PREVALENCE OF ORTHOSTATIC HYPOTENSION AMONG THE SCI PATIENT ATTEND IN CRP

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

Prevalence of orthostatic hypotension among the SCI patient attend in CRP

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DECLERATION

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

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Acronyms

AD:	Autonomic Dysreflexia
AIS:	ASIA Impairment Scale
ASIA:	American Spinal Injury Association
BHPI:	Bangladesh Health Professions Institute
BP:	Blood Pressure
CNS:	Central Nervous System
CRP:	Center for the Rehabilitation of the Paralysed
DBP:	Diastolic Blood Pressure
EPUAP:	Pressure Ulcer Advisory Panel
FES:	Effect of Functional Electrical Stimulation
HUT:	Head Up Tilt
NPUAP:	National Pressure Ulcer Advisory Panel
NSCISC:	National Spinal Cord Injury Statistical Center
OH:	Orthostatic Hypotension
SBP:	Systolic Blood Pressure
SCI:	Spinal Cord Injury
SCL:	Spinal Cord Lesion
SPSS:	Statistical Package of Social Science
WBV:	Whole-Body Vibration
IRB:	Institutional Review Board

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ABSTRACT

Purpose: To identify the prevalence of orthostatic hypotension among the spinal cord injury patients at CRP.

Objectives: The objectives of the study were to find out the information about the socio-demography and orthostatic hypotension, calculate the number of patients with orthostatic hypotension in per hundred SCI patients.

Methodology: A cross sectional design was carried out in this study; purposive sampling technique was used to collect the data from 50 participants among the SCI patients at CRP. A questionnaire was used to collect data and data was collected by face to face interview. Data were numerically coded and captured by using an SPSS 20.0 version software program and descriptive spastics was used for data analysis which focus to table, pie chart and bar chart.

Results: The findings of the study provided a baseline of information prevalence of orthostatic hypotension among the spinal cord injury patients at CRP. The finding of the study was that 60% SCI patients were suffered from orthostatic hypotension at CRP. Most of the patients have poor socioeconomic status and low literacy rate. Orthostatic hypotension most commonly occurs in cervical 56.7%.

Conclusion: The prevalence of orthostatic hypotension among the spinal cord injury patients at CRP was 60%. These results provide background information that may be useful in giving more attention to design the best-practice protocols for prevention and treatment of orthostatic hypotension, thereby reducing their prevalence.

Key words: Spinal cord injury (SCI), orthostatic hypotension, Blood pressure, Tetraplegia, Paraplegia.

CHAPTER I INTRODUCTION

1.1 Background

Most traumatic spinal cord injuries (SCIs) are caused by contusion or bruising of the spinal cord as a result of fracture and/or dislocation of the spine. Individuals with an SCI experience paralysis, abnormal sensation, autonomic dysfunction and compromised bowel, bladder, sexual and/or respiratory function at or below the level of injury. These effects are usually permanent as the mammalian central nervous system (CNS) has a limited capability for endogenous repair and axon regeneration. Although the incidence is small relative to other CNS disorders, SCI tends to affect people early in life with the average age at the time of injury around 30–37 years old (DeVivo and Chen, 2011).Spinal cord injury (SCI) is a very severe medical condition that reasons functional, socioeconomic and psychosomatic disorder. Hence, patients with SCI experience significant damages in various aspects of their life. The aims of rehabilitation and other treatment approaches in SCI are to decrease secondary morbidity, improve functional level and enhance health-related quality of life. It is very common secondary medical complications in patients with SCI in acute and long-term stage (Sezer et al., 2015). Spinal cord injury (SCI) effects neither only in overwhelming paralysis nor also in various autonomic dysfunctions, including abnormal cardiovascular (CV) control (Sidorov et al., 2008).

In 1996 orthostatic hypotension (OH) was defined in a consensus statement by the American Academy of Neurology and the American Autonomic Society as a fall in systolic blood pressure (SBP) 20mmHg or diastolic blood pressure (DBP) 10mmHg on postural changes, with or without warning sign, after 3 minutes of standing or head-up tilt (HUT) to at least 60 degree on a tilt table standing (Schatz et al., 1996). In the 2011 modernize, the consensus statement included definitions for other variants of OH, including initial and late OH. Initial OH is defined as a transient blood pressure decrease (40mmHg SBP and/or 20mmHg DBP) within 15 seconds of standing, whereas late OH was defined as OH that occurs beyond 3 minutes of postural changes (Freeman et al., 2011).

Orthostatic hypotension happens in some patients when they stand up or lay down also identified as postural hypotension. Patients frequently feel dizziness or lightheaded and can faint and fall through the episodes of orthostatic hypotension. The proportions of inpatient hospital falls after orthopedic surgeries are 2.5 falls per 1000 patient-days (Ackermen at al., 2010). Orthostatic hypotension (OH) is a medical condition in which blood pressure in erect position falls significantly compared with supine position. OH has a variety of reasons and mostly occurs through postural changing, particularly from supine position to erect position, which mainly affects signs of cerebral hypo perfusion and even syncope or sudden death (Freeman et al., 2011).

One of the most common difficulties of spinal cord injury (SCI) patients is orthostatic hypotension (OH). In patients with SCI over the level of T6, the occurrence rate of orthostatic hypotension is very high (Sidorov et al., 2008). Illman et al. (2000) registered 14 acute SCI patients; 73.6% of patients had suffered OH during rehabilitation, among them 58.9% had symptoms, and rehabilitation was limited in 43.2% of these patients (Illman et al., 2000). OH severely hampers the process of rehabilitation after SCI. Treatment of OH after SCI has become a vital part of rehabilitation in late-stage SCI (Gillis et al., 2008), Figueroa et al. (2010) mentioned that cerebral hypo perfusion indications to the symptoms that patients suffered during an episode of orthostatic hypotension. Symptoms consist of lightheadedness, weakness, dizziness, difficulty thinking, headaches, feeling faint, and syncope. After the first episode of cerebral hypo perfusion, a compensatory autonomic response occurs. Symptoms from this response embrace nausea, chest pain, and coldness of extremities, palpitations, and syncope (Figueroa et al., 2010).

Gibbons & Freeman (2006) stated that diagnosis of orthostatic hypotension can be completed by measuring blood pressure to identify orthostatic changes when the patient is lying on a tilt table in the supine position at an angle of at least 60º. It can also be identified by measuring blood pressure in the sitting and standing positions. They also mentioned that after 1 minute of standing, orthostatic hypotension will be noticed in the majority of patients. High orthostatic hypotension can be well-defined as a further fall of blood pressure after 2 minutes of upright. Orthostatic hypotension rising after 3 minutes

of standing generally represents a slight and initial form of adrenergic inactivity or a reflex vasovagal response (Gibbons & Freeman, 2006).

Orthostatic hypotension can be produced by drugs or neurogenic or non-neurogenic causes. The most important medications are vasodilators, diuretics, antihypertensive agents, antidepressants, and opioids. In the early postoperative period, orthopedic patients will frequently be taking 1 or more of these medications, putting them at danger for the improvement of orthostatic hypotension (Poon & Braun, 2005). Neurogenic reasons of orthostatic hypotension relate to an irregularity in the reflex regulation of circulation of the sympathetic noradrenergic nervous system. Non neurogenic orthostatic hypotension may be produced by hypovolemia, cardiac impairment, or vasodilation (Goldstein & Sharabi, 2009).

Electric upraise bed training is a relatively important therapeutic method for OH (Figueroa et al., 2010). By modifying the tilt angle, the upraise bed can make patient tied to the bed produce their own gravity, which can support SCI patients in the following aspects: 1) Benefit patients complete the progression from supine to erect position and from low to high level of gravity, and fully adjust to standing position; 2) Proliferation weight bearing ability of the trunk and lower limbs, and regulatory ability of cervix, thorax, waist, and pelvis in straight position, so as to produce a good basis for self-regulating standing and balance in the future; 3) By squeezing joints and muscles by gravity, proprioception is efficiently stimulated, the affected limbs are facilitated, and muscle tightness in patients with low muscle tension is produce; 4) For drooping feet, varus, and other abnormal modes produced by high tension of the lower limb muscles, gravity was used to complete satisfactorily strong and lasting traction of the Achilles tendon so as to utilize corrective action (Shen et al., 2014). The prevalence of hypotension in veterans suffering SCI was described as 16%11; however, we recently accepted an occurrence of 35% in individuals with tetraplegia and 27% in person with high thoracic lesions (T1-T6) (Wecht et al., 2013). OH continued in 74% of cervical and 20% of higher thoracic motor complete SCI patients during the first month during SCI. OH may perform with or without symptoms (Sidorov et al., 2008).

1.2 Rationale

Bangladesh is a developing country among the third world. The rate of education is very low; besides government and non-government activities in health sector are not significant for the people live in here. SCI is a common problem in our country and it will increase day by day. Orthostatic (postural) hypotension (OH) is a clinical feature commonly occurs in spinal cord injury (SCI) patient with cervical and high thoracic lesions.

Motor and sensory impairment are recognized consequences of spinal cord injury (SCI). During the last decade, an important number of experimental and clinical studies have focused on the investigation of autonomic dysfunction and cardiovascular control following SCI. Many clinical reports have recommended that unstable blood pressure control in individuals with SCI could be responsible for their increased cardiovascular mortality. The aim of this study is to identify the prevalence of orthostatic hypotension that commonly occurs following SCI. We describe the clinical irregularities of blood pressure control following SCI, with particular emphasis upon orthostatic hypotension. The possible mechanism that causes orthostatic hypotension in SCI, such as alterations in sympathetic activity, altered baroreflex activity, the lack of skeletal muscle pumping activity, cardiovascular abnormality and altered salt and water balance will be discussed. Moreover, cardiovascular disorders in the acute and chronic stages of SCI are among the most common causes of death in individuals with SCI.

Now a- days the evidence of spinal cord injury is increased in Bangladesh as increase population. Due to increasing population decreasing the working opportunities they are undertaking risky work as a result they are falling in spinal cord injuries. Orthostatic hypotension is commonly seen in spinal cord injury patient in acute and rehabilitation stage. But still now there is no evidence that research has been done on this tropics. So I become interested to select this topic. Most of the spinal cord injury patients of Bangladesh come at CRP for treatment. That’s why I select the patients of CRP as my sample population.

1.3 Research question

What is the prevalence of orthostatic hypotension among the spinal cord injury patients at CRP?

1.4 Objectives of study

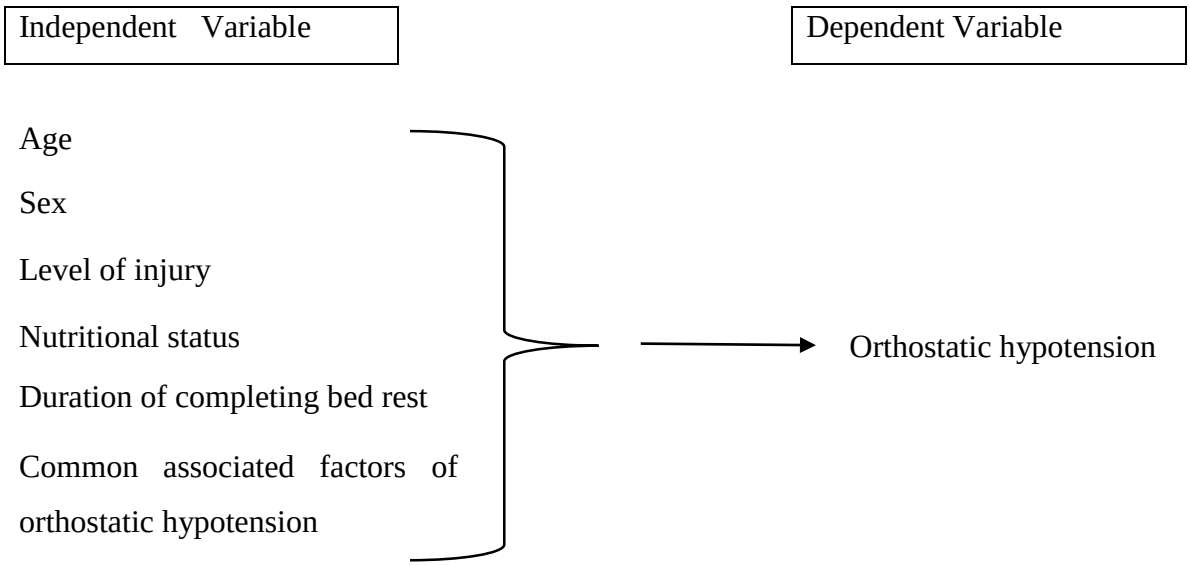
1.4.1 General objective

To identify the prevalence of orthostatic hypotension among the spinal cord injury patients at CRP.

1.4.2 Specific objective

- To find out the information about the socio-demography and developing orthostatic hypotension.
- To calculate the number of patients with orthostatic hypotension in per hundred SCI patients.
- To determine the common factors that influence orthostatic hypotension.
- To evaluate the frequency of orthostatic hypotension among the paraplegia and tetraplegia SCI patients.
- To increase the awareness of professionals and affected patients.

1.5 Conceptual Framework



1.6 Operational definition

Spinal Cord Injury (SCI): When the spinal cord is injured by any reasons like trauma or disease that result sensory and motor loss is called SCI.

Paraplegia: Paralysis of lower part of the body and of both legs.

Tetraplegia: Damage to the spinal cord in the cervical region, with related loss of muscle strength in all 4 extremities

Neurological level: Up to the level where both sensory and motor function is remain preserve.

Prevalence: Prevalence is a recurrently used epidemiological measure of how commonly a disease or condition happens in a population. Prevalence methods how much of some disease or condition there is in a population at a specific point in time.

Incidence: Incidence methods the rate of occurrence of new cases of a disease or condition. Incidence is considered as the number of new cases of a disease or condition in a particular time period (usually a year) divided by the size of the population under consideration who are initially disease free.

Orthostatic hypotension: Orthostatic hypotension (OH) is defined as a drop in systolic BP of at least 20 mmHg or in diastolic BP of at least 10 mmHg within 3 minutes of standing or during a head-up tilt of at least 60°.

Blood pressure: Pressure that is applied by the blood upon the walls of the blood vessels and particularly arteries and that differs with the muscular efficiency of the heart ,the blood viscosity and volume, the age and health of the individual people, and the state of the vascular wall.

Heart rate: The number of heart beat per minutes.

CHAPER II LITERATURE REVIEW

The dysfunction associated with SCI depends in large part on the initial damage inflicted at the time of SCI; however, delayed neurodegeneration and endogenous repair processes occur after SCI that can further exacerbate or ameliorate neurological impairments. The initial injury causes tissue destruction and cell loss due to mechanical shearing and breaking of cells and anatomical structures. This 'primary injury' is commonly incomplete, leaving some tissue spared from the damage (DeVivo, 2012). Spinal cord injury is defined as the incidence of an acute traumatic lesion of neural origins in the spinal canal (spinal cord and cauda equina), causing in temporary or permanent sensory and/or motor deficit. The medical definition of spinal cord injury except intervertebral disc disease, vertebral lesions in the lack of spinal cord injury, nerve root injuries and avulsions to nerve roots and peripheral nerves external the spinal canal, cancer, spinal cord vascular disease, and other non-traumatic spinal cord diseases (National spinal cord injury statistical center, 2011).

An injury of the spinal cord that effects in paralysis of certain areas of the body, along with the consistent loss of sensation (Disabled world, 2007). The spinal cord is portion of the central nervous system (CNS), which spreads caudally and is endangered by the bony structures of the vertebral column. It is protected by the three membranes of the CNS, i.e., the dura mater, arachnoid and the innermost pia mater. In utmost adult mammals it occupies only the upper two-thirds of the vertebral canal as the development of the bones composing the vertebral column is proportionally more rapid than that of the spinal cord. According to its rostrocaudal position the spinal cord can be separated into four parts: cervical, thoracic, lumbar and sacral, two of these are marked by an upper or cervical and a lower or lumbar (Nogradi & Vrobova, 2010).

Spinal cord lesion (SCL) remains to be a major cause of disability all over Asia as well as in Bangladesh. Patients, who have SCI, very often progress life threatening complications (Islam et al., 2011). In US, the National Spinal Cord Injury Statistical Center (NSCISC) described that motor vehicle accident account for (42%) of reported SCI cases. The other most common cause of SCI is falls (27.1%), followed by acts of violence (primarily gunshot wounds) (15.3%), and frivolous sporting activities (7.4%). In Pakistan falling

down (FD) injury account for (57.85%) of TSCI, followed by RTA (25.2%), and gunshot (8.4%) (Rathore et al., 2008).

ASIA Impairment Scale (AIS)

A = Complete: No motor or sensory function is preserved in the sacral segments S4- S5.

B = Incomplete: Sensory but not motor function is preserved bellow the neurological level and includes the sacral segments S4-S5.

C = Incomplete: Motor function is preserved below the neurological level, and more than half of key muscles below the neurological level have a muscle grade less than 3.

D = Incomplete: Motor function is preserved below the neurological level, and at least half of key muscles below the neurological level have a muscle grade of 3 or more.

E = Normal: motor and sensory functions are normal.

(American spinal cord injury association 2011).

Grossman et al. (2012) mentioned that 79% male with a median age of 44 years and the leading causes of injury were falls (37%) and motor vehicle accidents (28%). On that study the dissemination of initial ASIA grades were A (40%), B (16%), C (15%), and D (29%). Among of them fifty-eight percent (58%) of patients sustained 1 or more severe, moderate, or mild complications. Associated complications were more severe with ASIA grade: 84% of patients with Grade A and 25% of patients with Grade D who had 1 complication at least. On the other hand seventy-eight percent of complications happened within 14 days of injury. The most recurrent types of complications were severe and moderate respiratory failure, pleural effusion, pneumonia, anemia, severe bradycardia, and cardiac dysrhythmia. Among of them the mortality rate was 3.5% and it was associated with the increase aged people and prior morbidity.

Respiratory complications accompanying with SCI are the most common cause of morbidity and mortality in both acute and chronic stages. The degree of respiratory complications depends on the level of SCI and the degree of motor impairment (Tollefsen & Fondenes, 2012). Respiratory muscles paralysis is one the most common cause of spinal cord injury, particularly in high thoracic paraplegia and tetraplegia with injury up or right on the sixth thoracic section, and also biomechanics, capacities, volumes and respiratory pressures alterations in affected people. The elastic abdominal binder delivers a mechanical care for respiratory function treatment, supporting with abdominal

restriction and abdominal compliance decrease while at orthostatic position (Costa et al., 2015). The leading respiratory complications rising after SCI are breath shallowness, sneezing inefficiency and coughing, changes in mucociliary clearance and abdominal problem. These difficulties can end up as atelectasis, pneumonia and respiratory failures (Cornwell et al., 2014).

Autonomic dysreflexia (AD) is one of the most common clinical emergencies. It usually happens in patients with SCI at levels of T6 and above (Krassioukov et al., 2009). AD is representative for the chronic stage but may also occur any time after SCI (Popa et al., 2010). It is described that the life time incidence among patients with SCI is 19%-70%. It is more commonly occur in patients with cervical and complete injuries (Hagen et al., 2011). Autonomic dysreflexia (AD) is occurred by spinal response mechanisms introduced by a noxious stimulus arriving the spinal cord below the level of injury. This afferent stimulus produces a sympathetic over activity leading to vasoconstriction under the neurological lesion, along with participation of splanchnic circulation that causes hypertension and vasoconstriction. The extreme parasympathetic action (and deficiency of sympathetic tone) hints to vasodilation above the level of the injury and is thought to be accountable for headache, sweating, flushing and nasal congestion. The reflex bradycardia is secondary to vagal stimulus (Somani, 2009).

The most important part of the effective management of AD is prevention. It is described that education of the patient, caregivers and family members about autonomic dysreflexia is vital to prevent AD and to identify its existence without delay (Vaidyanathan et al., 2012). If AD happens, the initial management includes non-pharmacological therapeutic management. These interventions such as keep the patient in an upright position to take benefit of any orthostatic reduction in blood pressure. The next stage must be to untie tight clothing and/or constrictive devices. Blood pressure is measured at least every 5 min until the patient is stable. It is also essential to find and reduce the triggering stimulus which in 85% of patients is associated either to bowel impaction or bladder distension (Krassioukov et al., 2009).

Spinal Cord Injury also raise the risk of long-term complications and decrease mental and social well-being of the patient. SCI may lead to disorders of the urinary system. It

mainly causes bladder dysfunction, often raised to as the neurogenic bladder. Bladder function is mainly measured by three areas of the central nervous system: the pontine micturition center, the cerebral cortex and the sacral micturition center (Hagen et al., 2011). There are many types of clinical conditions in terms of sphincter and detrusor action in neurogenic bladder in patients with SCI: (Myers et al., 2007). Hypereflexia of sphincter and detrusor with involuntary contractions, sphincter dyssynergia, residual urine and reflex incontinence (Chindo et al., 2007).

Pressure ulcers are a vital and potentially serious secondary complication of SCI. They can cause to further fatal infections and functional disability and surgical interventions can be necessary (Regan et al., 2009). Pressure ulcers have been well-defined as a localized lesion to the skin and/or underlying tissue, generally over a bony prominence, as a consequence of pressure or pressure in combination with shear. A common classification system for pressure ulcers has been established by the European Pressure Ulcer Advisory Panel (EPUAP) and National Pressure Ulcer Advisory Panel (NPUAP). They have established on four levels of injury which range in severity from category/stage (undamaged skin with non-blanch able erythema) to category/stage iv (full thickness tissue loss). Distinguishing that the terms unclassified/unshakeable and deep tissue injury are usually graded as “iv” in Europe; NPUAP has agreed to put them separately (Panel, 2009).

Prevention of pressure ulcers starts at the time of injury and is a lifetime commitment for that patient living with SCI or their caregivers. Pressure ulcer management consist of daily inspection of skin, avoidance of excessive pressure or shearing, keeping skin clean and dry, proper pressure release techniques, individually with prescribed equipment (e.g., wheelchair cushions), balanced nutrition , treatment and early recognition (Regan et al., 2009).

Orthostatic Hypotension is frequently found in both acute and chronic stages following SCI (Sidorov et al., 2008). The loss of reflex vasoconstriction and the low level of efferent sympathetic nervous activity after SCI are the major causes of OH. OH is mainly common in cervical and high thoracic injuries (Krassioukov et al., 2007). It is also described that the prevalence of orthostatic hypotension was 21% and cervical injuries had the uppermost prevalence in a large cohort study with incomplete SCI (Sisto et al.,

2012). The symptoms related with orthostatic hypotension include dizziness, light headedness, pallor, headache, yawning, muscle weakness, sweating, fatigue and occasionally syncope (Krassioukov et al., 2009). It is described that management of OH such as application of pressure stockings and adequate hydration, abdominal binders, gradual progressive daily head up tilt and management by pharmacological agents (salt tablets, midodrine, dihydroergotamine, fludrocortisone, ephedrine or L-DOPS) (Bryce et al., 2007).

The orthostatic hypotension mechanism after SCI is not however clear, associated diagnosis and measurement have no unchanging criteria, and there is no exact therapeutic method (Krassioukov et al., 2009). It is generally measured that sympathetic preganglionic neurons are carry neural information are the last collective passageway from vasomotor center to cardiovascular sympathetic nerves, and SCI can occur disturbance of the transmission passageway between vasomotor center and sympathetic preganglionic neurons, subsequent in dysfunction of the normal central nervous system short-term blood pressure conduction mechanism (Clydon et al., 2006). Hence, in the early stage of SCI, duo to sympathetic response damage, vein dilation, and intra-abdominal pressure decreases, abdominal muscle paralysis, meanwhile, in upright or sitting positions cortisol, catecholamine and aldosterone are released inadequately or too slowly; therefore, when a patient transfers from the supine position to the erect position, blood pressure falls suddenly and is often complemented with increased heart rate, producing transient brain ischemia leading to vertigo dizziness, or sudden loss of consciousness (Teasell et al., 2000). The incidence rate is associated to the position of the injured spinal cord segment, the degree of injury, physical quality and length of time confined to bed; higher paraplegia level is related with higher incidence rate (Sidorov et al., 2008). As time passes on, the correlation of SCI distal sympathetic preganglionic neuron transmission pathway is reconstructed, and incomplete rehabilitation of sympathetic nerve function, long-term conduction, and vasoconstriction hormone secretion rise; increased sensitivity of these hormones and muscle spasm, cause orthostatic hypotension symptoms to recover and dissolve (Mengsc & Allan, 2013).

The low level of efferent sympathetic nervous action and the damage of the reflex vasoconstriction following Spinal Cord Injury are the two main causes of Orthostatic Hypotension. Reductions in blood pressure (BP) following the alteration to an upright position in individuals with SCI may be associated to extreme pooling of blood in the abdominal viscera and lower limbs (Krassioukov & Claydon, 2006). In addition to central reasons of Orthostatic Hypotension following SCI, there is also some evidence recommends that peripheral mechanisms also could play a role to orthostatic intolerance following SCI. For example, up-regulation of the potent vasodilator nitric oxide (NO) could potentially cause to the orthostatic intolerance in this population (Vaziri, 2002). In animal studies, it has been presented that NO synthase expression is deregulated following SCI (Zhao et al., 2007). Moreover, Wecht and co-investigators establish that intravenous infusion of a comparatively low dose of the NO synthase inhibitor L-arginine-N-methyl-ester (L-NAME) controlled blood pressure in individuals with SCI (Wecht et al., 2007).

Several other causes may predispose individuals with SCI to OH, containing low plasma volume, cardiovascular deconditioning and hypernatremia due to persistent bed-rest (Claydon et al., 2006). The prevalence of OH is more in patients with higher spinal cord lesions, and thus it is more commonly found in tetraplegia (Claydon et al., 2006; Mathias, 2006). Moreover, individuals with cervical SCI also suffer greater posture-related decreases in blood pressure than those suffered with paraplegia (Claydon et al., 2006)

Effective treatment options for orthostatic hypotension (OH) in persons with spinal cord injury (SCI) should normalize blood pressure, optimize cerebral blood flow (CBF), and minimize dependency on the renin-angiotensinaldosterone system (RAAS) during orthostasis. We previously reported increases in mean arterial pressure (MAP) at supine rest and during head-up tilt (HUT) after administration of a nitric oxide synthase (NOS) inhibitor (nitro-L-arginine methyl ester, L-NAME; 1.0mg/kg) and an alpha-1 agonist (midodrine hydrochloride; 10mg) in persons with tetraplegia.(Wecht et al., 2009)

Midodrine (ProAmatine)

Midodrine is a selective alpha1 adrenergic agonist, done its actions by activating the alpha-adrenergic receptors of the arteriolar and venous vasculature, thus generating an increase in blood pressure and vascular tone. Midodrine has a half-life of nearly 25

minutes. Exactly, plasma levels of Midodrine peak nearly half an hour after oral ingestion, with this volume halved every 25 minutes. However, the primary metabolite extents peak blood concentrations about 1 to 2 hours after taking a dose of Midodrine and has a half-life of about 3 to 4 hours. Normal starting dose is 2.5mg two or three times daily (Krassioukov et al., 2006). Importance of Midodrine in the management of OH in individuals with SCI were described in a level 2 pre-post trial and three level 4 studies (Wecht et al., 2010). Of note, a latest case report on 2 male subjects established urinary bladder dysreflexia with the usage of midodrine (Vaidyanathan et al., 2007) which suggests Midodrine should be active cautiously. Thus, there is level 2 evidence (Nieshoff et al., 2003) that Midodrine may raises blood pressure and improve exercise performance in some (75%) individuals with SCI, related to other clinical populations with cardiovascular autonomic dysfunction.

L-threo-3, 4-dihydroxyphenylserine (L-DOPS, Droxidopa) is an exogenous and neutral amino acid that is also work as a precursor of noradrenalin. (Wecht et al., 2013) assess the effects of L-DOPS on OH. Wecht et al., (2013) in a pre-post study establish that the use of increased doses of L-threo-3, 4-dihydroxyphenylserine (droxidopa 100 mg, 200 mg, 400 mg) in hypotensive subjects did not origin excessive increases in supine blood pressure. Moreover, the 400-mg dose of droxidopa was establish to be effective for increasing seated blood pressure for up to 3 hours in study subjects. The predictable fall in blood pressure when moved to the seated position from supine was stopped with droxidopa 200 and 400mg. There is level 4 evidence founded on one pre-post study (Wecht et al., 2013) that L-threo-3,4-dihydroxyphenylserine at the doses result is safe and moderately effective for the treatment of hypotension and OH.

Nitro-L-arginine methyl ester (L-NAME) reduces the production of the vasodilator nitric oxide by preventing the appearance of its enzyme, nitric oxide synthase. Improved nitric oxide release has been related with orthostatic intolerance after cardiovascular deconditioning and has been suggested to play a role in OH after SCI (Wecht et al., 2007). Three studies (Wecht et al., 2009; Wecht, 2011; La Fountaine et al., 2013) observed the use of L-NAME in the treatment of OH following SCI. These studies establish that after infusion of 1.0 or 2.0 mg/kg of L-NAME, individuals suffering tetraplegia had a upper mean arterial pressure in reaction to orthostatic challenge (a head

tilt procedure) associated with those individuals who take a placebo. It should be noticed that the rise in mean arterial pressure in the treatment group was not retained over the entire head tilt procedure for all 3 studies. In La Fountaine et al. (2013), the result was preserved for 1 additional hour post-infusion. In summary, there is level 2 evidence that L-NAME raises the blood pressure of SCI patients following a head up tilt process. Of the non-pharmacological researches, three related with the regulation of fluid and sodium intake while others examined physical activities such as abdominal binders, physical activities, whole-body vibration and electrical muscle stimulation.

OH is common among patients with upper levels of SCI, may be existing without symptoms, and often co-occurs with abnormal sodium and fluid metabolism. Increases in fluid ingestion and a food high in salt/sodium can enlarge extracellular fluid volume and increase orthostatic responses. This simple dietary intervention seems to be in effect in patients with idiopathic OH without SCI (Claydon & Hainsworth, 2004). In 4 patients with OH, Frisbie (2003) established that the estimated daily intake of sodium and water was in reversely related to their Ephedrine requirements and recommended that greater sodium and water intake may lead to a more balanced renal act.

The studies observing exterior pressure contributions generally test different pressure conditions with the same group of individuals (e.g. with and without stockings) whichever in a randomized order (RCT) (Wadsworth et al., 2012) or assigned order (non-RCT) (Helmi et al., 2013; Rimaud et al., 2012, 2008; Krassioukov & Harkema, 2006).

The application of these involvements must be interpreted with caution, as none of these studies measured more than the effect of pressure application during acute phase. Whenever these effects would persist with chronic use or cause any harmful effects upon deduction after extended use is unknown (Rimaud et al.,2008), after noticing a decrease in venous capacitance, proposed that graduated compression stockings damaged by individuals with paraplegia may inhibit blood pooling in the legs. However, these effects were perceived when the subjects were at rest and in the lack of orthostatic stress. Rimaud et al. (2012) found that with the progressed compression stockings, sympathetic activity improved and parasympathetic activity reduced after maximal exercise in men with SCI. A single RCT (n=14) by Wadsworth et al. (2012) establish that abdominal binders did not significantly affect mean arterial pressure.

Whole-body vibration (WBV) exercise is achieved on a platform that creates vertical sinusoidal vibrations, stimulating muscle spindles and causing in muscle contractions. The effect of WBV exercise on muscle activity is elicited over muscle twitch potentiation (Cochrane et al., 2010). There is one RCT (n=21) by Yarar-Fisher et al. (2014) studied the effect of whole-body vibration (WBV) on blood pressure while standing, and establish that lower limb peripheral blood flow enhanced post-WBV. However, the clinical application of WBV in stopping orthostatic hypotension has not yet been studied.

The applying of FES triggers intermittent muscle contractions that stimulate the physiologic muscle pump. The physiologic muscle pump helps venous return via compression of the superficial and deep veins of the legs. Chi et al. (2008) recommend that alleviation of the pooling effect could be further improved when FES of leg muscles is combined with passive mobilization. The clinical usefulness of this grouping must be examined further in subjects with SCI because subjects in Chi et al. (2008) were able-bodied. A cross-sectional study by Yoshida et al. (2013) associates isometric FES of leg muscles vs. passive stepping vs. isometric FES + passive stepping. They establish that both FES and passive stepping improved stroke volume and mean BP and that the highest growth in these two resulted from combined FES + stepping; however, the two interventions did not interrelate to synergistically raise stroke volume and mean BP.

Otsuka et al. (2008) establish that individuals with complete tetraplegia who were performed in regular physical activity training (2 hrs/day, 2 days/wk, ≥2 yrs) established greater orthostatic tolerance than inactive individuals with SCI (<30 mins/wk).

Active stand training that highlights weight bearing is thought to excite the neuromuscular system under the level of injury in individuals with SCI and may affect the reaction to orthostatic stress by increasing venous return (Harkema et al., 2008). Only one study studied the effect of active stand training using the body weight support treadmill system on cardiovascular function among individuals with complete SCI. Harkema et al. (2008) establish that after 80 sessions (60 minutes/session; 5x/week) of active stand training, individuals with complete cervical SCI established increased resting blood pressure and enhancements in the cardiovascular responses to standing.

Chelsea et al. (2013) studies a cross sectional study among the 41 Participants with tetraplegia (TP) 19, high paraplegia (HP) 8, or low paraplegia (LP) 14, to describe physical capacity, autonomic function, and perceptions of exercise among adults with sub-acute spinal cord injury (SCI). Peak exercise capacity was determined by an arm ergometry test. As a measure of autonomic function, orthostatic tolerance was measured by a passive sit-up test. Self-efficacy for exercise post discharge was evaluated by a questionnaire. There was a significant difference in peak oxygen consumption and heart rate between participants with TP and LP. Peak power output was also significantly lower in the TP group (30.06.9W) compared with the HP (55.57.56W) and LP groups (62.512.2W). Systolic blood pressure responses to the postural challenge varied significantly between groups (3.033.5mmHg in TP, 17.814.7mmHg in HP, 21.618.7mmHg in LP). Orthostatic hypotension was most predominant among participants with motor complete TP (73%).

Hamzaid et al. (2015) studies a Prospective study of two cases to label the effects of electrical stimulation (ES) therapy in the 4-week managing of two sub-acute spinal cord injured (SCI) patient. A diagnostic tilt-table test was lead to confirm the presence of orthostatic hypotension (OH) founded on the current clinical definitions. Following initial assessment, subjects experienced 4 weeks of ES therapy 4 times per week for 1 h per day. Post-tests tilt table challenge, both with and without ES on their gastrocnemius muscles, hamstrings, quadriceps and rectus abdominis was lead at the end of the study (week 5). Subjects' blood pressures (BP) and heart rates (HR) were noted every minute during pretest and post-tests. Orthostatic symptoms, as well as the extreme tolerance time that the subjects could withstand head up tilt at 60°, were noted. Subject A enhanced his orthostatic symptoms, but did not improve from clinically defined OH based on the 20-min duration constraint. With concurrent ES therapy, 60° head up tilt BP was 89/62mmHg related with baseline BP of 115/71mmHg. Subject B fully recovered from OH established by BP of 105/71mmHg during the 60° head up tilt compared with baseline BP of 124/77mmHg. Both patients established longer tolerance time during head up tilt with concomitant ES (subject A: pre-test 4min, post-test deprived of ES 6min, post-test with ES 12min; subject B: pre-test 4min, post-test deprived of ES 28min, post-test with ES 60 min).

Sidorov et al. (2008) studies a retrospective data analysis to determine prevalence of orthostatic hypotension (OH) in patients with spinal cord injury (SCI) throughout the acute rehabilitation period. In Quaternary care spinal unit, Vancouver General Hospital, British Columbia, Canada. Analysis was performed using Microsoft Excel and Sigma Plot 2001 for Windows. Eighty-nine participant with acute SCI stratified with neurological level (cervical, 55 (62%); upper thoracic, 12 (13%); lower thoracic, 22 (25%)), and classified by American Spinal Injury Association standards. Non-invasive measurement of systolic and diastolic blood pressure and heart rate were complete at baseline and 3 min following an orthostatic challenge test administered throughout the first month after SCI. Patients with cervical or upper thoracic motor complete SCI more frequently experienced OH (Po0.01). OH persisted during the first month next SCI in 74% of cervical and only 20% of upper thoracic motor complete SCI patients.

CHAPTER III METHODOLOGY

3.1 Study design

A cross sectional study was chosen to conduct the study. It is the simplest variety of descriptive or observational epidemiology and also known as surveys are a useful way to gather information on important health-related aspects of people's knowledge, attitudes, and practices. A survey is a research technique which involved collecting data from a large number of people, so that a general overview of the group could be obtained.

3.2 Study sites and area

The study was conducted in Spinal cord injury department of CRP, Savar Dhaka.

3.3 Study population and sampling

The study population is any set of people or events from which the sample is selected and to which the study results will generalize. In this study the study population was all the SCI patients of CRP and the samples are the SCI patients those staying in SCI unit of CRP, Savar, Dhaka. A group of people or events drawn from a population are known as sample. About 50 SCI patients were taken as sample for this study.

3.4 Sampling technique

Purposive sampling technique was selected. Because purposive sampling involves the deliberate selection of individuals by the researcher based on predefine criteria and getting of those samples whose criteria will be concerned with the study purpose. Here another factor is resource limitation to get the sample in bigger aspect as well as the limitation of time. Participants are chosen purposively because the participants have some particular features or characteristics which are enable detailed exploration of the research objectives. This method contained some inclusion criteria to select the participant as to find out the actual snap of the situation.

3.5 Inclusion criteria of the study

- All spinal cord injury patients staying at CRP, Savar, Dhaka.
- Both sex are equal priority
- The patients who has interest to participate in the interview.

3.6 Exclusion criteria of the study

- The patient who are in traction.
- The patient who are suffering from pressure sore.
- Subjects who are unwillingness to participate.

3.7 Sample size

Sampling procedure for cross sectional study done by following equation-

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

Here,

$z\left(1-\frac{\alpha}{2}\right) = 1.96$

p = 0.736 (Illman et al., 2000)

q = 1− p = 0.264

d = 0.05

Where,

n = sample size

$z\left(1-\frac{\alpha}{2}\right)$ = linked to 95% confidence interval (use 1.96)

p = expected prevalence (as fraction of 1)

q = 1- p (expected non-prevalence)

d = margin of error at 5% (standard value of 0.05)

According to this formula of sample size calculation, the actual sample size is about 286. But as it is an educational research and had the time limitation so 50 SCI patients were taken as sample.

3.8 Data collection method and tools

The face to face interview technique was used to collect data. For this the materials to successfully complete the interview session and collected the valuable data from the participants were used such as- question paper, consent form, pen, file, stethoscope, sphygmomanometer, clip board etc. A structured questionnaire for collecting information related to the study was used.

3.9 Data analysis

Data were numerically coded using an SPSS 20.0 version software program. Data was analyzed through descriptive spastics which focused to table, pie chart and bar chart.

3.10 Ethical consideration

Research proposal was submitted and presented to the institutional review board (IRB) and Bangladesh health professions institute (BHPI) and approval was obtain from the board. World health organization (WHO) and Bangladesh medical research council (BMRC) guideline also followed to conduct the study. I took approval from the ethical committee of Physiotherapy department to do the study. Then permission was taken from the In-charge of SCI unit for data collection from the patients by ensuring the safety of participants. The participant, who was interested to participate in the study, was informed verbally about the topic and purpose of study. They were informed about the number of interviews and length of interview. It was informed that the information given by participant will be published according to their permission and at this time their identities will be protected by using coding. Written consent was given to all participants prior to the completion of the pretest questionnaire. I explained the participants about his or her role in this study. I received a written consent form every participants including signature. So the participant assured that they could understand about the consent form and their participation was on voluntary basis. The participants were informed clearly that their information would be kept confidential. I assured the participants that the study would not be harmful for them. It was explained that there might not a direct benefit from the study for the participants but in the future cases like them might got benefit from it.

The participants have the right to withdraw consent and discontinue participation at any time without prejudice to present or future care at the SCI unit of physiotherapy of CRP.

CHAPTER IV RESULTS

The aim of the study was to find out the prevalence of orthostatic hypotension among the SCI patients in CRP. Data were numerically coded using an SPSS 20.0 version software program. The collected data were calculated as percentages and presented by using graph and table charts. 50 participants were taken to find out the prevalence of orthostatic hypotension among the SCI patients in CRP.

4.1. Prevalence of orthostatic hypotension

Among the 50 participant 60% (n=30) participants had changed blood pressure or orthostatic hypotension and 40% (n=20) participants had not changed blood pressure or orthostatic hypotension (Figure 4.1).

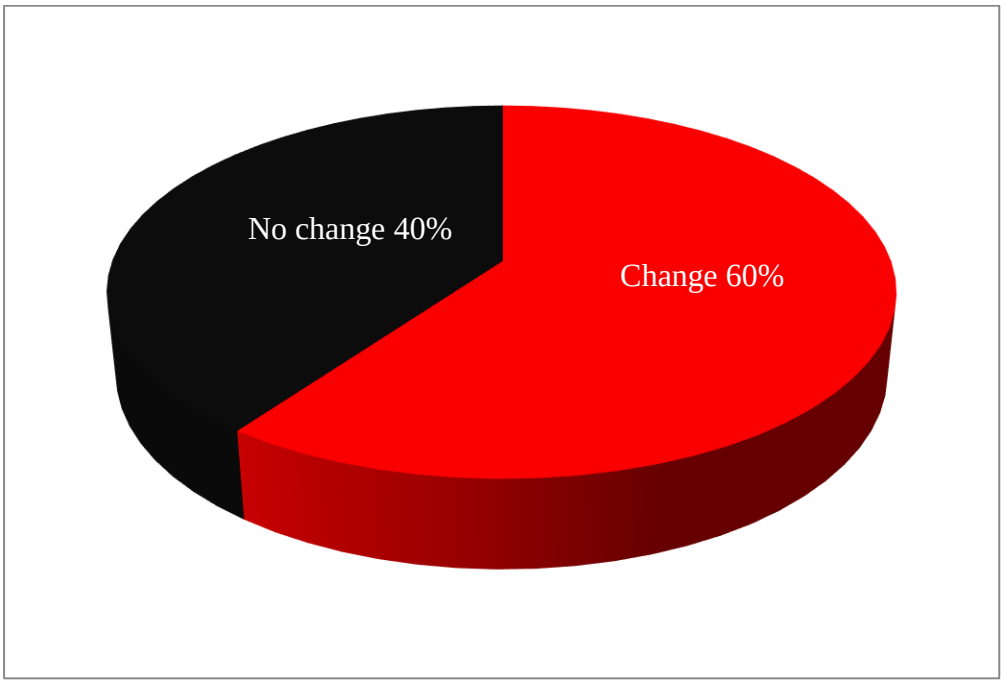


Figure- 4.1: Prevalence of orthostatic hypotension

Age frequency of the participants

Among the 50 participants from whom data were collected the lowest age was 11 and highest age was more than 72 years. And frequency was 24% (n=12) participants in between 11-20 years, 30% (n=15) participants in between 21-30 years, 20% (n=10) participants in between 31-40 years, 18% (n=9) participants in between 41-50 years and 8% (n=4) participants are more than 50 years (Figure 4.2).

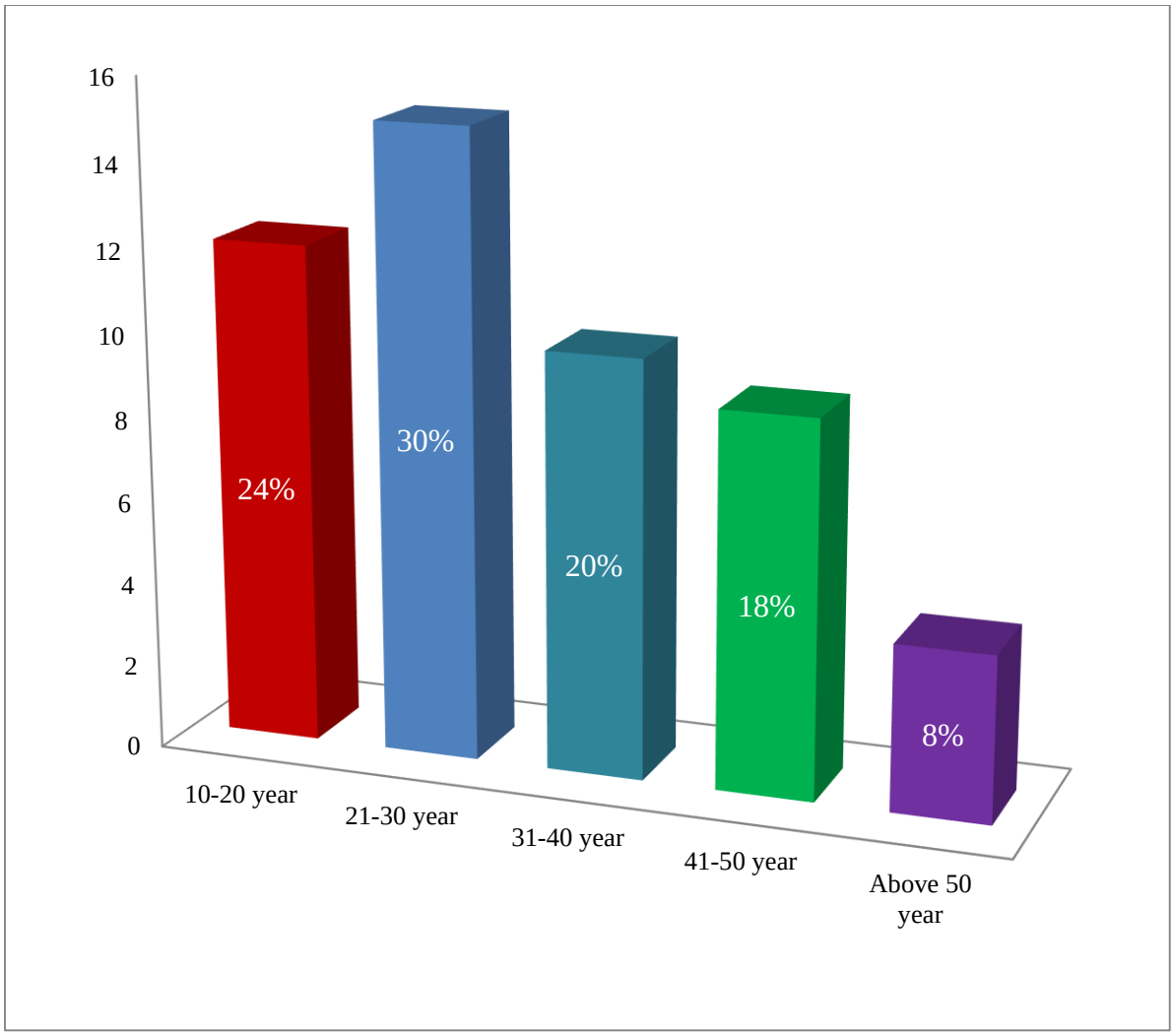


Figure-4.2: Age frequency of the participant

Neurological level of the participants

Among the 50 participants the neurological level were cervical 60% (n=30), thoracic 36% (n=18), lumber 4% (n=2) (Figure-4.3).

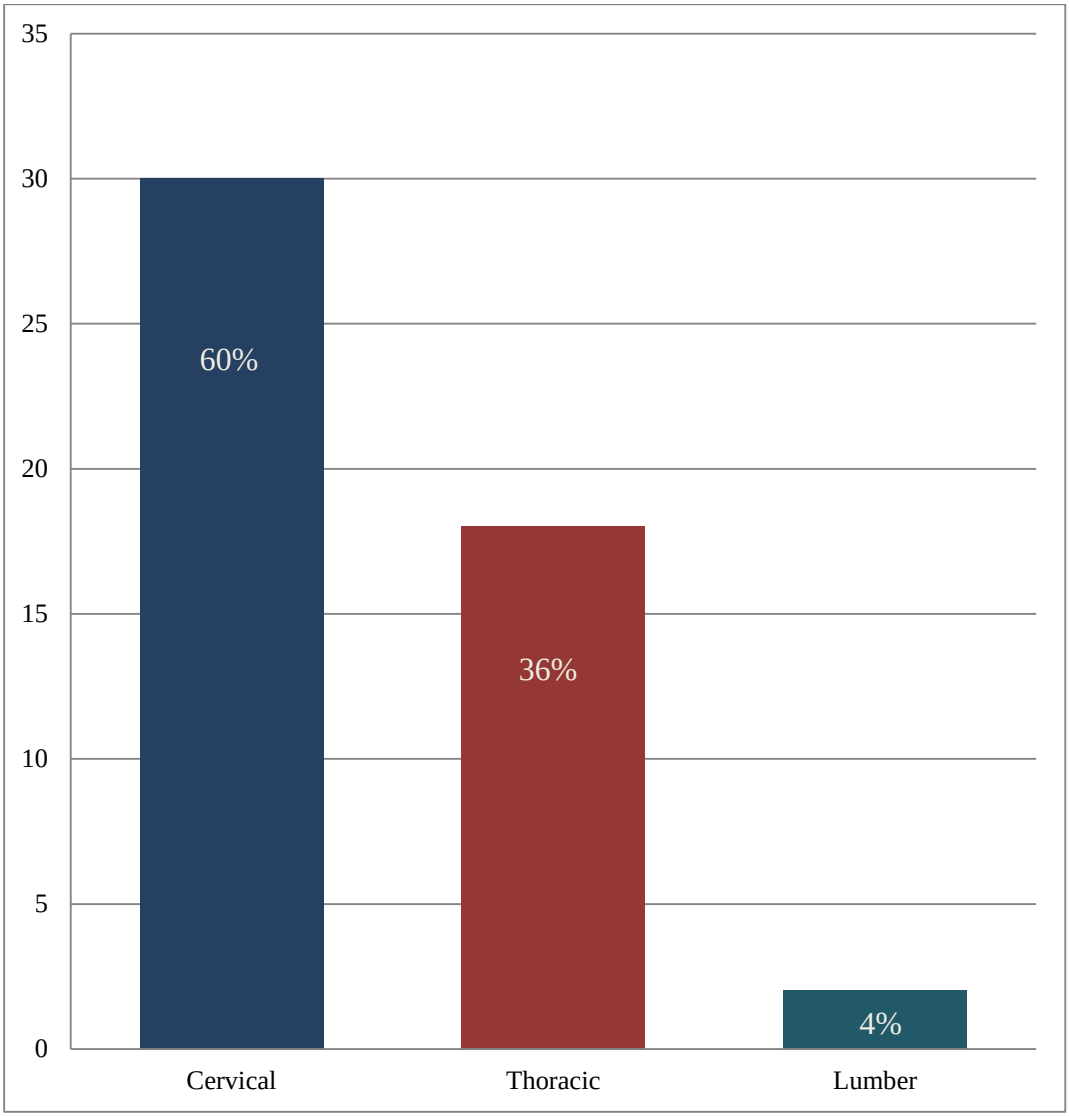


Figure-4.3: Neurological level of the participants

Information about neurological level and orthostatic hypotension

Among the 50 participants, 30 participants suffered from orthostatic hypotension their neurological level cervical 56.7% (n=17), thoracic 36.6% (n=11), lumber 6.7% (n=2). Another 20 participants who had no orthostatic hypotension their neurological level cervical 65% (n=13), thoracic 35% (n=7), lumber 0 (Table-4.2).

Table-4.1: Information about neurological level and orthostatic hypotension

	Neurological level of the participants			
Blood pressure change from lying to sitting	**Cervical n (%)**	**Thoracic n (%)**	**Lumber n (%)**	**Total n (%)**
Yes	17 (56.7%)	11 (36.6%)	2 (6.7%)	**30 (100%)**
No	13 (65%)	7 (35%)	0	**20 (100%)**
Total	**30 (60%)**	**18 (36%)**	**2 (4%)**	**50 (100%)**

Occupation

Among 50 participants the frequency of occupation was 24% (n=12) participants were farmer, 4% (n=2) were carpenter, 8% (n= 4) were housewife, 16% (n=8) were students, 18% (n=9) were business and 30% (n=15) were from other occupation (Figure- 4.4).

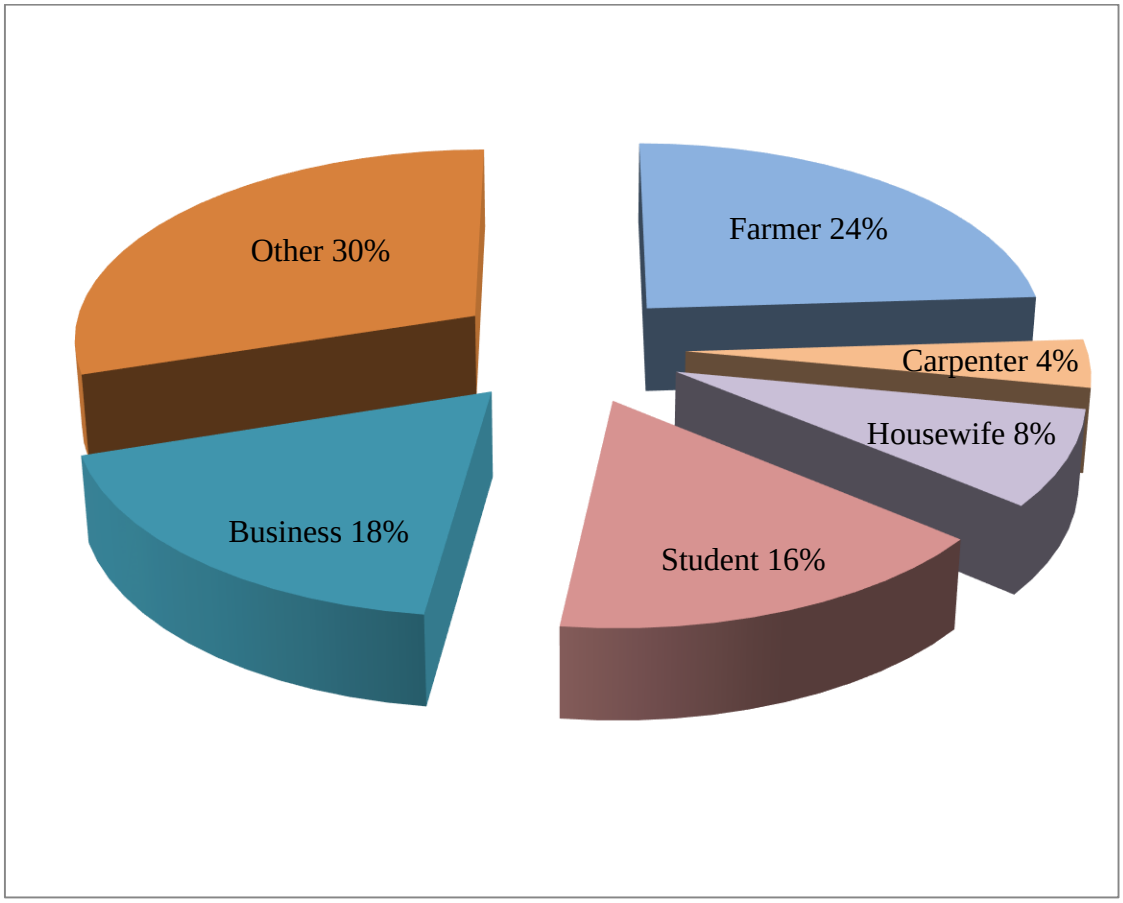


Figure-4.4: Occupation of the participants

Educational level of the participants

Among 50 participant the educational level are illiterate 18% (n=9), signature only 8% (n=4), primary 50% (n=25), S.S.C 12% (n=6). H.S.C 10% (n=5), graduate 2% (n=1) (Figure-4.5).

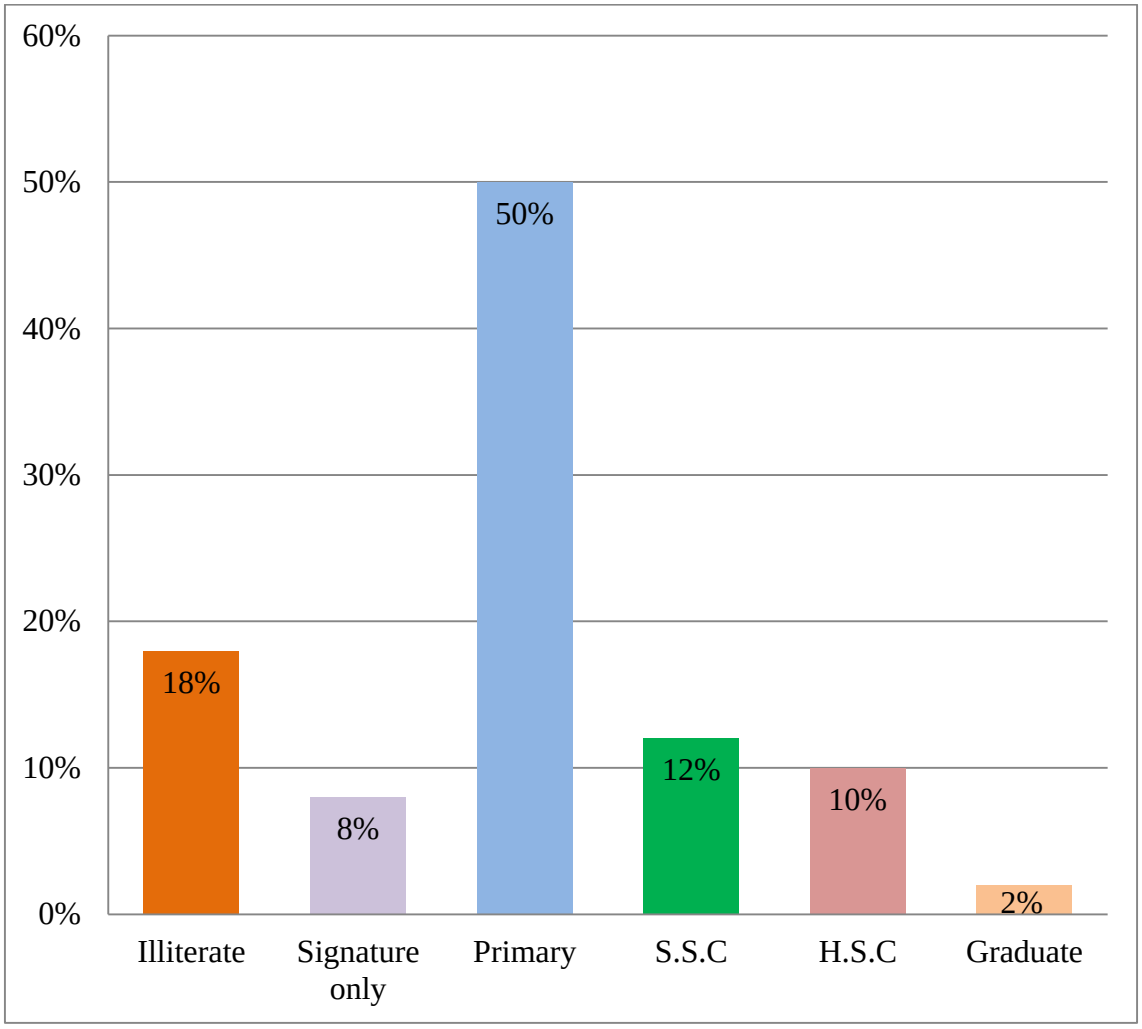


Figure-4.5: Educational level of the participants

Residential area

The frequency of residential area among 50 participants is 2 participants were urban and 48 participants were rural. The percentage was urban 4% and rural 96% (Figure- 4.6).

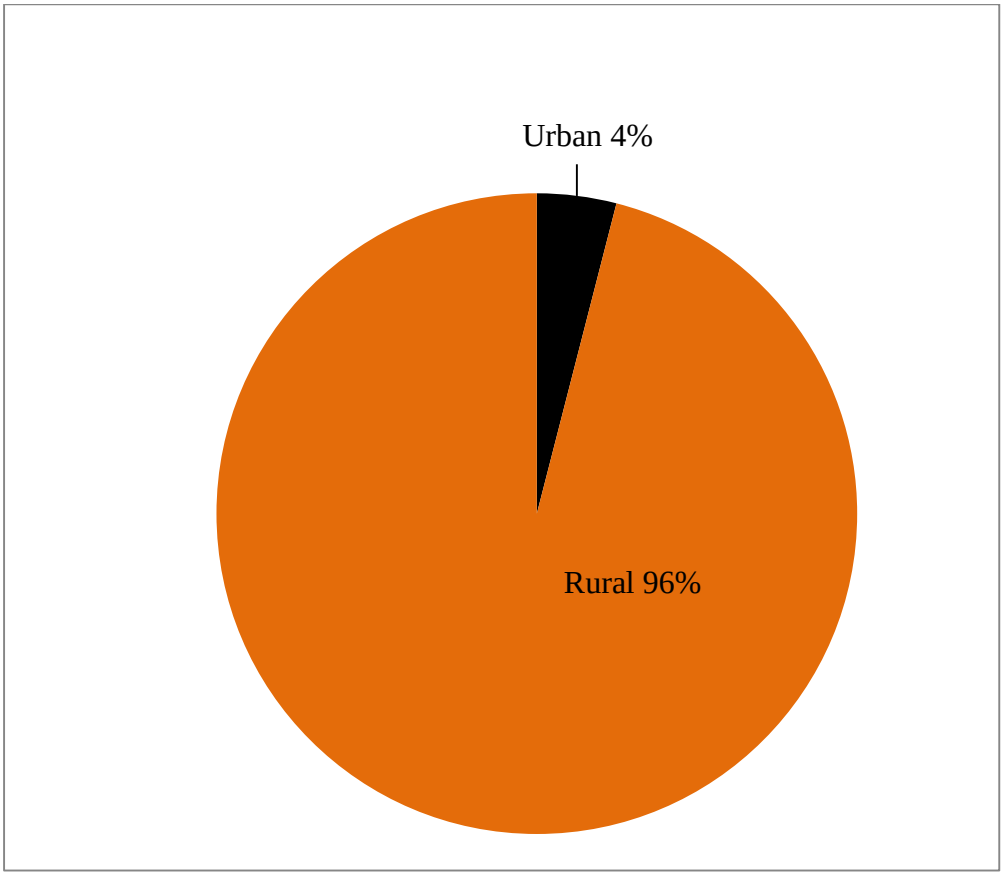


Figure-4.6: Residential area of the participant

Information about Classification of injury and orthostatic hypotension of the participant

Among the 50 participants, 30 participants suffered from orthostatic hypotension and their classification of injury was paraplegia 46.7% (n=14), tetraplegia 53.4% (n=16). 20 participants had not suffer from orthostatic hypotension their classification of injury was paraplegia 30% (n=6), tetraplegia 70% (n=14) (Table-4.3).

Table-4.2: Information about Classification of injury and orthostatic hypotension

Blood pressure change from lying to sitting	Classification of injury		Total n (%)
	Paraplegia n (%)	Tetraplegia n (%)	
Yes	14 (46.7%)	16 (53.4%)	**30 (100%)**
No	6 (30%)	14 (70%)	**20 (100%)**
Total	**20 (40%)**	**30 (60%)**	**50 (100%)**

Types of management

Among the 50 participants 64% (n=32) of the participants get conservative management and 36% (n=18) of the participants get surgical management (Figure-4.7).

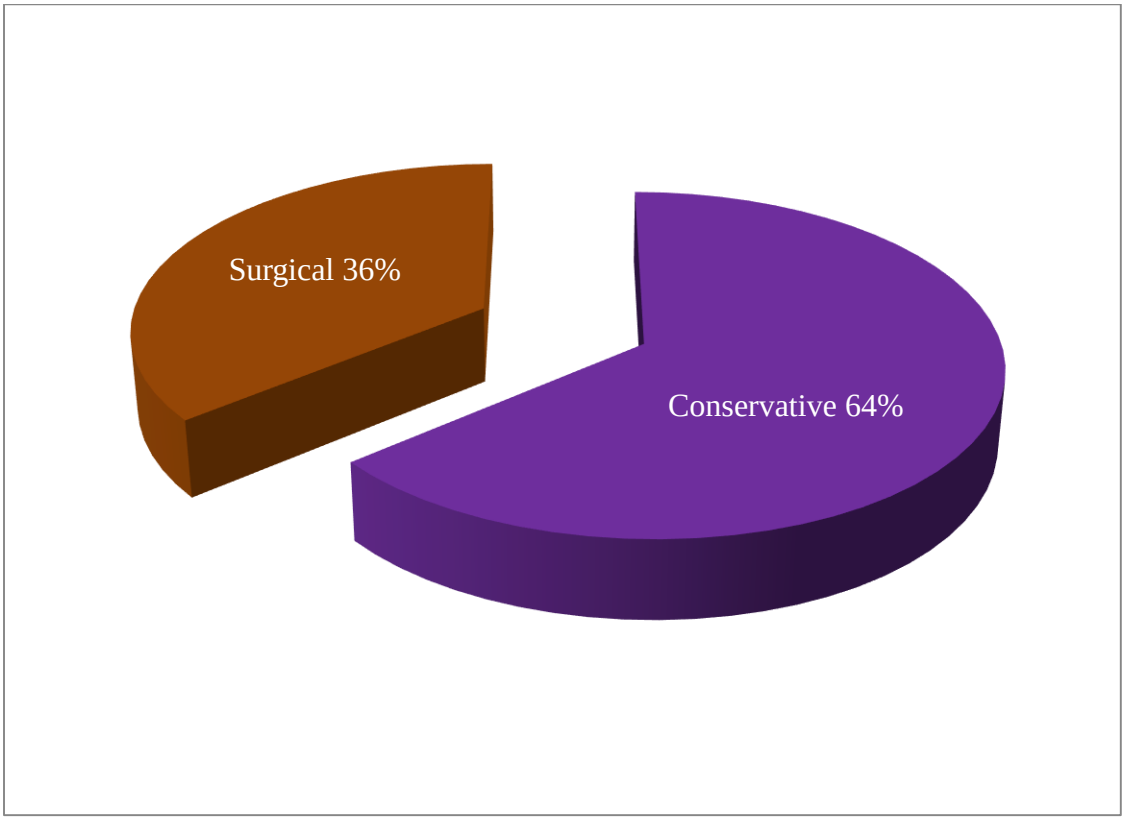


Figure-4.7: Types of management of the participants

Duration after injury

Among 50 participants duration after injury between (8-25) days was 2% (n=1) participant, between (26-42) days was 12% (n=6) participants, above 42 days was 86% (n=43) participants (Figure-4.8).

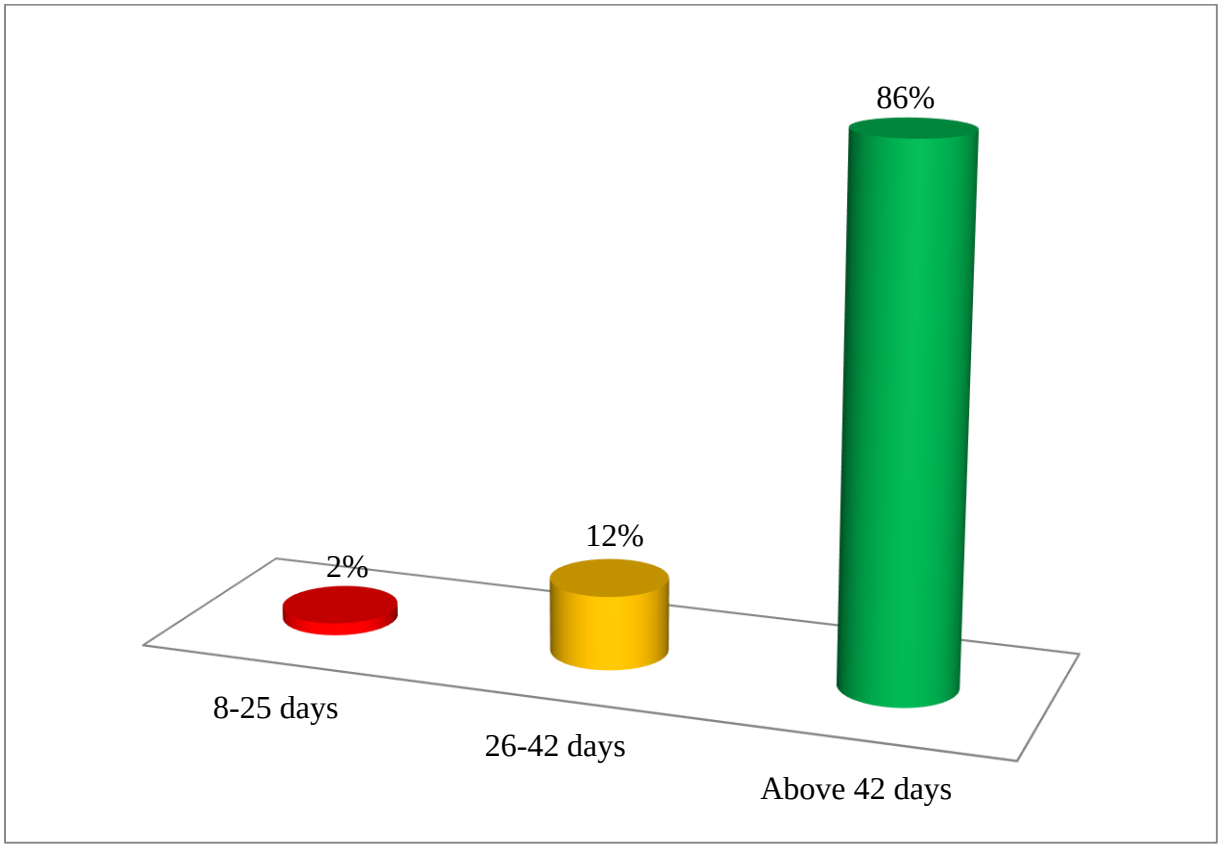


Figure-4.8: Duration after injury of the participants

Duration after bed rest

Among 50 participants duration after bed rest 1days were 20% (n=10) participants, between 2-5 days were 32% (n=18) participants, between 6-12 days were 12% (n=6) participants, above 12 days were 36% (n=16) participants (Table-4.4).

Table-4.3: Duration after bed rest of the participants

Duration after bed rest	Frequency	Percentage
1 days	10	20%
2-5 days	18	32%
6-12 days	6	12%
Above 12 days	16	36%

Symptoms of orthostatic hypotension

Among 50 participants the symptom of orthostatic hypotension such as dizziness found 76% (n=38), light headedness found 24% (n=12), faint found 62% (n=31), problem with vision found 50% (n=25), muscle weakness found 50% (n=25), fatigue found 62% (n=31), trouble concentration 38% (n=19), head neck discomfort 30% (n=15), Vomiting 12% (n=6) (Figure-4.9).

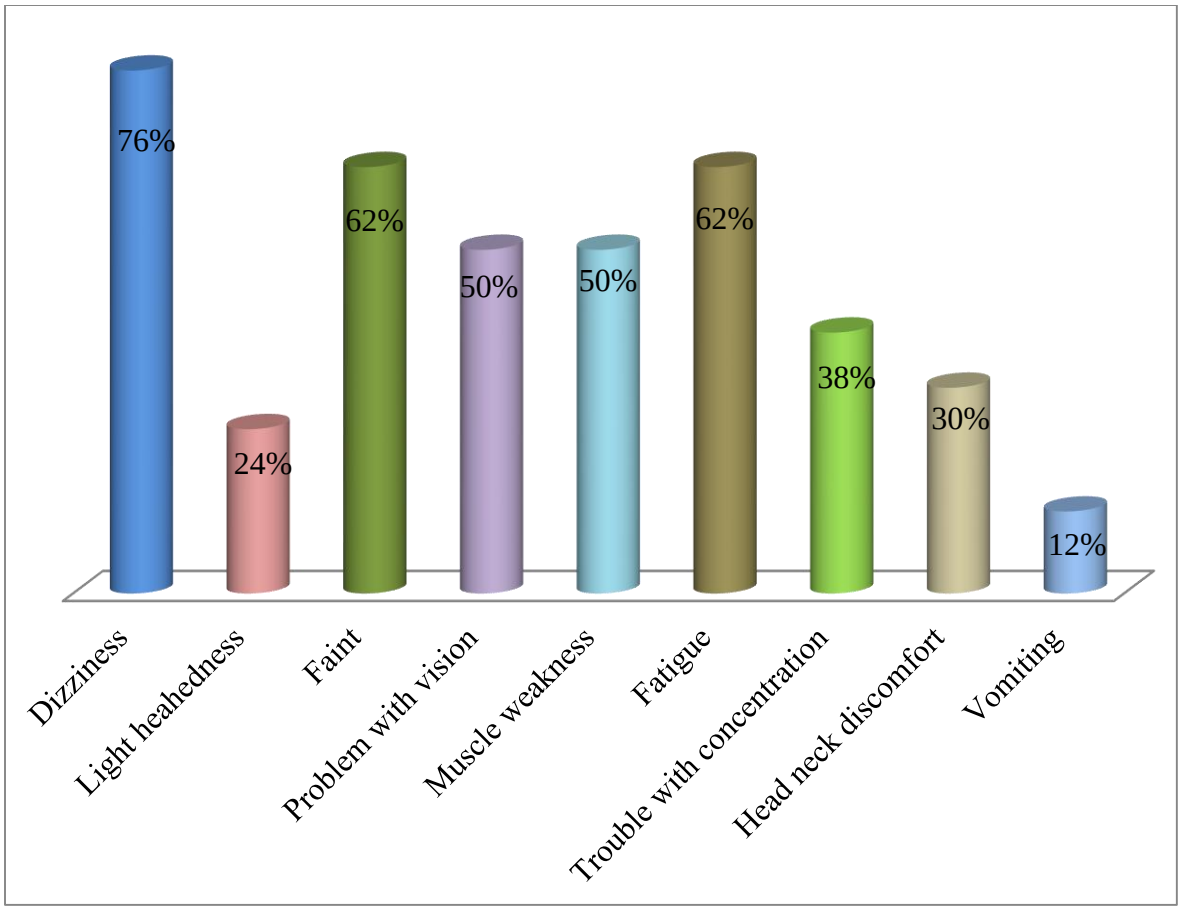


Figure-4.9: Symptoms of orthostatic hypotension of participants

Blood pressure in lying flat-diastolic

Among the 50 participants diastolic blood pressure in lying flat were 70 mm of Hg among 34% (n=17) participants, below 70 mm of Hg among 30% (n=15) participants, 80 mm of Hg among 26% (n=13) participants, above 80 mm of Hg among 10% (n=5) participants (Table-4.5).

Table-4.4: Blood pressure in lying flat-Diastolic

Blood pressure-diastolic	Frequency	Percentage
70 mm of Hg	17	34%
Below 70 mm of Hg	15	30%
80 mm of Hg	13	26%
Above 80 mm of Hg	5	10%

Blood pressure in lying flat-Systolic

Among 50 participants systolic blood pressure in lying flat were 100 mm of Hg among 44% (n=22) participants, below 100 mm of Hg among 20% (n=10) participants, 120 mm of Hg among 28% (n=14) participants, above 120 mm of Hg among 8% (n=4) participants (Table-4.6).

Table-4.5: Blood pressure lying flat-Systolic

Blood pressure-Systolic	Frequency	Percentage
100 mm of Hg	22	44%
Below 100 mm of Hg	10	20%
120 mm of Hg	14	28%
Above 120 mm of Hg	4	8%

Blood pressure measurement when head is tilt up to 60 degree –diastolic

Among 50 participants diastolic blood pressure measurement when head is tilt from bed up to 60 degree were 70 mm of Hg among 38% (n=19) participants, below 70 mm of Hg among 50% (n=25) participants, 80 mm of Hg among 8% (n=4) participants, above 80 mm of Hg among 4% (n=2) participants (Table-4.7).

Table-4.6: Blood pressure when head is tilt from bed up to 60 degree-Diastolic

Blood pressure when head is tilt up to 60 degree	Frequency	Percentage
70 mm of Hg	19	38%
Below 70 mm of Hg	25	50%
80 mm of Hg	4	8%
Above 80 mm of Hg	2	4%

Blood pressure measurement when head is tilt up to 60 degree –Systolic

Among 50 participants systolic blood pressure measurement when head is tilt from bed up to 60 degree were 100 mm of Hg among 38% (n=19) participants, below 100 mm of Hg among 44% (n=22) participants, 120 mm of Hg among 10% (n=5) participants, above 120 mm of Hg among 8% (n=4) participants (Table-4.8).

Table-4.7: Blood pressure when head is tilt from bed up to 60 degree-Systolic

Blood pressure when head is tilt up to 60 degree	Frequency	Percentage
100 mm of Hg	19	38%
Below 100 mm of Hg	22	44%
120 mm of Hg	5	10%
Above 120 mm of Hg	4	8%

Pulse measurement

Among 50 participants pulse measurement when lying flat between 60-100 per minutes found 94% (n=47) participants, below 60 per minutes found 6% (n=3) participants. Pulse measurements when head is tilt from bed up to 60 degree between 60-100 per minutes found 90% (n=45) participants, below 60 per minutes found 10% (n=5) participants (Table 4.9).

Table-4.8: Pulse measurement

Pulse measurement	When lying flat		Head tilt up to 60 degree	
	Frequency	Percent	Frequency	Percentage
60 per minutes	0	0	0	0
60-100 per minutes	47	94	45	90%
Below 60 per minutes	3	6	5	10%
Above 100 per minutes	0	0	0	0

CHAPTER V DISCUSSION

The present study used a cross-sectional design to find out the prevalence of orthostatic hypotension among the SCI patients in CRP. The results of this study showed that the prevalence of orthostatic hypotension among the SCI patients at CRP was 60%. Sidorov et al. (2008) have found that 60% of individuals with SCI exhibit evidence of OH during early rehabilitation. One study reports orthostatic hypotension during tilting in 57% of SCI patients (Cariga et al., 2002). Illman et al. (2000) enrolled 14 acute SCI patients; 73.6% of patients had OH during rehabilitation. The prevalence of orthostatic hypotension (OH) was 21% and was related to the total motor score and resting seated blood pressures. Cervical injuries had the highest prevalence (Sisto et al., 2012).

This study found the age range of the participants was 11-71 years and their mean age were 32.18 with standard deviation (± 14.958). Most of the participants were between 21-30 years of old. Neurological level of the participants was cervical 60%, thoracic 36%, lumber 4%. Sidorov et al. (2008) reported that OH persisted in 74% of cervical and 20% of upper thoracic motor complete SCI patients during the first month following SCI. In this study we observed that orthostatic hypotension most commonly occur in cervical 56.7%. This study shows that most of the participants were cervical injury patients and majority level was C4. It was reported that acute SCI in humans, especially at the cervical level, results in severe hypotension and persistent bradycardia that are common components of neurogenic shock (Krassioukov et al., 2006). Ackery et al. (2004) found that the majority of injuries occurred in the cervical spinal cord with C5 being the most common level The study shows the occupation of the participants and the occupation was 24% (n=12) participants were farmer, 4% were carpenter, 8% were housewife, 16% were students, 18% were business and 30% were from other occupation. The education level of the participants were illiterate 18%, signature only 8%, primary 50%, S.S.C 12%, H.S.C 10%, graduate 2%. Most of the participants were from rural area 96%, only 4% from urban area. In this study among the 50 participants, 30 participants suffered from orthostatic hypotension and their classification of injury was paraplegia 46.7%, tetraplegia 53.4%. 20 participants had not suffered from orthostatic hypotension their classification of injury was paraplegia 30%, tetraplegia 70%. Illman et al. (2000) reported

that OH was most likely to develop in quadriplegic rather than in paraplegic individuals regardless of grade of injury. Most of the participants of this study got conservative management 64%; others got surgical management 36%.

In this study most of the participants duration after injury above 42 days 86% participants, between (26-42) days were 12% participants, between (8-25) days were 2% participants. It is well established that OH hinders the rehabilitation process during the acute and sub-acute phases of SCI (Bravo et al., 2004). In this study duration after bed rest 1days were 20% participants, between 2-5 days were 32% participants, between 6-12 days were 12% participants, and above 12 days were 36% participants.

In this study the symptom of orthostatic hypotension such as dizziness found 76%, light headedness found 24%, faint found 62%, problem with vision found 50%, muscle weakness found 50%, fatigue found 62%, trouble concentration 38%, head neck discomfort 30%, Vomiting 12%. Symptoms of orthostatic hypotension were (such as lightheadedness or dizziness) in 59% of SCI individuals. Symptomatic OH was reported in 58.9% of the treatments and was perceived as the limiting factor for continued treatment in 43.2% of the treatments (Illman et al., 2000).

In this study diastolic blood pressure in lying flat were 70 mm of Hg among 34% participants, below 70 mm of Hg among 30% participants, 80 mm of Hg among 26% participants, above 80 mm of Hg among 10% participants. Systolic blood pressure in lying flat were 100 mm of Hg among 44% participants, below 100 mm of Hg among 20% participants, 120 mm of Hg among 28% participants, above 120 mm of Hg among 8% participants.

In this study diastolic blood pressure measurement when head is tilt from bed up to 60 degree was 70 mm of Hg among 38% participants, below 70 mm of Hg among 50% participants, 80 mm of Hg among 8% participants, above 80 mm of Hg among 4% participants. Systolic blood pressure measurement when head is tilt from bed up to 60 degree were 100 mm of Hg among 38% participants, below 100 mm of Hg among 44% participants, 120 mm of Hg among 10% participants, above 120 mm of Hg among 8% participants.

In this study pulse measurement when lying flat between 60-100 per minutes found 94% participants, below 60 per minutes found 6% participants. Pulse measurements when head is tilt from bed up to 60 degree between 60-100 per minutes found 90% participants; below 60 per minutes found 10% participants.

Limitation of the study

Some limitations were noted for this study. First of all, time was limited which had a great deal of impact on the study. If enough time was available knowledge on the thesis could be extended. On the other hand, the result of the study cannot be generalized to the whole population of SCI patients in Bangladesh as the samples were collected only from the CRP and the data were collected from very small population. The number of subjects (50) was not sufficient for the study. I could not able to collect samples by random selection because, there were not adequate subjects, therefore, the external validity had not achieved in this research. This study has provided for the first time data on the prevalence of orthostatic hypotension among the SCI patient in Bangladesh. No research has been done before on this topic. So there was little evidence to support the result of this project in the context of Bangladesh. The researcher was a 4th year B.Sc. in physiotherapy student and this was her first research project. She had limited experience with techniques and strategies in terms of the practical aspects of research. As it was the first survey of the researcher so might be there were some mistakes that overlooked by the researcher.

CHAPTER VI CONCLUSION AND RECOMMENDATION

6.1 Conclusion

In general from this study can be concluded that people with SCI are vulnerable across their lifespan to orthostatic hypotension that can interfere with initial rehabilitation in the acute post-traumatic recovery phase and successful reintegration into the communities, as well as lead to more serious medical complications. Orthostatic hypotension is responsible for physical, social, vocational, and economic costs and impairs quality of life. The prevalence of orthostatic hypotension among the SCI patients at CRP is 60%. This result is significantly high to the complete paraplegic patients. Most of the patients have poor socioeconomic status and low literacy rate.

6.2 Recommendation

This study showed that the prevalence of orthostatic hypotension among the SCI patients at CRP was 60% which is only at CRP, as there was time limitation it was not able to gather huge amount of participant and for this result cannot be generalized So for further study it is strongly recommended to increase sample size to generalize the result in all of the SCI patients in Bangladesh. As a consequence of the research, it is recommended that a larger sample should be chosen randomly for the cross sectional study at the whole Bangladesh to generalize this study. In case of further study it is also recommended that to find the association between orthostatic hypotension and socio-economic demography, medical causes and risk factors. It should also be encouraged for further study purpose in Bangladesh for developing the physiotherapy profession. So this study can make more sense which will help to improve efficacy of physiotherapeutic intervention for orthostatic hypotension among the SCI patients which will be beneficial for our profession and also for the people of Bangladesh who are suffer from SCI. If any researcher wants to replicate this study there is scope for it. In future, there is scope for further studies to be done in relation to this study.

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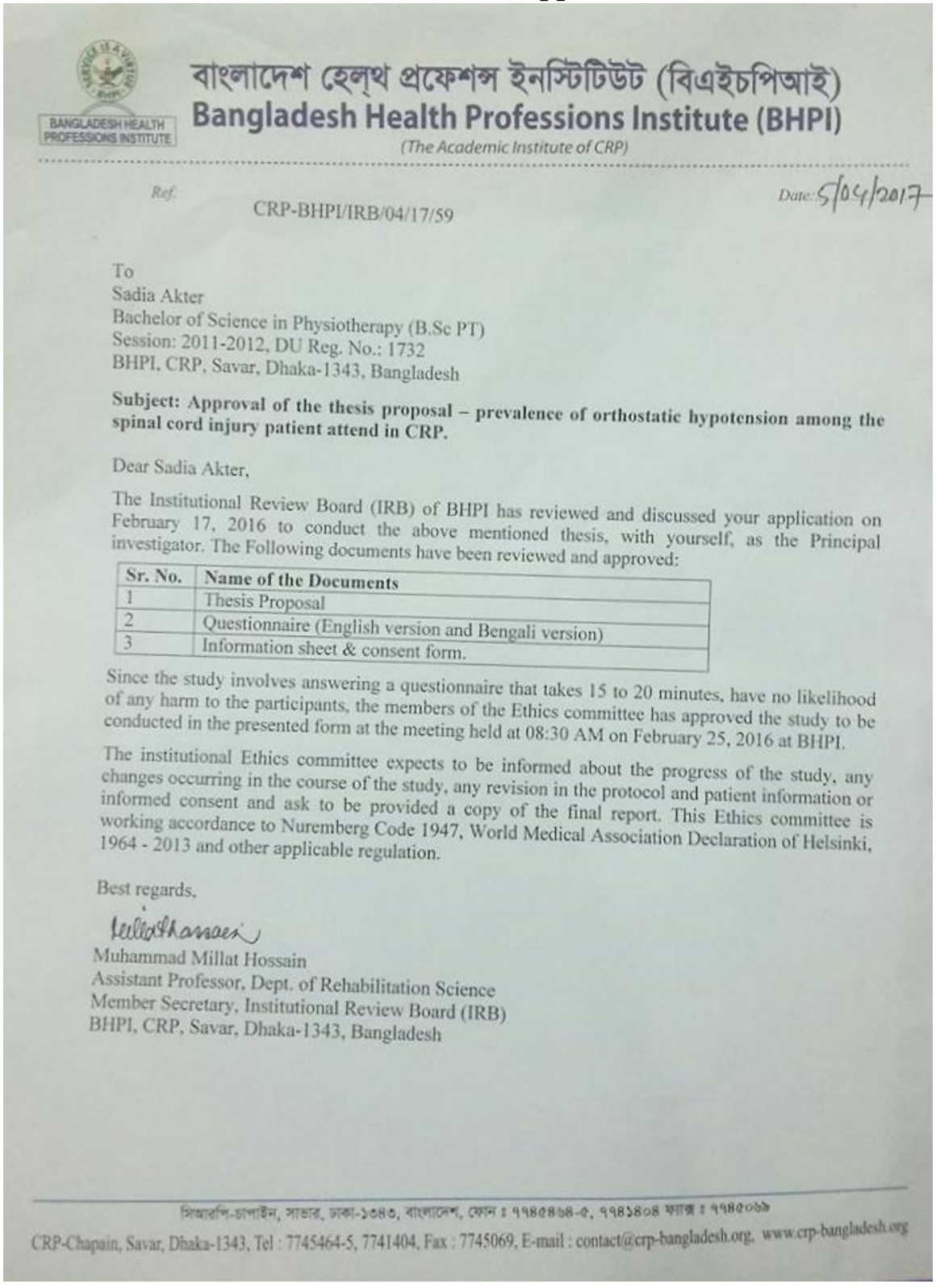
APPENDIX

Institutional review board approval letter



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

Ref: CRP-BHPI/IRB/04/17/59

Date: 5/04/2017

To
Sadia Akter
Bachelor of Science in Physiotherapy (B.Sc PT)
Session: 2011-2012, DU Reg. No.: 1732
BHPI, CRP, Savar, Dhaka-1343, Bangladesh

Subject: Approval of the thesis proposal – prevalence of orthostatic hypotension among the spinal cord injury patient attend in CRP.

Dear Sadia Akter,

The Institutional Review Board (IRB) of BHPI has reviewed and discussed your application on February 17, 2016 to conduct the above mentioned thesis, with yourself, as the Principal investigator. The Following documents have been reviewed and approved:

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

Since the study involves answering a questionnaire that takes 15 to 20 minutes, have no likelihood of any harm to the participants, the members of the Ethics committee has approved the study to be conducted in the presented form at the meeting held at 08:30 AM on February 25, 2016 at BHPI.

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

সিআরপি-চাপাইন, সাভার, ঢাকা-১৩৪৩, বাংলাদেশ, ফোন : ৭৭৪৫৪৬৪-৫, ৭৭৪১৪০৪ ফ্যাক্স : ৭৭৪৫০৬৯
CRP-Chapain, Savar, Dhaka-1343, Tel : 7745464-5, 7741404, Fax : 7745069, E-mail : contact@crp-bangladesh.org, www.crp-bangladesh.org

February 17, 2016
The Chairman
Institutional Review Board (IRB)
Bangladesh Health Professions Institute (BHPI)
CRP-Savar, Dhaka-1343, Bangladesh

Subject: **Application for review and ethical approval.**

Sir,

With due respect I would like to draw your kind attention that I am a student of Bachelor of Science in Physiotherapy at Bangladesh Health Professions Institute (BHPI)- an academic institute of CRP under Faculty of Medicine of University of Dhaka (DU). I have to conduct a thesis entitled, "Prevalence of orthostatic hypotension among the spinal cord injury patient attend at CRP" under honorable supervisor, Md. Shofiqul Islam, Assistant Professor Department of Physiotherapy BHPI, CRP, Savar, Dhaka. The purpose of the study is to find out the prevalence of orthostatic hypotension among the spinal cord injury patient attend at CRP.
Questionnaire will be used that will take about 15 to 20 minutes. Data collectors will receive informed consents from all participants. Any data collected will be kept confidential.

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

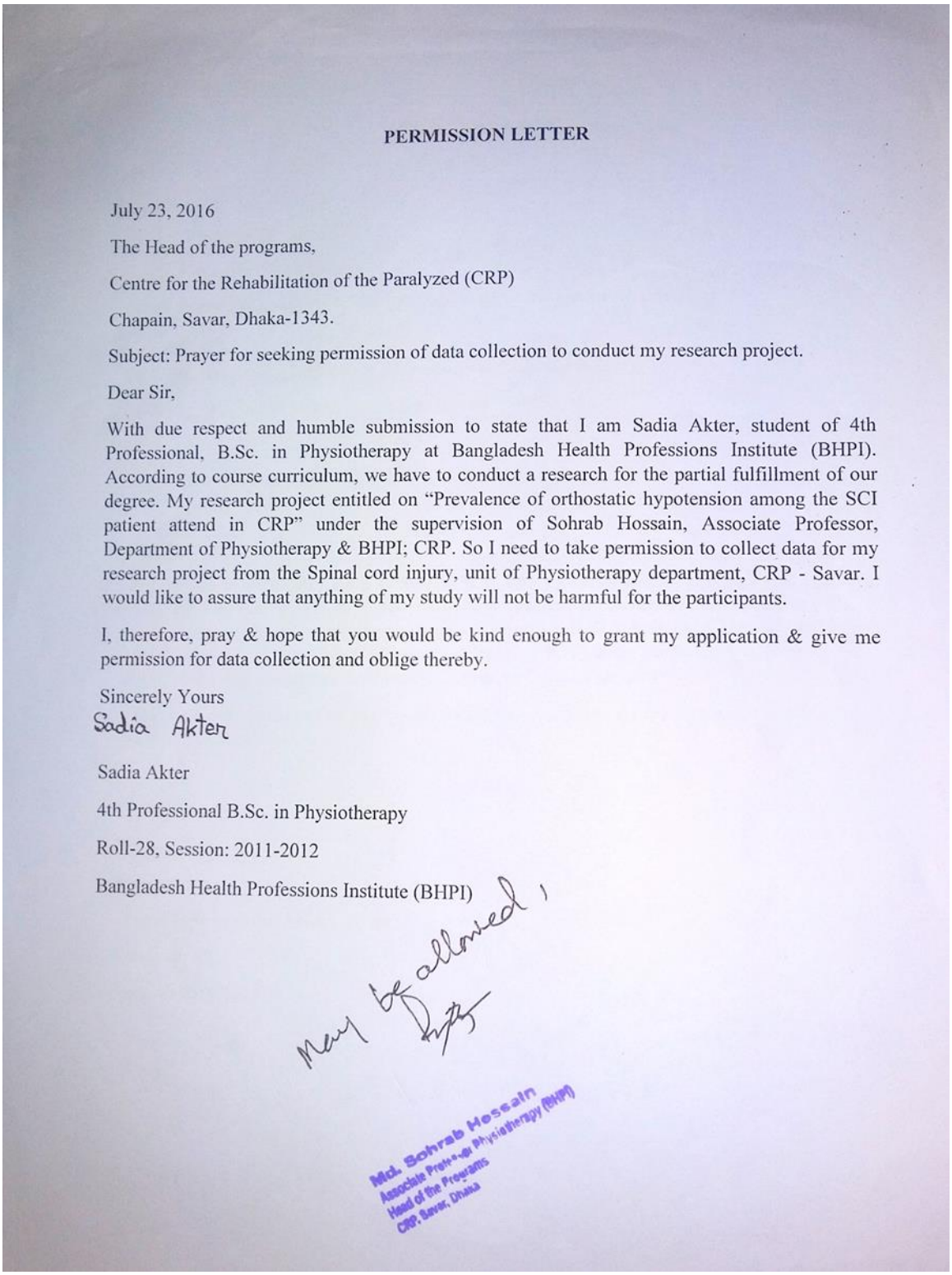
Sincerely yours,
Sadia Akter
Sadia Akter
Bachelor of Science in Physiotherapy (B.Sc PT)
Session: 2011-2012, DU Reg. No.: 1732
BHPI, CRP, Savar, Dhaka-1343, Bangladesh.

Recommendation from the thesis supervisor:

.....
Md. Shofiqul Islam
Assistant Professor
Department of Physiotherapy
BHPI, CRP, Savar, Dhaka

Attachment: Thesis Proposal including measurement tools and process and procedure for maintaining confidentiality, Questionnaire (English version), Information sheet & consent.

Permission letter



PERMISSION LETTER

July 23, 2016

The Head of the programs,

Centre for the Rehabilitation of the Paralyzed (CRP)

Chapain, Savar, Dhaka-1343.

Subject: Prayer for seeking permission of data collection to conduct my research project.

Dear Sir,

With due respect and humble submission to state that I am Sadia Akter, student of 4th Professional, B.Sc. in Physiotherapy at Bangladesh Health Professions Institute (BHPI). According to course curriculum, we have to conduct a research for the partial fulfillment of our degree. My research project entitled on "Prevalence of orthostatic hypotension among the SCI patient attend in CRP" under the supervision of Sohrab Hossain, Associate Professor, Department of Physiotherapy & BHPI; CRP. So I need to take permission to collect data for my research project from the Spinal cord injury, unit of Physiotherapy department, CRP - Savar. I would like to assure that anything of my study will not be harmful for the participants.

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

Sincerely Yours

Sadia Akter

Sadia Akter

4th Professional B.Sc. in Physiotherapy

Roll-28, Session: 2011-2012

Bangladesh Health Professions Institute (BHPI)

May be allowed

Md. Sohrab Hossain
Associate Professor, Physiotherapy (BHPI)
Head of the Programs
CRP, Savar, Dhaka

মৌখিক অনুমতি পত্র/ সম্মতি পত্র

(অংশগ্রহণকারীকে পড়ে শোনাতে হবে)

আসসালামুয়ালাইকুম/নমস্কার,

আমার নাম সাদিয়া আক্তার, আমি এই গবেষণা প্রকল্পটি বাংলাদেশ হেলথ্ প্রফেশনস ইনষ্টিটিউট (বিএইচপিআই)-এ পরিচালনা করছি যা আমার ৪র্থ বর্ষ বিএসসি ইন ফিজিওথেরাপী কোর্সের অধিভুক্ত । আমার গবেষণার শিরোনাম হল-"সিআরপিতে মেরুরজ্জুতে আঘাত প্রাপ্ত রোগীদের মধ্যে অবস্থান পরিবর্তনের সাথে মাথা ঘুরানোর হার"। আমি এক্ষেত্রে আপনাকে কিছু ব্যক্তিগত এবং মেরুরজ্জুর আঘাত সম্পর্কে আনুষাঙ্গিক কিছু প্রশ্ন করতে চাচ্ছি। এতে আনুমানিক ৩০-৪০ মিনিট সময় নিবো ।

আমি আপনাকে অনুগত করছি যে, এটা আমার অধ্যয়নের অংশ এবং যা অন্যকোন উদ্দেশ্যে ব্যবহৃত হবে না। গবেষক সরাসরি এই স্নায়ুজ্ঞান অধ্যয়নের সাথে অন্তর্ভুক্ত নয়। তাই এই গবেষনায় আপনার অংশগ্রহণ বর্তমান ও ভবিষ্যৎ চিকিৎসায় কোন প্রকার প্রভাব ফেলবেনা। আপনি যে সব তথ্য প্রদান করবেন তার গোপনীয়তা বজায় থাকবে এবং আপনার প্রতিবেদনের ঘটনা প্রবাহে এটা নিশ্চিত করা হবে যে এই তথ্যের উৎস অপ্রকাশিত থাকবে ।

এই অধ্যয়নে আপনার অংশগ্রহণ স্বেচ্ছাপ্রণোদীত এবং আপনি যে কোন সময় এই অধ্যয়ন থেকে কোন নেতিবাচক ফলাফল ছাড়াই নিজেকে প্রত্যাহার করতে পারবেন এছাড়াও কোন নির্দিষ্ট প্রশ্ন অপছন্দ হলে উত্তর না দেয়ার এবং সাক্ষাৎকারের সময় কোন উত্তর না দিতে চাওয়ার অধিকারও আপনার আছে ।

এই অধ্যয়নে অংশগ্রহণকারী হিসেবে যদি আপনার কোন প্রশ্ন থাকে তাহলে আপনি আমাকে আথবা/এবং আমার সুপারভাইসর শফিকুল ইসলাম, সহকারী অধ্যাপক, ফিজিওথেরাপী বিভাগ, বিএইচপিআই, সিআরপি, সাভার, ঢাকা-তে যোগাযোগ করতে পারেন ।

সক্ষাৎকার শুরু করার আগে কি আপনার কোন প্রশ্ন আছে?

আমি কি আপনার আনুমতি নিয়ে এই সাক্ষাৎকার শুরু করতে পারি ?

হ্যাঁ

না

১। অংশগ্রহণকারীর স্বাক্ষর.....

২। সাক্ষাৎগ্রহনকারীর স্বাক্ষর.....

৩। সাক্ষীর স্বাক্ষর .....

শিরোনামঃ-“সিআরপিতে মেরুরজ্জুতে আঘাত প্রাপ্ত রোগীদের মধ্যে অবস্থান পরিবর্তনের সাথে মাথা ঘুরানোর হার”

বাংলা প্রশ্নাবলী

সনাক্তকরন নং-	সাক্ষাৎকারের তারিখ -
মোবাইল নম্বর -	
ঠিকানা -	

প্রশ্ন নং	প্রশ্ন	উত্তর	কোড
১।	নাম		
২।	বয়স		
৩।	আঘাতের তারিখ		
৪।	ভর্তির তারিখ		
৫।	ডাটা সংগ্রহের তারিখ		
৬।	স্কেলেটাল লেবেল		
৭।	নিউরোলজিকাল লেবেল		

৮।	পেশা	কৃষক কাঠমিস্ত্রি গৃহিণী ছাত্র/ছাত্রী ব্যবসায়ী অন্যান্য	০১ ০২ ০৩ ০৪ ০৫ ০৬
৯।	আপনার শিক্ষাগত যোগ্যতা কি?	অশিক্ষিত স্বাক্ষর প্রাথমিক এস এস সি এইচ এস সি স্নাতক স্নতকোত্তর	০১ ০২ ০৩ ০৪ ০৫ ০৬ ০৭
১০।	বাসস্থান	শহর গ্রাম	০১ ০২
১১।	আপনার পরিবারে কয়জন উপার্জন করে	মাত্র এক জন দুই বা দুই এর বেশি	০১ ০২
১২।	আপনার পরিবারের মাসিক আয় কত?	১০০০-৫০০০ ৬০০০-১০০০০ ১১০০০-১৫০০০ ১৫০০০ এর বেশি	০১ ০২ ০৩ ০৪
১৩।	আঘাতের ধরন	প্যারাপ্লেজিক টেট্রাপ্লেজিক	০১ ০২
১৪।	আপনি কোন ধরনের চিকিৎসা নিচ্ছেন ?	• কনজারভেটিভ ট্রাকশন বেড রেস্ট • সারজিকেল	০১ ০২
১৫।	আঘাতের পরের সময়কাল	১-৭ দিন ৮-১৫ দিন ২৬-৪২ দিন ৪২ দিনের বেশি	০১ ০২ ০৩ ০৪

১৬।	পূর্ণ বিশ্রাম (বেডরেস্ট) সম্পূর্ণ হওয়ার সময়কাল	১ দিন ২-৫ দিন ৬-১২ দিন ১২ দিনের বেশি	০১ ০২ ০৩ ০৪
১৭।	আপনি কি মাথা ঘুরানো অনুভব করেন যখন আপনার মাথা বিছানা থেকে ৬০ডিগ্রী উপরে উঠানো হয়?	হ্যাঁ না	০১ ০২
১৮।	আপনি কি মাথা ব্যাথা অনুভব করেন যখন আপনার মাথা বিছানা থেকে ৬০ডিগ্রী উপরে উঠানো হয় ?	হ্যাঁ না	০১ ০২
১৯।	আপনি কি মাথায় দুর্বলতা অনুভব করেন যখন আপনার মাথা বিছানা থেকে ৬০ডিগ্রী উপরে উঠানো হয় ?	হ্যাঁ না	০১ ০২
২০।	আপনি কি চোখে দেখায় কোন সমস্যা অনুভব করেন যখন আপনার মাথা বিছানা থেকে ৬০ডিগ্রী উপরে উঠানো হয়?	হ্যাঁ না	০১ ০২
২১।	আপনি কি মাংসপেশিতে দুর্বলতা অনুভব করেন যখন আপনার মাথা বিছানা থেকে ৬০ডিগ্রী উপরে উঠানো হয় ?	হ্যাঁ না	০১ ০২
২২।	আপনি কি ক্লন্তি অনুভব করেন যখন আপনার মাথা বিছানা থেকে ৬০ডিগ্রী উপরে উঠানো হয় ?	হ্যাঁ না	০১ ০২
২৩।	আপনার কি মনোযোগ দিতে সমস্যা হয় যখন আপনার মাথা বিছানা থেকে ৬০ডিগ্রী উপরে উঠানো হয় ?	হ্যাঁ না	০১ ০২
২৪।	আপনি কি মাথা/ঘাড়ে কোন অসুবিধা হয় যখন আপনার মাথা বিছানা থেকে ৬০ডিগ্রী উপরে উঠানো হয় ?	হ্যাঁ না	০১ ০২
২৫।	আপনার কি বমি বমি ভাব হয় যখন আপনার মাথা বিছানা থেকে ৬০ডিগ্রী উপরে উঠানো হয় ?	হ্যাঁ না	০১ ০২

২৬।	রক্ত চাপ বিছানায় শুয়া অবস্থায় -ডায়াস্টোলিক	৭০ mm of Hg ৭০ mm of Hg এর কম ৮০ mm of Hg ৮০ mm of Hg এর বেশি	০১ ০২ ০৩ ০৪
২৭।	রক্ত চাপ বিছানায় শুয়া অবস্থায়-সিস্টোলিক	১০০mm of Hg ১০০mm of Hg এর কম ১২০mm of Hg ১২০mm of Hg এর বেশি	০১ ০২ ০৩ ০৪
২৮।	রক্ত চাপ যখন আপনার মাথা বিছানা থেকে ৬০ডিগ্রী উপরে উঠানো হয় -ডায়াস্টোলিক	৭০mm of Hg ৭০mm of Hg এর কম ৮০mm of Hg ৮০mm of Hg এর বেশি	০১ ০২ ০৩ ০৪
২৯।	রক্ত চাপ যখন আপনার মাথা বিছানা থেকে ৬০ডিগ্রী উপরে উঠানো হয়-সিস্টোলিক	১০০mm of Hg ১০০mm of Hg এর কম ১২০mm of Hg ১২০mm of Hg এর বেশি	০১ ০২ ০৩ ০৪
৩০।	হৃদস্পন্দন বিছানায় শুয়া অবস্থায়	৬০ per min ৬০-১০০ per min ৬০ per min এর কম ১০০ per min এর বেশি	০১ ০২ ০৩ ০৪
৩১।	হৃদস্পন্দন যখন মাথা বিছানা থেকে ৬০ডিগ্রী উপরে উঠানো হয়	৬০ per min ৬০-১০০ per min ৬০ per min এর কম ১০০ per min এর বেশি	০১ ০২ ০৩ ০৪
৩২।	রক্ত চাপ পরিবর্তনের পরিমাপ শুয়া থেকে বসা অবস্থায়	পরিবর্তন পরিবর্তন নয়	০১ ০২

VERBAL CONSENT STATEMENT

(Please read out to the participant)

Assalamualaikum/Namasker, my name is Sadia Akter. I am conducting this study for a B.sc in Physiotherapy project study dissertation titled "Prevalence of orthostatic hypotension among the spinal cord injury patient" under Bangladesh Health Professions Institute (BHPI), University of Dhaka. I would like to know about some personal and other related information regarding to orthostatic hypotension. You will perform some tasks which are mention in this form. This will take approximately 30-40 minutes.

I would like to inform you that this is a purely academic study and will not be used for any other purpose. The researcher is not directly related with this area (spinal cord injury), so your participation in the research will have no impact on your present or future treatment in this area (spinal cord injury unit). All information provided by you will be treated as confidential and in the event of any report or publication it will be ensured that the source of information remains anonymous.

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 query about the study or your right as a participant, you may contact with me, researcher and/or my supervisor Md. Shofiqul Islam**,** 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 or work?

YES

NO

Signature of the Participant …….

Signature of the Interviewer …….

Witness signature …….

Title: "Prevalence of orthostatic hypotension among the spinal cord injury patient"

Questionnaire

Identification number:	Date of Interview:
Contact number:	
Address:	

QN	Questions	Responses	Code
1.	Name		
2.	Age		
3.	Date of injury		
4.	Date of admission		
5.	Date of data collection		
6.	Skeletal level		
7.	Neurological level		

8.	Occupation	Farmer Carpenter House wife Student Business Others	01 02 03 04 05 06
9.	What is your educational level?	Illiterate Signature only Primary S.S.C HSC Graduation Post-graduation	01 02 03 04 05 06 07
10.	Residential area	Urban Rural	01 02
11.	How many earning member in your family?	Only one Two or more than two	01 02
12.	What your monthly family income?	1000-5000 6000-10000 11000-15000 > 15000	01 02 03 04
13.	Classification	Paraplegia Tetraplegia	01 02
14.	Type of management	• Conservative Traction Bed rest • Surgical	01 02
15.	Duration after injury	1-7 days 8-25 days 26-42 days Above 42 days	01 02 03 04

16.	Duration of completing bed rest	1 days 2-5 days 6-12 days Above 12 days	01 02 03 04
17.	Feeling dizziness when your head is tilt from bed up to 60 degree?	Yes No	01 02
18.	Feeling, light headedness when your head is tilt from bed up to 60 degree?	Yes No	01 02
19.	Feeling faint when your head is tilt from bed up to 60 degree?	Yes No	01 02
20.	Feeling any problem with vision (blurring, seeing spot) when your head is tilt from bed up to 60 degree?	Yes No	01 02
21.	Feeling any muscle weakness when your head is tilt from bed up to 60 degree?	Yes No	01 02
22.	Feeling fatigue when your head is tilt from bed up to 60 degree?	Yes No	01 02
23.	Feeling trouble concentrating when your head is tilt from bed up to 60 degree?	Yes No	01 02
24.	Feeling any head /neck discomfort when your head is tilt from bed up to 60 degree?	Yes No	01 02

25.	Feeling vomiting when your head is tilt from bed up to 60 degree?	Yes No	01 02
26.	Blood pressure measurement when lying flat – Diastolic	70 mm of Hg Below 70 mm of Hg 80 mm of Hg Above 80 mm of Hg	01 02 03 04
27.	Blood pressure measurement when lying flat – Systolic	100 mm of Hg Below 100 mm of Hg 120 mm of Hg Above 120 mm of Hg	01 02 03 04
28.	Blood pressure measurement when head is tilt from bed up to 60 degree – Diastolic	70 mm of Hg Below 70 mm of Hg 80 mm of Hg Above 80 mm of Hg	01 02 03 04
29.	Blood pressure measurement when head is tilt from bed up to 60 degree – Systolic	100 mm of Hg Below 100 mm of Hg 120 mm of Hg Above 120 mm of Hg	01 02 03 04
30.	Pulse measurement when lying flat	60 per minutes 60-100 per minutes Below 60 per minutes Above 100 per minutes	01 02 03 04
31.	Pulse measurement when head is tilt from bed up to 60 degree	60 per minutes 60-100 per minutes Below 60 per minutes Above 100 per minutes	01 02 03 04
32.	Measurement blood pressure changes from lying to sitting	Change No change	01 02