



Faculty of Medicine

**University of Dhaka**

**Effectiveness of McKenzie Manipulative Therapy on Pain, Function  
and Disability among Cervical Disc Prolapse Patient**

By

**Kanika Rani Roy**

Master of Science in Physiotherapy (M. Sc. PT)

DU Roll No: 702

Registration No: 2531

Session: 2020-2021

BHPI, CRP, Savar, Dhaka-1343



**Bangladesh Health Professions Institute (BHPI)**

Department of Physiotherapy

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We the undersigned certify that we have carefully read and recommended to the Faculty of Medicine, University of Dhaka, for the acceptance of this dissertation entitled, "**Effectiveness of McKenzie Manipulative Therapy on Pain, Function and Disability among Cervical Disc Prolapse Patient**". Submitted by **Kanika Rani Roy**, for the partial fulfillment of the requirement for the degree of the Master of Science in Physiotherapy (M.Sc. in PT).



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## Declaration Form

This work has not previously been accepted in substance for any degree and is not concurrently submitted in candidature for any degree. This dissertation is being submitted in partial fulfillment of the requirements for the degree of M.Sc. in Physiotherapy. This dissertation is the result of my own independent work/investigation, except where otherwise stated. Other sources are acknowledged by giving explicit references. A Reference list is appended. I confirm that if anything identified in my work that I have done plagiarism or any form of cheating that will directly awarded me fail and I am subject to disciplinary actions of authority. I confirm that the electronic copy is identical to the bound copy of the Thesis. In case of dissemination the finding of this project for future publication, research supervisor will highly concern and it will be duly acknowledged as graduate thesis.

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## List of Abbreviations

BHPI	Bangladesh Health Professions Institute
BMRC	Bangladesh Medical Research Council
CR	Cervical Radiculopathy
CRP	Centre for the Rehabilitation of the Paralyzed
DPQ	Dallas Pain Questionnaire
GP	General Physician
MT	Manual Therapy
NDI	Neck Disability Index
NPRS	Numeric Pain Rating Scale
PCID	Prolapse Cervical Intervertebral Disc
RCT	Randomized Control Trial
ROM	Range of Motion
TB	Tuberculosis
TENS	Transcutaneous Electrical Nerve Stimulation
VAS	Visual Analog Scale
WHO	World Health Organization

## ABSTRACT

**Background:** Neck pain as well as Cervical disc Prolapse became a more common determination for patient in search of primary care services confronting outpatient physiotherapists. McKenzie method is commonly used for treating neck pain as well as cervical disc prolapse. **Objectives:** To explore the effectiveness of McKenzie manipulative therapy over conventional physiotherapy for cervical disc prolapse patients. **Methodology:** A Randomized control trial study design was used in this study. Total of 42 samples were selected from hospital patient for this study attending the Centre for the rehabilitation of the paralysed (CRP) from the musculoskeletal unit at Savar. Among them 21 patients were assigned to the trial group who received McKenzie treatment with usual care and another 21 in the control group received conventional physiotherapy. The total treatment sessions were twelve comprising 3 sessions per week for 4 weeks. A double-blinding procedure was used during data collection. **Outcome measurement tools:** Dallas Pain Questionnaire (DPQ) was used to measure pain and NDI to measure neck disability. **Analysis of data:** Inferential statistics such as Unpaired t, Paired t and Chi-square test was done using SPSS version 22. **Results:** Significant improvements in spinal motion, pain reduction in different functional positions, and disability were observed in both groups, but the majority of indicators improved more in the McKenzie treatment group ( $p < 0.05$  or higher than  $p < 0.05$ ) in final assessment which indicate that the effectiveness of McKenzie treatment is superior to the conventional physiotherapy for Cervical Disc Prolapse patients. **Conclusion:** Patients diagnosed with Cervical Disc Prolapse may benefit from McKenzie's treatment approach. Physiotherapists may therefore recommend this treatment to patients with cervical disc prolapse in order to better their condition.

**Keywords:** *Cervical disc prolapse, McKenzie Manipulative Therapy, Conventional Physiotherapy.*

### **1.1 Background**

Cervical disc prolapse is the second most often seen health problem in physical therapy. Cervical disc prolapse has an annual incidence of around 83.2 per 100,000 persons in the general population. Males are more afflicted than females, and the frequency is greatest in the fifth decade (Hassan et al., 2020).

The incidence of cervical disc prolapse among adults has been progressively rising over the past 20 years, with more than half of all people reporting a recent occurrence. Hussain et al. (2016) report that in Pakistan, prevalence is between 6% and 22% with an even higher prevalence among the elderly (up to 38%), while lifetime prevalence is between 14.2% and 71%. Neck pain is extremely prevalent all around the world. Adult prevalence in China ranges from 12.1% to 71.5% each year and from 15.4% to 45.3% every month. Despite this widespread occurrence, 10% of men and 17% of women will experience chronic neck discomfort at some point in their lives (Cheng & Huang, 2014).

Intense, constant discomfort in the neck that radiates to the shoulders is a worldwide epidemic. Disc herniation, spondylitic spur, and cervical osteophyte are common space-occupying lesions responsible for this condition (Sambyal & Kumar, 2013; Ellenberg et al., 1994). Cervical disc prolapsed and radiculopathy occurs at a rate of 85 per 100,000 people per year overall, with a peak incidence in the fifth decade of life (Priya Vishnu, 2015). Disc herniation or spondylosis at the C5-C6 or C6-C7 level is a common cause of pain radiating down the arms and legs (Sambyal & Kumar, 2013; Radhakrishnan et al., 1994), with the C6 and C7 cervical roots being the most commonly affected. Sambyal and Kumar (2013) and Hult (1954) report that almost half of all people will suffer from neck and upper extremity pain at some point in their lives.

If the dorsal and ventral nerve roots are tangled up, the location and arrangement of the symptoms may change, and they may include changes in both sensory and motor function. This is because the severity of the condition depends on the level of nerve root involvement. Despite this fact, people who suffer from radiating neck discomfort

frequently seek medical help to alleviate arm pain. Patients typically complain of discomfort, numbness, tingling and weakness in their upper extremities, which frequently results in considerable functional limits and disability. Patients also regularly report with these symptoms. Patients suffering with cervical spine disorders can benefit tremendously from participation in physical therapy programs, which play a pivotal role in the relief of their symptoms and overall treatment. Pain that radiates from the neck may be treated with conservative methods such as the use of a cervical collar for a limited period of time, traction and medicines. A conservative course of care of physical therapy interventions may also include manipulation, physiotherapy and steroid injections. Cervical traction has been considered as the therapy of choice for individuals who suffer from cervical radiculopathy. In the realm of manual therapy for soft tissue problems, neuromobilization is one of the various techniques that can be utilized. More specifically, this technique targets neural tissue as well as the tissues that surround the nervous system. Neuromobilization is a collection of operations that are thought to reestablish the plasticity of the nervous system. Plasticity is defined as the capacity of nerve-surrounding structures to change in relation to other such structures. Neuromobilization is considered reestablishing the nervous system's plasticity. In addition to this, it encourages the rebuilding of normal physiological activity in nerve cells and helps to restore the ability of neural tissue itself to mobilize, stretch and apply strain (Butler, 1991).

Manual cervical traction, manipulation, therapeutic exercise, and modalities are just some of the physical therapy techniques that have been hypothesized to be helpful in the treatment of cervical disc prolapsed & radiculopathy. Although nerve mobilization may be more effective than traditional physiotherapy, no study has directly compared the two treatment methods (Sambyal & Kumar, 2013).

An annual prevalence of 4.8% to 79.5% (mean 25.8%) and an annual incidence of 10.4% to 21.3% were reported in a systematic literature review on the subject. The prevalence of chronic neck discomfort is 27.2% in women and 17.4% in men, with women being more prone to have it. As a result, neck pain has been linked to lost workdays and may call for extensive medical attention and expenditures (Cheng & Huang, 2014). One study indicated that 22.22% of office workers experienced neck discomfort on a regular basis and 52.22% of the respondent sometimes (Rahman,

2017); however no studies were discovered on the incidence of neck pain among the general population of Bangladesh.

Many people in modern culture suffer from cervical disc prolapsed as a result of their jobs requiring them to sit in one position for extended periods of time performing repetitive motions. Musculoskeletal disorders are a common contributor to lost productivity and increased healthcare expenses on a national scale and chronic neck discomfort is a major public health issue (Cheng & Huang, 2014). Discomfort in the upper thoracic spine, including the shoulder, is typically a mechanical discomfort brought on by poor posture and habits (Lee et al., 2017) and it can worsen and lessen with time. Furthermore, many patients never fully recover from the symptoms.

Musculoskeletal diseases continue to be a major reason why people can't take part fully in their daily lives. Musculoskeletal disorders as a whole are on the rise, and neck discomfort in particular is on the rise all over the world (Rubinstein & van Tulder, 2008). According to the research of Hoy et al. (2014), cervical disc prolapsed is defined as discomfort in the neck that persists for at least three months, with or without pain referral into one or both upper limbs. The incidence and impact of neck discomfort vary widely from region to region. Worldwide, anywhere from 0.4% to 86.8% of the general population experiences cervical disc prolapse at some point in their lives (Breivik et al., 2013). However, according to Hoy et al. (2014), cervical disc prolapse is becoming more common every year and is a major cause of disability around the world. There was also a rise from 23.9 million in 1990 to 33.6 million in 2010 in terms of disability-adjusted life years. The Global Burden of Disease study looked at 291 different diseases and conditions. According to a 2010 study, neck discomfort is the fourth most disabling condition in terms of YLDs (years of life lost due to disability) and the 21st most burdensome condition overall.

In terms of the continent of Asia, the prevalence of neck discomfort was found to be at its highest in the west and the middle of the continent, but it was found to be relatively lower in the southern half of the continent. In this region, the occurrence of neck discomfort varies greatly depending on the age range. There was a prevalence of neck discomfort ranging from 31.1% to 32.2% among people whose ages ranged from 45 to 64 years, 65 to 74 years and 75 years and older respectively. On the other hand,

people whose ages ranged from 18 to 44 years old revealed a lower prevalence of 23.9% (Paul, 2008).

According to Chiu et al. (2011), the prevalence of cervical disc prolapse among people who have desk jobs in Hong Kong was 25.2%. It was observed that 47 percent of computer operators in India suffer from cervical disc prolapsed on a regular basis. The majority of the people who took part in the study were between the ages of 30 and 50 years old. In contrast, Radhakrishnan et al. (2015) shown that females are more likely to experience persistent cervical disc prolapse and to suffer from it. According to a study conducted in Pakistan by Sabeen et al. (2013), which classified work-related neck diseases across various employees, the highest prevalence was identified among Pakistani computer users (72%), as opposed to bank personnel (45.7%). In addition, Mansoor et al. (2013) discovered that cervical disc prolapse had the highest prevalence, which was 28.6% of the population (Jahan et al., 2015) reported that the prevalence of cervical disc prolapse was 39.64% among sewing workers in a textiles industry in Sri Lanka. However, no relevant study has been identified on the prevalence of cervical disc prolapse among Bangladeshi people as of this date.

Cervical Disc Prolapse is the second most often seen health problem in physical therapy. Cervical radiculopathy has an annual incidence of around 83.2 per 100,000 persons in the general population. Males are more afflicted than females and the frequency is greatest in the fifth decade (Hassan et al., 2020).

Cervical disc prolapse is caused by inflammation of the nerve roots and narrowing of the intervertebral foramina as a consequence of disc prolapse. Symptom pattern and location may vary depending on the degree of the damaged nerve root. Cervical disc prolapsed & radiculopathy patients may appear with neck pain & discomfort and accompanying numbness or upper limb paralysis (Iyer & Kim, 2016).

Physiotherapy has demonstrated that treatments for cervical disc prolapse are both promising and effective. Other exercises emphasizing strength, endurance training, relaxation and stretching had shown a significant effect on cervical pain during short-term rehabilitation (Cleland et al., 2005). Manual treatment, on the other hand, is beneficial in alleviating symptoms and functional limitations in patients with cervical

disc prolapse and has been shown to improve postural and biomechanical performance. The McKenzie technique, which is often utilized in the treatment of lumbar radiculopathy, may also be used to treat radicular neck pain (Rathore, 2003). Only a few studies have explored oscillatory mobilization in conjunction with McKenzie exercises in the management of cervical disc prolapse (Cheng et al., 2015) enticing to conduct the following study.

The McKenzie technique (McKenzie, 1990) was first established in Sweden in 1985 and became popular in the 1990s as a therapeutic option for individuals with mechanical spine disorders. Physiotherapists in primary care nowadays often use this approach as a diagnostic tool as well as a therapy model. Although physiotherapists place a high premium on the approach (Turner & Whitfield, 1999), there is less empirical evidence that McKenzie therapy is useful for individuals suffering from cervical disc prolapse. No randomized clinical studies comparing the McKenzie technique to other therapy methods have been published (Rosenfeld et al., 2000).

There is minimal evidence that physiotherapeutic treatments are useful for people with cervical disc prolapse, owing to a lack of thorough research. Active physiotherapy, electromagnetic treatment, manipulation and mobilization have all been found to help patients with cervical disc prolapse in randomized clinical studies (Aker et al., 1996). As such, the goal of this study is to assess the efficacy of McKenzie manipulative therapy in the treatment of cervical disc prolapse.

The majority of the population suffers from cervical disc prolapse at some time in their lives, which interferes with their work, leisure, and day-to-day activities. Neck pain & discomfort has an impact on both physical and psychological well-being. Neck discomfort affects both men and women equally between the ages of twenty-five and sixty. Many treatments for cervical disc prolapsed are widely accessible; however numerous types of exercises may be discovered, with the focus on improved therapy. This particular study would require figuring out the efficiency of McKenzie manipulative technique workout as well as Conventional therapy for cervical disc prolapse patients, restoring purposeful capability and boosting spinal extension in chronic neck ache.



## **1.2 Rationale**

Cervical disc prolapse is a musculoskeletal disorder, and it is true that the percentage of neck pain sufferers is relatively low compared to the incidence of low back pain. According to modern science, the incidence of cervical disc prolapse is on the rise in Bangladesh, as it is worldwide. Conventional therapy and McKenzie techniques are both forms of hand-operated treatment designed to reduce radiating pain and increase range of motion. Effective and efficient care of severe neck pain is advised; so, the purpose of this analytical study was to determine the efficacy of both techniques in treating cervical radiculopathy associated with disc prolapsed. The purpose of this study is to determine the effectiveness of the McKenzie approach to physiotherapy treatment for patients with cervical disc prolapse. In our country, patients are not advised to undergo physiotherapy for their recuperation, despite the fact that many of them have excellent outcomes and recover completely from their condition. In this situation, the researcher wishes to determine the effectiveness of physiotherapy treatment for such patients.

### **1.3 Objectives of the study**

#### **1.3.1 General Objectives**

To identify the effectiveness of McKenzie manipulative therapy for pain, function and disability among cervical disc prolapse patients.

#### **1.3.2 Specific Objectives**

- i.** To find out the effectiveness of McKenzie manipulative therapy for PCID patients.
- ii.** To explore socio-demographic (age, gender, occupation, educational status) characteristics of patients with Cervical Disc Prolapse.
- iii.** To evaluate the outcome of pain in different functional position after receiving treatment.
- iv.** To determine the disability level due to PCID.
- v.** To explore the socio-demographic variables and their association with disabilities.

## **1.4 Hypothesis**

### **Null-Hypothesis**

Where there is no effectiveness of McKenzie manipulative therapy in cervical disc prolapse patients.

$H_0 : \mu_1 - \mu_2 = 0$ , where the experimental group and control group initial and final mean difference is same.

### **Alternative Hypothesis**

Where there is effectiveness of McKenzie manipulative therapy for cervical disc prolapse patients.

$H_a : \mu_1 - \mu_2 \neq 0$ , where the experimental group and control group initial and final mean difference is not same.

## 1.5 Operational Definition

**Cervical Disc Prolapse:** A disorder known as cervical disc prolapse occurs when the inner gelatinous substance of the disc leaks out through a tear in the outer fibrous ring. This results in a compression of the spinal cord or the nerves in the surrounding area, which can cause pain in the neck or the arms. There are a few different names for a herniated disc, including bulging disc, ruptured disc and slipping disc.

**Cervical Radiculopathy:** If one of the nerve roots that are located close to the cervical vertebrae is compressed, this can cause injury to the nerve or a disturbance in the nerve's normal function. This condition is known as cervical radiculopathy. Pain and a lack of sensation along the nerves are two symptoms that can be caused by damage to the nerve roots in the cervical region.

**Musculoskeletal Disorders:** Musculoskeletal disorders are a set of illness that affects the nerves, tendons, muscles and supporting structures such as the intervertebral discs. Musculoskeletal disorders can range in severity from mild to severe.

**McKenzie Approach:** A theory suggests that positioning, mobility and manipulation might help with the phenomena of centralization of peripheral symptoms.

**Directional Preference:** Directional preference is described as repetitive motions in a direction that alleviates, centralizes or eliminates symptoms and/or elicits a favorable mechanical response. Extension, flexion, lateral or combinations of these forms are possible. Although this is subject to alter with therapy.

**Conventional Physiotherapy:** The treatment of movement issues that are caused by impairments of joints and the muscles that move the joints is what is widely thought to be the scope of traditional physiotherapy. The term "movement problems" refers to any condition that prevents an individual from moving normally.

Cervical disc prolapse is a condition characterized by malfunctioning of the cervical nerve roots, most typically shown by pain radiating from the neck to the afflicted root (Rhee et al., 2007). Thoomes et al. (2012) presented a revised description of cervical radiculopathy as radiating pain in the arm along with motor, reflex and/or sensory alterations (such as paraesthesia or numbness) that is exacerbated by neck posture(s) and/or movement (s). This condition is caused by space-occupying lesions such as herniated cervical discs, spondylosis or osteophytosis. Pain, numbness, weakness and paresthesia in the upper extremities may be caused by these lesions that take up space in the cervical spine's bony and ligamentous components (Cleland et al., 2005).

Both mechanical nerve compression from the protrusion of the nucleus pulposus and a local increase in inflammatory cytokines have been linked to the pathophysiology of herniated discs. Micro-vascular injury is caused by compression forces and ranges from mild compression causing venous flow restriction and congestion or edema to severe compression causing arterial ischemia (Cleland et al., 2005). Inflammatory cytokines such as interleukin (IL)-1 and IL-6, substance P, bradykinin, tumor necrosis factor-alpha and prostaglandins can be produced in response to herniated disc material and nerve irritation. Stretching the nerve root could cause the symptoms to reappear. The cervical nerve is vulnerable to both compressions from a herniation and stretching due to its trajectory as it exits the neural foramen. Abducting the arm reduces pressure on the nerve, which may help relieve pain for certain people (Doughty & Bowley, 2019).

The incidence of cervical disc prolapse is highest in the West and the Midwest of Asia, and lowest in the South. Those with lower socioeconomic status are more likely to report having a cervical disc prolapse. Cervical disc prolapse had an incidence of between 31.1% and 32.2% among those aged 45 to 64 years, 65 to 74 years and 75 years and older, but only 23.9% among those aged 18 to 44 years. Prevalence rates of cervical disc prolapse ranged from 18.0% in white women to 16.8% in Hispanic women to 13.2% in white men to 12.0% in African American women (Paul, 2008). Patients with long-lasting pain experience a variety of negative attitudes and suspicion from healthcare providers, colleagues, family members and friends. Chronic pain is widespread in Europe, and it has a detrimental impact on many elements of quality of

life. For 19% of European adults, living with moderate to severe chronic pain is a daily reality, severely impacting their ability to participate in social and professional activities (Breivik et al., 2006). Complaint of Arm Neck & Shoulder among computer office workers has significantly increased not only in 8 western industrialised countries but also in emerging countries like Sudan and Sri Lanka as a result of the recent growth in computer-related employment as a consequence of rapid industrialization. Cervical disc prolapse affects 36.7 percent of computer-related workers in Sri Lanka. Secondary prevention in people already experiencing symptoms may also benefit from correcting harmful workplace postures and implementing ergonomic modifications (Ranasinghe et al., 2011). The most prevalent cause of disability is a herniated disc in the cervical spine. According to age and gender, 14.6% of the population is affected by cervical disc prolapse and impairment. Cervical disc prolapse is a debilitating illness that often progresses through remission and exacerbation phases. Most people with cervical disc prolapse do not recover fully from their symptoms and incapacity, which runs counter to popular opinion (Cote et al., 2003).

Cervical disc prolapse causes substantial disability in about 5% of adults. People who are inactive, have a history of neck trauma, use the keyboard and mouse for more than 6 hours per day, sit at their desk for more than 2 hours without a break and spend more than 2 hours on computer-based tasks are at a higher risk of developing cervical disc prolapse and becoming disabled as a result (Johnston et al., 2008). Pain in the cervical, upper back and shoulders is a common complaint among working-age people. Studies have shown that severe cervical disc prolapse is strongly associated with difficulty grasping small objects and loss of manual dexterity, despite the fact that most reported cervical disc prolapse is relatively mild and causes only minor limitations. This accounts for nearly 5% of the working population. Chronic fatigue, sleep disturbance, excessive rest and withdrawal from activities and mood disorders are all symptoms of pain, even if the underlying etiology is unknown (Korkmaz et al., 2011).

Individual and biomechanical risk factors in the workplace have been linked to musculoskeletal illnesses. These conditions tend to progress slowly, last for a long time and are frequently neglected. One of the most prominent symptoms of work-related musculoskeletal problems is pain, but there are numerous others as well. Loss of function and escalating pain are both possible outcomes of chronic pain. Symptoms include chronic pain and an inability to do daily tasks that might linger for years (Coury et al., 2009). In many professions, neck problems caused by work constitute a serious health issue. Over the past few decades, there has been an increasing focus on the prevalence of musculoskeletal problems in the workplace among computer users. Thirty-one computer operators from a communication corporation participated in the current investigation. There were around 55.4% females and 44.6% males. Work experience, obesity, monotonous tasks, emotional stress and frequent headaches have all been linked to an increased risk of cervical disc prolapse among computer users (Hagag et al., 2011).

Characteristics that cervical disc prolapse is strongly linked to physical burden, including repeated movements, static posture, uncomfortable posture and neck flexion or rotation. There are 37 individual joints in the cervical spine and it is their job to facilitate the many motions of the head and neck in relation to the trunk as well as to support the body's specialised sensory organs (such as the visual, auditory, gustatory, tactile and proprioceptive systems). When compared to the protective structures of the skull and thorax, the seven tiny cervical vertebrae's ligamentous, capsular, tendinous and muscular attachments seem inadequate. Because forwards have a more physically demanding role, they may be more likely to experience aberrant cervical functional characteristics than backs. Cervical pain patients are less able to reposition their heads on their bodies after making a conscious movement of the head (Gemmel & Dunford, 2007). The neck and arms may be affected by the societal burden of mechanical cervical disc prolapse. Pain in the neck or shoulders that persist after adjusting the neck's position, moving the neck, or palpating the cervical muscles is considered to be mechanical cervical disc prolapse. Patients with mechanical, idiopathic, subacute cervical disc prolapse often benefit from physical therapy and manual treatment is often the recommended technique (Hernandez et al., 2012). The upper limb is attached to the trunk via the cervical spine and the shoulder blades. Cervical disc prolapse may result from mechanical stress of the upper limbs, either directly as a

result of increased mechanical loading on the articular and ligamentous structures of the neck or indirectly as a result of protective spasm (Gorski & Schwartz, 2003).

Cervical disc prolapse is often accompanied by discomfort in other areas, such as the shoulders, jaw or back. Cervical disc prolapse, no matter how severe, might reduce your quality of life. Pain, stiffness or an inability to turn the head from side to side, grinding noises or a headache are all symptoms of nerve irritation caused by subtle differences in neck architecture. Prior neck injury was found to be a significant risk factor for cervical disc prolapse within a year following the baseline study by Croft et al. (2001), regardless of gender or mental health status. The cervical vertebrae and spinal cord aren't the only important structures for the neurological system, cardiovascular system and respiratory system that call the human neck home. It appears that rear-end crashes are the primary cause of over half of the injuries, the majority of which are to the neck. The neck is a slender column that can support axial and a variety of bending loads. Neck injuries can be extremely severe or even fatal. Lesions to the spinal cord at higher cervical levels increase the probability of death, while injuries to the spinal cord at lower levels increase the likelihood of paralysis, as stated by Chen et al. (2011).

Pain, tight soft tissues, imbalances in muscular activity or strength, muscle exhaustion and the cervical and thoracic curves are all factors that could throw off the cervical spine's natural curve. Altered scapular alignment has been linked to changes in cervical and thoracic alignment, as well as slouched posture. According to research by Helgadottir et al. (2011), altered cervical alignment is a significant mechanism influencing cervical and scapular kinematics. When a person experiences cervical disc prolapse, they typically feel it in the area bounded by the T1 spinous process, the lateral margin of their neck and the superior nuchal line. The anatomical places from which the discomfort in the neck appears to be emanating, regardless of the true cause of the pain, Cervical disc prolapse is a condition. Spondylosis, disc degeneration, zygapophyseal joint trouble, torticollis, Paeget's disease etc. are all possible causes of a slipped cervical disc. Prolapse of a disc in the neck is a common cause of headaches. One-seventeenth of patients experience both headaches and cervical disc prolapse (Bogduk, 2003).



Pain and stiffness in the neck can radiate to the shoulders, upper arms, hands and even the head. There are typically three distinct categories of cervical disc prolapse. Radiculopathy and myelopathy accompany axial pain in the neck. Acute and chronic cervical disc prolapse are the only two categories that all three of these conditions fall into. The rising disability load and compensation expenditures due to occupational accidents to the neck are largely responsible for the increased focus on neck discomfort. Although the absence of pain and other symptoms is often seen as evidence of recovery, their total resolution is not required. When an individual's symptoms have diminished to a manageable degree or when their level of pain or functional impairment has stabilized, they may be considered to have recovered (Cote et al., 2003). Musculoskeletal problems may be brought on by a combination of lifestyle and occupational factors. Work-related back and neck diseases are strongly linked to physical load risk factors such as lifting or carrying loads, whole-body vibration, prolonged periods of inactivity and frequent bending and twisting. Injuries to the lower back and/or neck are linked to mental health issues, according to research (Shah & Dave, 2012).

Locating the primary causes of neck pain and more specifically, the modifiable risk factors is crucial. It has been suggested that work-related activities may contribute to the development of neck diseases (Palmar et al., 2001). Previous research has shown that neck pain can have an impact on people's ability to participate in social activities like going out, interacting with their families, going on vacation and participating in hobbies. Heavy lifting, repeated motions, sitting for long periods of time and working at a fast pace are all physical causes of neck pain. In terms of mental health, neck pain has been linked to poor sleep quality, impaired concentration and attention and increased anxiety and sadness (Leonard et al., 2009).

Inflammation, sprains and strains are all potential causes of sudden neck pain. Disorders of the neural tissue, sprains of the spinal ligaments and degeneration of the facet joints are all potential causes of neck pain. Injuries and exhaustion of the muscles are also possible contributors. Pain can also originate in the intervertebral discs. Sixty-eight percent of those who reported having neck pain in a study examining the prevalence and risk factors for neck pain also reported working in a negative psychosocial environment. Up to 22% of the population suffers from neck

pain, with 44% seeking treatment from a primary care physician for persistent pain. Thirty percent of people who visit a doctor for neck discomfort also complain of arm pain or radicular symptoms (Miller, 2008). Mechanical neck pain is very common in the general population and it places a heavy financial strain on society. Joint mobilisation and manipulation are two manual techniques that physical therapists frequently use when treating patients with neck pain. Manual therapy interventions are one treatment option suitable for individuals with neck pain, despite the fact that the efficacy of mobilisation and manipulation of the cervical spine has not been well established. Patients presenting with primary neck dysfunction have their pain immediately alleviated and their range of motion in the cervical region increased after thoracic spine manipulation (Cleland et al., 2005).

Pain in the cervical area is the primary symptom of mechanical neck pain, which is often characterized by limited mobility and impaired function. Many structures in the cervical region, including the spine and soft tissues, are possible pain sources. Vibration, neck flexion, poor posture while seated and lifting heavy objects are all physical load variables that can lead to mechanical neck pain. It has been suggested that social factors contribute to and maintain neck pain. While the majority of people with mechanical neck pain never see a doctor whereas 40 percent do. Thirty percent are sent to a specialist for additional diagnosis, while 32 percent are sent to a chiropractor, physical therapist or other form of conservative care (Vonk, 2010). The majority of cases of sudden neck pain after exercise do not warrant any sort of diagnostic testing. Cervical sprain, cervical disc herniation, cervical spinal stenosis and cervical spondylosis (or osteoarthritis of the neck) is all examples of common mechanical diagnoses for neck pain. Red flags or constitutional symptoms shouldn't be included in the history. In most instances of neck pain, laboratory examinations have a relatively limited role. The ability of the doctor to give appropriate care is substantially improved when laboratory tests are used judiciously (Dreyer & Boden, 2003).

Renal cell carcinoma and multiple myeloma are two of the possible causes of metastasis. Patients with spinal involvement and localized discomfort are candidates for surgical decompression as part of their treatment. Clinical advancement may call for additional surgery or chemotherapy; thus, it's important to monitor the patient

closely throughout the course of time (Casey et al., 2004). Many patients seeking primary health care for musculoskeletal disorders, who would traditionally have been booked for assessment and treatment by a general practitioner, could instead be adequately assessed and managed by physiotherapists, despite the fact that the number of patients with spine problems has increased by 65% in less than a decade. Moreover, the physiotherapist's main assessment was well received by patients (Ludvigson & Ethovan, 2012). General Physician's are the go-to for initial diagnoses and ongoing management of neck discomfort and they have considerable leeway in the kinds of therapies they employ. When dealing with neck pain, it is common practice to just observe the patient and if necessary, refer them to a physiotherapist. What kind of doctor you see, whether or not they have a special interest in treating neck pain and how long and severe your disease has been all factor into your decision about what kind of treatment to pursue. Treatment options for non-specific neck discomfort that do not indicate a significant pathology include exercise training, mobilisation, manipulation, acupuncture, analgesics and low-level laser (Wermeling, Scherer, & Himmel, 2011).

Cervical radiculopathy (CR) is a term that refers to radiating pain in the arm along with motor, reflex and/or sensory alterations (such as paresthesia or numbness) that are caused by abnormal neck postures and/or movements (Kuijper et al., 2009). It is most often caused by a herniated cervical disc or spondylotic alterations such as bone spurs, which compress and/or inflame the nerve roots (Kuijper et al., 2009). CR affects the C6 and C7 segments the most, with an annual frequency of 63.5 to 107.3 cases per 100,000 persons (Radhakrishnan et al., 1994; Kim et al., 2016). There is an annual incidence of 83.2 per 100,000 persons with cervical radiculopathy (CR) in physical therapy and the frequency rises in the fifth decade of life (Wainner & Gill, 2000).

In terms of management, there are two primary approaches: conservative measures and surgery. Clinical recommendations published in 2011 and 2018 advocate for exercise, manual treatment and non-steroid medications (Bono et al., 2011). Additionally, evidence has been shown that both surgical and conservative procedures result in 2-year improvements, with no statistically significant differences between them (Weinstein et al., 2006). Clinicians and academics have debated the best therapy

for CR, with current data suggesting that conservative treatment is more beneficial than surgical treatments (Costello, 2008), because surgery carries a modest but real risk (Nikolaidis et al., 2010). In the absence of significant neurological impairments, conservative care is recommended as a first line of therapy (Van Middelkoop et al., 2013). There is equivocal or low-level data on manual treatment and no one strategy can be suggested by other authors (Salt et al., 2011). Conservative treatment for cervical disc prolapse often consists of therapeutic exercise (ROM, strength), manual therapy (muscle energy techniques, non-thrust mobilization and manipulation), modalities (cryotherapy, traction), massage therapy and medicines (Cleland, et al., 2005).

Physical therapists may specialize in passive manual (or "hands-on") treatments, which may include mobilization or manipulation (high-velocity thrust techniques), often known as manual therapy (Gross et al., 1996). Manual therapy is a kind of conservative treatment that is administered by specialist physical therapists, chiropractors and osteopaths, as well as sometimes by other health care practitioners. It is believed to have a number of beneficial benefits, including increased tissue extensibility and range of motion, relaxation, altered muscle function, pain modulation and decrease of soft tissue edema and inflammation (Mintken et al., 2008). Cervical traction, postural education, exercise and manual therapy performed to the cervical and thoracic spines are common physical therapy methods for the management of cervical disc prolapse (Gupta et al., 2013). There is some evidence that a combination of these therapies may lead to better results for people with this condition (Ruivo, Carita, & Pezarat-Correia, 2016). When it comes to treating musculoskeletal problems, MT may be a helpful modality for reducing pain, increasing range of motion (ROM) and modifying muscle function (Thoomes, 2016). There is a dearth of information on the usefulness of manual therapy in treating CR (Boyles et al., 2011). Optimal therapeutic techniques for people with cervical disc prolapse remain unclear.

There are systematic studies on the use of manual physical therapy to address the wide category of mechanical neck discomfort (Gross et al., 2010). Gross and colleagues, for example, evaluated the effects of graded mobilization or manipulation in the treatment of neck discomfort and found evidence to indicate that a course of

cervical manipulation or mobilization may provide some short-term relief. Additionally, they discovered evidence to support the use of thoracic manipulation to alleviate neck discomfort immediately (Gross et al., 2010). No systematic studies have been conducted to yet on the use of manual therapy in the treatment of cervical disc prolapse.

McKenzie, when used to treat derangement syndrome, extends the lower cervical segments, relieving stress on the posterior annulus and thereby relieving pain. Repeated neck retraction was demonstrated to result in a substantial reduction in peripheral pain and nerve root compression in individuals with neck and radicular discomfort, while neck flexion resulted in an increase in peripheral pain and nerve root compression. Additional advantages are possible. Individuals adopted a less prolonged posture after repeated neck retraction motions in a study of healthy participants. McKenzie's method incorporates postural awareness and repeated movement with the underlying belief that a converse power may alleviate pain and restore function (Diab et al., 2016). McKenzie intervention is a comprehensive strategy for consideration used by physical therapists that emphasizes self-treatment and increases pain awareness in relation to posture and spinal growth. McKenzie directed directional exercises repeated throughout the day may provide another avenue for modifying pain expectation and associated fear beliefs, eventually leading to the repair of functional impairments (Al-Obaidi et al., 2013).

The McKenzie protocol, which is often used to treat back problems, may also be used to treat neck pain, although there is inadequate evidence available to assess the McKenzie protocol's effectiveness on patients with non-specific neck pain since 2004. As a result, more study addressing these challenges is necessary (Clare, Adams, & Maher, 2004). As such, the purpose of this study was to determine the efficacy of the McKenzie manipulative therapy on non-specific chronic neck pain, cervical disc prolapse with radiculopathy.

**3.1. Study design**

This study was a Randomized Control Trial Study. There were two groups in this study that were experimental and control groups. There were an absolute (control) group and an experimental group where intervention was applied according to protocol. It was a double-blinded study where the assessor and participants were blinded.

**3.2 Study site**

Data was collected from the outpatient, Musculoskeletal Physiotherapy Unit of Centre for the Rehabilitation of the Paralyzed (CRP), Savar, Dhaka. These patients came to CRP from all across Bangladesh from all economic categories for complete rehabilitation, reflecting the whole community.

**3.3 Study population**

Patients with cervical disc prolapse who visited the Musculo-skeletal Unit of the Physiotherapy Department at CRP, Savar, Dhaka, was the study population.

**3.4 Study duration**

The duration of the study was 1st September, 2022 to 30<sup>th</sup> April, 2023.

**3.5 Sampling Techniques**

Hospital-based Randomization Technique organized by computerized technique through Microsoft Excel worksheet version 10. The samples were allocated in two different groups through concealed allocation.

**3.6 Sample size**

According to the inclusion and exclusion criteria researcher was selected 42 samples where 21 in experimental group and 21 in control group.

### **3.7 Selection Criteria**

#### **3.7.1 Inclusion criteria:**

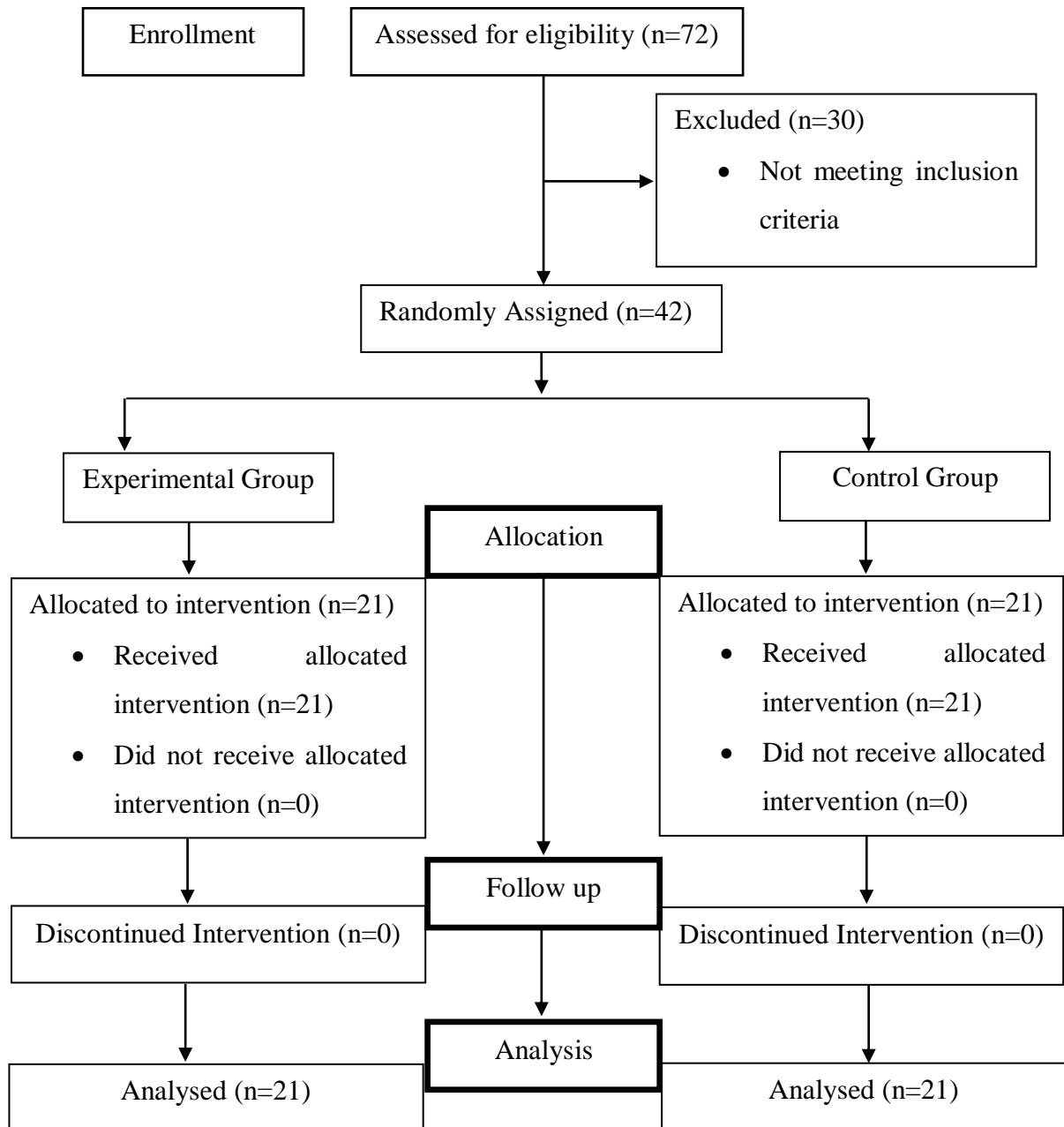
- Male and Female were same prioritize
- Cervical disc prolapse with neck pain with unilateral or asymmetrical radiculopathy by confirming with an MRI.
- Age range: 15-55 years. This age range was selected because most of the people around the age range showed most prevalent time of neck pain in their life (Gautam, et al., 2014).
- Cervical spine hypo-mobility with cervical PCID.
- Radiating discomfort from the neck to the upper limb for more than three months.
- Included those who showed willingness to participation: Included these patients because they provided written consent form and might be helpful or might not leave treatment during the study (Gautam, et al., 2014).

#### **3.7.2 Exclusion criteria:**

- Cervical spine fracture. Patients who were suffering from serious pathological disease e.g. tumours, tuberculosis and others pathological problems.
- Instability of the cervical spine/subluxation/spondylolisthesis.
- Radicular symptoms in both upper extremities.
- Insufficiency of the vertebrobasilar artery insufficiency.
- Cervicogenic headache
- Vertigo
- Dizziness
- Syndrome of the thoracic outlet
- Diagnosis of secondary complications such as tumour, TB spine, fracture, dislocation and severe osteoporosis, Paget's disease.
- All sorts of infection, Rheumatoid Arthritis, Ankylosing Spondylitis.
- Compressive cervical myelopathy.
- Surgery of the cervical spine.

### 3.8 Method of Data collection

#### CONSORT flow diagram



**Figure 1:** CONSORT flow diagram of the progress through the phases of a parallel randomized trial of two groups.



### **3.8.1 Measurement**

To conduct this study, the researcher collected data through using different types of data collection tools. The literature review and selection of pertinent questions from both the international standard questionnaire and our country's perspective formed the basis for the development of the questionnaire. The interviewer will employ a structured questionnaire in order to elicit data on important issues. The researcher was used structured questionnaire included-

- DALAS pain questionnaire by using Visual Analogue Scale (VAS) for pain measurement.
- Neck Disability Index (NDI) was used for disability measurement.
- Structural questionnaire was used for socio-demographic indicators.

#### **3.8.1. a Visual Analogue Scale (VAS)**

The researcher in this study utilized a visual analogue scale to determine how severe the pain was. The Visual Analog Scale (VAS) provides a quick and reliable method for gauging an individual's level of pain over a gradient display. Pain is measured along a continuous scale known as a visual analog scale (VAS). With 0 signifying no pain and 10 representing the worst anguish imaginable, the endpoints of the line reflect the extremes of the pain scale. Pain is commonly measured using the visual analog scale (VAS) and a change in the VAS score indicates a relative change in the intensity of the pain experience (Kumar, 2010).

#### **3.8.1.b Modified Dallas Pain Questionnaire (DPQ)**

The researcher employed the Dallas pain scale, a Visual Analogue Scale (VAS) for measuring pain, taking into account the viewpoints of those living in this country. The DPQ included 15 questions about many aspects of daily life, including pain, severity, self-care, lifting, standing, sitting, walking and sleeping, as well as professional and recreational activities (Kumar, 2010). For this study, we made a few tweaks to the questionnaire. Each end of the scale is assigned a descriptive name (for instance, "no pain in left," "all the time severe pain in right," etc.). The patient indicates his or her current state on the scale by marking a number for each question. Data from the Dallas pain questionnaire is collected and analyzed using SPSS version 22.

### **3.8.1.c Neck Disability Index (NDI)**

This is a collection of questionnaires that has been developed with the intention of providing information regarding the impact that the patient's neck pain has on his or her capacity to function normally in day-to-day activities. Vernon and Mior (1991) created what is now known as the Neck Disability Index (NDI). The NDI is broken up into ten distinct categories of questions, each of which has a graded scale of six different defined statements. If the initial statement is marked, the section score is equal to zero; however, if the last statement is noted, the section score is equal to five. The maximum possible score for each section is five. The test-retest reliability of the NDI was investigated by Cleland et al. (2008) for a population of patients who were suffering from mechanical neck discomfort. The findings of this research indicate that the NDI has only a moderate degree of consistency when it comes to test-retest reliability. In a similar vein, the findings of the research conducted by Young et al. (2010) reveal that the NDI demonstrates only a fair level of test-retest reliability. This value is lower than the values reported by Cleland et al. (2008) in patients who had mechanical neck discomfort or cervical disc prolapse. A researcher will collect information relevant to the Neck Disability Index (NDI), which will then be examined using SPSS software version 22.

### **3.8.2 Measurement Tools**

All questionnaires designed to conduct the interviews. Questionnaires, consent form, paper, pen and pencils were all properly put together.

### **3.8.3 Data collection procedure**

Patients were evaluated, baseline data were recorded, treatment was administered, and final data were recorded as part of the data collection process. Patients were evaluated by a graduate physiotherapist following an initial screening in the department. Everyone who took part received 12 individual therapy sessions. The researcher used a pre-test, an intervention and a post-test to collect data and the data were recorded on a written questionnaire form (Appendix- F). Before starting treatment, a preliminary examination was conducted, during which pain was measured using the Dallas pain questionnaire's visual analogue scale and impairment was measured using the Neck disability index. After 12 sessions of therapy, the same method was used to administer

a post-test. Each patient was given an assessment sheet before therapy began and again after 12 sessions. The patient was instructed to mark the subjective portion, while the physiotherapist filled out the objective portions (such as the Dallas pain questionnaire and the Neck Disability Index). Both the trial and control group data were taken in the presence of the Physiotherapist to reduce the possibility of bias.

### **3.9 Interventions**

The McKenzie manipulative therapy will be delivered to the experimental group for the cervical spine. The McKenzie manipulative therapy will consist of repeated movements, typically include retraction in lying or sitting; retraction extension in lying or sitting; and lateral movements of either side gliding or rotation and manipulative approach to the individual segments of cervical spine. Those movements will be performed by the participants at therapy sessions and at home. The dose of the McKenzie manipulative therapy (repeated movements) will have prescribed as 10 repetitions of directed movements, 2-3 hourly in 14 hours or most awaken time of a day and for 12 weeks. The manipulative approach will be performed by Physiotherapists for 10 repetitions in a single “on/off” maneuver for 5 minutes for 12 sessions in 4 weeks. And on the other hand the control group will be received Conventional therapy for 5 minutes, oscillatory movements for 60-120 repetitions per minute with 10 repetitions in each segment of the cervical spine. Both groups will be received 10 minutes of TENS. Dynamic shoulder stabilization exercise with a home advice indicating the proper way, how will they do the exercise. All of the interventions ended up after 4 weeks from the initial day of treatment. Intervention will be given by trained qualified physiotherapist in the experimental group.

An intervention protocol was delivered to the participants (see the Appendix- D).

### **3.10 Data Analysis**

The current version (v 22) of the Statistical Package for the Social Sciences (SPSS) was used for the statistical analysis.

#### **Estimated predictor**

Using a paired t-test or an unrelated t-test, we tested the null hypothesis that there was no significant difference in means between the experimental and control groups, both

within and across groups, assuming that the parent population followed a normal distribution.

## **Hypothesis Test**

### **Paired t-test**

Using the Paired t-Test, the difference between the means of paired variables was compared. The selection criterion for testing the hypothesis is the mean difference under the t distribution.

### **Assumption**

Related variables

Quantitative variables were used

Normality in the parent population of the sampled observation is assumed.

### **Null and alternative hypothesis**

Where there is no effectiveness of Mckenzie Manipulative therapy for cervical disc prolapse patients.

Ho:  $\mu_1 - \mu_2 = 0$ ; where the experimental group and control group initial and final mean difference was same.

Where there is effectiveness of Mckenzie Manipulative therapy for cervical disc prolapse patients.

Ha:  $\mu_1 - \mu_2 \neq 0$ ; where the experimental group and control group initial and final mean difference was not same.

Here,

Ho= Null hypothesis

Ha= Alternative hypothesis

$\mu_1$ = Mean difference in initial assessment

$\mu_2$ = Mean difference in final assessment

**Formula:** test statistic t is follows:

$$t = \frac{\bar{d}}{SE(\bar{d})} = \frac{\bar{d}}{\frac{SD}{\sqrt{n}}}$$

Where,

$\bar{d}$ = Mean of difference (d) between paired values

SE ( $\bar{d}$ ) = Standard Error of the mean difference

SD= Standard deviation of the differences

n= Number of paired observation.

Calculation of paired t value of the general pain intensity as below-

$$t = \frac{\bar{d}}{SE(\bar{d})} = \frac{\bar{d}}{\frac{SD}{\sqrt{n}}} = \frac{4.3}{\frac{2.385}{\sqrt{10}}} = \frac{4.3}{0.754} = 5.701$$

### Unrelated t-test

To compare the difference between two means of independent variables, an unrelated t test was utilized. Two independent mean differences under independent t distribution were chosen for the test of the hypothesis.

### Assumption

Variables that are distinct from one another.

Quantitative variables were used.

Variables follow a normal distribution.

**Formula:** test statistic t is follows:

$$t = \frac{\bar{x}_1 - \bar{x}_2}{S \sqrt{\frac{1}{n_1} + \frac{1}{n_2}}}$$

Where,

$\bar{x}_1$ = Mean of the Experimental Group

$\bar{x}_2$ =Mean of the Control Group

$n_1$ = Number of participants in the Experimental Group

$n_2$ = Number of participants in the Control Group

S = Combined standard deviation of both groups

Calculation unrelated t value for general pain intensity:

Where,

$$S = \sqrt{\frac{\sum(x_1 - \bar{x}_1)^2 + \sum(x_2 - \bar{x}_2)^2}{n_1 + n_2 - 2}} = \sqrt{\frac{62 + 54}{5 + 7 - 2}} = 3.406$$

Here,

$\bar{x}$  = Mean of the experimental Group

$\bar{x}$  = Mean of the experimental Group

$x_1$  = Individual value of the experimental group

$x_2$  = Individual value of the experimental group

$n_1$  = Number of participants in the Experimental Group

$n_2$  = Number of participants in the Control Group

$$t = \frac{\bar{x}_1 - \bar{x}_2}{S \sqrt{\frac{1}{n_1} + \frac{1}{n_2}}} = \frac{3.33 - 2.73}{1.686 \sqrt{\frac{1}{10} + \frac{1}{10}}} = \frac{0.60}{1.686 \times \sqrt{0.20}} = \frac{0.60}{1.686 \times 0.447} = \frac{0.60}{0.754} = 0.796$$

### Level of Significance

The study's significance was determined by calculating the "p" value. The probabilities of the outcomes of the experiment are represented by the p values. Probability indicates how likely it is that the findings are accurate. In health care research, a p-value of less than 0.05 was often considered to indicate statistical significance. Results are considered statistically significant if the p-value is less than or equal to the significance level (DePoy & Gitlin, 2015).

### 3.11 Ethical consideration

The study followed protocols established by the WHO and the Bangladesh Medical Research Council. The proposal for the dissertation, which includes the methodology, was accepted by the Institutional Review Board and received clearance from the appropriate official at the Bangladesh Health Professions Institute's (BHPI) Institutional ethical review committee (Appendix A). Researcher again obtained approval (Appendix- B) from the head of the physiotherapy department to access patient data-based management and allow full involvement of physiotherapists working in the musculoskeletal physiotherapy department at CRP in Savar, Dhaka-

1343, prior to beginning data collection. The study's participants' medical histories and treatments were kept totally confidential and the data collected from them will not be utilized for any other purpose. Each individual's participation in the study was authorized by a signed consent form provided by the researcher. All participants submitted signed copies of the informed consent form (Appendix- E). The participants refused to answer any questions and could end their involvement in the study at any time if they so desired. Patients who choose to withdraw from the trial were still offered physiotherapy services and maintained access to all study benefits. Each participant was given the opportunity to voice concerns and receives answers to all questions from CRP's administration and upper ranks.

### **3.12 Informed Consent**

Each person who participated in the study did so after providing informed consent to the researcher. Each person who took part in the study signed an informed consent form. It was made clear to the participants that they might consult an external doctor if they felt the treatment wasn't doing the trick or if their illness worsened. They were also told they could revoke their consent at any point or stop taking part in the study if they felt uncomfortable answering any questions. Patients who decide to withdraw from the trial should not see any changes to their care or access to physiotherapy facilities. Every participant got access to CRP's upper management in order to air grievances and get their questions answered.

## 4.1 Baseline characteristic of participants

Table I: Comparison of baseline characteristic of participants

Variable(s)		Experimental Group (n=21)	Control Group (n=21)
Age, (mean, SD)		39.95 ± 10.37	42.00 ± 14.15
Gender	Male	23.8%	33.3%
	Female	76.2%	66.7%
Occupation	Service holder	4.8%	19.0%
	Garments worker	4.8%	4.8%
	Businessman	19.0%	14.3%
	Housewife	66.7%	52.4%
	Student	4.8%	9.5%
Marital status	Married	95.2%	76.2%
	Unmarried	4.8%	19.0%
	Widowed	0.0%	4.8%
Family member	Small family	81.0%	85.7%
	Big family	19.0%	14.3%
Living place	Rural	23.8%	28.6%
	Urban	76.2%	71.4%
Smoking	Smoker	9.5%	4.8%
	Non-Smoker	90.5%	95.2%
Duration of pain	12-16 weeks	42.9%	38.0%
	16-20 weeks	23.9%	38.0%
	>20 weeks	33.2%	24.0%

Table I compares the baseline characteristics of participants between trial and control group. In trial group, the mean age ( $\pm$  SD) of the participants was 39.95 ( $\pm$ 10.37) years and in control group 42.00 ( $\pm$ 14.15) years. In trial group and control group, male and female ratio was quite like similar. Among the participants, (n=25) were



housewives (14 in experimental group and 11 in control group), (n=5) were service holder (1 person in experimental group and 4 persons in control group), (n=7) were businessman (4 persons in experimental group and 3 persons in control group), (n=1) were garments worker (1 person in experimental group and 0 person in control group), (n=1) were rickshaw puller (0 person in experimental group and 1 person in control group), (n=2) were student (0 person in experimental group and 2 persons in control group), and (n=1) were the others. Among the participants, most of them are married in experimental group that is 95.2% and unmarried were 4.8%, in control group married were 76.2%, unmarried were 19% and widowed were 4.8%. In this study, among the participants, in experimental group 81% had small family and 19% had large family, in control group where 85.7% were with small family and 14.3% with small family. In this study, 26% (n=11) participants were living in rural and 74% (n=31) participants were living in urban area. Among the 42 participants, 7% (n=3) were smoker and 93% (n=39) were non-smoker. In this study, in experimental group there were (n=9) people with pain lasting 12–16 weeks, (n=5) people with pain lasting 16–20, (n=7) people with pain lasting >20 weeks and in control group there were (n=8) people with pain lasting 12–16 weeks, (n=8) people with pain lasting 16–20 weeks, (n=5) people with pain lasting >20 weeks.

## 4.2 Dallas Questionnaire assessment within control and experimental group

Table II: Dallas Questionnaire (Initial and final assessment-Paired t-test)

Variables	Experimental Group		Control Group	
	t	Sig. (2-tailed)	t	Sig. (2-tailed)
General pain intensity	7.164	.000***	5.428	.000***
Pain intensity at night	5.403	.000***	4.498	.000***
Interfere with lifestyle	7.813	.000***	3.980	.001**
Pain severity at neck forward bending activity	6.199	.000***	3.860	.001**
Neck Stiffness	8.113	.000***	5.313	.000***
Interfere with Walking	6.372	.000***	1.933	.068
Pain During Walking	5.677	.000***	1.718	.101
Pain keep from standing still	5.071	.000***	4.561	.000***
Pain keep from twisting	4.256	.000***	3.614	.002**
Sit in upright hard chair	4.513	.000***	3.022	.007**
Sit in soft arm chair	5.357	.000***	2.726	.013*
Pain in lying in bed	3.801	.000***	5.218	.000***
Pain limit normal lifestyle	4.515	.000***	3.896	.001**
Interfere with work	6.670	.000***	4.655	.000***
Change of workplace	3.922	.001**	3.220	.004**

\*1% significant level

### 4.2.1 General pain intensity

According to the findings of this research, the level of general pain intensity had an observed t value of 7.164 ( $3.3 \pm 2.071$ ) in the experimental group during a two-tailed paired t test, whereas the level of general pain intensity had an observed value of 5.428 ( $3.4 \pm 2.854$ ) in the control group during the same test. 5% level of significance at 20 (twenty) degrees of freedom standard t value was 2.262 and observed t value in general pain intensity in both groups which were more than standard t value. This meant that the null hypothesis was rejected and the alternative hypothesis was

accepted in the within group. Both groups reached statistical significance at the 0.000% level with regard to the overall level of pain severity. The unrelated/independent t test for the group comparisons found a standard table value of 2.021 at a significance level of 5% and 40 degrees of freedom, but the observed t value was 1.083 at the same level of significance and the same degree of freedom. As the observed t value was lower than the value in the table, the null hypothesis was accepted and the alternative hypothesis was rejected. This indicated that there was no significant difference between McKenzie manipulative therapy and conventional therapy in the between group.

#### **4.2.2 Pain intensity at night**

According to the findings of this research, the level of pain intensity at night had an observed t value for the experimental group at a two-tailed paired t test was 5.403 ( $2.6 \pm 2.181$ ), but the observed value for the control group at the same test was 4.498 ( $2.9 \pm 3.008$ ) in within group. 5% level of significance at 20 (twenty) degrees of freedom standard t value was 2.262 and observed t value in pain intensity at night in both groups which were more than standard t value. This meant that the null hypothesis was rejected and the alternative hypothesis was accepted in the within group. Both groups showed statistical significance at the 0.000% level with regard to the level of pain experienced during the night. The unrelated/independent t test for the group comparisons found a standard table value of 2.021 at a significance level of 5% and 40 degrees of freedom, but the observed t value was 1.619 at the same level of significance and the same degree of freedom. As the observed t value was lower than the value in the table, the null hypothesis was accepted and the alternative hypothesis was rejected. This indicated that there was no significant difference between McKenzie manipulative therapy and conventional therapy in the between group.

#### **4.2.3 Interfere with lifestyle**

According to the findings of this research, interfere with lifestyle variable had an observed t value of 7.813 ( $3.3 \pm 1.927$ ) in the experimental group during a two-tailed paired t test, whereas interfere with lifestyle variable had an observed value of 3.980 ( $2.9 \pm 3.234$ ) in the control group during the same test. 5% level of significance at 20 (twenty) degrees of freedom standard t value was 2.262 and observed t value in

interfere with lifestyle in both groups which were more than standard t value. This meant that the null hypothesis was rejected and the alternative hypothesis was accepted in the within group. McKenzie manipulative therapy for Cervical Disc Prolapse patients was more effective than Conventional therapy for reducing pain and its interference with lifestyle. This was determined by comparing the means of the experimental group and the control group. The unrelated/independent t test for the group comparisons found a standard table value of 2.021 at a significance level of 5% and 40 degrees of freedom, but the observed t value was 0.886 at the same level of significance and the same degree of freedom. As the observed t value was lower than the value in the table, the null hypothesis was accepted and the alternative hypothesis was rejected. This indicated that there was no significant difference between McKenzie manipulative therapy and conventional therapy in the between group.

#### **4.2.4 Pain severity at neck forward bending activity**

According to this research, the observed t value for pain severity at neck forward bending exercise was 6.199 ( $3.4 \pm 2.500$ ) in the experimental group at two-tailed paired t test, but the observed value for this same variable in the control group was 3.860 ( $2.2 \pm 2.600$ ) in within group. 5% level of significance at 20 (twenty) degrees of freedom standard t value was 2.262 and observed t value in pain severity at neck forward bending activity in both groups which were greater than standard t value. This meant that the null hypothesis was rejected and the alternative hypothesis was accepted in the within group. McKenzie manipulative therapy for Cervical Disc Prolapse patients was more effective than Conventional therapy for reducing pain severity at neck forward bending activity. This was determined by comparing the means of the experimental and control groups and finding that the mean difference in the experimental group was greater than the mean difference in the control group. The unrelated/independent t test between groups found a standard table value of 2.021 at a significance level of 5% and 40 degrees of freedom, but the observed t value was 1.086 at the same level of significance and the same degree of freedom. As the observed t value was lower than the value in the table, the null hypothesis was accepted and the alternative hypothesis was rejected. This indicated that there was no significant difference between McKenzie manipulative therapy and conventional therapy in the between group.

#### **4.2.5 Neck stiffness**

According to the findings of this research, the observed t value for the variable of neck stiffness was 8.113 ( $3.6 \pm 1.990$ ) in the experimental group during a two-tailed paired t test, whereas the observed value for the control group during the same test was 5.313 ( $2.4 \pm 2.136$ ) in the within group. 5% level of significance at twenty (twenty) degrees of freedom standard t value was 2.262 and observed t value in neck stiffness in both groups which were more than standard t value meant that the null hypothesis was rejected and the alternative hypothesis was accepted in the within group. The level of significance for neck stiffness was 0.000% for both groups, but the mean difference for the experimental group was greater than the mean difference for the control group. This indicates that McKenzie manipulative therapy for patients with cervical disc prolapse was more effective than conventional therapy for reducing neck stiffness. The unrelated/independent t test for the group comparisons found a standard table value of 2.021 at a significance level of 5% and 40 degrees of freedom, but the observed t value was 0.818 at the same level of significance and the same degree of freedom. As the observed t value was lower than the value in the table, the null hypothesis was accepted and the alternative hypothesis was rejected. This indicated that there was no significant difference between McKenzie manipulative therapy and conventional therapy in the between group.

#### **4.2.6 Interfere with walking**

According to the findings of this research, interfere with walking variable had an observed t value of 6.372 ( $2.7 \pm 1.884$ ) in the experimental group during a two-tailed paired t test, whereas interfere with walking variable had an observed value of 1.933 ( $0.9 \pm 2.032$ ) in the control group during the same test. 5% level of significance at 20 (twenty) degrees of freedom standard t value was 2.262 and observed t value in interfere with walking in experimental group were greater than standard t value, which meant null hypothesis was rejected and alternative hypothesis was accepted in the within group; however, observed t value in interfere with walking in control group were less than standard t value, which meant null hypothesis was accepted and alternative hypothesis was rejected in the within group; overall, the results indicated that the alternative hypothesis was accepted in the McKenzie manipulative treatment for Cervical disc prolapse patients was beneficial for reducing pain and reducing

interference with walking, as measured by both the experimental group and the control group. The experimental group's results were significant at the 0.000% level, whereas the control group's results were statistically not significant at the 0.068% level. That means conventional therapy does not affect in interfere with walking. This could be caused by an imbalance in the muscles, shoulders that are rounded forward or slouched, stiffness, shallow breathing, or scrolling on a phone when the neck is bent forward. The unrelated/independent t test between groups found a standard table value of 2.021 at a significance level of 5% and 40 degrees of freedom, but the observed t value was only 1.058 at the same level of significance and the same number of degrees of freedom. As the observed t value was lower than the value in the table, the null hypothesis was accepted and the alternative hypothesis was rejected. This indicated that there was no significant difference between McKenzie manipulative therapy and conventional therapy in the between group.

#### **4.2.7 Pain during walking**

According to the findings of this study, the observed t value for pain experienced while walking was 5.677 ( $3.4 \pm 2.729$ ) in the experimental group during a two-tailed paired t test, but the observed value for the same variable in the control group was 1.718 ( $0.9 \pm 2.287$ ) in within group. 5% level of significant at 20 (twenty) degrees of freedom standard t value was 2.262 and observed t value in pain during walking in experimental group were greater than standard t value that meant null hypothesis was rejected and alternative hypothesis was accepted in the within group but observed t value in interfere with walking in control group were less than standard t value that meant null hypothesis was accepted and alternative hypothesis was rejected in the within group but observed t value in pain during walking in experimental group were significantly greater than standard t value. McKenzie manipulative therapy for Cervical disc prolapse patients was helpful for reducing patients' levels of pain while walking, as measured by an aspect of pain that was significant at the level of 0.000% in the experimental group but statistically not significant in the control group at the level of 0.101%, which indicates that the therapy helped patients experience less pain during walking. That means conventional therapy does not affect at all in pain during walking. This could be caused by an imbalance in the muscles, shoulders that are rounded forward or slouched, stiffness, shallow breathing or scrolling on a phone

when the neck is bent forward. The unrelated/independent t test for the group comparisons found a standard table value of 2.021 at a significance level of 5% and 40 degrees of freedom, but the observed t value was 0.688 at the same level of significance and the same degree of freedom. As the observed t value was lower than the value in the table, the null hypothesis was accepted and the alternative hypothesis was rejected. This indicated that there was no significant difference between McKenzie manipulative therapy and conventional therapy in the between group.

#### **4.2.8 Pain keep from standing still**

According to the findings of this research, the observed t value for the variable pain kept from standing still was 5.071 ( $3.0 \pm 2.625$ ) in the experimental group during a two-tailed paired t test, whereas the observed value for the same variable in the control group during the same test was 4.561 ( $2.0 \pm 1.962$ ) in the within group. 5% level of significance at 20 (twenty) degrees of freedom standard t value was 2.262 and observed t value in pain kept from standing still in both groups which were more than standard t value. This indicated that the null hypothesis was rejected and the alternative hypothesis was accepted in the within group. McKenzie manipulative therapy for Cervical Disc Prolapse patients was more effective than Conventional therapy for reducing pain keep from standing still. This was determined by comparing the means of the experimental and control groups and finding that the experimental group had a greater mean difference than the control group. The unrelated/independent t test for the between-group comparison found a standard table value of 2.021 at a significance level of 5% and 40 degrees of freedom; however, the observed t value for this comparison was 2.531 at the same level of significance and the same degree of freedom. The fact that the observed t value was higher than the table value indicated that the null hypothesis should not be accepted and that the alternative hypothesis should be accepted instead. This in turn indicated that there was a significant connection between McKenzie manipulative therapy and conventional therapy in between the groups. This significant result is due to McKenzie therapy and conventional treatment, both of which, when together, have a genuine effect on the pain that comes from standing still.

#### **4.2.9 Pain keep from twisting**

According to the findings of this research, the observed t value for twisting was 4.256 ( $2.1 \pm 2.256$ ) in the experimental group during a two-tailed paired t test, but the observed value for the same variable in the control group was 3.614 ( $1.8 \pm 2.234$ ) in the within group. 5% level of significance at 20 (twenty) degrees of freedom standard t value was 2.262 and observed t value in twisting in both groups which were more than standard t value. This meant that the null hypothesis was rejected and the alternative hypothesis was accepted in the within group. As the mean difference of the experimental group was greater than the mean difference of the control group, this indicates that McKenzie manipulative therapy for patients with cervical disc prolapse was more effective than conventional therapy for reducing the amount of twisting experienced by these patients. The unrelated/independent t test between groups found a standard table value of 2.021 at a significance level of 5% and 40 degrees of freedom, but the observed t value was 1.100 at the same level of significance and the same degree of freedom. As the observed t value was lower than the value in the table, the null hypothesis was accepted and the alternative hypothesis was rejected. This indicated that there was no significant difference between McKenzie manipulative therapy and conventional therapy in the between group.

#### **4.2.10 Sit in upright hard chair**

According to the findings of this research, the t value for the sit in upright hard chair observation for the experimental group was 4.513 ( $2.7 \pm 2.708$ ) at the two-tailed paired t test, whereas the t value for the sit in upright hard chair observation for the control group was 3.022 ( $1.1 \pm 1.517$ ) in within group. 5% level of statistical significance with 20 (twenty) degrees of freedom the null hypothesis was rejected because the observed t value was higher than the standard t value (which was 2.262) and the alternative hypothesis was accepted among the group of sit in upright hard chair. The results of the sit in upright hard chair test were significant at the 0.000% and 0.007% levels for both groups, but the mean difference for the experimental group was higher than the mean for the control group. This indicates that McKenzie manipulative therapy for patients with cervical disc prolapse was more effective than conventional therapy for this test. The unrelated/independent t test for the group comparisons found a standard table value of 2.021 at a significance level of 5% and 40 degrees of freedom but the



observed t value was 0.802 at the same level of significance and the same degree of freedom. As the observed t value was lower than the value in the table, the null hypothesis was accepted and the alternative hypothesis was rejected. This indicated that there was no significant difference between McKenzie manipulative therapy and conventional therapy in the between group.

#### **4.2.11 Sit in soft arm chair**

According to the findings of this research, the t value for the sit in soft arm chair observation was 5.357 ( $2.6 \pm 2.159$ ) in the experimental group at the two-tailed paired t test, but the t value for the sit in soft arm chair observation for the control group was 2.726 ( $1.1 \pm 1.841$ ) in the within group. 5% level of significance at twenty (twenty) degrees of freedom standard t value was 2.262 and observed t value in soft arm chair in both groups which were more than standard t value that meant null hypothesis was rejected and alternative hypothesis was accepted in the within group. As the mean difference of the experimental group was greater than the mean difference of the control group, we can conclude that McKenzie manipulative therapy for patients suffering from cervical disc prolapse was more effective than conventional therapy for patients who sat in soft arm chairs. This was determined by comparing the two groups' results when they sat in soft arm chairs at significance levels of 0.000% and 0.013%. The unrelated/independent t test for the group comparisons found a standard table value of 2.021 at a significance level of 5% and 40 degrees of freedom but the observed t value was 0.830 at the same level of significance and the same degree of freedom. As the observed t value was lower than the value in the table, the null hypothesis was accepted and the alternative hypothesis was rejected. This indicated that there was no significant difference between McKenzie manipulative therapy and conventional therapy in the between group.

#### **4.2.12 Pain in lying in bed**

According to the findings of this research, the observed t value for pain experienced while lying in bed was 4.620 ( $2.7 \pm 2.598$ ) in the experimental group during a two-tailed paired t test, but the observed value for the control group during the same test was 5.218 ( $3.1 \pm 2.719$ ) in the within group. 5% level of significance at 20 (twenty) degrees of freedom standard t value was 2.262 and observed t value in pain in lying in

bed in both groups which were more than standard t value. This meant that the null hypothesis was rejected and the alternative hypothesis was accepted in the within group. Both groups were significant at the 0.000% level with regard to the component of pain when lying in bed. The unrelated/independent t test for the group comparisons found a standard table value of 2.021 at a significance level of 5% and 40 degrees of freedom, whereas the observed t value was 2.520 at the same level of significance and the same degree of freedom. The fact that the observed t value was higher than the table value indicated that the null hypothesis should not be accepted and that the alternative hypothesis should be accepted instead. This in turn indicated that there was a significant relationship between McKenzie manipulative treatment and conventional therapy in between the groups. This significant result is due to McKenzie therapy and conventional treatment, both of which, when together, have a genuine effect on the pain in lying in bed.

#### **4.2.13 Pain limit normal lifestyle**

According to the findings of this research, the observed t value for the variable of pain limiting normal lifestyle was 4.515 ( $3.0 \pm 2.948$ ) in the experimental group of the two-tailed paired t test, whereas the observed value for the same variable in the control group was 3.896 ( $2.4 \pm 2.745$ ) in the within group. 5% level of statistical significance with 20 (twenty) degrees of freedom The null hypothesis was rejected because the observed t value was higher than the standard t value, which was 2.262. This meant that the alternative hypothesis was accepted in the within group. McKenzie manipulative therapy for Cervical Disc Prolapse patients was more effective than Conventional therapy for reducing pain limit normal lifestyle. This was determined by comparing the means of the experimental and control groups and finding that the mean difference of the experimental group was greater than the mean of the control group. The unrelated/independent t test for the between-group comparison found a standard table value of 2.021 at a significance level of 5% and 40 degrees of freedom, but the observed t value was 1.272 at the same level of significance and the same degree of freedom. As the observed t value was lower than the value in the table, the null hypothesis was accepted and the alternative hypothesis was rejected. This indicated that there was no significant difference between McKenzie manipulative therapy and conventional therapy in the between group.

#### **4.2.14 Interfere with work**

According to the findings of this research, the observed t value for the variable of how much pain interfered with work was 6.670 ( $3.6 \pm 2.421$ ) in the experimental group of the two-tailed paired t test, but the observed value for the same variable in the control group was 4.655 ( $2.7 \pm 2.578$ ) in within group. 5% level of significance at 20 (twenty) degrees of freedom standard t value was 2.262 and observed t value in pain interfere with work in both groups which were more than standard t value. This meant that the null hypothesis was rejected and the alternative hypothesis was accepted in the within group. McKenzie manipulative therapy for patients with cervical disc prolapse was more effective than conventional therapy for reducing the amount of pain that interfered with their work. This was determined by comparing the means of the experimental and control groups and finding that the experimental group had a greater mean difference than the control group. The unrelated/independent t test between groups found a standard table value of 2.021 at a significance level of 5% and 40 degrees of freedom, whereas the observed t value was 2.912 at the same level of significance and the same degree of freedom. The fact that the observed t value was higher than the table value indicated that the null hypothesis should not be accepted and that the alternative hypothesis should be accepted instead. This in turn indicated that there was a significant relationship between McKenzie manipulative treatment and conventional therapy in between the groups. This significant result is due to McKenzie therapy and conventional treatment, both of which, when together, have a genuine effect on the interfere with work.

#### **4.2.15 Change of workplace**

According to the findings of this research, the observed t value for the variable of changing workplaces was 3.922 ( $2.4 \pm 2.726$ ) in the experimental group during a two-tailed paired t test, whereas the observed value for the control group during the same test was 3.220 ( $2.1 \pm 2.846$ ) in within group. 5% level of significance at 20 (twenty) degrees of freedom standard t value was 2.262 and observed t value in change of workplace in both groups which were more than standard t value. This indicated that the null hypothesis was rejected and the alternative hypothesis was accepted in the within group. As the mean difference of the experimental group was greater than the mean difference of the control group, we can conclude that McKenzie manipulative

therapy for patients with cervical disc prolapse was more effective than conventional therapy for changing workplaces. This was determined by comparing the levels of significance used for each group, which were 0.001% and 0.004%, respectively. The unrelated/independent t test between groups found a standard table value of 2.021 at a significance level of 5% and 40 degrees of freedom, but the observed t value was 1.460 at the same level of significance and the same degree of freedom. As the observed t value was lower than the value in the table, the null hypothesis was accepted and the alternative hypothesis was rejected. This indicated that there was no significant difference between McKenzie manipulative therapy and conventional therapy in the between group.

### 4.3 Dallas Questionnaire assessment between control and experimental group

Table III: Dallas Questionnaire assessment between group Unpaired t-test

<b>Variables</b>	<b>Unpaired t</b>	<b>df</b>	<b>Sig. (2-tailed)</b>
General pain intensity	1.083	40	.29
Pain intensity at night	1.619	40	.14
Interfere with lifestyle	.886	40	.39
Pain severity at neck forward bending activity	1.086	40	.29
Neck Stiffness	.818	40	.42
Interfere with Walking	1.058	40	.30
Pain During Walking	.688	40	.50
Pain keep from standing still	2.531	40	.02*
Pain keep from twisting	1.100	40	.28
Sit in upright hard chair	.802	40	.43
Sit in soft arm chair	.830	40	.42
Pain in lying in bed	2.520	40	.02*
Pain limit normal lifestyle	1.272	40	.22
Interfere with work	2.912	40	.01*
Change of workplace	1.460	40	.16

\*Significant P-values.

#### 4.4 Neck Pain Disability Index between control and trial group

Table IV: Statistical outcome of Neck Pain Disability Index

Variables	Experimental Group		Control Group		Between Group	
	t	Sig. (2-tailed)	t	Sig. (2-tailed)	Unpaired t	Sig. (2-tailed)
Neck Pain Disability Index	6.182	.000***	7.020	.000***	0.565	0.58

According to the findings of this research, the observed t value for the Neck Pain Disability Index was 6.182 (13.05±9.672) in the experimental group during a two-tailed paired t test, whereas the observed t value for the same variable in the control group was 7.020 (12.15±7.926) within the group. 5% level of significance at 20 (twenty) degrees of freedom standard t value was 2.262 and observed t value in Neck Pain Disability Index in both groups which were more than standard t value. This meant that the null hypothesis was rejected and the alternative hypothesis was accepted in the within group. McKenzie manipulative therapy for Cervical Disc Prolapse patients was more effective than Conventional therapy for the Neck Pain Disability Index. This was determined by comparing the means of the experimental and control groups and finding that the mean difference in the experimental group was greater than the mean difference in the control group. The unrelated/independent t test for the between-group comparison found a standard table value of 2.021 at a significance level of 5% and 40 degrees of freedom but the observed t value was 0.565 at the same level of significance and the same degree of freedom. As the observed t value was lower than the value in the table, the null hypothesis was accepted and the alternative hypothesis was rejected. This indicated that there was no significant difference between McKenzie manipulative therapy and conventional therapy in the between group.

**4.5 Cross tabulation between different socio-demographic factors and Neck Pain Disability Index with significant level of control group:**

Table V: Cross tabulation between different socio-demographic factors and Neck Pain Disability Index

<b>Independent variables</b>	<b>Comparison with</b>	<b>Chi-square test value</b>	<b>P- value</b>
Age	Neck Pain Disability Index	23.033	0.518
Gender	Neck Pain Disability Index	3.536	0.739
Occupation	Neck Pain Disability Index	21.239	0.625
Education	Neck Pain Disability Index	27.937	0.263
Marital status	Neck Pain Disability Index	11.841	0.459

*\*5% significant level*

A Chi-square test for was used to assess whether the age groups was related to Neck Pain Disability Index of the participants. The Chi-square test was not statistically significant,  $\chi^2(24, N=21) = 23.033, p=0.518$ . A Chi-square test for was used to assess whether the gender was related to Neck Pain Disability Index of the participants. The Chi-square test was not statistically significant,  $\chi^2(6, N=21) = 3.535, p=0.739$ . A Chi-square test for was used to assess whether the occupation was related to Neck Pain Disability Index of the participants. The Chi-square test was not statistically significant,  $\chi^2(24, N=21) = 21.239, p=0.625$ . Researcher also found that education with Neck Pain Disability Index and marital status with Neck Pain Disability Index has no significant relationship with each other.

**4.6 Cross tabulation between different socio-demographic factors and Neck Pain Disability Index with significant level of trial group:**

Table VI: Cross tabulation between different socio-demographic factors and Neck Pain Disability Index

<b>Independent variables</b>	<b>Comparison with</b>	<b>Chi-square test value</b>	<b>P-value</b>
Age	Neck Pain Disability Index	16.152	0.582
Gender	Neck Pain Disability Index	4.200	0.650
Occupation	Neck Pain Disability Index	37.929	0.035*
Education	Neck Pain Disability Index	23.854	0.160
Marital status	Neck Pain Disability Index	6.300	0.390

*\*5% significant level*

A Chi-square test for was used to assess whether the age groups was related to Neck Pain Disability Index of the participants. The Chi-square test was not statistically significant,  $\chi^2(18, N=21) = 16.152, p=0.582$ . A Chi-square test for was used to assess whether the gender was related to Neck Pain Disability Index of the participants. The Chi-square test was not statistically significant,  $\chi^2(6, N=21) = 4.200, p=0.650$ . A Chi-square test for was used to assess whether the occupation was related to Neck Pain Disability Index of the participants. The Chi-square test was statistically significant,  $\chi^2(24, N=21) = 37.929, p=0.035$ . Among all of occupation, housewives are mostly affected with neck pain. Because women work with poor posture that strain the neck. Researcher also found that education with Neck Pain Disability Index and marital status with Neck Pain Disability Index has no significant relationship with each other.

Examining the effects of the McKenzie method of manipulative therapy on pain, function and disability in people with cervical disc prolapse was the focus of this study. The hypothesis was tested using several different types of measurements to determine whether or not the null hypothesis should be accepted. The socio-demographic indicators were gathered via a self-directed, structured questionnaire. Most pre and post-treatment measurements showed statistically significant enhancements. Participants' mean ages were determined to be 39.95 (10.37) and 42.00 (14.15) years old, respectively (SD). There were 29% males and 71% females in the sample. There were 25 housewives in total (14 in the treatment group and 11 in the control group), 5 service providers (1 in the treatment group and 4 in the control group), 7 businessman (4 in the treatment group and 3 in the control group), 1 garments worker (1 in the treatment group and 0 in the control group), 1 rickshaw puller (0 in the treatment group and 1 in the control group), 2 students (0 in the treatment group and 1 in the control group) and 2 others. There were 35 total participants; 15 in the control group and 20 in the experimental group were married. Then, 5 participants were never married (4 in the control group and 1 in the trial group) and 1 in the control group had lost a spouse to death. Individuals from rural areas made up 26% (n=11), while individuals from urban areas made up 74% (n=31). In this study, in experimental group there were (n=9) people with pain lasting 12–16 weeks, (n=5) people with pain lasting 16–20, (n=7) people with pain lasting >20 weeks and in control group there were (n=8) people with pain lasting 12–16 weeks, (n=8) people with pain lasting 16–20 weeks, (n=5) people with pain lasting >20 weeks.

Pain and discomfort were evaluated using the Dallas pain scale in a variety of work settings, including: general pain intensity, night pain intensity, pain interference with lifestyles, pain at neck forward bending activity, neck stiffness, interference with walking, hurts with walking, standing still, twisting activity, upright hard chair sitting, soft arm chair sitting, lying down, pain limit normal life, pain interfere in work and workplace change. All of these measures showed statistical significance (paired t test, p .05) in the experimental group. When compared to the control group, however, the indications of job interference and pain while walking were not found to be



statistically significant ( $p > .05$ ) with the paired t test. The mean difference of the Dallas indicators was significantly higher in the experimental group compared to the control group. When the pain when working, resting in bed, and causing work interference proved to be statistically significant ( $p \leq .05$  or greater), all other pain domains were not ( $p > .05$ ). The Dallas questionnaire was utilised to evaluate each session and it was shown that the experimental group showed greater improvement in the progression outline compared to the control group.

McKenzie's concept of "Manipulative Therapy" was utilised to guide the physiotherapy sessions, with a focus on tailoring treatment to each individual by employing a variety of directional preferences and "on/off" maneuvers. The control group received standard physiotherapy procedures, such as repeated motions. Those in the comparison group received standard physiotherapy care, including conventional therapy. They were treated for a total of four weeks, three times per week. In order to keep the treatment and protocol of the study endeavor at a high standard, a well-trained physiotherapist administered McKenzie physiotherapy. Members of the control group have not been exposed to any other therapies during their four weeks of treatment.

Treatment sessions were limited to a maximum of six over the course of three weeks in the randomised controlled trial investigated by Machado et al. (2005). All physical therapists were required to strictly adhere to the therapeutic guidelines outlined in McKenzie's textbooks. The principle of treatment was to promote movement and postures that produced centralization of pain, which was determined by testing participants' pain responses during a thorough physical examination and assigning them to one of the three McKenzie syndromes (derangement, dysfunction or postural).

A herniated disc in the neck is one of the many ailments that can be helped by Physiotherapy. The middle-aged are disproportionately affected. It's worth noting that the pain alleviation provided by the McKenzie approach was both more rapid and more comprehensive in the early stages of therapy. In the second stage of treatment, conventional methods showed symptomatic improvement. Pain centralization was found to have a strong link with treatment success in a retrospective study of 87 individuals examined and treated using the McKenzie concept (Kumar, 2010).

Classification in the McKenzie technique is based on a thorough clinical examination, including an assessment of the patient's symptomatic reaction to various loading strategies given to the spine, as well as an evaluation of the patient's posture and range of motion (Machado et al., 2005). Short-term therapy effects based on the McKenzie method have been demonstrated to induce quick symptom alleviation in individuals with low back pain and neck pain, according to a 2003 study (Schenk et al., 2003).

In comparison to other treatments like NSAIDs, educational booklets, neck massages with neck and back care advice, strength training under therapist supervision, spinal mobilization and general mobility exercises, several studies included in the review suggested that McKenzie therapy was more effective at short-term follow-up (Busanich & Verscheure, 2006). McKenzie therapy was shown to be more effective on both short and long-term disability by all but one of the six groups compared to the comparative treatment (massage/neck and back care guidance). McKenzie therapy was found to be more successful than any other treatment at every time point studied (Clare et al., 2004). Two of the six trials were left out of the meta-analysis (Van et al., 2003) because the McKenzie therapy concept is to treat the present symptoms rather than the underlying cause of inflammation (acute, sub-acute or chronic). To yet, no authors have discussed whether or if McKenzie therapy is effective over the long term. Given that McKenzie therapy places a premium on tailor-made treatment plans and avoiding future flare-ups, this appears like a significant knowledge gap. Most studies have looked at McKenzie's short-term effects or have reported results from the therapy during the first three months. Although the latest study only had 42 participants, it showed very comparable results.

Researcher Busanich and Verscheure (2006) found it challenging to assess whether the pain relief with McKenzie therapy is clinically noteworthy compared to other therapies (difference of 10 points on a 100-point scale). There is a dearth of high-quality studies (PEDro score of 7–10). Lack of randomization and blinding is the most common problem in studies with lower quality scores. Since both the patient and the therapist are aware of whether or not McKenzie therapy is being done, it may be impossible to accomplish blindness with McKenzie therapy. As the review did not specify the age, sex, activity level or kind of injury of the individuals, it is recommended that patient populations be properly described. Because of these

oversimplifications, it is not easy to tell if the McKenzie method is appropriate for athletes and the specific needs of their activity. According to Clare et al. (2004) randomised controlled studies of McKenzie therapy could benefit from better methodological quality. While a perfect score of 10 on the PEDro scale may be unattainable, it is recommended that a score of 6 or above be reached. Results from studies with a lower PEDro score are more likely to be skewed (Maher et al., 2003).

Several systematic reviews have been written on the topic of the effectiveness of McKenzie treatment and treatment based on symptom response after session using the patient response technique. This review presents a more recent systematic literature search; specifically, this analysis focused on studies that recruited people experiencing neck pain and found that the treatment was more effective than a placebo (Hancock et al., 2007).

Opioid painkillers are frequently used for chronic pain management, despite a lack of robust evidence for their effectiveness. While a recent Cochrane review comparing opioids to placebo in the treatment of neck pain came to a similar conclusion, a recent study that reviewed the evidence regarding the use of opioids to treat chronic pain suggested that "there is no high-quality evidence on the efficacy of long-term opioid treatment of chronic nonmalignant pain" (Kissin, 2013). Short-term use shows some improvement over placebo but there is no evidence that it is more effective than non-opioid drugs. "Despite rapidly increasing medical expenditures from 1997 to 2005, there was no improvement over this period in self-assessed health status, functional disability, work limitations or social functioning among respondents with spine problems" (Trescot et al., 2008), according to a study published in JAMA in 2008.

This randomised controlled experiment examined the effects of McKenzie Manipulative Treatment for Cervical Disc Prolapse on Pain, Function and Disability. A total of 42 people participated, with 21 assigned to the McKenzie group and 21 to the control group. Both groups engaged in basic physical activity but one received the McKenzie Physiotherapy treatment and the other had Conventional therapy. The majority of the clinical outcomes were collected at the end of the 4-week treatment period, for which the researcher used two assessment instruments including the Dallas pain questionnaire and the Neck Pain Disability Index (NDI) questionnaire. Most indicators on the Dallas pain scale and the Neck Pain Disability Index (NDI)

questionnaire were statistically significant within the McKenzie group and the conventional therapy group using a paired t test but only three showed statistical significance when comparing the groups. Since the McKenzie group's mean difference was greater than that of the conventional therapy group, it was clear that the McKenzie group had a greater impact. The majority of respondents in both the McKenzie and conventional groups reported improvements in their neck impairment status on the disability Questionnaire. Both looked at the effectiveness of McKenzie physiotherapy through the use of randomised trials.

Machado et al. (2005) undertook a similar multi-center randomised controlled experiment with a 3-month follow-up to assess the short-term impact of incorporating the McKenzie approach into primary care for patients with acute low back pain and neck discomfort. A total of 146 participants were used (73 from the McKenzie-first line care group and 73 from the first line care group alone). Participants were randomly assigned to receive either a 3-week McKenzie-based therapy programme in addition to first-line care (advice, reassurance and time-contingent paracetamol) or first-line care alone.

The study found that the McKenzie therapy group, when combined with standard care, resulted in modest but statistically significant reductions in pain ( $p=0.05$ ). There was no improvement in patients' global perceived effect, impairment or function and there was an increased likelihood of persistent symptoms. Patients in this group sought fewer medical services overall compared to those receiving solely primary care ( $P=0.002$ ). Advice to stay active and avoid bed rest, reassurance of the good prognosis of acute low back pain & neck pain and directions to take medication (paracetamol) on a time line basis were all part of the first line of care. The level of disability was evaluated using the Roland Morris Disability Questionnaire. In addition, from the researchers' points of view, the outcomes of the studies using McKenzie physiotherapy with diverse protocols, such as exercise or first-line care, were comparable.

The paired-t test was used to analyse the statistically significant level of disability. The study found that the use of Manipulative therapy considerably reduced disability. The NDI score indicated a statistically significant ( $p\leq 0.05$ ) reduction in disability. Several recent studies have evaluated NDI after receiving only McKenzie treatment

and have discovered an improvement in impairment. Pre- and post-test scores differ significantly ( $p \leq 0.05$ ) (Rathore, 2003). The present study compared two rehabilitation protocols for neck pain and found that the McKenzie therapy was more effective in reducing pain after 12 sessions and four weeks than the other protocol. In the centre, the McKenzie technique of treatment was employed to help patients improve their neck posture and feel less pain.

McKenzie states that patients with posterior or poster lateral disc dislocation have pain relief and centralization after neck retraction. Because of increased mechanical compression on the anterior surface of the intervertebral disc, this exacerbates peripheral discomfort and nerve root compression. McKenzie hypothesised that neck flexion would cause a relocation of the nucleus pulposus to a more posterior position. McKenzie, on the other hand, advocates for a retracted neck, which extends the lower cervical segment and may reduce pressure on the posterior annulus and associated pain. If the patient is experiencing neck pain due to compressed nerve roots. Cervical disc prolapsed and radiculopathy can be effectively treated in the short term using the McKenzie method (Rathore et al., 2003). In their study of a limited patient population, Sufka et al. (1998) found that 83 percent of those experiencing neck pain exhibited complete centralization. Patients with acute pain reported a centralization rate of 85% but there was a reduction in radicular pain symptoms (Sufka et al., 1998). Kjellman and Oberg (2002) found that the McKenzie method was more effective than general exercise and ultrasonography in the control group at reducing the severity of neck discomfort within the first three weeks.

The researcher discovered that there was no significant association between the various socio-demographic characteristics and the Neck Pain Disability Index (NDI) in the group that served as the control. The researchers observed that there was a significant association between occupation and the Neck Pain Disability Index (NDI) in the trial group, but they found no significant relationship between other socio-demographic characteristics and the NDI.

Some limitations were present in this trial, despite the positive effects of McKenzie Manipulative Therapy on pain, function and disability. The absence of external validity is due mostly to the fact that a sampling frame could not be developed. The study is limited in its capacity to generalize its findings to the community at large because it relied solely on samples from CRP- Savar, Dhaka. Furthermore, the study only included 42 individuals with cervical disc prolapse, which is a little sample size compared to the true prevalence. The study's absence of daily or weekly follow-up changes in dependent variables is a disadvantage caused by the fact that data were only gathered twice. The trial lacked a crucial component for determining the efficacy of treatment over the long term - the provision of follow up for participants.

## **CHAPTER-VII      CONCLUSION AND RECOMMENDATION**

Patients who had cervical disc prolapse reported significant improvements in pain, function and impairment after receiving twelve treatment sessions using the McKenzie treatment approach. These results imply that the McKenzie treatment approach is significantly more effective than conventional physiotherapy after 12 sessions for the patient with cervical disc prolapsed patient. According to the findings of the final evaluation, individuals in both groups had less discomfort across a wide range of contexts; however, the McKenzie therapy group received more benefits on an aggregate level. The McKenzie approach is one that physiotherapists who specialised in the treatment of cervical disc prolapse may find to be effective for their patients.

According to the findings of this study, the conventional physiotherapy treatment is not very beneficial. Patients suffering from cervical disc prolapse profited more from the McKenzie method when it was utilised appropriately, as demonstrated by a decrease in financial load, a decrease in fear avoidance of work and activity in everyday life and the workplace, and an increase in self-confidence among the patients. It has been discovered that persons who have been diagnosed with cervical disc prolapse as well as other mechanical issue diagnoses can benefit from the McKenzie method, which is a conservative approach to physiotherapy.

To determine whether or not the McKenzie treatment strategy is beneficial for Cervical Disc Prolapse patients, additional research should be conducted using more specialised treatments or a placebo treatment in a control group. This should be compared with the McKenzie treatment approach using a large sample size.

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## Appendix- A

### Institutional Review Board (IRB) Letter



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

Ref: CRP-BHPI/IRB/11/2022/677

Date: 13/11/2022

To  
Kanika Rani Roy  
7<sup>th</sup> Batch (Part-II) M.Sc. in Physiotherapy  
Session: 2020-2021, DU Reg No: 2531  
BHPI, CRP, Savar, Dhaka-1343, Bangladesh

**Subject:** Approval of the thesis proposal “Effectiveness of McKenzie Manipulative Therapy on Pain, Function and Disability among Cervical Disc Prolapsed Patient” by ethics committee.

Dear Kanika Rani Roy  
Congratulations.


The Institutional Review Board (IRB) of BHPI has reviewed and discussed your application to conduct the above-mentioned dissertation, with yourself, as the principal investigator. The Following documents have been reviewed and approved:

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

The purpose of the study is to assess the effectiveness of McKenzie manipulative therapy for pain, function and disability among cervical disc prolapsed patients. Should there any interpretation, type, spelling, and grammatical mistake in the title, it is responsibility of investigator. Since the study involve questionnaire that may take 30 to 40 minutes and no likelihood of any harm to the participants. Data collector will receive informed consents from all participants; the members of the Ethics committee have approved the study to be conducted in the presented form at the meeting held at 09.00 AM on 24<sup>th</sup> September 2022 at BHPI.

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

Best regards,

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

## Appendix- B

### Ethical Approval

Date:  
The Chairman,  
Institutional Review Board (IRB)  
Bangladesh Health Professional Institute (BHPI), CRP  
Savar.Dhaka-1343.Bangladesh

Subject: Application for review and ethical approval.

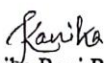
Dear Sir,


With due respect, I am Kanika Rani Roy, student of part II, M.Sc. in physiotherapy program at Bangladesh Health Professional Institute (BHPI), an academic institute of Centre for the Rehabilitation of the paralysed (CRP) under the faculty of medicine, University of Dhaka. As per the course curriculum, I have to conduct a study entitled **“Effectiveness of McKenzie Manipulative Therapy on Pain, Function and Disability among Cervical Disc Prolapsed Patient”** under the most honorable supervisor Associate Prof. Mohammad Anwar Hossain, BHPI & HOD, Department of Physiotherapy, Centre for the Rehabilitation of the Paralysed (CRP).

The purpose of the study is to assess the effectiveness of McKenzie manipulative therapy for pain, function and disability among cervical disc prolapsed patient. The study involves face to face interview by using structured questionnaire to explore the effectiveness of McKenzie manipulative therapy for pain, function and disability among cervical disc prolapsed patient in Bangladesh that may take 30 to 40 minutes to full fill in the questionnaire and there is no likelihood of any harm to the participants. Data collectors will receive informed consent from all participants: any data collected will be kept confidential.

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

Sincerely,

  
Kanika Rani Roy  
7<sup>th</sup> Batch (Part-II), M.Sc. in Physiotherapy  
Session: 2020-2021, DU Reg No: 2531  
BHPI, CRP, Savar, Dhaka-1343, Bangladesh

  
Recommendation from the thesis supervisor

Associate Prof. Mohammad Anwar Hossain (BHPI)  
Sr. Consultant & Head, Department of Physiotherapy, CRP.

## Appendix- C

### Permission Letter

#### Permission Letter

Date: January 12, 2023

Head

Department of Physiotherapy

Centre for the Rehabilitation of the Paralysed (CRP)

CRP-Chapain, Savar, Dhaka-1343.

**Through:** Head, Department of Physiotherapy, BHPI.

**Subject: Prayer for seeking permission to collect data for conducting research project.**

Sir,

With due respect and humble submission to state that I am Kanika Rani Roy, student of M.Sc. in Physiotherapy Part-II at Bangladesh Health Professions Institute (BHPI). The Ethical committee has approved my research project entitled: **“Effectiveness of McKenzie Manipulative Therapy on Pain, Function and Disability among Cervical Disc Prolapsed Patient”** under the supervision of Associate Prof. Dr. Mohammad Anwar Hossain, BHPI & HOD, Department of Physiotherapy, Centre for the Rehabilitation of the Paralysed (CRP). I want to collect data for my research project from the Musculoskeletal Unit, Department of Physiotherapy at CRP. So, I need permission for data collection from the honorable Head, Department of Physiotherapy, CRP. I would like to assure that anything of the study will not be harmful for the participants.

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

Yours Obediently,

*Kanika*

Kanika Rani Roy

Part II M.Sc. in Physiotherapy

Reg. No: 2531

Session: 2020-21

Bangladesh Health Professions Institute (BHPI)

CRP-Chapain, Savar, Dhaka-1343.

*[Signature]*  
12/01/23

## Appendix- D

### Treatment Protocol

#### Treatment Protocol for McKenzie Manipulative Approach

<b>Variables</b>	<b>Values</b>
Frequency	Three days in a week for 4 weeks.
Intensity & Time	10 repetitions in a single “on/off” maneuver for 5 minutes.
Directional Preference	10 repetition in 1 set
Type of Exercise	Mckenzie Manipulative Approach and Conventional Physiotherapy

#### Treatment Protocol for Conventional Physiotherapy

<b>Variables</b>	<b>Values</b>
Frequency	Three days in a week for 4 weeks.
Intensity	10 repetitions in each segment of the cervical spine
Time	5 minutes, oscillatory movements for 60-120 repetitions per minute for 4 weeks
Type of exercises	Maitland Mobilization, stretching, Active ROM exercises, neck muscles strengthening (isometric), dynamic shoulder stabilization exercise, TENS, postural advice and home advice.



## Appendix- E

### Consent form (Bangla)

আসসালামু আলাইকুম/ নমস্কার। আমি কণিকা রানী রায়, বাংলাদেশ হেলথ প্রফেশন্স ইনস্টিটিউট (BHPI), CRP-এর এম এস সিজিওথেরাপির ছাত্রী। আমি ফিজিওথেরাপি ডিগ্রিতে মাস্টার্স অফ সায়েন্সের আর্থসিক পরিপূর্ণতার জন্য একটি অধ্যয়ন পরিচালনা করছি, যার শিরোনাম, "সার্ভিক্যাল ডিস্ক প্রলাস রোগীদের ব্যথা, কার্যকারিতা এবং অক্ষমতার উপর ম্যাকিজি ম্যানিপুলেটিভ থেরাপির কার্যকারিতা।"। আপনাকে কিছু প্রশ্নের উত্তর দিতে হবে যা এই ফর্মে উল্লেখ করা হয়েছে। এটি প্রায় 20-30 মিনিট সময় নেবে। আমি আপনাকে জানাতে চাই যে এটি সম্পূর্ণরূপে একাডেমিক অধ্যয়ন এবং অন্য কোন উদ্দেশ্যে ব্যবহার করা হবে না। আপনার দেওয়া সমস্ত তথ্য গোপন রাখা হবে। এটা নিশ্চিত করা হয় যে তথ্যের উৎস বেনামী থাকে। এই অধ্যয়নে আপনার অংশগ্রহণ স্বেচ্ছায় এবং আপনি এই অধ্যয়নের সময় কোন নেতিবাচক পরিণতি ছাড়াই যে কোন সময় নিজেকে প্রত্যাহার করতে পারেন। সাক্ষাৎকারের সময় আপনি পছন্দ করেন না বা আপনি উত্তর দিতে চান না এমন একটি নির্দিষ্ট প্রশ্নের উত্তর না দেওয়ার অধিকারও আপনার রয়েছে। অধ্যয়ন বা অংশগ্রহণকারী হিসাবে আপনার অধিকার সম্পর্কে আপনার কোন প্রশ্ন থাকলে, আপনি যোগাযোগ করতে পারেন, গবেষক কণিকা রানী রায় বা আমার সুপারভাইজার, মোহাম্মদ আনোয়ার হোসেন, সহযোগী অধ্যাপক, ফিজিওথেরাপি বিভাগ, বিএইচপিআই, সিআরপি, সাভার, ঢাকা-১৩৪৩।

আমি শুরু করার আগে আপনার কোন প্রশ্ন আছে?

তাই ইন্টারভিউ নিয়ে এগিয়ে যাওয়ার জন্য আমি কি আপনার সম্মতি পেতে পারি?

হ্যাঁ না:

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

তথ্য সংগ্রাহকের স্বাক্ষর.....তারিখ.....

সাক্ষীর স্বাক্ষর.....তারিখ.....

### Consent Form (English)

Assalamu-alaikum / Namasker. I am Kanika Rani Roy, a student of M.sc.in Physiotherapy at Bangladesh Health Professions Institute (BHPI), CRP. I am conducting a study for partial fulfillment of Masters of Science in Physiotherapy degree, titled, “Effectiveness of McKenzie Manipulative Therapy on Pain, Function and Disability among Cervical Disc Prolapse Patient”. You will need to answer some questions which are mentioned in this form. It will take approximately 20-30 minutes. I would like to inform you that is purely academic study and will not be used for any other purpose. All information’s provided by you will be kept confidential. It is ensured that the source of information remains anonymous. Your participation in this study is voluntary and you may withdraw yourself at any time during this study without any negative consequence. You also have the right not to answer a particular question that you don’t like or you do not want to answer during interview. If you have any query about the study or your right as a participant , you may contact with, researcher Kanika Rani Roy or my supervisor, Mohammad Anwar Hossain, Associate Professor, Department of Physiotherapy BHPI,CRP,Savar,Dhaka-1343.

Do you have any questions before I start?

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

Yes:

No:

Signature of the participant ..... Date.....

Signature of the Data Collector.....Date.....

Signature of the witness.....Date.....

## APPENDIX-F

### Questionnaire (Bangla)

শিরোনাম: "সার্ভিক্যাল ডিস্ক প্রলাস্ন রোগীদের ব্যথা, কার্যকারিতা এবং অক্ষমতার উপর ম্যাকিজি ম্যানিপুলেটিভ থেরাপির কার্যকারিতা।"

কোড নং:

#### অংশ: 1- ব্যক্তিগত বিবরণ:

১.১ রোগীর নাম:

১.২ বয়স:

১.৩ লিঙ্গ:

১. পুরুষ

২. মহিলা

১.৪ উচ্চতা

১.৫ ওজন:

১.৬ ঠিকানা::

গ্রাম:

ডাকঘর:

থানাঃ

জেলা

#### অংশ: ২-সামাজিক-জনসংখ্যা সংক্রান্ত তথ্য

২.১ পেশা:

১. কৃষক

২. দিনমজুর

৩.চাকুরীজীবী

৪. গার্মেন্টসকর্মী

৫. চালক

৬. রিকশাওয়ালা

৭. ব্যবসায়ী

৮. বেকারত্ব

৯. গৃহিণী

১০. শিক্ষক

১১. ছাত্র

১২. অন্যান্য

২.২ বৈবাহিক অবস্থা

১.বিবাহিত

২. অবিবাহিত

৩.বিধবা

৪. তালাক

২.৩ পরিবার:

১. ছোট পরিবার

২. বড় পরিবার

২.৪ শিশুদের সংখ্যা:

২.৫ বাসস্থান :

১. গ্রামীণ

২. শহর

২.৬ শিক্ষাগত অবস্থা

১. নিরক্ষর

২.প্রাথমিক

৩.মাধ্যমিক

৪. এইচ এস সি পাশ

৫. স্নাতক ও মাস্টার্স



২.৮ ধূমপান ১. হ্যাঁ ২. না

**অংশ: ৩ – ব্যাথা সম্পর্কিত ভেরিয়েবল**

৩.১ ব্যথার সময়কাল ..... সপ্তাহ

৩.২ বর্তমান লক্ষণ

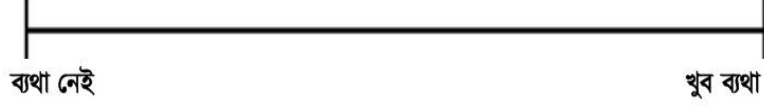
৩.৩ সহ-অসুস্থতা:

৩.৪ পূর্ববর্তী মেরুদণ্ডের অস্ত্রোপচারের ইতিহাস:

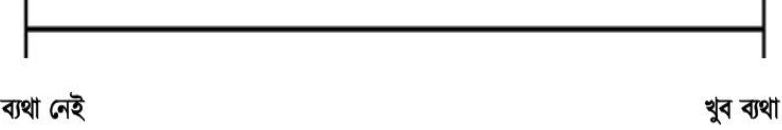
৩.৫ ঔষধ:

অংশ: ৪ - ডালাস ব্যথা প্রশ্নাবলী

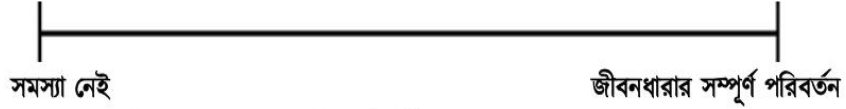
৪.১ আপনার ব্যথাটা কতটা খারাপ?



৪.২ ব্যথাটা রাতে কতটা খারাপ?



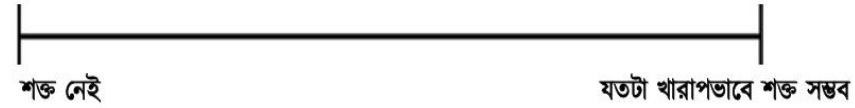
৪.৩ ব্যথা কি আপনার জীবনযাত্রায় হস্তক্ষেপ করে?



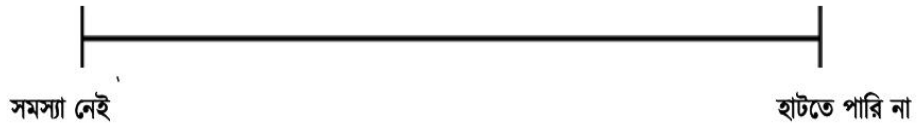
৪.৪ ঘাড় বুকানোর কার্যকলাপের সময় আপনি কতটা তীব্র ব্যথা অনুভব করে?



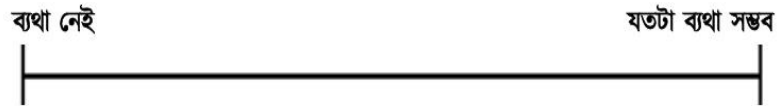
৪.৫ আপনার ঘাড় কতটা শক্ত?



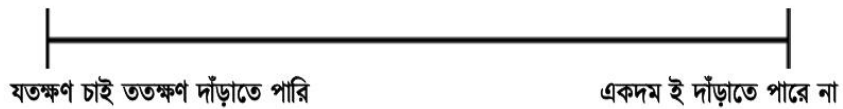
৪.৬ আপনার ব্যথা হাঁটার সঙ্গে হস্তক্ষেপ করে?



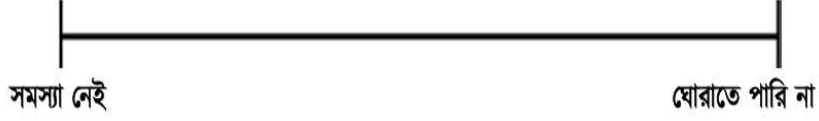
৪.৭ হাঁটার সময় কি ব্যথা লাগে?



৪.৮ আপনার ব্যথা কি আপনাকে স্থির থাকা থেকে বিরত রাখে?



8.৯ আপনার ব্যথা কি আপনাকে ঘোরানো থেকে বিরত রাখে ?



8.১০ আপনার ব্যথা কি আপনাকে একটি সোজা শক্ত চেয়ারে বসতে দেয়?



যতক্ষণ খুশি বসে থাকি

যতক্ষণ আমি চাই ততক্ষণ বসতে পারি না।

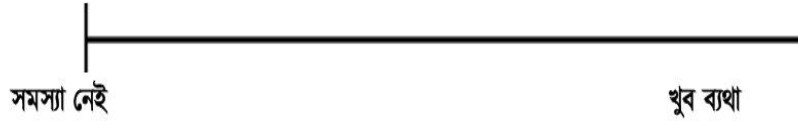
8.১১ আপনার ঘাড়ের ব্যথা কি আপনাকে নরম আরাম চেয়ারে বসতে দেয়?



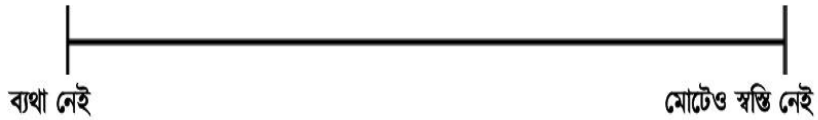
যতক্ষণ আমি পছন্দ করতে পারি না

নরম চেয়ার একেবারেই ব্যবহার করতে পারি না

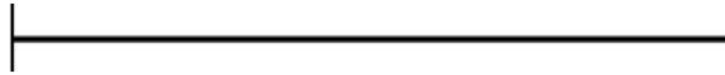
8.১২ বিছানায় শুলে কি ঘাড়ে ব্যথা হয়?



8.১৩ আপনার ব্যথা আপনার স্বাভাবিক জীবনধারা কতটা সীমাবদ্ধ করে?



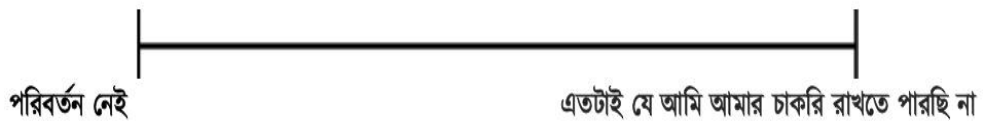
8.১৪ আপনার ব্যথা কি আপনার কাজে হস্তক্ষেপ করে?



সমস্যা নেই

অনেক হস্তক্ষেপ করে ঘাড় ব্যথার কারণে

8.১৫ আপনাকে আপনার কাজের জায়গা কতটা পরিবর্তন করতে হয়েছে?



#### পার্ট- 4: ঘাড়ের ব্যথার অক্ষমতা সূচক প্রশ্নাবলী

অনুগ্রহ করে পড়ুন: আপনার ঘাড়ের ব্যথা আপনার দৈনন্দিন জীবন পরিচালনা করার ক্ষমতাকে কতটা প্রভাবিত করেছে তা বুঝতে আমাদের সক্ষম করার জন্য এই প্রশ্নপত্রটি ডিজাইন করা হয়েছে। আপনার জন্য সবচেয়ে বেশি প্রযোজ্য এক পছন্দের প্রদক্ষিণ করে প্রতিটি বিভাগে উত্তর দিন। আমরা বুঝতে পারি যে আপনি মনে করতে পারেন যে একাধিক বিবৃতি আপনার সাথে সম্পর্কিত হতে পারে, কিন্তু দয়া করে শুধুমাত্র একটি পছন্দকে বৃত্ত করুন যা এই মুহূর্তে আপনার সমস্যাটিকে সবচেয়ে ঘনিষ্ঠভাবে বর্ণনা করে।

#### বিভাগ 1: ব্যথার তীব্রতা

- এই মুহূর্তে আমার কোন ব্যথা নেই
- এই মুহূর্তে ব্যথা খুবই হালকা
- এই মুহূর্তে ব্যথা মাঝারি
- এই মুহূর্তে ব্যথা মোটামুটি তীব্র
- এই মুহূর্তে ব্যথা খুব তীব্র
- এই মুহূর্তে যন্ত্রণা সবচেয়ে খারাপ

#### বিভাগ 2: ব্যক্তিগত যত্ন (ধোয়া, ড্রেসিং, ইত্যাদি)

- আমি অতিরিক্ত ব্যথা না করেই নিজের যত্ন নিতে পারি
- আমি সাধারণত নিজের যত্ন নিতে পারি কিন্তু এতে অতিরিক্ত ব্যথা হয়
- নিজের দেখাশোনা করা বেদনাদায়ক এবং আমি ধীরগতির এবং সতর্ক
- আমার কিছু সাহায্য দরকার কিন্তু আমি আমার ব্যক্তিগত যত্নের বেশিরভাগই পরিচালনা করতে পারি
- আত্ম-যত্নের বেশিরভাগ ক্ষেত্রে আমার প্রতিদিন সাহায্যের প্রয়োজন
- আমি জামাকাপড় করি না, আমি কষ্ট করে ধুয়ে বিছানায় থাকি

#### বিভাগ 3: উত্তোলন

- আমি অতিরিক্ত ব্যথা ছাড়াই ভারী ওজন তুলতে পারি
- আমি ভারী ওজন তুলতে পারি কিন্তু এটি অতিরিক্ত ব্যথা দেয়
- ব্যথা আমাকে মেঝে থেকে ভারী ওজন তুলতে বাধা দেয়, তবে সেগুলি সুবিধাজনকভাবে রাখা হলে আমি পরিচালনা করতে পারি, উদাহরণস্বরূপ একটি টেবিলে
- ব্যথা আমাকে ভারী ওজন তুলতে বাধা দেয় তবে আমি হালকা থেকে মাঝারি ওজন পরিচালনা করতে পারি যদি সেগুলি সুবিধামত অবস্থানে থাকে
- আমি শুধুমাত্র খুব হালকা ওজন তুলতে পারি
- আমি কিছু তুলতে বা বহন করতে পারি না

#### অধ্যায় 4: পড়া

- আমার ঘাড়ে ব্যথা ছাড়াই আমি যত খুশি পড়তে পারি
- আমার ঘাড়ে সামান্য ব্যথা নিয়ে আমি যত খুশি পড়তে পারি
- □ আমার ঘাড়ে মাঝারি ব্যথার সাথে আমি যত খুশি পড়তে পারি
- আমার ঘাড়ে মাঝারি ব্যথার কারণে আমি যতটা চাই ততটা পড়তে পারি না
- আমার ঘাড়ে প্রচণ্ড ব্যথার কারণে আমি খুব কমই পড়তে পারি
- আমি একদমই পড়তে পারি না

#### বিভাগ 5: মাথাব্যথা

- আমার কোন মাথা ব্যথা নেই
- আমার সামান্য মাথাব্যথা আছে, যা প্রায়ই আসে
- আমার মাঝারি মাথাব্যথা আছে, যা খুব কমই আসে
- আমার মাঝারি মাথাব্যথা আছে, যা ঘন ঘন আসে
- আমার প্রচণ্ড মাথাব্যথা আছে, যা প্রায়ই আসে
- আমার প্রায় সব সময়ই মাথাব্যথা থাকে

#### অধ্যায় 6: একাগ্রতা

- আমি কোন অসুবিধা ছাড়াই যখন চাই তখন পুরোপুরি মনোনিবেশ করতে পারি
- আমি সামান্য অসুবিধার সাথে যখন চাই তখন পুরোপুরি মনোনিবেশ করতে পারি
- আমি যখন চাই তখন মনোযোগ দিতে আমার যথেষ্ট অসুবিধা হয়
- আমি যখন চাই তখন মনোযোগ দিতে আমার অনেক অসুবিধা হয়
- আমি যখন চাই তখন মনোযোগ দিতে আমার অনেক অসুবিধা হয়
- আমি মোটেও মনোনিবেশ করতে পারি না

#### বিভাগ 7: কাজ

- আমি যত কাজ করতে চাই ততটুকু করতে পারি
- আমি শুধুমাত্র আমার স্বাভাবিক কাজ করতে পারি, কিন্তু আর কিছু না
- আমি আমার স্বাভাবিক কাজ বেশিরভাগই করতে পারি, কিন্তু আর না
- আমি আমার স্বাভাবিক কাজ করতে পারি না
- আমি খুব কমই কোনো কাজ করতে পারি
- আমি কোনো কাজই করতে পারি না

## বিভাগ 8: ড্রাইভিং

- আমি ঘাড়ের ব্যথা ছাড়াই আমার গাড়ি চালাতে পারি
- আমার ঘাড়ে সামান্য ব্যথা নিয়ে আমি যতক্ষণ চাই ততক্ষণ গাড়ি চালাতে পারি
- আমার ঘাড়ে মাঝারি ব্যথা নিয়ে আমি যতক্ষণ চাই ততক্ষণ আমার গাড়ি চালাতে পারি
- আমার ঘাড়ে মাঝারি ব্যথার কারণে আমি যতক্ষণ চাই ততক্ষণ আমার গাড়ি চালাতে পারি না
- আমার ঘাড়ে তীব্র ব্যথার কারণে আমি খুব কমই গাড়ি চালাতে পারি
- আমি আমার গাড়ি মোটেও চালাতে পারি না

## অধ্যায় 9: ঘুমানো

- আমার ঘুমাতে কোন সমস্যা নেই
- আমার ঘুম কিছুটা ব্যাহত হয়েছে (১ ঘণ্টার কম ঘুমহীন)
- আমার ঘুম হালকা বিঘ্নিত (1-2 ঘন্টা ঘুমহীন)
- আমার ঘুম মাঝারিভাবে ব্যাহত হয় (2-3 ঘন্টা ঘুমহীন)
- আমার ঘুম খুব ব্যাহত হয় (3-5 ঘন্টা ঘুমহীন)
- আমার ঘুম সম্পূর্ণভাবে ব্যাহত (5-7 ঘন্টা ঘুমহীন)

## বিভাগ 10: বিনোদন

- আমি ঘাড় ব্যথা ছাড়াই আমার সমস্ত বিনোদনমূলক ক্রিয়াকলাপে নিযুক্ত থাকতে পারি
- আমি আমার ঘাড়ে কিছু ব্যথা সহ আমার সমস্ত বিনোদনমূলক ক্রিয়াকলাপে নিযুক্ত হতে পারি
- আমার ঘাড়ে ব্যথার কারণে আমি বেশিরভাগ ক্ষেত্রেই নিয়োজিত হতে পারি, কিন্তু আমার স্বাভাবিক বিনোদনমূলক ক্রিয়াকলাপে নয়
- আমার ঘাড়ে ব্যথার কারণে আমি আমার কিছু স্বাভাবিক বিনোদনমূলক ক্রিয়াকলাপে নিযুক্ত হতে পারি
- আমার ঘাড়ে ব্যথার কারণে আমি খুব কমই কোনো বিনোদনমূলক কাজ করতে পারি
- আমি কোনো বিনোদনমূলক কাজ করতে পারি না

স্কোর /50 শতাংশ স্কোরে রূপান্তর  $100 = \%$  পয়েন্ট

স্কোরিং:

প্রতিটি বিভাগের জন্য মোট সম্ভাব্য স্কোর হল 5: যদি প্রথম বিবৃতিটি চিহ্নিত করা হয় বিভাগ স্কোর = 0, যদি শেষ বিবৃতিটি চিহ্নিত করা হয় = 5।

সব দশটি বিভাগ সম্পন্ন হলে স্কোর নিম্নরূপ গণনা করা হয়:

উদাহরণ:

16 (মোট স্কোর)

$50$  (মোট সম্ভাব্য স্কোর)  $\times 100 = 32\%$

একটি বিভাগ মিস হলে বা প্রযোজ্য না হলে স্কোর গণনা করা হয়: 16 (মোট স্কোর)

$45$  (মোট সম্ভাব্য স্কোর)  $\times 100 = 35.5\%$

ন্যূনতম সনাক্তযোগ্য পরিবর্তন (90% আত্মবিশ্বাস): 5 পয়েন্ট বা 10% পয়েন্ট

## Questionnaire (English)

Title: “Effectiveness of McKenzie Manipulative Therapy on Pain, Function and Disability among Cervical Disc Prolapse Patient.”

Code no:

### Part: 1- Personal details:

1.1 Patient's name:

1.2 Age:

1.3 Gender: 1. Male 2. Female

1.4 Height:

1.5 Weight:

1.6 Address:: Village: Post office:  
Thana: District

### Part: 2-Socio-demographic information

2.1 Occupation:

1. Farmer 2. Day labor 3. Service holder  
4. Garments worker 5. Driver 6. Rikshawala  
7. Businessman 8. Unemployment 9. Housewife  
10. Teacher 11. Student 12. Others

2.2 Marital status 1. Married 2. Unmarried 3. Widow  
4. Divorce

2.3 Family size: 1. Small family 2. Large family

2.4 Number of Children:

2.5 Living place: 1. Urban 2. Rural

2.6 Educational status 1. Illiterate 2. Primary 3. Secondary  
4. HSC passed 5. Graduate & Masters

2.7 Religion: 1. Islam 2. Hindu  
3. Christen 4. Boddho

2.8 Smoking 1. Yes 2. No



**Part: 3- Pain related variables**

3.1 Duration of pain ..... weeks

3.2 Present symptoms

3.3 Co-morbidity:

3.4 History of previous spine surgery:

3.5 Medication:

**Part- 4: NECK PAIN DISABILITY INDEX QUESTIONNAIRE**

Please read: this questionnaire is designed to enable us to understand how much your neck pain has affected your ability to manage your everyday life. Please answer each section by circling the ONE CHOICE that most applies to you .We realize that you may feel that more than one statement may relate to you, but please just circle the one choice which most closely describes your problem right now.

**Section 1: Pain Intensity**

- I have no pain at the moment
- The pain is very mild at the moment
- The pain is moderate at the moment
- The pain is fairly severe at the moment
- The pain is very severe at the moment
- The pain is the worst imaginable at the moment

**Section 2: Personal Care (Washing, Dressing, etc.)**

- I can look after myself normally without causing extra pain
- I can look after myself normally but it causes extra pain
- It is painful to look after myself and I am slow and careful
- I need some help but can manage most of my personal care
- I need help every day in most aspects of self-care
- I do not get dressed, I wash with difficulty and stay in bed

### **Section 3: Lifting**

- I can lift heavy weights without extra pain
- I can lift heavy weights but it gives extra pain
- Pain prevents me lifting heavy weights off the floor, but I can manage if they are conveniently placed, for example on a table
- Pain prevents me from lifting heavy weights but I can manage light to medium weights if they are conveniently positioned
- I can only lift very light weights
- I cannot lift or carry anything

### **Section 4: Reading**

- I can read as much as I want to with no pain in my neck
- I can read as much as I want to with slight pain in my neck
- I can read as much as I want with moderate pain in my neck
- I can't read as much as I want because of moderate pain in my neck
- I can hardly read at all because of severe pain in my neck
- I cannot read at all

### **Section 5: Headaches**

- I have no headaches at all
- I have slight headaches, which come infrequently
- I have moderate headaches, which come infrequently
- I have moderate headaches, which come frequently
- I have severe headaches, which come frequently
- I have headaches almost all the time

### **Section 6: Concentration**

- I can concentrate fully when I want to with no difficulty
- I can concentrate fully when I want to with slight difficulty
- I have a fair degree of difficulty in concentrating when I want to
- I have a lot of difficulty in concentrating when I want to
- I have a great deal of difficulty in concentrating when I want to
- I cannot concentrate at all

**Section 7: Work**

- I can do as much work as I want to
- I can only do my usual work, but no more
- I can do most of my usual work, but no more
- I cannot do my usual work
- I can hardly do any work at all
- I can't do any work at all

**Section 8: Driving**

- I can drive my car without any neck pain
- I can drive my car as long as I want with slight pain in my neck
- I can drive my car as long as I want with moderate pain in my neck
- I can't drive my car as long as I want because of moderate pain in my neck
- I can hardly drive at all because of severe pain in my neck
- I can't drive my car at all

**Section 9: Sleeping**

- I have no trouble sleeping
- My sleep is slightly disturbed (less than 1 hr sleepless)
- My sleep is mildly disturbed (1-2 hrs sleepless)
- My sleep is moderately disturbed (2-3 hrs sleepless)
- My sleep is greatly disturbed (3-5 hrs sleepless)
- My sleep is completely disturbed (5-7 hrs sleepless)

**Section 10: Recreation**

- I am able to engage in all my recreation activities with no neck pain at all
- I am able to engage in all my recreation activities, with some pain in my neck
- I am able to engage in most, but not all of my usual recreation activities because of pain in my neck
- I am able to engage in a few of my usual recreation activities because of pain in my neck
- I can hardly do any recreation activities because of pain in my neck
- I can't do any recreation activities at all

**Score: /50    Transform to percentage score x 100 =        % points**

**Scoring:**

For each section the total possible score is 5: if the first statement is marked the section score = 0,

if the last statement is marked it = 5.

If all ten sections are completed the score is calculated as follows:

Example:

16 (total scored)

50 (total possible score) x 100 = 32%

If one section is missed or not applicable the score is calculated: 16 (total scored)

45 (total possible score) x 100 = 35.5%

Minimum Detectable Change (90% confidence): 5 points or 10 %points