patients regain gait by 6 months who have had a stroke. And about 20% of all stroke survivors

show significant abnormality in mobility status between 1 and 3 years after stroke (Wevers et al., 2011). After stroke, between 52% and 85% of patients re-gain the capacity to walk but their have some abnormality in walking pattern and different from that of healthy subjects (Pradon et al., 2013). Improved walking ability is always associated with improved motor control of the paretic lower limb. It also associated with the development of compensation movement strategies and improved coping with loss of function in enhancing the ability to maintain balance over the non-paretic lower limb (Outermans et al., 2010).

Gait training or improving walking ability has been considered to be one of the most important goals for rehabilitation of stroke patients. In acute stage the physical therapy intervention in the walking training is generally recognized as beneficial in the treatment of the patient with stroke. But it is important what type of physiotherapy intervention has been given to the stroke patient. Most of the time emphasis give in training for independent walking has included weight bearing exercise, balance and co-ordination exercise (Nilsson et al., 2001). The physiotherapist plays a major role in the physical management of stroke using skills acquired during education and professional development, to identify and manage problems of stroke using scientific principles (Carr & Shephered., 2003).

Assessing recovery after stroke is critical to treatment and research. In spite of severe disabilities and neurological impairments in the post-stroke period, most stroke patients attain some degree of recovery over time. some stroke patients show early recovery of motor function, occurring primarily during the first few months. While the degree of paralysis is a primary predictor but cannot be used to exactly predict the rate of motor recovery through the sub acute phase Managing acute stroke in low resource settings requires a novel approach, one that could restart the original WHO global stroke initiative,. (Lee et al., 2015).

Prevention is the primary treatment strategy aimed at reducing the morbidity and

mortality related to stroke, and adequate treatment, control of risk factors, and lifestyle changes can prevent up to 50% of strokes. Primary prevention aims to reduce the risk of stroke in asymptomatic subjects. It is focused on identifying and managing known vascular risk factors, such as arterial hypertension, disorders of lipid metabolism, and diabetes mellitus, and non-drug strategies and lifestyle changes, including quitting smoking, limiting alcohol consumption, reducing elevated body weight, increasing regular aerobic physical activity, and adopting a healthy diet with more fruit and vegetables and less salt (Polivica et al., 2014).

Hypertension is the risk factor that most significantly correlates with stroke and plays a role in more than 50% of episodes of stroke worldwide. High blood pressure can lead to occlusive stroke, as well as intracerebral or subarachnoid hemorrhage, and correlates with the risk of first-ever stroke and recurrent stroke. A summary of the recent clinical trial data confirms that antihypertensive therapy substantially reduces the risk of any type of stroke, as well as stroke-related death and disability (Gaciong et al., 2013).

For secondary stroke prevention, aimed at reducing the risk of another stroke, identification of the etiologic mechanism of the initial stroke and the presence of any additional risk factors is most important. It consists of optimal treatment of vascular risk factors (arterial hypertension, hyperlipidemia, diabetes mellitus, and cardiac disease), administering antiplatelet or anticoagulant therapy, and if indicated, invasive surgical or endovascular therapeutic procedures. An integral part of this is lifestyle changes, emphasizing regular physical activity, a diet low in salt and saturated fat and high in fruit and vegetables, reducing overweight, and quitting smoking and heavy use of alcohol. Adequate longterm secondary prevention was associated with a reduced risk of death and recurrent stroke and improved outcome in routine settings (Palnum et al., 2012).

CHAPTER III METHODOLOGY

This research was an experimental design to evaluate the effectiveness of Physio-ball with bed exercises to improve gait of stroke patient. To identify the effectiveness of this treatment protocol, 10 Meter Walk Test (MWT) and 6 minutes walk test is used as measurement tools for measuring the improvement of gait of stroke patient.

3.1 Study design:

Here Quasi-experimental quantitative design was used for the study design. this study included the single group under the pre-test and post-test design because here the one 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.

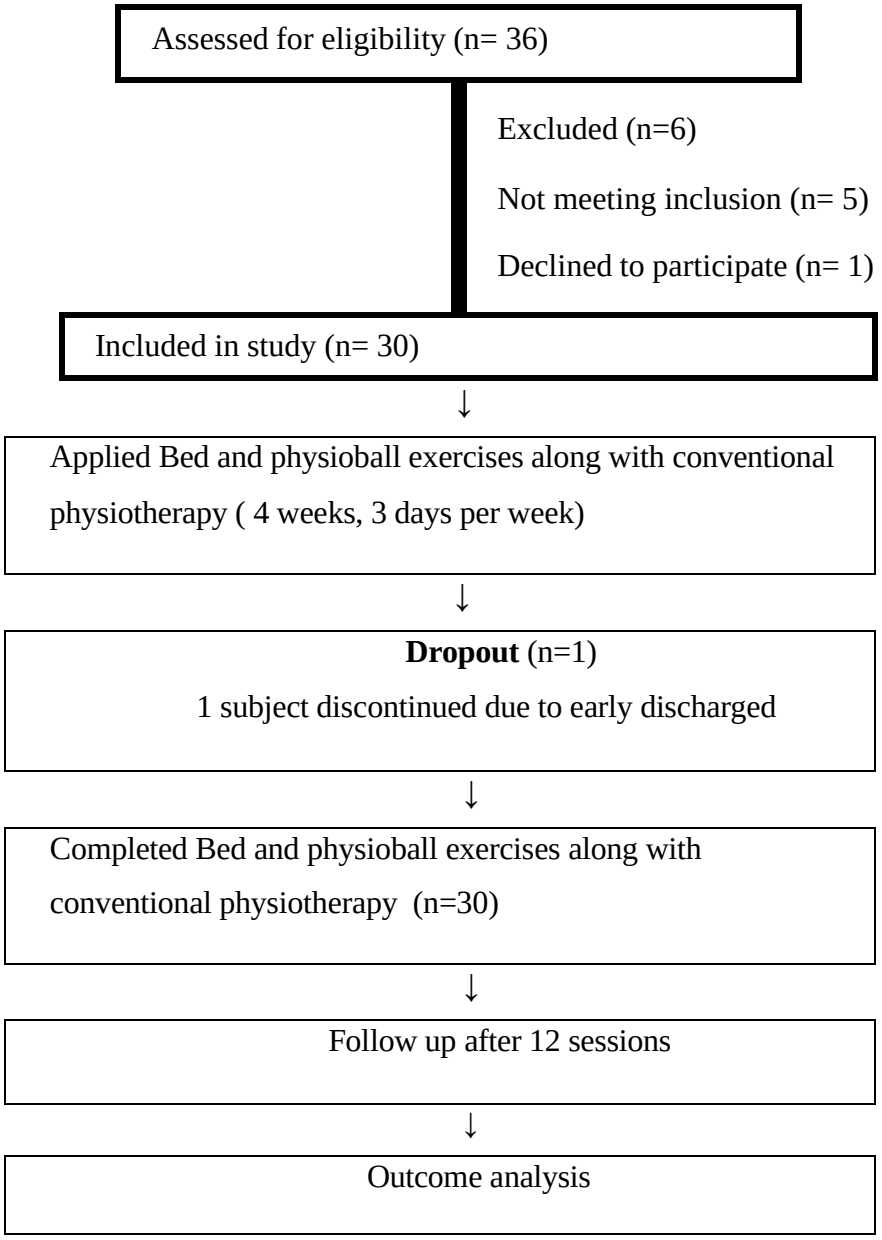
Quasi-experimental design differs from a true experimental design in that, although it contains an independent variable that is manipulated in order to look for an effect on a dependent variable, either control group or randomization is lacking. A pre-test (before intervention) and post-test (after intervention) were administered with each subject of the selected group to compare the walking ability of the stroke survivors before and after the treatment.

Quasi-experimental design (Pre test-Post test):

The Pretest-Posttest design is valuable in describing what occurs after the introduction of the independent variable.

This design can answer questions about change over time in that the pretest is given before the introduction of the independent variable. If the subject walking ability of stroke survivors are tested before the intervention, a change in scores on the dependent variable can be reported but cannot be attributed to the influence of the independent variable.

3.2 CONSORT Framework



3.3 Study area:

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

3.4 Study Population:

A population refers to the entire group of people that meet the criteria set by the researcher. The populations of this study were the stroke patients being treated at CRP.

3.5 Duration of data collection:

Data was collected carefully and confidentially and maintained all ethical considerations. The researcher gave each participants a particular time to collect the data. Data was collected from May 2023 to July 2023.

3.6 Sample selection:

In this study, subjects who fulfill the inclusion criteria are selected as sample 31 patients with stroke were selected from outdoor Neurology and Stroke Rehabilitation Unit, Department of Physiotherapy, CRP, Savar and then 31 patients with stroke assigned to bed and physioball exercises group by the physiotherapist. The study was a single blinded study. The samples were given a numerical number of 1,2, 3. Total of 31 samples were included in this study in one group to conduct the study. Meanwhile, one (1) patient were dropped out from the study. Finally, study was conducted with 30 patients.

3.7 Sample Size.

The equation of the sample size calculation is given below:

$$n=\left(\frac{Z\left(1-\frac{a}{2}\right)}{d}\right)^2 \text{ x } pq$$

Here,

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

p=The reported prevalence of stroke in Bangladesh is 1.1% (Mondal et. al., 2021)
q=1-p

Then calculation is-

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

=16.72

So, effective sample size is 16.72

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

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

= 18.19 =19

According to this equation the sample should be 19.

3.8 Inclusion criteria:

- More than 6-month post stroke (Sharma & Kaur,2017).
- Age 30-70 years (Dhawale et al.,2018).
- Patients including both the male and female (Dhawale et al., 2018).
- Both Ischemic and hammorhagic stroke patients are included (Sharma & Kaur,2017).
- First onset of unilateral stroke resulting in hemiplegic as diagnosed by a medical physician (Onwudiwe et al., 2018).
- Independent gait ability with or without walking aid for a minimum of 10m. (Sharma & Kaur, 2017)
- The capacity to understand and following structions (Chung et al., 2013).
- Adequate vision and hearing for completion of the study protocol (Chung et al.,2013).

3.9 Exclusion Criteria:

- A history of previous stroke or other neurologic diseases or disorders (Chung et al., 2013).
- Patients with pusher syndrome (Chungetal., 2013).
- Any co morbidity or disability other than stroke that precluded gait training (Onwudiwe et al., 2018).
- Subjects who could not communicate with therapists as a consequence of severe aphasia or cognitive impairment (Ko et al., 2016).
- Fracture (Onwudiweetal., 2018).
- Participants with, severe spasticity or severe flaccidity in lower limbs and upper limbs were excluded (Sharma & Kaur., 2017)

3.10 Method of data collection:

3.10.1 Data collection tools:

- Data collection form
- Consent Form
- Structured questionnaire
- Stop Watch, meter scale
- Pen, Papers, Pencil

3.10.2 Questionnaire:

The questionnaire was developed under the advice and permission of the supervisor following certain guidelines structured close ended questionnaire was used for data collection. To evaluate the walking ability of stroke patient 10 Meter Walk Test (MWT) and 6 minute walk test was used.

3.11 Measurement tool:

3.11.1 (10-Meter walk Test):

10m walk test is for the measurement of gait speed performed by the patients
Equipment: Digital stopwatch, masking tape, measurement tape, quiet hallway or open space at least 14 m long.

3.11.2 (6 minute walk test):

Purpose: Measure the response to medical intervention in a patient with
Moderate to severe heart or lung disease
Equipment: Stopwatch, measuring wheel, pulse oximeter

3.12 Data collection procedure:

The data collector fixed a date and time with his available time. Then the outdoor patients at Neurology and Stroke rehabilitation unit was taken purposively for the experiment. At first the data collect or informed the participant about the contents of the consent form and also briefly understand the aims and objectives of the corresponding research project. All participant names coded to maintain confidentiality, diagnosed and referred by qualified physiotherapist and doctor. Each participant received physiotherapy intervention for walking ability of stroke patient.

Participant evaluated by 10-meter walk test , 6 minutes walk test and gait parameter measurement test questionnaire form. The participant received treatment as regular patients in the Neurology and Stroke rehabilitation unit of CRP. They continue their treatment as per their schedule. Each participant received 3 session per week. Treatment program arranged for 4 weeks by the researcher with the permeation from of that unit. Before started the treatment there did the initial assessment where the researcher assessed walking ability of stroke patient that carried out in each area and provides the pretest score. After receiving 3 session per week in around 4 weeks intervention program, researcher was collected subjective and objective information including the gait speed measured by 10-meter walk test , 6 minutes walk test and gait parameter questionnaire form.

The treatment applied by qualified Physiotherapist. And the data collector instructed the appointee about the treatment protocol. During this time, the participants were continued their treatment as per their schedule. The SPSS version 25.0 software was used in performance of statistical analyses for the mean and standard deviation.

3.13 Data analysis procedure:

Data was analyzed with the Statistical Package for Social Science (SPSS) version 25 software, Microsoft Excel and scientific calculator. At first put the name of variables into the variable view of SPSS. Then input the data in data view of SPSS. After input all data researcher checked the inputted data to ensure that there was no missing data and all data had been accurately copied from the questionnaire sheet to SPSS data view. Then analyzed data in SPSS for result making. By the normality test it was found that the data was not normally distributed. So result was made by Wilcoxon Test was performed for finding result. Data was presented by using the bar graph, pie chart and table.

Wilcoxon Test:

This test is also known as ‘’Wilcoxon matched pair signed rank test’’ which is an alternative to the paired t test. when the data is not normally distributed then Wilcoxon test is required. When there are just two measures to be compared from the same case, and the data are normally distributed or the sample size is large, we apply a paired samples t test (also known as a related sample t test)

Wilcoxon Test for large sample (n>25)

In case of large sample size,ranks are assumed to be normally distributed. In this case, T is replaced by Z static given as

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

Here,

n= number of pairs where differences is not 0

Ws = smallest of absolute value of the sum

Z= value of wilcoxon matched pair signed rank test

3.14 Intervention

At first a common intervention program named conventional physiotherapy was executed for the groups. Conventional physiotherapy treatment for patients with stroke followed by different manual therapy along with home advices are practiced in clinical Department of Physiotherapy. The interventional procedure (treatment Strategy) depends on patient's condition and disease progress. Researcher collected opinion from staffs at least designated as Clinical Physiotherapist. They regarded conventional Physiotherapy as followings:

a) Positioning with postural correction

b) Functional activity

c) Neural connectivity exercise

d) Active facilitatory ROM exercise

e) Stretching for U/L and L/L-slow passive stretching

f) Co-ordination practice-Frenkel's exercise

g) Weight shifting

h) Weight bearing

i) Trunk mobilization exercise with or without physio ball

j) Balance training both static and dynamic

k) Bed mobility

l) Strengthening program (Isometric & Isotonic)

m) Gait re-education

- Side to side walking
- Backward walking
- Box walking
- Heel walking

- Toe walking Parallel bar walking
- Straight line walking

n) Proprioceptive exercise

o) Trunk control exercise

p) Soft tissue mobilization

q) Parallel bar walking

r) Transitional movement Practice

Then the trial group treated with core muscle strengthening exercise along with conventional physiotherapy. Clinical physiotherapist applied the core muscle strengthening exercises on each subject of the group and they will get 3 session per week, total 12 sessions of treatment within 4 weeks. It comprised with components: bed exercises and physio-ball exercises in each exercise, position was continued for 7 seconds followed by 10 repetition with 2 sets. The rest interval between sets was 60 seconds (Onwudiwe et al., 2018). Exercise was done by the capability of the patient's performance and frequency was increased by the session progression.

Table 1: Bed and physio-ball exercise treatment protocol:

Category	Exercise	Duration/repetition
Bed exercise	Bridging exercise	10reps× 7secholds ×2set
	Bridging exercise with leg cross	10reps× 7secholds ×2set
	Bridging exercise with one leg raise	10reps× 7secholds ×2set
	curl-ups with straight reaching	10reps× 7secholds ×2set
	curl-ups with diagonal reaching	10reps× 7secholds ×2set
	Bird dog exercise	10reps× 7secholds ×2set
	Side bridge exercise	10reps× 7secholds ×2set
	Curls up with arm cross	10reps× 7secholds ×2set
Physio-ball exercise	Bridge-up	10reps× 7secholds ×2set
	Push-up	10reps× 7secholds ×2set
	Bridging exercise	10reps× 7secholds ×2set
	Bird dog exercise	10reps× 7secholds ×2set

Bridging exercise raise

Bridging exercise with leg cross

Bridging exercise with one leg

Curl up with straight reaching cross

Curl up with diagonal reaching

Curls up with arm

Side bridge exercise

Bird dog exercise

Push-up

Bridging exercise exercise

Bridge-up

Bird dog

Figure 1: Bed and Physio-ball exercise

Significant level:

In order to find out the significance of the study, the "p" value was calculated. The p values refer to the probability of the results for experimental study. The word probability refers to the accuracy of the findings. A p value is called level of significance for an experiment and a p value of <0.05 was accepted as significant result for health service research. If the p value is equal or smaller than the significant level, the results are said to be significant.

Ethical consideration:

At first Research proposal was submitted for approval to the administrative bodies of ethical committee of CRP. Again, before beginning the data collection, researcher obtained the permission from the concerned authorities for smooth access to data collection with insurance of patient's safety. In order to eliminate ethical claims, the participants were set free to receive treatment for other purposes as usual. Each participant was informed about the study before beginning and given written consent. The researcher received verbal and signed an informed consent form to participate in this study from every subject. The participants were informed that they were completely free to decline to answer any question during the study and were free to withdraw their consent and terminate participation at any time. If the patient wants to withdraw herself from the study, it would not affect their treatment in the physiotherapy department and they would still get the same facilities. Bangladesh Medical Research Council (BMRC) guideline and World Health Organization (WHO) Research guideline was followed by the researcher.

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 with draw their consent and terminate participation at anytime.

CHAPTER-IV	RESULTS

Socio demographic information

Age range of the participant

Among the 30 participants age ranges were distributed into 4 categories including 30-40 years were (n=7) 23.%, 41-50 years were (n=6) 20%, 51-60 years were (n=9) 30%, 61-70 years were (n=8) 27%.

Here mean age was 51.17 years, maximum age 70 years and minimum age was 30 years

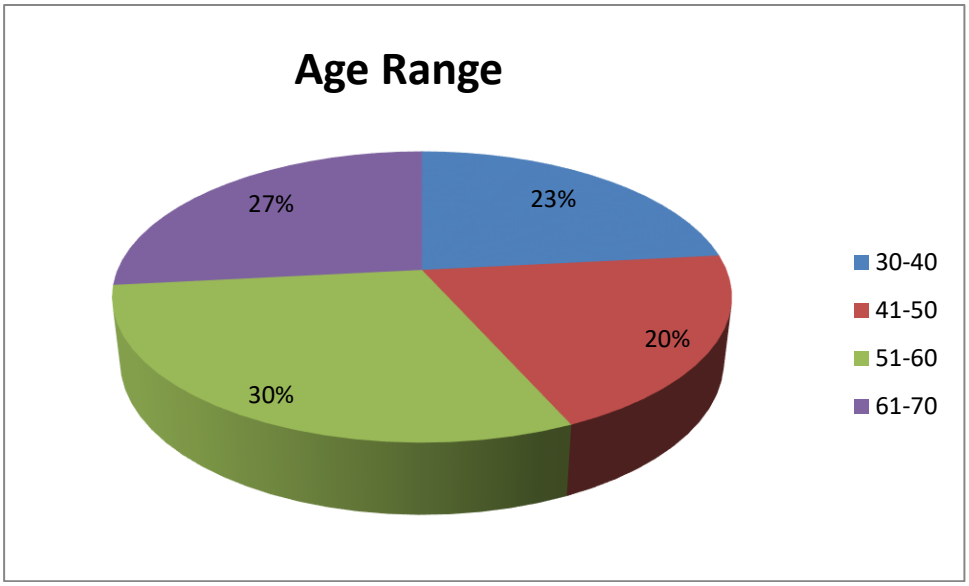


Figure-2: Age range of participant

Gender distribution among the participant

In the study 30 participants were selected as sample,in between them n=23 participants were male and n=7 participants were female. In percentage male participants were 76.67 % and female participants were 23.33%

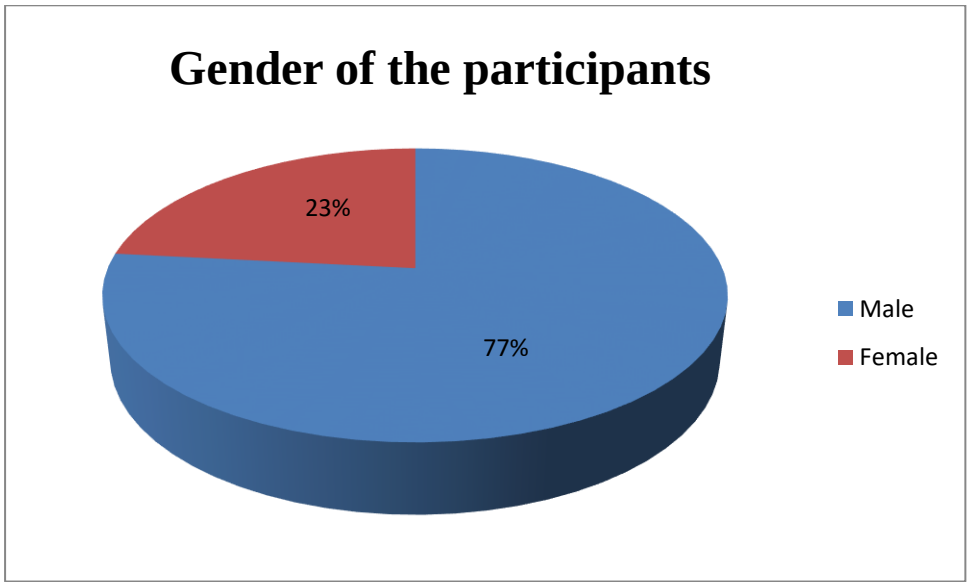


Figure 3: Gender distribution among participants

Weight range among the participants

From the study it was founded that the mean weight of the participants was kg.

There were n=14 (46.7%) in between 51-60 kg, n=11 (36.7%) was 61-70 kg and n=5 (16.7%) was 71-80 kg

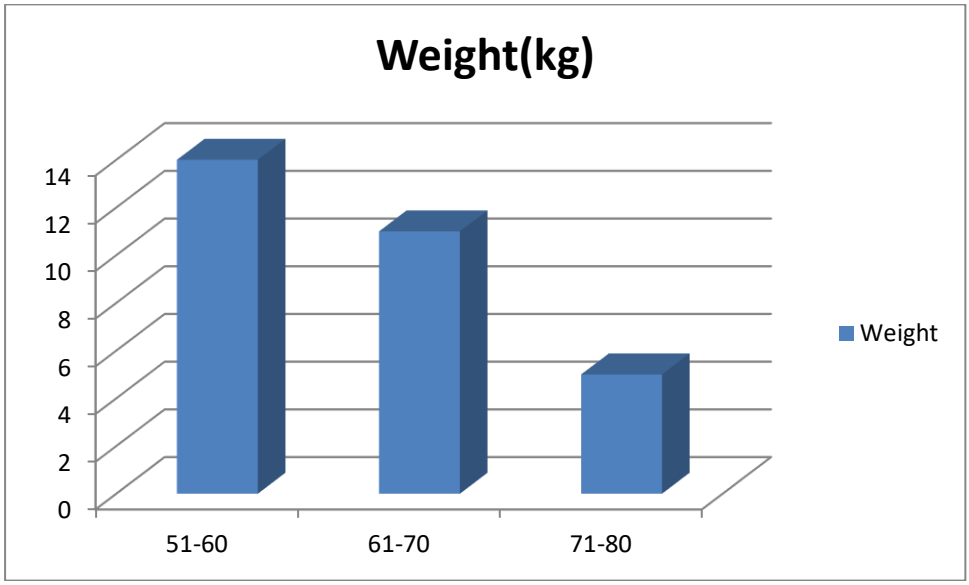


Figure 4: Weight range among the participants

Affected side:

In this study 30 participants were included. Among them n=17 participants have right side involvement and n=13 have left side. In percentage 56.7% have right side affected and 43.33% have left side affected.

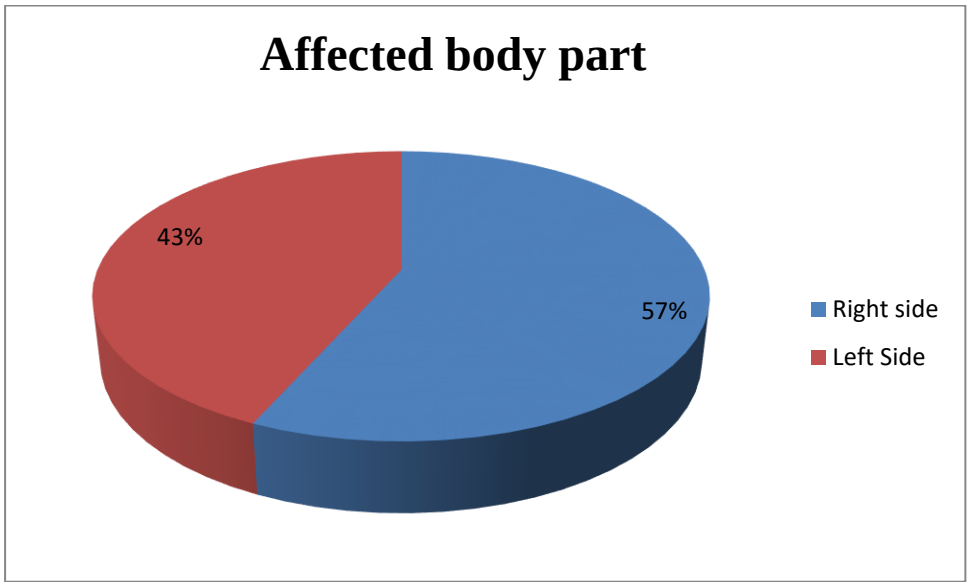


Figure 5: Affected side

Duration of incidence:

As sample 30 participants were included in this study. Among them (n=20) participants were 6-9 month post-stroke, (n=7) participants were 10-12 month post-stroke, (n=1) participants were 1-2 years post-stroke, (n=2) participants were 2-3 years post-stroke

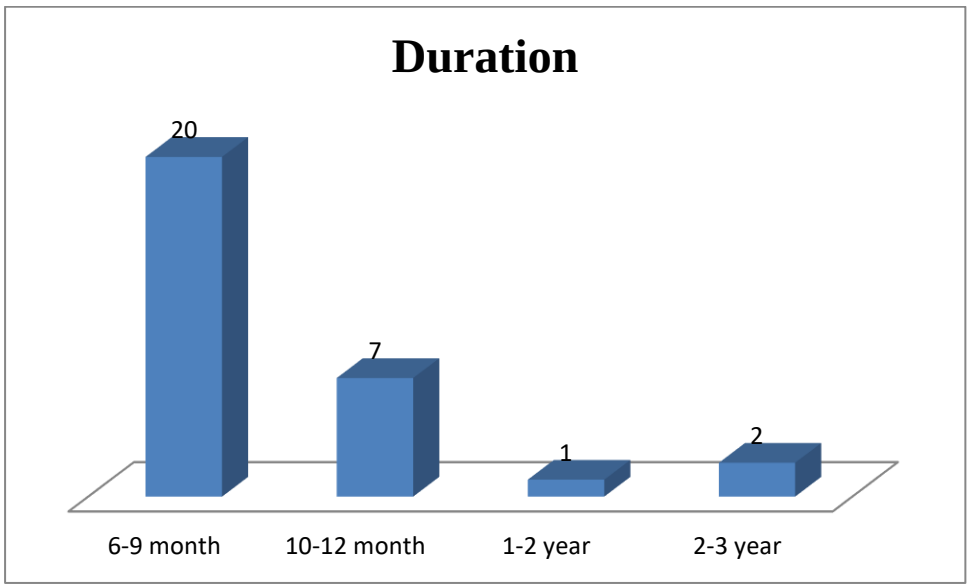


Figure 6 : Duration of incidence of stroke

Occupation

Among all the 30 participants (n=5) were housewife, (n=8) were businessman, (n=13) were service holder, (n=4) were others. In percentage housewife were 16.7 %, businessman were 26.7%, service holder were 43.3% and others were 13.3%.

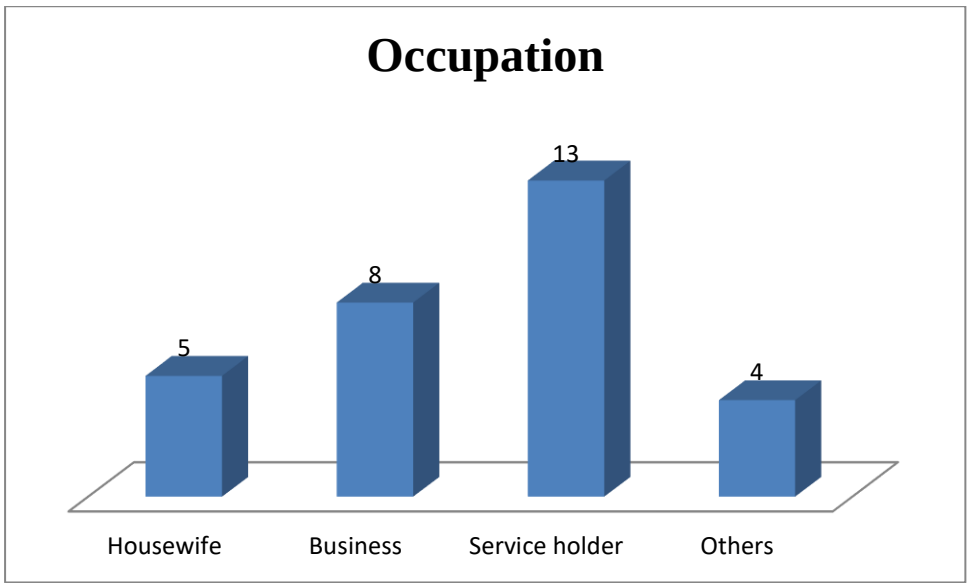


Figure 7 : Occupation of the participants

Educational level:

Among 30 participant n=4 (13.3%) was illiterate, n=4 (13.3%) was primary,n=8 (26.7%) was SSC, n=6 (20%) was HSC, n=5 (16.7%) was graduate, n=3 (10%) was masters and above.

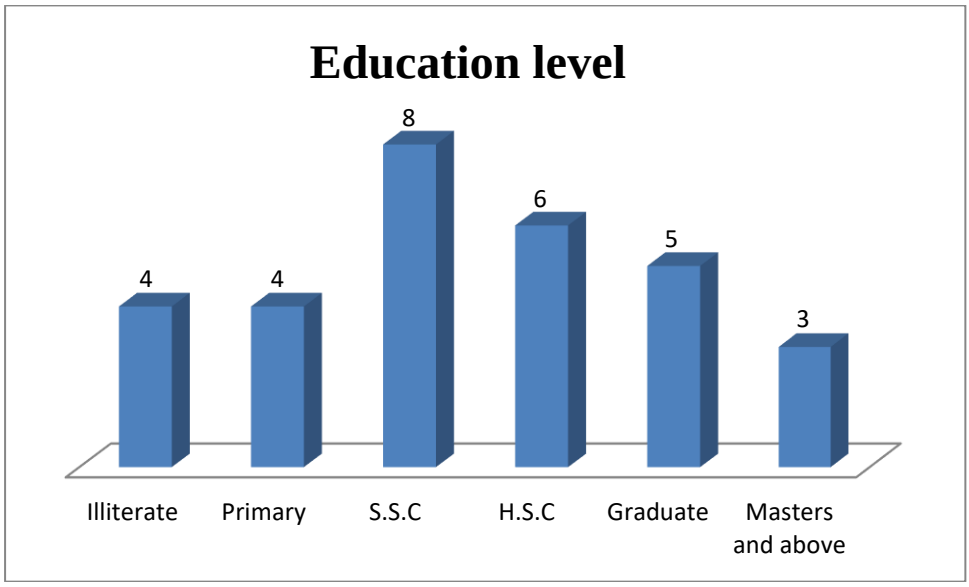


Figure 8: Educational level of participants

Living area:

30 participant were included in this study. Among them 70% (n=21) are living in rural area, 23.3 % (n=7) living in urban area and 6.67% (n=2) living in semi urban area.

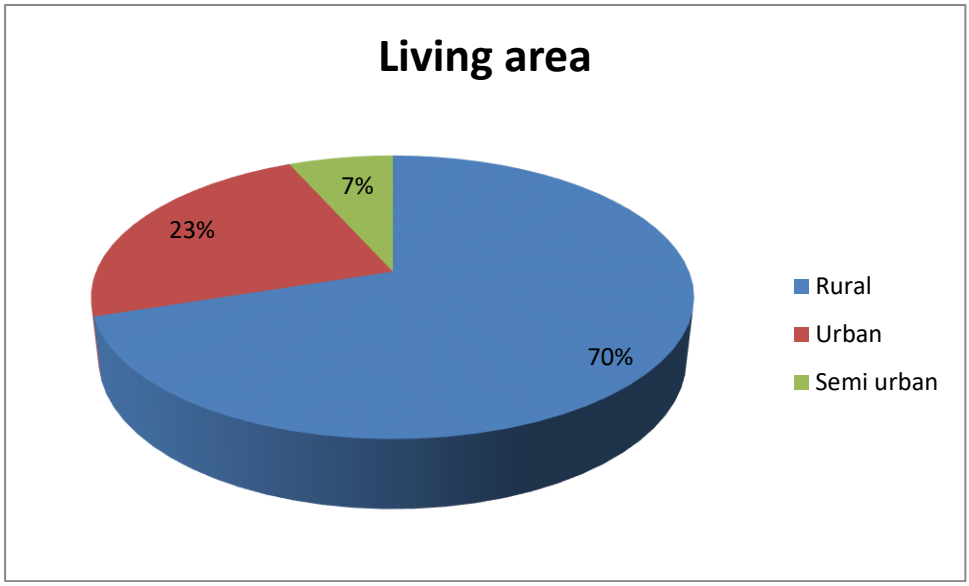


Figure 9 : Living area of participants

Table 2: Percentage of Hypertension, Diabetes mellitus, Personal habit of participants

Variable	Present (n)	Percentage %	Absent (n)	Percentage %
Hypertension	28	93.3	2	6.7
Diabetes mellitus	15	50	15	50
Personal habit (smoking/betel leaf)	10	33.3	20	66.7

From the table we have found that among 30 participants n=28 (93.3%) has hypertension and n=2 (6.7%) has no hypertension. Diabetes mellitus have present in n=15 (50%) and n=15 (50%) have no diabetes mellitus. In between 30 participant n=10 (33.3%) has personal habit and n=20 (66.7 %) has no personal habit.

Physiotherapy treatment received before conducting:

Among 30 participant of the stroke patient, 13.33% (n=4) received 5-6 session, 30% (n=9) received 7-8 session, 26.67% (n=8) received 9-10 session and 30% (n=9) received >10 session of physiotherapy before conducting.

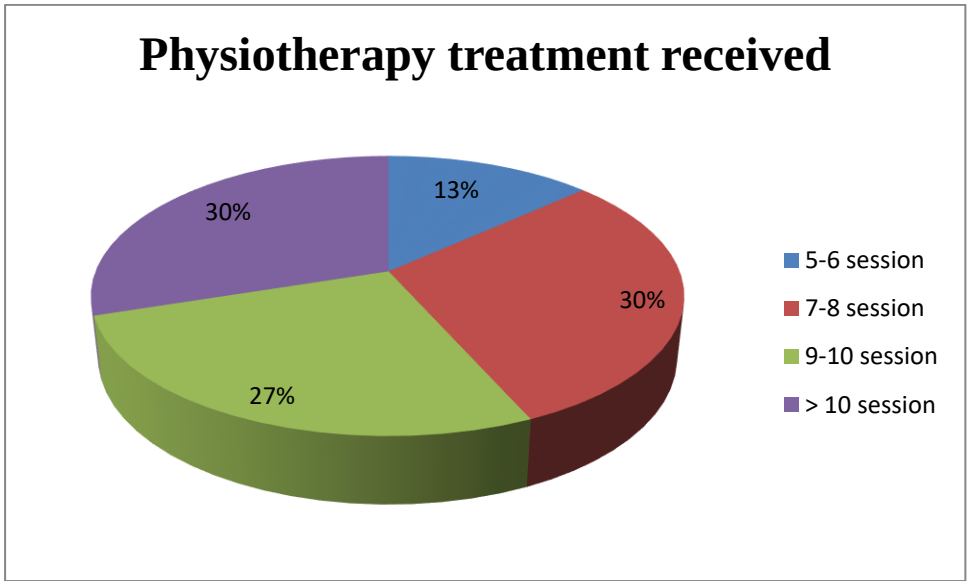


Figure 10 : Physiotherapy treatment received before conducting

Measurement of 10 meter walk test (MWT) comparison using Wilcoxon Signed Rank test within the trail group:

Table 3: Rank and test statistics of 10 meter walk test of stroke patient within the trail group

Measure of (10) MWT (pre-test)-(post-test)	N	Z	P value
Positive rank	0	4.784	0.000
Negative rank	30		
Ties	0		
Total	30		

From this table it was describe that the comparison of the participant's before (pretest) and after (post-test) of 10 Meter Walk Test (MWT) score. The table showed that in the trail group patient have no increase of 10 Meter Walk Test (MWT) score after taking Bed and physio-ball exercise along with Conventional physiotherapy. 30 participants of trial group had higher score in 10 Meter Walk Test (MWT) before the intervention and the score reduced after the application of the bed and physio-ball exercise along with conventional physiotherapy. Moreover, table indicate that no participant's score remained same as pretest score of 10 (MWT).

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 walking ability in 10 (MWT) ($Z=4.784$ $P=0.000^*$). Where 0.000 is less than 0.05 ($P<0.05$) which indicated that it was significant among 30 participants. Moreover, $Z=4.784$ which is greater than 1.96 ($Z>1.96$), so null hypothesis rejected and alternative hypothesis accepted. Therefore, it can be said that Bed and physio-ball exercise along with conventional physiotherapy can improve gait of stroke patient.

Table 4: Mean score of 10- meter walk test (MWT) in second in a trial group:

10 Meter Walk Test (sec)	Mean
Pre-test	41.11 sec
Post-test	29.80 sec
Mean difference = 11.31 sec	

In this study 30 participants were included.10 Meter Walk Test is a measurement tool to measure the gait of stroke patient. In above pre-test mean score was 41.11 sec and post-test mean score was 29.80 sec. The difference between mean was 11,31 sec. For this sample it may interpreted that post-test time is less than pre-test time. It indicated that, the required 11.3 sec less time than pre-test.

Table 5: Mean score of 10- meter walk test (MWT) in meter/ second in a trial group:

10 Meter Walk Test (sec)	Mean
Pre-test	0.24 m/s
Post-test	0.33 m/s
Mean difference = .9 m/s	

In above pre-test mean score was .24 m/s and post-test mean score was .33 m/s. The difference between mean was .9 m/s. This table indicated that meter was increased by walking when time was decreased from pre-test to post-test.

Measurement of 6 minute walk test (MWT) comparison using Wilcoxon Signed Rank test within the trail group:

Table 6: Rank and test statistics of 6 minute walk test of stroke patient within the trail group

Measure of (6) MWT (pre-test)-(post-test)	N	Z	P value
Positive rank	30	4.783	0.000
Negative rank	0		
Ties	0		
Total	30		

From this table it was describe that the comparison of the participant's before (pretest) and after (post-test) of 6 Minute Walk Test (MWT) score. The table showed that in the trail group patient have no increase of 6 Minute Walk Test (MWT) score after taking Bed and physio-ball exercise along with Conventional physiotherapy. 30 participants of trial group had higher score in 6 Minute Walk Test (MWT) before the intervention and the score reduced after the application of the bed and physio-ball exercise along with conventional physiotherapy. Moreover, table indicate that no participant's score remained same as pretest score of 6 (MWT).

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 walking ability in 10 (MWT) ($Z=4.783$ $P=0.000^*$). Where 0.000 is less than 0.05 ($P<0.05$) which indicated that it was significant among 30 participants. Moreover, $Z=4.784$ which is greater than 1.96 ($Z>1.96$), so null hypothesis rejected and alternative hypothesis accepted. Therefore, it can be said that Bed and physio-ball exercise along with conventional physiotherapy can improve gait of stroke patient.

Table 7: Mean score of 6 minute walk test (MWT) in meter in a trial group:

6 minute Walk Test (sec)	Mean
Pre-test	95.14 meter
Post-test	134.17 meter
Mean difference = 39.03 meter	

In this study 30 participants were included. 6 Minute Walk Test is a measurement tool to measure the gait of stroke patient. In above pre-test mean score was 95.14 meter and post-test mean score was 134.17 meter. The difference between mean was 39.09 meter. For this sample it may interpreted that post-test time is less than pre-test time.

Table 8: Mean score of 6 minute walk test (MWT) in meter/ second in a trial group:

6 minute walk test	Mean
Pre-test	0.26 m/s
Post-test	0.37 m/s
Mean difference = .11 m/s	

In above pre-test mean score was .26 m/s and post-test mean score was .37 m/s. The difference between mean was .11 m/s. This table indicated that meter was increased by walking when time was decreased from pre-test to post-test.

CHAPTER-V DISCUSSION

The purpose of This study was to determine the effectiveness of physio-ball with bed exercise to improve gait of stroke patient. As post injury symptoms, stroke patients have some deficits as post injury symptoms like decreased motor control, difficulty with co-ordination, balance problem and abnormal gait (Chung et al., 2013). In this experimental study 30 patients with stroke were enrolled who received specific physiotherapy intervention. They 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 functional outcome of walking ability or gait was measured by 10-MWT and 6-MWT test. Many walking tests are available to assess walking ability in stroke survivors. (Sharma & Kaur, 2017) used Wisconsin Gait Scale (WGS) to evaluate gait quality of individuals after stroke with hemiplegia. Walking speed, walking distance ,step length, stride length, cadence measurement is more valid for measuring gait ability. Gait speed was measured by 10-m walk test (10-MWT). In previous study researcher used 10 Meter Walk Test (MWT) and 6 minute walk test to measure walking ability or gait of stroke survivors (Lee et al., 2018).

Age was one of variable in this study. In a study it is showed that 38-47 years were 18.8%, 48-57years were 37.5%, 58-67 years were 33.3%, 68-77 years were 10.4% (Onwudiwe et al., 2018). In this study it was found that between participants the age distribution was 30-40 years were 23%, 41-50 years were 20%, 51-60 years were 30%. And 61-70 years were 27%. The mean age was 51.17 years , maximum age was 70 years and minimum age was 30 years.

It was also be found that among all the participants almost (n=23) 76.7 % of them were male and n=7 (23.3%) of them were female. In other study (n=30) 62.5% male and (n=18) 37.5% were female (Onwudiwe et al., 2018).

Among 30 participants about 56.67% of patients who were affected at the right side where 43.33% affected by left side. So the right side became more affected than the left side. (Sharma & Kaur, 2017) found among 13 participants 61.5% had right side affected and 38.5% had left side affected in the study.

From the study it was founded that 46.7% in between 51-60 kg, 36.7% was 61-70 kg and 16.7% was 71-80 kg. It also found that the mean weight was 63.43 kilograms. In other study showed the mean weight 71.30± 9.23 kg (Sharma & Kaur, 2017). In a study in Bangladesh, 28% participant were service holder, 17% participant were businessman, 16% participant were house wife, (Hossain et al., 2011). In this study, 43.3% were service holder, 26.7% were businessman, 16.7% were housewife, 13.3% were others.

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). In this study among 30 participants, 13.3% was illiterate, 13.3% was primary passed, 26.7% was S.S.C. passed, 20% was H.S.C. passed, 16.7% was graduate, 10% were masters and above.

30 patients with stroke were included as sample of the study, among them almost 70% lived in rural, 23.3% lived in urban and 6.7% lived in semi urban. Other study shows in Bangladesh, 54% participants lived in urban area and 46% participant lived in rural area (Hossain et al, 2011).

From the study among 30 participants (93.3%) has hypertension and (6.7%) has no hypertension. Diabetes mellitus have present in (50%) and Diabetes mellitus absent in (50%). In between 30 participants (33.3%) has personal habit and (66.7%) has no personal habit. Boehme et al. (2017) stated that Hypertension is a particularly important risk factor for hemorrhagic stroke. Another study showed that 63% of the stroke patients were suffering from hypertension, 53% participant were smoker and 21% diabetes militias (Hossain et al., 2011).

In this research mean duration after stroke with standard deviation was 8.61. In another researcher found mean Time since stroke 12.15± 3.89 (Sharma & Kaur, 2017). The study revealed that 13.33% received 5-6 session, 30% patients received 7-8 sessions, 26.67% patient received 9-10 sessions and 30% patient received >10 session physiotherapy treatment. Another study showed that stroke patient received physiotherapy session on average 13.6 days, average number of patients in physical therapy session per day was 1.5 (Jette et al., 2005).

In this study the researcher found that the significant improvement of gait of chronic stroke patients. Here in the trial group, the mean score of 6 minute walk test was 95.14 meter to 134.17 which was decreased and mean difference of was 39.03(p=0.000) meter which indicated the result was significant and improvement of gait of stroke patient. .

In this study researcher also found the means score of 10MWT was 41.11 to 29.80 sec and mean difference was 11 sec (p=0.000)which was significant. Lee et al. (2018) found that the score of 10 MWT was 14.22 to 12.93 and p=0.00(p<0.01) which indicated the result was significant.

Sharma & Kaur, 2017 suggested that core muscle strengthening combined with pelvic PNF was effective for improving trunk impairment, balance and gait of chronic stroke patients. In this study researcher measure the walking ability/gait with Wisconsin Gait Scale (WGS) and found the significant difference (P=0.000).

Chung et al. (2013) reported that bed and physioball exercise training improves the stability of the lower trunk and pelvis, thereby improving static and dynamic balance. They also found that core training improved stride length, cadence, and speed in the stroke participants.

A recent study demonstrated that, diaphragm and deep abdominal muscle exercise program is effective for patients are suffering difficulty in walking ability, balance ability, trunk asymmetry, abnormal alignment, mobility of trunk muscles, power, or endurance (Lee et al., 2018).

In Wilcoxon test for 10 MWT and 6 MWT test, the both results are significant. It indicates that, no participate has experienced increased walking duration after bed and physioball along with conventional physiotherapy. By this test the results were found to be significant in 10 MWT (P=0.000) and 6 MWT test (P=0.000). That actually means, bed and physio-ball is effective on improve gait of of stroke patient.

Limitation of the study:

The study was conducted with 30 patients with stroke, which was a very small number of samples and was not sufficient enough for the study to generalize the wider population of this condition. Due to time limitation the external validity of the study decreased but maintained internal validity during data collection. In this study the participant gets only 4 weeks treatment sessions due to lack of time limitation. In this research the result was significant but if time was increased then result might be same or non-significant. The time was limited and patients were not available who might be fulfill the inclusion criteria. If data was collected from Mirpur or others branch of CRP, result had been more specific. But for time limitation situation Data was collected only from CRP. 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.

CHAPTER-VI CONCLUSION AND RECOMMENDATION

6.1 Conclusion:

The result of this experimental study has recognized that the physio-ball with bed exercise was very effective on gait of stroke patient. It was a Quantitative trial study. The result of the current study indicates that the conventional physiotherapy physioball with bed exercise can be an effective therapeutic approach to improve gait of stroke patient. From this result researcher found the significant changes between pre-test and post-test due 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. With the Improvement of Gait of stroke patients have the opportunities to return normal daily activities and work. Core strengthening 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 physioball with bed exercises along with conventional physiotherapy is effective for stroke patient. Because of some limitation, this study has lack of generalize ability. This study should be expanded to confirm the validity of findings.

6.2 Recommendation:

The aim of the study was to identify the effectiveness of physio-ball with bed exercises of stroke patients in improving gait. But the study had some limitations. So, some steps will be taken for the better success for further study in this study, 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 Physio-ball with bed exercises for more specific result. Double blinding procedure should be maintained. Here researcher used only two measurement tools for walking ability which was not enough, so further study will be needed with more measurement tools.

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APPENDIX

Verbal Consent Form

Title: Effectiveness of physio-ball with bed exercises to improve gait of Stroke patient.

Assalamualaikum\ Namashker,

I am Mohammad Shahinur Islam, 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 "Effectiveness of bed and physioball exercises to improve gait of stroke patient". Through this study I will find Effectiveness of bed exercise and physioball exercise to improve gait of stroke patient. If I can complete the study successfully, the patients may get the benefits of improve neurology outdoor 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 Mohammad Shahinur Islam or supervisor Fabiha Alam, Assistant Professor, Department of Physiotherapy BHPI, CRP, Savar, Dhaka-1343.

Do you have any questions before I start?

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

☐ Yes ☐ No

Signature of the participant & Date.....

Signature of the researcher & Date.....

মৌখিক সম্মতিপত্র

শিরোনামঃ স্টোক রোগীর চলাচলের উন্নতির জন্য বিছানা এবং ফিজিওবল ব্যায়ামের কার্যকারিতা।

আসসালামু আলাইকুম/নমস্কার,

আমি মোহম্মদ শাহিনুর ইসলাম,বাংলাদেশ হেলথ প্রফেশন্স ইনস্টিউট এর বি.এস.সি ইন ফিজিওথেরাপি বিভাগের ৪র্থ বর্ষের শিক্ষার্থী,আমার গবেষনা প্রকল্পটি বাংলাদেশ হেলথ প্রফেশন্স ইনস্টিউট এ পরিচালনা করছি যা আমার ৪র্থ বর্ষ বি.এস.সি. ইন ফিজিওথেরাপি কোর্সের অধিভুক্ত।অংশগ্রহণকারীদেরকে নিম্নলিখিত অংশটুকু পড়ার পর অংশগ্রহণ করার অনুরোধ রইল।

আমি "স্টোক রোগীর চলাচলের উন্নতির জন্য বিছানা এবং ফিজিওবল ব্যায়ামের কার্যকারিতা "এর উপর গবেষনা করছি।এই গবেষনার মাধ্যমে আমি স্টোক রোগীর চলাচলের উন্নতির উপর বিছানা এবং ফিজিওবল ব্যায়ামের কার্যকারিতা খুঁজে পাব।আমি যদি সফলভাবে অধ্যয়নটি সম্পূর্ণ করতে পারি, তাহলে রোগীরা স্নায়ুবিদ্যার আউটডোর ফিজিওথেরাপি পরিষেবার উন্নতির সুবিধা পেতে পারে।আমার গবেষনা প্রকল্প বাস্তবায়ন করতে,আমাকে রোগীদের কাছ থেকে তথ্য সংগ্রহ করতে হবে।অতএব,আপনি আমার অধ্যয়নের জন্য আমার মূল্যবান বিষয় হতে পারেন।

আমি প্রতিশ্রুতিবদ্ধ যে অধ্যয়নটি আপনার কোন ক্ষতি বা ঝুঁকি তৈরি করবে না।কোন দ্বিধা বা ঝুঁকি ছাড়াই যেকোন সময় প্রত্যাহার বা বন্ধ করার পরম অধিকার আপনার আছে।আমি আপনার কাছ থেকে প্রাপ্ত সমস্ত তথ্য গোপন রাখব এবং অংশগ্রহণকারীর ব্যাক্তিগত পরিচয় কোথাও প্রকাশ করা হবে না।

এই অধ্যয়নে অংশগ্রহণকারী হিসেবে যদি আপনার কিছু জনার থাকে তাহলে আপনি আমাকে অথবা/এবং আমার সুপারভাইজার ফাবিহা আলম,সহকারী অধ্যাপক,ফিজিওথেরাপি বিভাগ,বিএইচপিআই,সিআরপি,সাভার,ঢাকা-১৩৪৩ উনার সাথে যোগাযোগ করতে পারেন।

আমি শুরু করার আগে আপনি কি কিছু জানতে চান?

আমি আপনার অনুমতি নিয়ে এই সাক্ষাতকার শুরু করতে পারি?

হ্যা ☐

না ☐

অংশগ্রহণকারীর স্বাক্ষর ও তারিখ.... .....

উপাত্ত সংগ্রহকারীর স্বাক্ষর ও তারিখ.....

গবেষকের স্বাক্ষর ও তারিখ.....

Questionnaire

Title: Effectiveness of physioball with bed exercises to improve gait of stroke patient.

Questionnaire (English)

This questionnaire is developed to assessment of gait of stroke patients and this part will be filled by physiotherapist using a black coloured ball pen.

Part-1: Patient's identification:

a.	Identification number:
b.	Date of interview:
c.	Patient's name:
d.	Address:
e.	Contact number:
f.	Place of data collection:
g.	Consent taken:

Part:2 Socio demographic information (Tick which is appropriate):

a.	Age	.....years
b.	Sex	-Male -Female
c.	What is your marital status?	-Married -Unmarried -Widow -Divorced
d.	Weight	.....Kg
e.	Affected body side	- Right - Left -Both
f.	Occupation	
g.	Type of stroke	-Ischemic -Hemorrhagic
h.	Duration of incidence of stroke	.....months

i.	Did you have hypertension before stroke?	-Yes -No
j.	Do you have diabetes mellitus	-Yes -No
k.	Do you have any carer ?	-Yes -No
l.	What is your educational level?	-Illiterate -Primary -S.S.C -H.S.C -Graduate -Masters and above -Others

m.	Living area	-Rural -Urban -Semi-urban
n.	Personal Habit (Smoking/Betel leaf)	-Yes -No
o.	Family Size	-Nuclear Family -Joint Family
p.	Who is earning member?	-Patient himself/herself -others(specify)
q.	How long you have received physiotherapy treatment?	=1-2 session =3-4 session =5-6 session =7-8 session =8-9 session =>10 session

Part 3- 10-Meter walk Test

10m walk test is for the measurement of gait speed performed by the patients

Equipment: Digital stopwatch, masking tape, measurement tape, quiet hallway or open space at least 14 m long

Note: The participant should be wearing flat shoes orshoes with a heel less than 1⁄2 inch.

1 In a quiet hall way or open space a14 m.Line is drawn with tape at 0,2,12,and14 m.

2. With the participant consent, measure the participant's heart rate and blood pressure. Do not start the test if the participant's blood pressure is 180/100 mm Hg or his or her heart rate is greater than 100 bpm.

3. Give the participant the following information: "You are going to walk a distance of about 40 feet. We will repeat this distance 2 times. Both times will be completed at your comfortable step. Do you have any questions?"

4. Have the participant proceed to the start line (0 m). Before the first trial, tell the participant, "You are going to walk at a comfortable step to the chair. (Use appropriate descriptor of chair/location as needed but do not refer to the tape on the floor.) Continue walking until I saw 'STOP.' The start command will be 'Ready and go.'"

5. When you and the participant are ready, say, "Ready and Go.'" If the participant starts too early, have him or her start again.

6. Start the stopwatch when the participant's first foot crosses the plane of the 2-m line, and stops the stopwatch when the participant's first foot crosses the plane of the 12-m line. Have the participant continue walking until he or she reaches the chair after the 14-m line.

7. Record the time (in seconds to the hundredths) it took for the participant to walk the 10-m distance between the 2-m line and the 12-m line.

8. Have the participant rest, if needed, in the chair at the14-m line.

9. The participant is going to repeat the exact same procedure as described above at a "comfortable step," except he or she will be walking from the 14-m line to the 0-m line. Start the stopwatch at the 12-m line, and stop the stopwatch at the 2m line.

10. Record the time (in seconds to the hundredths) for the second trial at a "comfortable pace." The participant can rest, if needed, in the chair at the 0-m line.

11. Take the average measurement of 1st and 2nd measurement of walking.

12.take the participant's pulse and blood pressure when he or she is sitting in the chair.

10 meter walk test

a. Blood pressure: Date:

b. Heart rate:

c. Measurement of 10-meter walk test:

10 meter walk test (m/s)	Pre-test
1st time walk measurement	
2nd time walk measurement	
Average measurement	

10 meter walk test (m/s)	Post-test
1st time walk measurement	
2nd time walk measurement	
Average measurement	

Part -4 : 6 minute walk test

Purpose: Measure the response to medical intervention in a patient with moderate to severe heart or lung disease.

Equipment: Stopwatch, measuring wheel, pulse oximeter

Procedure:

- Wear clothes and shoes that are comfortable
- You may use your walking aids such as a cane or walker, if needed
- The object of the test is to walk as far as possible for six minutes. You will walk at your normal pace to a chair or cone, and turn around. And you continue to walk back and forth for six minutes
- Let the staff know if you are having chest pain or breathing
- It is acceptable to slow down, count total number of rest or stop. After every minute interval, you will be given an update.
- Record time and distance

6 minute walk test	Pre-test
Number of rest	
1st rest (Distance)	
Total distance	

6 minute walk test	Post-test
Number of rest	
1st rest (Distance)	
Total distance	

প্রশ্নাবলী(বাংলা)

শিরোনামঃ"স্টোক রোগীদের চলনভঙ্গির উন্নতির জন্য বিছানা এবং ফিজিওবল ব্যায়ামের কার্যকারিতা"

এই প্রশ্নপত্রটি স্টোক রোগীদের চলাচলের উন্নতির মূল্যায়নের জন্য তৈরি করা হয়েছে এবং এই অংশটি ফিজিওথেরাপিস্ট একটি কালো রঙের বল কলম ব্যবহার করে পূরন করবেন।

১ম অংশঃ রোগী সনাক্তকরণ :

ক	সনাক্তকরণ নাম্বার:
খ	সাক্ষাতকারের তারিখ:
গ	রোগীর নাম:
ঘ	ঠিকানা:
ঙ	মোবাইল নাম্বার:
চ	তথ্য সংগ্রহের স্থান:
ছ	সম্মতি নেয়া হয়েছে:

২য় অংশঃ আর্থসামাজিক-বৈষয়িক তথ্যাবলী(কোনটি উপযুক্ত তা টিক দিন):

১.	বয়স	.....বছর
২.	লিঙ্গ	-পুরুষ -মহিলা
৩.	বৈবাহিক অবস্থা	-বিবাহিত -অবিবাহিত -বিধবা -তালাকপ্রাপ্ত

৪.	ওজন	.....কেজি
৫.	শরিরের আক্রান্ত অংশ	-ডান -বাম -উভয়েই
৬.	স্ট্রোক এর ধরণ	-ইস্কেমিক -হ্যামরহেজিক
৭.	স্টোকের ঘটনার সময়কাল	.....মাস
৮.	স্টোকের পূর্বে আপনার কি হাইপারটেনশন ছিল?	-হ্যা -না
৯.	আপনার কি ডায়াবেটিস আছে?	-হ্যা -না
১০.	আপনার কি সাহায্যকারী আছে?	-হ্যা -না
১১.	পেশা	
১২.	আপনার শিক্ষাগত যোগ্যতা কী?	--কোন প্রাতিষ্ঠানিক শিক্ষা নেই -প্রাথমিক শিক্ষা --মাধ্যমিক শিক্ষা -উচ্চ মাধ্যমিক শিক্ষা -স্নাতক -স্নাতকোত্তর -অন্যান্য

১৩.	বসবাসের জায়গা	-গ্রাম -শহর -উপশহর
১৪.	ব্যাক্তিগত অভ্যাস (সিগারেট /পান)	-হ্যা -না
১৫.	পরিবারের ধরন	একান্নবর্তী পরিবার যৌগ পরিবার
১৬.	উপার্জনকারী ব্যাক্তি কে?	-রোগী নিজেই -অন্যান্য
১৭.	আপনি কতদিন ধরে ফিজিওথেরাপি চিকিৎসা নিয়েছেন	১-২ সেশন ৩-৪ সেশন ৫-৬ সেশন ৭-৮ সেশন ৯- ১০ সেশন

১ম অংশঃ হাঁটার পরিমাপ

১০ মিটার ওয়াক টেস্ট

১ রক্ত চাপঃ তারিখঃ.

২. হৃদ কম্পনঃ

৩. ১০-মিটার ওয়াক টেস্ট পরিমাপঃ

১০ মিটার ওয়াক টেস্ট(মিটার/সেকেনড)	প্রাক- পরীক্ষা
১ ম সময় হাঁটার পরিমাপ	
২য় সময় হাঁটার পরিমাপ	
গড় পরিমাপ	

১০ মিটার ওয়াক টেস্ট(মিটার/সেকেনড)	পোস্ট- পরীক্ষা
১ ম সময় হাঁটার পরিমাপ	
২য় সময় হাঁটার পরিমাপ	
গড় পরিমাপ	

২য় অংশঃ

৬ মিনিট হাঁটার পরীক্ষা

উদ্দেশ্য: মাঝারি থেকে গুরুতর হার্ট বা ফুসফুসের রোগে আক্রান্ত রোগীর চিকিৎসা হস্তক্ষেপের প্রতিক্রিয়া পরিমাপ করুন।

সরঞ্জাম: স্টপওয়াচ, মাপার চাকা, পালস অক্সিমিটার

পদ্ধতি:

- আরামদায়ক পোশাক এবং জুতা পরুন
- প্রয়োজনে আপনি আপনার হাঁটার সাহায্য যেমন বেত বা ওয়াকার ব্যবহার করতে পারেন

- পরীক্ষার উদ্দেশ্য হল ছয় মিনিটের জন্য যতটা সম্ভব হাঁটা। আপনি আপনার স্বাভাবিক গতিতে একটি চেয়ার বা শঙ্কুতে হাঁটবেন এবং ঘুরে যাবেন। এবং আপনি ছয় মিনিটের জন্য পিছনে পিছনে হাঁটা
- অবিরত আপনার বুকে ব্যথা বা শ্বাসকষ্ট হচ্ছে কিনা তা কর্মীদের জানান
- এটি ধীর করা, বিশ্রাম বা থামার মোট সংখ্যা গণনা করা গ্রহণযোগ্য। প্রতি মিনিটের ব্যবধানের পরে, আপনাকে একটি আপডেট দেওয়া হবে
- সময় এবং দূরত্ব রেকর্ড করুন

	প্রাক-পরীক্ষা
বিশ্রাম এর পরিমান	
১ম বিশ্রাম (দুরত্ব)	
মোট দূরত্ব	

	পোস্ট-পরীক্ষা
বিশ্রাম এর পরিমান	
১ম বিশ্রাম (দুরত্ব)	
মোট দূরত্ব	

PERMISSION LETTER

Date: 18 March, 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 Mohammad Shahinur Islam, a student of 4th year B. Sc. in Physiotherapy at Bangladesh Health Professions Institute (BHPI). The Ethical Committee has approved my research project entitled: **"Effectiveness of bed and physioball exercises to improve gait of stroke patient."** under the supervision of Fabiha Alam, Assistant professor, Department of Physiotherapy, 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 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

Mohammad Shahinur Islam

Mohammad Shahinur Islam

4th professional B.Sc. in Physiotherapy

Roll: 04, Session: 2017-18, ID:112170409

BHPI, CRP, Savar, Dhaka-1343, Bangladesh

Forward
20.03.23

Recommended
Shofiq
20.03.23
Md. Shofiqul Islam
Associate Professor & Head
Department of Physiotherapy
Bangladesh Health Professions Institute (BHPI)
CRP, Chapain, Savar, Dhaka-1343

Approved
23/03/23

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

Institutional Review Board (IRB)

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

Ref: CRP/BHPI/IRB/03/2023/685 Date: 13/03/2023

To
Mohammad Shahinur Islam
B.Sc. in Physiotherapy,
Session: 2017-2018, DU Reg. No: 8623
BHPI, CRP, Savar, Dhaka- 1343, Bangladesh

Subject: Approval of the dissertation proposal **"Effectiveness of Bed and Physio-ball Exercises to Improve Gait of Stroke Patient"**-by ethics committee.

Dear
Mohammad Shahinur Islam,
Congratulations
The Institutional Review Board (IRB) of BHPI has reviewed and discussed your application to conduct the above-mentioned dissertation, with yourself, as the Principal Investigator Fabiha Alam, Assistant Professor, Department of Physiotherapy, 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 find out the Effectiveness of bed & physio-ball exercises to improve gait of stroke patient in CRP. Should there any interpretation, typo, spelling, grammatical mistakes in the title, it is the responsibilities of the investigator. Since the study involves questionnaire that takes maximum 30-40 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

Review and Ethical Approval

Date: 11th 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 Mohammad Shahinur Islam, student of B.Sc. in physiotherapy program at Bangladesh Health Professions Institute (BHPI) the academic institute of Centre for the Rehabilitation of the Paralyzed (CRP) under the Faculty of Medicine,University of Dhaka.As per the course curriculum, I have to conduct a dissertation entitled **"Effectiveness of bed and physioball exercises to improve gait of stroke patient"** under the supervision of Fabiha Alam, Assistant professor, Department of Physiotherapy, BHPI.

The purpose of the study is effectiveness of bed and physioball exercises to improve gait of stroke patient. The study involves face-to-face interview. If I can complete the study successfully, the patient may get the benefit of improve neurology outdoor physiotherapy service. To implement my research project, I need to collect data from the patient, that may take 30 to 40 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,
Shahin

Mohammad Shahinur Islam
4th Year B.Sc. in Physiotherapy
Session: 2017-2018 Student ID:112170409
BHPI, CRP, Savar, Dhaka-1343, Bangladesh

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Recommendation from the dissertation supervisor
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Conventional Physiotherapy

Conventional physiotherapy treatment protocol for stroke patient.

- Positioning with postural correction
- Functional activity
- Neural connectivity exercise
- Active facilitatory ROM exercise
- Stretching for U/L and L/L - slow passive stretching
- Co-ordination practice - Frenkel's exercise
- Weight shifting
- Weight bearing
- Trunk mobilization exercise with on without physio ball.
- Balance training both static and dynamic
- Bed mobility
- Strengthening program
- Gait re-education
  - side to side walking
  - Backward walking
  - Box walking
  - Heel walking
  - Toe walking parallel bar walking
  - straight like walking

- Proprioceptive exercise
- Trunk control exercise
- Soft tissue mobilization
- Parallel bar walking
- Transitional movement practice
- stepping

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