EXPERIENCE OF UPPER EXTREMITY MUSCULOSKLETAL PAIN

DURING REHABILITATION OF SPINAL CORD INJUEY PATIENT

Tandra Rani Mukherjee
Bachelor of Science in Physiotherapy (B. Sc. PT)
Roll No – 157
Registration No - 6276
Session: 2013-2014
BHPI, CRP, Savar, Dhaka-1343

Bangladesh Health Professions Institute (BHPI)
Department of Physiotherapy
CRP, Savar, Dhaka-1343
Bangladesh
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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

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Submitted by Tandra Rani Mukherjee, for partial fulfillment of the requirements for the degree of Bachelor of Science in Physiotherapy (B. Sc. PT).

……..
Mst. Fatema Akter
Senior lecturer
Department of Physiotherapy
BHPI, CRP, Savar, Dhaka

……..
Mohammad Habibur Rahman
Associate Professor
Department of Physiotherapy
BHPI, CRP, Savar, Dhaka

…….
Ehsanur Rahman
Assistant Professor
Department of Physiotherapy
BHPI, CRP, Savar, Dhaka

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

……
Prof. Md. Obaidul Haque
Head of Physiotherapy Department
Vice Principal
BHPI, CRP, Savar, Dhaka

DECLERATION

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

Signature: **Date:**

Tandra Rani Mukherjee
Bachelor of Science in Physiotherapy (B. Sc. PT)
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BHPI, CRP, Savar, Dhaka-1343

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Acronyms

ADL :	Activity of Daily Living
ASIA:	American Spinal Injury Association
BHPI :	Bangladesh Health Profession's Institute
BMRC:	Bangladesh Medical Research Council
CRP :	Centre for the Rehabilitation of the Paralysed
IRB:	Institutional Review Board
NRS:	Neumeric Rating Scale
SCI :	Spinal Cord Injury
SPSS :	Statistical Package for the Social Sciences
USA :	United state of America
WHO :	World Health Organization

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Abstract

Purpose : The purpose of the study was to explore the pain experiences of upper extremity musculoskeletal pain during rehabilitation of spinal cord injury patient. Objectives: To find out the pain experience of patients with upper extremity musculoskeletal pain during rehabilitation of spinal cord injury. Methodology: A cross sectional research design was carried out in this study, purposive sampling method was used to collect data and data was collected by face to face interview from 60 subjects. This study was chosen to conduct this study among 60 participants who were selected according to inclusion criteria. To find out upper extremity musculoskeletal pain during rehabilitation experience the spinal cord injury pain a standard questionnaire was used. Results: Out of 60 participants with SCI were experiences of shoulder pain 45%(n=31),13.3%(n=8) elbow pain, wrist pain 23.3(n=14), shoulder to elbow pain 1.7%(n= 1), shoulder to wrist pain 3%(n= 3), elbow to wrist pain 0% and below wrist pain 3.3% (n=2) during rehabilitation and the association of different parameters result are not significance. Conclusion: The percentage of finding result was approximate to other study of musculoskeletal pain during rehabilitation SCI patients and the correlation between pain intensity and other association of different parameters are not significance, the study results may also useful for the prevention of reducing the pain percentage.

Key words: pain; upper extremity; spinal cord injury; rehabilitation.

CHAPTER –I: INTRODUCTION

1.1 Background

Bangladesh is a country of South Asian subcontinent and it is densely populated, below sea level, mainly riverine country. The total population of this country is around 166,913,572 and approximately 1278 people lives in per square kilometer area and total land-living area is 130,170 Km2. Most of the maximum employment force is involved in agriculture and in excess of 36.5% of the population is in rural ((Ditunno et al., 2006).

Spinal cord injury (SCI) is a condition which is medically complex and life disturbing condition (WHO & International spinal cord society, 2013). It is catastrophic events related to the health of people and considered as one of the biggest problems; This spinal cord injury is one of the major health related problems of human societies and leading to different type of physical and mental problems for the disabled person and his family (Moghimian et al., 2015). Several health problems are occurring by Spinal cord injury (SCI) causes that harmfully effect on the patient's physical condition (Saadat et al., 2010).

The World Health Organization (WHO) states that, 10% of total population are disabled in Bangladesh & most of those are physically disabled. These disabled people are very often deprived of social opportunities and their right in our country. SCI is a devastating condition often affecting young & healthy individuals around the world. SCI can happen to anyone at any age. However, men between the age of 19 and 26 are more likely to have a SCI due to an accident or some act of violence (Ackery et al., 2005). SCI occur when the spinal cord is damaged in a way that results in some loss of sensation & motor control. SCI are a major public health problem in Bangladesh. The 2011 World Health Organization (WHO), 2011 report expected that there were more than 1 billion people alive by way of some form of disability universal, among them with nearly 200 million facing significant complications in functioning and major proportion of them reside in developing country (World Health Organization, 2011) .That the world prevalence (15%) of disability is estimated to increase with the rising ageing population available estimates suggest that , as disability is consistently associated with older age (Rashed et all., 2005).

Spinal cord injury (SCI) was one of the most concerning conditions to the mankind (Rathore et al., 2008). Razzak (2013) spinal cord injury stated within a few seconds and normally not need to a long time, SCI may occur but in the last period of lifetime the devastating effects of that could be stayed. Now a days the most common causes of SCI in the world such as , road traffic accidents, gunshot injuries, knife injuries, fall from height and sports injuries. In the developing countries like road safety situation was detreating day by day and the number of road traffic accident (RTA) is increasing in recent year (Razzak, 2013). In the developed country, road traffic accidents was the major cause of spinal cord injury followed by fall and sports injury. Spinal Cord Injury brings impairment of person physical function and independence of individual's life, as well as take in many complications because of the injury. There was a strong relationship between functional status and whether the injury was complete or not complete, along with the level of the injury (Rathore , 2010).

Spinal cord injury (SCI) is an acute and overwhelming event that results in significant and permanent life changes for the individuals who are injured, as well as their surroundings. In worldwide, approximately 90 million people currently suffer from SCI and the incidence in developed countries varies from one to five persons per 100,000 (Holtz & Levi, 2006). In the Nordic countries the incidence show that the traumatic SCI is about 11-16 cases per million inhabitants per year (Biering-Sorensen et al., 2002), and prevalence rates of 223-755 per million inhabitants have been reported in studies from Australia, Finland, Sweden, and USA (Dahlberg et al., 2005). National Spinal Cord Injury Database has been assessed that 11,000 spinal cord injuries arise each year in the United States and that approximately 222,000 to 288,000 individuals with SCI are currently living in the United States.

The intensity of pain in persons with spinal cord injury (SCI) varied as a function of pain site, and to identify the patient and SCI characteristics associated with pain location, pain intensity and pain interference in a sample of persons with SCI. verage pain intensity was moderate and pain was common across the body. Demographic and medical variables, including SCI level, were generally not associated with pain prevalence, intensity and interference. However, persons with higher level injuries were more likely to report upper extremity pain than persons with paraplegic injuries. The lower body was the location of the highest pain ratings (Chen et al., 2005).

The patient with Spinal cord injury faces lots of challenges in coping with the injury process as well as rehabilitation and it is true that Spinal cord injury can occur in everyone's life; However some patients recover partial and to perform the daily living activities as their capability through rehabilitation but many activities are permanently altered from their past life (Kumar & Gupta, 2016). The spinal cord injury (SCI) is one of the most severe forms of inactivating syndromes, being a challenge for rehabilitation, because spinal cord is a communication way among various portions of the body, such as the brain, also having a regulator center, controlling important functions such as breathing, blood flow, bladder, intestines, thermal control, and sexual activity (Lianza S et all., 2001).

The common difficulty after spinal cord injury is pain is a which can significantly impact upon a person's functional ability and independence, ability to return to work and quality of life. Spinal cord injury patients suffer from several types of pain such as musculoskeletal pain, visceral pain, Neuropathic pain. Musculoskeletal pain generally arises from bones, joints, ligaments and muscles either in the acute post-injury phase or with chronic overuse in spinal cord injury patients. (International Journal of Physiotherapy and Research., 2013). Spinal cord injury (SCI) was that which often followed by complications, which lead to the critical effect that loss of motor, sensory and autonomic function had on a person's health, quality of life and social participation (Haisma et al., 2007). Neurogenic bladder and bowel dysfunction, urinary tract infections, fall, pressure ulcers, pain, fractures, deep vein thrombosis, spasticity, autonomic dysreflexia, pulmonary and cardiovascular complications, and psychotic disorders were the common complications after SCI. Because of serious disability in the patient after SCI loss of work and which brings psychosocial and economic problems of person's life (Nas et al., 2015).

The patient with SCI are excessively overloads the upper limbs, especially the shoulders, elbow and wrist using them more frequently and in a higher number of activities than people without SCI. Those segments are used for performing transferences, wheelchair propulsion, locomotion with crutches and sports related activities. Also, due to the need to remain in a seated position, many daily activities must be performed with the arms raised above the level of the head, resulting in muscle unbalance and overload (Lee TQ et all., 2002).

Musculoskeletal pain affects the muscles, bones, ligaments, tendon, nerves, joints and its severity may intersect everyday activities. Musculoskeletal pain can be acute (having a rapid onset with severe symptoms) or chronic (long lasting). Musculoskeletal pain can be localized in one area, or widespread. Discomfort, minor aches, and sprains are some of more thoughtful health problems of musculoskeletal symptoms which require medical treatment. Anyone can experience musculoskeletal pain. It is most often caused by injury to the bone, joint, muscle, tendon, ligaments or nerves. This can be caused by jerking movement, car accidents, falls, fractures and direct blows to the muscle (Darwish and Al-Zuhair, 2013).

Based on epidemiological studies, it seems evident that manual wheelchair propulsion and wheelchair-related daily life activities cause a heavy load on the upper extremities, especially for persons with traumatic paraplegic of spinal cord injury (SCI) (Curtis et al., 1999). Other suggested risk factors for the development of upper extremity pain are the duration of injury, age (ie older people have a higher risk than younger people), higher body mass index (BMI) (Pentland et al., 1994) and wheelchair propulsion style (Boninger et al., 2002).

Shoulder pain from overuse of the arm is common after spinal cord injury (SCI). This pain can be difficult to eliminate. There are many other complications after SCI; therefore, shoulder pain is sometimes not the first priority. However, if neglected for too long, shoulder pain could mean that more serious problems are happening inside the shoulder joint. Here we present the options available when treatment for shoulder pain is needed .Due to extensive costs of the rehabilitation process, different non-governmental organizations and various charitably societies came forward to reduce their free services for physically disabled persons, and the wheelchair is conventionally distributed to persons unable to walk for their independent ambulation and to enhance their social functioning despite impairments .SCI results in a complete or partial loss of motor and/or sensory function below the level of injury. It causes extensive functional impairment convincing many persons to wheelchairs usage (Bjerkefors, 2006).

The most obvious consequence of the patient with spinal cord injury (SCI) is paralysis. However, SCI also has prevalent consequences for many body functions, including bladder, bowel, respiratory, cardiovascular and sexual function. It also has social, financial and psychological inferences, and increases people’s vulnerability to late-life renal complications

as well as musculoskeletal injuries, pain, osteoporosis and other problems. People with SCI require not only initial medical care and rehabilitation, but also ongoing access to wheelchair-friendly environments and appropriate homecare, equipment, transport, employment and financial support. The different management of people with SCI is therefore complex, involving many healthcare professionals, organizations and government services. Physiotherapists treat an collection of different problems related patient to SCI and these involve many body systems, even though the underlying pathology is neurological feature in nature. This analysis outlines the principles of physiotherapy rehabilitation for the people with SCI and the evidence of underpinning the effectiveness of commonly used physiotherapy interventions. It focuses on three common problems such as : weakness, contractures and poor motor control. Only the rehabilitation phase is discussed here, although physiotherapists also have an important role to play the immediately after injury and in the community once patients are discharged from the hospital (Physiotherapy rehabilitation for people with spinal cord injuries, 2016).

The aim of this study was to investigate the course of upper extremity musculoskeletal pain, with special attention to all upper extremity musculoskeletal pain related joint such as the shoulder joint, elbow joint and wrist joint. Furthermore, the most important predictors for upper extremity musculoskeletal pain during the rehabilitation were investigated. It is expected that subjects with tetraplegia (TP), paraplegia (PP) have more upper extremity musculoskeletal pain and that subjects with higher muscle strength and higher functional outcome develop fewer complaints. For some subjects, the length of stay in in-patient rehabilitation was no longer than 3 months; in these cases, their second measurement was performed at the time of discharge (Van Drongelen S et all., 2005).

1.2 Rationale

Experiences of upper extremity musculoskeletal pain are one of the most important health problems for the spinal cord injured patient who have continue their rehabilitation. Physiotherapy plays a vital role in the management of SCI patient. This study is designed to explore the experience of those SCI patient's upper extremity musculoskeletal pain during rehabilitation. It will be helpful for physiotherapist in working in this area for delivering treatment service. As a result, patients become more benefited. Thus the study might create a future prospect of physiotherapy profession in Bangladesh. This study also will be helpful in making physiotherapist to aware about the pain problem of SCI patients. And to aware the people and professionals about the spinal cord injury and its complications. Now a day the evidence of spinal cord injury is increased in Bangladesh with increased population. Due to increasing population and decreasing the working opportunities they are undertaking risky work, as a result they are falling in spinal cord injuries. But still now there is no evidence that research has been done on this topic in Bangladesh. So I become interested to select this topic. Most of the spinal cord injury patients of Bangladesh come at CRP for treatment so I select the patients of CRP as my sample.

1.3 Research question

What is the experience of upper extremity musculoskeletal pain during rehabilitation of spinal cord injury patients?

1.4 Study objectives:

1.4.1 General objective:

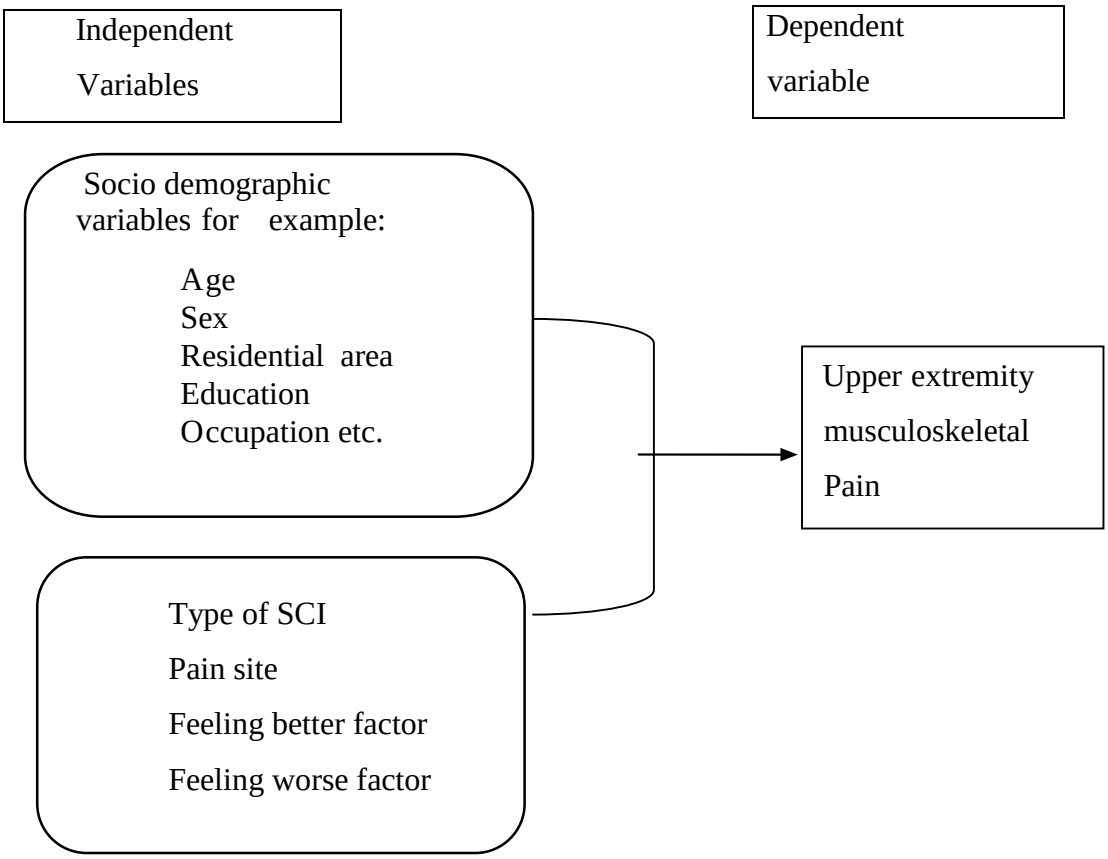
To explore the experience of upper extremity musculoskeletal pain during rehabilitation of spinal cord injury patient.

1.4.2 Specific objective:

- To determine the socio-demographic information of the patient.
- To determine the medical information of the patient.
- To find out nature of pain among paraplegic and tetraplegic patient.
- To identify association between various age group of SCI and pain perception according to NRS.
- To find out the association between pain intensity and age among the participants.
- To find out the association between pain intensity and gender among the participants.
- To find out the association of pain intensity with the physiotherapy treatment.
- Association between result of physiotherapy treatment and severity of pain among the participations.
- To know the severity of pain by using NRS scale.

1.5 Conceptual framework

List of variables



1.6 Operational Definition:

Spinal cord injury : Spinal cord injury is defined as the occurrence of an acute traumatic lesion of neural elements in the spinal canal resulting in temporary or permanent sensory and/or motor deficit. A spinal cord injury (SCI) is damage to the spinal cord that causes changes in its function, either temporary or permanent. It is the damage to any part of the spinal cord or nerves at the end of the spinal canal (cauda equina), often causes permanent changes in strength, sensation and other body functions below the site of the injury.

Experience: Capability of understanding the situation through individuals own pattern and can express the condition by any means.

Paralysis: Injury or disease to the nervous system can affect the ability to move a particular part of the body. This reduced motor ability is called paralysis.

Paraplegia: The term paraplegia means impairment of motor and/ or sensory function in the thoracic, lumber and sacral segments of the spinal cord which is secondary to the damage of neural elements within the spinal canal. Paralysis occurs of lower portion of the body and of both legs.

Tetraplegia: Injury of the spinal cord in the cervical region, with associated loss of muscle strength in all 4 extremities is called tetraplegia. Paralysis of both legs and both arms, it is also called quadriplegia

Musculoskeletal: The word musculoskeletal is related to the involvement of muscles, tendons, ligaments and bones.

Rehabilitation: Restoration of an entity to its normal or near-normal functional capabilities after the occurrence of a disabling event. Rehabilitation is the process of helping an individual achieve the highest level of function, independence, and quality of life possible. Rehabilitation does not reverse or undo the damage caused by disease or trauma, but rather helps restore the individual to optimal health, functioning, and well-being.

The success of rehabilitation depends on many variables, including the following: The nature and severity of the disease, disorder, or injury .The type and degree of any resulting impairments and disabilities .The overall health of the patient family support.

CHAPTER –II: LITERATURE REVIEW

Pain is a state which is an unpleasant sensory and emotional experience which may have actual or potential tissue damage, or described in terms of such damage. Pain can be explained in an another way by defining the pain as an unpleasant emotional experience which is usually initiated by noxious stimulus and transmitted over a specialized neural network that connect to the central nervous system where it is interpreted (Kumar and Elavarasi, 2016).

spinal cord is the portion of the central nervous system (CNS) in the superior two third of the vertebral canal. It is incompletely cylindrical to oval in cross section with a central canal (Drake et al., 2005). It is endangered by the vertebra and their associated muscles, ligaments, spinal meninges and the cerebrospinal fluid (CSF). The spinal cord starts as a continuation of the medulla oblongata; the caudal part of the brainstem (Moore and Dalley, 2006). The spinal cord is 42-45cm long and extends from the foramen magnum to the level of the L1 or L2 vertebra (Drake et al., 2005). The function of the spinal cord is to act as the main pathway for all incoming and outgoing impulses from the higher center to the periphery for reflex activities and also exerts traffic control over the muscular system (Drake et al., 2005).

Spinal cord injury refers to a injury to the spinal cord that disrupts normal spinal cord function (McKinley et al., 2005), its result in devastating impairments that can cause severe functional limitations (Scivoletto et al., 2005) & incidence varies depending on age, gender, region and occupation (Vasiliadis, 2012). Internationally, between 12 and 58 SCI cases are reported per million annually (Van den Berg et al., 2010). The severity of the impairments and functional limitations depend on the extent and location of the spinal cord lesion (Itzkovich et al., 2007). When the spinal cord is damaged, communication is disrupted between the brain and parts of the body that are innervated at or below the lesion, the lesion may be complete or incomplete, the cord need not be completely severed to result in a complete injury; the nerve cells may be destroyed as a result of pressure, bruising or loss of blood supply and if they die they do not have the ability to regenerate, here individuals who sustain damage at the cervical level will have impaired function in both their upper and lower extremities, a condition known as tetraplegia & those who are injured at or below the

thoracic level will have paraplegia, with function maintained in their upper extremities but some degree of impairment in the trunk and lower extremities, slightly more than half of injuries result in tetraplegia (Brodwin et al., 2009).

Spinal cord injury Spinal cord injury (SCI) is an insult to the spinal cord resulting in a change, either temporary or permanent, in its normal motor, sensory, or autonomic function (International Standards for Neurological Classifications of Spinal Cord Injury, 2000). Spinal cord injury usually results from an accident that breaks severely damaged the central nerve cord in the neck or back, when the cord is damaged, feeling and movement in the body below the level of injury are lost or reduced (Jahan, 2008).

Spinal cord injury (SCI) is a life disrupting condition and it is medically complex (WHO & International spinal cord society, 2013). Bangladesh is a poor but developing country in South Asia (Arafat, 2016). Spinal cord injury poses great impact on economy of both personal & national (Quadir et al., 2017).

Spinal cord injury (SCI) is caused by direct mechanical damage to the spinal cord that usually results in complete or incomplete loss of neural functions such as mobility and sensory function. Motor vehicle accidents (40.4%), falls (27.9%), and acts of violence (15%) are the most frequent causes of SCI, and people with the average age of 40.7 years are most at risk. The annual incidence of SCI is 40 cases per million population in the United States. An estimated 12000 cases of paraplegia and quadriplegia are caused by SCI in the United States in each year, and approximately, 4000 patients die on the way to hospital and 1000 die during their hospitalization. (Saunders et al., 2012).

Rehabilitation is helping the individual achieve the highest level of functioning, independence, participation and quality of life possible (Cardenas, 2004).

ASIA impairment scale

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

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

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

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

E = Normal: motor and sensory function are normal (American spinal cord injury association, 2011).

Classification of Spinal Cord Injury (SCI)

There are mainly two types of lesions associated with a spinal cord injury (SCI). Spinal cord injury (SCI) can be complete or incomplete (Crepeau, 2003). A complete type of injury means the spinal cord is damaged completely & in a "complete" spinal injury, all functions below the injured area are lost . Whereas an incomplete injury means only part of the spinal cord is damaged. A person with an incomplete injury may have sensation below their lesion but no movement. An "incomplete" spinal cord injury involves preservation of motor or sensory function below the level of injury in the spinal cord. To be classed as incomplete, there must be some preservation of sensation or motion in the areas innervated by S4 to S5 (Krassioukov et al., 2007). The following classification is also used in terms of spinal cord injury-

Tetraplegia, also known as quadriplegia, is paralysis caused by illness or injury of spinal cord that results in the partial or total loss of use of all four limbs. It refers to impairment or loss of motor and /or sensory function of the upper limb & lower limb of the body which is supplied by the cervical segments of the spinal cord due to damage or neural elements within the spinal canal (Kirshblum et al., 2011). Injury to the spinal cord in the cervical region is associated with loss of muscle strength in all four extremities.

Paraplegia is an impairment in motor or sensory function of the lower extremities. This term refers to impairment or loss of motor and /or sensory function in the thoracic, lumber or sacral segments of the spinal cord, secondary to damage of neural elements within the spinal column (Kirshblum et al., 2011).

Causes of Spinal Cord Injury (SCI) in Bangladesh

In Bangladesh the most common cause of spinal cord injury (SCI) is fall from height. People while climbing tree or while performing constructive work on building can face this trauma.

In our country it is a common practice to carry heavy load on the head. Most of the spinal cord injuries (SCI) take place due to accidental fall while carrying such load and it is a public problem (Hoque et al., 2012). In Bangladesh during harvesting season the farmers and laborers carry their products on their head and transport them from harvesting areas to local store houses or from one vehicle to another. The coolies (Labours who undertake heavy load) of Bangladesh frequently carry a load between 50-100 kg. The common causes of spinal cord injury in Bangladesh are fall while carrying heavy load on head, road traffic accidents, falling from a height, fall of a heavy object onto the head or neck, bull attack and diving into shallow water (Hoque et al., 2012) & (Razzak et al., 2011). The large number of falls in Bangladesh is a result of food harvesting which is an important part of our largely agricultural economy. Among the spinal cord injuries caused by road traffic accidents, mostly involve passengers of 'three wheel vehicles' like baby, taxis and rickshaws.

The psychological effects of the spinal cord injury patient create burden for family members and the society (Grivna et al., 2015). Spinal cord and its health-related complications are a major problem because it is the disease's prevalence and mortality and economic problems around the world (World Bank World report on disability reviews evidence showed that about 15% of the world's population lives with some form of disability and 2-4% experience functional problems (Simpson et al.2015,). In the United States 259,000 people in the United States were alive with an SCI in 2008 and 70% of them were using a wheelchair for the reason that spinal cord injury and their primary revenue of mobility (Mc Clure et al., 2001).

In Bangladesh prevalence of spinal cord injury unit records of all admitted patients with spinal injuries from January 2011 to June 2016 were collected from the medical records of the CRP hospital, Male are 1897 (86.82 %) & female are 287 (13.14%). From this studies in the USA most common reason of SCI were car crashes (31.5%) and falls (25.3%), gunshot wounds (10.4%), motorcycle crashes (6.8%), diving incidents (4.7%) and medical or surgical complains (4.3%), which cooperatively accounted for83.1% of total SCI since 2005(Chen et al., 2013). In the North America seems to be subordinate with a higher percentage of violence-related SCI (18%) and Australia (2%) (Chen et al., 2013). According to (Lee at el., 2014) non traumatic Spinal cord injury patients A global-incident rate (2007)

is projected at 23 TSCI cases per million (179312 cases per annum). Regional data are available from North America (40 per million), Western Europe (16 per million) and Australia (15 per million). Generalized regional data are available for Asia-Central (25 per million), Asia-South (21 per million), Caribbean (19 per million), Latin America, Andean (19 per million), Latin America, Central (24 per million), Latin America-Southern (25 per million), Sub-Saharan Africa Central (29 per million), Sub-Saharan Africa-East (21 per million). In Bangladesh life expectation of persons with SCI exposed that, (40.30%) was found to be the most common cause in this study falling from height, either from trees, construction works, electric poles or roofs and carrying a heavy load object on 13 the head was second most common cause (16.0%). SCI have various non-traumatic and traumatic cause with varying neurological injury (Razzak et al., 2017). Traumatic spinal cord injury (TSCI) is a catastrophic event that can be sudden. In human and social positions it is sudden and disturbing and exclusive (Lee at el., 2014). The concept of barriers used three main components wished-for by lack of assistance or support of personal care, proper management of home assistance and incapability of performing active of daily livings (Silver et al., 2012). The most common causes of SCI were automobile crashes (31.1%) and falls (25.3%). More SCIs happened during the weekends and warmer months, which look like to parallel the increase of motorcycle and diving related injury. The present findings suggest that prevention strategies should be custom-made to the targeted population and major causes to have a significant impact on reducing the incidence of SCI (Chen et al., 2013).

In this research the author presented that most of young and active people are affected by spinal cord injury due to low income in society and most of the causes are falls from height road traffic accident etc. Sufferers are travail because of pre hospital precaution and lack of occupational safety. In Bangladesh here should be the strong preventive way to decrease the spinal cord injuries. Another way to public awareness of SCI to established rehabilitation program and better SCI management (Razzak et al., 2017).

Spinal cord injury is two types such as , complete and incomplete injury. A person loses all ability to feel and voluntarily move below the neurological level of the injury which follows in a complete injury, on the other hand there is some functioning below the level of the injury which follows in an incomplete injury. Complete loss of function below the level of

injury when complete spinal cord damages occur, while incomplete spinal cord injuries are those that outcome in some sensation and feeling below the level of injury. The way in which the spinal cord has been injured it reliant on upon the level and degree of function (Brain and Spinal Cord, 2017).

Rehabilitation is the process helping individuals recover skills and abilities which have been missing as a result of a serious injury, illness, disease, disorder or confinement and which may get well slowly. Individuals may need to recover strength, relearn skills or find new ways of doing things that they did before. The long term goal of rehabilitation service of individual who experience a SCI is community reintegration with the best possible functional independence and a return to their previous lifestyle (Anderson, 2007). Returning to employment is a protuberant goal of rehabilitation after an SCI. Employment is related with both extrinsic economic rewards and intrinsic rewards, such as greater life satisfaction, higher level of activities, and better overall health (Krause, et al., 2010).

Unemployment is a prevalent and serious problem for persons with spinal cord injury (SCI). Unemployment rates in the SCI population have been reported as 10 fold compared with the general population (Ottomanelli et al., 2009). The most common age group for spinal cord injury ranges from 25-29 years in Bangladesh and 83% of them are male (Islam et al., 2011).

This is due to males are exposed to higher risks because of their occupation or type of work they do. Women all over the globe are less exposed to the type of work they carry risk of this particular type of injury such as fall from tree, fall from height or falling while having load on head or neck (Islam et al., 2011).

SCI patients often require extended treatment in specialized spinal unit or an intensive care unit. The rehabilitation process typically begins in the acute care setting. Usually the inpatient phase lasts 8–12 weeks and then the outpatient rehabilitation phase lasts 3–12 months after that, followed by yearly medical and functional evaluation. Physical therapists, occupational therapists, recreational therapists, nurses, social workers, psychologists and other health care professionals work as a team under the coordination of a physiatrist to decide on goals with the patient and develop a plan of discharge that is appropriate for the person's condition (Nas et al., 2015).

The SCI is the 'highway' done which motor and sensory information travels between the brain and body via nerves which pass up and down through the spinal cord along definite pathway. When the pathway is broken, the massage cannot get through. This arise when there is an injury to, or disease of the spinal cord (Momin, 2003).

Spinal cord injury is a traumatic damage to the spinal cord that can effect in variation of normal motor, sensory and anatomic function. Paraplegia and tetraplegia are the two common terms recycled in spinal cord injury. Paraplegia includes the lower extremities. Tetraplegia includes all extremities. The Central Nervous System – CNS lies of the brain and spinal cord. The principle portions of the CNS are to participate and manage incoming and outgoing neural signals and to carry out higher mental function, such as thinking and learning. Spinal cord is an allowance of the brain, a thick bundle of nerve fibers from which individual nerves branch off to connect your brain with your muscles, skin and internal organs. The spinal cord transmits messages from the brain to the different parts of the body and also from the different parts of the body to the brain. The brain monitors the whole physical functioning. The vertebral column (Spinal column) is collected of 33 vertebrae. The spinal column not only allows the weight of the body, but it also allows motion between body parts and helps to defend the spinal cord from injury (DeLisa, et al., 2005).

ASIA first issued an international classification of spinal cord injury in 1982, called the International Standards for Neurological and Functional Classification of Spinal Cord Injury. It is founded on the neurological replies, touching and testing each dermatome, pinprick sensations, and ten key muscles on each side of the body (Ditunno et al., 1997).

Shoulder pain is a common problem in paraplegia. Wheelchair impulsion as well as transmissions are supposed to cause and rise upper extremity pain, such as shoulder pain in active wheelchair users (Samuelsson et al., 2004). There are many different motorized causes of shoulder pain after spinal cord injury (SCI) such as stiffness, tight muscles, muscle tears (rotator cuff), overuse, biomechanical difficulties, neglect, impingement, inflammation, arthritis and additional weight bearing while strengthening (Alm et al., 2008).

Rehabilitation is the process of making an individual achieve & independent, help to perform the highest level of functioning, participation in activity of daily living (ADL)

independently and achieve better quality of life possible (DeLisa, 2004). Rehabilitation is the process of enabling the spinal cord injury patient to access, maintain or return to employment or useful occupation. Rehabilitation reflects a wide variety of interventions, including meaningful occupations through voluntary work, sheltered work, supported employment and open employment opportunities (Desiron et al., 2011). By the process rehabilitation individuals can regain skills and abilities which they have been lost as a result of a serious injury, illness, disease, disorder or incarceration and which may recover slowly. Individuals may need to regain strength, relearn skills or find new ways of doing things that they did before. According to the definition of rehabilitation, activities of daily living including the physical demands which deliberate structured activity to maintain or improve fitness, normal ambulation, play, sport and domestic chores. Today the model of fitness development includes play, sport, physical demands of employment involving large and small muscles and daily chores for people with disabilities and able bodied people alike. By rehabilitation program flexibility, mobility and coordination can be improved (Sherrill & Rimmer, 1998).

CHAPTER –III: METHODOLOGY

This research was a cross sectional study design to identify experiences of upper extremity musculoskeletal pain during rehabilitation of spinal cord injury patient.

3.1 Study design:

A cross sectional study design is used. A cross sectional is a research technique which involved collecting data from a large number of people, so that a general overview of the group could be obtained. This study was chosen as appropriate to achieve the aim of the study. All the measurements on each person are made at one point in time. The most important advantage of cross sectional studies is that in general they are quick and cheap. As there is no follow up, less resource are required to run the study.

3.2 Study site:

The Researcher collected data from spinal cord injury (SCI) unit at Centre for the Rehabilitation of the Paralysed (CRP), Savar, Dhaka. Centre for the Rehabilitation of the Paralysed (CRP) focuses on a holistic approach to rehabilitation, recognizing that all aspects of the rehabilitation process. Researcher was choosing this setting because the participant was available in spinal cord injury (SCI) unit. In the study that place was easy to obtain the desire data.

3.3 Study population:

Sample of this study was selected by Persons who admitted in Centre for the Rehabilitation of the Paralysed (CRP) at spinal cord injury (SCI) rehabilitation area and are affecting upper extremity musculoskeletal pain sush as shoulder pain , elbow pain and wrist pain.

3.4 Sample Technique:

The researcher was selected the spinal cord injury (SCI) unit of physiotherapy department of CRP for data collection. At first researcher developed a standard questionnaire and then selected the patient who have experiences of upper extremity musculoskeletal pain during rehabilitation of SCI unit as sample for data collection.

3.5 Sample Size:

Sampling procedure for cross sectional study done by following equation-

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

Here, n = sample size

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

p = expected prevalence 0.68

q = 1- p (1-0.68)

=0.32

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

Here, the actual sample size for this study is calculated 273 But as it is an educational research and had the time limitation so 60 SCI patients were taken as sample.

3.6 Inclusion Criteria

- People who have experienced in upper extremity musculoskeletal pain during Rehabilitation.
- People who have spinal cord injury (SCI).
- Spinal cord injury (SCI) patients who admitted at Centre for the Rehabilitation of the Paralysed (CRP).
- Spinal cord injury (SCI) patients who continue their rehabilitation at Centre for the Rehabilitation of the Paralysed (CRP).
- Spinal cord injury (SCI) patients both male & female.
- Spinal cord injury (SCI) patients who has Age between (10-60) years not administer able above and below of this age range.

3.7 Exclusion Criteria

- People who doesn't have spinal cord injury (SCI).
- Spinal cord injury (SCI) patients who were unwilling to participate in this research
- Spinal cord injury (SCI) patients who don't continue their rehabilitation
- Spinal cord injury (SCI) patients with psychological disturbances.
- Subject who had mental disorders.
- Patients who were in acute stage.

3.8 Data Processing:

3.8.1 Data Collection Tools:

The face to face interview technique was used to collect data. For this the materials to successfully complete the interview session and collected the valuable data from the participants were used such as- a standard question, paper, consent form, Diary, pen, file, clip board etc.

3.8.2 Data collection procedure:

After taking permission from the ethical body of BHPI, the investigator had to find out the people with spinal cord injury who has Experiences of upper extremity musculoskeletal pain during rehabilitation of spinal cord injury patient. The data that the researcher collected is descriptive data. The researcher used the graph technique for analyzing data, calculated as percentages, and presented this using bar and pie charts by SPSS (Statistical Package of Social Science) software version 16.0. SPSS is a comprehensive and flexible statistical analysis and data management solution. SPSS can take data from almost any type of file and use them to generate tabulated reports, charts, and plots of distributions and trends, descriptive statistics, and conduct complex statistical analyses.

3.8.3 Data analysis:

The data was collected using developed a standard questionnaire. A developed standard questionnaire and for the analysis of data descriptive statistics was used. Use the graph technique for analyzing data, calculated as percentages, and presented this using bar, column, table and pie charts by SPSS software version 20.0. SPSS is a comprehensive and flexible statistical analysis and data management solution. SPSS can take data from almost any type of file and use them to generate tabulated reports, charts, and plots of distributions and trends, descriptive statistics, and conduct complex statistical analyses.

Chi-Square (x2) test:

Chi-Square (x2) test is the most popular discrete data hypothesis testing method. It is a nonparametric test of statistical significance for bivariate tabular analysis with a contingency table. Chi-Square test helps to analyze data come in the form of counts. This test can be applied to nominal or categorical data which can’t be analyzed using the ranking technique.

Calculation of Chi-Square

Chi square (x^2) is the sum of the square difference $(O — E)^2$ between observed (O) and the expected (E) data divided expected (E) in all possible data completing by the following equation;

$$\frac{(\text{Observed count} - \text{Expected count})^2}{\text{Expected count}}$$

$$(x^2) = \frac{(O — E)^2}{E}$$

The mathematical notation, the formula looks like this:

$$X^2 = \sum_{i=1}^{k} \frac{(O — E)^2}{E}$$

3.9 Ethical consideration:

The proposal was submitted to the Institutional Review Board (IRB) of Bangladesh Health Professions Institute (BHPI) & approval was obtained from the board. The whole process of this research project was done by following the Bangladesh Medical Research Council (BMRC) guidelines and World Health Organization (WHO) Research guidelines. Verbal and written inform consent was taken from every participants. And ensure every participants that they can leave any time during data collection, & it was ensured that participants were not influenced by data collector. The researcher strictly maintained the confidentiality regarding participant's condition.. The study was conducted in a clean and systematic way. Every subject had the opportunity to discuss their problem with the senior authority or administration of CRP and have any questioned answer to their satisfaction.

3.10 Informed Consent:

A written consent was given to all participants. Consent form was explained to the participants verbally. The researcher explained to the participants about his or her role in this study. The researcher received a written consent from every participants including signature. So the participant assured that they could understand about the consent form and their participation was on voluntary basis. The participants were informed clearly that their information would be kept confidential. The researcher assured the participants the study would not be harmful for them. It was explained that there might not a direct benefit from the study for the participants but in the future cases like them might got benefit from it. The participants have the right to withdraw consent at any time. Information from this study was anonymously coded to ensure confidentiality. They would not be embarrassed by the study.

3.11 Rigor of the study

100% accuracy will not be possible in any research so that some limitation may exist. Regarding this study, there were some limitations or barriers to consider the result of the study as below:

- The first limitation of this study was small sample size. It was taken only 60 samples.
- A very few researches have been done on a few of musculoskeletal pain of spinal cord injury patient. So there was little evidence to support the result of this project study in the context of Bangladesh.
- Another major limitation was time. The time period was very limited to conduct the research project on this topic. As the study period was short so the adequate number of sample could not arrange for the study.
- The result of the study might not be generalized because of small number of sample As the study was conducted at Centre for the Rehabilitation of the paralyzed (CRP) which may not represent the whole country.

CHAPTER –IV: RESULTS

Table 1: Socio-demographical information:

Variables	Categories	Number	Percentage
Age	1-20 year	16	23%
	21-40 year	28	50%
	41-60 year	16	26.7%
		(n=60)	
Sex	Male	50	83%
	Female	10	17%
		(n=60)	
Marital Status :	Married	40	66.7%
	Unmarried	20	33.3%
		(n=60)	
Residential area	Rural	46	76%
	Urban	14	23%
		(n=60)	
Educational level	Illiterate	18	35%
	Primary	21	23%
	SSC	14	8.3%
	HSC	5	1.7%
	Honers	1	1.7%
	Masters	1	1.7%
		(n=60)	

Among the 60 participants 23%(n=14) participants were between 1-20 years, 50% (n=30) were between 21-40 years, 26.7%(n=16) were between years 41-60 year , surrounded by the 60 spinal cord injury patients were included as sample of the study, among them 83% (n=50) were male and about 17 % (n=10) were female. Male are more affected than female in spinal cord injury. Including the 60 participants 66.7% (n=40) participants are married, 33.3%(n=20) participants are unmarried. Among that 60 participants there 76% (n=46), who lived in the rural area and the rest of the participants which is 23%(n=14) lived in urban area. Among 60 participants in this study,30%(n=18) participants were illiterate, about 35%(n=21) participants were primary and about 23.3%(n=14) were completed SSC, 8.3% (n=5) completed HSC 1.7%(n=1) completed honors and 1.7%(n=1) completed their masters. The study shown that people with lower educational level were more prone to have a spinal cord injury. About 60 participants were involved as sample in this study. Among them 6.7%(n=4) were student,1.7%(n=1) were teacher, 8.3%(n=5) were businessman, 5.0%(n=3) were driver, 1.7% (n=1) were service worker, 20%(n=12) were farmer 35%(n=21) were day labor, 8.3%(n=5) were housewife, 10% (n=6) were shopkeeper and others were 3.3%(n=2). In this case study it is found that day labor and farmer are the most vulnerable group to spinal cord injurie

Type of spinal cord injury:

Among this 60 spinal cord injury patients, researcher found that 79% (n=47) were paraplegia and 21% (n=13) were tetraplegia.

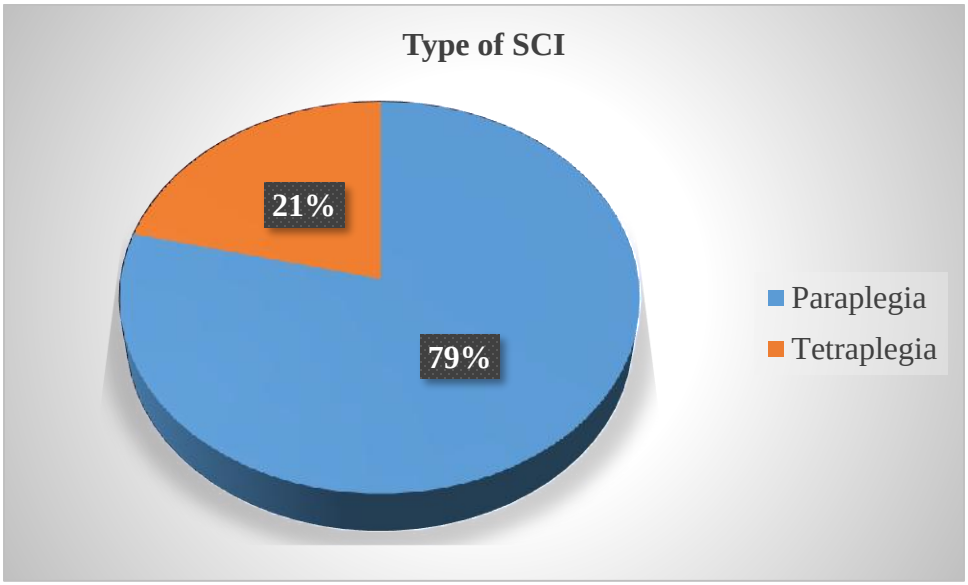


Figure 1: Type of spinal cord injury of the Participant

Pain Site :

Involvement of musculoskeletal pain About 60 patients were selected as sample to carry out this study. In this, it was found that about shoulder pain 45%(n=31),13.3% (n= 8) elbow pain, wrist pain 23.3(n=14),shoulder to elbow pain 1.7%(n= 1),shoulder to wrist pain 3%(n= 3), elbow to wrist pain 0% and below wrist pain 3.3% (n=2).The bar chart below shows the involvement of upper extremity musculoskeletal pain of the participants.

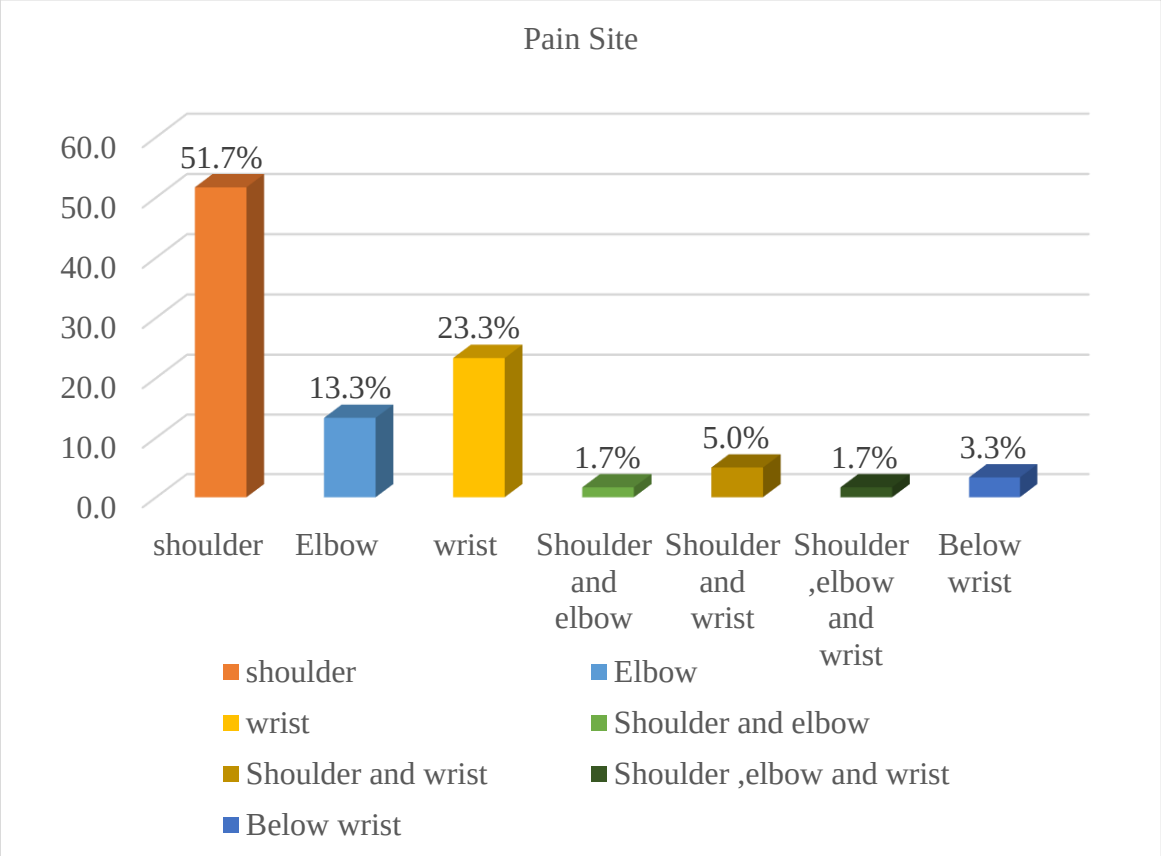


Figure 2: Pain site of the participants

Nature of pain :

Among the 60 patient 40% (n=1) had aching pain,13.3 % had burning pain, 11.7 % had dull pain,5% had electric shock like pain, 8.3% had tender pain ,3.3% Pins and needles pain,11.7 %had tingling pain and last 6.7 %had sharp pain.

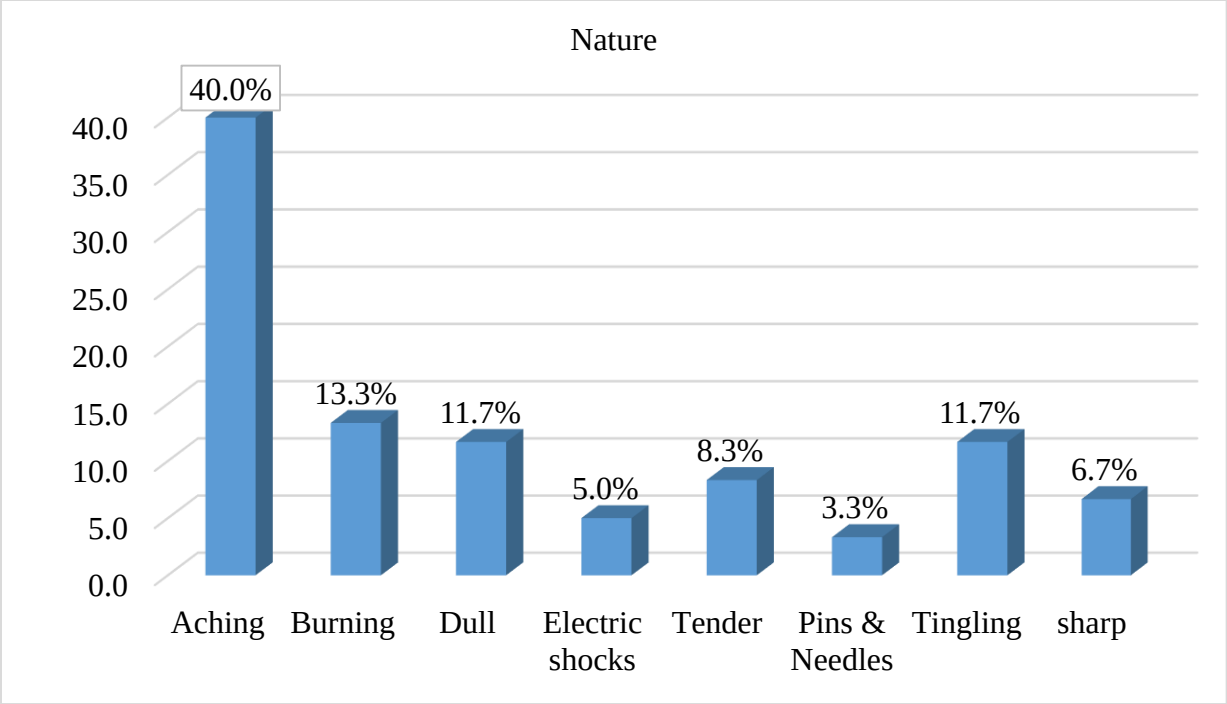


Figure 3 : Nature of pain of the participants

Severity of pain :

Among the 60 participants 5% (n=3) participants had mild symptoms and 70% (n=42) participants‟ had moderate symptoms and 25%(n=15) have severe symptoms of pain.

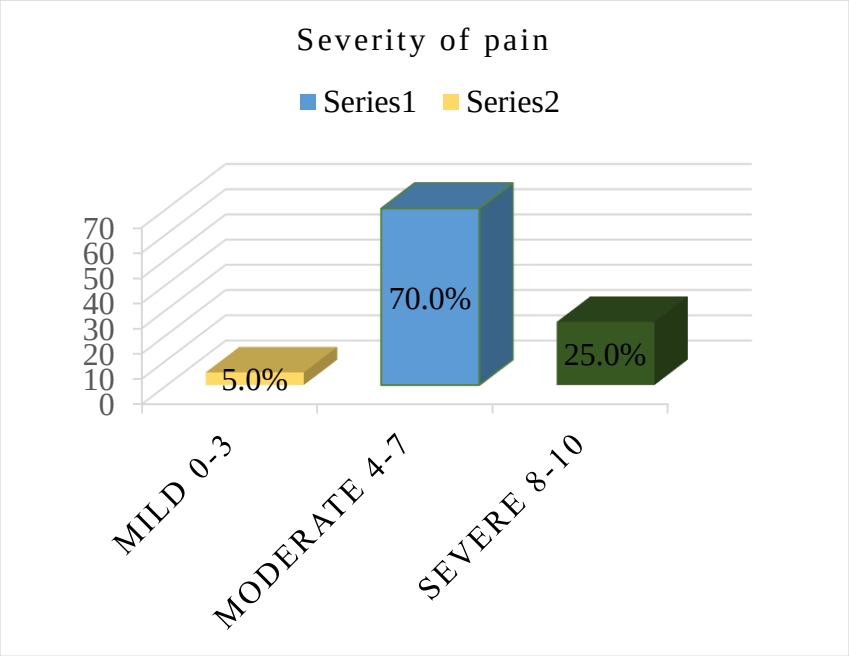


Figure 4: Severity of pain of the participants

Physiotherapy treatment

Among the 60 patient 57%(n=34) taken physiotherapy treatment and 43%(n=26) are not taken physiotherapy treatment.

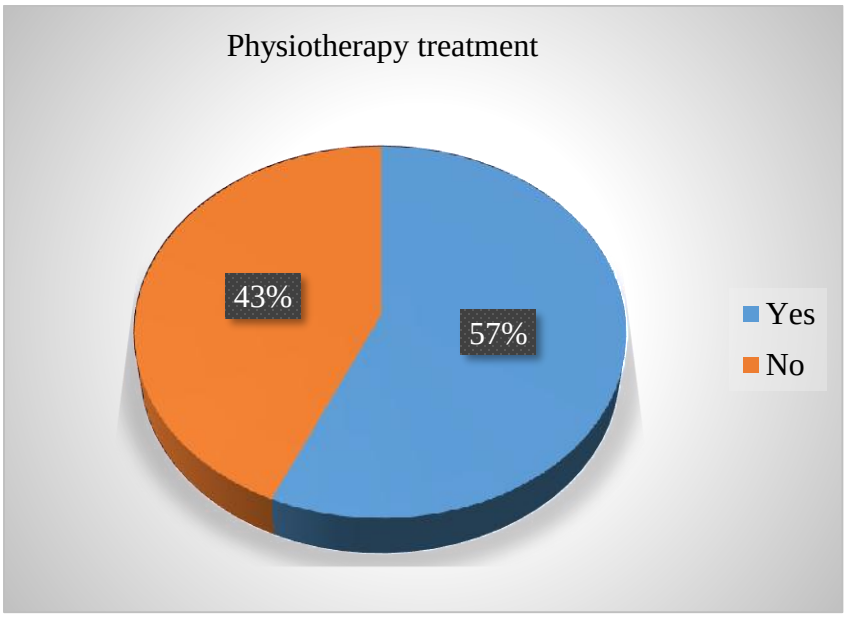


Figure 5: Physiotherapy treatment of the participants

Result of physiotherapy treatment:

Among the 60 patient who have been taken physiotherapy treatment their result 47% (n=16%) improving 50% (n=17) unchanging and 3% (n=1) present worse.

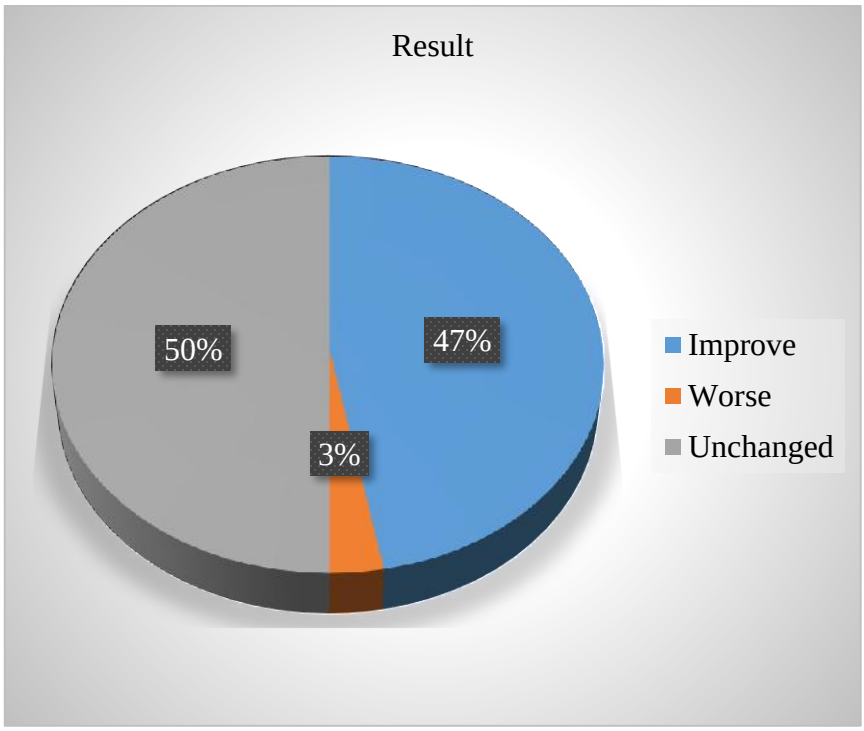


Figure 6: Result of physiotherapy treatment of the participants

Table 2 : Association between various age group of SCI and pain perception according to NRS scale :

Age range	Severity of pain			Chi-Square Tests	P value	Significance/ Not Significance
	Mild	Moderate	Severe			
1-20 year	1	12	4	3.200	0.074	Not Significance
21-40 year	2	17	8	.564	0.754	Not Significance
41-60 year	1	12	3	1.667	0.435	Not Significance

The table showed that age range between 1-20 year 1 participants have mild pain ,12 participants have moderate pain and 4 participants have severe pain. Age range between 21-40 year 2 participants had mild pain ,17 participants have moderate pain and 8 participants have severe pain besides age range between 41-60 year 1 participants have mild pain ,12 participants have moderate pain and 3 participants have severe pain. p-value between various age and pain intensity like 1-20-year p value $P< 0.074$,21-40-year p value $P<0.564$ and 41-60-year p value $P< 0.435$. This P value showed that means the result is not significance and there is no relationship between pain intensity and various age of the participants.

Table 3 : Association between pain intensity and gender , physiotherapy treatment and result of physiotherapy treatment among the participants :

Parameters	Chi-Square Tests	P value	Significance/Not Significance
Gender and pain intensity	0.720	0.698	Not Significance
Physiotherapy treatment and severity of pain	0.873	0.646	Not Significance
Result of physiotherapy treatment and severity of pain	3.727	0.444	Not Significance

The table showed that P-value between Gender and pain intensity p-value P<0.698. This P value showed that there is no relationship between gender and pain intensity of the participants. Furthermore, P-value between physiotherapy treatment and severity of pain intensity p-value is P<0.646. That indicate the result is not significance and there is no relationship between physiotherapy treatment and severity of pain of the participants. P-value between result of physiotherapy treatment and severity of pain p-value is P<0.444. That indicate the result is not significance and there is no relationship between Result of physiotherapy treatment and severity of pain of the participants.

Table 4 : Association between nature of pain and type of SCI among the spinal cord injury patient :

Type of SCI	Frequency	Nature of pain	Frequency	Chi squre test	P value	Significance /Not Significance
Paraplegia	47	Aching	24	4.082	0.770	Not Significance
		Burning	8			
		Dull	7			
		Electric shocks	3			
		Tender	5			
		Pins & Needles	2			
		Tingling	7			
		sharp	4			
Tetraplegia	13	Aching	7			
		Burning	2			
		Dull	2			
		Electric shocks	0			
		Tender	1			
		Pins & Needles	0			
		Tingling	2			
		sharp	4			

The table showed that among 47 paraplegia participants nature of pain such as aching pain 24 participants, burning pain 8 participants, dull pain 7 participants, electric shocks 3 participants, tender pain 5 participants, pins and needles pain 2 participants, tingling pain 7 participants and sharp pain 4 participants.

The table showed that among 21 tetraplegia participants nature of pain such as aching pain 7 participants, burning pain 2 participants, dull pain 2 participants, electric shocks 0 participants, tender pain 1 participants, pins and needles pain 0 participants, tingling pain 2 participants and sharp pain 4 participants.

P-value between nature of pain and type of SCI P Value P<0.770. This P value showed that means the result is not significance and there is no relationship between nature of pain and type of SCI among the spinal cord injury patient:

CHAPTER –V: DISCUSSION

The finding of the study is experience of upper extremity musculoskeletal pain during rehabilitation. The results of this study displayed that the experience of upper extremity pain such as shoulder pain 45%(n=31),13.3% (n= 8) elbow pain, wrist pain 23.3(n=14), shoulder to elbow pain 1.7%(n= 1), shoulder to wrist pain 3%(n= 3), elbow to wrist pain 0% and below wrist pain 3.3% (n=2). Other study showed that responded, 76 (58.5%) reported upper extremity pain: 71% had shoulder pain, 53% wrist pain, 43% hand pain, and 35% elbow pain (Dalyan et al., 1999).The results of this study displayed that the experience of upper extremity pain among SCI patients which is not comparatively equal to other studies but approximate to the other study.

Among the 60 participants 23%(n=14) participants were between 1-20 years, 50% (n=30) were between 21-40 years, 26.7%(n=16) were between years 41-60 year , surrounded by the 60 spinal cord injury patients were included as sample of the study. Other study showed that the overall age group for SCI is ranged from 10-70 years. The majority of the patient's aged from between 10-40 years, with 19% between 10-20 years, 42% between 20-30 years, 20% between 30-40 years, 15% between 40-50 years and 4% between 50-60 years (Rahman, 2008).

Nature of the pain of the participants is 40% (n=1) had aching pain,13.3 % had burning pain, 11.7 % had dull pain, 5% had electric shock like pain, 8.3% had tender pain ,3.3% Pins and needles pain,11.7 %had tingling pain and last 6.7 % had sharp pain.

Type of spinal cord injury researcher found that 79% were paraplegic and 21% were tetraplegic . Other study showed that subjects with tetraplegia (TP) showed more musculoskeletal pain than subjects with paraplegia (PP) (Drongelen et al .,2006).

Among these 60 spinal cord injury patients among them 83% (n=50) were male and about 17 % (n=10) were female. Rintala et al. (2004) reported in a study there was 64% (n=69) male and 96% (n=27) female were experiencing pain following SCI. In another study there was 82% male and 18 % female were affected in the same condition during the accident subsequent period (Norrbrink et al., 2003).

Among 60 participants in this study,30%(n=18) participants were illiterate, about 35%(n=21) participants were primary and about 23.3%(n=14) were completed SSC,

8.3% (n=5) completed HSC 1.7%(n=1) completed honors and 1.7%(n=1) completed their masters Analysis shows that here illiterate participants are more. Other study showed that the illiterate participants are 55.3% (n=26). Primary complete participants are 21.3% (n=10). S.S.C complete participants are 6.4% (n=3). H.S.C complete participants are 6.4% (n=3). Graduation complete participants are 6.4% (n=3). (Shing et al., 2003).

In the middle of the 60 participants 5% (n=3) participants had mild symptoms and 70% (n=42) participants had moderate symptoms and 25%(n=15) had severe symptoms of pain according to NRS. A 0–10 Point Numerical Rating Scale (NRS) is recommended as the outcome measure for pain intensity after SCI (Bryce TN et al.,2007). Including the 60 patient 57%(n=34) taken physiotherapy treatment and 43%(n=26) are not taken physiotherapy treatment. Who have been taken physiotherapy treatment their result after taken physiotherapy treatment 47% (n=16%) improving 50% (n=17) unchanging and 3% (n=1) worse.

Association between various age group of SCI and pain perception according to NRS scale result are not significance . Association between Pain intensity and gender ,other study showed that the result of gender and pain intensity according to NRS scale are not significance so there is no association between gender and pain intensity (Chryssoula Staikou et al., 2017). Pain intensity and physiotherapy treatment ,result of physiotherapy treatment among the participants and nature of pain and type of SCI among the spinal cord injury participants result are not significance due to limitation of time and small amount of data.

CHAPTER –VI: CONCLUSION AND RECOMMENDATION

Recommendation:

In this study, the researcher takes information from the participants' trough a standard questionnaire to identify the experience of upper extremity musculoskeletal pain during rehabilitation of spinal cord injury patient. Though the research has some limitations but researcher identified some further step that might help for the better accomplishment of further research. To ensure the generalizability of further research it is recommended to investigate a large sample. Musculoskeletal Pain problem among the spinal cord injury patients is much common. If there are more research in this sector, it would be a great achievement to manage the patients with spinal cord injury related musculoskeletal pain. So it is needed more study in the SCI related musculoskeletal pain during rehabilitation or pain management.

Conclusion:

The occurrence of upper extremity musculoskeletal pain during rehabilitation decreased over time. This study explores the experience of upper extremity musculoskeletal pain during rehabilitation of spinal cord injury patient and results of this study displayed that the experience of the finding result was not same as the other study result of upper extremity musculoskeletal pain. The results of the study can help to the physiotherapy community to provide the different valuable information related to the title. To reduce the percentage of the pain perception among the patients with spinal cord injury some measures should have to follow by taking the information from the study. In Bangladesh many of people in every year face Spinal Cord Injury and there is lack of information about this injury. So it may be effective for the patient with spinal cord injury.

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APPENDIX

1. IRB form
2. Permission letter
3. Informed Consent (Bangla)
4. Informed Consent (English)
5. Questionnaire (Bangla)
6. Questionnaire (English)

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

Ref. CRP-BHPI/IRB/11/18/1278

Date: 17/1/2018

To
Tandra Rani Mukherjee
B.Sc. in Physiotherapy
Session: 2013-2014 Student ID:112130228
BHPI, CRP, Savar, Dhaka-1343, Bangladesh

Subject: Approval of the thesis proposal **"Experience of upper extremity musculoskeletal pain during rehabilitation of spinal cord injury patient"** by ethics committee.

Dear Tandra Rani Mukherjee,
Congratulations.
The Institutional Review Board (IRB) of BHPI has reviewed the above mentioned dissertation, with yourself, as the Principal investigator. The Following documents have been reviewed and approved:

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

The purpose of the study is to explore the experience of upper extremity musculoskeletal pain during rehabilitation of spinal cord injury patient. The study involves use of a self – administered questionnaire explore the result that may take 20 to 30 minutes to answer fill in the questionnaire, have no likelihood of any harm to the participants. The members of the Ethics committee have approved the study to be conducted in the presented form at the meeting held at 9.30 AM on 24th January 2018at BHPI.

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

Best regards,

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

21st July 2018

The Head
Department of Physiotherapy
Centre for the Rehabilitation of the paralysed (CRP).
CRP, Chapain, Savar, Dhaka-1343.

Through: Head, Department of Physiotherapy, BHPI.

Subject: Application for permission for data collection.

Dear Sir,

With due respect and humble submission to state that I am Tandra Rani Mukherjee, student of 4th Professional B.Sc in Physiotherapy at Bangladesh Health Professions Institute (BHPI).The ethical board of BHPI has approved my research project entitled on **"Experiences Of Upper Extremity Musculo-skeletal Pain During Rehabilitation Of Spinal Cord Injured Patients ".** To conduct this research, I want to collect data from Spinal Cord Injury Unit from SCI patients who has been suffering from upper extremity musculo-skeleral pain during their rehabilitation period . So, I need your permission and support for data collection. I would like to assure that anything of my study will not be harmful for the participants.

I therefore, pray and hope that you would be kind enough to give me the permission to make this research project successful.

Sincerely yours

Tandra Rani Mukherjee

Signature:.....

4th professional B.Sc in physiotherapy
Class Roll-31, Session: 2013-2014
Bangladesh Health professions Institute (BHPI)
CRP, Chapain, Savar, Dhaka-1343.

Recommended & Forwarded
11.07.18
23.07.18
Md. Obaidul Haque

Approved
Mohammad Anwar Hossain
Associate Professor & Head
Physiotherapy Dept., CRP
CRP-Chapain, Savar, Dhaka-1343

Allow for data collection at CCU
Govt.
31.07.18
COR HOSSAIN

মৌখিক অনুমতিপত্র / সম্মতিপত্র
(অংশগ্রহণকারীকে পড়ে শোনাতে হবে)

আসসালামু আলাইকুম নমস্কার

আমি তন্দ্রা রানী মুখার্জ্জী বাংলাদেশ হেলথ প্রফেসন্স ইন্সটিটিউট (বি এইচ পি আই), ঢাকা বিশ্ববিদ্যালয় এর স্নাতক ফিজিওথেরাপি বিভাগের একজন ছাত্রী। স্নাতক ডিগ্রী প্রাপ্তির জন্য আমার একটি গবেষনামুলক প্রকল্প পরিচালনা করা প্রয়োজন এবং আমার প্রকল্পটি হচ্ছে " মেরুরজ্জুতে আঘাতপ্রাপ্ত রোগীর পুনর্বাসনের সময় উর্ধাঙ্গের হাড় ও পেশী সমুহের ব্যথার অভিজ্ঞতা " এজন্য আমি একটি জরিপ পরিচালনা করবো। আপনার দেয়া যাবতীয় তথ্য গোপন রাখা হবে। এ তথ্য প্রদানের কারনে আপনার চিকিৎসায় প্রভাব পড়বেনা।আপনার সাহায্য যথাযথ ভাবে আশা করছি, আপনাকে সত্য তথ্য দিতে অনুরোধ করবো। এই গবেষনায় আপনার অংশগ্রহন স্বেচ্ছাকৃত এবং যেকোন সময় আপনি এই গবেষনা থেকে নিজেকে প্রত্যাহার করে নিতে পারেন। আপনার যদি কোন জিজ্ঞাসা থাকে তাহলে কোন সংকোচ ছাড়াই জিজ্ঞাসা করতে পারেন।

পরবর্তীতে আরো তথ্যের জন্য আপনি আমার সাথে অথবা/এবং মোছাঃ ফাতেমা আক্তার , সিনিয়র লেকচারার,ডিপার্টমেন্ট অফ ফিজিওথেরাপি, বি এইচ পি আই,সি আর পি,সাভার,ঢাকা-১৩৪৩ এর সাথে যোগাযোগ করতে পারেন।

আমি শুরু করার আগে আপনার কোন প্রশ্ন আছে?

আমি কি শুরু করতে পারি?

☐ হ্যাঁ ☐ না

অংশগ্রহনকারীর সাক্ষর ও তারিখঃ
রোগীঃ .....
মোবাইল নম্বরঃ

তথ্য সংগ্রহকারীর সাক্ষর ও তারিখঃ

Verbal Consent Statement

(Please read out to the participants)

Assalamualaikum/Namasker,

My name is Tandra Rani Mukherjee, I am conducting this study as a part of my academic work of B.Sc. in Physiotherapy under Bangladesh Health Professions Institute (BHPI), which is affiliated to University of Dhaka. My study title is "Experience of upper extremity musculoskeletal pain during rehabilitation of spinal cord injury patient". I would like to know about some personal and other related information regarding Spinal cord injury. You will need to answer some questions which are mentioned in this form. It will take approximately 20-25 minutes.

I would like to inform you that this is a purely academic study and will not be used for any other purpose. All information provided by you will keep in a locker as confidential and in the event of any report or publication it will be ensured that the source of information remains anonymous and also all information will be destroyed after completion of the study.

Your participation in this study is voluntary and you may withdraw yourself at any time during this study without any negative consequences. You also have the right not to answer a particular question that you don't like or do not want to answer during interview.

If you have any query about the study or your right as a participant, you may contact with me and/or Mst. Fatema Akter, Senior lecturer of Physiotherapy Department, Bangladesh Health Professions Institute (BHPI), Savar, Dhaka.

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

Yes: Date:

No: Date:

Signature of the Participant _____ Date:

Mobile No:

Signature of the Interviewer _____ Date:

Mobile No:

উপাধিঃ মেরুরজ্জুতে আঘাতপ্রাপ্ত রোগীর পুনর্বাসনের সময় ঊর্ধাঙ্গের হাড় ও পেশী সমূহের ব্যথার অভিজ্ঞতা

ক) ব্যক্তিগত বিবরণ :

১। নাম-	
২। ঠিকানা-	

খ)সামাজিক জনসংখ্যা তাত্ত্বিক তথ্যসূত্র

৩। বয়স :	
৪। লিঙ্গ :	○ পুরুষ ○ মহিলা
৫। বৈবাহিক অবস্থা :	○ অবিবাহিত ○ বিবাহিত ○ তালাকপ্রাপ্ত ○ বিধবা/ বিপত্নীক
৬। বাসস্থানের ধরন :	○ গ্রাম ○ শহর
৭। ধর্ম :	○ ইসলাম ○ হিন্দু ○ বৌদ্ধ ○ অনন্য
৮। শিক্ষাগত যোগ্যতা :	○ অশিক্ষিত ○ প্রাথমিক ○ মাধ্যমিক ○ উচ্চ মাধ্যমিক ○ স্নাতক ○ স্নাতকোত্তর ○ অন্যান্য
৯। পেশা:	○ ছাত্র /ছাত্রী ○ শিক্ষকতা ○ ব্যবসা ○ দোকানদার

	○ ড্রাইভার ○ ডাক্তার ○ চাকরী ○ কৃষিকাজ ○ শ্রমিক ○ গৃহিণী ○ বেকার ○ অনন্য

গ) মেডিকেল বিষয়ক তথ্য:

১০। আঘাতের তারিখ :	
১১। ভর্তির তারিখ :	
১২। আঘাতের ধরণ :	○ ট্রমাটিক টেট্রাপ্লেজিয়া ○ ট্রমাটিক পেরাপ্লেজিয়া ○ নন-ট্রমাটিক টেট্রাপ্লেজিয়া ○ নন-ট্রমাটিক পেরাপ্লেজিয়া
১৩। আঘাতের কারণ :	১। ট্রমাটিক ○ মটর যানের আঘাত ○ উঁচু স্থান থেকে পড়ে গিয়ে ○ ভারী কিছু বহন করার সময় পড়ে গিয়ে ○ পিঠে ভারী কিছু পড়েছে ○ খেলাধুলার কারণে ○ শারীরিক আঘাত ○ অন্যান্য ২। নন-ট্রমাটিক
১৪। আঘাত পাওয়ার কতদিন পর ব্যথা শুরু হয়েছিল?	○ ০-৭ দিন ○ ৮-১৪ দিন ○ ১৫-২১ দিন ○ ২১ দিনের বেশি

ঘ) হাড় এবং পেশী সমূহের ব্যাথা সম্পর্কিত প্রশ্নাবলী

১৫। পুনর্বাসনের সময় আপনি কোন জায়গার ব্যথায় ভুগছেন?	○ কাঁধ ○ কনুই ○ কব্জি ○ কাঁধ ও কনুই ○ কাঁধ ওকব্জি ○ কনুই ও কব্জি ○ কাঁধ , কনুই ও কব্জি ○ কব্জির নিচে
১৬।আপনি দেহের কোন পাশে ব্যথা অনুভব করেন?	○ ডান ○ বাম ○ উভয়
১৭। আপানার ব্যথার জন্য কোনটি প্রযোজ্য ?	○ ধরে থাকা ব্যথা ○ জ্বালাপোড়া ○ নিস্তেজ থাকে ○ বফের মত ঠাণ্ডা ○ ক্রাম্পিং ○ বিদ্যুতের শক ○ টেন্ডার ○ সুচের মত ○ চাপ ধরে থাকে ○ টিংলিং ○ ধারালো ○ অন্যান্য
১৮। আপনি কতদিন ধরে এই ব্যথায় ভুগছেন?	○ ০-১ সপ্তাহ ○ ১-২ সপ্তাহ ○ ৩-৪ সপ্তাহ ○ ৪-৫ সপ্তাহ ○ ৬-৮ সপ্তাহ ○ ৯-১২ সপ্তাহ
১৯। আপনার ব্যথাটা এন আর এস স্কেল অনুযায়ী কতটা খারাপ বলে মনে করেন?	০ ১ ২ ৩ ৪ ৫ ৬ ৭ ৮ ৯ ১০
২০। আপনি ব্যথাটা কখন অনুভব করেন?	○ সকালে ○ দিন বাড়ার সাথে সাথে ○ রাতে ○ কজের স্াথে স্াথে
২১। আপানার ব্যাথার ধরণ কেমন?	○ সবসময় ○ মাঝেমাঝে
২২। আপনার ব্যথার স্থায়িত্বকাল কতক্ষন?	○ ১-২ ঘণ্টা ○ ২-৪ ঘণ্টা ○ ৪-৬ ঘণ্টা ○ ৬ ঘণ্টার বেশি

২৩। ব্যথার জন্য ঘুমে ব্যাঘাত হচ্ছে কিনা ?	○ হ্যাঁ ○ না
২৪। কি করলে ব্যথাটা বাড়ে ?	○ হুইল চেয়ার ব্যবহার করলে ○ স্থানান্তরণে ○ দৈনন্দিন জীবনযাত্রার কার্জকলাপে ○ খেলাধুলায় ○ অনন্য
২৫। কি করলে ব্যথাটা কমে ?	○ নড়াচড়ার সাথে সাথে ○ বিশ্রামে ○ অবস্থান পরিবর্তন ○ ব্যায়াম
২৬। হুইলচেয়ারের যান্ত্রিক সমস্যার কারণে কি আপনি কোন সমস্যা বা অসস্থি বোধ করেন ?	○ হ্যাঁ ○ না
২৭। আপনি কি কখনো এই ব্যথার জন্য ফিজিওথেরাপি চিকিৎসা নিয়েছেন?	○ হ্যাঁ ○ না
নিয়ে থাকলে ফলাফল কি?	○ উন্নতি হয়েছে ○ খ্রাপ ○ অপরিবর্তিত

সময় দেয়ার জন্য আপনাকে ধন্যবাদ।

Tittle: Experiences of upper extremity musculoskeletal pain during rehabilitation of spinal cord injury patient

A. Personal Details:

1. Name :	
2. Address :	

B. Socio-Demographic Questionnaire:

3. Age :	
4. Sex :	○ Male ○ Female
5.Marrital status :	○ Married ○ Unmarried ○ Divorced ○ Widowed
6. Place of residence:	○ Rural ○ Urban
7. Religion :	○ Islam ○ Hindu ○ Vudho ○ Others……..
8. Education :	○ Illiterate ○ Primary Education ○ SSC ○ HSC ○ Honors ○ Masters ○ Others…
9. Occupation :	○ Student ○ Teacher

	○ Businessman ○ Shopkeeper ○ Driver ○ Doctor ○ Service ○ farmer ○ Day labor ○ Hawker ○ Housewife ○ Others……..

C. Medical History:

10. Date of injury :	
11. Date of admission :	
12. Diagnosis :	○ Traumatic Tetraplegia ○ Traumatic Paraplegia ○ Non-traumatic Tetraplegia ○ Non-traumatic Paraplegia
13. Causes of injury :	A. Traumatic ○ Road traffic accident ○ Fall from height ○ sports accident ○ Assault ○ Bull attack ○ Scarf injury ○ Gun shot injury ○ Fall of heavy weight over head ○ Others..... B. Nontraumatic
14. After how many days of injury pain started ?	○ 0-7 day ○ 8-14 days ○ 15-21 days ○ More than 21 days

D. Musculoskeletal Pain Related Questionnaire

15. Where do you have pain during rehabilitation?	○ Shoulder ○ Elbow ○ wrist ○ shoulder and elbow ○ Shoulder and wrist ○ Elbow and wrist ○ Shoulder ,elbow and wrist ○ Below wrist
16. In which side of the limb do you feel pain??	○ Right ○ Left ○ Both
17. What words best describe your pain?	○ Aching ○ Burning ○ Dull ○ Icy cold ○ Cramping ○ Electric Shocks ○ Tender ○ Pins & Needles ○ Squeezing ○ Tingling ○ Sharp ○ Other____
18. How long have you had your current pain problem?	○ 0-1 week ○ 1-2 week ○ 3-4 week ○ 4-5 week ○ 6-8 week ○ 9-12week
19. How severe is your pain on NRS Scale ?	0 1 2 3 4 5 6 7 8 9 10

20. When do you notice the pain?	○ Day ○ As day progress ○ Night ○ During work
21. What of is the nature your pain?	○ Constant ○ Intermittent
22. How long does the pain last?	○ 1-2 hours ○ 2-4 hours ○ 4-6 hours ○ More than 6 hours
23. Does pain disturbed your sleep ?	○ Yes ○ No
24 .What are the aggravating factors of pain ?	○ Using wheelchair ○ Transferring ○ Activity of daily living ((ADL) ○ Sports ○ Others
25. What are the ease factors of pain ?	○ During movement ○ rest ○ Posture change ○ exercise
26.Have you feel any other problem/discomfort due to technical problem of your wheelchair?	○ Yes ○ No
27**.** Have you ever taken Physiotherapy treatment for this pain?	○ Yes ○ No
If yes, then what was the result?	○ Improve ○ Worse ○ Unchanged

Thank you very much for your time!