EFFECTIVENESS OF PELVIC FLOOR MUSCLES STRENGTHENING FOR INCONTINENCE PATIENTS FOLLOWING INCOMPLETE SPINAL CORD INJURY

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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 PELVIC FLOOR MUSCLES STRENGTHENING FOR INCONTINENCE PATIENTS FOLLOWING INCOMPLETE SPINAL CORD INJURY

Submitted by **Md. Abdul Fattah**, for partial fulfillment of the requirements for the degree of Bachelor of Science in Physiotherapy (B.Sc.PT).

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Declaration

I declare that the work presented here is my own. All sources used in the study 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 of my supervisor.

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Abbreviation

ASIA:	American Spinal Injury Association
BHPI:	Bangladesh Health Professions institute
BMI:	Body Mass Index
CNS:	Central Nervous System
CRP:	Centre for the Rehabilitation of the Paralysed
DALY:	Disability Adjusted Life Year
DIR:	Detrusor Inhibition Reflex
IC:	Intermittent Catheterization
ICS:	International Continence Society
KHQ:	King's Health Questionnaire
LUTE:	Lower Urinary Tract Exercises
OI:	Overflow incontinence
P Value:	Probability Value
PFM:	Pelvic Floor Muscle
PFM:	Pelvic Floor Muscle Exercise
QOL:	Quality of Life
RCT:	Randomized Control Trail
SCI:	Spinal Cord Injury
SD:	Standard Deviation
SPSS:	Statistical Package of Social Sciences
SUI:	Stress Urinary Incontinence
UI:	Urinary Incontinence or and Urge Incontinence
UTI:	Urinary Tract Infection
WHO:	World Health Organization

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ABSTRACT

Purpose: To identify the effectiveness of of pelvic floor muscles strengthening for incontinence patients following incomplete spinal cord injury. *Objectives:* To identify the impact of urinary incontinence on quality of life among spinal cord injury patient,to measure the effectiveness of pelvic floor muscle exercise. *Methodology:* Quasi-experimental design was used for the study. Total twenty two (22) incomplete spinal cord injury (SCI) patients having urinary incontinence were selected for this study. The inclusion criteria for sample selection were: Patient with incomplete spinal cord injury, patient with incontinence, muscle power according to Oxford grade 3 or above, willingness to participate, Age range: 15-60 years, both male and female included. The exclusion criteria were: Patient with severe complications, muscle power according to Oxford grade below 3, Patient with mental illness, physically inactive patient, Age less than 15 years and more than 60 years are excluded. Twenty two (22) patients were randomly assigned into two groups named 'Control group' and 'Experimental group' by lottery. The data collection was done by a King's Health Questionnaire and bladder diary that was used before treatment and after treatment. *Result:* Data analysis was done with a statistical calculation using inferential statistical parametric unrelated't' test. In this study three domains: Physical limitation, Severity measures, Episodes of leaking urine had showed significant level of 'p' value ($p<0.025$, $p<0.025$, $p<0.025$), were two domains: General health perception, Incontinence impact had not significant level of 'p' value ($p>.01$, $p> .01$). *Conclusion:* The researcher concluded the study with the result that pelvic floor muscle strengthening (PFME) is more effective for incontinence patients following incomplete spinal cord injury than the no other treatment. But the results can't be generalized to a wider population having small sample size as well as other limitations.

CHAPTER –I: INTRODUCTION

1.1 Background

Disability is an important developmental issue all over the world. There are many theories about disability. Different people understand disability in different ways. Health professionals have their own view about disability, people with disabilities have their own view, and the general people of society have their own view. Initially there were many prejudices about disability. Then medical model of disability was originated that describes disability as the result of physical condition and it is the part of that individual's body. It can reduce the quality of life of that person. Nowadays medical model is being replaced by the right based model that emphasizes upon the independence of the people with disabilities (PWD) as they have full rights to join in activities of society (Models of Disability, 2007).

A definition of disability is "Disability is not a natural, inevitable phenomenon. It does not merely exist, nor it is a fatality that must be accepted as it is; it is constructed and can be deconstructed, as long as the underlying reasons are identified (Kronenberg et al., 2005).Injuries result in severe, disabling sequel. Worldwide five million people die annually and cause harm to millions more due to injuries resulting from traffic collisions, drowning, poisoning, falls or burns, violence, assault , self-inflicted violence or acts of war. It account for 9% of global mortality, and are a threat to health in every country of the world (WHO, 2010). Road traffic accidents, violence, and self-inflicted injuries are all among the top 10 leading causes of burden in these regions (Lopez et al., 2006).

Globally Spinal Cord Injury (SCI) mainly results from motor vehicle collisions, falls, violence, sports related and aquatic/diving and self G inflicted/suicide attempts (Ackry, Tator, and Krassoiuk, 2004). In most countries the incidence of SCI is between 10.4 to 83 cases per million per year (Wyndaele et.al 2006). According to the national SCI statistical center (2010) in US the incidence of SCI is approximately 40 cases per million population or approximately 12,000 new cases each year (excluding those who die at the scene of the accident).

There are 10% disable people in Bangladesh. The prevalence of disability of Bangladesh is 5.6 (WHO). Different types of disability (such as physical, mental speech, learning etc). Incidence of SCI lies between 10.4 and 83 per million inhabitants per year. One-third of patients with SCI are reported to be tetraplegic in USA.SCI patient may develop bladder incontinence after being SCI (Wyndaele and Wyndaele, 2006). This common problem prevents people of all ages from fully participating in their normal activities. There are 33 million individuals in the United States who have bladder control problems (Stewart et al., 2003). Most spinal cord injuries affect bladder and bowel functions because the nerves that control the involved organs originate in the segments near the lower termination of the spinal cord and are cut off from brain input. Without coordination from the brain, the muscles of the bladder and urethra can't work together effectively, and urination becomes abnormal. The bladder can empty suddenly without warning, or become over-full without releasing. In some cases the bladder releases, but urine backs up into the kidneys because it isn't able to get past the urethral sphincter. Most people with spinal cord injuries use either intermittent catheterization or an indwelling catheter to empty their bladders (Nsccenter and Admin, 2003). The increased survival of SCI patients via the modern spinal unit care is associated with secondary complications, which continue to pose management challenges. Urinary tract infection (UTI) is still one of the leading causes of morbidity in SCI patients. Urinary and skin complications are the two main reasons for hospital readmissions in people with chronic SCI. UTI interferes with the rehabilitation, and may lead to secondary urologic complications. Recurrent urinary tract infections, indwelling catheters, vesicoureteral reflux, and immobilization hypercalcinuria are a few of the major risk factors for the development of urolithiasis among spinal cord injury patients (Singh et al., 2011).

The various types of incontinence resulting from SCI are dependent on the level of injury sustained. Physiotherapy management of bladder can minimize the suffering to a great extend. The aim of this study is to provide both individuals with spinal cord injury and the health-care providers who advise them with the best and most up-to-date information on the wide variety of bladder management techniques available to them (Centemero,2010).

Urinary incontinence is defined by the International Continence Society as involuntary urinary leakage. The condition is common among older people. It affects more than a fifth of people aged over 85 years, according to a recent cohort study, although this is probably an underestimate. Urinary incontinence has both physical and psychological consequences, including damage to skin, urinary tract infections, an increased risk of falls, avoidance of going far from home, and a feeling of alienation (Thirugnanasothy, 2010). Urinary incontinence is the defined by the International Continence Society (ICS) as the compliant of any involuntary leakage of urine (Abrams et al., 2002). Urinary incontinence is more common in women than in men and affects women of all ages. Prevalence rates vary between 9% and 72% of women aged 17 to79 years living in the community. The most common type of UI in women is stress urinary incontinence (SUI), defined as the compliant of involuntary leakage on effort or exertion, or on sneezing or coughing (Abrams et.al 2002). Urinary incontinence is a socially embarrassing condition, causing withdrawal from social situations and reduced quality of life (QOL) (Hunskaar et al., 2002).

According to Newman to Newman & Wilson (2002), urinary incontinence is a common, chronic condition among women. Treatment of UI can involve behavioral techniques, pharmacological strategies, or surgical intervention. It has been recommended that treatment strategies start with the simplest and least invasive, and only if they are not effective, then progress to more complex and invasive techniques (Society of Urologic nurses and associates, 2005).

Self-monitoring techniques such as (a) timing and amount of fluid intake, (b)amount of caffeine consumption, (c) quick pelvic floor muscle(PEM)contraction(Quick kegal) (Miller et al.,1998), (d) bladder training and (e) management of constipation are recognized as important management strategies for bladder problems (Fant et al., 1996). A short-term exercise program for pelvic-floor musculature produced positive changes in subjects with anatomical urinary incontinence (Tehou et al., 1988). Another research has done to evaluate the physiotherapy as alternative to surgery & the result has proved that physiotherapist-guided pelvic floor exercise a realistic alternative to surgery in patients with mild degrees of incontinence, also patients with residual symptoms after surgery are candidates for pelvic floor training **(**Klarskov et al., 1986).

1.2 Justification of the study

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. Physiotherapy is not a new profession in Bangladesh. But it is still a developing health profession which is dominated by other health professionals due to lack of skilled manpower. Now at present situation lots of NGOs working on disability are included this clinical practice. Injuries and diseases affecting the spinal cord and complicated by neurological damage are an important health problem in Bangladesh as they carry high rates of mobidity and mortality. There is no relevant research has been conducted in this field yet in Bangladesh. The great majority of individuals with SCI have impairment in bladder function which depend on the grade and level of injury. Urinary tract infections are one of the most common complications following spinal cord injury and may require hospitalization. Urinary retention are a major causes of neurological impairment for persons with spinal cord injury (SCI). It also negatively impacts quality of life. This study will help to liberate effective treatment for the patients with urinary incontinence which will in term reduce the mortality & morbidity of SCI.

1.3 Aims of the study

To identify the effectiveness of pelvic floor muscles strengthening for incontinence patients following incomplete spinal cord injury.

1.4 Objectives of the study

- To identify the impact of urinary incontinence on quality of life among spinal cord injury patient.
- To measure the effectiveness of pelvic floor muscle exercise.
- To recognize the improvement in bladder control.
- To minimize the frequency of urination.
- To maintained on intermittent self-catheterization (ISC).
- To explore the knowledge of self bladder management techniques.

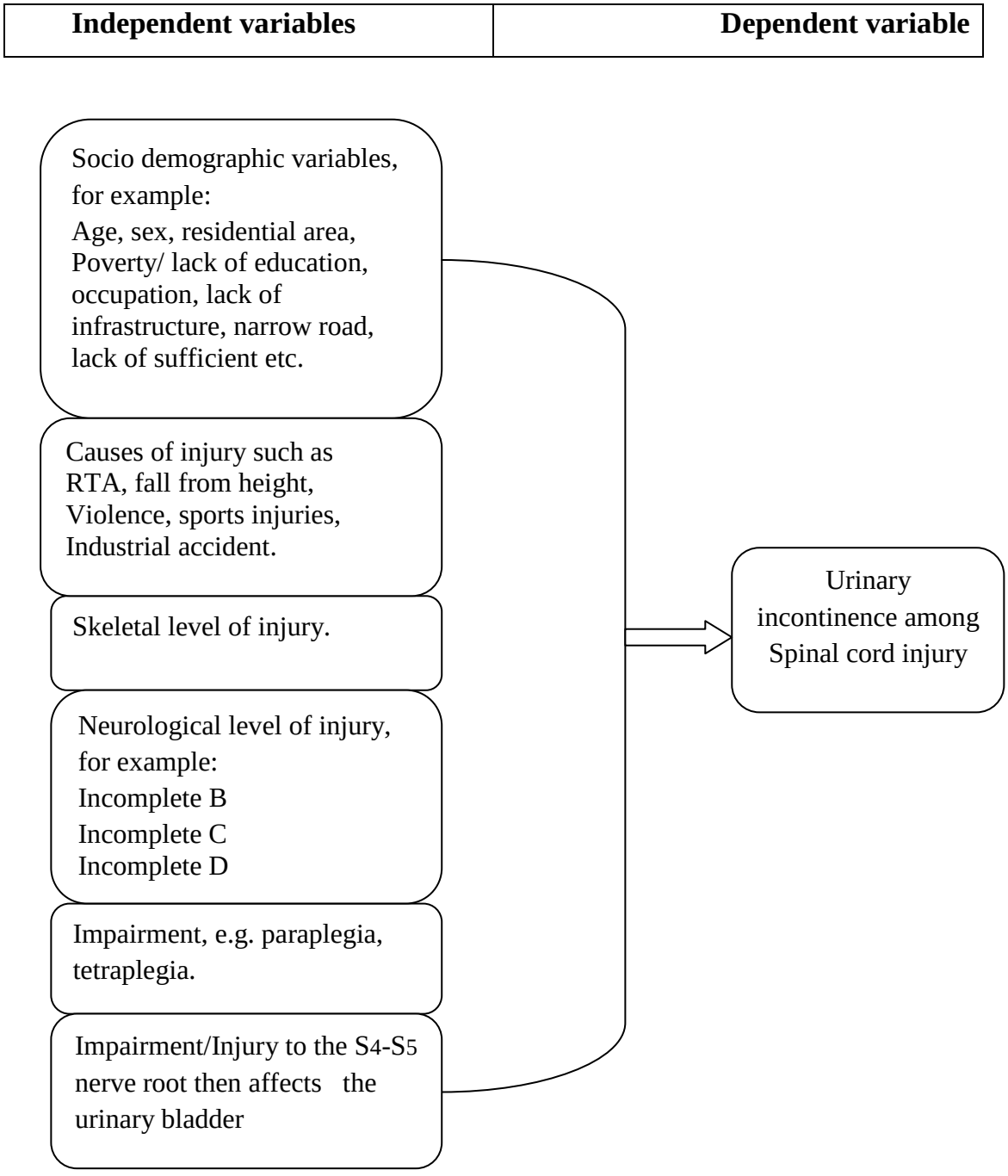
1.5 Hypothesis

Pelvic floor muscle strengthening is an effective intervention for the incontinence patients following incomplete SCI.

1.6 Null hypothesis

Pelvic floor muscle strengthening is not an effective intervention for the incontinence patients following incomplete SCI.

1.7 Conceptual Framework



1.8 Operational definitions

Pelvic floor, pelvic floor muscle, pelvic floor muscle weakness, pelvic floor muscle exercise, the bladder, bladder control, urinary incontinence, Spinal cord and Spinal cord injury.

1.8.1 Pelvic floor

The pelvic floor or pelvic diaphragm is composed of muscle fibers of the levator ani, the coccygeus, and associated connective tissue which span the area underneath the pelvis. The pelvic diaphragm is a muscular partition formed by the levator ani and coccygei, with which may be included the parietal pelvic fascia on their upper and lower aspects. The pelvic floor separates the pelvic cavity above from the perineal region.

1.8.2 The pelvic floor muscle

The pelvic floor muscles are the foundation for the core of the body. They help stabilize the pelvis, and they support the organs of the lower abdominal cavity, like the bladder and uterus. The pelvic floor muscles, along with the deep muscles of the back and abdomen, form the group of muscles.

1.7.3 Pelvic floor muscle weakness

Factors contributing pelvic floor muscle weakness: Pregnancy, Childbirth, Straining to empty the bladder or bowel with or without constipation, persistent heavy lifting, changes in hormonal levels at menopause growing older. Chronic cough (from smoking, chronic bronchitis or asthma) being overweight, lack of general fitness.

1.8.4 Pelvic floor muscle exercises

Kegel exercises are exercises that strengthen the pelvic floor muscles (the muscles that support the urethra, bladder, uterus, and rectum). They are also called pelvic floor muscle exercises.

1.8.5 The Bladder

The bladder is a collapsible sac lying in the pelvis. It is able to stretch to hold urine until you are ready to urinate. The bladder walls are made up of muscles known collectively as the detrusor muscles. When they are ready to urinate, the detrusor muscles contract (squeeze) to help push the urine from the bladder. The lower portion of the bladder, which funnels urine into the urethra, is called the bladder neck or bladder outlet. The bladder, along with the rest of the body, undergoes dramatic changes. Since messages between the bladder and the brain cannot travel up and down the spinal cord, the voiding pattern described above is not possible. Depending on your type of spinal cord injury, your bladder may become either "floppy" (flaccid) or "hyperactive" (spastic or reflex).

1.8.6 Bladder control

Problems related to bladder control, such as urine leakage at inappropriate times, impact your quality of life. This common problem prevents people of all ages from fully participating in their normal activities.

1.8.7 Urinary incontinence (UI)

Urinary incontinence is unintentional loss of urine that is sufficient enough in frequency and amount to cause physical and/or emotional distress in the person experiencing it (Ford, 2000).Urinary incontinence (UI), or the involuntary loss of urine, can occur at any age, but is especially common in elderly women. UI has been estimated to affect 20% to 33% of adults or 11% to 55% of the elderly depending on the age of the subjects.

1.8.8 Spinal cord

Spinal Cord is the major bundles of nerves that carry impulses to/from the brain to the rest of the body. Spinal Cord is surrounded by rings of bone-vertebra. They function to protect the spinal cord.

1.8.9 Spinal cord injury

Spinal Cord Injury is damage to the spinal cord that results in a loss of function such as mobility or feeling. Frequent causes of damage are trauma and disease.

1.8.10 Skeletal Level

Level of the greatest vertebral damage on radiograph.

1.8.11 Neurological Level

The most caudal segment of spinal cord where motor and sensory function in normal.

1.8.12 Dermatome

This term refers to the area of the skin innervated by the sensory axons within each segmental nerve.

1.8.13 Myotome

This term refers to the collection of muscle fibers innervated by the motor axons within each segmental nerve (Ditunnolr, 1994).

CHAPTER – II: LITERATURE REVIEW

2.1 Literature review

Urinary incontinence is a significant health problem in the United States and worldwide. It has a considerable social and economic impact on individuals and society (Victor and Nitti, 2001). Urinary incontinence is common in older people and is associated with considerable morbidity. Older people are more likely to delay seeking help for urinary incontinence, and symptoms are often poorly managed in primary and secondary care (Thirugnanasothy 2010). The prevalence of urinary incontinence increases rapidly with age – particularly once adults reach the age of 65 years. The Canadian Urinary Bladder Survey (CUBS 2003) showed that 21.8% of Canadians 18 or older have bladder problems, costing Canadians 1.5 billion per year. Another study18 conducted in the year 2000, estimated that 17 million community-dwelling adults in the United States had daily urinary incontinence (UI), and an additional 33 million suffered from the overlapping condition, overactive bladder (Swanson, 2005). Urinary incontinence is common and it can have an impact on the physical, psychological and social wellbeing of sufferers, as well as their families and careers (NICE, 2006). In the United Kingdom, the 2001 report National Service Framework for Older People highlighted a need for continence services to be integrated across primary, acute, and specialist care (Thirugnanasothy,2010). In the practice of physical medicine and rehabilitation, voiding disorders are usually a result of spinal cord injury (SCI) or disease. Incontinence and urinary retention can cause social embarrassment and added morbidity, such as infections, stones or renal injury (Ramon et al., 2011).

Urinary incontinence can be thought of as a symptom as reported by the patient, as a sign that is demonstrable on examination, and as a disorder. Urinary incontinence should not be thought of as a disease, because no specific etiology exists; most individual cases are likely multi-factorial in nature. The etiologies of urinary incontinence are diverse and, in many cases, incompletely understood (Raymond, 1994). Urinary incontinence is a common health problem among women that negatively impacts quality of life (Leduc, 2001).The great majority of individuals with SCI have impairments in bladder function but this will depend on the grade and

level of injury. Urinary tract infections are one of the most common complications following spinal cord injury and may require hospitalization.

The following are the main types of incontinence:
Stress Urinary Incontinence (SUI), which is the leaking of urine with coughing, sneezing, straining, exercise or any other type of exertion. 50% of individuals with incontinence have SUI.

Urge Incontinence (UI) is leaking of urine associated with the sudden uncontrollable urge to empty the bladder. The urge to empty the bladder cannot be delayed and leakage occurs. UI is a key symptom of the overactive bladder syndrome.

Overflow incontinence (OI) is constant leaking or dribbling from a full bladder. OI implies that normal urination is impossible.

Mixed incontinence (MI) is a combination of stress and urges incontinence.

Other types of incontinence include:
Functional incontinence denotes incontinence related to causes outside of the urinary system.

Nocturnal enuresis is used to describe bedwetting in children who are old enough to be "potty trained" and adults who have loss of control at night. (Thirugnanasothy, 2010).

The Canadian Urinary Bladder Survey, 8% of all respondents initially acknowledged having a bladder problem. However, 52% responded "yes" to having one or more bladder symptoms. "With these respondents the commonest symptoms were nocturia (38%), urgency (16%), frequency (14%), stress incontinence (13%), and urge incontinence (7%)"(Swanson, 2005).

Urinary tract infection (UTI) is responsible for major morbidity in SCI patients. Despite improved methods of treatment, urinary tract morbidity still ranks as the second leading cause of death in SCI patients. Spinal cord injury produces profound

alterations in the lower urinary tract function. Incontinence, elevated intravesical pressure, reflux, stones, and neurological obstruction, commonly found in the spinal cord-injured population, increase the risk of UTI. Incomplete voiding and catheter use contribute to an increased risk of symptomatic UTI. Medical morbidity and urological outcome in SCI patients, using different methods of bladder management, is made difficult by the many uncontrollable management variables within each method, which may influence the outcome. It remains difficult to get a proper estimate of the risk of infection from literature. The data differ so much, that many different factors must influence the prevalence of this complication (Singh et al., 2011).

Spinal cord injury occurs through various countries throughout the world with an annual incidence of 15 to 40 cases per million, with the causes of these injuries ranging from motor vehicle accidents and community violence to recreational activities and workplace-related injuries (Sekhon, 2001). The spinal cord is the major conduit through which motor and sensory information travels between brain and body. Spinal cord injury referred to neurological damage of the spinal cord following trauma resulting in a change, either temporary or permanent, in its normal motor, sensory, or autonomic function which may leads to disability (Dawodu, 2008; Middletone, Mario and Kennedy; 2008, Maynard et al., 1997)). It creates a wide range of impairments of functioning and health which may lead to limitations in activity and restrictions in participation functions below the level of the neurological lesion (Kirchberger et al., 2010). The incidences of SCI are between 20 and 40 years of age. The higher life expectancies found is more in developed countries (Ackry, Tator, and Krassoiuk et al., 2004). Most common causes of SCI include motor vehicle accidents (50.4%), violence (11.2%), falls (23.8%), and recreational activities (9%) (Ho, Wuermser and Kirshblum et al., 2007). A study in Bangladesh found that fall from the tree and fall while carrying heavy load on the head is the primary cause of SCI followed by motor vehicle accident (Hoque, Grangeon and Reed., 1999).

Spinal cord injury (SCI) is often followed by complications, which add to the detrimental effect that loss of motor, sensory and autonomic function have on a person's health, social participation and quality of life (McKinley et al., 1999). Occurrence of complications is high both during and after inpatient rehabilitation. The most frequently occurring problems regarded bladder problem including urinary tract

infections and incontinence; bowel problem including constipation, incontinence and diarrhea; spasms, pain, pressure sore, edema breathing problems including breathlessness; respiratory tract infection, and sexuality. On average of each spinal cord injured person faces 8 health problems (Haisma et al., 2007; and Bloemen-Vrencken et al., 2005).

An increase in age, tetraplegia and completeness of the lesion is the most frequently risk factors for developing a complication. A high BMI with a traumatic lesion increased the risk. The risks are associated with gender or smoking and largely affect by presence of cardiovascular disease (Haisma et al., 2007). Bowling (1997 cited in Chappell & Wirz, 2003) defines quality of life as "a concept representing individual responses to the physical, mental and social effects of illness on daily living, which influences the extent to which personal satisfaction with life circumstances can be achieved". The widespread view of a good quality of life is usually based on the idea of good health and experiencing personal well being and life satisfaction e.g. independence, fitness, status and respect. QOL among individuals with SCI are lower compared with nondisabled people.

The average yearly health care and living expenses and the estimated lifetime costs that are directly attributable to SCI vary greatly according to severity of injury. Significant costs are incurred throughout the life of a person with SCI, including initial hospitalization and acute rehabilitation, home and vehicle modifications, and recurring costs for durable medical equipment, medications, supplies, and personal assistance (Priebe et al., 2007).

Bladder disorders are nearly universal in children with myelomeningocele and in patients with SCI. Urinary tract infections are a frequent cause of morbidity in patients with neurogenic bladder. Patients with neurogenic bladder who lack sensation do not experience dysuria. Instead, symptoms may include fever, tachycardia, a feeling of uneasiness, signs and symptoms of autonomic dysreflexia, malodorous urine, increase in spasticity in patients with upper motor neuron lesions, and lethargy. The main morbid feature of urinary tract infection is that, if left untreated, it may lead to urosepsis and/or pyelonephritis. Predisposition to bladder stone formation is noted at 4 weeks in patients with SCI as a result of hypocalcaemia and hypercalcinuria and

may persist 12-15 months or even longer. Incidence of kidney stone formation is highest in patients with indwelling catheters, up to 8%. Kidney stones are the leading cause of renal dysfunction in SCI. The prevalence of bladder cancer is higher in SCI patients who have had an indwelling .Foley catheter for 10 years or more than in other patients with SCI. Squamous cell carcinoma and transitional cell carcinomas are the types of bladder cancer commonly diagnosed in SCI patients (Ramon et al., 2011).

The goals of bladder management are to preserve the upper tracts, minimize lower tract complications and be compatible with the individual's lifestyle. In the main, patients are followed up at their spinal cord injury centre and have ongoing assessment of urological needs (Britnell,2005).Many different bladder management methods are now in use in SCI patients; the most common among them are intermittent catheterization by a trained staff or self, suprapubic cystostomy, indwelling catheterization, condom drainage, Crede maneuver, and ileal conduit. Each of these methods has certain advantages and disadvantages in terms of convenience, expense, and differential risk of a variety of secondary complications such as urinary tract infection, orchitis, epididymitis, penoscrotal abcess and fistula, penile pressure ulcers, and bladder and renal calculi (Singh et al., 2011).

Many patients are maintained on intermittent self-catheterization (ISC) regimens, which may be impossible to maintain during acute illness. Pelvic floor muscle rehabilitation has been demonstrated to be effective in treating stress urinary incontinence and, if maintained, is effective over a 5-year period. Pelvic floor muscle retraining with biofeedback for urge urinary incontinence is effective, but further research is needed. Physiotherapy treatment includes education about bladder and bowel management and behavioral modification that decreases the symptoms of stress and urges incontinence. Pelvic floor muscle retraining may decrease risk of early pelvic organ prolapsed, as one of the functions of the pelvic floor muscles is to support the genital organs (Britnell, 2005). In this case, it may be appropriate to pass an indwelling catheter if the admission is short. However, long-term indwelling urethral catheters can lead to complications such as infection or urethral stricture. In the longer term, it is preferable to reestablish them, if possible, on their normal bladder routine, in liaison with their regular team. A common scenario is the patient with incomplete SCI who has some spontaneous voiding but retains a residual volume

which gradually increases: this can eventually lead to complications if not appropriately managed (Gall et al., 2006).

2.2 Pathophysiology of bladder dysfunction

The sympathetic nervous system regulates the process of urine storage in the bladder. In contrast, the parasympathetic nervous system controls bladder contractions and the passage of urine. Parasympathetic nerve impulses travel from S2-S4 ventral gray matter via the pelvic nerves to the ganglia near the bladder wall. Postganglionic nerve impulses then travel to the smooth muscle cholinergic receptors to produce bladder contraction. Sympathetic efferent nerve fibers originate from the lateral gray column of the spinal cord from T11-L2. The sympathetic system has a long postganglionic chain that runs with the hypo gastric nerve to synapse with alpha-receptors and beta-receptors in the bladder wall and bladder neck or internal sphincter. Beta-receptors are responsible for mediating relaxation of the bladder with filling. Alpha-receptors are responsible for tonically contracting the internal sphincter during bladder filling. The somatic efferent nerve fibers originate from the pudendal nucleus of S2-S4 and supply the external per urethral sphincter. The external sphincter is under voluntary control and normally contracts in response to coughing or the Valsalva maneuver or when a person actively tries to prevent or halt urine flow. Three areas of the CNS such as the sacral micturition center, the pontine micturition center, the cerebral cortex control bladder function. The sacral micturition center is located at the S2-S4 levels and is responsible for bladder contraction. The pontine micturition center may play a role in coordinating relaxation of the external sphincter with bladder contractions while the cerebral cortex plays an inhibitory role in relation to the sacral micturition center. Lesions of the peripheral nerves or the sacral micturition center cause detrusor areflexia that manifests as distended bladder with overflow incontinence. Individuals with lesions below the pontine micturition center have both detrusor hyperreflexia and sphincter-detrusor muscle dyssynergia. These are the patients with SCI (Ramon et al., 2011).

2.3 Anatomy of the Spinal Cord

The spinal cord is the most important structure between the body and the brain. The spinal cord extends from the foramen magnum where it is continuous with the medulla to the level of the first or second lumbar vertebrae. It is a vital link between the brain and the body, and from the body to the brain. The spinal cord is 40 to 50 cm long and 1 cm to 1.5 cm in diameter. Two consecutive rows of nerve roots emerge on each of its sides. These nerve roots join distally to form 31 pairs of spinal nerves**.** The spinal cord is a cylindrical structure of nervous tissue composed of white and gray matter, is uniformly organized and is divided into four regions: cervical (C), thoracic (T), lumbar (L) and sacral (S) each of which is comprised of several segments. The spinal nerve contains motor and sensory nerve fibers to and from all parts of the body. Each spinal cord segment innervates a dermatome (Nachumdafny, 1997)**.**

Broadly SCI is classified into tetraplegic and paraplegic. In tetraplegia all four limbs are affected whereas in paraplegia lower limb is affected. Most clinicians commonly describe injuries as "complete" or "incomplete". Complete SCI means having no voluntary motor or conscious sensory function below the injury site. Furthermore, American spinal injury association (ASIA) classified complete and incomplete injuries into five categories which is called ASIA impairment scale (Young, 2010 and Maynard et al., 1997).

2.4 Complete injury

No motor or sensory function is preserved in the sacral segments S4-S5 which means patient with complete level of injury had no bowel and bladder sensation and unable to control them.

2.5 Incomplete injury

Sensory function is preserved in the sacral segment S4-S5 but motor function may or may not be preserved which means patient with complete level of injury had bowel and bladder sensation and may or may not be able to control them.

2.6 Paraplegia

This term refers to impairment or loss of motor and/or sensory function in the thoracic, lumbar or sacral (but not cervical) segments of the spinal cord, secondary to damage of neural elements within the spinal canal. With paraplegia, arm functioning is spared, but, depending on the level of injury, the trunk, legs and pelvic organs may be involved (Maynard et al., 1997).

2.7 Tetraplegia (preferred to `quadriplegia')

This term refers to impairment or loss of motor and/or sensory function in the cervical segments of the spinal cord due to damage of neural elements within the spinal canal. Tetraplegia results in impairment of function in the arms as well as in the trunk, legs and pelvic organs (Maynard et al., 1997).

2.8 ASIA impairment Scale

In 1982, based on neurological responses, touch and pinprick sensations tested in each dermatome, and strength of ten key muscles on each side of the body the American Spinal Injury Association (ASIA) first published an international classification of spinal cord injury called the International Standards for Neurological and Functional Classification of Spinal Cord Injury. Traumatic spinal cord injury is classified into five categories on the ASIA Impairment Scale (Maynard et al., 1997):

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

B = Incomplete: Sensory but not motor function is preserved below 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 function are normal.

2.9 Bladder Management Program after Spinal Cord Injury

Medication

According to OASIS answers (2005) there are 4 general types of drugs used to treat patients with overactive bladder:

Anticholinergic medications (e.g., oxybutynin, tolterodine, impramine, trospium): These reduce feelings of urgency and inhibit contraction of the detrusor muscle.

Tricyclic antidepressants (e.g., imipramine): These exert an anticholinergic effect by blocking norepinephrine or serotonin amine uptake.

Combined anticholinergics and smooth muscle relaxants (e.g., oxybutynin chloride).These drugs are used for treating overactive bladder (David & Ames, 2008 and Swanson, 2005).

Surgical Treatments

There are two main surgical treatments for SUI: Retro pubic suspension and sling insertion (mid-urethral sling) and transobturator approach. The Burch procedure (retro pubic suspension technique) has been shown to be successful for the treatment of SUI and has good long term efficacy. Slings provide support under the bladder neck and/or urethra, and can be made from a number of different materials. The harvesting of a patient's own tissue (fascia) over the abdominal muscles is still commonly performed.

Behavioral Treatments

Behavioral treatments are conservative measures and are the first treatment option for patients with stress and urge incontinence. Behavioral treatments include bladder retraining, education, and dietary modifications (David and Ames, 2008).

Intermittent Self-Catheterization (IC)

Intermittent catheterization (IC) is nowadays widely used for the urological management of patients with a neurogenic bladder due to a spinal cord lesion (Wyndaele, 2002). Intermittent self-catheterization involves passing a small disposable catheter through the urethra and into the bladder to empty it. Intermittent self-catheterization is a safe and effective method of completely emptying the bladder at regular intervals. Self-catheterization should be done every 3 to 8 hours, or as

recommended by your physician. Never stop self-catheterization unless instructed by your Physician (David and Kaufman, 1998).

Injectable Treatments

Injecting bulking agents, such as collagen, to narrow the urethral walls has been shown to be successful for SUI and is minimally invasive. Botulinum toxin therapy (Botox) injections have also been used to treat urge incontinence.

Physiotherapy

There are many different forms of physiotherapy available to help with bladder problems. These include pelvic floor muscle exercises, biofeedback, electrical stimulation and use of vaginal cones. Pelvic floor muscle exercises can help strengthen the muscles in the pelvic floor, giving more control over bladder. They are very helpful for stress incontinence problems. One of the most common treatment recommendations for urinary incontinence includes incontinence exercises that are exercising the muscles of the pelvis. Incontinence exercises strengthen pelvic floor muscles and sphincter muscles to reduce stress leakage. Patients younger than 60 years old benefit the most. The patient should do at least 24 daily contractions for at least 6 weeks. It is possible to assess pelvic floor muscle strength using a Kegel perineometer (Burnet, 2004).

Pelvic floor muscle exercises

A pelvic floor exercise, more commonly called a Kegel exercise consists of contracting and relaxing the muscles that form part of the pelvic floor, which are now sometimes colloquially referred to as the "Kegel muscles" (Hay-Smith & Dumoulin et al., 2006). The floor of the pelvis is made up of layers of muscle and other tissues. These layers stretch like a hammock from the tailbone at the back to the pubic bone in front. Pelvic floor muscle training can strengthen the pelvic floor muscles and help control of the bladder and the bowel. Pelvic floor muscle training may also be useful for men who have an urgent need to pass urine frequently (more often called urge incontinence) (NCMS, 2007). Regular pelvic floor muscle exercises make the muscle that support your pelvic organs stronger and helps you use the muscles more effectively. Women who have a problem with urine leakage have been able to

eliminate or greatly improve this problem just by doing pelvic floor muscle exercises each day. Pregnant and postpartum women who do pelvic floor muscle exercises have significantly less urine leakage (University of Michigan & School of Nursing, 2000). Exercises to strengthen bladders and surrounding muscles are fundamental therapies for bladder control problems (Thoms 2010).

Intervention

According to Bary Berghmans 2002, for each individual patient an optimal lower urinary tract exercises (LUTE) program was provided consisting of the following components:

- Patient information about the lower urinary tract function, the function of the pelvic floor and the way to contract and relax the pelvic floor.
- Bladder retraining consisting of four components. The first is an educational program that addresses lower urinary tract function. The next component involves training to inhibit the sensation of urgency and postpone voiding. The third is to urinate according to a time table in patients with an interval less than two hours between two consecutive micturitions in order to reach an interval of at least three hours between two consecutive voiding and to reach larger voided volumes. As a fourth step, reinforcement of patient motivation by the Physiotherapist.
- Specific pelvic floor muscle exercise (PFME) training in order to probably facilitate and restore the detrusor inhibition reflex (DIR) by selective contraction of the pelvic floor muscles. In many patients with an overactive bladder, the level of activation is high that selective contraction of the pelvic floor muscles on order to achieve reciprocal inhibition of the bladder is very difficult or not possible. Teaching selective contraction and relaxation of the pelvic floor muscles focuses on facilitation of the DIR.

Step 1

• Sit on the toilet and start to urinate. (Men may find this easier if they sit to urinate).
• Try to stop the flow of urine midstream by contracting the pelvic floor muscles.
• Keep the muscles in their abdomen, thighs and buttocks relaxed.
• Do not hold their breath.

• They may have to practice several times before being able to recognize and control the muscles.

Step 1

• Begin by emptying bladder.
• In a lying position, tighten the pelvic muscles for a slow count of 1—2—3 and then relax the muscles for, a slow count of 1—2—3. Repeat 10 times.
• Sitting in a comfortable chair, place their feet flat on the floor, relax arms and hands. Tighten in pelvic muscles for a slow count of 1—2—3 and then relax the muscles for the same length of time. Repeat 10 times.
• In a standing position relax arms and shoulders. Concentrate on isolating pelvic muscles and tighten them for a slow count of 3, then relax for the same length of time.

Advance

• Exercise of pelvic floor muscles in each position at least twice a day.
• After completing two weeks counting to 3, advance to a slow count of 5.
• After completing two weeks slowly counting to 5, advance to a slow count of 10.

Remember

• Keep the muscles in their abdomen, thighs and buttocks relaxed.
• Do not hold their breath.
• Use the Pelvic Floor Exercise Log to keep on track and establish a routine.
• To maintain muscle fitness the exercises can be incorporated into their daily routine.

Proper hygiene and catheter care; high fluid intake; patient education; and overall change in the aptitude of the patients toward bladder management methods could be the possible reasons for this. This may also be due to the regular follow-up of the patients enrolled for this study as they were given advice to prevent urological complications regularly (Singh et al., 2011).

CHAPTER –III: METHODOLOGY

3.1 Study design

Quasi-experimental quantitative design was used for the study design. An experimental design that does not meet all requirements necessary for controlling influences of extraneous variables. Here, often random assign of participants not possible. This kind of design includes at least an experimental (treatment group) group and a control group (Fisk-quasi-experimental design, 2004). The lack of random assignment in the quasi-experimental design method may allow studies to be more feasible, but this also posses many challenges for the investigator. This deficient in randomization makes it harder to rule out confounds and introduces new threat to internal validity. Utilizing quasi-experimental designs minimizes threats to external validity since quasi-experiments are natural experiments, findings in one may be applied and setting, allowing for some generalizations to be made about population.

3.2 Study site

The study was conduct in Center for the Rehabilitation of the Paralyzed (CRP), Savar. The hospital at CRP-Savar is the only hospital in Bangladesh that specializes in the treatment of spinal cord injuries. The 100-bed hospital received over 350 admissions as in-patients in each year. Admissions were normally due to traumatic paraplegia, traumatic tetraplegia and conditions caused by disease, but exclusively for the treatment of spinal injuries or illness affecting the spine.

3.3 Study population

The study populations were patient with spinal cord injury admitted in CRP for treatment and rehabilitation.

3.4 Sampling procedure

A total twenty two (22) incomplete spinal cord injury (SCI) patients having urinary incontinence were selected for this study. Eleven (11) patients were selected for experimental group and eleven (11) patients were selected for control group. The sampling procedure was Non-probability convenience sampling. In convenience sampling procedure, sample comprises subjects who are simply available in a

convenient way to the researcher. However; this method often the only seldom feasible one, particularly for student or others with restricted time and resources, and can legitimately be used provided its limitations are clearly understood and stated (Galloway, 1997). Convenient sampling system also used while unable to access a wider population, for example due to time or cost constraints. The researcher gave each patient a code number which made the researcher impartial while lottery. The researcher wrote experimental group in one page while control group on another page. The researcher wrote the code number of the patients in 22 scrap of paper and then folding them and put into experimental page were considered as experimental group numbers and the numbers in the control group were considered as control group. Thus the researcher randomly assigned the selected patients to control group and experimental group by lottery system.

3.5 Inclusion criteria

- Patient with Incomplete Spinal Cord Injury (SCI) admitted in CRP.
- Patient with incontinence
- Muscle power according to Oxford grade scale 3 or more
- Willingness to participate.
- Age range: From 15-70 years.
- Both male and female included.

3.6 Exclusion criteria

- Patient with severe complications.
- Muscle power according to Oxford grade scale less than 3.
- Patient with mental illness.
- Physically inactive patient.
- Age less than 15 years and more than 70 years are excluded

3.7 Data collection and materials

Data collection

Samples were selected from the spinal cord injury unit (indoor) of Center for the Rehabilitation of the Paralyzed (CRP). All the subjects had received same facilities and treatment time which were given to other patients. The client was given preliminary education about bladder management and pelvic floor muscle exercises. This was done via demonstration and visualization. The regime of pelvic floor exercises was three sets of ten repetitions three times per day depending on their capabilities and stamina after each void. Before and after treatment, data was collected regarding some quality of life domains (By KHQ). These were General health perception e.g. present health status, Incontinence impact e.g. affection of bladder problem, Physical limitation e.g. affection of bed mobility & activities of daily living, Severity measures (fluid intake and urine production frequency, method of products used such as catheterization, aware of urge to void. According to Dr. Donnica moore, (2001) states that urinary incontinence affects patients physical, social, psychological status etc, that is urinary incontinence affects patients quality of life severely. Tannenbaum et al., (2008) stated that urinary incontinence affects health adversely and outcome measures, such as voiding diaries, pad tests, or quality of life questioners, are recommended for use by the 3rd international consultation on urinary incontinence. However, due to time constrains, logistic difficulties and unfamiliarity with tools, these are seldom used by clinicians in routine practice. The data was collected for six weeks.

Data collection materials

In quantitative part socio-demographic information, types and cause of SCI, clinical and rehabilitation characteristics, date of injury, skeletal and neurological level of injury, types of incontinence were collected by reviewing medical record, inpatients record and record of SCI unit of CRP. A check list was used for collecting quantitative data. In-depth interview the researcher used same materials and same structured questionnaire in pre-test and post-test condition, a quality of life questionnaire (King's Health Questionnaire) including following domains: General health perception, Physical limitation, Severity measures, Episodes of leaking urine.

King's Health Questionnaire (KHQ)

According to Langenhoff, et al., 2004 states that the "quality of life is an abstract and highly subjective concept influenced by personal and cultural values, beliefs, self concepts, goals, age and life expectancy. Its indicators have become an important outcome in clinical trials". These indicators obtained by structural questionnaires. There is a wide range of generic and disease specific quality of life questionnaires covering different areas of life such as global quality of life, physical health and social lifestyle among others. King's Health Questionnaire (KHQ) can be used for measuring the quality of life after the treatment of urinary incontinence. It is now available for use in national or international multicentre clinical trials, thus allowing scientific conclusions to be reached regarding the efficacy of such procedure. King's Health Questionnaire demonstrated moderate concurrent validity and strong internal consistency, mainly after treatment (Jose et al., 2004).

Bladder Diary

A bladder diary is a twenty four (24) hour recording of patient's liquid intake and urine output. The information recorded can be helpful to the healthcare provider to understand their fluid balance, urinary frequency, functional bladder capacity (how much the bladders hold in their own environment), and many other aspects important to bladder function (Howe, 2011). Helps us to make an assessment of how patient's bladder is working and gives us an idea of the amount they drink, the amount of urine their bladder can hold and how often they pass urine (Thoms, 2010). Healthcare provider may request that patient complete a diary to evaluate urinary frequency, urgency or incontinence. A bladder diary can point to any dietary or behavioral factors that may be contributing to their bladder symptoms (Howe, 2011).

3.8 Informed consent

The aim and objectives of this study should be informed to the subjects verbally. The researcher should given the consent form to the subjects and explained them. The subjects have the rights to withdraw themselves from the research at any times. If the subject thinks that the treatment would not be enough to control his or her condition, he or she could reject to receive the treatment. The name or address would not be used. The information of the subjects might be published in any normal presentation

or seminar or written but they would not be identified the participants or subject will also be informed or given notice that the research result will not be harmful for them, but in future participants will be benefited. Every participant has the right to discuss about his or her problem with senior authority.

3.9 Ethical Considerations

The research proposal was sent to the ethical review committee of Bangladesh Health Professions Institute (BHPI) for approval and to CRP's ethical committee for getting permission for data collection. The major ethical concerns for the participants include loss of confidentiality and psychological distress due to the potentially sensitive nature of the topic. Every effort was made to keep information confidential. Name and identity of the respondents were not documented in this study. All the data was keep in a secured place. Only principle investigator had the access of that information. Considering all those ethical norms and values no ethical problems arise as there were some personal and sensitive questions. No compensation was provided for participating in this study. Verbal informed consent was taken under the conditions of confidentiality and voluntary withdrawal without consequence.

3.10 Limitation of the study

The researcher faced some limitation while conducting the research project. Those limitations are as follow:

The study was used twenty two (22) spinal cord injury patents with urinary incontinence to evaluate the effectiveness of pelvic floor muscle strengthening. Eleven (11) patients were assigned for 'control group' and eleven (11) patents were assigned for 'experimental group'. But this was very small number of sample size in both groups, as it is not possible to generalize the result for a wider population. Short time was taken for the study which was also a noticeable limitation in this study. There was limited time fixed for the study the researcher couldn't evaluate the long term efficacy of the intervention.

There was no available research has done on this area in Bangladesh. As a result relevant information on pelvic floor muscle exercise (PFME) for urinary incontinence

spinal cord injury patients even on urinary incontinence information were limited related to this study. Patients were very conservative to express their problem in this area as they think it's an embarrassing situation to tell this in front of anyone, they think that it will be cured over time without any intervention. Moreover, they don't think that it should be expressed.

As there should have adequate assessment relevant to urinary incontinence which would have helped the researcher to get more information about patients, but there was no assessment available on urinary incontinence thus the researcher confirm those patients as being urinary incontinent only asking some bladder related questions to the spinal cord injury patients. As there are no bladder management Physiotherapist worked in our country, the researcher instruct the treatment procedure (though the procedure was safe enough) his or herself to the patients, which would cause experimenter's bias effect.

However, the large number of patients and overall longer follow-up helped to minimize the influence of this variable.

3.11 Data Management and analysis

Quantitative Analysis

The entire completed document review check lists were verified after each day of data collection for inconsistency or gap. All variables and raw data were entered in computer using SPSS 16.0 for Windows software. Data cleaning was carried out after entering all the data. Different types and cause of SCI, clinical and rehabilitation characteristics, date of injury, skeletal and neurological level of injury, types of incontinence were analyzed by their relative frequency.

Socio-Demographic Characteristics of the respondents

Socio-demographic characteristics of the respondents are presented in table 1. The mean age of the respondents was **2.32±.995** years and the mean sex of the respondents was **1.14±.351.**

Age range involvement

The majority of the respondents 50.0 %(n=11) were in 26 to 35 years of age followed by 15 to 25 and 46 to 55 years of age group both 18.2% (n=4). In a study, it was found that the majority of the spinal cord injury patients were aged between 20-30 years and the nearest maximum age range 30-40 years (Hoque et al., 1999).

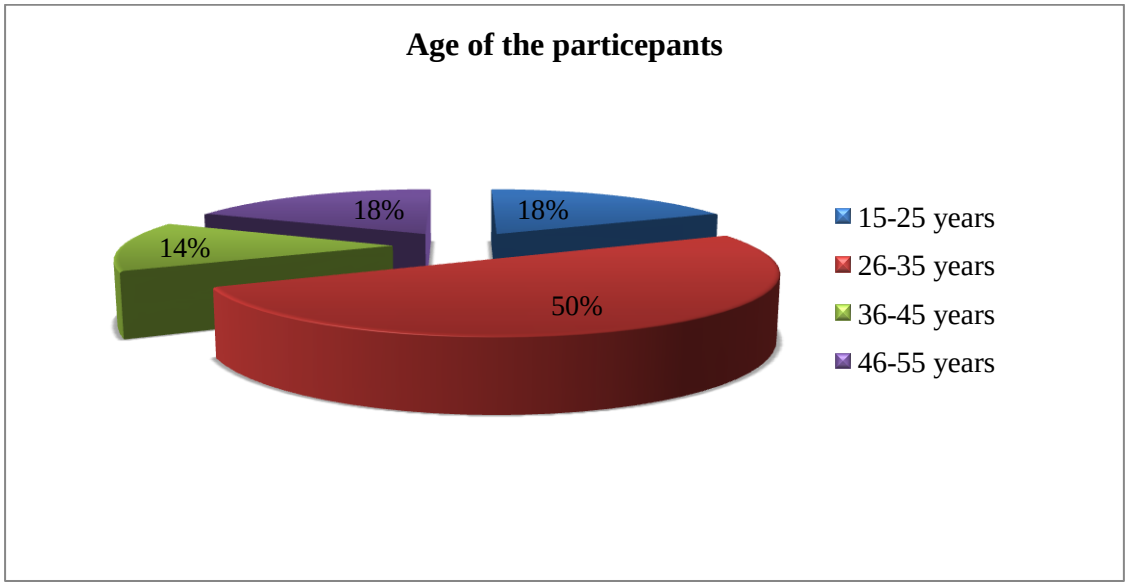


Figure-1: Age range of the participants with percentage

Table: 1 Socio-demographic characteristics

Age (mean ± SD): 2.32±.995			**Sex (mean ± SD): 1.14±.351**	
15-25 years	4 (18.2%)		Male	19(86.4)
26-35 Years	11(50.0%)		Female	3 (13.6%)
36-45 years	3 (13.6%)			
46-55 Years	4 (18.2%)			
Education (mean ± SD) 2.86±1.670			**Occupation (mean ±SD): 5.73±3.439**	
Illiterate	5(22.7%)		Rickshaw puller	1(4.5%)
Literate	5(22.7%)		Agriculture	7(31.8%)
Primary	7(31.8%)		Businessman	2(9.1%)
Junior school certificate	1(4.5%)		Day laborer	3(13.6%)
Secondary school certificate	2(9.1%)		Unemployed	1(4.5%)
Higher secondary certificate	1(4.5%)		Housewife	2(9.1%)
Bachelor or above	1(4.5%)		Student	3(13.6%)
			Others	3(13.6%)

Male female ratio

22 spinal cord injury (incontinence) patients were included as sample of the study, among them 86.4 %(n=19) were male and about 13.6 %(n=3). In an epidemiological study it has been found that 84.5% of spinal cord injury patients were male where 15.5% patients were female (Karamehmetog et al., 1997). Another study has found that 80% of spinal cord injury patients were male (Dowodu, 2007). So male are more affected than female in spinal cord injury. In this study it was found that male and female ratio was 4.1:1. In Bangladesh a few researches have been conducted on spinal cord injury and the result shown that male, female ratio was 7.5:1 (Hoque et al., 2002).

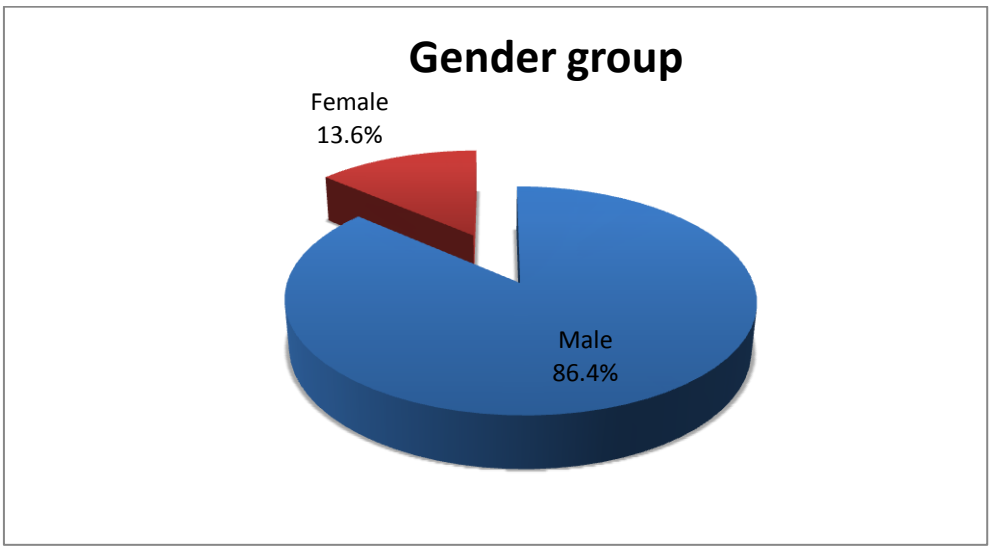


Figure-2: Involvement of sex (male and female).

Educational level

Majority of the respondents (31.80%) primary education followed by those who illiterate (22.70%) or have some literate (22.70%) and others participant (23.6%) have well educated. An epidemiological study in India has been found that approximate 20,000 new cases of SCI are added every year; 60-70% of them are illiterate, poor villagers (Singh et al., 2003). The figure shown that the involvement of spinal cord injury in the people who are illiterate, literate and well educated:

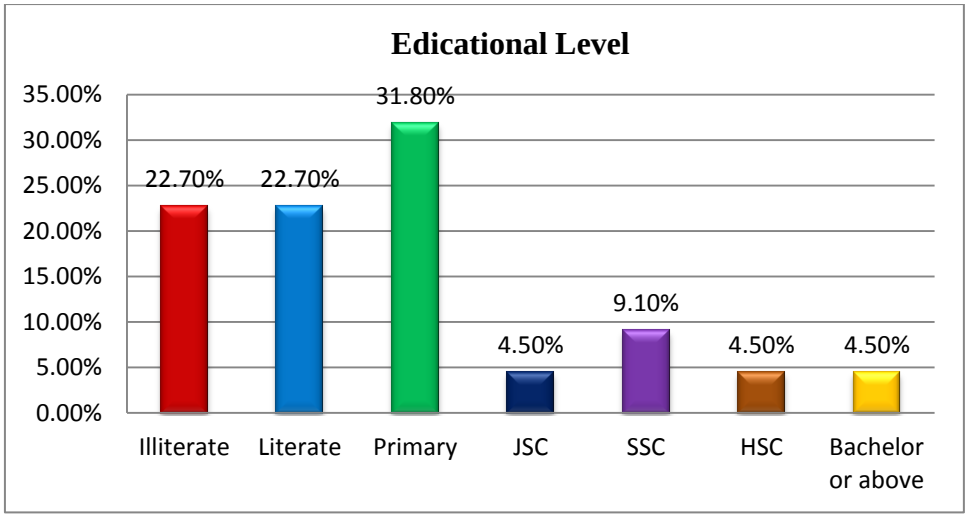


Figure -3: Educational status of the participants with percentage.

Occupation

Among the 22 participants 1 participant was rickshaw puller (4.5%), 7 participants were agriculture(31.8%), 2 participants were businessmen(9.1%), 3 participants were day labor(13.6%),2 participants were housewife(9.1%), 1 participants was unemployed(4.5%), 3 participants were student (13.6%) and 3 participants were other occupation(13.6%) table1 and figure 3. The figure bellow shows the occupations of the participant which was found in this study.

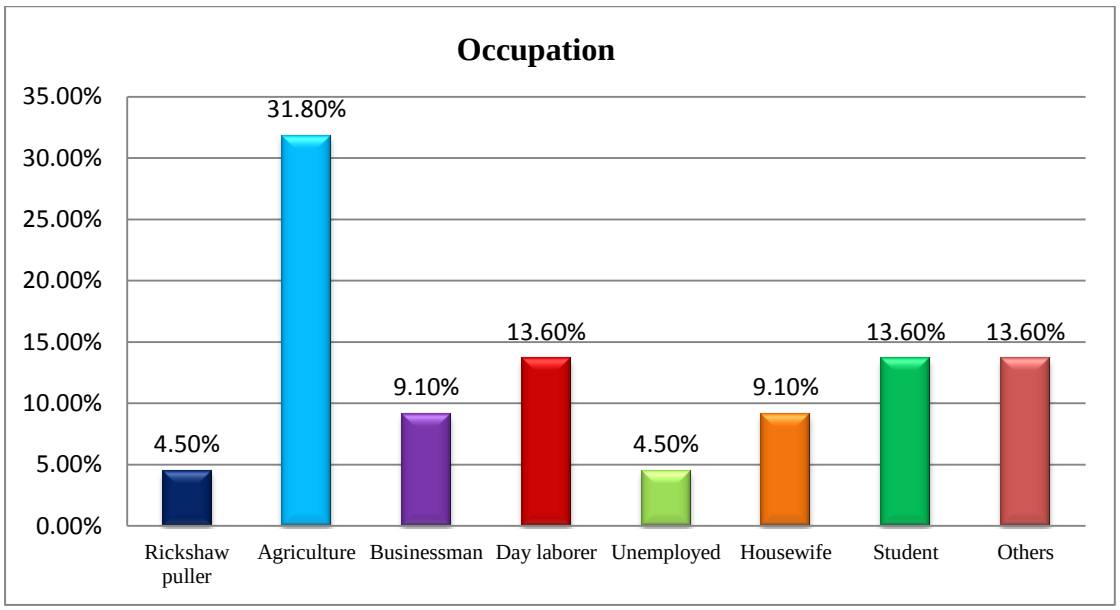


Figure-4: Occupation of the involved participants with percentage.

Table-2: Characteristics of Spinal cord injury with Urinary incontinence

Type of injury				**Neurological level by ASIA**		
	Experimental group	Control Group			Experimental group	Control Group
Traumatic	**90.9%**	**81.8%**		Incomplete B	**81.8%**	**27.3%**
Non traumatic	**9.1%**	**18.2%**		Incomplete C	**18.2%**	**63.6%**
				Incomplete D		**9.1%**
Cause of injury						
Motor vehicle injury	**18.2%**	**27.3%**		**Diagnosis**		
Fall from height	**18.2%**	**36.4%**		Traumatic Paraplegia	**36.4%**	**45.5%**
Fall while carrying heavy load	**45.5%**	**18.2%**		Traumatic tetraplegia	**54.5%**	**45.5%**
Transverse myelitis	**9.1%**			Non traumatic Paraplegia	**9.1%**	
Spinal tumor		**18.2%**		Non traumatic tetraplegia		**9.1%**
0thers	**9.1%**					
Skeletal level of injury				**Types of incontinence**		
Cervical	**54.5%**	**63.6%**		Stress incontinence	**27.3%**	**36.4%**
Thoracic		**9.1%**		Urge incontinence	**72.7%**	**63.6%**
Lumber	**45.5%**	**27.3%**				

Causes of injury

In this study it was found that among 22 participant 31.8% (n=7) were injured by fall while carrying heavy load, 27.3% (n=6) were by fall from height, 22.7 %(n=5) were by motor vehicle or road traffic accident, spinal tumor were 9.1% (n=2) transverse myelitis and others were 4.5% (n=1). In an epidemiological study (Spinal cord lesions in Bangladesh: an epidemiological study 1994-1995), it was shown that out of 179 participant seventy-six (43%) resulted from a fall from a height (such as a tree). Thirty-seven injuries (20%) were associated with fall of heavy load on back and fall while carrying heavy object (a common practice in Bangladesh). Thirty-three (18%) were a result of a road traumatic accident. Eleven patients (6%) formed a very diverse group which included assault, stab injury, sports injury and bull attack (Hoque et al., 1999).

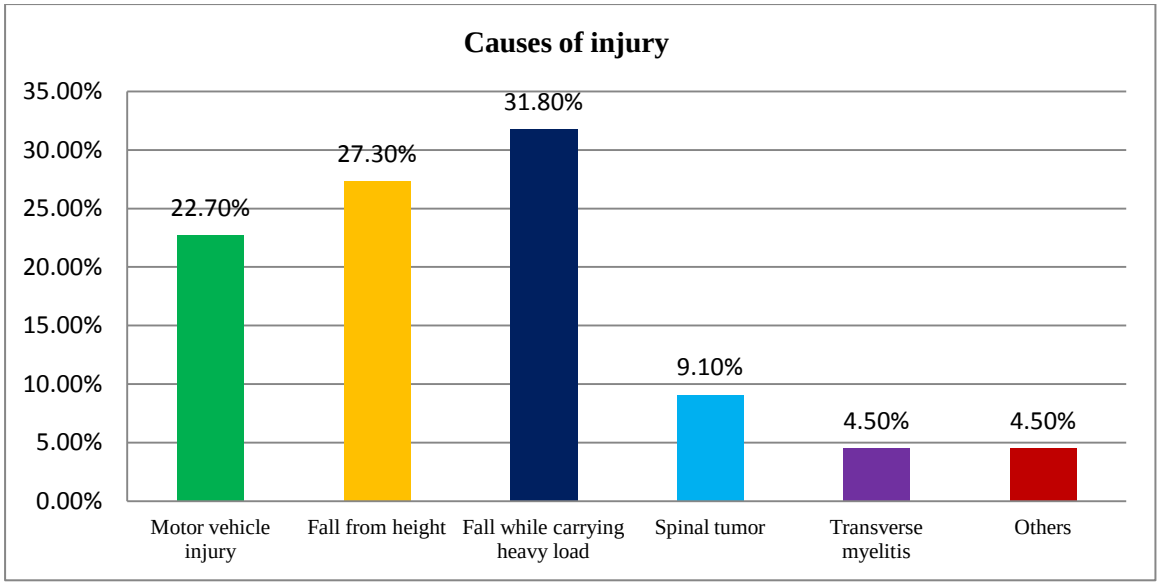


Figure-5: Percentage of causes of injury among involved participants.

Types of urinary incontinence

Among 22 participants of this study the types of urinary incontinence of the participants were about 68.2% (n=15) urge incontinence and about 31.8% (n=7) stress incontinence of injury. The bar chart below shows the types of incontinence among the participants that were found in this study.

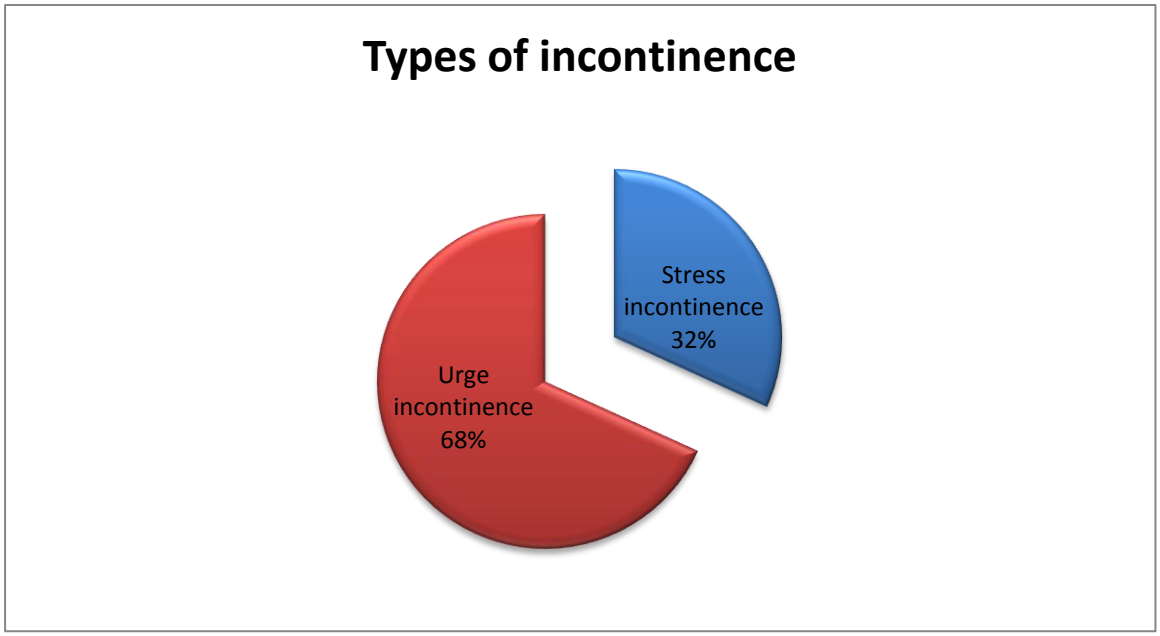


Figure-6: Types of urinary incontinence of the participants with Percentage.

Statistical analysis

Data analysis was done with a statistical calculation using inferential statistical parametric ‘t’ test which was performed during ratio data system as randomly selection of the subjects were done for the two groups of this parametric study. All participants were code according to group to maintain participant’s confidentially. The King’s health questionnaire was scored for all subjects in the control group and experimental group to measure the quality of life before starting treatment and after completing the treatment. Differences were calculated by comparing the pre-test and post-test from King’s health questionnaire and bladder diary.

Data of King’s health questionnaire which were collected by pre-test and post-test in the control group and experimental group and differences between pre-test and post-test score indicated the effectiveness of pelvic floor muscles strengthening for incontinence patients which referred to reduction of urinary incontinence.

As it was experimental study and had unmatched groups of different subjects, they were randomly allocated to control group and experimental group. Measurement of the effectiveness came from collecting King’s health questionnaire. For this reason this study used parametric unrelated‘t’ test to calculate the significance level of the study. These‘t’ tests were used to find out whether the‘t’ value represented a significance difference between the results from different treatment group.

Unrelated‘t’ test and mean different will calculate to test the hypothesis on the basis of the following assumptions:

- Data were ratio.
- Two different set of subjects in two conditions.
- General observations were existed in the course of treatment.

't' formula:

$$\mathbf{t} = \frac{\bar{x_1} - \bar{x_2}}{\left[\sqrt{\frac{\left\{\sum x_1^2 - \frac{(\sum x_1)^2}{n_1}\right\} + \left\{\sum x_2^2 - \frac{(\sum x_2)^2}{n_2}\right\}}{(n_1 - 1) + (n_2 - 1)}} X \sqrt{\left(\frac{1}{n_1} + \frac{1}{n_2}\right)}\right]}$$

Were,

x_1 = Scores from experimental group.

x_2 = Scores from control group.

$\bar{x_1}$ = Mean of scores from experimental group.

$\bar{x_2}$ = Mean of scores from control group.

$\sum x_1^2$ = The square of each individual score from experimental group totaled.

$\sum x_2^2$ = The square of each individual score from control group totaled.

$(\sum x_1)^2$ = The total of the individual scores from experimental group squared.

$(\sum x_2)^2$ = The total of the individual scores from control group squared.

n_1 = Number of subjects in the experimental group.

n_2 = Number of subjects in the control group.

To find out the significant level of the Probability (P) value. This experimental study hypothesis was one tailed because it was producing specific direction to the result. If P value is <0.05 which will be accepted by the researcher to show the significant result of the study to prove or support the hypothesis and reject the null hypothesis. The statistical approach to determining sample size is the power calculation. Statistical power is a measure of how likely the result is to produce statistically significant result for a difference between groups of given magnitude (Bowling, 1997). Researcher calculate the data that added in the appendix (A&B) and found the 't' value for improvement of bladder management that is reduction of urinary incontinence (in King's Health Questionnaire) in five domains (e.g. General health perception, incontinence impact, physical limitation, severity measures and episodes of leaking urine). One quality of life domains Severity measures were found to be significant in this study by using the p values.

For an example an analysis of the measurement of quality of life in Severity measures is given bellow:

Table-3: Severity measures

Improvement in quality of life i.e. reduction of urinary incontinence in experimental group and control group in the 'Severity measures' domain were differences between pre-test and post-test quality of life scores.

Experimental Group			**Control Group**		
Subjects	Quality of life scores x_1	x_1^2	Subjects	Quality of life scores x_2	x_2^2
1.	25	625		16.66	277.55
2.	33.34	1111.55		8.34	69.55
3.	16.66	277.55		16.67	277.88
4.	-8.33	69.38		8.33	69.38
5.	8.33	69.38		25	625
6.	8.34	69.55		8.33	69.38
7.	66.66	4443.55		00	00
8.	25	625		00	00
9.	41.67	1736.39		00	00
10.	58.33	3398.98		25	625
11.	25	625		8.34	69.55
	$\sum x_1$ =299.97 (approx)	$\sum x_1^2$ =13051.33 (approx)		$\sum x_2$=116.67 (approx)	$\sum x_2^2$=2083.9 (approx)

Were,

$\bar{x_1}$ = 27.27

$\sum x_1$ = 299.97

$\sum x_1^2$ = 13051.33

$(\sum x_1)^2$ = 89982.00

n_1 = 11

$\bar{x_2}$ = 10.61

$\sum x_2$ = 116.67

$\sum x_2^2$ = 2083.29

$(\sum x_2)^2$ = 13597.89

n_2 = 11

If we substitute these values in the formula:

$$\mathbf{t} = \frac{27.27 - 10.61}{\left[\sqrt{\frac{\left\{13051.33 - \frac{89982.00}{11}\right\} + \left\{2083.29 - \frac{13597.89}{11}\right\}}{(11-1)+(11-1)}} X \sqrt{\left(\frac{1}{11} + \frac{1}{11}\right)}\right]}$$

t = 2.323

Significance level

After statistical analysis the researcher found the 't' value and find out the 'p'value from the six number critical values of 't'. For example the 'p' value of the above is mentioned.

Degree of freedom (df) from the formula:

df = $(n_1 - 1) + (n_2 - 1)$

= (11-1) + (11-1)

=10+10

= 20

Six number of critical values of't'=

1.325 1.725 2.086 2.528 2.845 3.850

To be significant at one of this level, the 't' value above must be equal to or larger than the associated 't' value.

Here the 't' value is larger than 2.086 and smaller than 2.528.this means that for one tailed hypothesis, the provability associated with 't' value of 2.323 comes where between 2.5% and 1%.In other word the probability for 2.323 is less than 2.5% but greater than 1%. According to convention, we analysis say that p is less than a given level, and so here the p value for t = 2.323 is less than 2.5% (or 0.025).

This is expressed as:

P < 0.025 (or 2.5%) As (<, means 'less than')

P value: P < 0.025 (or 2.5%)

Following this way, the researcher analyzed the data. For further information see in the appendix (A) for next proceeding in significant of improvement of quality of life according to five domains of quality of life measurement.

Participants (Both groups) No	Quality of life scores														
	General health perceptions			Incontinence impact			Physical limitation			Severity measures			Episodes of leaking urine		
	Pre-test	Post - test	**Difference**	Pre-test	Post-test	**Difference**	Pre-test	Post-test	**Difference**	Pre-test	Post-test	**Difference**	Pre - test	Post-test	**Difference**
E_1	75	50	**25**	66.66	33.33	**33.33**	66.66	33.33	**33.33**	75	50	**25**	6	4	**2**
E2	50	50	**00**	33.33	33.33	**00**	50	33.33	**16.67**	75	41.66	**33.34**	6	2	**4**
E3	50	25	**25**	100	100	**00**	33.33	33.33	**00**	41.66	25	**16.66**	6	4	**2**
E4	50	25	**25**	33.33	33.33	**00**	33.33	33.33	**00**	33.33	41.66	**-8.33**	4	2	**2**
E5	50	25	**25**	33.33	33.33	**00**	33.33	33.33	**00**	41.66	33.33	**8.33**	6	2	**4**
E6	25	25	**00**	66.66	33.33	**33.33**	66.66	33.33	**33.33**	75	66.66	**8.34**	6	4	**2**
E7	50	50	**00**	33.33	33.33	**00**	66.66	33.33	**33.33**	91.66	25	**66.66**	6	4	**2**
E8	50	25	**25**	33.33	33.33	**00**	50	33.33	**16.67**	91.66	66.66	**25**	6	4	**2**
E9	50	25	**25**	66.66	33.33	**33.33**	83.33	66.66	**16.67**	83.33	41.66	**41.67**	6	2	**4**
E10	50	25	**25**	66.66	33.33	**33.33**	50	33.33	**16.67**	83.33	25	**58.33**	6	6	**0**
E11	100	50	**50**	66.66	33.33	**33.33**	66.66	50	**16.66**	91.66	66.66	**25**	4	4	**0**
C_1	75	50	**25**	66.66	66.66	**00**	66.66	50	**16.66**	91.66	75	**16.66**	4	4	**0**
C2	75	50	**25**	00	00	**00**	16.66	16.66	**00**	75	66.66	**8.34**	6	4	**2**
C3	25	25	**00**	66.66	66.66	**00**	66.66	66.66	**00**	58.33	41.66	**16.67**	6	2	**4**
C4	50	50	**00**	33.33	33.33	**00**	33.33	33.33	**00**	83.33	75	**8.33**	6	6	**0**
C5	25	25	**00**	00	00	**00**	00	00	**00**	100	75	**25**	6	6	**0**
C6	50	50	**00**	66.66	66.66	**00**	50	33.33	**16.67**	91.66	83.33	**8.33**	6	6	**0**
C7	50	50	**00**	33.33	33.33	**00**	50	33.33	**16.67**	50	50	**00**	6	4	**2**
C8	75	50	**25**	33.33	33.33	**00**	66.66	50	**16.66**	00	00	**00**	0	0	**0**
C9	50	50	**00**	66.66	33.33	**33.33**	66.66	66.66	**00**	50	50	**00**	2	2	**0**
C10	75	50	**25**	66.66	33.33	**33.33**	66.66	50	**16.66**	50	25	**25**	2	0	**2**
C11	50	25	**25**	66.66	66.66	**00**	16.66	16.66	**00**	25	16.66	**8.34**	0	0	**0**

Table-4: The impacts of urinary incontinence (UI) in different quality of life domains for experimental group and control group are given below:

Experimental group					
No	**Domains**	**Pre-test**		**Post-test**	
		Mean (%)	**SD(±)**	**Mean (%)**	**SD(±)**
1	General health perceptions	54.55	±17.84	34.10	±12.03
2	Incontinence impact	54.54	±21.42	39.39	±20.92
3	Physical limitation	54.54	±28.12	37.88	±10.28
4	Severity measures	67.42	±21.17	43.94	±14.98
5	Episodes of leaking urine	5.64	±0.77	3.45	±1.23
Control group					
No	**Domains**	**Pre-test**		**Post-test**	
		Mean (%)	**SD(±)**	**Mean (%)**	**SD(±)**
1	General health perceptions	54.55	±17.89	43.18	±9.49
2	Incontinence impact	45.45	±20.23	39.39	±16.94
3	Physical limitation	45.35	±19.45	37.78	±15.99
4	Severity measures	61.36	±22.92	50.75	±21.29
5	Episodes of leaking urine	4	±1.70	3.09	±1.66

Table-5: Domains or variables in the study statistically significant or not significant according to observed 't' value are showed in the table

No	Domains	Observed 't' value	Observed 'p' value	Significant or not significant
1	General health perceptions e.g. present health status	1.520	P > 0.1	Not significant
2	Incontinence impact e.g. affection of bladder problem	1.377	P > 0.1	Not significant
3	Physical limitation e.g. affection of bed mobility & activities of daily living	1.948	P < 0.025	Significant
4	Severity measures e.g. urine production frequency, fluid intake and output of urine, method of products used (catheterization) product, aware of urge to void.	2.323	P < 0.025	Significant
5	Episodes of leaking urine E.g. Episode of leaking urine	2.222	P < 0.025	Significant

CHAPTER –IV: RESULTS

The researcher interprets the result in different domains based on Quality of life using the values that come from this comparative study.

General health perception

Researcher found that 't' value of 'General health perception' was 1.520.The means scores of 'General health perception' for experimental group was larger than the control group (20.454 opposed to 11.364).Using unrelated 't' test on the data of 'General health perception'($t = 1.520$, $df = 20$, $p>0.1$) the result were not found to be significant ($p > 0.1$ for one tailed hypothesis).As the 't' has an associated probability level more than 10%,which means that the probability of random error being responsible for the outcome of the experiment is more than 10 in 100. As the usual cut off point for climbing support for significance level of the experimental one tailed hypothesis is 5% (0.05), this study can say that the result is not significant.

Incontinence impact

Researcher found that 't' value of 'Incontinence impact' was 1.377. The means scores of 'Incontinence impact' for experimental group were larger than the control group (15.15 opposed to 6.06). Using unrelated 't' test on the data of 'Incontinence impact'($t = 1.377$, $df = 20$, $p>0.1$) the result were not found to be significant ($p > 0.1$ for one tailed hypothesis). As the 't' has an associated probability level more than 10%, which means that the probability of random error being responsible for the outcome of the experiment is more than 10 in 100.As the usual cut off point for climbing support for significance level of the experimental one tailed hypothesis is 5% (0.05), this study can say that the result is not significant.

Physical limitation

Researcher found that 't' value of 'Physical limitation' was 1.948.The means scores of 'Physical limitation' for experimental group were larger than the control group (16.67 opposed to 7.575).Using unrelated 't' test on the data of 'Physical limitation'($t = 1.948$, $df = 20$, $p<0.025$) the result were found to be significant ($p< 0.025$ for one tailed hypothesis). As the 't' has an associated probability level less than 2.5%, which means that the probability of random error being responsible for the

outcome of the experiment is more than 25 in 1000. As the usual cut off point for climbing support for significance level of the experimental one tailed hypothesis is 5% (0.05), this study can say that the result is significant.

Severity measures

Researcher found that 't' value of 'Severity measures' was 2.323. The means scores of 'Severity measures' for experimental group were larger than the control group (27.27 opposed to 10.61).Using unrelated 't' test on the data of 'Severity measures'(t = 2.323, df = 20, p<0.025) the result were found to be significant (p< 0.025 for one tailed hypothesis). As the 't' has an associated probability level less than 2.5%, which means that the probability of random error being responsible for the outcome of the experiment is more than 25 in 1000. As the usual cut off point for climbing support for significance level of the experimental one tailed hypothesis is 5% (0.05), this study can say that the result is significant.

Episodes of leaking urine

Researcher found that 't' value of 'Episodes of leaking urine' was 2.222. The means scores of 'Episodes of leaking urine' for experimental group were larger than the control group (2.182 opposed to 0.909).Using unrelated 't' test on the data of 'Episodes of leaking urine' (t = 2.22, df = 20, p<0.025) the result were found to be significant (p< 0.025 for one tailed hypothesis). As the't' has an associated probability level less than 2.5%, which means that the probability of random error being responsible for the outcome of the experiment is more than 25 in 1000. As the usual cut off point for climbing support for significance level of the experimental one tailed hypothesis is 5% (0.05), this study can say that the result is significant.

In this study three domains (Physical limitation, Severity measures, Episodes of leaking urine) had showed significant level of 'p'value, whereas two domains (General health perception, Incontinence impact) had not showed significant level of 'p' value. As in this study majority of Quality of life domain showed significant level of 'p'value, this means that one tailed hypothesis for this study is accepted or the null hypothesis is rejected.

CHAPTER V DISCUSSION

The purpose of the study was to determine the strengthening of pelvic floor muscles for incontinence patients following incomplete spinal cord injury. Objectives: To identify the impact of urinary incontinence on quality of life among spinal cord injury patient,to measure the effectiveness of pelvic floor muscle exercise.

In the experimental study total twenty two (22) incomplete spinal cord injury (SCI) patients having urinary incontinence were selected for this study and then randomly assign them in experimental and control group by lottery. Each group were completed a questionnaire before treatment session and after treatment session. The experimental group received other medical management with pelvic floor muscle exercise and control group received only medical managements. The experimental group received one day instruction for treatment and followed up for 42 days full treatment session, meanwhile the control group also followed up. Finally the outcome measured through quality of life score using King's health questionnaire.

The study assessed patient's quality of life in five domains of quality of life. These domains were: General health perception, Incontinence impact, Physical limitation, Severity measures (aware of urge to void, fluid intake per day, incontinence product used, incontinence product changed), Episodes of leaking. The findings from this study showed a significant improvement in quality of life on three domains among five domains in the experimental group compared to control group.

Significant improvements in quality of life were found in Physical limitation, Severity measures, Episodes of leaking urine. General health perception and Incontinence impact were not found. Lamers and van der Vaart (2006) point out that a research on Medium-term efficacy of pelvic floor muscle training for female urinary incontinence in daily practice where three hundred and fifty five women were treated in five physiotherapy practices between January 200 and December 2004. 50% of women were satisfied with the result of Physiotherapy.

In ‘General health perception’ the experimental group did not show significant (P> 0.1) improvement than the control group. Maria et al., (2006) suggests that the prospective study on effectiveness of pelvic floor muscle exercise with biofeedback for stress urinary incontinence.14 patients diagnosed with stress urinary incontinence (SUI) were selected for that study. All patients underwent a pelvic floor training associated to biofeedback for consecutive weeks. Urodynamic tests, pad test and bladder diary were analyzed at the beginning of the study, at the end and after 3 months. The King’s Health Questionnaire (KHQ) was applied before and after treatment to assess the impact in the quality of life. The KHQ revealed significances differences except in the case of ‘General health perception’, which covers health in general and not exclusively urinary incontinence .In this study, the ‘t’ value of quality of life score in ‘General health perception’ was 1.520 associated probability level of more than 0.1. The mean score of improvement of quality of life in ‘General health perception’ domain in experimental group were 20.454 as opposed to 11.364 and the result was not found to be significant.

In ‘Incontinence impact’ domain, the experimental group did not show significant (P>0.1) improvement in quality of life than control group. Capelini et al. (2006) suggest that did prospective study on effectiveness of pelvic floor muscle exercise with biofeedback for stress urinary incontinence and showed that ‘Incontinence impact ‘domain for that study was not significant (P=0.136). In this study, the ‘t’ value of quality of life score in ‘Incontinence impact’ was 1.377 associated probability level of more than 0.1. The mean score of improvement of quality of life in ‘Incontinence impact’ domain in experimental group was 15.15 as opposed to 6.06 and the result was not found to be significant.

In ‘Physical limitation’ domain, the experimental group showed significant (P<0.025) improvement in quality of life than control group. An examination on effectiveness of pelvic floor muscle exercise with biofeedback for stress urinary incontinence and showed significant (<0.001) improvement in ‘Physical limitation’ domain (Capelini et al., 2006). In this study, the ‘t’ value of quality of life score in ‘Physical limitation’ was 1.948 associated probability level of less than 0.025 in this study. The mean score of improvement of quality of life in ‘Physical limitation ‘domain in

experimental group was 16.67 as opposed to 7.575 and the result was not found to be significant.

In ‘Severity Measures’ domain, the experimental group showed significant (P<0.025) improvement in quality of life than control group. In Mariana et.al. 2007, study on ‘Women’s life quality after physical therapy treatment for stress urinary incontinence had showed a significant improvement in ‘Severity measures’ (66.9 ± 19.6 versus 22.3±24.2; P<0.001) domain. The study by Alex et al., (2004) suggests that showed a significant improvement in ‘Severity measures’ domain (P=0.029). In this study, the ‘t’ value of quality of life score in ‘Severity Measures’ was 2.323 associated probability level of less than 0.025 in this study. The mean score of improvement of quality of life in ‘Severity Measures’ domain in experimental group was 27.27 as opposed to 10.61 and the result was not found to be significant.

In ‘Episodes of leaking urine’ domain, the experimental group showed significant (P<0.025) improvement in quality of life than control group. In this study, the ‘t’ value of quality of life score in ‘‘Episodes of leaking urine’ domain’ was 2.323 associated probability level of less than 0.025 in this study. The mean score of improvement of quality of life in ‘Episodes of leaking urine’ domain in experimental group was 27.27 as opposed to 10.61 and the result was not found to be significant.

CHAPTER VI CONCLUSION AND RECOMMENDATION

6.1 Conclusion

A more aggressive attitude in urinary management following SCI is necessary in order to improve the rehabilitation and quality of life of persons with SCI. The objectives were to determine the effectiveness of pelvic floor muscle strengthening (PFME) for incontinence patients following spinal cord injury. In this study five quality of life domains were used to evaluate the effectiveness. Three domains had showed significant result and two of these did not show significant result. As the majority of these domains had showed significant level, so the hypothesis of this study could be considered to be 'Accepted' and the null hypothesis considered to be 'Rejected'. So, the researcher can conclude the study with the result that pelvic floor muscle strengthening (PFME) is more effective for incontinence patients following incomplete spinal cord injury than the no other treatment. But the result can't be generalized to wider population having small sample size as well as other limitations. Due to small sample the data were analyzed by unrelated 't' test, if the sample size could be increased then the data could be analyzed by 'unrelated 't' distribution'.

No nationally recognized such type of research has been done this area. This study seemed to be the first study about effectiveness of pelvic floor muscle strengthening (PFME) for urinary incontinence in the practice of Physiotherapy in 'Bangladesh'. One of the objectives was to find out the impact of urinary incontinence on quality of life of spinal cord injury incontinence patient was achieved (see table: 4 mean, SD table). The study showed that urinary incontinence affects the quality of life severely.

The Physiotherapists in Bangladesh could apply this treatment option for urinary incontinence among spinal cord injury after this study. But further high quality RCT should be carried out to apply this intervention widely in general practice.

6.2 Recommendation

In this study, the researcher measured the reduction of urinary incontinence through improvement in quality of life which included five domains of quality of life. But there are other measurement tools present which can be used to measure the reduction of urinary incontinence and give more accurate indication of incontinence such as using bladder diary, pad test. So the further study in this area is recommended to use these tools as outcome measurement. Pelvic floor muscle exercise has been showed to increase the muscle strength and decrease the symptoms of urinary incontinence (Sampselle et al., 1998). Sampselle et.al. 1998 infernces a result from effect of pelvic floor muscle strengthening or exercise on transient incontinence during pregnancy and after childbirth that the practice of pelvic floor muscle exercise by primiparas result in fewer incontinence symptoms during late pregnancy and postpartum. The effectiveness of pelvic floor muscle exercise during pregnancy should be evaluated in further study. According to American Academy of family Physicians (2005), the one of the causes of developing urinary incontinence is menopause. Does pelvic floor exercise reduce urinary incontinence? It is recommended to find out the answer of this question through a well designed project study.

Finally, for the same research a further study is recommended to investigate the long lasting effects of pelvic floor muscle exercise in bladder management with large sample size by using a double blinded procedure to get more valid result.

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Appendix-A

Improvement in quality of life i.e. reduction of urinary incontinence in experimental group and control group in the **'General health perception'** domain were differences between pre-test and post-test quality of life scores.

Table-6: General health perceptions

Experimental Group			**Control Group**		
Subjects	Quality of life scores x_1	x_1^2	Subjects	Quality of life scores x_2	x_2^2
1.	25	625		25	625
2.	00	00		25	625
3.	25	625		00	00
4.	25	625		00	00
5.	25	625		00	00
6.	00	00		00	00
7.	00	00		00	00
8.	25	625		25	625
9.	25	625		00	00
10.	25	625		25	625
11.	50	2500		25	625
	$\sum x_1 = 225$ (approx)	$\sum x_1^2 =$ 6875 (approx)		$\sum x_2 = 125$ (approx)	$\sum x_2^2 =$ 3125 (approx)

Were,

$\bar{x}_1 = 20.454$

$\sum x_1 = 225$

$\sum x_1^2 = 6875$

$(\sum x_1)^2 = 50625$

$n_1 = 11$

$\bar{x}_2 = 11.364$

$\sum x_2 = 125$

$\sum x_2^2 = 3125$

$(\sum x_2)^2 = 15625$

$n_2 = 11$

If we substitute these values in the formula:

$$\mathbf{t} = \frac{\mathbf{20.454 - 11.364}}{\left[\sqrt{\frac{\left\{6875 - \frac{50625}{11}\right\} + \left\{3125 - \frac{15625}{11}\right\}}{(11-1)+(11-1)}} X \sqrt{\left(\frac{1}{11} + \frac{1}{11}\right)}\right]}$$

t = 1.520

Significance level

After statistical analysis the researcher found the‘t’ value and find out the ‘p’ value from the six number critical values of‘t’. For example the ‘p’ value of the above is mentioned.

Degree of freedom (df) from the formula:

$df = (n_1 - 1) + (n_2 - 1)$

= (11-1) + (11-1)

=10+10

= 20

Six number of critical values of‘t’=

1.325 1.725 2.086 2.528 2.845 3.850

To be significant at one of this level, the‘t’ value above must be equal to or larger than the associated‘t’ value.

P value: P > 0.1 (10%)

Table-7: Incontinence impact

Improvement in quality of life i.e. reduction of urinary incontinence in experimental group and control group in the **'Incontinence impact'** domain were differences between pre-test and post-test quality of life scores.

Experimental Group			**Control Group**		
Subjects	Quality of life scores x_1	x_1^2	Subjects	Quality of life scores x_2	x_2^2
1.	33.33	1110.889		00	00
2.	00	00		00	00
3.	00	00		00	00
4.	00	00		00	00
5.	00	00		00	00
6.	33.33	110.889		00	00
7.	00	00		00	00
8.	00	00		00	00
9.	33.33	1110.889		33.33	1110.889
10.	33.33	1110.889		33.33	1110.889
11.	33.33	1110.889		00	00
	$\sum x_1$ = 166.65 (approx)	$\sum x_1^2$ = 5554.45 (approx)		$\sum x_2$ = 66.66 (approx)	$\sum x_2^2$ = 2221.778 (approx)

Were,

$\bar{x}_1 = 15.15$

$\sum x_1 = 166.65$

$\sum x_1^2 = 5554.45$

$(\sum x_1)^2 = 27772.22$

$n_1 = 11$

$\bar{x}_2 = 6.06$

$\sum x_2 = 66.66$

$\sum x_2^2 = 2221.778$

$(\sum x_2)^2 = 4443.56$

$n_2 = 11$

If we substitute these values in the formula:

$$t = \frac{15.15 - 6.06}{\left[\sqrt{\frac{\left\{5554.45 - \frac{27772.22}{11}\right\} + \left\{2221.778 - \frac{4443.56}{11}\right\}}{(11-1)+(11-1)}} X \sqrt{\left(\frac{1}{11} + \frac{1}{11}\right)}\right]}$$

t = 1.377

Significance level

After statistical analysis the researcher found the‘t’ value and find out the ‘p’value from the six number critical values of‘t’. For example the ‘p’value of the above is mentioned.

Degree of freedom (df) from the formula:

$df = (n_1 - 1) + (n_2 - 1)$

= (11-1) + (11-1)

=10+10

= 20

Six number of critical values of‘t’=

1.325 1.725 2.086 2.528 2.845 3.850

To be significant at one of this level, the‘t’ value above must be equal to or larger than the associated‘t’ value.

P value: P > 0.1 (10%)

Table-8: Physical limitations

Improvement in quality of life i.e. reduction of urinary incontinence in experimental group and control group in the **'Physical limitation'** domain were differences between pre-test and post-test quality of life scores.

Experimental Group			**Control Group**		
Subjects	Quality of life scores x_1	x_1^2	Subjects	Quality of life scores x_2	x_2^2
1.	33.33	1110.889		16.66	277.56
2.	16.67	277.89		00	00
3.	00	00		00	00
4.	00	00		00	00
5.	00	00		00	00
6.	33.33	1110.889		16.67	277.89
7.	33.33	1110.889		16.67	277.89
8.	16.67	277.89		16.66	277.56
9.	16.67	277.89		00	00
10.	16.67	277.89		16.66	277.56
11.	16.66	277.56		00	00
	$\sum x_1$ = 183.33 (approx)	$\sum x_1^2$ = 4721.78 (approx)		$\sum x_2$ = 83.32 (approx)	$\sum x_2^2$ =1388.46 (approx)

Were,

$\bar{x}_1 = 16.67$

$\sum x_1 = 183.33$

$\sum x_1^2 = 4721.78$

$(\sum x_1)^2 = 33609.89$

$n_1 = 11$

$\bar{x}_2 = 7.575$

$\sum x_2 = 83.32$

$\sum x_2^2 = 1388.46$

$(\sum x_2)^2 = 6942.22$

$n_2 = 11$

If we substitute these values in the formula:

$$\mathbf{t} = \frac{16.67 - 7.575}{\left[\sqrt{\frac{\left\{4721.78 - \frac{33609.89}{11}\right\} + \left\{1388.46 - \frac{6942.22}{11}\right\}}{(11-1)+(11-1)}} X \sqrt{\left(\frac{1}{11} + \frac{1}{11}\right)}\right]}$$

t = 1.948

Significance level

After statistical analysis the researcher found the‘t’ value and find out the ‘p’value from the six number critical values of‘t’. For example the ‘p’value of the above is mentioned.

Degree of freedom (df) from the formula:

$df = (n_1 - 1) + (n_2 - 1)$

= (11-1) + (11-1)

=10+10

= 20

Six number of critical values of‘t’=

1.325 1.725 2.086 2.528 2.845 3.850

To be significant at one of these level, the ‘t’value above must be equal to or larger than the associated‘t’ value.

P value: P < 0.025 (or 2.5%)

Table-9: Episodes of leaking urine

Improvement in quality of life i.e. reduction of urinary incontinence in experimental group and control group in the **'Episodes of leaking urine'** domain were differences between pre-test and post-test quality of life scores.

Experimental Group			**Control Group**		
Subjects	Episodes of leaking urine scores x_1	x_1^2	Subjects	Episodes of leaking urine scores x_2	x_2^2
1.	2	4		0	0
2.	4	16		2	4
3.	2	4		4	16
4.	2	4		0	0
5.	4	16		0	0
6.	2	4		0	0
7.	2	4		2	4
8.	2	4		0	0
9.	4	16		0	0
10.	0	0		2	4
11.	0	0		0	0
	$\sum x_1 = 24$ (approx)	$\sum x_1^2 = 70$ (approx)		$\sum x_2 = 10$ (approx)	$\sum x_2^2 = 28$ (approx)

Were,

$\bar{x}_1 = 2.182$ $\bar{x}_2 = 0.909$

$\sum x_1 = 24$ $\sum x_2 = 10$

$\sum x_1^2 = 70$ $\sum x_2^2 = 28$

$(\sum x_1)^2 = 576$ $(\sum x_2)^2 = 100$

$n_1 = 11$ $n_2 = 11$

If we substitute these values in the formula:

$$t = \frac{2.182 - 0.909}{\left[\sqrt{\frac{\left\{70 - \frac{576}{11}\right\} + \left\{28 - \frac{100}{11}\right\}}{(11-1)+(11-1)}} \mathrm{X} \sqrt{\left(\frac{1}{11} + \frac{1}{11}\right)}\right]}$$

t = 2.222

Significance level

After statistical analysis the researcher found the‘t’ value and find out the ‘p’value from the six number critical values of‘t’. For example the ‘p’value of the above is mentioned.

Degree of freedom (df) from the formula:

$df = (n_1 - 1) + (n_2 - 1)$

= (11-1) + (11-1)

=10+10

= 20

Six number of critical values of‘t’=

1.325 1.725 2.086 2.528 2.845 3.850

To be significant at one of these level, the ‘t’value above must be equal to or larger than the associated‘t’ value.

P value: P < 0.025 (or 2.5%)

Data findings of both Experimental and control group

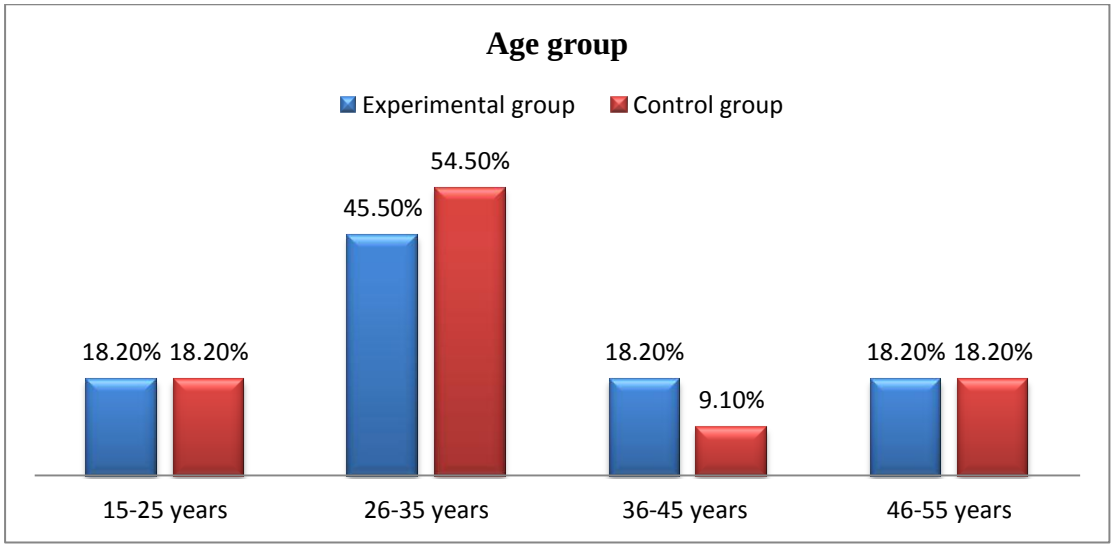

Figure-7: Age of the participants (Experimental and Control group).

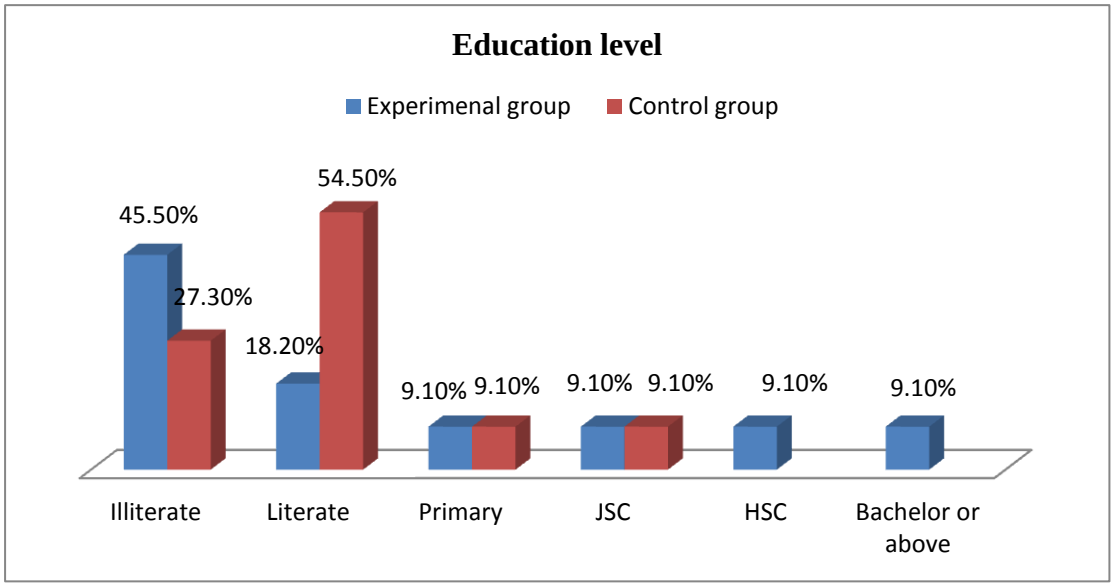

Figure-8: Educational statuses of the participants (Experimental and Control group).

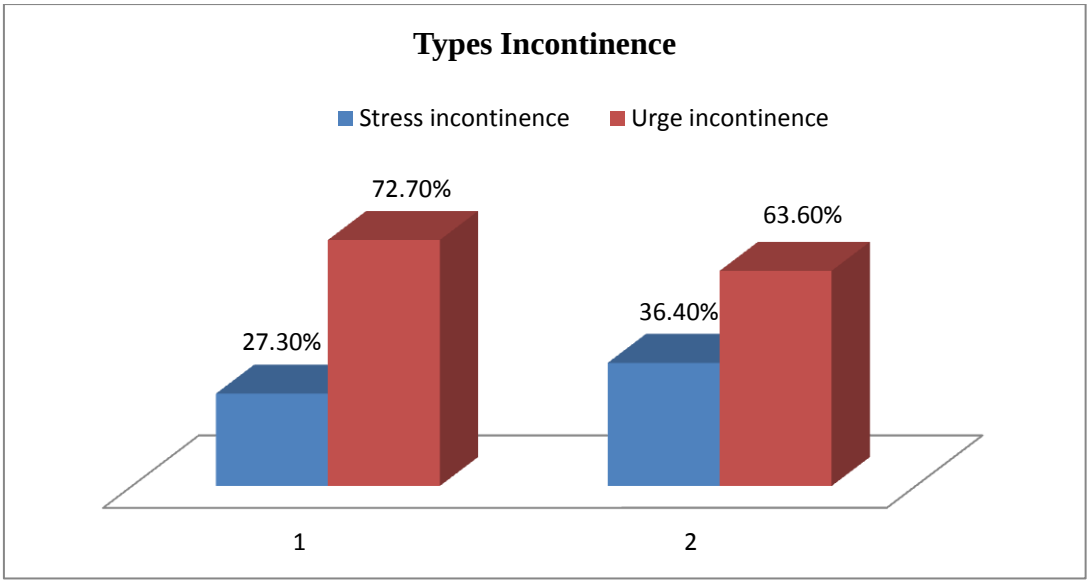

Figure-9: Types of the urinary incontinence (1= Experimental and 2=Control group).

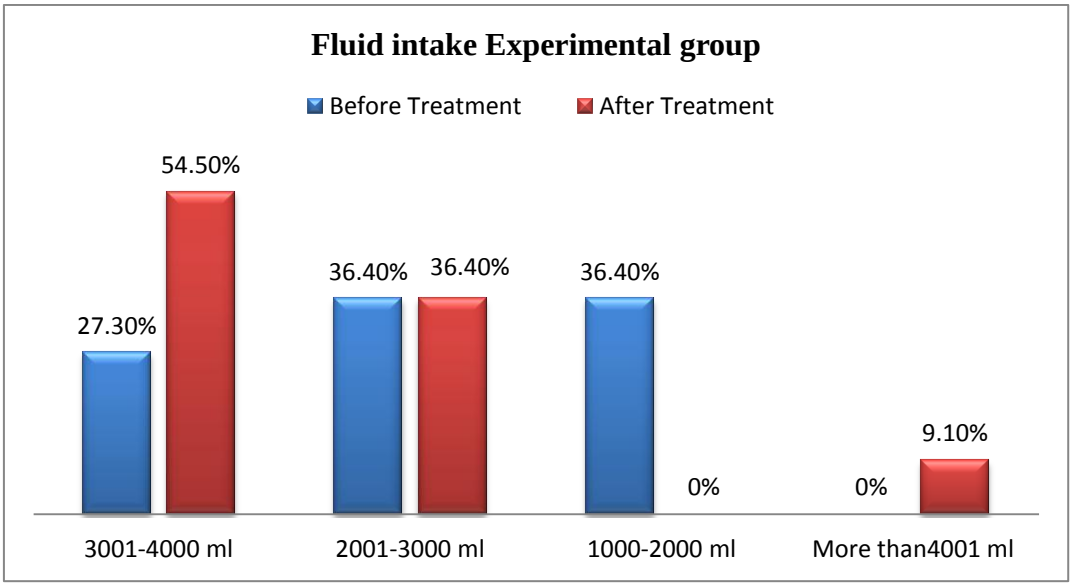

Figure-10: Average daily fluid intakes of the experimental group (before & after treatment)

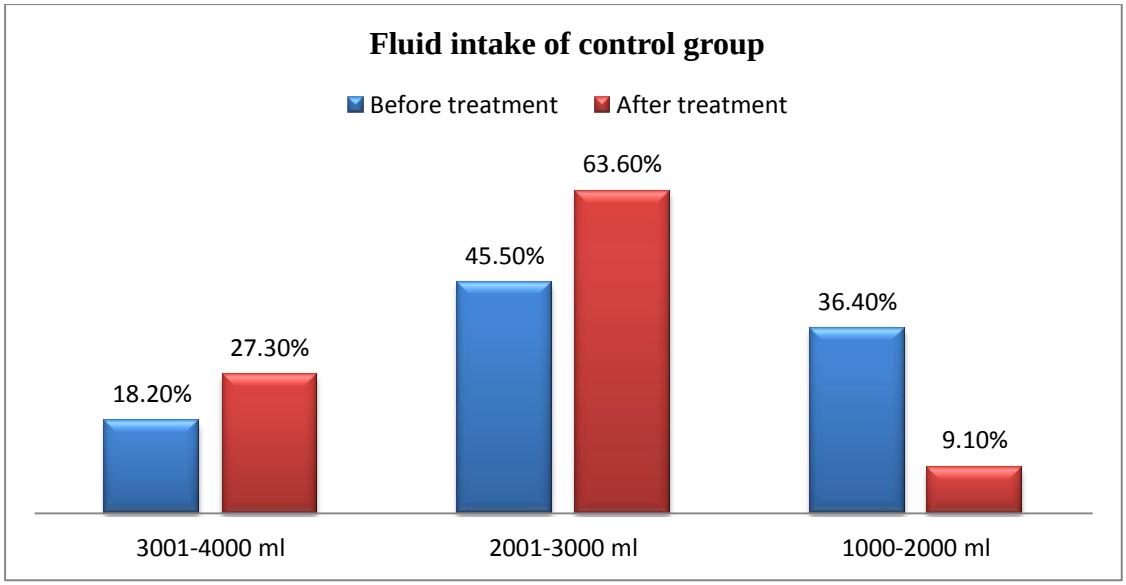

Figure-11: Average daily fluid intakes of the control group (before and after treatment)

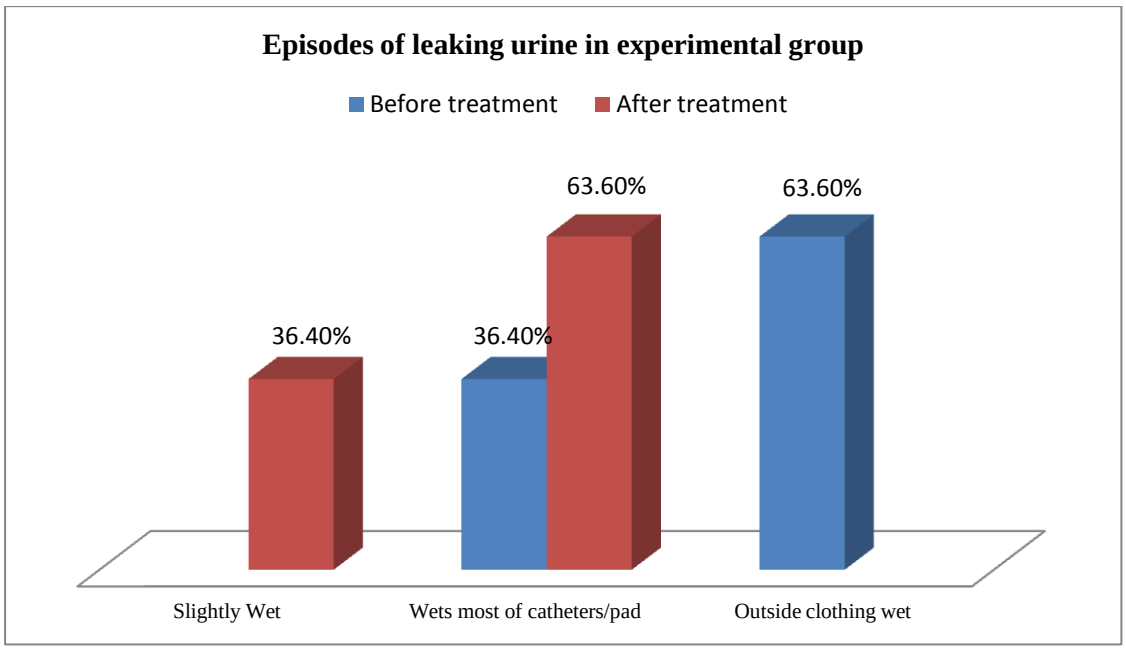

Figure-12: Episodes of leaking urine of experimental group (pre & post test)

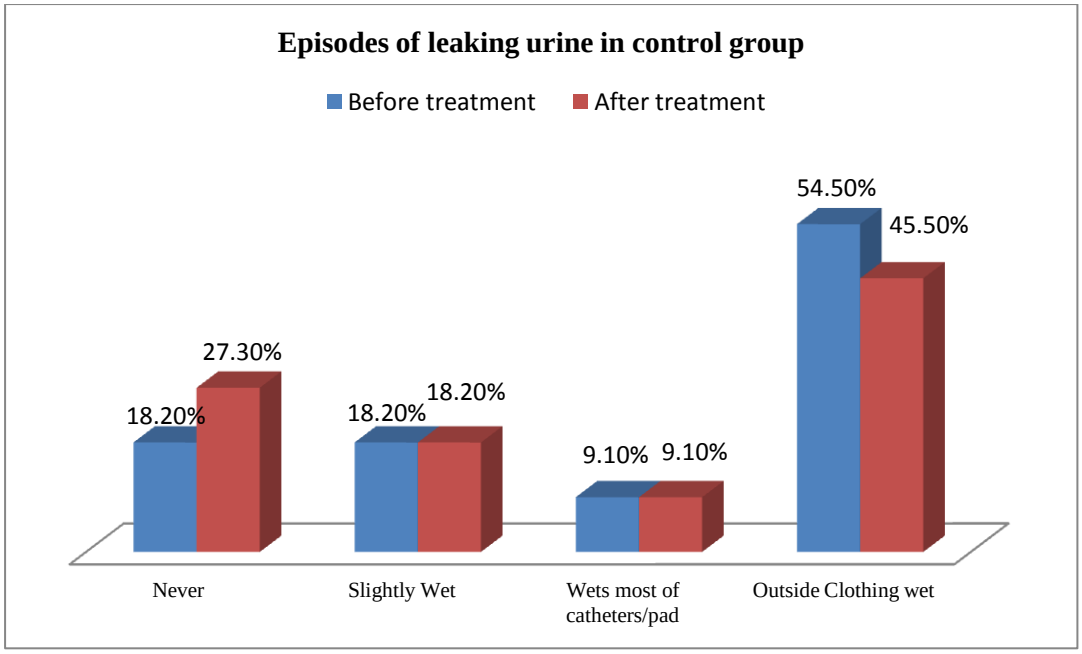

Figure-13: Episodes of leaking urine of control group (pre & post test)

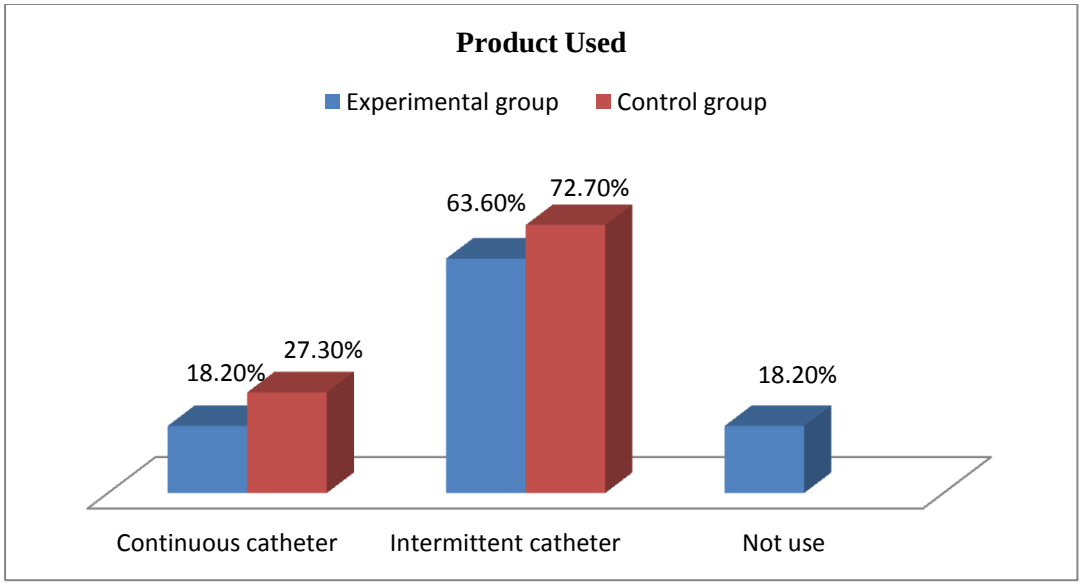

Figure-14: Products used in both (experimental & control) group.

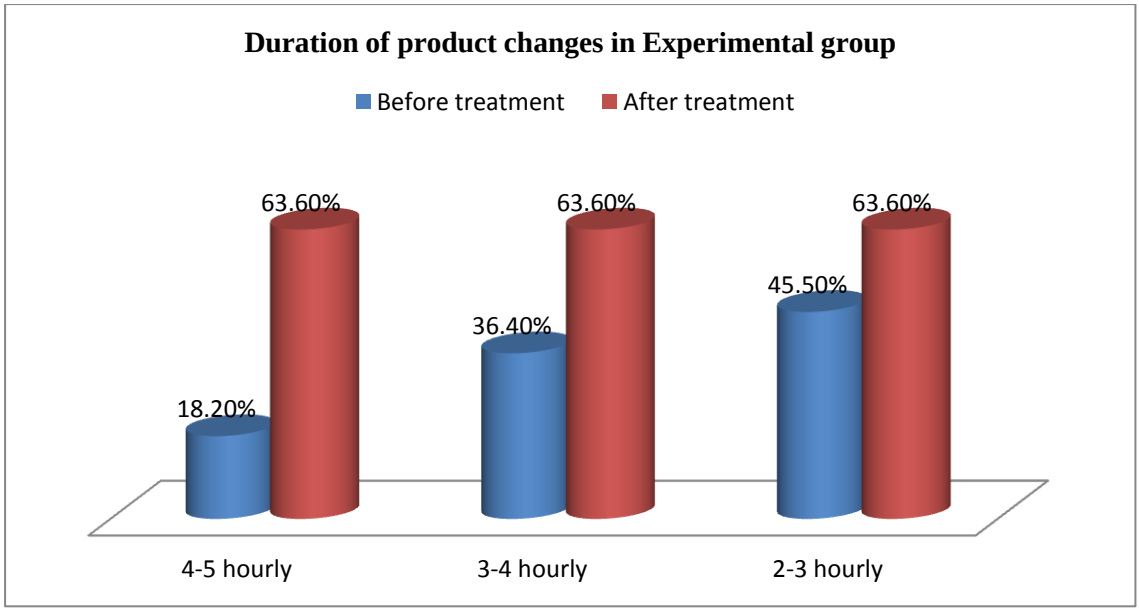

Figure-15: Duration of product changes in experimental group (pre & post test)

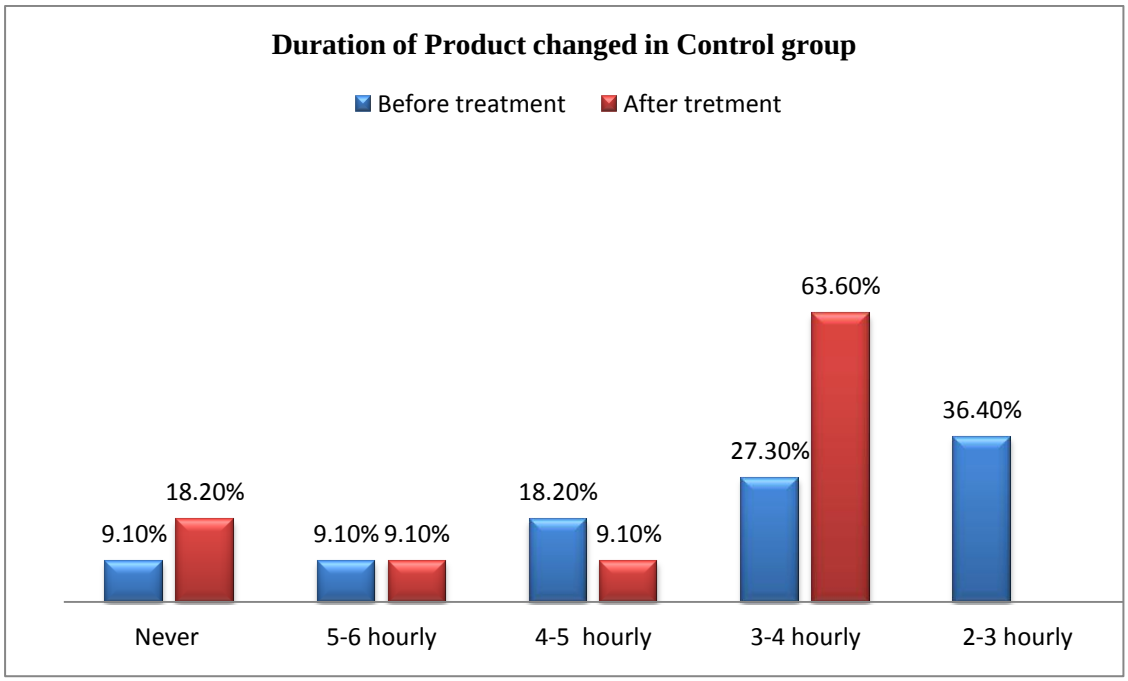

Figure-16: Duration of product changes in control group (pre & post test)

Appendix-B

VARBAL CONSENT STATEMENT

(**Please read out to the participant**)

Assalamu Alaaikum/nomosker, my name is *Md.Abdul Fattah*; I am conducting a research project (dissertation) study which included in our course curriculum of Bangladesh health professions institute (BHPI). The title of the study is "effectiveness of pelvic floor muscles strengthening for incontinence patients following incomplete spinal cord injury". I would like to know about some personal and other related question about bladder incontinence problems. This will take approximately 20 to 30 minutes. I would like to inform you that this is purely academic study and will not be used for any other purpose. The researcher is not directly related with this Spinal Cord Injury (SCI) area, so your participation in the research will have no impact on your present or future treatment. All information provided by you will be treated as confidential and in the event of any report or publication. It will be insured that the sources of information remains anonymous. Your participation in this study is voluntary and you may withdraw yourself at any time during this study without any consequence. You also have a right not to answer a particular question that you do not 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 and / or Md. Obaidul Haque, Course Coordinator, Department of Physiotherapy. BHPI, CRP, Savar.Dhaka-1343.

Do you have any question before you start?

So may have your consent to proceed with the interview?

YES ☐

NO ☐

Signature of the interviewer_____

"Effectiveness of pelvic floor muscles strengthening for incontinence patients following incomplete spinal cord injury"

Questionnaire

Interview Schedule **Part I :** Patient's Identification (to be provided by patient or attendant)	
Identification number:	Date:
Address :	
Contact number:	

Part II : Patient's Socio-demographic Information (To be collected from Record/ Care provider)			
QN	**Questions and filters**	**Responses**	**Code**
2.1	Age (in year)	|__|__| yrs	
2.2	Sex	Male……	01
		Female……	02
2.3	Marital status	Married……..	01
		Unmarried…….…….	02
		Divorced……..……..	03
		Separated……..……..……	04
		Widow…….……	05
		Others…….	06
2.4	Religion	Islam …….…….	01
		Hinduism……	02
		Christianity...….……	03
		Buddhist……	04
		Other (Specify);_____	05

2.5	Educational status	Illiterate…….	01
		Literate…….…….	02
		Primary…….	03
		Junior school certificate (JSC)…….	04
		Secondary school certificate (SSC)…	05
		Higher secondary certificate (HSC)…	06
		Bachelor or above …….	07
		Masters or above……	08
		Other (Specify): _____	09
2.6	Occupations	Rickshaw puller ……	01
		Agriculture ……..	02
		Factory/garments worker …….	03
		Driver...…….	04
		Businessman...……..	05
		Day laborer…….	06
		Unemployed …….……...	07
		Housewife ……	08
		Student……	09
		Teacher …….	10
		Other (Specify): _____	11
2.7	Average monthly family income	_____ (Taka)	
2.8	Earning member |__|__	Himself …….	01
		Others (specify)……	02
2.9	Residential Area	Rural…….	01
		Semirural……..	02
		Urban……	03
3.0	Family type	Nuclear family……..	01
		Extended family…….	02
Part III : Physiotherapy related Information (To be collected from Record/ Care provider/clinical examination)			
III a	History of injury (HI)		

3.1	Date of injury	
3.2	Date of admission	
3.3	Type of injury	▪ Traumatic ▪ Non traumatic ***If answer is traumatic please answer 3.4 otherwise go to 3.5***
3.4	Causes of injury(traumatic)	▪ Motor Vehicle Injury ▪ Fall From Height ▪ Fall while carrying heavy Load ▪ Sport-related ▪ Other (Please Specify):_____
3.5	Non traumatic injury	▪ Potts diseases ▪ Spinal tumor ▪ Transverse myelitis ▪ Intervartebral disc prolapsed ▪ Cervical spondylosis ▪ Other(specify) ▪ Undiagnosed
3.6	Skeletal level of injury	▪ Cervical |__ |__| ▪ Thoracic |__ |__| ▪ Lumber |__ |__| ▪ Sacral |__ |__|
Length of time between date of accident/ onset and admission to first point of contact for treatment		
III b	Physical status at admission	☐ Traumatic: • Paralyzed lower limbs =1 • Paralyzed four limbs =2 ☐ Non-traumatic • Weakness of lower limbs =3 • Weakness of four limbs =4
III c	Confirmed type of Paralysis	☐ Paraplegia =1 ☐ Tetraplegia =2

III d	Initial Neurological condition according to ASIA Scale	☐ Complete A = 1 ☐ Incomplete B = 2 ☐ Incomplete C = 3 ☐ Incomplete D = 4 ☐ Normal E = 5
III e	Initial Neurological level	☐ C __ __ ☐ T __ __ ☐ L __ __ ☐ S __ __
III f	Diagnosis(During admission)	☐ T/P ☐ T/T
III g	Types of incontinence	☐ Stress urinary incontinence 1 ☐ Urge incontinence 2 ☐ Mixed urinary incontinence 3 ☐ Others (Specify) 4

"Effectiveness of pelvic floor muscles strengthening for incontinence patients following incomplete spinal cord injury"

The King's Heath Questionnaire (KHQ)

Patient's Code No:

Date:

- **General health perceptions:**

1. How would you describe your heath at the present?

Please tick one answer

Answer	Code
▪ Very good	01
▪ Good	02
▪ Fair	03
▪ Poor	04
▪ Very poor	05

Calculate scores:

Score= ((scores to Q1-1) /4) x100

- **Incontinence impact:**

2. How much do you think your bladder problem affects your life?

Please tick one answer

Answer	Code
▪ Not at all	01
▪ A little	02
▪ Moderately	03
▪ A lot	04

Calculate scores:

Score= ((scores to Q2-1) /3) x100

Below are some daily activities than can be affected by bladder problems.

How much does your bladder problem affect you?

We would like you to answer every question.

3. Physical limitation:

A. Does your bladder problem affect your bed mobility (rolling, lying, prone lying, lying to sitting etc)?

Answer	Code
▪ Not at all	01
▪ Slightly	02
▪ Moderately	03
▪ A lot	04

B. Does your bladder problem affect your activity of daily livings (eating, bathing, dressing, wheelchair activity)?

Answer	Code
▪ Not at all	01
▪ Slightly	02
▪ Moderately	03
▪ A lot	04

Calculate scores:

Score= (((scores to Q3A+3B) – 2) /6) x100

❖ **Severity measures:**

4. Do you do any of the following? If so how much?

A. Incontinence product used

Answer	Code
▪ Never	01
▪ Sometimes	02
▪ Often	03
▪ All the time	04

B. Fluid intake per day

▪ More than 4001 ml	01
▪ 3001-4000 ml	02
▪ 2001-3000 ml	03
▪ 1000-2000 ml	04

C. Incontinence product changed

Answer	**Code**
▪ 5-6 Hourly	01
▪ 4-5 Hourly	02
▪ 3-4 Hourly	03
▪ 2-3 Hourly	04

D. Aware of urge to void?

▪ All the time	01
▪ Often	02
▪ Sometimes	03
▪ Never	04

Calculate scores:

Score= (((scores to Q4A+4B+4C+4D) – 4) /12) x100

5. I would like to know how much urine you think leaks.

How much urine do you usually leak (whether you wear protection or not)

0R, Episodes of leaking urine?	**Answer**	**Code**
	▪ Never	00
	▪ A small amount	02
	▪ A moderate amount	04
	▪ A large amount	06

(Small = Slightly Wet, Moderately = Wets most of catheters/pad, Large = Outside clothing wet)

With thanks

Md. Abdul Fattah

4th year B.Sc. in Physiotherapy

BHPI, CRP, Savar, Dhaka.

Urinary Incontinence Assessment in SCI (Incomplete) Patients

Bladder Diary/Record-Track a 24 Hour Time Period for Several Days

Name: ---------- ID No: ----------Date: ----------

Time Interval	Fluid Intake (ml)	Volume of urine (ml)	Aware Urge to Void?	Episodes of leaking Urine? S = Slightly Wet. M =Wets most of catheters/pad. L = Outside clothing wet.	Product Use	Incontinence Product Changed
12.00-1.00 AM			Yes No	S M L	Yes No	Yes No
01.00-2.00 AM			Yes No	S M L	Yes No	Yes No
02.00-3.00 AM			Yes No	S M L	Yes No	Yes No
03.00-4.00 AM			Yes No	S M L	Yes No	Yes No
04.00-5.00 AM			Yes No	S M L	Yes No	Yes No
05.00-6.00 AM			Yes No	S M L	Yes No	Yes No
06.00-7.00 AM			Yes No	S M L	Yes No	Yes No
07.00-8.00 AM			Yes No	S M L	Yes No	Yes No
08.00-9.00 AM			Yes No	S M L	Yes No	Yes No
10.00-11.0 AM			Yes No	S M L	Yes No	Yes No
11.00-12.0 PM			Yes No	S M L	Yes No	Yes No
12.00-1.00 PM			Yes No	S M L	Yes No	Yes No
01.00-2.00 PM			Yes No	S M L	Yes No	Yes No
02.00-3.00 PM			Yes No	S M L	Yes No	Yes No
03.00-4.00 PM			Yes No	S M L	Yes No	Yes No
04.00-5.00 PM			Yes No	S M L	Yes No	Yes No
05.00-6.00 PM			Yes No	S M L	Yes No	Yes No
06.00-7.00 PM			Yes No	S M L	Yes No	Yes No
07.00-8.00 PM			Yes No	S M L	Yes No	Yes No
08.00-9.00 PM			Yes No	S M L	Yes No	Yes No
09.00-10.0 PM			Yes No	S M L	Yes No	Yes No
10.00-11.0 PM			Yes No	S M L	Yes No	Yes No
11.00-12.0 AM			Yes No	S M L	Yes No	Yes No

সম্মতি পত্র/মৌখিক অনুমতি পত্র

(অংশগ্রহনকারীকে পড়ে শোনাতে হবে)

আসসালামুআলাইকুম/ নমস্কার,

আমার নাম মোঃ আব্দুল ফাত্তাহ্, আমি এই গবেষণা প্রকল্পটি বাংলাদেশ হেলথ্ প্রফেশনস ইনষ্টিটিউট (বিএইচপিআই)-এ পরিচালনা করছি যা আমার ৪র্থ বর্ষ বি এস সি ইন ফিজিওথেরাপী কোর্সের অধিভুক্ত। আমার গবেষণার শিরোনাম হল- "অসম্পূণ মেরুরজ্জুতে আঘাত জনিত রোগীদের নিয়ন্ত্রহীন মূত্র সমস্যায় শ্রোণী মাংসপেশীর অনুশীলনের প্রভাব"। আমি এক্ষেত্রে আপনাকে কিছু ব্যক্তিগত এবং আনুষঙ্গিক প্রশ্ন মেরুরজ্জু ক্ষতিগ্রস্থ সম্পর্কে করতে চাচ্ছি। এতে আনুমানিক ২০-৩০মিনিট সময় নিবে। আমি আপনাকে অনুগত করছি যে, এটা আমার অধ্যয়নের অংশ এবং যা অন্যকোন উদ্দেশ্যে ব্যবহৃত হবে না। গবেষক সরাসরি এই স্নায়ুজ্ঞান অধ্যয়নের সাথে অন্তর্ভূক্ত 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 প্রশ থাকে তাহলে আপনি আমাকে অথবা/এবং মোঃওবায়দুল হক, কোর্স সমন্বয়কারী, ফিজিওথেরাপী বিভাগ, বিএইচপিআই, সিআরপি, সাভার, ঢাকা-১৩৪৩-তে যোগাযোগ করতে পারেন।

সাক্ষাৎকার শুরু করার আগে আপনার কি কোন প্রশ্ন আছে?

আমি আপনার অনুমতি নিয়ে এই সাক্ষাৎকার শুরু করতে যাচ্ছি।

হ্যাঁ ☐

না ☐

সাক্ষাৎগ্রহনকারীর সাক্ষর

"অসম্পূর্ণ মেরুরজ্জুতে আঘাত জনিত রোগীদের নিয়ন্ত্রহীন মূত্র সমস্যায় শ্রোণী মাংসপেশীর অনুশীলনের প্রভাব"

প্রশ্নাবলী/প্রশ্নমালা

সাক্ষাৎকারের সময়সূচী পর্ব-১ঃ রোগীর সনাক্তকরণ/পরিচয় (রোগী অথবা রোগীর সহকারী তথ্যপ্রদান করবেন)	
* সনাক্তকরণ নম্বর	সাক্ষাতের তারিখঃ
* ঠিকানাঃ	
* যোগাযোগ/ফোন নম্বর ঃ	

পর্ব- ২ঃ রোগীর আর্থসামাজিক অবস্থার তথ্যাবলী

ক্রমিক নং	প্রশ্ন	উত্তর	কোড
২.১	আপনার বয়স	----------বছর	
২.২	লিঙ্গ	▪ পুরুষ ▪ মহিলা	০১ ০২
২.৩	বৈবাহিক অবস্থা	▪ বিবাহিত ▪ অবিবাহিত ▪ তালাকপ্রাপ্ত ▪ পৃথক/বিচ্ছেদ ▪ বিধবা/বিপত্নীক	০১ ০২ ০৩ ০৪ ০৫
২.৪	ধর্ম	▪ ইসলাম ▪ হিন্দু ▪ খ্রিষ্টান ▪ বৌদ্ধ	০১ ০২ ০৩ ০৪
২.৫	শিক্ষাগত যোগ্যতা	▪ নিরক্ষর/মূর্খ ▪ অক্ষরজ্ঞান সম্পূর্ণ ▪ প্রাথমিক ▪ মাধ্যমিক ▪ উচ্চ মাধ্যমিক ▪ স্নাতক ▪ স্নাতকোত্তর ▪ অন্যান্য	০১ ০২ ০৩ ০৪ ০৫ ০৬ ০৭ ০৮

২.৬	পেশা	▪ রিকশা চালক ▪ কৃষিকাজ ▪ ফ্যাক্টরী শ্রমিক ▪ গাড়ী চালক ▪ ব্যবসা ▪ চাকুরী ▪ শিক্ষকতা ▪ ছাত্র ▪ শ্রমিক ▪ গৃহিণী ▪ বেকার	০১ ০২ ০৩ ০৪ ০৫ ০৬ ০৭ ০৮ ০৯ ১০ ১১
২.৭	মাসিক আয়	---------- টাকা	
২.৮	উপর্জানক্ষম/ উপার্জনকারী ব্যক্তি	▪ নিজে ▪ অন্য কেউ ( )	০১ ০২
২.৯	আবাসিক এলাকা/ অবস্থা	▪ গ্রাম ▪ মফস্বল ▪ শহর	০১ ০২ ০৩
৩.০	পরিবারের ধরন	▪ একক পরিবার ▪ মাঝারি পরিবার ▪ যৌথ পরিবার	০১ ০২ ০৩
পর্ব-৩ ঃ ফিজিওথেরাপী সম্পর্কে তথ্যাবলী			
আঘাতের ইতিবৃত্ত / ইতিহাস			
৩.১	আঘাতপ্রাপ্তের তারিখ		
৩.২	ভর্তির তারিখ		

৩.৩	আঘাতের ধরন	* শারীরিক আঘাত শারীরিক আঘাত ব্যতিত উত্তর যদি * হয় তাহলে ৩.৪ প্রশ্নের উত্তর দিন। আর যদি না হয় তবে ৩.৫ এর উত্তর দিন।	০১ ০২

৩.৪	আঘাতের কারণ	▪ মটর যানের আঘাত ▪ উপর থেকে পড়ে ▪ পিঠে ভারী কিছু পড়েছে ▪ খেলাধুলার কারণে ▪ অন্য কারণে	০১ ০২ ০৩ ০৪ ০৫
৩.৫	শারীরিক আঘাত ব্যতিত	▪ পট্‌স রোগের কারণে ▪ স্পাইনাল টিউমারের কারণে ▪ টান্‌সভারস মাইলাইটিস ▪ ইন্টারভারটিব্রাল ডিকস্‌ প্রলাপস ▪ সারভাইকল স্পনডাইলোসিস ▪ অনির্নয়ীয় ▪ অন্যান্য	০১ ০২ ০৩ ০৪ ০৫ ০৬ ০৭
৩.৬	মরুদন্ডের কোন অংশে আঘাত পেয়েছেন	☐ গ্রীবাদেশীয় অংশে ☐ বক্ষদেশীয় অংশে ☐ কটিদেশীয় অংশে ☐ শ্রোনীদেশীয় অংশে ☐ পুচ্ছদেশীয় অংশে	০১ ০২ ০৩ ০৪ ০৫
৩.৭	ভর্তির সময় এবং চিকিৎসা শুরু মধ্যকার ব্যবধান কত দিনের/সময়ের ---------- দিনের।		
III (b)	ভর্তিকালীন শারীরিক অবস্থা	☐ শারীরিক আঘাতজনিত • নিম্বাংঙ্গের পক্ষাঘাত = ১ • উর্ধ্ব ও নিম্নবাহুর পক্ষাঘাত (চার হাত পায়ের পক্ষাঘাত) =২ ☐ শারীরিক আঘাতব্যতিত • নিম্নবাহুর দূর্বলতা = ৩ • উর্ধ্ববাহু ও নিম্নবাহুর দূর্বলতা =৪	

III (c)	নিশ্চিত পক্ষাঘাতের ধরন	☐ অর্ধাঙ্গের পক্ষাঘাত সচারচর নিম্নবাহুর/নিম্নঅংশের পক্ষাঘাত=১ ☐ উর্ধ্ববাহু ও নিম্নবাহুর পক্ষাঘাত (চার হাত পা'র) = ২
III (d)	প্রারম্ভিক স্নায়ু তন্ত্রীয় অবস্থা (এশিয়ার স্কেল অনুযায়ী)	☐ সম্পূর্ণ A =1 ☐ অসম্পূর্ণ B =2 ☐ অসম্পূর্ণ C =3

		☐ অসম্পূর্ণ D =4 ☐ স্বাভাবিক E =5
III (e)	প্রারম্বিক স্নায়ুতন্ত্রীয় অবস্থা	☐ গ্রীবাদেশীয় অংশে (C) ☐ বক্ষদেশীয় অংশে (T) ☐ কটিদেশীয় অংশে (L) ☐ শ্রোনীদেশীয় অংশে (S) ☐ পুচ্ছদেশীয় অংশে (C)
III (f)	রোগের ধরন/কারণ নির্ণয়	☐ শারীরিক আঘাত জনিত অর্ধাঙ্গের পক্ষাঘাত সচারচর নিম্নবাহুর/নিম্নঅংশের পক্ষাঘাত ☐ শারীরিক আঘাত জনিত উর্ধ্ববাহু ও নিম্নবাহুর পক্ষাঘাত (চার হাত পা'র)
III (g)	নিয়ন্ত্রণহীন মূত্রথলীর ধরন	☐ স্ট্রেজ নিয়ন্ত্রণহীন মূত্রথলী ১ ☐ আর্জ নিয়ন্ত্রণহীন মূত্রথলী ২ ☐ মিকস্ড নিয়ন্ত্রণহীন মূত্রথলী ৩ ☐ অন্যান্য ৪

"অসম্পূর্ণ মেরুরজ্জুতে আঘাত জনিত রোগীদের নিয়ন্ত্রহীন মূত্র সমস্যায় শ্রোণী মাংসপেশীর অনুশীলনের প্রভাব"

কিংস্ হেল্‌থ প্রশ্নপত্র

সনাক্তকরণ নম্বর :

তারিখ:

১. আপনি আপনার স্বাস্থ্যের ড়োত্রে নিচের কোন্‌টি সঠিক বলে মনে করেন?

উত্তর	কোড নং
▪ খুব ভাল	০১
▪ ভাল	০২
▪ মোটামুটি	০৩
▪ খারাপ	০৪
▪ খুব খারাপ	০৫

২. আপনার মূত্র সমস্যা আপনার দৈনন্দিন জীবনকে কতটা প্রভাবিত করে?

▪ মোটেও না	০১
▪ কিছুটা	০২
▪ বেশি	০৩
▪ খুব বেশি	০৪

৩. সামাজিক সীমাবদ্ধতা

ক). আপনার মূত্র সমস্যা কি বিছানায় নড়াচড়া কে প্রভাবিত করে? (যেমন ঘুমানো, এপাশ ওপাশ হওয়া ইত্যাদি)

▪ মোটেও না	০১
▪ কিছুটা	০২
▪ বেশি	০৩
▪ খুব বেশি	০৪

খ). আপনার মূত্র সমস্যা কি আপনার দৈনন্দিন কাজকর্মকে প্রভাবিত করে? (যেমন খাওয়া, কাপড় পড়া, হুইলচেয়ার ব্যবহার ইত্যাদি)

▪ মোটেও না	০১
▪ কিছুটা	০২
▪ বেশি	০৩
▪ খুব বেশি	০৪

৪. নিচের উলেস্নখিত কোনটা কি আপনি করেন ?

ক). মূত্র নিয়ন্ত্রনকারী পদ্ধতি বা সামগ্রীর ব্যবহার করেন কি ?

উত্তর	কোড নং
▪ কখনও না	০১
▪ মাঝে-মাঝে	০২
▪ প্রায়ই	০৩
▪ সবসময়	০৪

খ). আপনি কি পরিমান তরল খাবার গ্রহন করেন? (মি.লি)

▪ ৪০০১মি.লি'র চেয়ে বেশি	০১
▪ ৩০০১-৪০০০ মি.লি	০২
▪ ২০০১-৩০০০ মি.লি	০৩
▪ ১০০০-২০০০ মি.লি	০৪

গ). মূত্র নিয়ন্ত্রনকারী পদ্ধতি বা সামগ্রীর পরিবর্তন করেন কতক্ষণ পরপর ?

▪ ৫-৬ ঘন্টা পরপর	০১
▪ ৪-৫ ঘন্টা পরপর	০২
▪ ৩-৪ ঘন্টা পরপর	০৩
▪ ২-৩ ঘন্টা পরপর	০৪

ঘ). মূত্রের বেগের অনুভূতি টের পান কি?

▪ সবসময়	০১
▪ প্রায়ই	০২
▪ মাঝে-মাঝে	০৩
▪ কখনও না	০৪

৫. আমরা জানতে চাই আপনার কি পরিমান মূত্র নির্গত হয়/ অনিচ্ছাকৃত মূত্র নিঃসরনের পরিমান?

▪ মোটেও না	০১
▪ কিছুটা	০২
▪ বেশি	০৩
▪ খুব বেশি	০৪

(কিছুটা =সামান্য ভেজা, বেশি =ক্যাথেটার/ প্যাডের অধিকাংশ ভেজা, খুব বেশি = কাপড় সহ ভেজা)

ধন্যবাদান্তে

মোঃ আব্দুল ফাত্তাহ

৪র্থ বর্ষ বি.এস.সি ইন ফিজিওথেরাপী, বি.এইচ.পি.আই, সি.আর.পি।

মেরুরজ্জুতে আঘাত জনিত রোগীদের নিয়ন্ত্রহীন মূত্র সমস্যার পর্যবেক্ষণ

দৈনিক ২৪ ঘণ্টার মূত্রথলির ক্রিয়া সম্পর্কিত তথ্যাবলী

নাম: ----------সনাক্তকরণ নম্বর:----------

---------- তারিখ: ----------

সময়ের ব্যবধান	তরল খাবার গ্রহনের পরিমান (মিলি)	মূত্রের পরিমান (মিলি)	মূত্রের বেগের অনুভূতি?	মূত্র নিয়ন্ত্রনকারী পদ্ধতি বা সামগ্রীর ব্যবহার	মূত্র নিয়ন্ত্রনকারী পদ্ধতি বা সামগ্রীর পরিবর্তন
রাত ১২.০০-১.০০			হ্যাঁ না	হ্যাঁ না	হ্যাঁ না
রাত ০১.০০-২.০০			হ্যাঁ না	হ্যাঁ না	হ্যাঁ না
রাত ০২.০০-৩.০০			হ্যাঁ না	হ্যাঁ না	হ্যাঁ না
রাত ০৩.০০-৪.০০			হ্যাঁ না	হ্যাঁ না	হ্যাঁ না
রাত ০৪.০০-৫.০০			হ্যাঁ না	হ্যাঁ না	হ্যাঁ না
ভোর ০৫.০০-৬.০০			হ্যাঁ না	হ্যাঁ না	হ্যাঁ না
ভোর ০৬.০০-৭.০০			হ্যাঁ না	হ্যাঁ না	হ্যাঁ না
সকাল ০৭.০০-৮.০০			হ্যাঁ না	হ্যাঁ না	হ্যাঁ না
সকাল ০৮.০০-৯.০০			হ্যাঁ না	হ্যাঁ না	হ্যাঁ না
সকাল ৯.০০-১০.০০			হ্যাঁ না	হ্যাঁ না	হ্যাঁ না
সকাল ১০.০০-১১.০০			হ্যাঁ না	হ্যাঁ না	হ্যাঁ না
সকাল ১১.০০-১২.০০			হ্যাঁ না	হ্যাঁ না	হ্যাঁ না
দুপুর ১২.০০-১.০০			হ্যাঁ না	হ্যাঁ না	হ্যাঁ না
দুপুর ০১.০০-২.০০			হ্যাঁ না	হ্যাঁ না	হ্যাঁ না
দুপুর ০২.০০-৩.০০			হ্যাঁ না	হ্যাঁ না	হ্যাঁ না
দুপুর ০৩.০০-৪.০০			হ্যাঁ না	হ্যাঁ না	হ্যাঁ না
বিকাল ০৪.০০-৫.০০			হ্যাঁ না	হ্যাঁ না	হ্যাঁ না
বিকাল ০৫.০০-৬.০০			হ্যাঁ না	হ্যাঁ না	হ্যাঁ না
সন্ধ্যা ০৬.০০-৭.০০			হ্যাঁ না	হ্যাঁ না	হ্যাঁ না
সন্ধ্যা ০৭.০০-৮.০০			হ্যাঁ না	হ্যাঁ না	হ্যাঁ না
রাত ০৮.০০-৯.০০			হ্যাঁ না	হ্যাঁ না	হ্যাঁ না
রাত ১০.০০-১১.০০			হ্যাঁ না	হ্যাঁ না	হ্যাঁ না
রাত ১১.০০-১২.০০			হ্যাঁ না	হ্যাঁ না	হ্যাঁ না

Permission letter

April 24, 2011

To
Head of the Department
Department of Physiotherapy
Center for the Rehabilitation of the Paralyzed (CRP),
Savar, Dhaka -1343.

Subject: Application for permission of data collection at Spinal cord inpatient unit.

Sir,

I respectfully state that I am Md. Abdul Fattah student of fourth year B. Sc in Physiotherapy at Bangladesh Health Professions Institute (BHPI). In fourth year course curriculum we have do a research project. I have chosen a research title that "Effectiveness of pelvic floor muscles strengthening for incontinence patient following incomplete spinal cord injury". For this reason, I need permission for collect data from the CRP Spinal cord inpatient unit at Savar.

Therefore, I pray and hope that you would be kind enough to grant my application and give me the permission for collect data from CRP Spinal cord inpatient unit.

Yours faithfully
Md. Abdul Fattah
Md. Abdul Fattah
4th year B.Sc in Physiotherapy
Session: 2005-2006
BHPI, CRP, Savar, Dhaka-1343

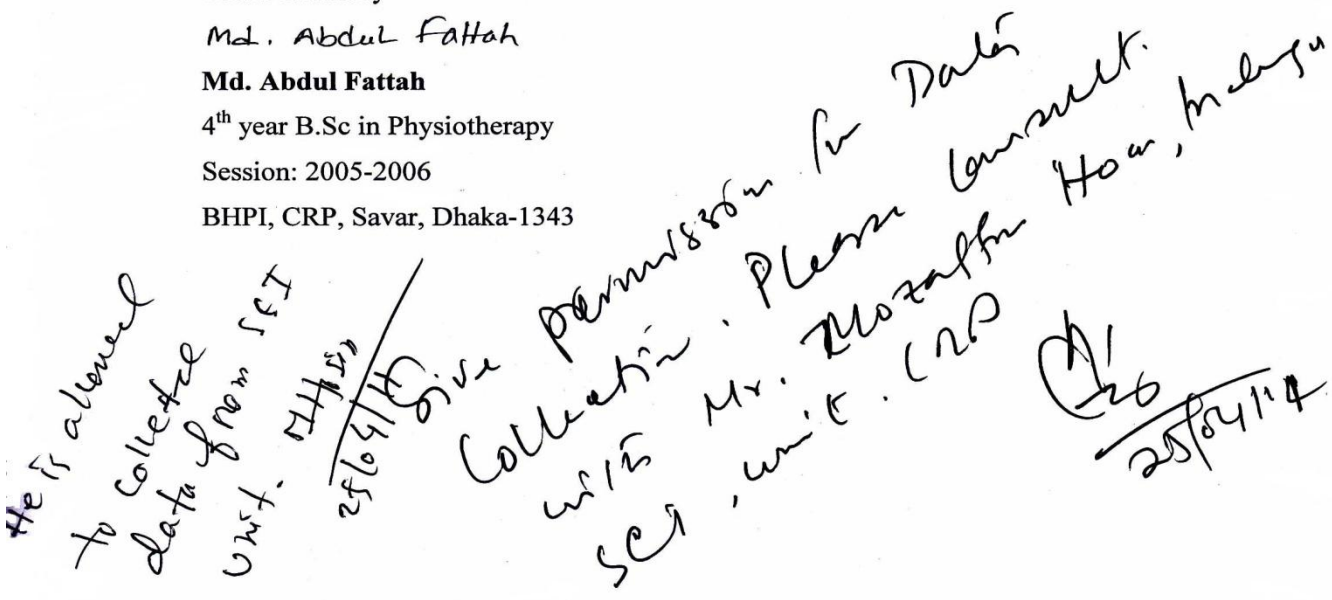

Table A2.5 Critical values of *t* (related and unrelated *t* tests) at various levels of probability. For your *t* value to be significant at a particular probability level, it should be *equal* to or *larger than* critical values associated with the df in your study (Reproduced from Lindley DV, Scott WF (1984) New Cambridge Elementary Statistical Tables, 10th edn. Cambridge University Press, with permission.)

	Level of significance for one-tailed test					
	.10	.05	.025	.01	.005	.0005
	Level of significance for two-tailed test					
df	.20	.10	.05	.02	.01	.001
1	3.078	6.314	12.706	31.821	63.657	636.619
2	1.886	2.920	4.303	6.965	9.925	31.598
3	1.638	2.353	3.182	4.541	5.841	12.941
4	1.533	2.132	2.776	3.747	4.604	8.610
5	1.476	2.015	2.571	3.365	4.032	6.859
6	1.440	1.943	2.447	3.143	3.707	5.959
7	1.415	1.895	2.365	2.998	3.499	5.405
8	1.397	1.860	2.306	2.896	3.355	5.041
9	1.383	1.833	2.262	2.821	3.250	4.781
10	1.372	1.812	2.228	2.764	3.169	4.587
11	1.363	1.796	2.201	2.718	3.106	4.437
12	1.356	1.782	2.179	2.681	3.055	4.318
13	1.350	1.771	2.160	2.650	3.012	4.221
14	1.345	1.761	2.145	2.624	2.977	4.140
15	1.341	1.753	2.131	2.602	2.947	4.073
16	1.337	1.746	2.120	2.583	2.921	4.015
17	1.333	1.740	2.110	2.567	2.898	3.965
18	1.330	1.734	2.101	2.552	2.878	3.922
19	1.328	1.729	2.093	2.539	2.861	3.883
20	1.325	1.725	2.086	2.528	2.845	3.850
21	1.323	1.721	2.080	2.518	2.831	3.819
22	1.321	1.717	2.074	2.508	2.819	3.792
23	1.319	1.714	2.069	2.500	2.807	3.767
24	1.318	1.711	2.064	2.492	2.797	3.745
25	1.316	1.708	2.060	2.485	2.787	3.725
26	1.315	1.706	2.056	2.479	2.779	3.707
27	1.314	1.703	2.052	2.473	2.771	3.690
28	1.313	1.701	2.048	2.467	2.763	3.674
29	1.311	1.699	2.045	2.462	2.756	3.659
30	1.310	1.697	2.042	2.457	2.750	3.646
40	1.303	1.684	2.021	2.423	2.704	3.551
60	1.296	1.671	2.000	2.390	2.660	3.460
120	1.289	1.658	1.980	2.358	2.617	3.373
	1.282	1.645	1.960	2.326	2.576	3.291

NB When there is no exact df use the next lowest number, except for very large dfs (well over 120), when you should use the infinity row. This is marked