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MUSCULOSKELETAL PAIN AND ITS MANAGEMENT AMONG SPINAL CORD INJURY PATIENTS

Aisha Habiba Iffat

Bachelor of Science in Physiotherapy (B.Sc. PT)

Registration No: 1770

DU Roll No: 139

BHPI, CRP, Savar, Dhaka

Bangladesh Health Professions Institute (BHPI)

Department of physiotherapy

CRP, Savar, Dhaka-1343

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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-

MUSCULOSKELETAL PAIN AND ITS MANAGEMENT AMONG SPINAL CORD INJURY PATIENTS

Submitted by **Aisha Habiba Iffat,** for the partial fulfillment of the requirements for the degree of Bachelor of Science in Physiotherapy (B.Sc. PT).

.....
Firoz Ahmed Mamin
Associate Professor
Department of Rehabilitation Science
Course co-ordinator
M.Sc in Physiotherapy program
BHPI, CRP, Savar, Dhaka.

.....
Mohammad Anwar Hossain
Associate Professor, Physiotherapy, BHPI
Senior Consultant & Head of the department of Physiotherapy
CRP, Savar, Dhaka.

.....
Muhammad Millat Hossain
Assistant Professor
Department of Rehabilitation science
BHPI, CRP, Savar, Dhaka.

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

.....
Professor Md Obaidul Haque
Head of the Department of Physiotherapy
Vice Principal
BHPI, CRP, Savar, Dhaka

Declaration

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

Signature: Aisha Habiba Iffat **Date:** 01.12.19

Aisha Habiba Iffat
Bachelor of Science in Physiotherapy (B.Sc. PT)
DU Roll No: 139
Registration No: 1770
BHPI, CRP, Savar, Dhaka
Bangladesh.

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Acknowledgement

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Acronyms

ASIA: American Spinal cord Injury Association.

BHPI: Bangladesh Health Professions Institute

CNS: Central Nervous System.

CRP: Centre for the Rehabilitation of the Paralysed.

CSF: Cerebro Spinal Fluid.

DAP: Deep Anal Pressure.

DREZ: Dorsal Root Entry Zone.

GBD: Global Burden of Disease.

IASP: International Association for the Study of Pain.

ICF: International Classification System of Functioning.

ICIDH: International Classification of Impairment, Disability and Handicap.

IRB: Institutional Review Board.

ISNCSCI: International Standards for Neurological Classification

LMIC: Low to Middle-Income Countries.

NITOR: National Institute of Traumatology Orthopedics and Rehabilitation.

NPRS: Numeric Pain Rating Scale.

NSAID: Non-Steroidal Anti Inflammatory Drug.

of Spinal Cord Injury.

QoL: Quality of Life.

SCI: Spinal Cord Injury.

SPSS: Statistical Package of Social Science.

TENS: Transcutaneous Electrical Nerve Stimulation.

WHO: World Health Organization.

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Abstract

Purpose: To find out the musculoskeletal pain and its management among the spinal cord injury patients in CRP. ***Objectives*****:** The aim of the study was to identify the musculoskeletal pain among spinal cord injury patients and its physiotherapy management. ***Methodology*****:** The study design was surveillance of cross sectional study where quantitative method used. For conducting this study 106 samples were selected in purposive sampling technique. In this study, patients who are admitted in Centre for the Rehabilitation of the Paralyzed (CRP) in Bangladesh which is the largest spinal cord injury rehabilitation centre in South Asia are the participants of the study. Data was collected self-structured questionnaire and analysed by SPSS software version 20.0. Outcome of pain was measured by Numeric Pain Rating Scale (NPRS) to measure the pain level of the participants. ***Results*****:** It was observed on this study that among the 106 participants most of the injury caused by fall from height (26.4%), and fall from tree (24.5%). The maximum participants are injured on thoracic level (37.7%) and lumber 34%. It was also investigated that presence of current pain of the participants (74.5%). And the location of pain was 20.8% (n=22) complains of pain on neck and shoulder region, 18.9% (n=20) back at level of injury. Most of them undergo surgery (66%) and spinal fixation was (54.7%). On numeric pain rating scale moderate pain was found the most (n=53) 49.9%. For managing pain exercise (n= 29) 27.4% found the most. Most of the participants express their effectiveness that treatment made the pain slightly better (n=38) 35.8%. ***Conclusion*****:** From this study it can be concluded that pain is the most common complication after spinal cord injury. Most of the person develops it due to injury to the back and it can be worsen by wheelchair propulsion activity and prolong sitting posture. Physiotherapy treatment is most effective for managing pain. The study may help to provide awareness among the people of Bangladesh. And also express the pain developing activity and proper measure of pain. So SCI pain can be reduced through taking preventative measure.

Key words: SCI, NPRS, pain management, level of injury, CRP.

CHAPTER I INTRODUCTION

1.1 Background

Disability is a physical or mental impairment of a human being that limits ones normal functioning of life. It may be described as a complex form of deprivation. Disability involves dysfunctioning at one or more levels of physical function, individual activity or social participation. It could occur at birth or during the course of life.

In Bangladesh the rate of disability is about 10% of total population which is identified by the Social Assistance and Rehabilitation for the Physical Vulnerable. World Health Organization (WHO) estimated the prevalence of the disable person at 10.5% and it is more common in the rural areas. In 2004, the prevalence of disability was about 6% among those below the age of 18 and about 14% among those above that age (Disability in Bangladesh, 2015).

Spinal cord injury (SCI) is a type of physical disability, which is characterized by partial or complete damage of spinal cord and cauda equina resulting in loss of sensory, motor and autonomic function (Khan & Majedi, 2019). It is not common as other injuries thus its physical and psychological consequence is dangerous. A significant proportion of individual with SCI result in neurologically complete and incomplete injury (Chen et al, 2013).

Global incidence rate of spinal cord injury is about 10.4 million per year and before admitted to hospital 83 per million per year had been survived. In developed countries the annual incidence of Spinal Cord Injury (SCI) ranges from 11.5 to 53.4 per million populations. In Bangladesh the estimated range of people having spinal cord injury is 2.5% cases per million (Hossain et al., 2018).

Spinal cord injury can be traumatic or non-traumatic, though trauma is the most frequent cause. The incidence of traumatic Spinal Cord Injury (SCI) varies across

countries and regions, ranging from 2.1 to 195.4 individuals per million per year, with Asian countries reporting 12.1–61.6 individuals per million (Chang et al., 2018).

Age of the victims with SCI follows a bimodal distribution with a first peak between the ages of 15–29 and then a second peak at age >65. Globally, motor vehicle accidents, falls, and violence are the leading causes of traumatic SCI. In developed countries, falls are becoming a more common cause for SCI, likely due to an aging population. On the other hand, in low- to middle-income countries (LMIC), road traffic accidents and violence account for the majority of the SCI (Luk & Souter, 2017).

A crucial complication arises in the course of SCI is acute and chronic pain. Not only on the primary rehabilitation, but also on the individuals' quality of life in later phases of Spinal Cord Injury (SCI) pain implicates their activities. Hence numerous varieties of pain presentation are common in SCI. These presentations can generally be assigned to different pain types (Franz et al., 2019).

After spinal cord injury people experiences different types of pain. Musculoskeletal pain occurs in an area with preserved sensation above, at, or below the level of injury with a prevalence rate of 49% in SCI. (Burke et al., 2017).

Pain originated from bones, joints, ligaments and muscles either in the acute post injury state or with chronic overuse determined as musculoskeletal pain. Other common type of pain is visceral pain, which is caused by disturbances of bladder or bowel. Neuropathic pain can occur as a result of lesion to the somatosensory system such as (spinal cord injury). In turn, neuropathic pain is also classified into at- level or below level of neuropathic pain. In United States the prevalence of neuropathic pain is 12,000 new cases per year (Khan & Majedi, 2019). Prevalence of pain after spinal cord injury ranges from 19% to 96% (Gorp et al., 2015). After SCI approximately two third of the patients develop pain which is either nociceptive (pain arising from nociceptors) or neuropathic (pain arising from damage to the somatosensory nervous system). Musculoskeletal pain included in nociceptive pain type which arises in regions with preserved sensory innervation and can be a consequence of overuse of the arms and back due to wheelchair use. Although 60% of cervical lesion patients develop pain below the level of their injury. Neuropathic pain developes 53% of

patients which is either at level or below level of injury. Among them 59% have at level neuropathic pain and 30% had below level neuropathic pain (Shiao & Lee-Kubli, 2018).

According to current studies, optimized management of pain in SCI involves both pharmacological and non-pharmacological means approach. This guideline addresses physicians and therapists of all participating medical societies and specialist disciplines (e.g. neurologists, physiatrists, pain specialists, orthopedists, psychotherapists). It should serve as a source of information for all further professional fields that are involved in the treatment of adult individuals with acute and chronic spinal cord injury in out-and in patient setting (Franz et al., 2019).

A person having spinal cord injury faces life threatening complications so they need appropriate management and specialized rehabilitation. In Bangladesh the proper management for spinal cord injured patients were given in only one non-governmental organization, which has conducting a rehabilitation program for many years through which the patients can improve their life style named Centre for the Rehabilitation of the Paralyzed (CRP). This organization managed the patients with multi and inters disciplinary approaches which emphasis on the development of community based rehabilitation programs (Rahman et al., 2018). This study explore about musculoskeletal pain among the spinal cord injury patients and physiotherapeutic management for musculoskeletal pain.

1.2 Rationale

Spinal cord Injury is most commonly occurring disabling condition in all developing and developed countries in the world and day by day the rate will increase due to lack of awareness. Bangladesh is a low socio economic country and most of the people live in rural area, injury rate is high among them. After spinal cord injury its physical damage is high which leading to various type of complication and increase risk of morbidity and mortality rate.

The interventions which are provided to the spinal cord injury (SCI) patients have been limited to prevention, good initial resuscitation, pharmacotherapy and nursing care. As the Bangladesh is a developing country and trying to develop health care system. So the spinal cord injury patient needs a specialized and comprehensive rehabilitation services to continue their activities of daily living in the community.

In Bangladesh, there are two specialized hospital for the management of spinal cord injury (SCI). They are National Institute of Traumatology Orthopedics and Rehabilitation (NITOR) and Center for the Rehabilitation of the Paralyzed (CRP). The CRP is a non-governmental organization specializing in the management of patients with spinal cord lesions.

Depending on the type of lesion the injured have faces various types of secondary complication; pain is the most common complication. In each stages after spinal cord injury patients complains of pain. Most commonly they complain of musculoskeletal pain. It hampers their daily activities. The intervention provided for managing their pain is pharmacological and physiotherapy management.

By doing this research, the musculoskeletal related pain may be drawn out. And patient will try to enhance these facts during the rehabilitation program. Thus the research may help the spinal cord injured patients experiencing musculoskeletal pain in their daily living during rehabilitation phase and after completing rehabilitation about the condition and management lies on it. The researches will also aware the medical professional about the arising musculoskeletal disorders among spinal cord injured patients and thus it will enhance them to take further proper management in each stage of rehabilitation and to minimize these disorders.

1.3 Research question

What are the prevalence of musculoskeletal pain and how the pain will be managed?

1.4 Objectives

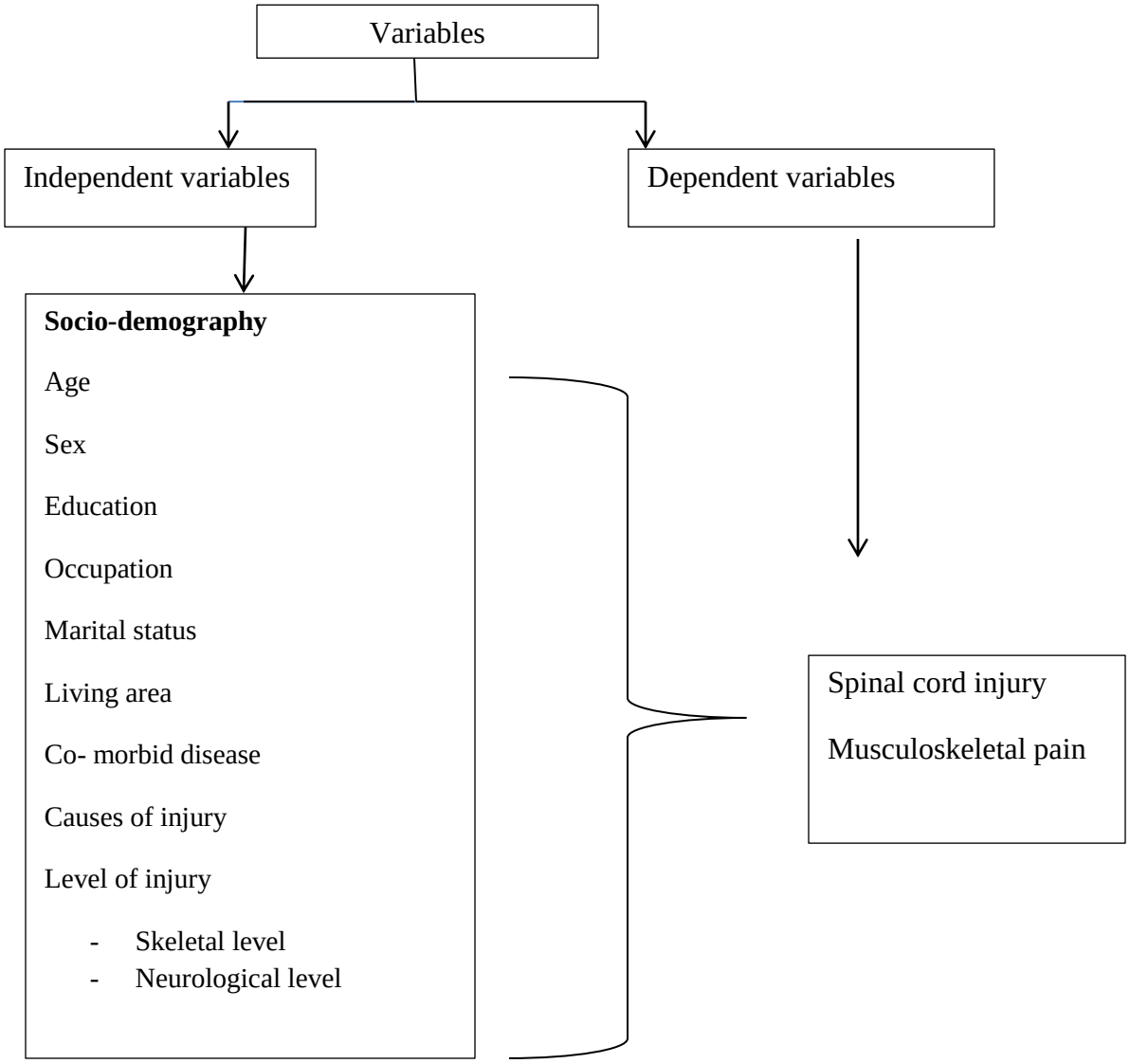
1.4.1 General objective

To find out the musculoskeletal pain and its management among spinal cord injury patients.

1.4.2 Specific objectives

1. To explore the socio-demographic information of the spinal cord injury patients.
2. To ascertain which type of injured are vulnerable for developing musculoskeletal pain
3. To find out different types of musculoskeletal pain on different body parts.
4. To identify the severity and types of musculoskeletal pain.
5. To know about the management of musculoskeletal pain.

1.5 Conceptual framework



1.6 Operational definition

Spinal cord injury

Spinal cord injury (SCI) leads to disruption of the neural connectivity, resulting in temporary or permanent neurological disability. And the disruption may occurred by external trauma including accidents, falls and sports-related injuries, rather than a degenerative disease (Hutson & Di Giovanni, 2019).

Musculoskeletal pain

Musculoskeletal pain is a subjective experience, involving sensations and perceptions, which may or may not be the result of tissue damage (muscle, ligament, tendon, bones) or physical injury. Generally the meaning of pain will differ among individuals depending on how pain affects their lives (Ploumis and Gkiatas.,2019).

Skeletal level of injury

The skeletal level of injury is the level of the greatest vertebral damage on radiographic view (Burns et al., 2012).

Neurological level of injury

It is the most caudal segment of spinal cord in where both sensory and motor functions are preserved (Burns et al., 2012).

Complete lesion

This term is used when there is an absence of sensory and motor function in the lowest sacral segments (S4-S5) (Burns et al., 2012).

Incomplete lesion

This term is used when there is preservation of any sensory and /or motor function below the neurological level that includes the lowest sacral segments (Burns et al., 2012).

CHAPTER II LITERATURE REVIEW

There are many parts of central nervous system (CNS), spinal cord is one of the structure (Eric Diaz et al., 2016). It is anatomically simplest and most conserved region of the vertebrate central nervous system (CNS) (Dale et al., 2017). The spinal cord is a tubular structure composed of nervous tissue that extends from the brainstem and continuing distally as gradually narrowing at the lower thoracic/upper lumbar region as the cones medullary. Usually terminate anywhere from T12 to L2-L3 level. Distally spinal cord is fixed firmly and stably by the filum terminale, a fibrous extension of the pia mater anchoring the spinal cord to the coccyx. Cerebrospinal fluid (CSF), supportive soft tissue membranes and meninges, and the osseous vertebral column surrounded by the spinal cord protecting the spinal cord (Adigun et al., 2018). Spinal cord is covered by 3 meningeal layers respectively dura matter, arachonoid matter, and pia matter (Bican et al., 2013). The vertebrae occupying a relatively constant anatomic theme and consist of a vertebral body and a vertebral (neural) arch. The vertebral body serves as a pillar, supporting the head and trunk. The intervertebral disks consist of the inner nucleus pulposus and the outer annulus fibrosis (Pukenas, 2015). The spinal cord consists of 5 segments, cervical, thoracic, lumbar, sacral and coccygeal. Long, cylindrical structure with varying levels of thickness/width depending on the corresponding vertebral levels 31 total nerve root segments 8 cervical 12 thoracic 5 lumbar 5 sacral 1 coccygeal (Cho et al., 2015). The length of spinal cord is about 45 cm in men and 43 cm in women. And width ranges from 0.64-0.83 cm in the thoracic region and 1.27-1.33 cm in the cervical and lumbar regions (Adigun et al., 2019). Blood supply of the spinal cord is mainly by the anterior and posterior branch of vertebral artery. Anterior spinal artery branch of the vertebral artery, supplies the anterior 2/3 of the spinal segment. Left and right posterior spinal arteries pair posterior branches of the vertebral artery supply the posterior 1/3 of the spinal segment (Cho et al., 2015). There are 31 spinal nerve pairs that arise from the intervertebral foramen on both sides of the vertebral column. 8 Cervical nerves C1-C7

nerves arising from above corresponding cervical vertebra except for C8 which exits from between C7 and T1 Vertebrae, 12 Thoracic nerves, 5 Lumber nerves, 5 sacral nerves, and 1 coccygeal segment (Adigun et al., 2018).

Spinal cord injury (SCI) is a highly riotous time in the life of an individual and requires a considerable coping process (Lude et al., 2014). Injury to the spinal cord which may leads to motor and/or sensory defecit and paralysis is known as spinal cord injury (Hagen et al.2015). Conduction of the sensory and motor signals across the site of the lesion is affected as a result of spinal cord injury (Maynard et al., 1997). Spinal cord is a tract through 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 tract is disturbed, the massage cannot get through. This disturbance occurs when there is an injury, or disease of the spinal cord (Hossain et al., 2012).

The main reason for spinal cord injury is either traumatic or non-traumatic (Rahman et al., 2018). Both are severe neurological and physical imairement for an individual which is increasing day by day (Rahman et al., 2017). In Bangladesh, trauma is considered as the most common cause of spinal cord injury (SCI). Fall from height, road traffic accident, gunshot injury, sports injury is so far identified to the leading cause of injury around the world (Rahman et al., 2017). Rahman (2018) stated that auto crash, including jeep, truck and bus, fall: including jumping and being pushed accidentally (not as an act of violence), fall from height (such as tree), fall while carrying heavy load on head or back, falls as a result of being pushed, gunshot wound, motorcycle crash: 2-wheeled: bicycle, tricycles, shallow diving, Pedestrian, including falling or jumping into the path of a vehicle, auto racing, machinery accidents, working in factory or any construction, tractor, bulldozer, steamroller, train, road grader, playing ice hockey, snowboarding. Personal contact, including being hit with a blunt object, bull attack, sports related injury, physical assault, stabbing, scarf injury etc. are traumatic cause of injury in Bangladesh. Non traumatic cause include tumors, transverse myelitis, TB spine, spinal deformity (scoliosis, spina bifida), degenerative

condition (spondylolisthesis, prolapsed intervertebral disc) etc. (Rahman et al., 2017). Among them 46% are fall from height in Bangladesh, 24% are road traffic accident, 18% are fall while carrying heavy object, 6% are involved in physical assault, stab injury, sports injury and bull attack, 3.2% spinal tuberculosis, 0.9% transvers myelitis (Rahman et al.,2018).

Tetraplegia: Injury to the cervical segment of the spinal cord due to damage of the neuronal elements of the spinal canal resulting in any impairment or loss of motor and /or sensory function within the cervical segment. (Burns et al.,2012)

Paraplegia: Any 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. (Burns et al.,2012)

Complete injury: Injury to the spinal cord resulting in absence of sensory and motor function below the level of the lesion is refers to complete injury. No sacral sparing. (Hossain et al.,2012)

Incomplete injury: When any sensory and /or function is preserved below the neurological level of injury that includes the lowest sacral segments S4-S5 (i.e., presence of “sacral sparing”). Sensory sacral sparing includes preservation of sensory function on S4-S5 dermatome (intact or impaired) on one or both sides for light touch or pin prick, or deep anal pressure (DAP). Presence of voluntary contraction of the external anal sphincter upon digital rectal examination is refers to motor sacral sparing. (Burns et al.,2012)

Sub type of traumatic spinal cord injury: Traumatic spinal cord injury is divided into five sub type grading from A to E which also known as ASIA impairment scale (Hossain et al.,2012). 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 on this classification based largely on the concept of sacral sparing that is, pinprick and light touch sensation, some degree of maintained perianal sensation, voluntary anal contraction, and/or great toe flexion indicating an incomplete lesion. (Ahuja et al.,2017)

Grade **A**:

Sensory or motor function below the neurological level (that is, the lowest segment where sensorimotor function is normal on both sides) of injury including absent sacral function (that is, no voluntary anal contraction, no great toe flexion, no perianal, genital, anal pinprick or light touch sensation) (Ahuja et al., 2017).

Grade **B**:

Sensory, but not motor function is preserved below the neurological level of injury, including the distal sacral segments (S4-5). No motor function is present more than three levels below the neurological level, on either side of the body (Ahuja et al., 2017).

Grade **C**

Motor function below the neurological level of injury (including the distal sacral segments) is preserved with more than half of the key muscles (that is, elbow flexors and extensors, wrist extensors, finger flexors and abductors, hip flexors, knee extensors, ankle dorsi-flexors, long toe extensors and ankle plantar flexors) having a grade of less than 3 on the ASIA motor score (against gravity without additional resistance). (Ahuja et al., 2017)

Grade **D**:

Motor function below the neurological level of injury (including the distal sacral segments) is preserved with more than half of the key muscles having a grade of 3 (antigravity) or greater. (Ahuja et al., 2017)

Grade **E**:

Neurologically intact patients (that is, sensorimotor function is normal in all segments) who previously had deficits secondary to a suspected SCI. (Ahuja et al., 2017)

According to International Association for the Study of Pain (IASP), pain is "An unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage."

Pain is an unpleasant sensation localized to a part of the body. It is often described in terms of a penetrating or tissue-destructive process (e.g.: Stabbing, burning, twisting, tearing, and squeezing) and or of a bodily or emotional reaction (e.g.: Terrifying, nauseating, and sickening). (Fields et al., 2016).

The most exhausting consequence after spinal cord injury (SCI) is pain. It imposes a major burden for the patients who have already suffered substantial emotional and physical trauma. Loss of function is considered the most significant issue for spinal cord injured patient. Pain has a direct bearing on the ability of those with such injuries to regain their optimal level of activity (Saifai et al., 2013). The most common symptoms after spinal cord injury is pain which starts immediately after injury and continuing throughout the life. After spinal cord injury pain can occur in parts of the body where there is normal sensation as well as areas that have little or no feeling. This severe pain has negative impact on quality of life and a person may have difficulty carrying out daily activities or participating in enjoyable pastimes. (Richard et al., 2010). A number of studies have investigated the prevalence of pain following SCI, and most indicate a prevalence of approximately 65%. Approximately one-third of people describing the pain as severe or excruciating after SCI. Pain also hamper an individual's activity levels and mental health status, reducing their quality of life (QoL) (Wang et al., 2013). A study found in USA showed that prevalence of pain in spinal cord injury is alarmingly high: as many as 60–80% of spinal cord injury patients experience pain with at least 1/3 of the patients reporting severe pain. After spinal cord injury pain is initiated by a primary lesion or dysfunction in the central nervous system. Central pain can be initiated by a variety of conditions and insults at any level of the spinal cord (Masri et al., 2012). Basically, pain in a person with SCI has two categories:

a) Nociceptive pain: It is caused by a variety of noxious stimuli to the normally innervated body parts, both acute and chronic pain, caused by trauma or disease, usually above or at the level of the spinal cord injury.

b) Neurogenic pain: It is related to injury to the nerve roots, cauda equina and to the spinal cord. It is chronic and mostly caused by excessive use of the upper extremities and spine during the performance of self-care activities and wheelchair propulsion for mobility, which may variably result in myofascial pain, nerve entrapment syndromes and premature development of degenerative conditions of the musculoskeletal system (Ragnarsson et al., 1997).

The International Spinal Cord Injury Pain Classification (ISCIP) was developed a classification of pain for spinal cord injury patients:

Nociceptive pain:

Musculoskeletal pain: musculoskeletal pain includes glenohumeral arthritis, lateral epicondylitis, communited femur fracture, quadratus lumborum muscle spasm etc.

Visceral pain: Myocardial infraction, abdominal pain due to bowel impaction,cholecystitis.

Other nociceptive pain: autonomic dysreflexia, headache, migraine headache, surgical skin incision.

Neuropathic pain: Neuropathic pain is categorized according to level of spinal cord lesion, such as:

At level spinal cord pain: spinal cord compression, nerve root compression, cauda equina compression.

Below level spinal cord pain: spinal cord ischemia, spinal cord compression.

Other neuropathic pain: carpal tunnel syndrome, trigeminal neuralgia, diabetic neuropathy.

Others or unknown: fibromyalgia, complex regional pain syndrome, interstitial cystitis, irritable bowel syndrome (Perry et al., 2009).

Depending on the variability of clinical presentation, location and causes of spinal cord injury there is general agreement on a number of pathophysiological factors. Nociceptive pain mechanism is same as SCI and non SCI persons.

Acute musculoskeletal pain arises from injury to structures such as bones, ligaments, muscles, intervertebral discs and facet joints. Chronic musculoskeletal pain may be the result of muscle imbalance and overuse of upper limbs during transfers, use of a wheelchair or crutches and sustained abnormal postures or movements associated with muscle weakness or spinal deformity and malalignment. Pain is associated with peripheral nociceptive mechanisms with activation of primary afferent nociceptors and transmission of signals along nociceptive pathways to the brain. Releasing of inflammatory mediators and subsequent peripheral sensitization will also contribute to pain and also activation of central pathways which causes central sensitization leads to developing the pain (Siddall et al., 2015). Many studies show that central pain is based on pain caused by damage or injury to the thalamus. It also results in damage to the afferent spinothalamic pathway that conveys pain and temperature information (Masri et al., 2012).

Visceral pain following SCI may arise from nociception caused by disease, inflammation or distension within visceral structures, such as urinary tract infection, calculi formation and bowel impaction**.** Amplification through peripheral or central sensitization with possible activation of high threshold or silent nociceptive afferents may cause visceral pain (Siddall et al., 2015).

After SCI, structural neuroplasticity and sudden changes of new dendritic fibers is critical for recovery and these changes are responsible for neuropathic pain, muscle spasticity, and autonomic dysreflexia (Hadjipavlou et al., 2016). Pain at and below level of injury may be caused by post traumatic changes of spinal cord. Different clinical procedure to relieve pain at and below level of spinal cord injury such as anesthetic block (Rekand et al., 2012). A number of molecular changes occur after injury such as up regulation of sodium ion channel, changes in glutamate receptors, and inhibition of serotonergic, noradrenergic, opioid and gamma aminobuteric acid

receptor. Drugs are also responsible for this molecular change (Hagen et al., 2015). Injury also leads to activation of microglia and production of cytokines such TNF-α, interleukins etc. Changes in supraspinal structure, reorganization in thalamic neurons and function contributes to development of central neuropathic pain. Changes in neuroplasticity in the cortex and in spinothalamic cortical pathways are probably involved in modulating the intensity of neuropathic pain (Rekand et al., 2012).

Musculoskeletal conditions comprise more than 150 diagnoses that affect the loco motor system – that is, muscles, bones, joints and associated tissues such as tendons and ligaments, as listed in the International Classification of Diseases. Musculoskeletal conditions are typically characterized by pain (often persistent pain) and limitations in mobility, dexterity and functional ability, reducing people's ability to work and participate in social roles with associated impacts on mental wellbeing, and at broader level impacts on the prosperity of communities. In the 2016 Global Burden of Disease (GBD) study shows that, musculoskeletal conditions were the second highest contributor to global disability (WHO 2018).

In our daily activities one of the most important causes of activity limitation and participation restriction is musculoskeletal disorder (Rahman et al., 2017). The impact of pain on a patients daily functioning is generally expressed as a patient's level of disability. According to the international classification of impairment, disability and handicap (ICIDH) disability has been defined as "any restriction or lack of ability to perform an activity in the manner or within the range considered normal for a human being" (WHO, 1980). World Health Organization (WHO) also concentrated on international classification system of functioning (ICF) it focuses on patient's residual functional capacity despite disease (WHO, 2001).

In the ICF concept "activity" more than "disability" has become an important parameter for daily functioning (Verbunt et al., 2009). Any pain or strain or pathology in the skeletal system of the body is considered as musculoskeletal pain (Hendi et al., 2019). Musculoskeletal injuries include diseases of the bone, joints, and structures around the joints, (tendons, ligaments, and muscles) (Thelin et al., 2016).

In spinal cord injury patients musculoskeletal pain occurs in a region where there is at least some intact sensation and the source of which is believed to arise from musculoskeletal structures and dysfunction (Siddall et al., 2015). Musculoskeletal pain results from unusual demands on the body (transfers, Wheeling) is commonly reported. SCI patients have a higher risk of suffering from musculoskeletal pain in comparison to normal population because of having decreased lean body mass and increased fat mass in comparison to age and sex matched normal population (Saifai et al., 2013). In the spinal cord injury (SCI) population, musculoskeletal pain can be produced by injury at the time of SCI, overuse or strain, arthritic changes, or wear and tear of the joints, often from wheelchair use (Northwest Regional Spinal Cord Injury System, 2002).

Up to 80% of individuals with spinal cord injury develop chronic pain within their first year after injury (Widerstrom-Noga et al., 2018). Another study found that chronic pain affect 63% of spinal cord injured patients (Dawa et al., 2019). The prevalence of musculoskeletal pain in the upper extremity is 27.7% (Barbetta et al., 2016). A European systematic review found that 53% person develop neuropathic pain after SCI among them at level neuropathic pain rate is about 19%, below level neuropathic pain is about 27% (Burke et al., 2017).

The changes among uninjured population about musculoskeletal pain have been well-described and studied, but we know much less about musculoskeletal conditions that happen after spinal cord injury (SCI). Musculoskeletal problems are the most frequent cause of disability after spinal cord injury (Hossain et al., 2012).

The following are common musculoskeletal conditions:

Acute injury and delayed effects of acute injury

Fractures and dislocations

Sprains: Partial or complete tear of ligament.

Strains: Muscle, tendon, or ligament pushed or pulled to its maximal limit)

Inflammation:

Tendonitis: Inflammation of a tendon.

Tenosynovitis: Inflammation of a tendon sheet.

Bursitis: Inflammation of a bursa.

Myositis: Inflammation of a muscle, which may be primary (e.g., polymyositis or secondary to mechanical injuries.

Arthritis:

Post-traumatic arthritis: Occurs after acute trauma.

Infectious arthritis: It occurs due to direct infection of a joint.

Reactive arthritis: Inflammation of a joint due to an immunologic process or reaction.e.g. Rheumatoid arthritis.

Osteoarthritis

Sometimes also called arthrosis,it can be caused by a degenerative process in joint cartilage, partly cause is unknown (Thelin et al., 2016).

Barbetta (2016) reported that pain is often caused by overuse of the muscles due to transferring, and doing pressure relief maneuvers, and from pushing a wheelchair. Upper limb pain can make it difficult to transfer safely and perform other activities of daily living. The prevalence of musculoskeletal pain in the upper extremity is about 27.7%. A study said that prevalence of shoulder pain is about 30% to 78% in person with spinal cord injury due to weight bearing activities such as transfer, pressure relief, wheel chair propulsion and activities of daily living among paraplegic and weakness, spasticity, subluxation and reducing normal function among tetraplegic. The prevalence of elbow pain and hand pain is about 32% and 48% respectively. And wrist pain is about 54% in chronic spinal cord injured person (Drongelen et al., 2006).

Back and neck pain are common problems. In people with paraplegia who have had surgery to fuse their spine, increased motion that occurs just above and just below the fusion can lead to back pain. People with tetraplegia (quadriplegia) may also have back pain, especially if they are able to walk but still have weakness. People who use cervical collar and cervical traction during immobilization stage can develop neck pain. A study found that prevalence of chronic back pain and chronic low back pain among spinal cord injured is 47% and 49% (Michailidou et al., 2012).

Visceral pain is located in the abdomen (stomach and digestive area) and is often described as cramping and/ or dull and aching pain. Sometimes visceral pain is due to referred pain from another structure (Forchheimer et al., 2011).

Acute musculoskeletal pain arises from injury to structures such as bones, ligaments, muscles, intervertebral discs and facet joints (Siddall et al., 2015).

Chronic musculoskeletal pain may be the result of muscle imbalance and overuse of upper limbs during transfers, use of a wheelchair or crutches and sustained abnormal postures or movements associated with muscle weakness or spinal deformity and misalignment. A recent systematic review has suggested that the prevalence of chronic back and low back pain in people with SCI may be as high as 50% (Siddall et al., 2015). A systematic literature review found that prevalence of chronic musculoskeletal pain among spinal cord injured is 49% (Michailidou et al., 2013).

Neuropathic pain above the level of injury is usually not due to the SCI itself. Patients who use a manual wheelchair may experience carpal tunnel syndrome and peripheral neuropathic pain as a result and shoulder pain due to overuse of muscle. Peripheral neuropathic pain at injury level can be due to consequence of injury to the nerve root (Hagen et al., 2015).

Nociceptive pain is caused by acute or chronic injury to normally or partially innervated structures and tissues within or adjacent to the spine, causes include trauma, spinal instability, degenerative joint disease, infections or even tumors. Such pain tends to be localized to the injured area of the spine and the immediately surrounding area. It is frequently increased by physical activity and prolonged sitting, but relieved by lying down or by provision of spinal supportive devices, such as custom-fitted spinal orthotics and wheelchair seating systems (Drongelen et al., 2006).

After spinal cord injury features of pain have typical description. At level spinal cord injury patient may describe pain as, electric shock-like, sharp, shooting, squeezing and burning. The pain may be unilateral or bilateral and is located in a segmental pattern within the dermatome of the neurological level of injury and or within the three dermatomes below the neurological level of injury but not extending beyond this level.

Below-level neuropathic pain is defined as pain with typical neuropathic features and similar descriptors to those used for at-level neuropathic pain, such as electric shock-like, sharp, shooting, squeezing or burning. The pain is distributed below the neurological level of injury and, in contrast to at-level neuropathic pain, is located more than three dermatomal levels caudal to the neurological level of injury, but may also extend to within three dermatomes below the neurological level of injury (Siddall et al., 2015). Depending on the exact source of the pain, it may be described as a dull ache or as a sharp penetrating pain. Persistent complaints of such pain require careful diagnostic evaluation with appropriate imaging studies to rule out spinal instability, deformity, infections and tumors. Each of these would require a specific intervention, which may include a surgical procedure (Ragnarsson et al., 1997).

A study showed that neuropathic SCI pain in 49%, at-level pain reported in 30% and below-level pain in 25%. The most common descriptors used to describe at-level and below level SCI neuropathic pain were tingling or pins and needles (59 and 90%, respectively), pain evoked by touch (59 and 30%), warm/burning (45 and 55%), shooting (55 and 40%), pressing/ squeezing (50 and 70%), cold/freezing (23 and 25%) and itching (14 and 5%). Below-level pain was more often reported as tingling or pins and needles compared with at-level pain (Finnerup et al., 2016).

A detailed history should be taken describing the pain type, onset and distribution, exacerbating and relieving factors, including relationship to posture and functional activity, such as transfers, etc. (Forchheimer et al., 2011).

Performing a comprehensive physical examination is essential and should include sensory, motor and reflex testing to classify the level and degree of neurological lesion using ASIA standards. As indicated by the proposed pain classification system, the first step is to determine whether the pain is nociceptive or neuropathic in nature. This is largely dependent on pain description (nociceptive: dull, cramping, aching, worse with movement or related to visceral function, localized tenderness, located in the region of sensory preservation; neuropathic: shooting, electric, burning, unrelated to activity, numbness or hypersensitivity to touch, located in the region of sensory

disturbance). The pain can then be classified more specifically as visceral or musculoskeletal or above-, at or below-level neuropathic in type. A careful history and clinical examination provides the basis for subsequent focused investigations, including imaging and/or electro diagnostic testing or other special procedures. (Forchheimer et al., 2011).

Screening of psychosocial factors contributing to disability and distress is important at this stage. Ideally, a full assessment should be undertaken by a suitably trained psychosocial professional, although some screening of mood may be done through the use of questionnaires, such as the Hospital Anxiety and Depression Scale (Forchheimer et al., 2011).

The general approach to managing pain acute or chronic is the multidisciplinary team. These team involves pain specialists, clinical psychologists, psychiatrists, physiotherapists, a spinal cord injury specialist/rehabilitation specialist, social and occupational therapy services. The entire team is necessary to treat the biology of pain, address psychological factors, and reduce obstacles to a normal life (Hadjipavlou et al., 2019).

Management of pain in persons with SCI can often be a difficult and frustrating experience, both for the clinician and the patient, but it should not be undertaken with a feeling of hopelessness. As with other clinical conditions, an accurate diagnosis must first be made, the etiology defined and all factors influencing the pain perception should be assessed (Kristjan et al., 1997).

Activity modification for musculoskeletal pain:

Changes in mobility equipment (wheelchair, sliding board), wheelchair pushing and transfer techniques, and pressure reliefs can significantly decrease muscles and joint pain. Strengthening exercise and balance training can also help reduce musculoskeletal pain.

Therapeutic massage may help relieve musculoskeletal pain due to muscle tightness and muscle imbalance.

Acupuncture is used to treat musculoskeletal pain. Tiny needles are inserted into the skin at specific points on the body. Acupuncture is thought to work by stimulating the body's pain control system or by blocking the flow of pain.

Transcutaneous electrical nerve stimulation (TENS) is sometimes used to treat musculoskeletal pain. Electrodes are placed on the surface of the skin and send low levels of electrical current into the body. The current blocks signals from the areas of nerve damage that are triggering a pain response.

Another study represents that. Physical treatments including exercise and hydrotherapy programs, postural re-education, retraining activities of daily living such as transfers and mobility, wheelchair and seating adjustments, modifying lifestyle and possible other physical modalities are often helpful in managing pain (Forchheimer et al., 2011).

Psychologists trained in pain management can help with a variety of behavioral techniques proven to be effective in reducing the intensity and impact of pain.

Relaxation techniques and/or biofeedback designed to reduce muscle pain tension and "mental tension" associated with pain can be helpful in self-management.

Cognitive restructuring learning how to think differently about pain and its effects can lead to changes in brain activity and, in turn the experience of pain.

Individual psychotherapy designed to help identify desired goals and increase pleasure and meaning in daily life can help reduce pain. It can also help if there is a significant amount of anxiety associated with pain (Richards et al., 2016).

Self-management Strategies and psychological counseling (Michailidou et al., 2014).

There are many medications to treat pain. All of the medications listed below have shown some success in reducing pain, but none do so completely in every instance.

Non-steroidal anti-inflammatory drugs (also known as NSAIDs) such as aspirin, ibuprofen and naproxen are commonly used to treat musculoskeletal pain.

Anti- seizure medications such as gabapentin (Neurontin) and Pregabalin (Lyrica) are used to treat neuropathic pain.

Muscle relaxants and anti-spasticity medications such as diazepam (Valium), baclofen (Lioresal) and tizanidine (Zanaflex) are used to treat spasm and musculoskeletal pain.

Topical local anesthetics such as lidocaine (Lidoderm) are used to treat pain that occurs when skin is touched lightly (Hadjipavlou et al., 2019).

Visceral pain requires specific attention to the presumed source of pain. Urinary tract infections and calculi need to be treated appropriately. Bowel related pain may respond to simple measures such as change in diet or bowel regime, but may also require further assistance from a spinal specialist (James et al., 2019).

Typically, surgical intervention for pain is used in compression, neuropathies, syringomyelia drainage, and treatment of segmental pain at the level of injury with dorsal root entry zone (DREZ) lesioning. Carpal tunnel syndrome is treated with surgical decompression or injections, and ulnar entrapment with nerve trunk transposition surgery. Thoracic outlet syndrome is treated by minimizing physical activities that potentiate nerve irritation (Hadjipavlou et al., 2019).

CHAPTER III METHODOLOGY

I. Study design

The aim of this study was to find out the musculoskeletal pain among spinal cord injury patients. For this reason the investigator choose a quantitative research model in the form of a surveillance of cross sectional study design to find the result. Cross-sectional studies are carried out at one time point or over a short period of time. They are usually conducted to estimate the prevalence of the outcome of interest for a given population, commonly for the purposes of public health planning (Levin et al., 2006).

II. Study area

The Centre for the Rehabilitation of the Paralyzed (CRP) was selected. In Bangladesh it is the largest spinal cord injury rehabilitation center for the patient with spinal cord injury. Where at a time 100 or more patients were admitted and treated in different rehabilitation phage. At first the standard questionnaire was developed and then collected data from SCI unit.

III. Study population

A population refers to the members of a clearly defined set or class of people, objects or events that are the focus of the investigation. So all the patients admitted in Spinal Cord Injury Unit of Centre for the Rehabilitation of the Paralyzed (CRP), savar, Dhaka who will fulfill the inclusion and exclusion criteria are the population of this study.

IV. Sample size

Globally the prevalence rate of pain after spinal cord injury is about 71% (Burke et al., 2019). The calculated sample is about 316. For conducting this study the researcher collected 106 samples from spinal cord injury unit of CRP.

V. Sampling procedure

Purposive sampling technique was used for sample selection. Purposive sampling starts with a purpose of the study and the sample is thus selected to include people of interest and exclude those who do not suit the purpose. Usually, the population is too large for the research to attempt to survey all of its members. A small, but carefully chosen sample can be used to represent the population. The sample reflects the characteristics of the population from which it is drawn.

VI. Inclusion criteria

- Spinal cord injury patients admitted into CRP.
- The patients who has assessed and diagnosed spinal cord injury (SCI).
- Both male and female patients with any age group were selected.
- The patients who were agreed to give consent.

VII. Exclusion criteria

- Participants who have severe difficulties in communication were excluded.
- Patients who were not-interested to give consent.
- The patient who have non traumatic spinal cord injury.

VIII. Data collection

Data collection is one of the most crucial parts of research. For this study data was collected by face to face interview (close ended questionnaire) of the participants.

IX. Method of data collection

Data was collected by using a close ended questionnaire. Data was quantitative data and collected through face to face conversation of the participants. In that way questionnaire was present and data was completed. In addition the aim of study was to identify either spinal cord injury patient has any musculoskeletal pain or not and their physiotherapy management in CRP.

X. Materials and tools

Consent form, questionnaire, pencil and eraser, page, file and NPRS (Numeric pain rating scale), computer.

XI. Pilot study

A pilot study for validation of the questionnaire was done using responses from 15 subjects. The subjects consisted of males and alterations were made according to the feedback received. Initially, all the participants were supposed to complete the questionnaire on their own but three had problems with writing due to a C5 level injury. Four have problem in understanding the question then researcher change the questionnaire. The other preferred a one to one interaction with the researcher. The researcher then decided to change to a researcher administered questionnaire in both English and Bangla.

XII. Questionnaire

For data collection Bangla questionnaire was used. The samples of the study were the both male and female. The questions of the questionnaire was closed ended questions, which was set up sequentially. The questionnaire is set in such a pattern that is available in the field data and participants can answer them easily and the researcher can fulfill the objective of the study.

XIII. Duration of data collection

Data was collected within 4 weeks and the duration was May 25, 2019 to June 24, 2019. Data was collected carefully and maintain the confidentiality of the data. Each participant provided particular time to collect data. In general, each questionnaire took approximately 10-15 minutes to complete.

XIV. Procedure of data collection

Though there was several ways of collecting data, it was easy and reliable if the questionnaire completed or filled up in the presence of the researcher. Subjects were chosen under purposive sampling procedure and the data was taken from asking the

question to the participants and filled up the questionnaire form by the researcher. In the questionnaire participant's socio-demographic, spinal cord injury related, pain and treatment related information was asked.

XV. Data analysis

The data was analyzed by both descriptive and inferential statistics. Generally descriptive statistics are often uses in conjunction with descriptive statistics survey methods. The graph technique was used for analyzing data, calculated as percentages and presented this using bar and pie charts by SPSS (Statistical Package of Social Science) software version 20. The collected data was illustrated with bar graphs. By this survey a lot of information was collected. All these results were gave a basic idea about the musculoskeletal pain and its management among spinal cord injury patients.

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.

XVI. Ethical consideration

Before conducting the study necessary information has been approved by the ethical committee of CRP and was permitted to do this research. A research proposal was submitted to the Institutional Review Board (IRB) of Bangladesh Health Professions Institute and the code is 1947. The research proposal was approved and obtained from IRB. Beginning the data collection, permission was obtained from the concerned authorities ensuring the safety of the participants. The formal permission was taken from the head of the physiotherapy department to check patient file and collect the data. Data collection was started and completed within the allocate time frame. All information was kept in secure. The World Health Organization (WHO) and Bangladesh Medical Research Council (BMRC) guideline were always followed to conduct study.

XVII. Informed consent

Written consent was given to all participants prior to the completion of the pretest questionnaire. I explained the participants about his or her role in this study. I received a written consent form every participants including signature. So the participant assured that they could understand about the consent form and their participation was on voluntary basis. The participants were informed clearly that their information would be kept confidential. I assured the participants that the study would not be harmful for them. It was explained that there might not a direct benefit from the study for the participants but in the future cases like them might got benefit from it. The participants have the right to withdraw consent and discontinue participation at any time without prejudice to present or future care at the SCI unit of physiotherapy of CRP.

CHAPTER IV RESULTS

The aim of the study was to explore the musculoskeletal pain and its management among spinal cord injury patients. Data were numerically coded and analysis the data by using an SPSS 20.0 version software program and the result captured in Microsoft Excel. The descriptive data was collected from the spinal cord injury unit of CRP and calculated as percentages and presented by using bar and pie chart and in table, for this study 106 participants were chosen. The participants in this study involved paraplegic and tetraplegic patients and experienced with various types of musculoskeletal pain in spinal cord injury at Centre for the Rehabilitation of the Paralysed (CRP).

1. Respondents' Socio-demographic Characteristics

1.1 Gender of the participants:

Among 106 participants of spinal cord injured, majority of them were male (88.7%, n= 94) and female (11.3%, n=12).

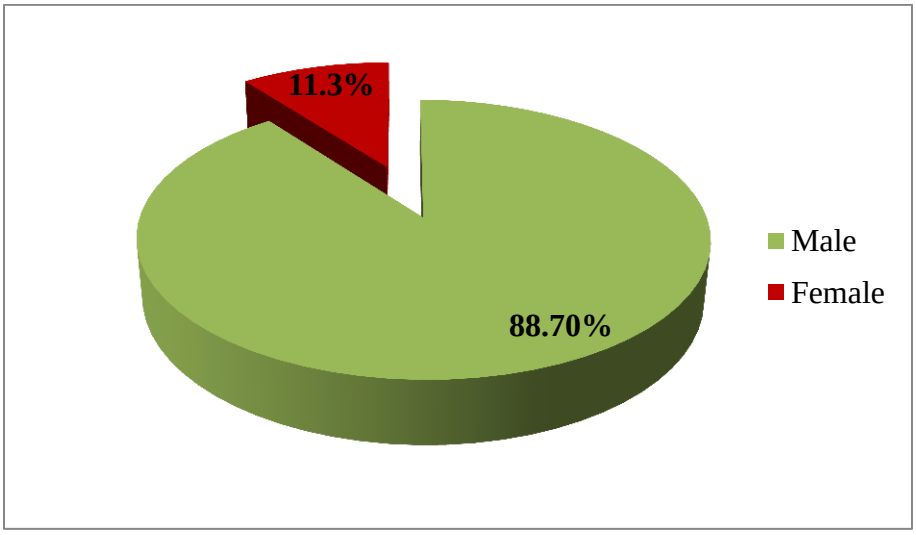


Figure: Gender distribution of the participants.

1.2 Age of the participants:

Among the 106 spinal cord injured patients the mean age was 31.45 years. Maximum age (n=35) was between 21-30 years age range and the percentage was 33%. In between 10-20 years 24.5% (n=26), 31-40 years 18.9% (n=20), 41-50 years 14.2% (n=15), 51-60 years 6.6% (n=7), 61-70 years 2.8% (n=3).

Age Group	Number (n)	Percentage (%)
10-20	26	24.5
21-30	35	33
31-40	20	18.9
41-50	15	14.2
51-60	7	6.6
61-70	3	2.8
Total	**106**	**100**

Table: Age of the participants.

1.3 Educational background:

Among the 106 participants 23 (21.7%) have no formal education. Most of them were completed their primary education 33 (31.1%), secondary were completed 23 (21.7%), higher secondary were 15 (14.2%), bachelor degree were 8 (7.5%), masters completed were 4 (3.8%).

Education level	Number (n)	Percentage (%)
No formal education	23	21.7
Primary	33	31.1
Secondary	23	21.7
Higher secondary	15	14.2
Bachelor degree	8	7.5
Masters	4	3.8
Total	**106**	**100**

Table: Educational background of the participants

1.4 Occupation of the participants:

Out of the participants, most of the participants were day laborers (n=23) 21.7%, students were (n=17) 16%, businessman were (n=16) 15.1%, service holder were (n=15) 14.2%, agriculture were (n=12) 11.3%, driver were (n=8) 7.5%, factory or garments worker were (n=6) 5.7%, teacher were (n=4) 3.8%, Rickshawpollar were (n=2) 1.9%, housewife were (n=3) 2.8%.

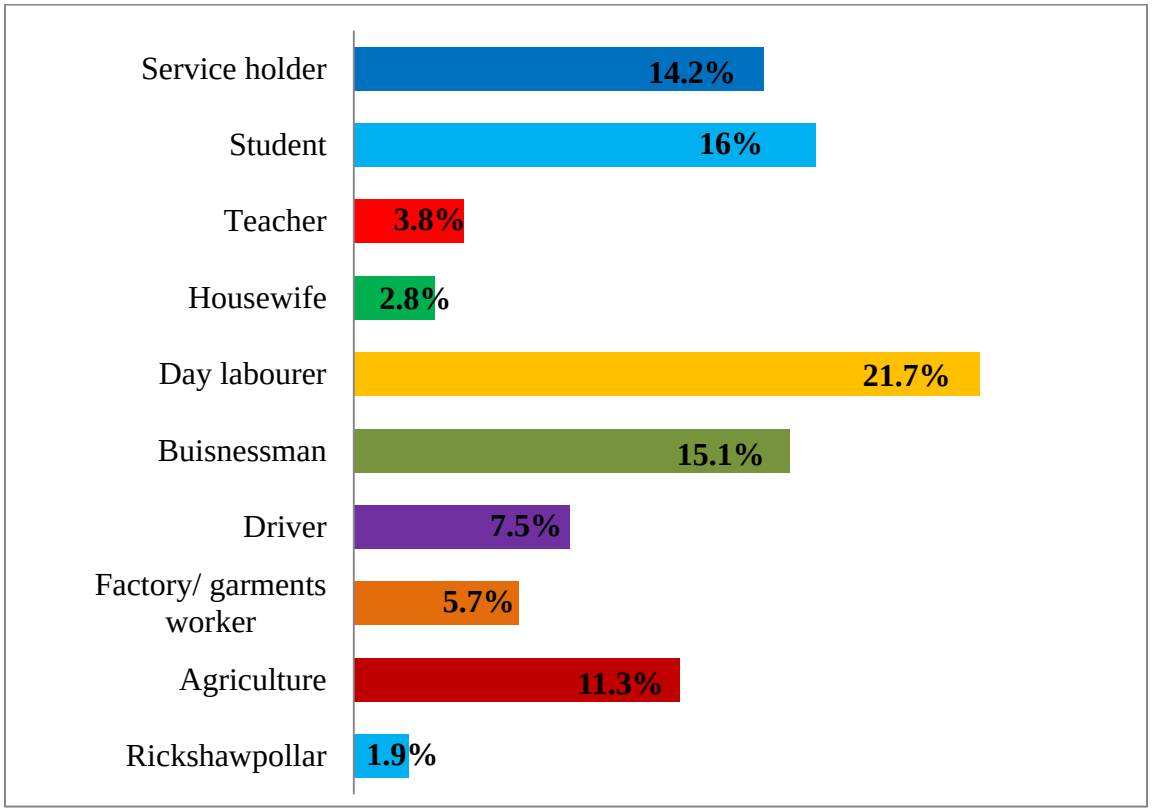


Figure: Occupation of the participants

1.5 Marital status:

Most of the participants were married (n=64) 60.4%, unmarried were (n=41) 38.7%, and one was separated (n=1) 0.9%.

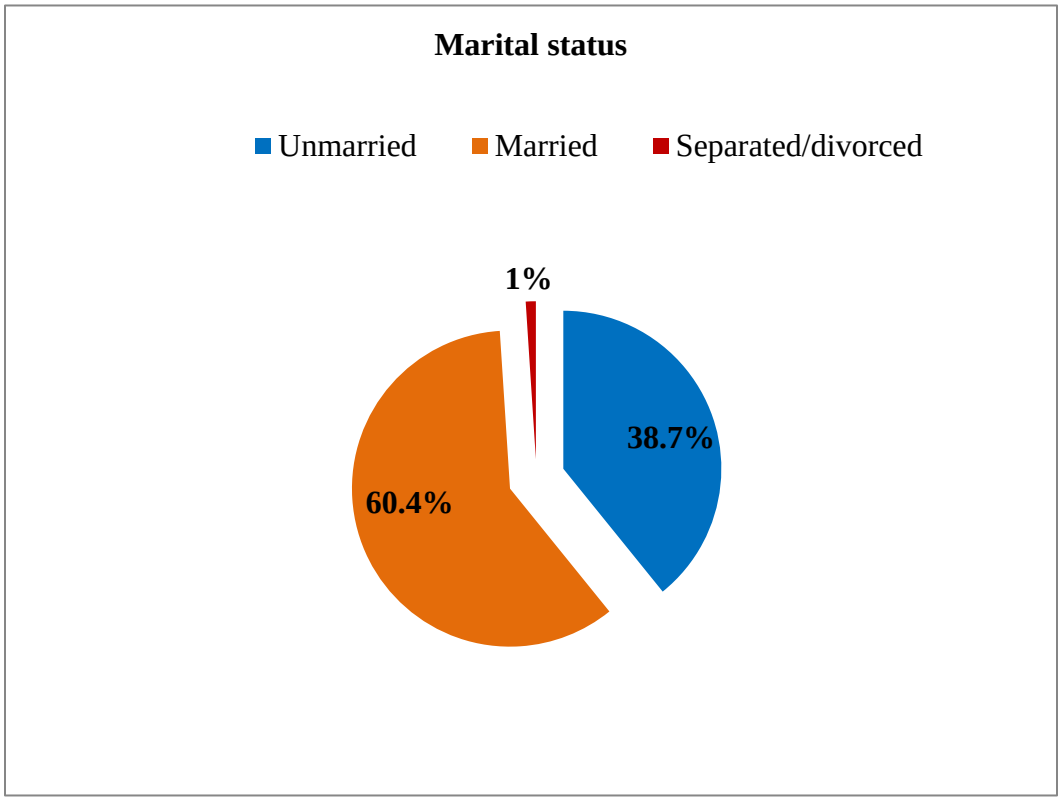


Figure: Marital status

1.6 Living area

The analysis showed that most of the sufferers came from rural area. Among the 106 participants of spinal cord injury rural people were (n=66) 62.3% and urban people were (n=40) 37.7%s.

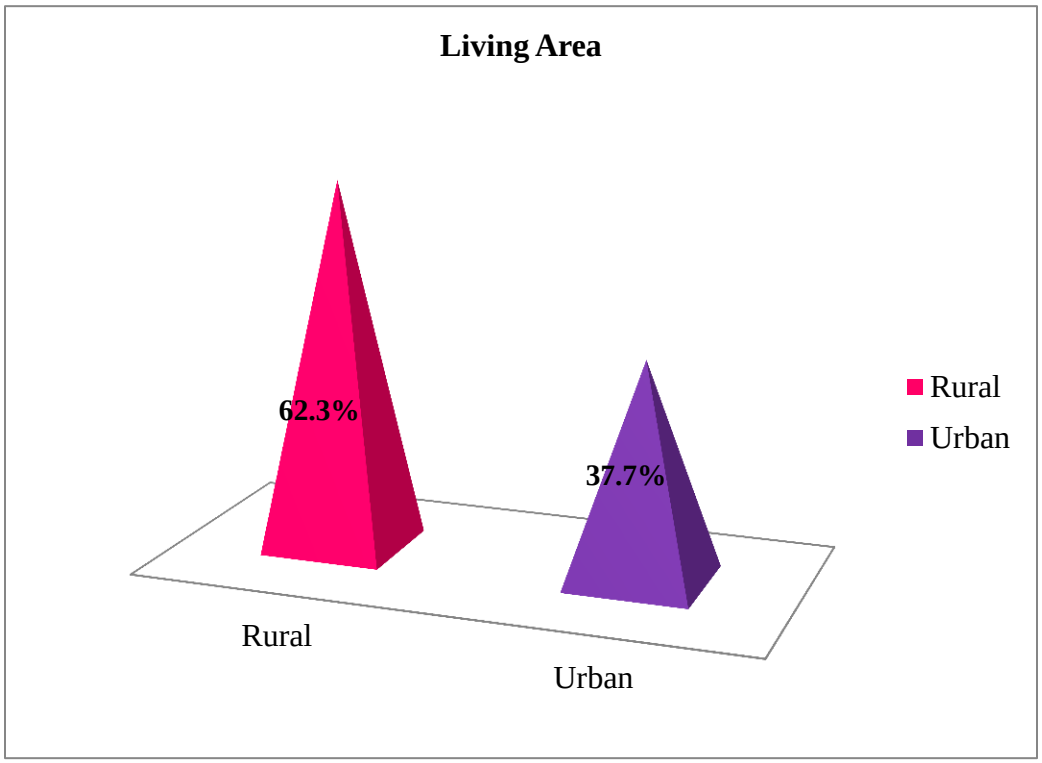


Figure: Living area of the participants.

1.7 Monthly income

Among the respondents most of them have income range is between 0-5000 BDT 35.8% (n= 38), 5100-10000 BDT is 33% (n= 35), 10100-15000 BDT is 11.3% (n=12), 15100-20000 BDT is 15.1% (n=16), 20100-25000 BDT is 0.9% (n=1), 25100-30000 BDT is (n=2) 1.9% and 30100-35000 BDT is 1.9% (n= 2). The mean income was 9530.19. Minimum income is 0, and maximum income is 35000 BDT.

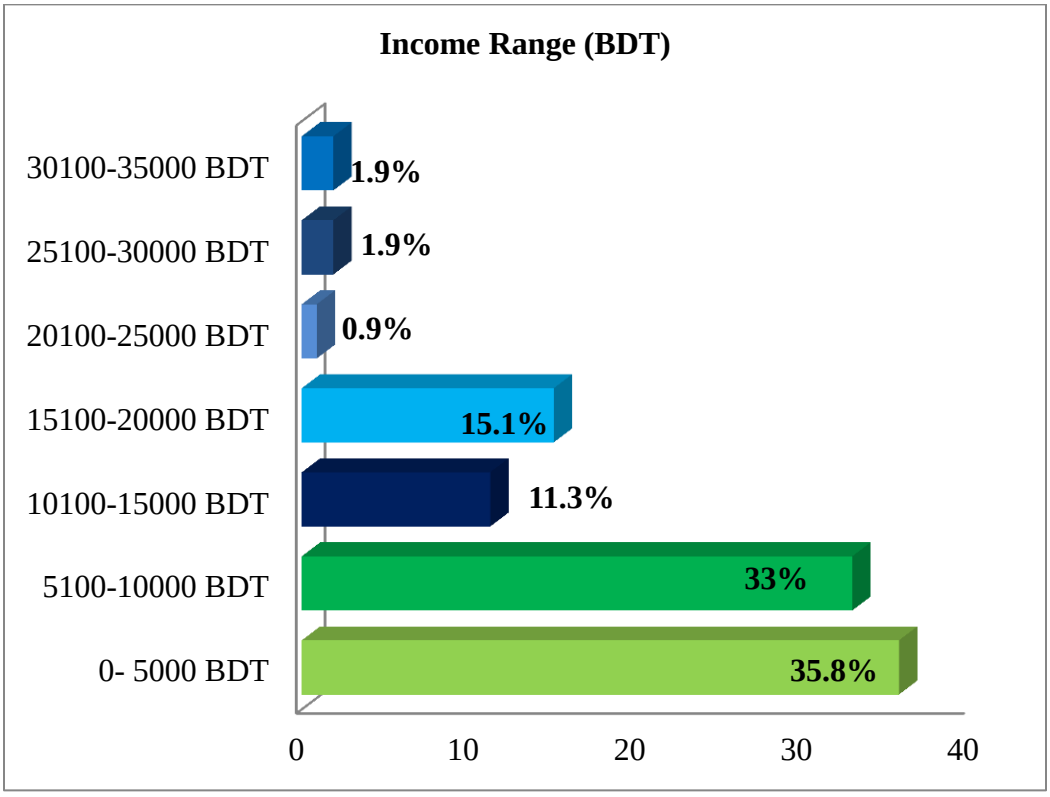


Figure: Income Range of the participants (monthly).

1.8 Comorbid disease

Participants who were diagnosed spinal cord injury and completed the criteria, most of them have none any comorbid condition 76.4% (n=81) and 23.6% (n=25) have any comorbidities. Among them most of the participants suffering from diabetes mellitus 10.4% (n=11), second most common condition they suffer from asthma 10.4% (n=11), and 2.8% (n=3) are suffer from hypertension.

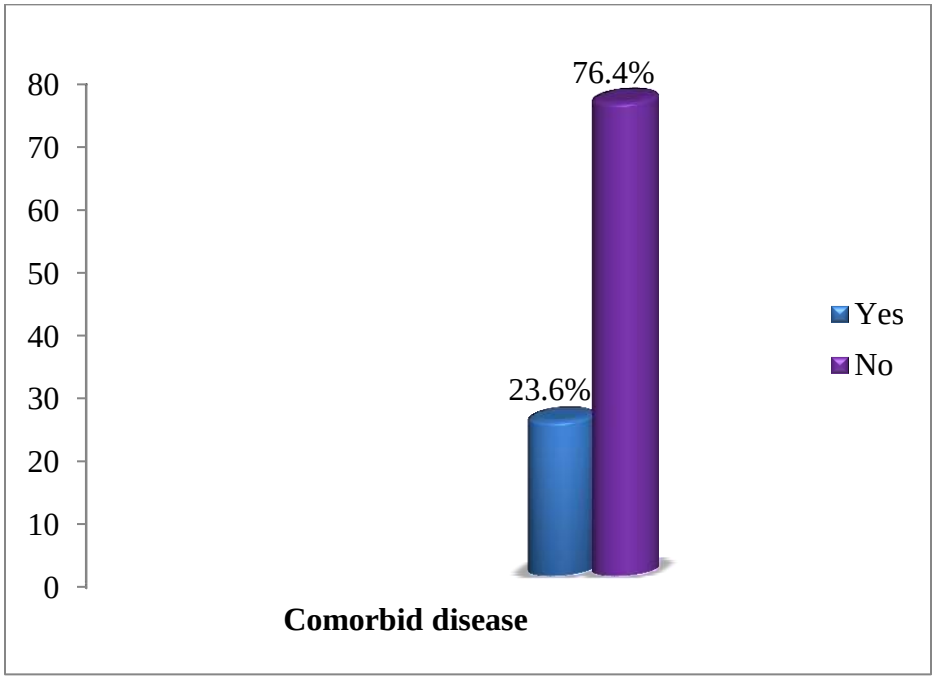


Figure: Participants presence of comorbid disease.

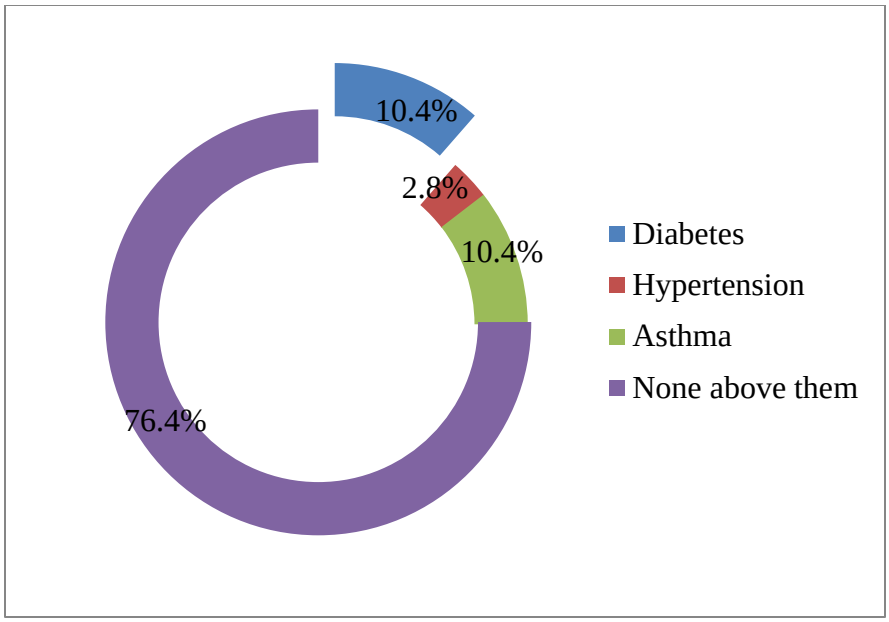


Figure: Comorbid disease of the participants.

Among the 106 participants having any comorbid physical condition most of them has not suffering any co-morbid condition (n=84) 78.4%, suffering from co-morbidities 3 months or less (n=10) 9.3%, from 4-6 months (n=8) 8.2%, from 7-9 months (n=3) 3.1%, from 1 year or more than 1 year (n=1) 1%.

Suffering from co-morbidities (months)	**Number (n)**	**Percentage (%)**
03 or less than 03 months	10	9.3
04-06 months	8	8.2
07-09 months	3	3.1
01 or more than 01 year	1	1
Not suffering any co-morbidities	84	78.4
Total	**106**	**100**

Table: Participants suffering co-morbidities (months).

2. Spinal cord injury related information

2.1 Causes of injury

Cause	Number (n)	Percentage (%)
Road traffic accident	25	23.6
Fall from height	28	26.4
Fall from tree	26	24.5
Fall while carrying heavy load on head or back	19	17.9
Bull attack	2	1.9
Gun shoot injury	2	1.9
Shallow water diving	2	1.9
Spinal deformity (scoliosis)	2	1.9
Total	**106**	**100**

Table: Participants causes of spinal cord injury.

Regarding table based on this study shows that spinal cord injury caused mostly by traumatic cause fall from height 26.4% (n= 28), fall from tree 24.5% (n= 26), rood traffic accident 23.3% (n= 25), fall while carrying heavy load on head or back 17.9% (n= 19), bull attack 1.9% (n= 2), shallow water diving 1.9% (n= 2), gun shoot injury 1.9% (n= 2), and spinal deformity 1.9% (n=2).

2.1.1 Distribution between age range and causes of injury of the participants

Age range of the participants	**Causes of injury (n)%**								**Total (n)%**
	Road traffic accident	Fall from height	Fall from tree	Fall while carrying heavy load on head or back	Bull attack	Gun shoot injury	Shallow water diving	Spinal deformity	
10-20	(10) 9.40	(4) 3.80	(7) 6.61	(3) 2.81	0	0	(1) 0.90	(1) 0.90	(26) 24.50
21-30	(5) 4.71	(12) 11.31	(10) 9.40	(6) 5.73	(1) 0.90	0	0	(1) 0.9	(35) 33
31-40	(1) 0.91	(7) 6.6	(5) 4.92	(5) 4.91	(1) 0.90	0	(1) 0.90	0	(20) 18.91
41-50	(6) 5.70	(2) 1.90	(2) 1.90	(3) 2.82	0	(2) 1.90	0	0	(15) 14.20
51-60	(2) 1.90	(2) 1.90	(1) 0.90	(2) 1.90	0	0	0	0	(7) 6.61
61-70	(1) 0.90	(1) 0.90	(1) 0.91	0	0	0	0	0	(3) 2.81

Table: Distribution between age and causes of injury of the participants.

2.2 Skeletal level of injury

Among the 106 participants thoracic level of injured were (n= 40) 37.7%, on lumber were (n=36) 34%, on cervical were (n=30) 28.3%.

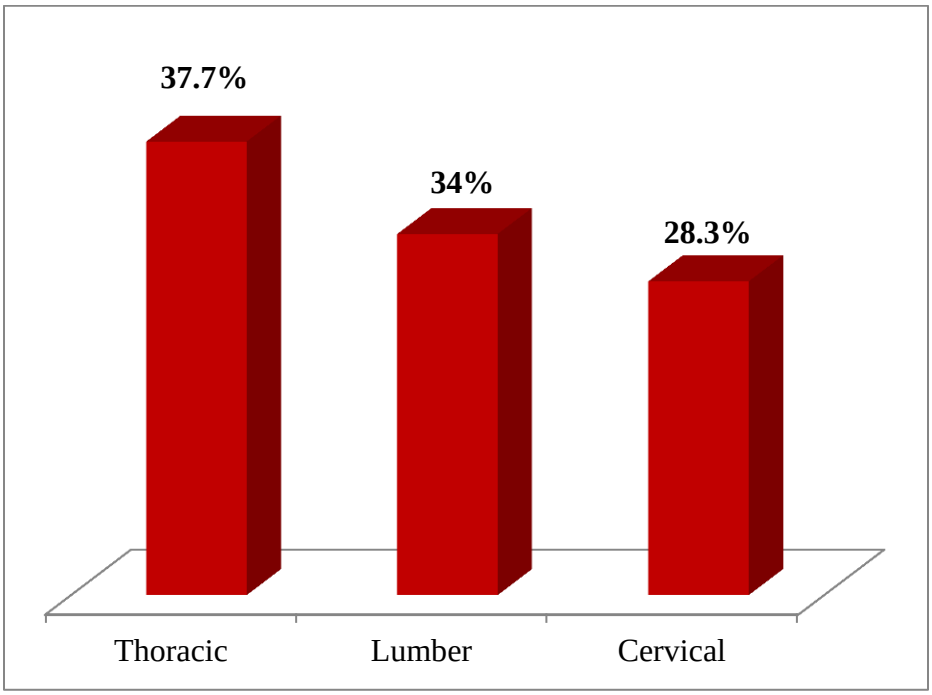


Figure: Participants skeletal level of injury.

2.3 Level of impairment (according to ASIA)

Level of impairment found on this study according to American Spinal Cord Injury Association shown below the table that 48.1% (n= 51) were complete A, incomplete B were 33% (n= 35), incomplete C were 14.2% (n= 15), incomplete D were 2.8% (n= 3), and other 1.9% (n= 2) were diagnosed ASIA impairment scale E.

Level of impairment (According to ASIA scale)	**Number (n)**	**Percentage (%)**
Complete A	51	48.1
Incomplete B	35	33
Incomplete C	15	14.2
Incomplete D	3	2.8
Normal E	2	1.9
Total	**106**	**100**

Table: Participants level of impairment (ASIA).

2.3.1 Distribution between causes of injury and level of impairment of the participants:

Causes of injury	**Level of impairment (according to ASIA) (%)**				
	Complete A	**Incomplete B**	**Incomplete C**	**Incomplete D**	**Normal E**
Road traffic accident	13.2	5.7	1.9	2.8	0
Fall from height	10.4	12.3	3.8	0	0
Fall from tree	15.1	5.7	3.8	0	0
Fall while carrying heavy load on head or back	8.5	6.6	1.9	0	1.9
Bull attack	0	0.9	0.9	0	0
Gun shoot injury	0	0.9		0	
Shallow water diving	0	0.9	0.9	0	0
Spinal deformity	0.9	0	0	0	0

Table: Distribution between cause of injury and level of impairment the participants.

2.3.2 Association between causes of injury and level of impairment of the participants:

Causes and level of impairment of the participants	Chi-square	P-value
	54.997	0.007

Table: Association between cause and level of impairment of the participants.

The analysis based on this study represents that chi-square value between causes of injury and level of impairment of the participants was 54.997 and the P-value is 0.007 (<0.05) it is significant and there have association between causes of injury and neurological level of the participants.

2.3.3 Distribution between level of impairment and current pain because of SCI

Level of impairment (ASIA)	**Pain because of SCI**		**Total (n) %**
	Yes(n) %	**No (n) %**	
Complete A	40(37.75)	11(10.43)	51 (48.18)
Incomplete B	31(29.20)	4(3.80)	35 (33)
Incomplete C	6(5.75)	9(8.52)	15(14.27)
Incomplete D	2(1.93)	1(0.90)	3(2.83)
Normal E	0	2(1.90)	2(1.90)

Table: Distribution between level of impairment and presence of current pain because of SCI.

2.3.4 Association between level of impairment and presence of current pain because of SCI.

Level of impairment and presence of current pain because of SCI.	Chi-square	P-value
	19.415	0.001

Table: Association between level of impairment and presence of current pain because of SCI.

According to the result of this study the table represents that chi square value between level of impairment (according to ASIA) and current pain level is 19.415 and the P-value is 0.001(<0.05), which indicates the association between neurological level of injury and presence of pain. The result is significant.

2.4 Neurological level of injury

On dermatome and myotomal distribution of each side of the body among the respondents' 64.2% (n= 68) have sensory impairment and 35.8% (n= 38) have motor impairment according to International Standards for Neurological Classification of Spinal Cord Injury (ISNCSCI).

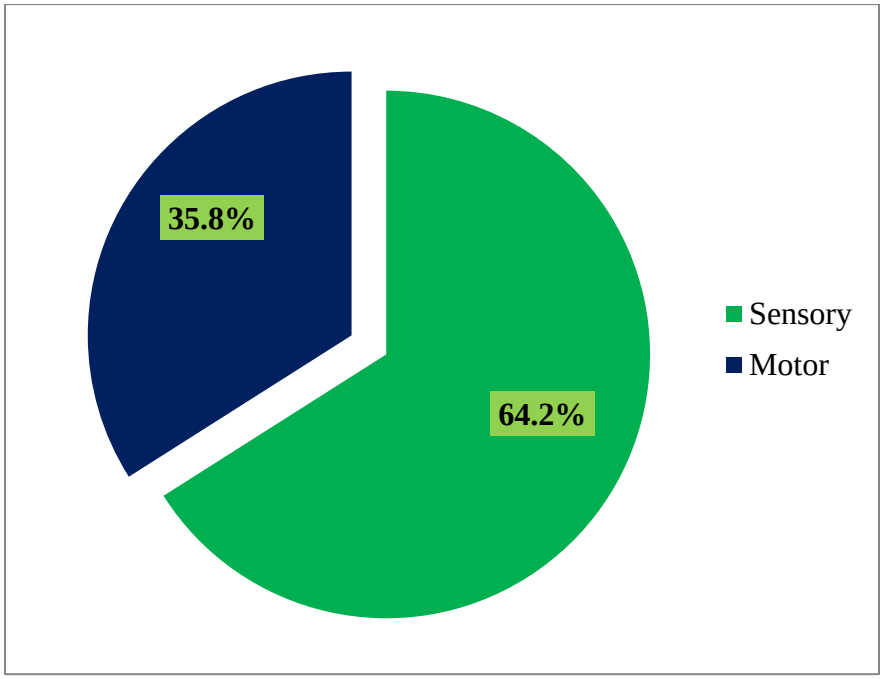


Figure: Neurological level of injury

3 Pain related information

3.1 Current pain because of SCI

Most of the participants 74.5% (n=79) reported about current pain and 25.5% (n=29) have no pain.

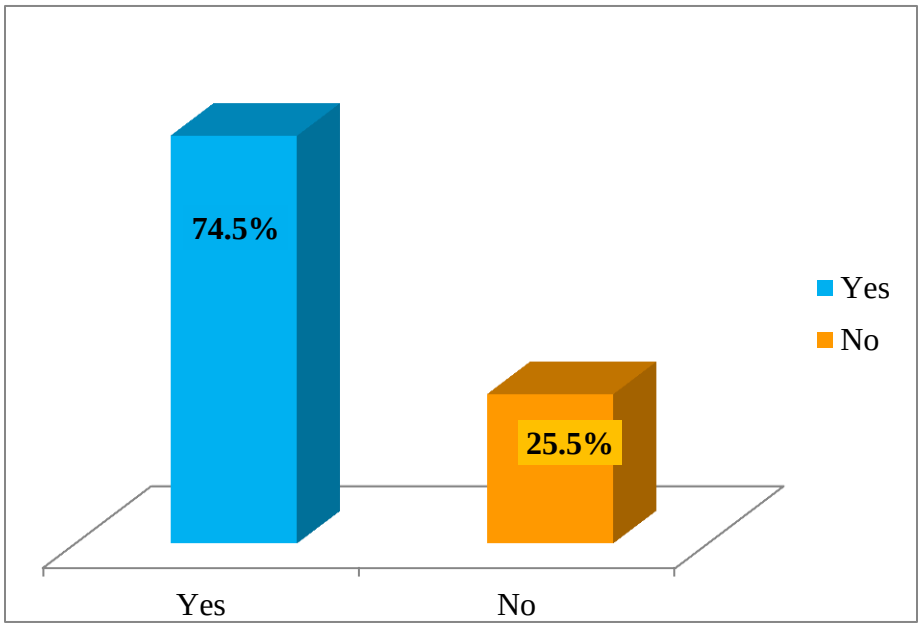


Figure: Participants presence of current pain.

3.1.1 Association between causes of injury and current pain because of SCI

Causes of injury	Current pain because of SCI (%)		Total %	Chi-square	P-value
	Yes	No			
Road traffic accident	21.70	1.90	23.60		
Fall from height	19.80	6.60	26.40		
Fall from tree	16	8.50	24.50		
Fall while carrying heavy load on head or back	13.20	4.70	17.90	18.25	0.019
Bull attack	0.90	0.90	1.90		
Gun shoot injury	0.90	0.90	1.90		
Shallow water diving		1.90	1.90		
Spinal deformity	1.90				

Table: Association between causes of injury and presence of current pain because of SCI.

Regarding the table based on analysis shows that chi-square value between causes of injury and presence of current pain was 18.25 and the P-value was 0.019(<0.05) which is significant. So the result was significant it indicates that there has association between causes of injury and current pain because of SCI.

3.2 Pain persisted before injury

Majority of the patient have no pain before injury 89.6% (n=95), and 10.4% (n= 11) have pain.

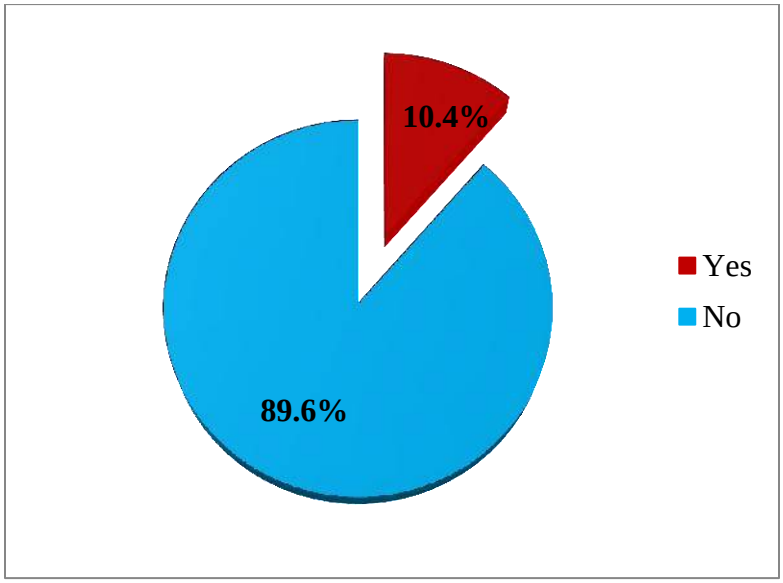


Figure: Participants persistence of pain before injury.

3.2.1 Association between causes of injury and persistence of pain before SCI

Causes of injury and pain	Chi-Square	P-value
	18.716	0.016

Table: Association between causes of injury and persistence of pain before SCI.

The result based on the analysis of this study shows that chi-square value between causes of injury and persistence of pain before injury was 18.716 and the P-value is 0.016 (<0.05) which indicates that causes of injury is associated with persistence of pain before SCI.

1.3 Surgery because of SCI

The table shows that majority of participants 66% (n=70) has had surgery because of SCI and 34% (n=36) had no surgery.

Surgery because of SCI	Number (n)	Percentage (%)
Yes	70	66
No	36	34
Total	**106**	**100**

Table: Participants having surgery because of SCI.

3.3.1 Association between surgery and pain

Surgery and pain because of SCI	Chi-Square	P-value
	0.742	0.389

Table: Association between surgery and pain.

The chi square value between surgery and pain because of spinal cord injury showing on the table found on this study is 0.742 and the P-value is 0.389 (>0.05) which is not significant. It indicates that there is no association between surgery and pain because of SCI.

1.4 Type of surgery

Operation type	Number (n)	Percentage (%)
Spinal fixation	58	54.70
Pressure ulcer	9	8.51
Spinal deformity correction	9	8.51
Amputation	1	0.91
Traction	1	0.91
Injury related deformity correction On normal limb	1	0.91
No operation done	27	25.52
Total	**106**	**100**

Table: Participants type of surgery

Regarding the table according to the finding of this study shows that 54.70% (n=58) has undergo spinal fixation, pressure ulcer 8.51% (n=9), spinal deformity correction 8.51% (n=9), and 0.91% (n= 1) amputation, traction and deformity correction on normal limb respectively, (n=27) 25.52% had no operation done.

1.5 Surgery before SCI

Before spinal cord injury 95.3% (n=101) has no surgery and 4.7% (n=5) has surgery.

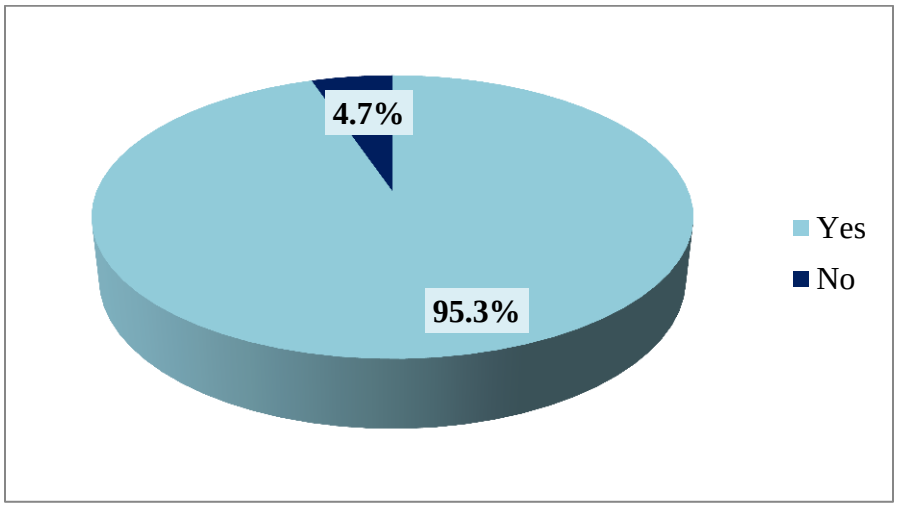


Figure: Participants surgery before SCI.

1.6 Site of surgery

Surgery site	Number (n)	Percentage (%)
Cervical	10	9.4
Thoracic	18	17
Lumber	27	25.5
Buttock area	9	8.5
Whole spine	1	0.9
Abdominal surgery	1	0.9
Amputed limb	1	0.9
Normal limb	1	0.9
No operation	38	35.8
Total	**106**	**100**

Table: Participants surgery site.

Among the participants 25.5% (n=27) on lumber area, 17% (n= 18) thoracic area, 9.4% (n= 10) on cervical area, 8.5% (n=9) on buttock area, and 0.9% (n=1) on whole spine, abdomen, amputation and normal injured limb respectively, 35.8% (n=38) had no operation done.

1.7 Pain on surgical site

71.7% (n=76) patients have no pain on surgical site and 28.3% (n=30) have pain on that site.

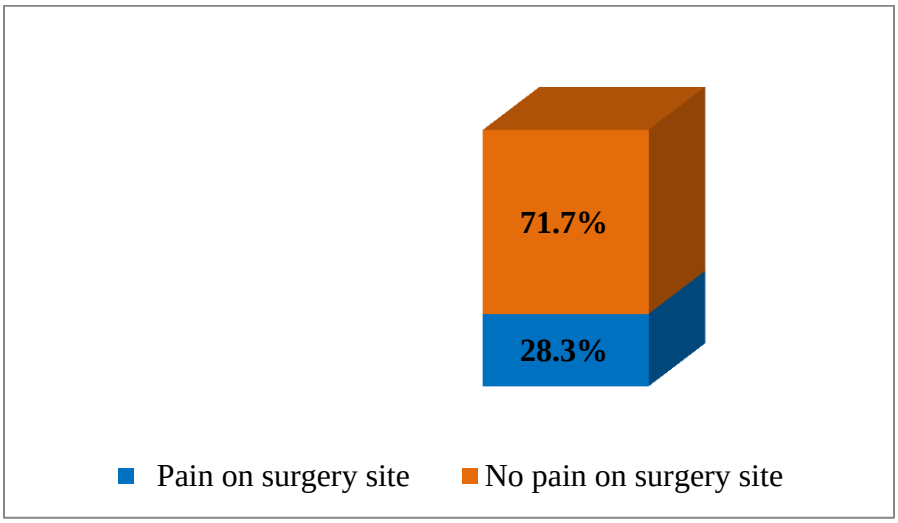


Figure: Participants presence of pain on surgery site.

3.8 Site of pain of the participants

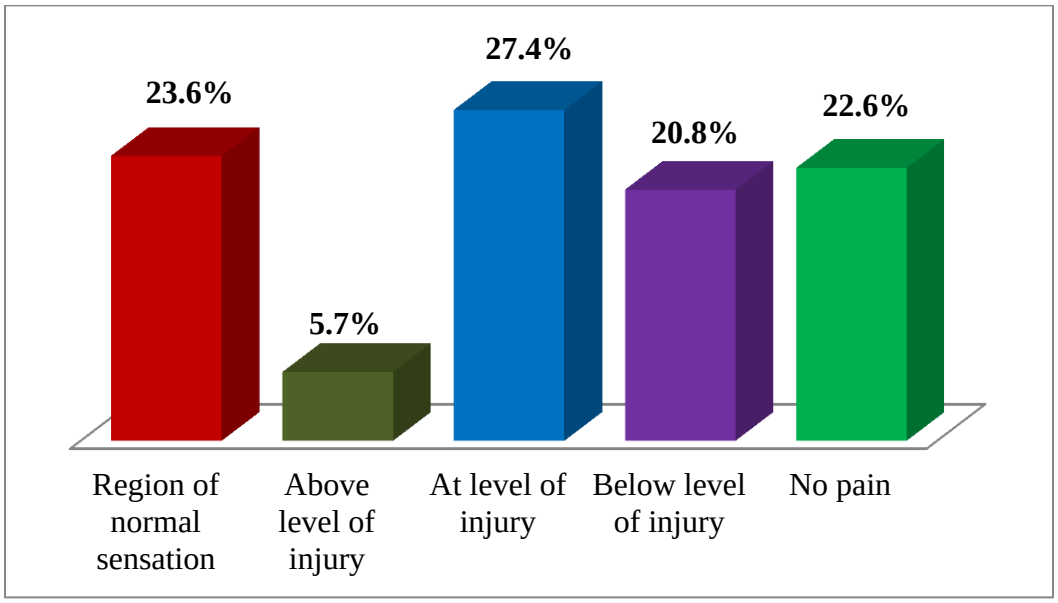


Figure: Participants site of pain

The chart based on the participants site of pain of this study shows that among them 27.4% (n=29) felt pain at the level of injury, 23.6% (n=25) felt pain on region of normal sensation, 20.8% (n=22) felt pain on below the level of injury, 5.7% (n=6) have pain on above level of injury, and 22.6% (n=24) have no pain.

3.8.1 Association between type of surgery and site of pain

Types of surgery	Site of pain (n)%					Total (n)%	Chi-Square	P-Value
	Region of preserved sensation	Above level of injury	At level of injury	Below level of injury	No pain			
Spinal fixation	10 (9.4)	2 (1.9)	21 (19.8)	12 (11.3)	13 (12.3)	58 (54.7)	52.024	0.001
Pressure ulcer	2 (1.9)	0(0)	2 (1.9)	3 (2.8)	2 (1.9)	9 (8.5)		
Spinal deformity correction	4 (3.8)	3 (2.8)	2 (1.9)	0 (0)	0 (0)	9 (8.5)		
Amputation	0(0)	0(0)	0(0)	1(0.9)	0(0)	1(0.9)		
Traction	0(0)	0(0)	1(0.9)	0(0)	0(0)	1(0.9)		
Injury related deformity correction	0(0)	1(0.9)	0(0)	0(0)	0(0)	1(0.9)		
No operation done.	9(8.5)	0(0)	3(2.8)	6(5.7)	9(8.5)	27 (25.5)		

Table: Association between type of surgery and site of pain.

Regarding the table shows the association between type of surgery and site of pain of the participants on this study, the chi-square value is 52.024 and the P-value is 0.001(<0.05) which is significant and there have association between types of operation and site of pain.

3.9 Anatomical location of pain

Considering pain in different parts of the body 20.8% (n=22) complains of pain on neck and shoulder region, 18.9% (n=20) back at level of injury, 17.9% (n=19) back below level of injury, thigh pain 6.6% (n=7), arms and hand pain 6.6% (n=7), back above level of injury 3.8% (n= 4), 2.8% (n= 3) have chest pain and 22.6% (n=24) felt no pain.

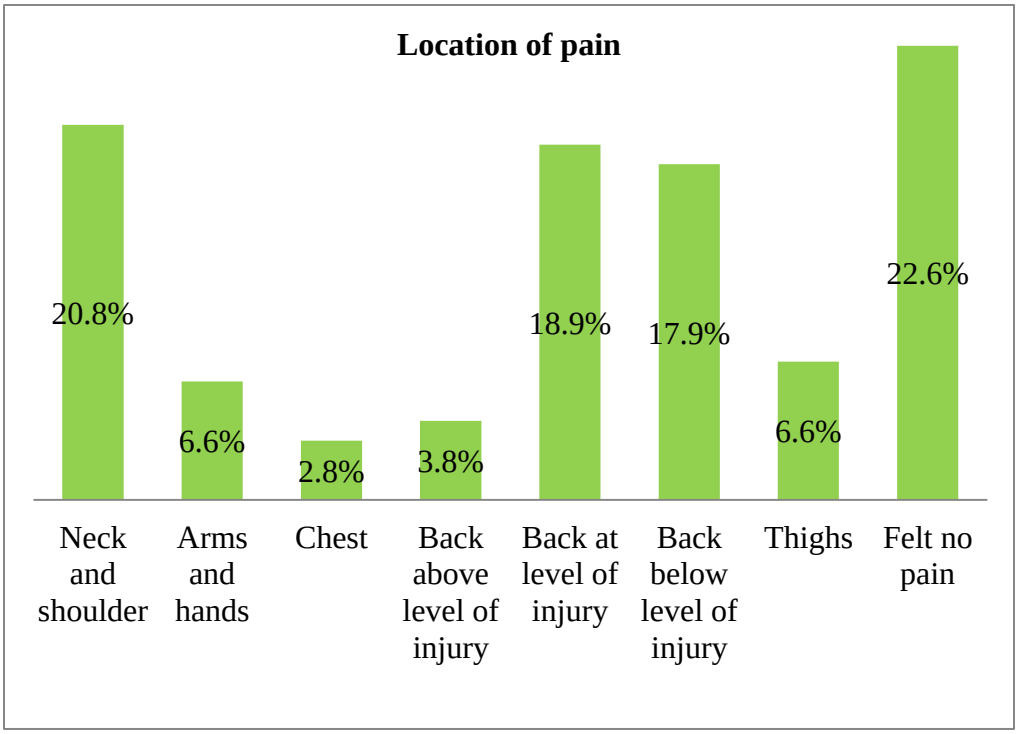


Figure Pain location of the participants.

3.9.1 Distribution between anatomical location of pain and skeletal level of injury

Anatomical location of pain	**Skeletal level of injury (n)%**			**Total (n)%**
	Cervical	**Thoracic**	**Lumber**	
Neck and shoulder	(15) 14.2	(5) 4.7	(2) 1.9	(22) 20.8
Arms and hands	(4) 3.8	(2) 1.9	(1) 0.9	(7) 6.6
Chest	0	(2) 1.9	(1) 0.9	(3) 2.8
Back above level of injury	0	0	(4) 3.8	3.8
Back at level of injury	0	(11) 10.4	(9) 8.5	(20) 18.9
Back below level of injury	(2) 1.9	(7) 6.6	(10) 9.4	(20) 17.9
Thighs	(1) 0.9	(4) 3.8	(2) 1.9	(7) 6.6
Felt no pain	(8) 7.5	(9) 8.5	(7) 6.6	(24) 22.6

Table: Distribution between anatomical location and skeletal level of injury.

3.10 Aggravating factors

Out of 106 participants 23.6% (n=25) pain is aggravated by overexertion, 18.9% (n=20) on activity, 21.7% (n=23) abnormal positioning, 3.8% (n=4) stress and compression respectively, 4.7% (n=5) weather change, and 0.9% (n=1) on spasticity, 22.6% (n=24) have no pain so doesn't aggravate any of the factors.

Aggravating factors	**Number (n)**	**Percentage (%)**
Activity	20	18.9
Over exertion	25	23.6
Abnormal positioning	23	21.7
Compression	4	3.8
Stress	4	3.8
Weather change	5	4.7
Spasticity	1	0.9
Doesn't aggravated by any of these	24	22.6
Total	**106**	**100%**

Table: Aggravating factors of the participants.

3.11 Easing factors

The table shows that rest eases the pain 28.9% (n= 28), position or posture change 18.6% (n=18), medications 10.3% (n=10), 9.3% (n= 9) activity pacing, 5.2% (n=5) on distraction, 4.1% (n=4) on exercise, 23.7% (n=23) have no pain so they have no ease factors.

Easing factors	Number (n)	Percentage (%)
Rest	34	32.1
Position/Posture change	18	17
Medications	10	9.4
Activity pacing	10	9.4
Distraction	5	4.7
Exercise	5	4.7
None above	24	22.6
Total	**106**	**100**

Table: Easing factors of the participants.

3.12 Severity of pain on Numeric pain rating scale (NPRS)

Pain severity on numeric pain rating scale shows that most of the participants have moderate (4-6) pain (n=53) 49.9%, mild (1-3) pain found (n=24) 22.6%, Severe (7-10) pain found (n=5) 4.7%, and no pain (0) found (n=24) 22.6%.

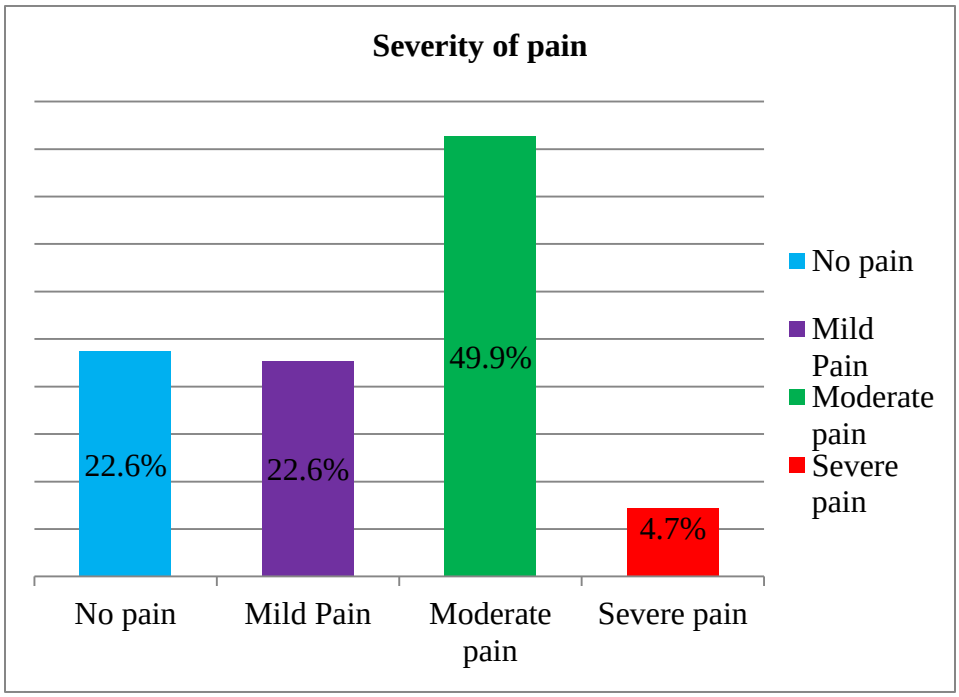


Figure: Severity of pain on (NPRS).

3.12.1 Association between anatomical location of pain and severity of pain

Anatomical location of pain	Severity of pain on Numeric Pain Rating Scale (NPRS)				Total (n)	Chi-square	P-value
	Mild (1-3)	Moderate (4-6)	Severe (7-10)	no pain (0)			
Neck and Shoulder	9	12	1	0	22		
Arms and hands	0	6	1	0	7		
Chest	1	2	0	0	3		
Back above level of injury	2	2	0	0	4	111.179	0.000
Back at level of injury	7	11	2	0	20		
Back below level of injury	4	14	1	0	19		
Thighs	1	5	1	0	7		
Felt no pain	0	0	0	24	24		

Table: Association between anatomical location of pain and severity of pain.

The table represents the association between anatomical location of pain and severity of pain on Numeric Pain Rating Scale (NPRS) based on this study, the chi-square value is 111.179 and the P-value is 0.000(<0.05) it is significant. It indicates that there has association between anatomical location of pain and severity of pain.

3.13 Quality of pain

The quality of pain varies from person to person. Among the participants most of them describes different quality of pain 11.3% (n=12) burning, radiating, and throbbing pain individually, 9.4% (n=10) sharp, shooting, pricking and stinging pain separately, 6.6% (n=7) stabbing pain, 7.5% (n=8), 3.8% (n=4) pressing pain, 4.7% (n=5) pulsating pain, 1.9% (n=2) crumping pain and 0.9% (n=1) aching, dull and exhausting pain separately, 22.6% (n=24) have no pain so, they need not any pain quality description.

Pain Quality	Number (n)	Percentage (%)
Burning	12	11.3
Stabbing	8	7.5
Pricking	7	6.6
Aching	1	0.9
Sharp	7	6.6
Shooting	7	6.6
Stinging	7	6.6
Pulsating	5	4.7
Radiating	10	9.4
Pressing	4	3.8
Throbbing	10	9.4
Dull	1	0.9
Exhausting	1	0.9
Crumping	2	1.9
No pain	24	22.6
Total	**106**	**100**

Table: Pain quality of the participants.

3.14 24-hour behavior of pain

Out of 106 patients most of them have intermittent pain 54.7% (n=58), and continuous pain 22.6% (n=24), 22.6% (n=24) have no pain.

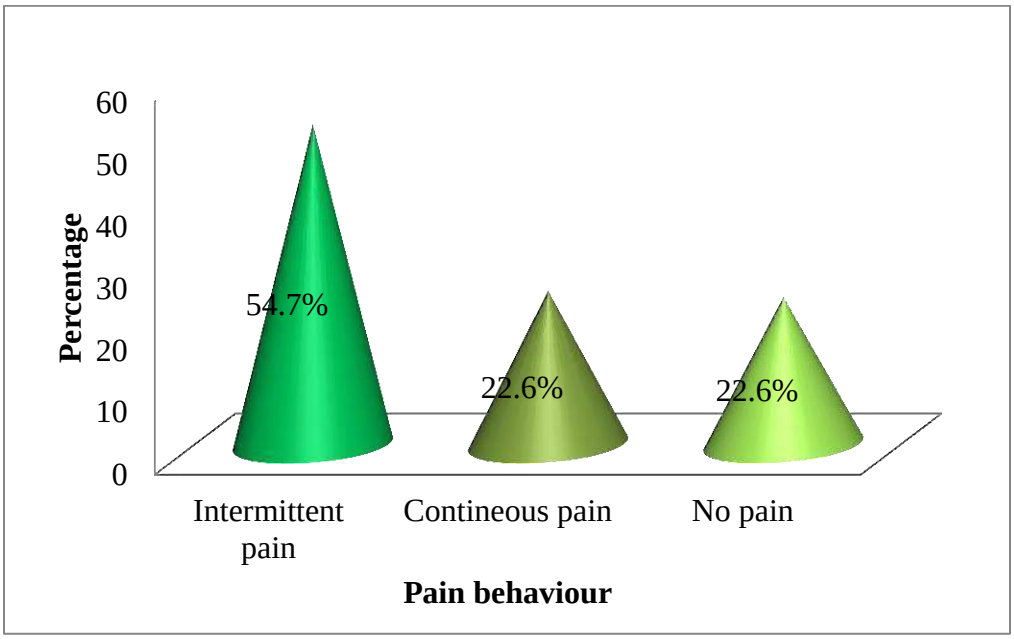


Figure: Pain behavior of the participants.

4 Pain treatment related information

4.1 Treatment used in managing pain

Following the table based on this study shows that, among the participants 27.4% (n= 29) receive exercise for managing pain, 16% (n=17) soft tissue mobilization, 14.2% (n=15) medication, 7.5% (n= 8) joint mobilization and manipulation, 5.7% (n=6) despite of having they receive no treatment for managing pain, 4.7% (n=5) cold compression, 0.9% (n=1) trigger point injection, and 0.9% (n=1) using lumber corset for managing pain, 22.6% (n=24) have no pain ever that's why they receive no treatment for pain.

Treatment	Number (n)	Percentage (%)
No treatment	6	5.7
Soft tissue mobilization	17	16
Cold compression	5	4.7
Exercise	29	27.4
Trigger point injection	1	0.9
Joint mobilization and manipulation	8	7.5
Medication	15	14.2
Orthotic device (Lumber corset)	1	0.9
No pain ever	24	22.6
Total	**106**	**100**

Table: Participants received treatment for pain management.

4.2 Rate the perceived effectiveness of treatment

Participants express their effectiveness according to their psychological nature of pain experience. Most of the patients 35.8% (n=38) pain treatment made slightly better, 21.7% (n=23) had no pain after treatment, 15.1% (n=16) made pain considerably better, 2.8% (n=3) made pain worse, 1.9% (n=2) made pain disappear, 22.6% (n=24) have no pain after spinal cord injury.

Effectiveness of treatment	**Number (n)**	**Percentage (%)**
Made pain worse	3	2.8
Had no pain after treatment	23	21.7
Made pain slightly better	38	35.8
Made pain considerably better	16	15.1
Made pain disappear	2	1.9
None of these	24	22.6
Total	**106**	**100**

Table: Perceived effectiveness of treatment of the participants.

CHAPTER V DISCUSSION

This study was conducted to investigate the musculoskeletal pain and its management among the spinal cord injury patients. For this reason Centre for the Rehabilitation of the Paralyzed (CRP) which is the largest spinal cord injury rehabilitation Centre for the patient with spinal cord injury in Bangladesh was selected to draw the sample. Spinal cord injury is a major insult to the spinal cord of an individual. It leads to severe impairment for the person which can bring down an individual's activity limitation and participation restriction. In this study the total 106 spinal cord injured patients were agreed to give information.

In this study the participants were injured at different age maximum injured on this study (n=31) was between 21-30 years age range and the percentage was 32%. In between 10-20 years 24.7% (n=24), 31-40 years 19.6% (n=19), 41-50 years 12.4% (n=12), 51-60 years 7.2% (n=7), 61-70 years 4.1% (n=4). And the mean age was 31.45 years. Among them male (88.7%, n= 94) and female (11.3%, n=12).

A study found in Zimbabwe that the age range of the participants was 24 - 69 years with a median age of 32 years (Fidelis et al., 2016). Another study found in Switzerland shows that participants were mostly male (72%), with a median age of 52 years (Muller et al., 2017). Lovas (2016) found that Female, (n= 6) 15%, Male (n=34) 85% and mean age was 46 years.

On this study I found that educational background of the spinal cord injured patients was (n=23) 21.7% have no formal education. Most of them were completed their primary education (n=33) 31.1%, secondary were completed (n=23) 21.7%, higher secondary were (n=15) 14.2%, bachelor degree were (n=8) 7.5%, masters completed were (n= 4) 3.8%.

A study in Taiwan showed that less than high school completed 6.3%, High school graduated 48.3%, some college or college graduated 45.5% on their study (Chang et al., 2016). In Canadian study 43% (n=62) participants were complete education from high school, 49% (n=71) complete from college education or under graduation and 8% (n=12) were graduate (Noonan et al., 2010).

On this study I found that most of the participants were day laborer (n=23) 21.7%, students were (n=17) 16%, businessman were (n=16) 15.1%, service holder were (n=15) 14.2%, agriculture were (n=12) 11.3%, driver were (n=8) 7.5%, factory or garments worker were (n=6) 5.7%, teacher were (n=4) 3.8%, Rickshawpollar were (n=2) 1.9%, housewife were (n=3) 2.8%.

Another study said that in Bangladesh agriculture and other laborers was 50.5%, small job 20.5%, housewife 10.3%, student 9.3%, petty business 9.3% (Islam et al., 2011).

The occupations of patients in China study, included retired (27.3%), peasants (32.2%), workers (26.6%), drivers (4.9%), teachers (4.2%) and students (4.2%) (Niga et al., 2012).

Most of the participants on this study were married 64 (60.4%), unmarried were 41 (38.7%), and one was separated 1 (0.9%).

Chang (2016) found that married 38.1%, and unmarried 61.9%. Islam et al found in 2011 that married 65.4%, unmarried 32.7%, widowed 1.9%.

The analysis on this study showed that most of the sufferers came from rural area (n=66) 62.3% and urban people were (n=40) 37.7%.

Islam (2011), found that patients came from urban area was 8.4% and rural area was 91.6%. Rahman (2018) showed on their study that 61.1% injured from rural area and 38.9% from urban area.

On this study I found that the participants have different types of comorbid health condition. Most of them have none any comorbidities 76.4% (n=81) and 23.4% (n=25) having comorbid condition. Among those participants I found that suffering from diabetes mellitus 10.4% (n=11), second most common condition they suffer from asthma 10.4% (n=11), and 2.8 % (n=3) are suffer from hypertension. When comparing those with SCI over 65 years of age several conditions show higher rates among those with SCI, hypertension (61%); atrial fibrillation (9%); arthritis (53%); osteoporosis (16%); depression (21%); and diabetes (32%) (Denise et al., 2015).

A Canadian study shows that rate of hypertension in younger age group is 4% and older age is 15%, Asthma in younger and elder age group is 5% and 2%, Diabetes

mellitus in younger and older age group is 2% and 4% respectively (Krassioukov et al., 2003).

Cause of spinal cord injury varies from person to person similarly from region to region. On this study I found different causes of injured patients most of them have traumatic cause. Fall from height 26.4% (n= 28), fall from tree 24.5% (n= 26), rood traffic accident 23.3% (n= 25), fall while carrying heavy load on head or back 17.9% (n= 19), bull attack 1.9% (n= 2), shallow water diving 1.9% (n= 2), gun shoot injury 1.9% (n= 2), and spinal deformity 1.9% (n=2).

Rahman (2018) found on their study that Fall from height 537 (45.8%); Road traffic accident 288 (24.7%); Fall heavy object overhead 112 (9.6%); Fall heavy object over the back 106 (9.0%); Spinal tuberculosis 38 (3.2%); Bull attack 24 (2.0%); Physical assault 23 (2.0%); Scarf injury 13 (1.1%); Shallow water diving 11 (0.9%); Transverse myelitis 11 (0.9%); Bullet injury 8 (0.7%); Sports injury 1 (0.1%).

Chen (2013) suggested that road traffic accident responsible for about 31.47% spinal cord injured in USA; fall 25.29%; gun shoot injury 10.42%; motor bike accident 6.8%; diving 4.67%; sports 0.45%.

Level of injury differs from person to person and it depends on causes and force of injury. In this study the skeletal level of injury found thoracic level of injured were 40 (37.7%), on lumber were 36 (34%), on cervical were 30 (28.3%). In 2013 a study in China shows that injury in cervical spine is 46.3%, thoracic 20.4% and lumbosacral 33.3% (Wang et al., 2013). An Ireland study shows that in cervical spine (C1 – C4) and neurological level ASIA A, B, C is about (n=16) 26.2%; (C5 – C8) ASIA A, B, C (n=8) 13.1%; in thoracic and lumber spine (T1 – S5) ASIA A, B, C is about (n= 16) 26.2% (Smith et al., 2019).

During admitted in CRP the assessment was followed according to the American Spinal Cord Injury Association, according to American Spinal cord Injury Association level of impairment of the participants 48.1% (n= 51) were complete A, incomplete B were 33% (n= 35), incomplete C were 14.2% (n= 15), incomplete D were 2.8% (n= 3), and other 1.9% (n= 2) were diagnosed ASIA impairment scale E. And according to dermatome and myotomal distribution of the body sensory and motor level was 64.2% (n= 68) have sensory impairment and 35.8% (n= 38) have motor impairment

according to International Standards for Neurological Classification of Spinal Cord Injury (ISNCSCI).

Another study found that complete A (n=195) 25.6%; incomplete B (n=90) 11.8%; incomplete C (n=208) 27.3%; incomplete D (n=268) 35.2% (Wang et al 2013).

A study in Norway demonstrate on their findings that among 165 participants tetraplegia 60 and paraplegia 105. Neurological level according to ASIA classification A (n=113); B (n=13); C (n= 11); D (n= 19); E (n=5) (Jakimovska et al 2018).

Pain is the most common complication in almost every individual. After spinal cord injury it is not uncommon. In each stage of injury patients experience pain. On this study I found many participants having pain. I found that 74.5% (n=79) reported about current pain and 25.5% (n=29) have no pain.

The similarities found in another study they shows that in paraplegia (n=78) 42% have no pain, in tetraplegia (n=60) 32% have no pain, and people with paraplegia having pain is about (n=92) 45% nociceptive pain and (n=119) 50% have neuropathic pain. In tetraplegic patients nociceptive and neuropathic pain accounts for (n=76) 37% and (n=79) 34% respectively (Burke et al, 2017).

On this study participant develop their pain after injury. I found about 89.6% (n=95), have no pain before injury and 10.4% (n= 11) have pain.

A study in 2012 found that about 60-80% patients with spinal cord injury experience pain after spinal cord injury among them one third develop severe pain (Masri et al., 2012).

Due to major injury to the spine sometimes it requires surgical intervention to correct. This study it was found that 66% (n=70) has had surgery because of SCI and 34% (n=36) had no surgery.

Among the participants having surgery different types of surgical intervention had done 54.7% (n=58) has undergo spinal fixation, pressure ulcer 8.5% (n=9), spinal deformity correction 8.5% (n=9), and 0.9% (n= 1) amputation, traction and deformity correction on normal limb respectively, (n=27) 25.5% had no operation done.

Another study investigate that among the 101 participants (n=50) have done surgery because of spinal cord injury (Patchell et al, 2005).

A study in China describe on their result that 84% (n=267) have done surgery due to SCI and 15% (n=50) have no surgery due to SCI (Dawu et al, 2019).

A systematic review in 2019 shows that on cervical spine most of the participants done spinal stabilization surgery, comparatively less in thoracic and lumber spine (Ahern et al, 2019).

After injury surgery is done in different body part on this study it is showed that, 25.5% (n=27) on lumber area, 17% (n= 18) thoracic area, 9.4% (n= 10) on cervical area, 8.5% (n=9) on buttock area, and 0.9% (n=1) on whole spine, abdomen, amputation and normal injured limb respectively.

Another study investigate that out of 50 participants on cervical spine n=8; on thoracic spine (T1-T6) 20, and (T7-T12) 22 (Patchell et al, 2005). Another study investigate their findings that among 69 participants on cervical spine surgery about (n=31) 45%, on thoracic spine (n=14) 20%, on lumber spine (n= 22) 32%, on sacral spine (n=2) 3%, in case of complete lesion (n=26) 38% (Sved et al, 1997).

Due to surgery on spine pain must be felt among the respondents on this study 71.7% (n=76) patients have no pain on surgical site and 28.3% (n=30) have pain on that site.

On 2001 it was found that patients who had spinal surgery experiences more pain then that had no surgery or treated conservatively (Siddall et al., 2001).

The participants who experiences different types of pain among them 27.4% (n=29) felt pain at the level of injury, 23.6% (n=25) felt pain on region of normal sensation, 20.8% (n=22) felt pain on below the level of injury, 5.7% (n=6) have pain on above level of injury, and 22.6% (n=24) have no pain.

A result found in 2016 that location of pain according to region of sensory and motor loss was distributed as (n=8) 33.3%, subjects had pain located in the region of sensory and motor loss while (n=11) 45.8%, had pain present in both the normal regions and those of sensory and motor loss (Fidelis et al., 2016). In study of Switzerland pain at level of spinal cord injury in complete lesion is about 74% and in incomplete lesion is about 38%. Below level spinal cord injury pain in complete and incomplete lesion is about 44% and 41% respectively. In paraplegic and tetraplegic patients at level pain is 73% and 23%. And below level pain is 28% and 65% (Mahnig et al, 2016). Another

study investigated that below level neuropathic pain is about (n=44) 38%, at level pain is (n=17) 12% (Burke Et al., 2019).

Considering pain in different parts of the body on this study it is showed that 19.6% (n=19) complains of pain on neck and shoulder region, 18.6% (n=18) back at level of injury, 17.5% (n=17) back below level of injury, thigh pain 7.2% (n=7), arms and hand pain 6.2% (n=6), back above level of injury 4.1% (n= 4), 3.1% (n= 3) have chest pain.

Fidelis (2016) reported that most participants had pain in the legs and feet (70.8%), followed by pain in the back at level of injury (58.3%). Only one participant (n=1) 4.2% reported pain in the back above level of injury (Fidelis et al., 2016). A Switzerland study found that pain on back or spine is about 54.3%, shoulder 50.9%, neck 43.2%, wrist and hand 28.6%, ankle and foot 24.8%, buttock and hip 23.8%, knee 20.2%, elbow 12.9% (Muller et al, 2016).

In 2017 Burk reported that pain on neck, shoulder and arms and hand is about (n=367) 80%, torso (n=79) 17%, head (n=26) 6%, back upper and lower (n=231) 50%, upper leg, thigh, hip and buttock (n=234) 51%, lower leg and feet (n= 181) 40% (Burk et al, 2017).

In increasing and decreasing of pain it is associated with various types of factors. Here respondents said that some aggravating factors can increase their pain level. Among them 23.6% (n=25) pain is aggravated by overexertion, 18.9% (n=20) on activity, 21.7% (n=23) abnormal positioning, 3.8% (n=4) stress and compression respectively, 4.7% (n=5) weather change, and 0.9% (n=1) on spasticity, 22.6% (n=24) have no pain so doesn’t aggravate any of the factors. In 2013 a study describes that before pain treatment starts correct sitting posture, proper transferring technique, proper wearing of brace or assistive device is important because it can aggravate pain (Lee et al, 2013). Another study have found that inactivity, overexertion, stress, weather change were important aggravating factors for pain (Demirel et al, 1998).

Another study correlate with interference of average pain intensity rating, they found that General activity 0.51%; Mood 0.57%; Mobility (ability to get around) 0.59% Normal work (including housework) 0.52%; Relations with other people 0.50%; Sleep

0.51%; Enjoyment of life 0.53%; Self-care 0.52%; Recreational activity 0.59%; Social activities 0.54% (Jensen et al, 2005).

Here found that pain relieve at rest 28.9% (n= 28), position or posture change 18.6% (n=18), medications 10.3% (n=10), 9.3% (n= 9) activity pacing, 5.2% (n=5) on distraction, 4.1% (n=4) on exercise, 23.7% (n=23) have no pain so they have no ease factors.

Another result shows that rest and sleep can decrease pain by providing relaxation (Demirel et al, 1998).

Pain severity on numeric pain rating scale shows that most of the participants have moderate (4-6) pain (n=53) 49.9%, mild (1-3) pain found (n=24) 22.6%, Severe (7-10) pain found (n=5) 4.7%, and no pain (0) found (n=24) 22.6%.

A study shows that pain rating on numeric pain rating scale that (n=11) 36% had no pain, (n=5) 16.7% mild pain, (n=3) 10% moderate pain, (n=11) 36.7% severe pain. Here '0' no pain, '1-3' mild pain, '4-6' moderate pain, and '7-10' severe pain (Matin et al, 2014). Another study investigate that the prevalence of neuropathic pain was 82.3% (n=204), musculoskeletal pain 81% (n=201), visceral pain 41.1% (n=102), and other pain 1.2% (n=2) (Hatefi et al, 2019).

A study also found in 2016 the rate their pain intensity on NPRS that severe pain (7-10) 40.8%, moderate pain (4-6) 43.4%, mild pain (1-3) 15.8% (Muller et al, 2016).

The quality of pain varies from person to person. Among the participants on this study most of them describes different quality of pain 11.3% (n=12) burning, radiating, and throbbing pain individually, 9.4% (n=10) sharp, shooting, pricking and stinging pain separately, 6.6% (n=7) stabbing pain, 7.5% (n=8), 3.8% (n=4) pressing pain, 4.7% (n=5) pulsating pain, 1.9% (n=2) crumping pain and 0.9% (n=1) aching, dull and exhausting pain separately. Another study investigated that 'burning,' 'aching,' and 'sharp' pain is the most commonly described as pain quality whereas other types are less common (Noga & Turk, 2003).

In other study it shows that burning pain is common in tetraplegic 45% than paraplegic 44%, electric shock like pain 29% in paraplegic and 26% in tetraplegic, tingling pain tetraplegic 45% and paraplegic 41%, pins and needle sensation in tetraplegic 55% and paraplegic 54%, numbness 30% tetraplegic and 25% paraplegic,

itching and electric shock like pain is almost same in both tetraplegic and paraplegic patients (Andresen et al, 2016).

Another study describes that both at-level pain and below-level pain were reported as burning (60 and 71%), but shooting almost exclusively occurred in at-level pain (43% vs 7%) (Mahnig et al 2016).

Out of 106 patients on this study it is investigated that most of them have intermittent pain 54.7% (n=58), and continuous pain 22.6% (n=24), 22.6% (n=24) have no pain. A similar study found in Zimbabwe that intermittent pain found in all parts of the body continuous pain was found to be less on the body part (Fidelis et al, 2016).

It is investigated on this study that the participants 27.4% (n= 29) receive exercise for managing pain, 16% (n=17) soft tissue mobilization, 14.2% (n=15) medication, 7.5% (n= 8) joint mobilization and manipulation, 5.7% (n=6) despite of having they receive no treatment for managing pain, 4.7% (n=5) cold compression, 0.9% (n=1) trigger point injection, and 0.9% (n=1) using lumber corset for managing pain. Another study demonstrate that for managing pain 26.7% uses therapeutic massage, heat therapy 16.7%, other physiotherapy 15%, ice therapy 13.3%, and medication uses 10% (Widerstrom-Noga & DC Turk, 2003). On the basis of other study 34.6% patients uses prescribed medication and non-pharmacological methods for pain management included rest/sleep (27.2%) and stretching (25.7%), massage (16.9%) and heat application (11.0%). Non-pharmacological strategies included changing positions/exercise (9.6%), psychological/cognitive-behavioral strategies (that is, deep-breathing, distraction; 9.6%), acupuncture (2.2%) and yoga (2.2%) (Murry et al, 2017).

On the basis of this study participants express their effectiveness of treatment according to their psychological nature of pain experience. Most of the patients 35.8% (n=38) pain treatment made slightly better, 21.7% (n=23) had no pain after treatment, 15.1% (n=16) made pain considerably better, 2.8% (n=3) made pain worse, 1.9% (n=2) made pain disappear.

Other similar study shows that 67% receive physiotherapy for managing pain and 41% take pharmacological measure for pain (Andresen et al, 2016).

Another result found on perceived effectiveness of pain treatment, where Physical therapy (n=40) 7.5% had no effect, 42.5% slightly better, 47.5% considerably better, 2.5% pain free, Medical (n=8) 8.3% made pain worse, 41.7% no effect, 8.3% slightly better, 33.3% considerably better, 8.3% pain free, Psychological (n=13) 23.1% no effect, 61.5% slightly better, 15.4% considerably better, medication Opioids (n=27) 18.5% no effect, 48.1% slightly better, 22.2% considerably better, better, 4.8% pain free, NSAIDs (n=24) 29.2% no effect, 50.0% slightly better, 20.8% considerably better (Widerstrom-Noga et al., 2003).

Limitations:

Complete accuracy is not being possible in any research so that some limitations 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. The data was taken only in one year.

As the study conducted only center so multi-center data will not accessible in the study.

As the study was conducted at Centre for the Rehabilitation of the paralyzed (CRP) which may not represent the whole country.

CHAPTER VI CONCLUSION & RECOMMENDATION

5.1 Conclusion

Spinal cord injury is a major insult to the spinal cord resulting in a change, either temporary or permanent, in its normal motor, sensory, or autonomic function. Bangladesh is a low socioeconomic country most of the people live in rural area due to lack of proper education and awareness the rate of spinal cord injury people increasing day by day. Spinal cord injury (SCI) is one of the most destructive conditions for mankind. Although spinal cord injury is one of the most serious injuries that a person can survive, it is possible to return to a healthy, happy and productive life after even the most severe of cord injuries. It limits person's daily living activity, restriction in social participation. After spinal cord injury various types of complication arises which makes a person depressed and fearful about recovery. In Bangladesh the biggest specialized rehabilitation center named Centre for the Rehabilitation of the Paralysed (CRP) where appropriately managing the spinal cord injured. The study provide about pain which is the most common complication after spinal cord injury. Overall in this dissertation shows that musculoskeletal pain and its management among spinal cord injury patients. Predominantly male (88.7%) more injured than female (11.3%) and most of them are young age. Among the injured paraplegic are most common than tetraplegic. Pain is comparatively common in paraplegic participant than tetraplegic participants. And most of them receive physiotherapeutic intervention for managing pain. Spinal Cord Injury management and rehabilitation is a long time process so it is important to create awareness and receive proper step to reduce the risk of Spinal Cord Injury.

5.2 Recommendation

A recommendation evolves out of the context in which the study was conducted. The aim of the study was to find out the musculoskeletal pain and its management among spinal cord injury patients. I recommended the following things:

Should take more samples for generating the result and try to make more valid and reliable. Should be taking more samples for pilot study to establish the accuracy of the questionnaire.

Sample should collect from the only rehabilitative institute in Bangladesh.

Promoting a positive attitude and addressing personal and behavioral factors are important for proper care of the affected individual.

Providing adequate knowledge to general population if it possible then it will assist them to cope with the stress and develop positive attitude towards Spinal Cord Injury and its proper management.

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APPENDIX (1)

সম্মতিপত্র (বাংলায়) **কোড নং:**

(অংশগ্রহনকারীকে পড়ে শোনাতে হবে)

আসালামু আলাইকুম / নমস্কার, আমার নাম আয়শা হাবিবা ইফফাত , আমি এই গবেষণাটি বাংলাদেশ হেল্‌থ প্রফেশনাল ইন্সটিটিউট (বি এইচ পি আই), ঢাকা বিশ্ববিদ্যালয়ের চিকিৎসা অনুষদের অধীনে করছি যা আমার ফিজিওথেরাপী স্নাতক কোর্সের আংশিক অধিভূক্ত যার শিরোনাম হল **"মেরুরজ্জুতে আঘাত প্রাপ্ত রোগীদের মাংসপেশী ও অস্থি সন্ধির ব্যাথা এবং এর ফিজিওথেরাপি ব্যাবস্থাপনা"।**

আমি এই গবেষণাটির মাধ্যমে " **মেরুরজ্জুতে আঘাত প্রাপ্ত রোগীদের মাংসপেশী ও অস্থি সন্ধির ব্যাথা এবং এর ফিজিওথেরাপি ব্যাবস্থাপনা** " দেখতে চাচ্ছি। আমি এক্ষেত্রে কিছু ব্যাক্তিগত এবং মাংসপেশী ও অস্থি সন্ধির ব্যাথা সম্পর্কে কিছু আনুষাঙ্গিক তথ্য জানতে চাচ্ছি। ফরমে উল্লেখিত কিছু প্রশ্নের উত্তর দেয়ার জন্য আন্তরিকভাবে অনুরোধ জানাচ্ছি যা আনুমানিক ১০-১৫ মিনিট সময় নিবে।

আমি আপনাকে অবগত করছি যে, এটা কেবলমাত্র আমার অধ্যয়নের সাথে সম্পর্কযুক্ত এবং অন্য কোন উদ্দেশ্যে ব্যবহার হবে না। আমি আপনাকে আরো নিশ্চয়তা প্রদান করছি যে সকল তথ্য প্রদান করবেন তার গোপনীয়তা বজায় থাকবে এবং এই তথ্যের উৎস অপ্রকাশিত থাকবে। এমনকি গবেষণাটির শেষে এই সকল তথ্য নষ্ট করে ফেলা হবে। এই অধ্যয়নে আপনার অংশগ্রহন স্বেচ্ছাপ্রণোদীত এবং আপনি যে কোন সময় এই অধ্যয়ন থেকে কোন নেতিবাচক এবং ফলাফল কোন বিব্রতবোধ ছাড়াই নিজেকে প্রত্যাহার করতে পারবেন। যদি আপনার এই গবেষণা সম্পর্কে কিছু প্রশ্ন করার থাকে অথবা একজন অংশগ্রহনকারী হিসেবে এটা আপনার অধিকার , তাহলে আপনি গবেষক আয়শা হাবিবা ইফফাত অথবা ফিরোজ আহাম্মেদ মমিন , সহযোগী অধ্যাপকের সাথে যোগাযোগ করতে পারেন। ফিজিওথেরাপি বিভাগ , বি এইচ পি আই , সাভার , ঢাকা – ১৩৪৩ এই ঠিকানায়।

এই সাক্ষাৎকার শুরু করার আগে আপনার কি কোন প্রশ্ন আছে ?

আমি আপনার অনুমতি নিয়ে এই সাক্ষাৎকার শুরু করতে যাচ্ছি ? হ্যাঁ ☐ না ☐

সাক্ষাৎকার প্রদানকারীর স্বাক্ষর ..... তারিখ .....

নাম .....

ঠিকানা ..... যোগাযোগ/ ফোন নম্বরঃ .....

সাক্ষাৎকার গ্রহনকারীর স্বাক্ষর..... তারিখ .....

সাক্ষীর স্বাক্ষর..... তারিখ .....

কোড নং :

শিরোনামঃ " মেরুরজ্জুতে আঘাত প্রাপ্ত রোগীদের মাংস পেশী ও অস্থিসন্ধির ব্যাথা এবং এর ফিজিওথেরাপি ব্যাবস্থাপনা "

(প্রশ্নমালা /প্রশ্নাবলী)

(রোগী অথবা রোগীর সহকারী তথ্য প্রদান করবেন)

পর্ব ০ঃ ১- আর্থ-সামাজিক অবস্থার তথ্যাবলি

১.১	বয়স		
১.২	লিঙ্গঃ	□ পুরুষ □ মহিলা	০১ ০২
১.৩	শিক্ষাগত যোগ্যতা	▪ অক্ষর জ্ঞান সম্পন্ন ▪ প্রাথমিক ▪ মাধ্যমিক ▪ উচ্চমাধ্যমিক ▪ স্নাতক	০১ ০২ ০৩ ০৪ ০৫
১.৪	বৈবাহিক অবস্থা	▪ অবিবাহিত ▪ বিবাহিত ▪ বিধবা/বিপত্নিক ▪ বিচ্ছিন্ন/তালাকপ্রাপ্ত	০১ ০২ ০৩ ০৪
১.৫	পেশাগত অবস্থা	▪ রিকশাচালক ▪ কৃষি কাজ ▪ ফ্যাক্টরি/ শিল্প কারখানার শ্রমিক ▪ গাড়ি চালক ▪ ব্যাবসা ▪ শ্রমিক/ দিনমজুর ▪ বেকার ▪ গৃহিণী ▪ শিক্ষক ▪ ছাত্র ▪ চাকুরী ▪ অবসরপ্রাপ্ত	০১ ০২ ০৩ ০৪ ০৫ ০৬ ০৭ ০৮ ০৯ ১০ ১১ ১২
১.৬	আবাসিক এলাকা	▪ শহর ▪ গ্রাম	০১ ০২

১.৭	মাসিক আয়		
১.৮	অন্য কোন ধরনের রোগ রয়েছে কি?	□ হ্যাঁ □ না	০১ ০২
১.৯	যদি থাকে তবে কোন রোগটি রয়েছে?	▪ ডায়াবেটিস ▪ উচ্চরক্তচাপ ▪ অ্যাজমা ▪ হৃদরোগ ▪ কোনটিই নয়	০১ ০২ ০৩ ০৪ ০৫
১.১০	কতদিন যাবৎ এ রোগে ভুগছেন?		

<u>পর্ব ঃ ২- মেরুরজ্জুতে আঘাত সম্পর্কিত তথ্য :</u>

২.১- আঘাতের তারিখ.....

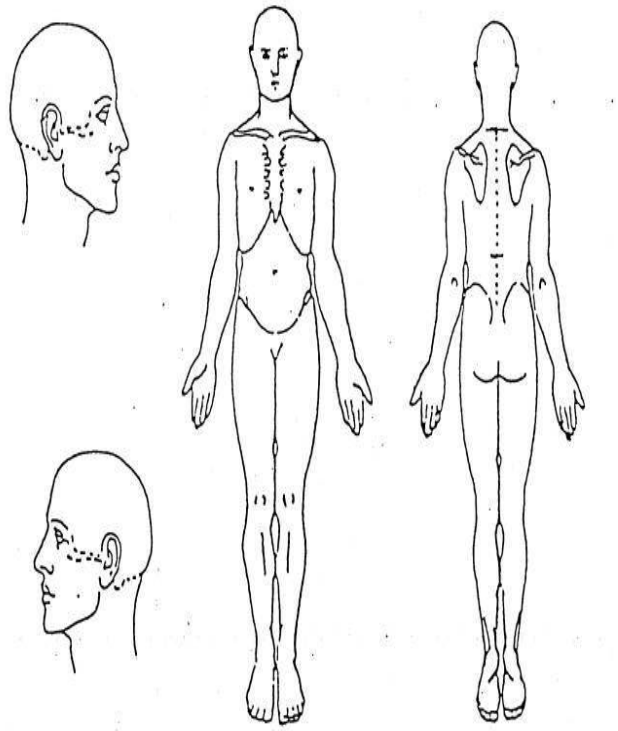
২.২- সি. আর.পি তে ভর্তির তারিখ.....

২.৩	আঘাতের কারন	▪ সড়ক দূর্ঘটনা ▪ মারামারি জনিত ▪ উপর থেকে পরে ▪ গাছ থেকে পরে ▪ ভারী বোঝা বহনের সময় (পিঠে অথবা ঘাড়ে বোঝা পরে গিয়ে) ▪ খেলাধুলা জনিত আঘাত ▪ কোন প্রাণীর আঘাতের মাধ্যমে ▪ ছুরিকাঘাত/ ভোঁতা কিছু দ্বারা আঘাতের মাধ্যমে ▪ শিল্প কারখানা জনিত দূর্ঘটনা ▪ গুলি বিদ্ধ হয়ে ▪ অল্প পানিতে সাঁতার কাটার সময় ▪ ট্রান্সভার্স মাইলাইটিস জনিত ▪ মেরুদণ্ডে টিবি জনিত ▪ ক্ষয় জনিত রোগ ▪ মেরুদন্ডের বিকলাঙ্গতা	০১ ০২ ০৩ ০৪ ০৫ ০৬ ০৭ ০৮ ০৯ ১০ ১১ ১২ ১৩ ১৪ ১৫ ১৬

২.৪	মেরুদন্ডে আঘাতের স্থান	▪ সারভাইকাল লেভেল ▪ থোরাসিক লেভেল ▪ লাম্বার লেভেল ▪ সেক্রাল লেভেল	০১ ০২ ০৩ ০৪
২.৫	স্নায়ুবিক স্তরের অবস্থা (এশিয়া অনুযায়ী)	▪ সম্পূর্ণ (A) ▪ অসম্পূর্ণ (B) ▪ অসম্পূর্ণ (C) ▪ অসম্পূর্ণ (D) ▪ স্বাভাবিক (E)	০১ ০২ ০৩ ০৪ ০৫
২.৬	স্নায়ু তন্ত্রীয় অবস্থা	▪ সেন্সরি লেভেল ▪ মোটোর লেভেল	০১ ০২

পর্ব-৩: ব্যাথা সম্পর্কিত তথ্যাবলিঃ

৩.১	মেরুরজ্জুতে আঘাতের কারনে বর্তমানে কোন ব্যাথা অনুভূত হয়?	☐ হ্যাঁ ☐ না	০১ ০২
৩.২	আঘাতপ্রাপ্ত হবার পূর্বে কি কোন ব্যাথা ছিল?	☐ হ্যাঁ ☐ না	০১ ০২
৩.৩	আঘাতের কারনে কি কোন অপারেশন হয়েছে?	☐ হ্যাঁ ☐ না	০১ ০২
৩.৪	কি ধরনের অপারেশন হয়েছে?	▪ ফিক্সেসন ▪ প্রেসার আলসার ▪ মেরুদণ্ডের বিকলাঙ্গতা সংশোধন ▪ এ্যাম্পুটেসন (অঙ্গ চ্ছেদ) ▪ ট্রাকসন ▪ দূর্ঘটনা জনিত বিকলাঙ্গতা সংশোধন ▪ কোন অপারেশন হয় নি।	০১ ০২ ০৩ ০৪ ০৫ ০৬ ০৭
৩.৫	আঘাতপ্রাপ্ত হবার পূর্বে কি কোন অপারেশন হয়েছিল?	☐ হ্যাঁ ☐ না	০১ ০২
৩.৬	অপারেশন কোন স্থানে হয়েছিল?		

৩.৭	অপারেশন করার স্থানে কি কোন ব্যাথা অনুভূত হয়?	☐ হ্যাঁ ☐ না	০১ ০২
৩.৮	ব্যাথা কোথায় অনুভূত হয়?	▪ স্বাভাবিক সংবেদনশীল স্থান ▪ আঘাতপ্রাপ্ত স্থানের উপরে ▪ আঘাতপ্রাপ্ত স্থানে ▪ আঘাতপ্রাপ্ত স্থানের নিচে ▪ ব্যাথা নেই	০১ ০২ ০৩ ০৪ ০৫
৩.৯	ব্যাথা অনুভূত হবার স্থান		
৩.১০	আঘাতের পর ব্যাথা প্রথম কোথায় শুরু হয়?	▪ মাথা ▪ ঘাড় ও কাঁধ ▪ হাত ও কব্জি ▪ বুক ▪ পেট ▪ মেরুদণ্ডের আঘাত প্রাপ্ত স্থানের উপরে ▪ মেরুদণ্ডের আঘাত প্রাপ্ত স্থানে ▪ মেরুদণ্ডে আঘাত প্রাপ্ত স্থানের নিচে ▪ নিতম্ব ▪ উরু ▪ পা এবং গোড়ালি।	০১ ০২ ০৩ ০৪ ০৫ ০৬ ০৭ ০৮ ০৯ ১০ ১১

৩.১১	ব্যাথা কখন খারাপ হয় ?	▪ নিজের কাজকর্ম ▪ অবস্থান পরিবর্তন (ট্রান্সফার , হুইলচেয়ার) ▪ অস্বাভাবিক অবস্থান ▪ সংকোচন ▪ চাপ ▪ আবহাওয়ার পরিবর্তন ▪ পেশি সংকোচন ▪ অন্যান্য.....	০১ ০২ ০৩ ০৪ ০৫ ০৬ ০৭ ০৮
৩.১২	ব্যাথা কখন ভাল হয় ?	▪ বিশ্রাম ▪ ঔষধ ▪ অবস্থান পরিবর্তন ▪ মনোযোগ পরিবর্তন ▪ ধীর গতির কাজকর্ম ▪ এক্সাসাইজ/ ব্যায়াম ▪ অন্যান্য	০১ ০২ ০৩ ০৪ ০৫ ০৬
৩.১৩	ব্যাথার তীব্রতাঃ আপনার ব্যাথার তীব্রতা ১০ –পয়েন্ট স্কেল দ্বারা বুঝাতে পারবেন? ০----০১--------০২-------০৩-------০৪--------০৫------০৬--------০৭---------০৮-------০৯--------১০		
৩.১৪	আপনার ব্যাথার ধরন নিচের যে কোন একটি শব্দ দ্বারা বোঝান	▪ জ্বালাপোড়া ব্যাথা ▪ ধরা ব্যাথা ▪ তীব্র ব্যাথা ▪ ছুরিকাঘাত করার মত ব্যাথা ▪ খোঁচা দেয়ার মত ব্যাথা ▪ শক লাগার মত ব্যাথা ▪ চিন চিন ব্যাথা ▪ থেমে থেমে ব্যাথা ▪ কামড়ানো ব্যাথা ▪ ছড়ানো ব্যাথা ▪ চাপা ব্যাথা ▪ টনটন ব্যাথা ▪ অবশ ব্যাথা ▪ ক্লান্তিকর ব্যাথা ▪ মোচড়ানো ব্যাথা ▪ অন্যান্য.....	০১ ০২ ০৩ ০৪ ০৫ ০৬ ০৭ ০৮ ০৯ ১০ ১১ ১৩ ১৪ ১৫ ১৬

৩.১৫	২৪ ঘন্টায় ব্যাথার আচরন	▪ সবসময় ব্যাথা ▪ মাঝে মাঝে ব্যাথা	০১ ০২

<u>পর্বঃ৪-ব্যাথার চিকিৎসা বিষয়ক তথ্যাবলিঃ</u>

৪.১	ব্যাথার জন্য কি ধরনের চিকিৎসা পদ্বতি ব্যবহৃত হয়েছে?		
৪.২	আপনার চিকিৎসার কার্যকারিতা নিচের ৫-পয়েন্ট স্কেল দ্বারা বুঝান	□ ব্যাথা খারাপ হয়েছে -১ □ কোন পরিবর্তন হয় নি -২ □ ব্যাথা একটু ভাল হয়েছে -৩ □ ব্যাথার ভালো উন্নতি হয়েছে -৪ □ ব্যাথা পুরোপুরি ভালো হয়েছে -৫	০১ ০২ ০৩ ০৪ ০৫

APPENDIX (2)

CONSENT FORM (English) **Code No:**

(Please read out the participants)

Assalamu-alaikum / Namasker. I am Aisha Habiba Iffat, student of B.Sc. in physiotherapy at Bangladesh Health Professions Institute (BHPI), CRP. I am conducting a study for partial fulfillment of Bachelor of Science in Physiotherapy degree, titled, **"Musculoskeletal Pain and its Management among Spinal Cord Injury Patients"**

Through this research, I will see the spinal cord injured patient experience of different musculoskeletal pain and its management. For this regard, I would need to collect information about musculoskeletal pain. You will need to answer some questions which are mentioned in this form. It will take approximately 10-15 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 confidential and 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. If you have any query as a participant, you may contact with, researcher Aisha Habiba Iffat or Firoz Ahmed Mamin Associate professor, Department of Rehabilitation science, course co-ordinator , M.S c in Physiotherapy program, BHPI, CRP, Savar, Dhaka-1343.

Do you have any questions before I start?

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

Yes: □ No: □

Signature of the Interviewer and Date……..

Signature of the participant and Date ……Signature of the witness……

Address & Contact No .....

Signature of the Witness and Date …….

Questionnaire

Code no……

SECTION A: Demographic Information

1.1	Age		
1.2	Sex	☐ Male ☐ Female	01 02
1.3	Education	▪ No formal education ▪ Primary ▪ Secondary ▪ Higher secondary ▪ Bachelor degree ▪ Masters	01 02 03 04 05 06
1.4	Marital status	▪ Unmarried ▪ Married ▪ Widowed ▪ Separated /Divorced	01 02 03 04
1.5	Occupation	▪ Rickshaw puller. ▪ Agriculture. ▪ Factory/garments worker. ▪ Driver. ▪ Businessman. ▪ Day laborer. ▪ Unemployed. ▪ Housewife. ▪ Teacher. ▪ Student. ▪ Retired. ▪ ……..	01 02 03 04 05 06 07 08 09 10 11 12
1.6	Living area	☐ Urban. ☐ Rural.	01 02

1.7	Income (monthly)…….		
1.8	Any co morbid disease	▪ Yes ▪ No	01 02
1.9	If any, which one of this?	▪ Diabetes ▪ Hypertension ▪ Asthma ▪ Heart disease ▪ ……	01 02 03 04 05
1.10	How long have you suffering from?		

SECTION B: SCI Information

2.1. Date of injury:

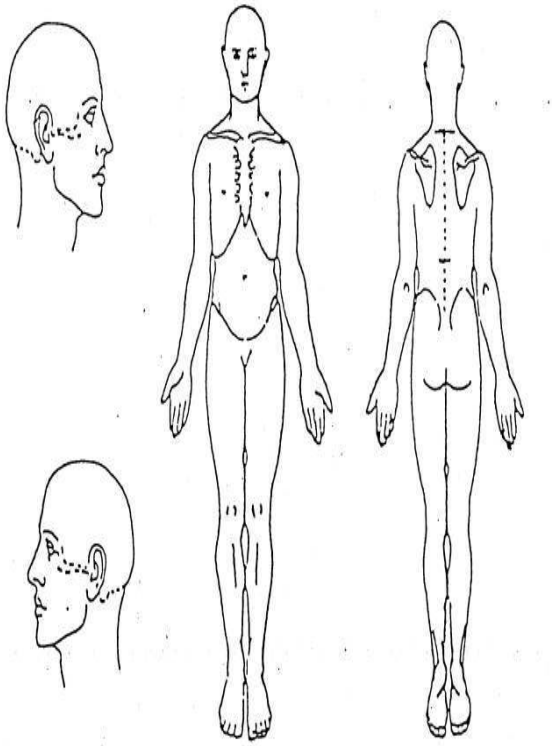
2.2. Date of admission:

2.3	Causes of injury	○ RTA ○ Assault ○ Fall from height ○ Fall from tree ○ Fall while carrying heavy load on head or back ○ Industrial accident ○ Sports injury ○ Bull attack ○ Stab injury ○ Industrial accident ○ Gun shoot injury ○ Shallow water diving ○ Transverse myelitis ○ Spine tuberculosis ○ Degenerative disease of spine ○ Spinal deformity ○ …….	01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17
2.4	Skeletal level of injury	▪ Cervical ▪ Thoracic ▪ Lumber ▪ Sacral	01 02 03 04

2.5	Level of impairment (according to ASIA)	▪ Complete A ▪ Incomplete B ▪ Incomplete C ▪ Incomplete D ▪ Normal E	01 02 03 04 05
2.6	Neurological level	▪ Sensory ▪ Motor	01 02

SECTION C: Pain related information

3.1	Any current pain because of SCI?	☐ Yes ☐ No	01 02
3.2	Is the pain persisted before injury?	☐ Yes ☐ No	01 02
3.3	Is there any surgery because of SCI?	☐ Yes ☐ No	01 02
3.4	Which type of surgery you have	▪ Spinal fixation ▪ Pressure ulcer ▪ spinal deformity correction ▪ amputation ▪ traction ▪ injury related deformity correction ▪ no operatiom	01 02 03 04 05 06 07
3.5	Is there any surgery before SCI?	☐ Yes ☐ No	01 02

3.6	In which site have your surgery done?		
3.7	Is the pain felt on the surgical site?	☐ Yes ☐ No	01 02
3.8	Where is the pain?	○ Region of normal sensation ○ Above level of injury ○ At level of injury ○ Below level of injury ○ No pain	01 02 03 04
3.9	Anatomical location of pain		

3.10	Where does this pain start after injury?	▪ Head ▪ Neck and Shoulder ▪ Arms and Hands ▪ Chest ▪ Abdomen ▪ Back above level of injury ▪ Back at level of injury ▪ Back below level of injury ▪ Buttocks ▪ Thighs ▪ Legs and feet	01 02 03 04 05 06 07 08 09 10 11
3.11	Aggravating factors	▪ Personal care ▪ Mobility (Transfer, Wheelchair) ▪ Abnormal positioning ▪ Compression ▪ Stress ▪ Weather changes ▪ Spasticity ▪ ……	01 02 03 04 05 06 07 08
3.12	Ease factors	▪ Rest ▪ Medications ▪ Position/posture change ▪ Distraction ▪ Activity Pacing ▪ Exercise ▪ ….	01 02 03 04 05 06 07

3.13: Severity of pain:
Can you rate your pain severity using the following 10-point scale.
01…. 02 ….. 03….. 04 ….. 05….. 06 ….. 07 …. 08 ……09…… 10

3.14	Quality of pain: Can you describe your pain quality?	□ Burning. □ Stabbing □ Pricking □ Aching □ Sharp □ Shooting □ Stinging □ Pulsating □ Radiating □ Pressing □ Throbbing □ Electric □ Dull □ Exhausting □ Cramping □ Any other……	01 02 03 04 05 06 07 08 09 10 12 13 14 15 16
3.15	24-hour behavior of pain	▪ Continuous ▪ Intermittent ▪ No pain	01 02 03

SECTION D: Pain treatments

4.1.	Which treatment have used in the management of current pain	▪ No treatment ▪ Soft tissue mobilization ▪ Ultrasound ▪ Heat therapy ▪ Ice therapy ▪ Transcutaneous electrical nerve stimulation (TENS) ▪ Exercise ▪ Trigger point injection ▪ Joint mobilization and manipulation ▪ Medication ▪ Surgery ▪ Any others…..	01 02 03 04 05 06 07 08 09 10 11 12

4.2. Can you rate your perceived effectiveness of treatment using the following 5-point scale?

☐ Made pain worse -1

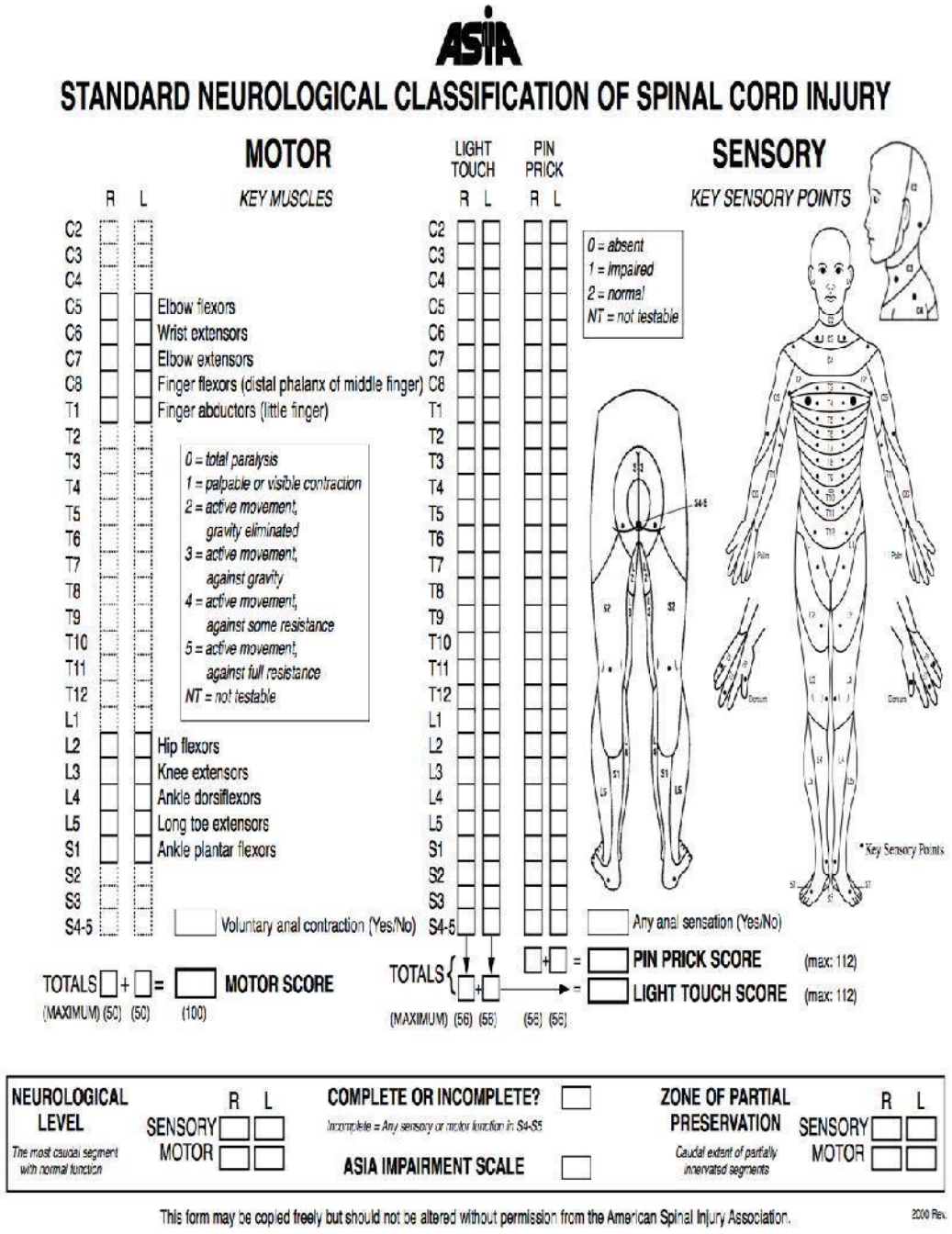
☐ Had no effect -2

☐ Made pain slightly better-3

☐ Made pain considerably better-4

☐ Made pain disappear - 5

APPENDIX (3)



ASIA

STANDARD NEUROLOGICAL CLASSIFICATION OF SPINAL CORD INJURY

MOTOR

KEY MUSCLES

	R	L	
C2			
C3			
C4			
C5			Elbow flexors
C6			Wrist extensors
C7			Elbow extensors
C8			Finger flexors (distal phalanx of middle finger)
T1			Finger abductors (little finger)
T2			
T3			
T4			
T5			
T6			
T7			
T8			
T9			
T10			
T11			
T12			
L1			
L2			Hip flexors
L3			Knee extensors
L4			Ankle dorsiflexors
L5			Long toe extensors
S1			Ankle plantar flexors
S2			
S3			
S4-5			Voluntary anal contraction (Yes/No)

0 = total paralysis
1 = palpable or visible contraction
2 = active movement, gravity eliminated
3 = active movement, against gravity
4 = active movement, against some resistance
5 = active movement, against full resistance
NT = not testable

TOTALS ☐ + ☐ = ☐ MOTOR SCORE
(MAXIMUM) (50) (50) (100)

LIGHT TOUCH / PIN PRICK

	LIGHT TOUCH R	LIGHT TOUCH L	PIN PRICK R	PIN PRICK L
C2				
C3				
C4				
C5				
C6				
C7				
C8				
T1				
T2				
T3				
T4				
T5				
T6				
T7				
T8				
T9				
T10				
T11				
T12				
L1				
L2				
L3				
L4				
L5				
S1				
S2				
S3				
S4-5				

TOTALS ☐ + ☐ = ☐ PIN PRICK SCORE (max: 112)
(MAXIMUM) (56) (56) (56) (56) = ☐ LIGHT TOUCH SCORE (max: 112)

SENSORY

KEY SENSORY POINTS

0 = absent
1 = impaired
2 = normal
NT = not testable

☐ Any anal sensation (Yes/No)

NEUROLOGICAL LEVEL	R	L
The most caudal segment with normal function		
SENSORY	☐	☐
MOTOR	☐	☐

COMPLETE OR INCOMPLETE? ☐
Incomplete = Any sensory or motor function in S4-S5

ASIA IMPAIRMENT SCALE ☐

ZONE OF PARTIAL PRESERVATION	R	L
Caudal extent of partially innervated segments		
SENSORY	☐	☐
MOTOR	☐	☐

2000 Rev.

Permission Letter

23rd May, 2019

Head of the Department

Department of the Physiotherapy

Center for the Rehabilitation of the Paralysed (CRP), Chapain, Savar, Dhaka, 1343

Through: Head of the Department, Department of Physiotherapy, Bangladesh Health Professions Institute (BHPI).

Subject: Permission for data collection.

Dear Sir,

I respectfully to state that I am a 4th year B.S c in Physiotherapy student at Bangladesh Health Professions Institute (BHPI). In 4th year we have to do a research project and I have chosen a title that is **"Musculoskeletal pain and its management among spinal cord injury patient"** and my supervisor is Firoz Ahmed Mamin, Associate Professor, Department of Rehabilitation science, BHPI. I would like to collect data from spinal cord injury (SCI) unit of your department.

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

Yours faithfully

Aisha Habiba Iffat.

Aisha Habiba Iffat

4th year B.S c in physiotherapy, BHPI.

Class roll: 26.

Session: 2014-2015

Forwarded
for
23.05.19

Firoz Ahmed Mamin
Associate Professor
Dept. of Rehabilitation Science
Coordinator
M.Sc in Physiotherapy Program
BHPI, CRP, Savar, Dhaka-1343

Recommended
23.05.19

Prof. Md. Obaidul Haque
Head, Department of Physiotherapy
Bangladesh Health Professions Institute (BHPI)
CRP, Savar, Dhaka-1343

Approved
25/05/19

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

Allow for data collection from SCI unit.
25.05.19

MUZAFFOR HOSSAIN
Junior Consultant & Incharge, SCI Unit
Physiotherapy Department
CRP, Savar, Dhaka

বাংলাদেশ হেল্‌থ প্রফেশন্স ইনস্টিটিউট (বিএইচপিআই)
BANGLADESH HEALTH PROFESSIONS INSTITUTE (BHPI)
(The Academic Institute of CRP)
CRP-Chapain, Savar, Dhaka-1343. Tel: 02-7745464-5, 7741404

Ref: CRP-BHPI/IRB/09/19/1330 Date: 17/09/2019

To
Aisha Habiba Iffat
B.Sc. in Physiotherapy
Session: 2014-2015, Student ID: 112140257
BHPI, CRP, Savar, Dhaka-1343, Bangladesh.

Subject: Approval of the thesis proposal **"Musculoskeletal pain and its management among spinal cord injury patients"** by ethics committee.

Dear Aisha Habiba,

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

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

The purpose of this study is to evaluate the musculoskeletal pain among spinal cord injury patients and its physiotherapy management. That may take 10 to 15 minutes to answer the questionnaire and there is no likelihood of any harm to the participants. Data collectors will receive informed consents from all participants. Any data collected will be kept confidential. The members of the Ethics committee have approved the study to be conducted in the presented form at the meeting held at 10 AM on 11th August, 2018 at BHPI.

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

Best regards,

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