

**EFFECTIVENESS OF TRUNK PROPRIOCEPTIVE  
NEUROMUSCULAR FACILITATION TRAINING FOR PAIN AND  
DISABILITY ON MECHANICAL LOW BACK PAIN PATIENTS  
ATTENDED AT CRP**

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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 Trunk Proprioceptive Neuromuscular Facilitation Training for pain and disability on Mechanical Low Back Pain patients attended at CRP”** Submitted by **Md. Nuruzzaman**, for partial fulfillment of the requirements for the degree of Bachelor of Science in Physiotherapy (B.Sc PT).

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## **Declaration**

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

**Signature:**

**Date:**

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## List of Contents

|  | <b>Page No.</b> |
|--|-----------------|
| Acknowledgement                        | i               |
| Contents                               | ii- iii         |
| Acronyms                               | iv              |
| List of Tables                         | v               |
| List of Figures                        | vi              |
| Abstract                               | vii             |
| <b>CHAPTER – I: INTRODUCTION</b>       | <b>1-6</b>      |
| 1.1 Background                         | 1-4             |
| 1.2 Rationale                          | 4               |
| 1.3 Objectives                         | 5               |
| 1.4 Hypothesis test                    | 5               |
| 1.5 operational Definition             | 6               |
| <b>CHAPTER – II: LITERATURE REVIEW</b> | <b>7-13</b>     |
| <b>CHAPTER – III: METHODOLOGY</b>      | <b>14-28</b>    |
| 3.1 Study Design                       | 14              |
| 3.2 Sampling                           | 14              |
| 3.3 Sample size                        | 14              |
| 3.4 Study area                         | 15              |
| 3.5 Study population                   | 15              |
| 3.6 Sample selection                   | 15              |
| 3.7 Inclusion criteria                 | 16              |
| 3.8 Exclusion criteria                 | 16              |

|   | <b>Page No.</b>  |
|---|------------------|
| 3.9 Method of data collection                 | 17               |
| 3.10 Treatment protocol                       | 18               |
| 3.11 Measurement                              | 19               |
| 3.11.1 Data collection tools                  | 19               |
| 3.11.2 Questionnaire                          | 19               |
| 3.12 Measurement tools                        | 19               |
| 3.12.1 Dallas Questionnaire                   | 19               |
| 3.12.2 Oswestry disability index              | 19               |
| 3.13 Data collection procedure                | 20               |
| 3.14 Ethical Consideration                    | 21               |
| 3.15 Data Analysis                            | 21-28            |
| 3.15.1 Statistical test                       | 22               |
| 3.15.2 level of significance                  | 23-28            |
| <b>CHAPTER – IV: RESULTS</b>                  | <b>29-43</b>     |
| <b>CHAPTER – V: DISCUSSION</b>                | <b>44-46</b>     |
| <b>CHAPTER-VI:CONCLUSIONANDRECOMMENDATION</b> | <b>47</b>        |
| <b>REFERENCES</b>                             | <b>48-54</b>     |
| <b>APPENDIXES :</b>                           | <b>xiii-xxix</b> |

## Acronyms

|             |  |
|-------------|--|
| <b>BHPI</b> | Bangladesh Health Professions Institute        |
| <b>BMI</b>  | Body Mass Index                                |
| <b>CRP</b>  | Centre for the Rehabilitation of the Paralysed |
| <b>IRB</b>  | Institutional Review Board                     |
| <b>LBP</b>  | Low Back Pain                                  |
| <b>ODI</b>  | Oswestry Disability Index                      |
| <b>PNF</b>  | Proprioceptive Neuromuscular Facilitation      |
| <b>SPSS</b> | Statistical Package for the Social Sciences    |
| <b>VAS</b>  | Visual Analogue Scale                          |
| <b>WHO</b>  | World Health Organization                      |

## List of Tables

| <b>Table No.</b> | <b>Title</b>   | <b>Page No.</b> |
|------------------|--|-----------------|
| Table -1         | Experimental group treatment protocol                                | 18              |
| Table -2         | Control group treatment protocol                                     | 18              |
| Table -3         | Dallas Questionnaire (initial and final assessment<br>Paired t test) | 24              |
| Table -4         | ODI (initial and final paired t test)                                | 25              |
| Table-5          | Dallas questionnaire (final unpaired t-test)                         | 27              |
| Table- 6         | Mean age of participants   | 29              |



|                        |
|------------------------|
| <b>List of Figures</b> |
|------------------------|

| <b>Figure No.</b> | <b>Title</b>                           | <b>Page No.</b> |
|-------------------|--|-----------------|
| Figure – 1        | Age Range                              | 30              |
| Figure – 2        | Gender of participations               | 31              |
| Figure – 3        | Educational Status of the participants | 32              |
| Figure – 4        | Occupation of the participants         | 33              |
| Figure – 5        | Body Mass Index of the participant     | 34              |
| Figure – 6        | Disability among the participants      | 35              |
| Figure – 7        | Mean disability                        | 36              |

## Abstract

*Purpose:* To identify the trunk PNF training effectiveness of mechanical low back pain patient. *Objectives:* To evaluate the effect of pain at PNF Training for mechanical low back pain patients. To identify the improvement of the disability level for mechanical low back pain patients. *Methodology:* This study was conducted by Randomized Control Trail (RCT) in which a total 10 participants were selected randomly included 5 control group and 5 experimental group. Data was collected by using Oswestry disability index questionnaire to evaluate disability level and pain measured by Dallas pain questionnaire. SPSS was used for data analysis which was displayed through table, pie chart, bar chart and parametric test- paired t-test and unpaired or unrelated t-test. *Results:* A significant improvement of reduction of pain in different positions were found in experimental group by using trunk PNF training . So this treatment approach may be considered as beneficial for mechanical low back pain patient and physiotherapist can suggest this technique. *Conclusion:* The result of this study suggest trunk PNF program with conventional physiotherapy is effective for mechanical low back pain patient. This reduce pain as well as disability.

***Key words:* Mechanical low back pain, Trunk PNF, Disability and pain**

**1.1 Background**

The prevalence of mechanical low back pain is about 80-90% of people in some times in their life time (George et al., 2013). Pain is a major cause of morbidity. Besides low back pain being one of the most common location of symptom (Mannion et al., 2007). International surveys of low back pain (LBP) was reported a point prevalence of 15% to 30%, a 1-month prevalence of 19% to 43% and worldwide estimates of lifetime prevalence of LBP vary from 50% to 84% (Ghaffari et al., 2006). In developed countries such as the United States of America and Australia, LBP prevalence is 26.4% to 79.2% (Walker et al., 2004). The 1 year prevalence of LBP in Britain was 49% and in the Nordic countries the 1 month prevalence of LBP was 35% (Torill et al., 2004). In Netherland & Belgium LBP prevalence rates are 30% and 40% was recorded among workers, in Italy 60% of LBP are recognized as occupational diseases, in France LBP accounted for 40% (Fernandes et al., 2011). In Canada, low back pain (LBP) is an important occupational health problem and also in most industrialized countries (Tissot et al., 2009).

On any given day 12-33% of the people complain low back pain and the cost of treatment is enormous in Australia. In 21 million people, there was a statement that 90% of patient with low back pain recover within six weeks (Henschke et al., 2008). Low back pain is the main cause of workers compensation in the USA & Canada. A major reason for visit to health care professionals 60-90% of the adult people is at risk of developing low back pain at some point in their lifetime while the majority episodes are resolve within six weeks. It is estimated that 10-20% of affected adult develop the clinical feature of low back pain. The persistent pain lasts for more than 3 months & occurring at least 50% of days (Bekkering et al., 2003).

Among adult population low back pain is the most common everyday complaint. In Australia about 20% of the adult population experiences low back pain at any given time (Alsaadi et al., 2011). Louw et al. (2007) stated that in Africa the

prevalence of low back pain is 33% among adolescents and 50% among adults in one year. Low back pain is as common complaint as in childhood and adolescence that are seen in adults. A cross-sectional study among 18-year-old females and 20-year-old males showed that the lifetime incidence surpassed 50% in Denmark (Sato et al., 2011).

In first episode of low back pain found 62% of people, 16% of those initially unable to work are not working after one year (Alsaadi et al., 2011). Estimates for the adult population burden of chronic mechanical low back pain includes, 11% for disabling back pain in the previous 3 months, 23% for low back pain lasting more than 3 months & 18% for at least troublesome pain in the previous month & it represents a burden to many people & enormous cost for society.

In 55.5% of Australian adult population has the majority respondent to low back pain in the past 6 month did not seek care for it (Hilde et al., 2002). Adoption of self-management strategies was not achieved consistently in this group of participants. There was a strongly perceived need for self-management support following discharge from physiotherapy (Nahar et al.,2012).Exercises were reportedly the most common self-management strategy in use. However, it was common for participants to perceive that physiotherapy had little influence on their Chronic low back pain management following discharge (Coopera et al., 2009).

A cross-sectional study was performed during December 2010 using a questionnaire and car drivers who experienced back pain for at least one day during the past 12 months were included in the study. The study demonstrated that 78% of car drivers reported LBP for at least one day during the past 12 months. Occupational health and safety management interventions should be implemented to prevent adverse health effects in professional car drivers (Nahar et al., 2012).

In Patient education was recommended for all patients with LBP. There was an agreement to advise spine manipulation for patients with acute and sub-acute non-specific LBP (Kumar et al.,2011). There was a agreement to recommend exercises for acute, sub-acute and chronic LBP. Few guidelines addressed conservative management (physical activity, exercise, education, electro-physical agents,

behavioral counseling) of LBP with radiculopathy. Overall, the guidelines did not offer specific advice for manipulation (hypo mobility or instability) and exercise (stabilization or directional preference) (Ladeira, 2011).

Back pain affects millions of people and is one of the most common maladies prompting patients to seek medical attention and remain most common cause of time off work. The lifetime prevalence of low back pain in the general population approaches 85% with 2%-5% of people affected yearly. Furthermore, over 80% of such patients report recurrent episode. However, few (7.7%) of them will develop chronic low back pain (Kumar et al., 2011). Exercise can be prescribed for patients with mechanical LBP with three distinct goals. The first and most obvious goal is to improve back flexibility and strength, and to improve performance of endurance activities. The second goal of exercise is to reduce the intensity of back pain. The third and most important goal of exercise is the reduction of back pain related disability (Kumar et al., 2011).

Proprioceptive neuromuscular facilitation (PNF) exercises are designed to enhance the response of neuromuscular mechanisms by stimulating proprioceptors (Kofotolis et al., 2006). The patterns of PNF exercises have a spiral, diagonal direction, and the performance of these patterns is in line with the topographic arrangement of the muscles being used. Therefore, these exercises should be better suited for performance enhancement of mechanical LBP than conventional training programs (Kumar et al., 2011).

## **1.2 Rationale**

Low back pain is a most common health problem affecting the possible age 20-50. Most of the patients are taking medical treatment for their problem. Moreover a large part of population has lack of physical fitness, didn't regular physical exercise and lack of normal posture and leading of a sedentary life are most common prevalent predisposing characteristics of LBP in Bangladesh. Still health care delivery system in Bangladesh allows an individual patient to receive medical treatment for managing mechanical low back pain.

Trunk PNF training is such treatment approach which is very effective in some study. This technique applied in India very recently but such research was not applied in Bangladesh. If i found this technique effectiveness, I think it may very helpful in our professional as well as mechanical low back pain sufferers also.

### 1.3 Objectives

#### General objective

- To identify the effectiveness of trunk proprioceptive neuromuscular facilitation training on mechanical LBP patients.

#### Specific objectives

- To find out the effectiveness of trunk proprioceptive neuromuscular facilitation training on mechanical LBP patients.
- To evaluate the outcome of pain in different functional position after receiving treatment.
- To determine the disability level due to mechanical LBP.
- To explore socio-demographic (age, gender, occupation, educational status) characteristics of patients with mechanical LBP.

### 1.4 Hypothesis

#### Null Hypothesis

$H_0 : \mu_1 - \mu_2 = 0$  or  $\mu_1 \geq \mu_2$ , where the experimental group and control group mean difference is same or control group is higher than experimental group.

#### Alternative Hypothesis

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

Where,

$H_0$  = Null hypothesis

$H_a$  = Alternative hypothesis

$\mu_1$  = mean difference in initial assessment

$\mu_2$  = mean difference in final assessment

## **1.5 Operational definition**

### **Mechanical low back pain**

Mechanical low back pain is the general term that refers to any type of back pain caused by strain on muscles of the vertebral column and abnormal stress.

### **Proprioceptive neuromuscular facilitation (PNF)**

A method of stretching muscles to maximize their flexibility that is often performed with a partner or trainer and that involves a series of contractions and relaxations with enforced stretching during the relaxation phase.

### **Pain**

Pain is an unpleasant sensory or emotional experience associated with actual or potential tissue damage, or described in terms of such damage.

### **Disability**

A condition such as illness or an injury that damages or limits a person's physical or mental abilities.



International Association for the Study of Pain defined pain as an unpleasant sensory and emotional experience associated with actual or potential tissue damage or described in terms of such damage (IASP, 2012).

Perhaps LBP more precisely called lumbago or lumbosacral pain that occurs below the 12th rib and above the gluteal folds (Sikiru & Hanif, 2010). According to the European guidelines for management of acute nonspecific back pain in primary care defined LBP is a pain and discomfort localized below the costal margin and above the inferior gluteal folds, with or without leg pain (Kuritzky & Samraj, 2012). The lumbar spine consists of five vertebrae. These vertebrae have heavy thick bodies to support the greater stress and weight as they serve as major load bearing portion of the vertebrae. Biomechanical functions of these spines are transmitting forces (weights), bending moments to the pelvis, allowing motions and protecting the spinal cord (Lee, 2006).

The ligaments of lumbar spine are anterior longitudinal ligament (ALL), posterior longitudinal ligament (PLL), interspinous ligament, intertransverse ligament and ligamentum flavum (LF). The ALL maintains the stability of the joints and limits extension. The PLL limits flexion except at the lower lumbar spine where it is narrow and weak. The intertransverse ligament resists lateral bending of the trunk. During flexion ligament becomes stretched and during extension it becomes contracted. As a whole ligament permit sufficient physiologic movements, protect the spinal cord and provide stability to the spine (Lee, 2006).

The spinal cord is enclosed within the spinal canal. The spinal canal works as follows: when the spine is extended it decreases in length and increased when the spine is flexed. Small nerve roots branch off from the spinal cord through spaces called neural foramen (Lee, 2006).

Low back pain may or may not pass on to the lower limb and into the groin or perineum. When pain is referred in the lower limb associated with LBP then it may either somatic referred pain or radicular pain. Pain extending across relatively wide region and felt deeply, in a relatively constant or fixed location and it is called

somatic referred pain. Pain that move by the side of the length of the lower limb, along a narrow band and it is called radicular pain or sciatica. When pain is persist in the buttock or proximal thigh extending below the knee is not necessarily radicular pain. A patient does not necessarily have to exhibit neurological features to be suffering from radicular pain, but the presence of neurological features (motor weakness, sensory deficit, or numbness) favours the diagnosis of radicular (sciatic) pain. Somatic referred pain indicates when patient feel deep aching pain (Kilpikoski, 2010).

The causes of low back pain include exertion or lifting, postural strain (improper position when sitting, standing and bending), infection nerve dysfunction, osteoporosis, tumors, and congenital problem. Spinal stenosis, rheumatoid arthritis, prostate trouble in men, problems with reproductive organs in women, kidney disease, such as an infection or kidney stone, diseases of the intestines or pancreas such as cancer or a blockage, cancer that has spread to the spine, multiple myeloma, a form of cancer of the bone and bone marrow, curvature of the spine, rarely a tumor on the spinal cord are the other cause of low back pain (NHS, 2010).

The symptoms of low back pain includes pain or deep ache may on the low back or buttocks, burning or tingling sensation of the leg or foot. These symptoms may be continuous or intermittent which worsened by activity and improved partially by rest. Physical activity, particularly bending, extending, twisting and lifting, commonly aggravates the symptoms, whereas restriction of pain-producing activities results in improvement at least temporarily. Typical physical findings are nonspecific, including restricted range of motion of the spine, tight hamstring muscles, paravertebral muscle spasms, Muscular trigger points, tenderness and aggravation of symptoms on flexion or extension and straight leg raising tests (Alema & Sayadipour, 2008).

Depending on the duration of pain LBP is categorized as- acute pain that lasts less than 6 weeks, sub-acute pain lasts up to 6 to 12 weeks and chronic pain that lasts more than 3 months. Recurrence of LBP is common. If recurrence occur in less than 6 months is considered as exacerbation of chronic LBP. There is sometimes a

very short hyperacute period that lasts for 24–48 hours. During this period there is pain and intense spasm in which sufferers are immobilized and motion is prevented. Fortunately very few patients experiences this period and usually resolves within 24–48 hours (Kuritzky & Samraj, 2012). The lifetime prevalence of acute LBP between 60% to 90% and 30% may develop a chronic condition (Ladeira, 2011). One of the most common causes of LBP is strain or sprain and accounts for 65%-70% (Cohen et al., 2009). Sprains and strains are soft tissue injuries. Sprains affect tendons and ligaments whereas strains concern muscles. Injury occur when these structure are stretched beyond their normal limits due to excessive flexion or extension or when excessive forces are applied to these structures causing tiny tears in the tissue (Akbarnia et al., 2013). If the injury persists for days to weeks then it is called acute and if it lasts longer than three months it is called chronic. It usually occurs in people with 40s but it can happen at any age (William & Shiel, 2012). Bone and joint conditions also lead to low back pain. In facet joint osteoarthritis breakdown of the cartilage leads to the cause of pain (Ullrich, 2012). Patients more than 70 years and have a history of osteoporosis often occurs spinal compression fracture (Karnath, 2003). Who use corticosteroid for long-term are more susceptible to occur a compression fracture and result in LBP (Ullrich, 2012).

Non mechanical causes accounts only 1-2% and includes neoplastic disease, infection, and inflammatory arthritis, tumor of the pelvis, spine and Paget 's disease. Besides these there are also some psychological causes to develop the LBP which include: somatoform disorder-somatisation disorder, pain disorder, malingering and these are account for 2-4% (Cohen et al., 2009).

CLBP is a multifactorial phenomenon where physiotherapy plays an important role in the treatment of it. The aim of treatment includes- decreasing pain, increasing strength, normalizing somatosensory deficits, improve functional activity and quality of life (Geletka et al., 2012).

Physiotherapy includes various type of stretching and strengthening exercises, manual therapies such as mobilization, manipulation, McKenzie therapy and

electrotherapeutic modalities such as ice, heat, transcutaneous electrical nerve stimulation (TENS), ultrasound (Krishna, 2013). Electrotherapeutic modalities especially hot packs, short wave diathermy, ultrasound, TENS are commonly used to reduce pain (Rashid et al., 2012). Massage reduces pain, improves function and relaxation. It become more effective when combined with exercises, stretching and education (Buselli et al., 2011). Spinal manipulation reduces pain, improves functional activities and return to work (Jacobson et al., 2009). Exercise therapy includes strengthening and core stability exercises that reduce pain and improve functions (Last & Hulbert, 2009). Motor control exercise improves neuromuscular control of trunk segments. If spinal manipulation and motor control exercises are used combinedly, the treatment become more effective (Jacobson et al., 2009). Medium-firm mattress is beneficial for the patients (Chou et al., 2007). Recent study shows that early activity, specific core stabilisation exercises, ergonomic and postural advices are effective for LBP management (Fritz et al., 2007).

Bunzli et al. (2010) stated that LBP is categorized by the duration of symptoms as: Acute LBP (0–6 weeks); Sub acute LBP (7–12 weeks); Chronic LBP (>12 weeks). Disability related to chronic low back pain (CLBP) is a complex and multifactorial phenomenon, associated with high social and health costs. This complexity can be explained by the interaction among the many variables that determine disability. The high costs are associated with productivity losses, leaves of absence from work and health system spending (Salveti et al., 2012). Dartmouth-Hitchcock (2013) stated that chronic low back pain is defined as long-lasting lower back pain continuing for more than three months. In the United States it is estimated that seven million adults have activity limitations as a result of chronic low back pain (Jacobson et al., 2009).

Risk factors for LBP have not been completely elucidated (Tomita et al., 2010). After several expert group discussions risk factors are categorized as modifiable and non-modifiable. Non modifiable factors include increasing age, a previous episode of LBP, history of LBP during pregnancy, socioeconomic status, marriage status, educational level etc. Modifiable risk factors further classified as lifestyle

(obesity, smoking, Alcohol intake), and occupational (heavy lifting, twisting, bending, prolonged sitting, awkward posture at work, monotonous work, previous history of injury) (Vindigni et al., 2005).

As degenerative changes in the spine and disc are one of the major causes of LBP so aging is a well-known risk factor of LBP (Tomita et al., 2010). Many studies have shown that the risk of low back pain increases as a patient gets older. Our bodies are made with trillions of cells and that have more than 200 types. Cell normally reproduce and replaces the old cells during youth. Advanced age affects cellular activities including metabolism, which slows down. The annulus fibrosus the outer layer of intervertebral disc may begin to lose elasticity and flexibility. The annulus may crack or tear the nucleus pulposus, a fibrous, gel-like core that containing protein and water may diminish water content and distress the balance of protein to water. It also alters the strength and softness of the disc (Spineuniverse, 2013).

Robin McKenzie (1981) has placed mechanical low back pain in the three relatively simple categories like. The postural syndrome results from mechanical deformation in posture causing when the soft tissues surrounding the lumbar segments to be placed under prolonged stretch. It is intermittent in nature. This occurs most commonly when poor sitting posture includes a forward head, rounded shoulders, and a flexed low back and poor standing postures are adopted (Browning, 2012).

The dysfunction syndrome is the condition in which implies some sort of adaptive shortening, scarring or adherence of connective tissue causing discomfort and resultant loss of mobility causing pain prematurely- that is, before achievement of full normal end range movement. When the patient moves away from end range their pain is decreased (Romano, 2013).

Derangement syndrome is the situation in which the normal resting position of the articular surfaces of two adjacent vertebrae is disturbed as a result of a change in

the position of the fluid nucleus between these surfaces. The alteration in the position of the nucleus may also disturb annular material. This change will affect the ability of the joint surfaces within the joint to move in their normal relative pathways. This condition becomes painful when the disk wall or nucleus deformation intrudes on adjacent pain sensitive soft tissues. This pattern of pain increases and peripheralizes as the tissues become more deformed or as nerve root irritation becomes a factor. Symptoms tend to centralize and eventually diminish as the displaced disk material is relocated and the deformity of surrounding tissues is reduced. The effects of test movements on symptoms usually occur during the movement rather than at end range and tend to be sustained (Browning, 2012).

Proprioceptive neuromuscular facilitation (PNF) exercises are designed to enhance the response of neuromuscular mechanisms by stimulating proprioceptors. The patterns of PNF exercises have a spiral, diagonal direction, and the performance of these patterns is in line with the topographic arrangement of the muscles being used (Kofotolis et al., 2005). The performance of movements in PNF patterns may permit muscles to act in ways that are close to the actions and movements found in various sports. Therefore, these exercises should be better suited for performance enhancement than is conventional single-plane or single-direction training programs (Kofotolis, 2006).

PNF is a widely used therapeutic approach by physiotherapists in clinical practice, but irrespective of the long history of PNF concept, its therapeutic implication in the management of LBP is less investigated. Whatever available evidence directs towards the positive effects of PNF training in improving pain, back pain related functional disability, back endurance and flexibility in low back pain population. Researchers have demonstrated that significant difference exist in the proprioceptive function of the low back, between individuals with and without low back pain and researchers have suggested that interventions that address the proprioceptive function must be investigated for their effects in LBP population. The need to address the proprioceptive function of the low back pain population and paucity of evidence regarding the effectiveness of PNF training in low back

pain, the present study is conducted to examine the beneficial effects of PNF training in improving pain, back pain related functional disability and trans versus abdominis activation capacity in mechanical low back pain population. The main objectives of this study was to compare the effectiveness of combination of trunk Proprioceptive neuromuscular facilitation training and conventional strengthening exercises with conventional strengthening exercises alone in the management of mechanical low back pain( G. Amal Jose et al., 2013).

### **3.1 Study design**

The aim of this study was to find out the effectiveness of trunk PNF training in mechanical LBP patients attended at musculoskeletal unit at CRP-Savar. Experimental design of quantitative research which was Randomized Controlled Trail (RCT) sign was chosen because the experimental study is the best way to find out the effectiveness of the study.

A pre-test (before intervention) and post-test (after intervention) was administered with each subject of both groups to compare the pain effects before and after the treatment. The design could be shown by-

r o x o (experimental group)

r o o (control group)

### **3.2 Sampling Technique**

Simple random sampling technique was used for this study. Subjects, who met the inclusion criteria, were taken as sample in this study. 10 patients with Low Back Pain were selected from outpatient musculoskeletal unit of physiotherapy department of CRP, Savar and then 5 patients were randomly assigned to Experimental group comprising of treatment approaches of trunk PNF training along with other Physiotherapy treatment and 5 patients to the only other Physiotherapy treatment for this study. The study was a single blinded technique.

### **3.3 Sample size**

Researcher has taken 10 participants as sample. Obviously this is a small sample but still we believe they will be provided a representative picture of the study. Due to time limitation the researcher has to choose 10 participants to conduct this study; within the short time it could not be possible to conduct the study with a large number subjects.



### **3.4 Study area**

Data was collected from the outpatient, Musculoskeletal Physiotherapy unit of Centre for the Rehabilitation of the Paralyzed (CRP), Savar. Because these patients came at CRP from all over the Bangladesh from all economic groups for comprehensive rehabilitation, so it reflects the entire population.

### **3.5 Study Population**

A population refers to the entire group of people or items that meet the criteria set by the researcher. The populations of this study were the Mechanical low back pain Patients.

### **3.6 Sample selection**

Subjects, who met the inclusion criteria, were taken as sample in this study. Ten patients with Mechanical low back pain were selected from outdoor musculoskeletal physiotherapy department of CRP (Savar). From the outdoor patients with Mechanical low back pain ,10 patients randomly selected from outdoor musculo-skeletal unit, CRP and then 5 patients with Mechanical low back pain were randomly assigned to trunk PNF with conventional physiotherapy group and 5 patients to the only conventional physiotherapy group for this randomized control trial study. When the samples were collected, the researcher randomly assigned the participants into experimental and control group, because it improves internal validity of experimental research. The samples were given numerical number C1, C2, C3 etc for the control and E1, E2, E3 etc for experimental group. Total 10 samples included in this study, among them 5 patients were selected for the experimental group (received trunk PNF with conventional physiotherapy) and rest 5 patients were selected for control group (conventional physiotherapy only).

### **3.7 Inclusion criteria**

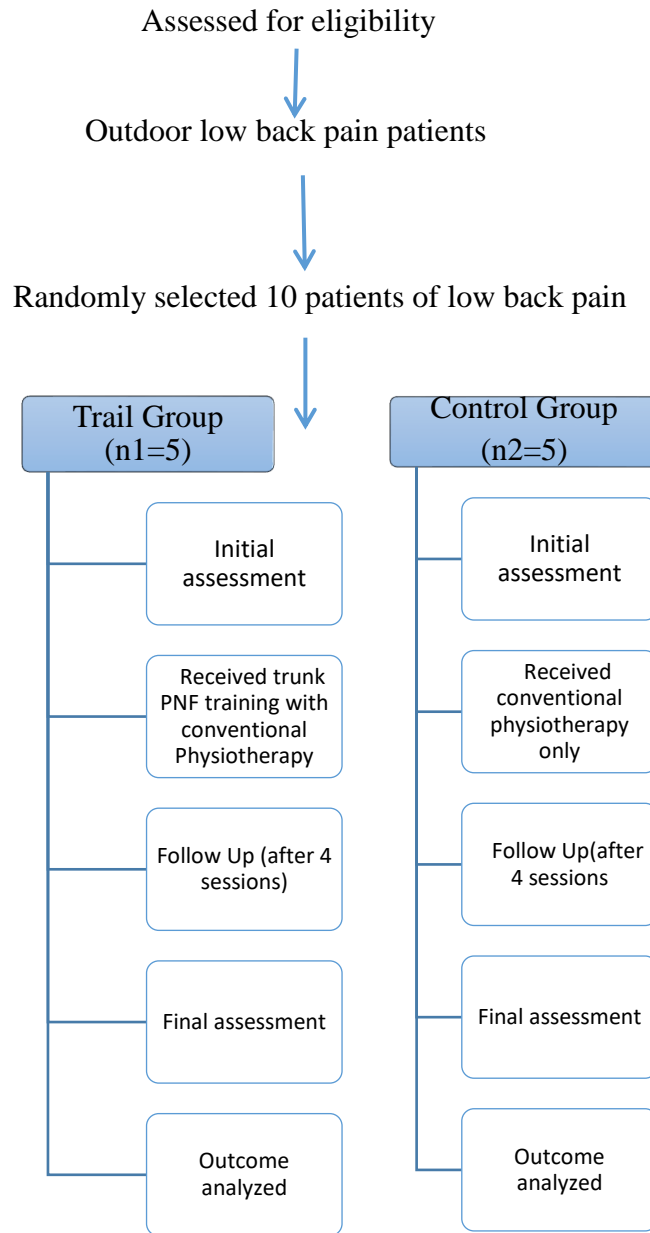
- ✓ The participants were those individuals who has been diagnosed previously or recently diagnosed by Physiotherapist who has mechanical low back pain 3 months or more.
- ✓ Voluntary participants.
- ✓ Age group: 18-45 years old of both sexes.

### **3.8 Exclusion criteria**

- Patients who were suffering from serious pathological disease e.g. tumours, tuberculosis and others pathological problems.
- Surgery to the lumber spine.
- Pregnant women.
- Mentally retarded patient.

### 3.9 Method of data collection

#### Flowchart of the phases of randomized controlled trial



A flowchart for a randomized controlled trial of a treatment program including conventional physiotherapy with trunk PNF for patient with mechanical low back pain.

### 3.10 Treatment Protocol

Trunk PNF training was applied by a graduate qualified physiotherapist who is expertized in PNF technique to the patients of experimental group and home advice given to the patients. Both group received treatment weekly two days in two weeks.

**Table -1: Experimental Group Treatment Protocol**

| <b>Treatment options</b>                    | <b>Duration/Repetition</b>    |
|---|-------------------------------|
| Trunk PNF training                          | 15 minutes                    |
| Lumber Mobilization (Maitland mobilization) | 5 minutes in each session     |
| McKenzie Approach (Directional Preference)  | 10 repetition in each session |
| Back muscles strengthening                  | 3 minutes                     |
| Soft tissue technique                       | 3 minutes                     |
| IRR   | 10 minutes in each session    |

**Table - 2: Control Group Treatment Protocol**

| <b>Treatment options</b>                    | <b>Duration/Repetition</b>    |
|---|-------------------------------|
| McKenzie Approach (Directional Preference)  | 10 repetition in each session |
| Back muscles strengthening                  | 3 minutes                     |
| Lumber Mobilization (Maitland mobilization) | 5 minutes in each session     |
| Soft tissue technique                       | 3 minutes                     |
| IRR   | 10 minutes in each session    |

### **3.11 Measurement**

To conduct this study, the researcher collected data through using different types of data collection tools. The researcher has used Dallas pain scale by using Visual Analogue Scale (VAS) for pain measurement in different working position and also activities, Oswestry Low Back Pain Disability Questionnaire were used for disability measurement.

#### **3.11.1 Data collection tools**

The organized material was questionnaires, consent forms, paper, pen & a pencil. All questionnaires designed to conduct the interviews.

#### **3.11.2 Questionnaire**

The questionnaire was developed under the advice and permission of the supervisor following certain guidelines. There were eleven close ended questions with visual analogue scale (VAS) with some objective questions which were measured by examiner and each question was formulated to identify the change of pain with each activity and Oswestry Disability Index Questionnaire for measures disability score.

### **3.12 Measurement tools**

#### **3.12.1 Dallas pain questionnaire (DPQ)**

The DPQ was a 11-item instrument to assess pain intensity, forward bending, twisting, lifting, standing, sitting, walking, sleeping, travelling and ADLs and each item was scored with a Visual Analog Scale (VAS). This questionnaire slightly modified for suitable this study. Scale extremities are labeled with specific words (e.g. no pain in left/all the time severe pain in right). For every specific question, the patient marks the point on the scale which represents his/her condition.

#### **3.12.2 Oswestry disability Index**

Oswestry disability index( ODI) was included 10 sections of questions. The ODI domains were the following : pain intensity, personal care, lifting, walking, sitting, standing, sleeping, sex life and social life. Each section has six statements that were scored from 0 ( minimum degree of difficulties in that activity) to 5( maximum

degree of difficulty). If more than one statement was marked in each section, the highest score should be taken. The total score is obtained by summing up the scores of all sections, giving a maximum of 60 points.

### **3.13 Data collection procedure**

The study procedure was conducted through assessing the patient, initial recording, treatment and final recording. After screening the patient at department, the patients were assessed by qualified physiotherapist. Four sessions of treatment was provided for every subject.

Ten subjects were chosen for data collection according to the inclusion criteria. The researcher divide all participants into two groups and coded C1 (5) for control group and E1 (5) for experimental group. Experimental group received conventional physiotherapy with trunk PNF training and control group received only conventional physiotherapy.

Data was gathered through a pre-test, intervention and post-test and the data was collected by using a written questionnaire form which was formatted by the researcher. Pre test was performed before beginning the treatment and the intensity of pain and disability noted with VAS score and disability score on questionnaire form. The same procedure was performed to take post-test at the end of four session of treatment. Researcher gave the assessment form to each subject before starting treatment and after four session of treatment and instructed to put mark on the line of VAS according to their intensity of pain. The researcher collected the data both in experimental and control group in front of the qualified physiotherapist in order to reduce the biasness. At the end of the study, specific test was performed for statistical analysis.

### **3.14 Ethical Issues**

The whole process of this research project was done by following the Bangladesh Medical Research Council (BMRC) guidelines and World Health Organization (WHO) Research guidelines. The proposal of the dissertation including methodology was approved by IRB and obtained permission from the concerned authority of ethical committee of Bangladesh Health Professions Institute (BHPI). Again before the beginning of the data collection, the researcher obtained the permission ensuring the safety of the participants from the concerned authorities of the clinical setting and was allotted with a witness from the authority for the verification of the collected data. The researcher strictly maintained the confidentiality regarding participant's condition and treatments.

### **3.15 Data analysis**

Statistical analysis was performed by using Microsoft Office Excel 2013 and scientific calculator. Data was analyzed by using SPSS version 22.00 to compute the descriptive statistics using pie chart, bar chart and also percentage and parametric tests were conducted using paired t-test and unrelated t-test.

The researcher had calculated the variables mean, mean difference, standard deviations, standard error, degree of freedom and significant level to show that experimental group and control group mean difference in within group was significantly different than the standard table values. In the between group, the data shows that the mean difference was greater than the control group. The researcher had tested mean variables stating problem to test using t statistic, which is paired t-test and also unrelated t-test

### 3.15.1 Statistical Test

In order to ensure that the research have some values, the meaning of collected data has to be presented in ways that other research workers can understand. In other words the researcher has to make sense of the results. As the result came from an experiment in this research, data analysis was done with statistical analysis.

All participants were code according to group to maintain participant's confidentiality. All subjects of both experimental and control group score their pain intensity on dallas pain scale by using Visual Analogue Scale (VAS) before starting treatment and after completing treatment. Reduction of pain intensity for both groups and reduction of disability are the differences between pre-test and post-test score.

According to Hicks (2009), experimental studies with the different subject design where two groups are used and each tested in two different conditions and the data is interval or ratio should be analyzed with unrelated t test. This test is used when' the experimental design compares two separate or different unmatched groups of subjects participating in different conditions. When calculating the unrelated t test, you find the value called 't' which you then look up in the probability tables associated with the t test to find out whether the t value represents a significant difference between the results from your two groups.

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

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 d and

n= number of paired observations.



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

$$\begin{aligned}t &= \frac{\bar{d}}{\frac{SD}{\sqrt{n}}} \\ &= \frac{3.30}{\frac{0.24}{\sqrt{5}}} \\ &= \frac{3.30}{\frac{2}{2.24}} \\ &= 3.69\end{aligned}$$

### 3.15.2 Level of Significant

In order to find out the significance of the study, the “p” value was calculated. The p values refer to the probability of the results for experimental study. The word probability refers to the accuracy of the findings. A p value is called level of significance for an experiment and a p value of <0.05 was accepted as significant result for health service research. If the p value is equal or smaller than the significant level, the results are said to be significant.

In this way researcher had calculated paired t-value and significant level and have presented in the following tables-

| Serial no | variables   | Experimental |                        |    | Control |                        |
|-----------|---|--------------|------------------------|----|---------|------------------------|
|           |   | t            | Sig.<br>(1-<br>tailed) | df | t       | Sig.<br>(1-<br>tailed) |
| Pair1     | pretest How severe pain at your back? -<br>post test how severe pain at your back?                        | 3.058        | .038                   | 4  | 3.808   | .019                   |
| Pair 2    | pretest how severe pain during sitting? -<br>post test how severe pain during sitting?                    | 2.693        | .054                   | 4  | 3.603   | .023                   |
| Pair 3    | pretest how severe pain during forward<br>bending? - post test how severe pain<br>during forward bending? | 4.707        | .009                   | 4  | 2.008   | .115                   |
| Pair 4    | pretest how feel pain during twisting? -<br>post test how feel pain during twisting?                      | 2.894        | .044                   | 4  | 4.072   | .015                   |
| Pair 5    | pretest how feel pain during at rest? -<br>post test how feel pain during at rest?                        | 2.073        | .107                   | 4  | 2.480   | .068                   |
| Pair 6    | pretest how severe pain at sleep? - post<br>test how severe pain at sleep?                                | 1.000        | .374                   | 4  | 2.241   | .089                   |
| Pair 7    | pretest how severe pain at standing? -<br>post test how severe pain at standing?                          | 1.902        | .130                   | 4  | 2.200   | .093                   |
| Pair 8    | pretest how severe pain at walking? -<br>post test how severe pain at walking?                            | 4.929        | .008                   | 4  | 2.531   | .065                   |
| Pair 9    | pretest how severe pain during<br>travelling? - post test how severe pain<br>during travelling?           | 3.390        | .028                   | 4  | 4.881   | .008                   |
| Pair10    | pretest how severe pain at lifting? - post<br>test how severe pain at lifting?                            | 12.359       | .000                   | 4  | 4.042   | .016                   |
| Pair11    | pretest how severe pain at ADL? - post<br>test how severe pain at ADL?                                    | 2.125        | .101                   | 4  | 2.846   | .047                   |

Table 3: Dallas Questionnaire (Initial and Final assessment-paired t-test)

| group     |                         | Experimental group |                 |    |       | Control         |
|-----------|-------------------------|--------------------|-----------------|----|-------|-----------------|
| Serial no | variables               | T                  | Sig. (1-tailed) | df | t     | Sig. (1-tailed) |
| Pair 1    | ODI(%)<br>initial-final | 3.412              | .027            | 4  | 3.688 | .021            |

Table 4: Oswestry Disability Index( Initial and final paired t-test).

### Unrelated t test

Unrelated t test was used to compare difference between two means of independent variables. Selection of test of hypothesis was two independent mean differences under independent t distribution.

Formula: test statistic t is follows:

$$t = \frac{\bar{x}_1 - \bar{x}_2}{s \sqrt{\left(\frac{1}{n_1} + \frac{1}{n_2}\right)}}$$

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

### Analysis of Pain Intensity

| Subject | $X_1$            | $X_1^2$              | Subject | $X_2$            | $X_2^2$             |
|---------|------------------|----------------------|---------|------------------|---------------------|
| E1      | 0.5              | 0.25                 | C1      | 2.2              | 4.84                |
| E2      | 0.8              | 0.64                 | C2      | 1.6              | 2.56                |
| E3      | 1.6              | 2.56                 | C3      | 0.9              | 0.81                |
| E4      | 3.3              | 10.89                | C4      | 0.6              | 0.36                |
| E5      | 2.0              | 4.0                  | C5      | 0.8              | 0.64                |
|         | $\sum X_1 = 8.2$ | $\sum X_1^2 = 18.34$ |         | $\sum X_2 = 6.1$ | $\sum X_2^2 = 9.18$ |

$$(\sum X_1)^2 = 67.24$$

$$n_1 = 5$$

$$\bar{x}_1 = \frac{8.2}{5} = 1.64$$

$$(\sum X_2)^2 = 37.21$$

$$n_2 = 5$$

$$\bar{x}_2 = \frac{9.18}{5} = 1.836$$

Calculating the degree of freedom from the formula:

$$df = (n_1 - 1) + (n_2 - 1) = (5 - 1) + (5 - 1) = 8$$

| Serial no | Variables                         | t     | df | Sig.(1-tailed) |
|-----------|-----------------------------------|-------|----|----------------|
| 1         | Severity of pain at back          | 0.428 | 8  | 0.917          |
| 2         | Pain during sitting               | 1.188 | 8  | 0.609          |
| 3         | Pain during forward bending       | 0.624 | 8  | 0.802          |
| 4         | Severity of pain during twisting  | 0.106 | 8  | 0.546          |
| 5         | Severity of pain during at rest   | 0.117 | 8  | 0.963          |
| 6         | Severity of pain at sleep         | 1.000 | 8  | 0.459          |
| 7         | Severity of during standing       | 1.974 | 8  | 0.062          |
| 8         | Severity of pain at walking       | 0.433 | 8  | 0.502          |
| 9         | Severity of pin during travelling | 0.385 | 8  | .711           |
| 10        | Severity of pain at lifting       | 0.158 | 8  | 0.723          |
| 11        | Pain at ADL                       | 1.069 | 8  | 0.228          |

**Table 5: Dallas Questionnaire (Final Un-paired-t test)**

Calculation unrelated t value for general pain intensity:

Where,

$$S = \sqrt{\frac{\sum(\bar{x}_E - x_1)^2 + \sum(\bar{x}_C - x_2)^2}{(n_1 + n_2 - 2)}} = \sqrt{\frac{4.89 + 121.04}{(5 + 5 - 2)}} = \sqrt{\frac{125.93}{8}} = 0.35$$

$$t = \frac{\bar{x}_1 - \bar{x}_2}{s \sqrt{\left(\frac{1}{n_1} + \frac{1}{n_2}\right)}} = \frac{1.64 - 1.22}{0.35 \sqrt{\left(\frac{1}{5} + \frac{1}{5}\right)}} = \frac{0.42}{0.35 \times 0.633} = \frac{0.42}{1.174} = 0.4$$

Here,

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

$\bar{x}_C$  = Mean of the control group

$x_1$  = Individual value of the experimental group

$x_2$  = Individual value of the control group

$n_1$  = Number of participants in the Experimental Group

$n_2$  = Number of participants in the Control Group

**4.1: Socio-Demographical variables****4.1.1. Mean age of the participants**

| <b>Experimental Group</b> |                    | <b>Control Group</b> |                    |
|---------------------------|--------------------|----------------------|--------------------|
| <b>Subjects</b>           | <b>Age (Years)</b> | <b>Subjects</b>      | <b>Age (Years)</b> |
| E1                        | 28                 | C1                   | 22                 |
| E2                        | 28                 | C2                   | 28                 |
| E3                        | 26                 | C3                   | 38                 |
| E4                        | 38                 | C4                   | 32                 |
| E5                        | 38                 | C5                   | 30                 |
| <b>Mean Age</b>           | <b>31 years</b>    | <b>Mean Age</b>      | <b>30 years</b>    |

Table 6: Mean age of the participants

#### 4.1.1. Age of the participants

Among the participants age were in between 22-38 with mean age was 30.8 years (31.6 year in experimental group and 30 years in control group) where 22 years was 10%, 26 years was 10%, 28 years was 30%, 30 years was 10%, 32 years was 10%, 38 years was 38%.

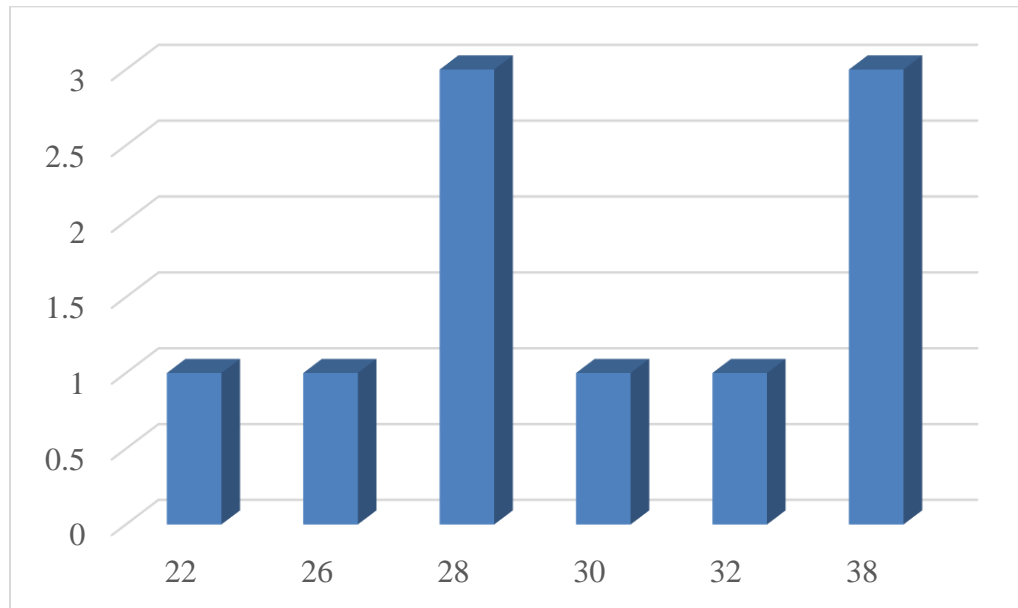


Figure 1: Age of the participants



#### 4.1.2 Gender of the participants:

Among all participants 70% was male and 30% was female. 80% male and 20% female in experimental group. 60% male and 40% female in control group.

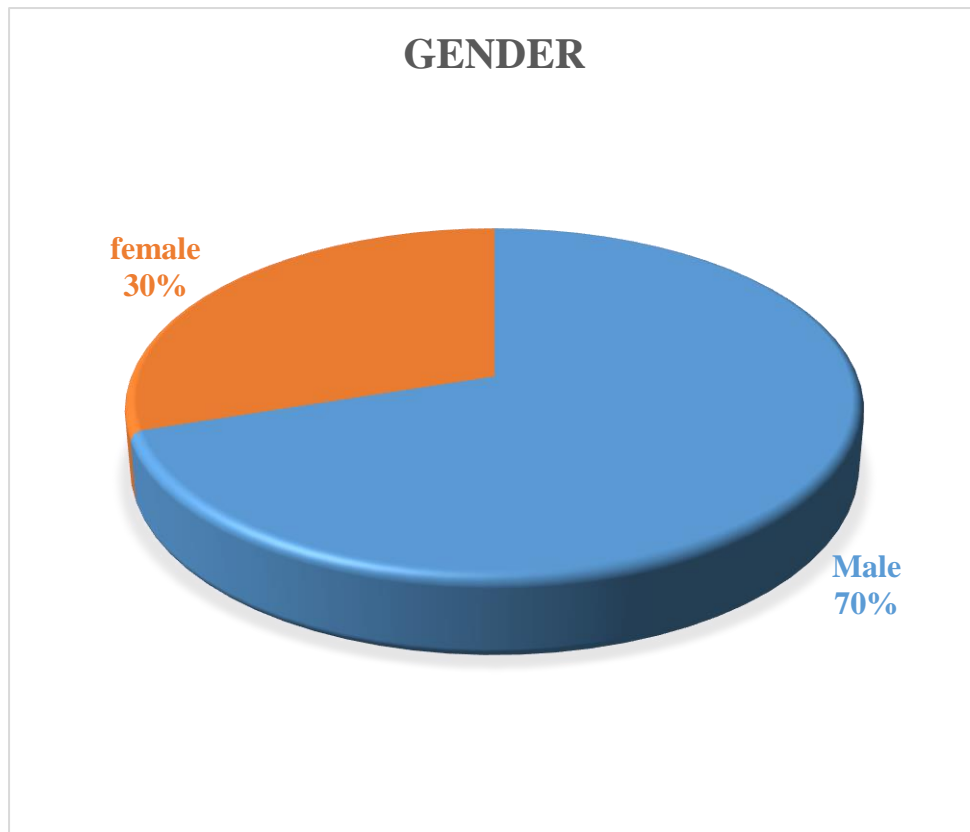


Figure 2 : Gender of participations

### 4.1.3 Education of the participants

In this study 10% was finish some primary education, 30% was completed some secondary education , 40% was completed higher secondary education and 20% was completed post-graduation.

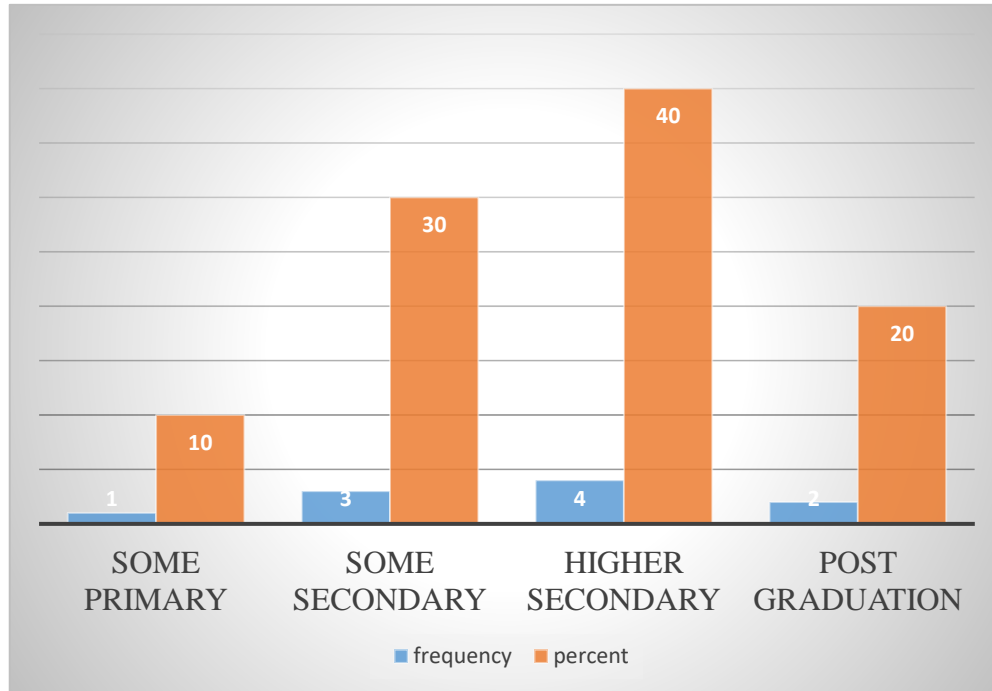


Figure 3 : Education of the participant

#### 4.1.4 Occupation of the participants

In this study seven class people participate. Here security guard was 10% , farmer was 10%, employeewas 8%, businessman was 10%, unemployment 10%, student 10%, driver 21% and housewife 20%.

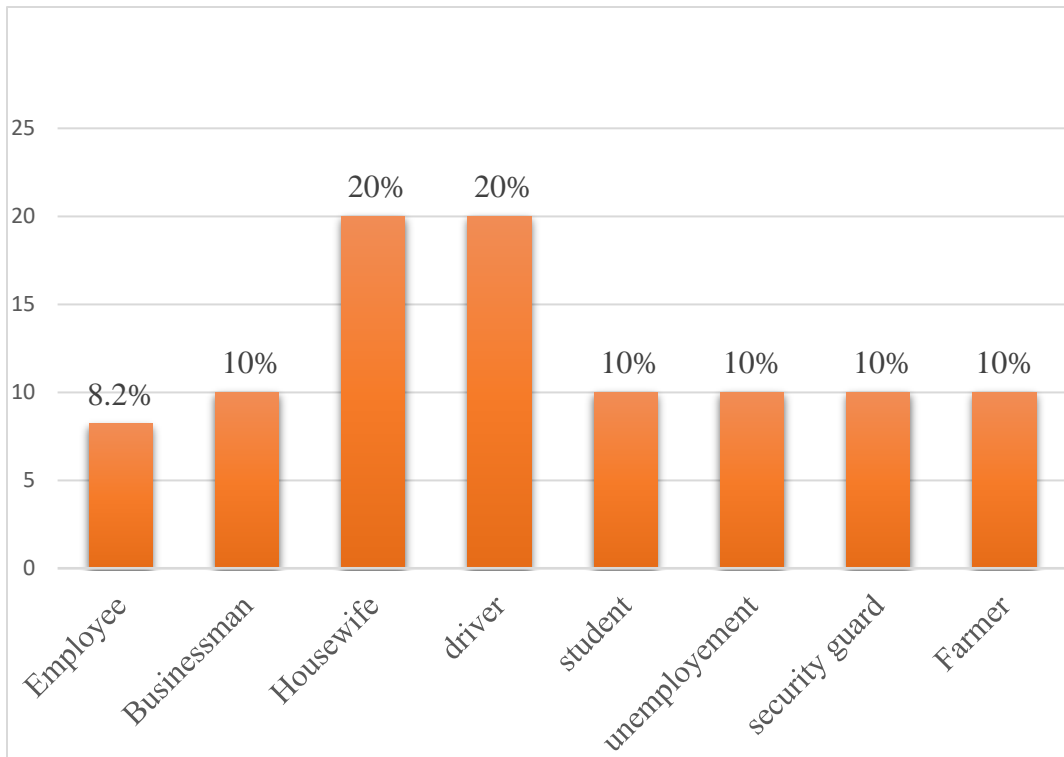


Figure 4 : Occupation of the participants

#### 4.1.5 Body mass index of the participants

In this study all participants was 10 (n=10).The height BMI was 4(obese) which was in experimental group and this was 10%. Under weight 10% and overweight 40%. 40% was normal BMI.

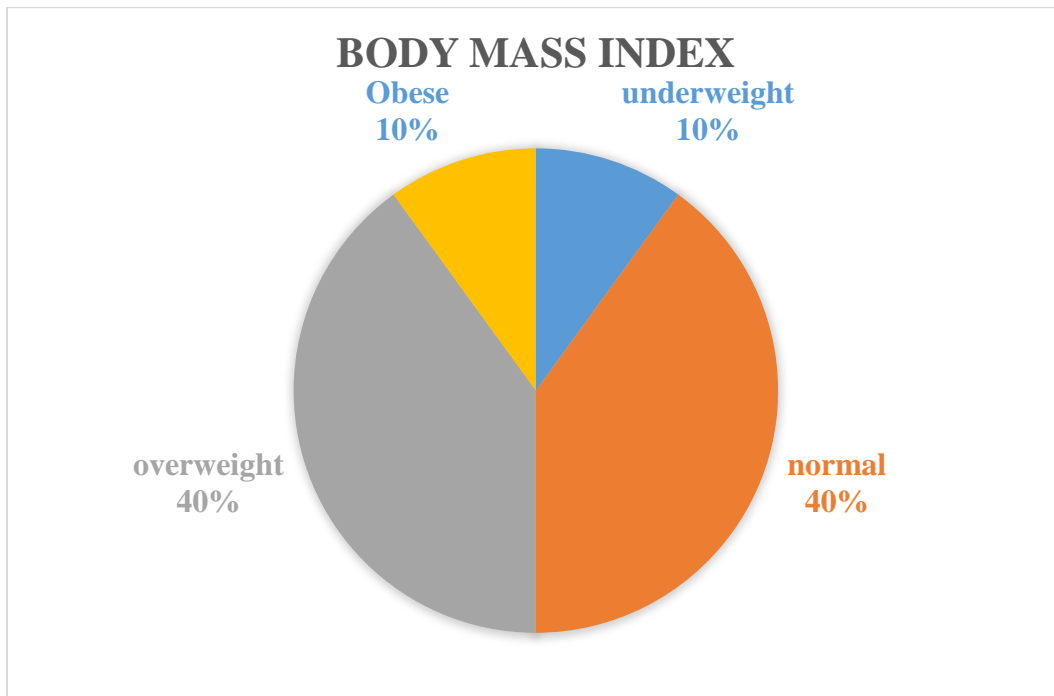
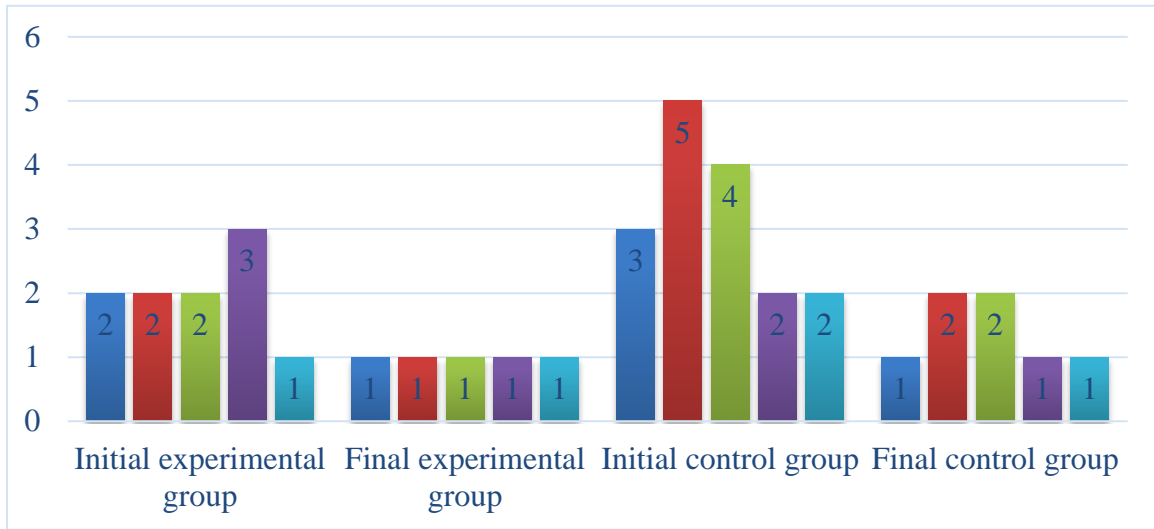


Figure 5 : Body mass index of the participants.

### 4.3 Oswestry Disability Index Questionnaire



Here.....

Figure 6 : Disability among the participants.

|                         |
|-------------------------|
| 1 - Minimal disability  |
| 2 - Moderate disability |
| 3 - Severe disability   |
| 4 - crippled            |
| 5 - Bed bounded         |

In this study, among the participants of experimental group (n=5) and control group (n=5). In initial assessment 10% patient was bed bounded and that was control group. Initial assessment 50% patient moderate disability along them experimental group 60% and control group 40%. Severe disability found in initial assessment of experimental group 50% and control group 50%. Minimal disability only 20% in initial assessment of experimental group. In final assessment experimental group minimal disability 100% where n=5 and control group of final assessment was 60% where n=5. Moderate disability found 40% in control group of final assessment.

#### 4.4 Mean disability

In this study initial assessment of control group mean disability 51.6% and experimental group mean disability 4.4% .In final assessment mean disability of control group 4.4% and experimental group 10.8% . .

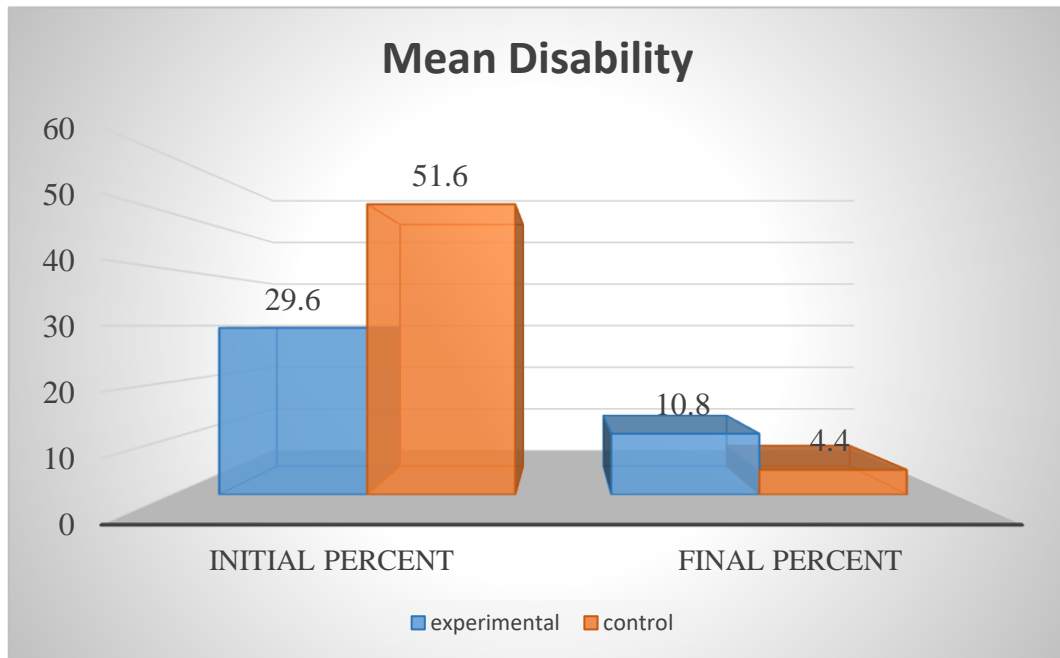


Figure 7 : Mean disability

## **4.2 Dallas questionnaire**

### **4.2.1 General pain intensity**

This study found that in the general pain intensity, observed t value was 3.058 (3.280 ±2.398) in the experimental group at two tailed paired t test while this same variable for control group observed value was 3.808 (4.880±2.866) in within group. 5% level of significant at 4 (four) degrees of freedom standard t value was 2.78 and observed t value in general pain intensity in both groups which were greater than standard t value that mean null hypothesis was rejected and alternative hypothesis was accepted in the within group. Both groups in aspect of general pain intensity were significant at .002% and .042% level, but the mean difference of the experimental group was greater than the control group mean that means PNF training for Low back pain patients was more effective than basic physiotherapy treatment for reducing general pain intensity. The Unrelated/independent t test in between group at 5% level of significant and 8 degrees of freedom standard table value was 2.306 and at the same significant level and same degree of freedom observed t value was 0.728. The observed t value was less than the table value that indicate null hypothesis was accepted and alternative hypothesis was rejected which indicate there was no difference trunk PNF training group and basic physiotherapy treatment group treatment in between group.

### **4.2.2 Pain intensity during Sitting**

This study found that during sitting, observed t value was 2.693 (1.600±1.3285) in the experimental group at two tailed paired t test while this same variable for control group observed value was 3.603 (3.92±2.43). 5% level of significant at 4 (four) degrees of freedom standard t value was 2.78 and observed t value during sitting pain intensity in both groups which were greater than standard t value that mean null hypothesis was rejected and alternative hypothesis was accepted in the within group. Both groups in aspect of general pain intensity were significant at .040% and .042% level, but the mean difference of the experimental group was greater than the control group mean that means PNF training for Low back pain patients was more effective than basic physiotherapy treatment for reducing general pain intensity. Unrelated/independent t test in between group at 5% level of significant and 8 degrees of freedom standard table value was 2.306 and at the same

significant level and same degree of freedom observed t value was 1.188. The observed t value was less than the table value that tends to null hypothesis was accepted and alternative hypothesis was rejected which indicate there was no difference between trunk PNF training group and basic physiotherapy treatment group.

#### **4.2.3 Pain at forward bending activity**

This study found that in forward bending activity, observed t value was 4.707 ( $3.34 \pm 1.587$ ) in the experimental group at two tailed paired t test while this same variable for control group observed value was 2.008 ( $2.76 \pm 3.0729$ ) in within group. 5% level of significant at 4 (four) degrees of freedom standard t value was 2.78 and the observed t value of experimental group was greater than standard t value that means null hypothesis was rejected and alternative hypothesis was accepted in the within group in experimental group and significant level was .034%. The mean difference of the experimental group was greater than the control group mean that means PNF training for Low back pain patients was more effective than basic physiotherapy treatment for reducing general pain intensity in forward bending activity . The Unrelated/independent t test in between group at 5% level of significant and 8 degrees of freedom standard table value was 2.306 and at the same significant level and same degree of freedom observed t value was 0.624. The observed t value was less than the table value that meant null hypothesis was accepted and alternative hypothesis was rejected which indicate there was no difference trunk PNF training group and basic physiotherapy treatment group treatment in between group.

#### **4.2.4 Pain intensity during twisting**

This study found that during twisting, observed t value was 2.894 ( $3.140 \pm 2.4265$ ) in the experimental group at two tailed paired t test while this same variable for control group observed value was 4.072 ( $4.90 \pm 2.6907$ ) in within group. 5% level of significant at 4 (four) degrees of freedom standard t value was 2.78 and the observed t value of experimental group was greater than standard t value that means null hypothesis was rejected and alternative hypothesis was accepted in experimental group and significant level was at .005%. So trunk PNF training was significantly reducing pain interfere with work for Low back pain patients. On the other hand, in control group observed t value was less than the



standard table value which means that null hypothesis was accepted and alternative hypothesis was rejected, but the mean difference of the experimental group was greater than the control group mean that means PNF training for Low back pain patients was more effective than basic physiotherapy treatment for reducing general pain intensity. The Unrelated/independent t test in between group at 5% level of significant and 8 degrees of freedom standard table value was 2.306 and at the same significant level and same degree of freedom observed t value was 0.106. The observed t value was less than the table value that meant null hypothesis was accepted and alternative hypothesis was rejected which indicate there was no difference trunk PNF training group and basic physiotherapy treatment group treatment in between group.

#### **4.2.5 Pain intensity during rest**

This study found that during rest, observed t value was 2.073 ( $2.50 \pm 2.6963$ ) in the experimental group at two tailed paired t test while this same variable for control group observed value was 2.480 ( $3.260 \pm 2.9399$ ) in within group. 5% level of significant at 4 (four) degrees of freedom standard t value was 2.78 and observed t value in general both groups which were greater than standard t value that mean null hypothesis was rejected and alternative hypothesis was accepted in the within group. Both groups in aspect of pain intensity were significant at .032% and .050% level, but the mean difference of the experimental group was less than the control group mean that means PNF training for Low back pain patients was not effective than basic physiotherapy treatment for reducing general pain intensity. The Unrelated/independent t test in between group at 5% level of significant and 8 degrees of freedom standard table value was 2.306 and at the same significant level and same degree of freedom observed t value was 0.117. The observed t value was less than the table value that meant null hypothesis was accepted and alternative hypothesis was rejected which indicate there was no difference trunk PNF training group and basic physiotherapy treatment group treatment in between group.

#### **4.2.6 Pain intensity during sleeping**

This study found that during sleeping, observed t value was 1.000 ( $.4400 \pm .9839$ ) in the experimental group at two tailed paired t test while this same variable for control group observed value was 2.241 ( $4.26 \pm 4.251$ ) in within group. 5% level of significant at 4 (four)

degrees of freedom standard t value was 2.78 and the observed t value of experimental group was greater than standard t value that means null hypothesis was rejected and alternative hypothesis was accepted in experimental group. So PNF training was significantly reducing pain interfere with work for Low back pain patients and significant level was .021%. On the other hand, in control group observed t value was less than the standard table value which is statistically not significant that means null hypothesis was accepted and alternative hypothesis was rejected, but the mean difference of the experimental group was less than the control group mean that means PNF training for Low back pain patients was not effective than basic physiotherapy treatment for reducing general pain intensity. The Unrelated/independent t test in between group at 5% level of significant and 8 degrees of freedom standard table value was 2.306 and at the same significant level and same degree of freedom observed t value was 1.000. The observed t value was less than the table value that meant null hypothesis was accepted and alternative hypothesis was rejected which indicate there was no difference trunk PNF training group and basic physiotherapy treatment group treatment in between group.

#### **4.2.7 Pain intensity during Standing**

This study found that during standing, observed t value was 1.902 ( $2.0800 \pm 2.445$ ) in the experimental group at two tailed paired t test while this same variable for control group observed value was 2.200 ( $2.820 \pm 2.8057$ ) in within group. 5% level of significant at 4 (four) degrees of freedom standard t value was 2.78 and the observed t value of experimental group was greater than standard t value that means null hypothesis was rejected and alternative hypothesis was accepted in the within group in experimental group and significant level was at .004%. So PNF training was significantly reducing pain interfere with work for Low back pain patients. On the other hand, in control group observed t value was less than the standard table value which means that null hypothesis was accepted and alternative hypothesis was rejected. So, basic physiotherapy was not significantly effective for Low back pain patients in this indicator. The Unrelated/independent t test in between group at 5% level of significant and 8 degrees of freedom standard table value was 2.306 and at the same significant level and same degree of freedom observed t value was 1.974. The observed t value was less than the table value

that meant null hypothesis was accepted and alternative hypothesis was rejected which indicate there was no difference trunk PNF training group and basic physiotherapy treatment group treatment in between group.

#### **4.2.8 Pain intensity during walking**

This study found that during walking, observed t value was 4.929 ( $3.48 \pm 1.5786$ ) in the experimental group at two tailed paired t test while this same variable for control group observed value was 2.53 ( $2.52 \pm 2.2264$ ) in within group. 5% level of significant at 4 (four) degrees of freedom standard t value was 2.78 and observed t value in general pain intensity in both groups which were greater than standard t value that mean null hypothesis was rejected and alternative hypothesis was accepted in the within group. Both groups in aspect of general pain intensity were significant at .006% and .029% level, but the mean difference of the experimental group was greater than the control group mean that means PNF training for Low back pain patients was more effective than basic physiotherapy treatment for reducing general pain intensity during walking. Unrelated/independent t test in between group at 5% level of significant and 8 degrees of freedom standard table value was 2.306 and at the same significant level and same degree of freedom observed t value was 0.433. The observed t value was less than the table value that meant null hypothesis was accepted and alternative hypothesis was rejected which indicate there was no difference trunk PNF training group and basic physiotherapy treatment group treatment in between group.

#### **4.2.9 Pain intensity during lifting**

This study found that during lifting, observed t value was 12.359 ( $4.4480 \pm 0.8106$ ) in the experimental group at two tailed paired t test while this same variable for control group observed value was 4.042 ( $4.3600 \pm 1.24121$ ) in within group. 5% level of significant at 4 (four) degrees of freedom standard t value was 2.78 and observed t value in general pain intensity in both groups which were greater than standard t value that mean null hypothesis was rejected and alternative hypothesis was accepted in the within group. Both groups in aspect of general pain intensity during lifting were significant at .001% and .013% level, but the mean difference of the experimental group was greater than the control group mean that means PNF training for Low back pain patients was more effective than basic

physiotherapy treatment for reducing general pain intensity. The Unrelated/independent t test in between group at 5% level of significant and 8 degrees of freedom standard table value was 2.306 and at the same significant level and same degree of freedom observed t value was 0.158. The observed t value was less than the table value that meant null hypothesis was accepted and alternative hypothesis was rejected which indicate there was no difference trunk PNF training group and basic physiotherapy treatment group treatment in between group.

#### **4.2.10 Pain intensity during travelling**

This study found that during travelling, observed t value was 3.390 ( $3.24 \pm 2.14$ ) in the experimental group at two tailed paired t test while this same variable for control group observed value was 4.88 ( $2.64 \pm 1.2095$ ) in within group. 5% level of significant at 4 (four) degrees of freedom standard t value was 2.78 and observed t value in general pain intensity in both groups which were greater than standard t value that mean null hypothesis was rejected and alternative hypothesis was accepted in the within group. Both groups in aspect of general pain intensity during travelling were significant at .030% and .031% level, but the mean difference of the experimental group was greater than the control group mean that means PNF training for Low back pain patients was more effective than basic physiotherapy treatment for reducing general pain intensity. The Unrelated/independent t test in between group at 5% level of significant and 8 degrees of freedom standard table value was 2.306 and at the same significant level and same degree of freedom observed t value was 0.385. The observed t value was less than the table value that meant null hypothesis was accepted and alternative hypothesis was rejected which indicate there was no difference trunk PNF training group and basic physiotherapy treatment group treatment in between group.

#### **4.2.11 Pain intensity at ADL**

This study found that at ADL, observed t value was 2.125 ( $2.48 \pm 2.61$ ) in the experimental group at two tailed paired t test while this same variable for control group observed value was 2.846 ( $3.82 \pm 3.0012$ ) in within group. 5% level of significant at 4 (four) degrees of freedom standard t value was 2.78 and observed t value in general pain intensity in both groups which were greater than standard t value that mean null hypothesis was rejected and alternative hypothesis was accepted in the within group. Both groups in aspect of general pain intensity were significant at .049% and .038% level, but the mean difference of the experimental group was greater than the control group mean that means PNF training for Low back pain patients was more effective than basic physiotherapy treatment for reducing pain intensity at ADL. The Unrelated/independent t test in between group at 5% level of significant and 8 degrees of freedom standard table value was 2.306 and at the same significant level and same degree of freedom observed t value was 1.069. The observed t value was less than the table value that meant null hypothesis was accepted and alternative hypothesis was rejected which indicate there was no difference trunk PNF training group and basic physiotherapy treatment group treatment in between group.

The purpose of this study was to identify effectiveness of Trunk PNF along with conventional physiotherapy and conventional physiotherapy alone in patients with Mechanical low back pain. In the study, a total of 10 patients were recruited and they were a randomly assigned into 2 groups. Both groups were assessed to determine the intensity of pain, Back pain related functional disability using the outcome measures. The mean age of patients of experimental group was 31.6 and mean age of patients in the control group 30. In the experimental group, patients were given Trunk PNF along with conventional physiotherapy exercise and for the patients in the control group, conventional physiotherapy exercises alone was given. The results in the Experimental group, had an initial mean values of Dallas pain questionnaire of  $4.920 \pm 3.3833$  had reduced to  $1.640 \pm 1.1059$  after 4 sessions showing reduction in pain intensity. Initial mean values of Oswestry disability index Questionnaire of  $2.00 \pm .707$  had reduced to  $.80 \pm .447$  showing the significant improvement in functional ability of the patient with experimental group. The control group had an initial mean value of Dallas pain questionnaire of  $6.1 \pm 3.2$  that reduced to  $1.22 \pm .6648$  after 4 sessions showing reduction in pain intensity. Initial values of Oswestry disability index Questionnaire of  $2.60 \pm 1.517$  had reduced to  $1.00 \pm .707$ , showing a significant improvement in the functional ability of the patients in this group. In the Experimental group Dallas questionnaire t-value was 3.058 and P 0.038 ( $P < 0.05$ ). For Oswestry Low Back Pain Disability Questionnaire t-value was 3.412 and P 0.027 ( $P < 0.05$ ). These results show that there is more significant improvement in pain and in functional ability in Experimental group when compared to Control group. The results the present study proves that, Trunk PNF training along with conventional physiotherapy exercises obtained significantly better improvement in pain levels and back pain related functional disability when compared to conventional physiotherapy exercises alone. The findings of the present study goes along with the results of the similar studies conducted by (kofotolis et al., 2006) and (Kumar et al., 2011) that also concluded that Trunk PNF significantly improved pain levels and functional disability in patients with mechanical low back pain. The control group in the study who received conventional physiotherapy alone also showed significant improvement of pain, back pain related functional disability . This result is in

line with the study conducted by ( Stankovic et al., 2012) which concluded that trunk PNF is more effective than traditional exercises in improving pain, function and quality of life. (Panjabi, 2003) assumed a relationship between abnormal intervertebral motion and LBP and he suggested that a decrease in the abnormal intervertebral motion in a patient with LBP may result in reduced pain. The Conventional physiotherapy exercises, that was given in common for both experimental and control group included exercises that addressed the spinal stabilizers. Improved function of the spinal stabilizers might have resulted in a reduction of abnormal intervertebral motion and thus a significant reduction of pain occurred in both experimental and control group.

Nick k. et al, (2006) showed that 4 weeks of intensive PNF training for the CLBP patients is very effective in improving trunk muscle endurance. They attributed these findings to the dynamic nature of the PNF exercises (COI), which used all muscle action types (eccentric, concentric, and isometric) through a progressively increased range of motion, and also to the fact that PNF exercises involve significant muscle work that results in muscle strength and endurance improvement .Trunk PNF exercises are the exercises that enhance the neuromuscular mechanism by stimulating the proprioceptors and this might have contributed to the more significant reduction of pain in the experimental group were Trunk PNF was given in addition to conventional physiotherapy exercises compared to control group. (Van Dieën et al., 2003), (Dankaerts et al., 2006), (Luomajoki et al., 2008) concluded that there is impaired function of superficial and deep trunk muscles and there is a reduced ability to actively control the movements of the back. The control of the movements of the low back requires continues proprioceptive feedback and neuromuscular re-adjustments. Trunk proprioceptive neuromuscular facilitation training might have helped in promoting muscle sensitivity by enhancing the sensitivity of muscle spindle and Golgi tendon organs which are responsible for proprioception. This enhanced control of movement helps in the reduction of local stress and thereby pain This also explain the additional benefit of using Trunk PNF training as an adjunct to conventional strengthening exercises in the management of mechanical LBP. In the present study Experimental group demonstrated better improvement functional ability (as registered by the Oswestry disability index Questionnaire) which can be attributed to the addition of PNF exercises. The improvements in functional ability could be seen as a direct result of pain, lumbar

flexibility, endurance and general strength improvements as concluded by (kofotolis et al., 2006) and (kumar et al., 2011), thereby providing further support for the effectiveness of PNF exercises for mechanical LBP treatment. Trunk PNF might have caused the indirect activation of muscles of limbs and upper trunk which promote generalised improvement. Further support for this concept is the study conducted by (Gontijo et al., 2012) who reported Trunk PNF could be utilized to indirectly activate the muscles of lower limb.

The main limitation of this study was its short duration.

Treatment session was small ,only given 4 session.

The study was conducted with 10 patients of low back pain which was a very small number of samples in both groups and was not sufficient enough for the study to generalize the wider population of this condition.

The research was carried out in CRP Savar such a small environment, so it was difficult to keep confidential the aims of the study for blinding procedure. Therefore, single blind method was used in this study.

There was no available research done in this area in Bangladesh. So, relevant information about low back pain patient with specific intervention for Bangladesh was very limited in this study.



The results of the present study proves that Trunk PNF along with conventional Physiotherapy exercises is more effective than conventional Physiotherapy Exercises alone in improving pain and Back Pain Related functional disability in the management of Mechanical LBP and experimental hypothesis is accepted. This study concludes that trunk PNF is a suitable adjunct to conventional Physiotherapy exercise in the management of Mechanical low back pain. This study also reveals the scope of PNF in the management of musculoskeletal disorders and movement dysfunctions which need to be further investigated.

Despite the limitations of the study particularly small sample size, the results of the study give further motivation to controlled clinical trials with sufficient time and sample size. It could be also suggested that for further future study can be carried out with comparable patient variables with emphasis on ergometrics variables.

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

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

Sir,

With due respect I would like to draw your kind attention that I am a student of Bachelor of Science in Physiotherapy at Bangladesh Health Professions Institute (BHPI)- an academic institute of CRP under Faculty of Medicine of University of Dhaka (DU). I have to conduct a thesis entitled, "Effectiveness of Trunk Proprioceptive Neuromuscular Facilitation Training for pain and disability on Mechanical Low Back Pain patients attended at CRP" under honorable supervisor, Mohammad Anwar Hossain, Associate Professor & Head Department of Physiotherapy, CRP, Savar, Dhaka. The purpose of the study is to find out the Effectiveness of Trunk Proprioceptive Neuromuscular Facilitation Training for pain and disability on Mechanical Low Back Pain patients .

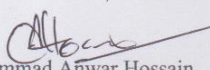
Questionnaire will be used that will take about 20 to 30 minutes. Data collectors will receive informed consents from all participants. Any data collected will be kept confidential.

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

Sincerely yours,

Md. Nuruzzaman  
Bachelor of Science in Physiotherapy (B. Sc. PT)  
Session: 2011-2012, DU Reg. No: 1721  
BHPI, CRP, Savar, Dhaka-1343, Bangladesh

Recommendation from the thesis supervisor

  
Mohammad Anwar Hossain  
Associate Professor & Head  
Department of Physiotherapy  
CRP, Savar, Dhaka

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



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

Ref.

CRP-BHPI/IRB/04/17/72

Date: 05/04/17

To

Md. Nuruzzaman  
Bachelor of Science in Physiotherapy  
Session: 2011-2012, DU Reg. No.: 1721  
BHPI, CRP, Savar, Dhaka-1343, Bangladesh

**Subject: Approval of the thesis proposal – Effectiveness of Trunk Proprioceptive Neuromuscular Facilitation Training for pain and disability on Mechanical Low Back Pain patients attended at CRP.**

Dear Md. Nuruzzaman

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

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

Since the study involves answering a 'Oswestry Disability Index' questionnaire that takes 20 to 30 minutes, have no likelihood of any harm to the participants and have possibility of benefit patients in their pain management, the members of the Ethics committee has approved the study to be conducted in the presented form at the meeting held at 08:30 AM on February 25, 2016 at BHPI.

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

Best regards,

*Muhammad Millat Hossain*

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

সিআরপি-চাপাইন, সাভার, ঢাকা-১৩৪৩, বাংলাদেশ, ফোন : ৭৭৪৫৪৬৪-৫, ৭৭৪১৪০৪ ফ্যাক্স : ৭৭৪৫০৬৯

CRP-Chapain, Savar, Dhaka-1343, Tel : 7745464-5, 7741404, Fax : 7745069, E-mail : contact@crp-bangladesh.org, www.crp-bangladesh.org



## Permission Letter

Date: 20 Aug, 2016

To  
The Head of the Department,  
Department of the Physiotherapy,  
Center for the Rehabilitation of the paralysed (CRP),  
Savar, Dhaka, 1343

**Subject: Application for permission to collect data to conduct a research study.**

Sir,

I respectfully to state that I am a student of 4<sup>th</sup> year B.Sc in physiotherapy at Bangladesh Health Professions Institute (B.H.P.I). In 4<sup>th</sup> year we have to do a research project and I have chosen a title that is "Effectiveness of Trunk Proprioceptive Neuromuscular Facilitation Training for pain and disability on Mechanical Low Back Pain attended at CRP" and my supervisor is Mohammad Anwar Hossain, Associate Professor, Physiotherapy, BHPI & Head Department of Physiotherapy. I would like to collect data at physiotherapy department of CRP in Savar. Data will be collected within 8.00 a.m to 5.00 p.m.

I, therefore, pray and hope that you would be kind enough to give me permission to do this study successfully in your department.

Yours Faithfully

Md. Nuruzzaman

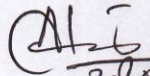
Md. Nuruzzaman

Bachelor of science in physiotherapy (B.Sc PT)

Session: 2011-2012

CRP, Savar, Dhaka.

Approved



20/08/16  
Mohammad Anwar Hossain  
Associate Professor &  
Head of Physiotherapy Dept.  
CRP, Chapain, Savar, Dhaka-1343

Forwarded  
9/20/08/16

Md. Obaidul Haque  
Associate Professor & Head of the Department  
Department of Physiotherapy  
Bangladesh Health Professions Institute (BHPI)  
CRP, Chapain, Savar, Dhaka-1343

## APPENDIXES

### CONSENT FORM (English)

Assalamu-alaikum/ Namasker. My name is Md. Nuruzzaman student of B.Sc. in physiotherapy at Bangladesh Health Professions Institute (BHPI), CRP. I am conducting a study for partial fulfillment of Bachelor of Science in Physiotherapy degree, titled, ‘‘Effectiveness of Trunk Proprioceptive Neuromuscular Facilitation(PNF) Training for pain and disability on mechanical low back pain attended at CRP’’.Through this research, I will see the efficacy of Trunk Proprioceptive Neuromuscular Facilitation (PNF)Training in case of mechanical low back pain patient. For this regard, I would need to collect data from the patient having Mechanical low back pain.Considering the area of research, you have met the inclusion criteria and i would like to invite you as a subject of my study. If you participate in this study, I will evaluate for a particular intervention (‘Efficacy of Trunk Proprioceptive Neuromuscular Facilitation Training for Mechanical Low Back pain ). The interventions that would be given are safe and will not cause any harm and also adverse effect.I want to meet you two sessions during your as usual therapy. Your participation will be voluntary. You have the right to withdraw consent and discontinue participation at any time. If you have any query about the study or your right as a participant, you may contact with, researcher Md.Nuruzzaman or Mohammad Anwar Hossen, Associate professor & Head of the Physiotherapy Department of physiotherapy,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:

I .....have read and understand the contents of the form. I agree to participant in the research without any force.

Signature of the Interviewer \_\_\_\_\_

Signature of the participant \_\_\_\_\_

Signature of the witness \_\_\_\_\_

## মৌখিক অনুমতি পত্র

(অংশগ্রহনকারীকে পড়ে শোনাতে হবে)

আস্সালামু আলাইকুম/ নমস্কার, আমার নাম মোঃ নূরুজ্জামান, আমি এই গবেষণাটি বাংলাদেশ হেলথ প্রফেশনস ইনস্টিটিউট (বিএইচপিআই), ঢাকা বিশ্ববিদ্যালয়ের চিকিৎসা অনুষদের অধিনে করছি যা আমার ফিজিওথেরাপী স্নাতক কোর্সের আংশিক অধিভুক্ত যার শিরোনাম হল- " সিআরপি-তে আগত কোমর ব্যথা রুগীদের ব্যথা ও অক্ষমতার জন্য বক্ষ পিএনএফ প্রশিক্ষণের কার্যকরীতা"। আমি এক্ষেত্রে কিছু ব্যক্তিগত এবং কোমর ব্যথা সম্পর্কে আনুষঙ্গিক কিছু তথ্য জানতে চাচ্ছি। ফরমে উল্লিখিত কিছু প্রশ্নের উত্তর দেয়ার জন্য আন্তরিক অনুরোধ জানাচ্ছি যা আনুমানিক ২০-৩০ মিনিট সময় নিবে। আমি এই তথ্য সংগ্রহের জন্য আপনার সাথে দুই সেশন সাক্ষাৎ করব।

এই অধ্যয়নের লক্ষ্য হল “ কোমরে ব্যথার জন্য বক্ষ পিএনএফ এর কার্যকরীতা” সম্পর্কে জানা। যদি এই গবেষণা সম্পূর্ণভাবে সফল হয় তবে কোমড় ব্যথা হত্তয়ার জন্য এই চিকিৎসা পদ্ধতি দ্বারা রুগী বিশেষভাবে উপকৃত হবেন। এইভাবে প্রতিরোধমূলক ব্যবস্থা গ্রহণের মাধ্যমে সমাজের সাধারণ জনগনের স্বাস্থ্য ও সুখ সমৃদ্ধির উন্নতি সাধন হবে।

আমি আপনাকে অবগত করছি যে, এটা কেবলমাত্র আমার অধ্যয়নের সাথে সম্পর্কযুক্ত এবং অন্য কোন উদ্দেশ্যে ব্যবহৃত হবে না। আমি আপনাকে আরো নিশ্চয়তা প্রদান করছি যে সকল তথ্য প্রদান করবেন তার গোপনীয়তা বজায় থাকবে এবং এই তথ্যের উৎস অপ্রকাশিত থাকবে।

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

এই রিসার্চ সংক্রান্ত যদি কোন জিজ্ঞাসা থাকে তাহলে যোগাযোগ করার জন্য অনুরোধ করছি গবেষক মোঃ নূরুজ্জামান অথবা মোহাম্মদ আনোয়ার হোসেন, সহযোগী প্রফেসর এবং ফিজিওথেরাপি বিভাগীয় প্রধান, সি আর পি, সাভার, ঢাকা।

এই সাক্ষাৎকার শুরু করার আগে আপনার কি কোন প্রশ্ন আছে?

আমি আপনার অনুমতি নিয়ে এই সাক্ষাৎকার শুরু করতে যাচ্ছি?

হ্যাঁ

না

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

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

সাক্ষীর স্বাক্ষর..... তারিখ .....

প্রশ্নপত্র

শিরোনামঃ সি.আর.পি-তে আগত কোমর ব্যথা রুগীদের ব্যথা ও অক্ষমতার জন্য ট্রাঙ্ক পি.এন.এফ  
প্রশিক্ষণের কার্যকরীতা"

রোগীর সনাক্তকরণঃ(রোগীর তালিকা পুস্তক/রোগীর নিকট থেকে সংগৃহীত)

|   |  |
|---|--|
| ১ | সনাক্তকরণ নম্বরঃ   |
| ২ | সাক্ষাতকারের তারিখঃ                                      |
| ৩ | উত্তরবাদীর নামঃ  |
| ৪ | ঠিকানাঃ<br>বাড়ী নং/গ্রামঃ<br>ইউনিয়নঃ<br>থানাঃ<br>জেলাঃ |
| ৫ | যোগাযোগ নম্বরঃ   |
| ৬ | উপাত্ত সংগ্রহের স্থানঃ                                   |
| ৭ | সম্মতি গ্রহনঃ  |

পর্ব-১। রোগীর সামাজিক জনতাত্ত্বিক তথ্যাবলী(রোগীর তালিকাপুস্তক/রোগীর নিকট থেকে সংগৃহিত)

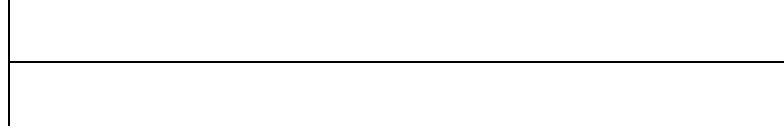
| প্রশ্ন নং | প্রশ্ন                   | উত্তর  |
|-----------|--------------------------|--|
| ২.১       | বয়স                     | .....বছর   |
| ২.২       | লিঙ্গ                    | ১=পুরুষ<br>২= মহিলা  |
| ২.৩       | শরীরের ওজন               | .....কেজি  |
| ২.৪       | উচ্চতা                   | ..... মিটার<br>(১ ফুট = .৩০৪৮ মিটার)   |
| ২.৫       | শরীর ভর সূচক             | ১= স্বাভাবিকের কম ওজন (<১৮.৫০ কেজি/মি <sup>২</sup> )<br>২= স্বাভাবিক ওজন (১৮.৫০-২৪.৯৯ কেজি/মি <sup>২</sup> )<br>৩= অধিক ওজন (২৫-২৯.৯৯ কেজি/মি <sup>২</sup> )<br>৪= মেদবহুল (≥৩০ কেজি/মি <sup>২</sup> ) |
| ২.৬       | আপনার বৈবাহিক অবস্থা কি? | ১ = বিবাহিত<br>২ = অবিবাহিত<br>৩= তালাকপ্রাপ্ত<br>৪ = পৃথকীকৃত<br>৫= অন্যান্য(নির্দিষ্টকরণ)  |
| ২.৭       | আপনার ধর্ম কি?           | ১ = ইসলাম<br>২ = হিন্দুধর্ম<br>৩ = খ্রিস্টান<br>৪ = বুদ্ধ  |

|      |                           |   |
|------|---------------------------|---|
|      |                           |   |
| ২.৮  | আপনার শিক্ষা অবস্থা কী?   | ১ = নিরক্ষর<br>২ = নিম্ন প্রাথমিক<br>৩ = প্রাথমিক<br>৪ = নিম্ন মাধ্যমিক<br>৫ = মাধ্যমিক<br>৬ = উচ্চ মাধ্যমিক<br>৭ = স্নাতক<br>৮ = স্নাতকোত্তর<br>৯ = অন্যান্য ( নিদিষ্টকরণ )                          |
| ২.৯  | আপনার পেশা কি?            | ১ = রিকসাওয়ালা<br>২ = চাকরিজীবী<br>৩ = কৃষক<br>৪ = চালক<br>৫ = ব্যবসায়ী<br>৬ = দিনমজুর<br>৭ = গৃহিনী<br>৮ = শিক্ষক<br>৯ = ছাত্র<br>১০ = ডাক্তার<br>১১ = ফিজিওথেরাপিস্ট<br>১২ = অন্যান্য(নিদিষ্টকরণ) |
| ২.১০ | আপনার বসবাসের এলাকা কেমন? | ১ = শহর<br>২ = গ্রাম  |



পর্বঃ ২। কোমরে ব্যথা সম্পর্কিত প্রশ্ন ?

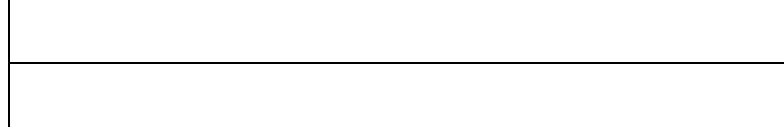
১। বর্তমানে আপনার কোমরে ব্যথার তীব্রতা কেমন?



ব্যথা নেই

তীব্র ব্যথা

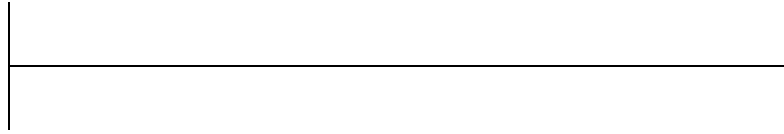
২। বসা অবস্থায় কোমরে ব্যথার তীব্রতা কেমন?



ব্যথা নেই

তীব্র ব্যথা

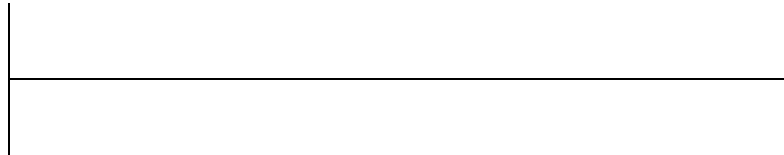
৩। সামনে ঝুঁকা অবস্থায় কোমরে ব্যথার তীব্রতা কেমন?



ব্যথা নেই

তীব্র ব্যথা

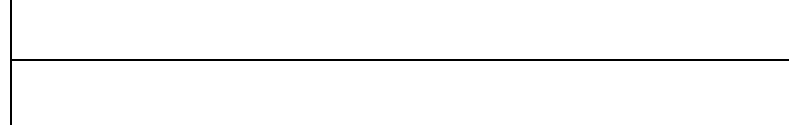
৪। কোমর ঘুরানোর সময় কোমরে ব্যথা কেমন অনুভব করেন?



ব্যথা নেই

তীব্র ব্যথা

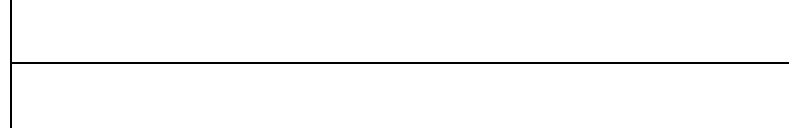
৫। বিশ্রাম নেওয়ার সময় কোমরে ব্যথার তীব্রতা কেমন?



ব্যথা নেই

তীব্র ব্যথা

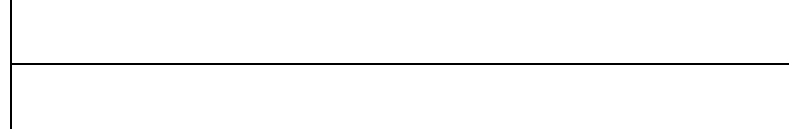
৬। ঘুমন্ত অবস্থায় কোমরে ব্যথার তীব্রতা কেমন?



ব্যথা নেই

তীব্র ব্যথা

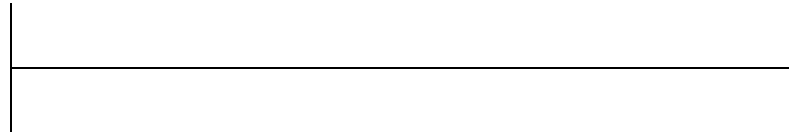
৭। দাঁড়ানো অবস্থায় কোমরে ব্যথা কেমন থাকে?



ব্যথা নেই

তীব্র ব্যথা

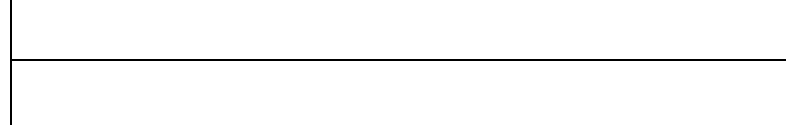
৮। হাঁটার সময় কোমরে ব্যথার তীব্রতা কেমন থাকে?



ব্যথা নেই

তীব্র ব্যথা

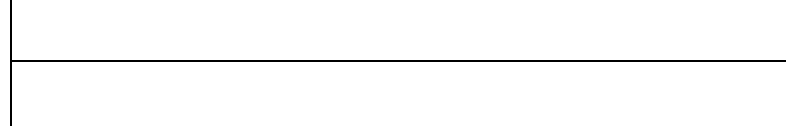
৯। ভ্রমণের সময় কোমরে ব্যথার তীব্রতা কেমন থাকে?



ব্যথা নেই

তীব্র ব্যথা

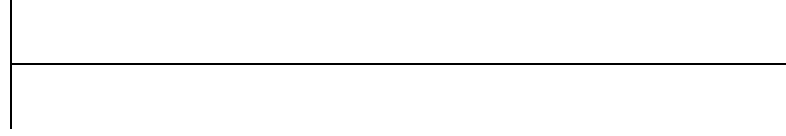
১০। কোন কিছু নিচ থেকে তোলার সময় কোমরে ব্যথার তীব্রতা কেমন থাকে?



ব্যথা নেই

তীব্র ব্যথা

১১। দৈনন্দিন কাজ কর্মে কোমরে ব্যথার তীব্রতা কেমন থাকে?



ব্যথা নেই

তীব্র ব্যথা

## পর্বঃ ৩। অস-ওয়সট্রি কোমর ব্যথার অক্ষমতা সংক্রান্ত প্রশ্নাবলী

### ১. ব্যথার তীব্রতা

- আমার এই মুহূর্তে কোন ব্যথা নেই
- এই মুহূর্তে ব্যথা খুবই হালকা
- এই মুহূর্তে ব্যথা মধ্যপন্থী
- এই মুহূর্তে ব্যথা মোটামুটি তীব্র
- এই মুহূর্তে ব্যথা খুব গুরুতর
- এই মুহূর্তে ব্যথা অচিন্তনীয়

### ২. ব্যক্তিগত যত্ন ( ওয়াশিং, ড্রেসিং ইত্যাদি )

- আমি সাধারণত নিজেকে দেখাশুনা করতে পারি, ব্যথা ছাড়া
- আমি সাধারণত নিজেকে দেখাশুনা করতে পারি, কিন্তু এটা কিছুটা ব্যথাদায়ক
- নিজেকে দেখাশুনা করা ব্যথাদায়ক, কিন্তু আমি কিছুটা সতর্কতা অবলম্বন করি
- আমার কিছু সাহায্য প্রয়োজন হয়, কিন্তু অধিকাংশ কাজ আমি নিজে করতে পারি
- আমার নিজের কাজকর্মের জন্য সারাদিন ব্যাপি অন্যের সাহায্যের প্রয়োজন হয়
- আমি কষ্ট করেও কাপড় পরিষ্কার করতে পারি না এবং বিশ্রামে থাকি

### ৩. উত্তোলন

- আমি অতিরিক্ত ব্যথা ছাড়া ভারী ওজন উত্তোলন করতে পারি
- আমি ভারী ওজন উত্তোলন করতে পারি, কিন্তু এটা কিছুটা ব্যথা তৈরী করে
- আমি ব্যথার জন্য ভারী ওজন উত্তোলন করতে পারি না, কিন্তু আমি সুবিধামত স্থান থেকে ওজন উত্তোলন করতে পারি, যেমন: টেবিল হতে
- আমি ব্যথার জন্য ভারী ওজন উত্তোলন করতে পারি না, কিন্তু আমি সুবিধামত স্থান থেকে অল্প অথবা মোটামুটি ওজন উত্তোলন করতে পারি
- আমি খুবই অল্প ওজন উত্তোলন করতে পারি
- আমি কোন ওজনই উত্তোলন অথবা বহন করতে পারি না

## ৪. হাঁটা

- ব্যথা আমাকে যে কোন দূরত্বে হাঁটার ক্ষেত্রে বাঁধার সৃষ্টি করে না
- ব্যথা আমাকে এক মাইলের বেশি হাটতে বাঁধার সৃষ্টি করে
- ব্যথা আমাকে আধা মাইলের বেশি হাটতে বাঁধার সৃষ্টি করে
- ব্যথা আমাকে ১০০ গজের বেশি হাটতে বাঁধার সৃষ্টি করে
- আমি শুধু লাঠি অথবা ক্রাচ ব্যবহার করে হাঁটতে পারি
- আমি বেশীরভাগে সময়ই বিছানায় থাকি এবং হামাগুড়ি দিয়ে টয়লেটে যাই

## ৫. বসা

- আমি যেকোন চেয়ারে আমার নিজের ইচ্ছামত বসতে পারি
- আমি শুধুমাত্র আমার পছন্দের চেয়ারে নিজের ইচ্ছামত বসতে পারি
- আমি ব্যথার জন্য একঘন্টার বেশী বসতে পারি না
- আমি ব্যথার জন্য আধা ঘন্টার বেশী বসতে পারি না
- আমি ব্যথার জন্য ১০ মিনিটের বেশী বসতে পারি না
- আমি ব্যথার জন্য সব সময় বসতে পারি না

## ৬. দাঁড়ানো

- আমি ব্যথা ছাড়া আমার ইচ্ছামত দাঁড়িয়ে থাকতে পারি
- আমি আমার ইচ্ছামত অনেকক্ষণ দাঁড়িয়ে থাকতে পারি, কিন্তু এটা কিছুটা ব্যথার সৃষ্টি করে
- আমি ব্যথার জন্য একঘন্টার বেশী দাঁড়িয়ে থাকতে পারি না
- আমি ব্যথার জন্য আধা ঘন্টার বেশী দাঁড়িয়ে থাকতে পারি না
- আমি ব্যথার জন্য ১০ মিনিটের বেশী দাঁড়িয়ে থাকতে পারি না
- আমি ব্যথার জন্য সব সময় দাঁড়িয়ে থাকতে পারি না

## ৭. ঘুমানো

- ব্যথা আমার ঘুমের কোন সমস্যা তৈরী করে না
- আমি একমাত্র বিছানায় ভালভাবে ঘুমাতে পারি
- আমি বিছানায় ছয় ঘন্টার কম ঘুমাতে পারি
- আমি বিছানায় চার ঘন্টার কম ঘুমাতে পারি
- আমি বিছানায় দুই ঘন্টার কম ঘুমাতে পারি
- আমি ব্যথার জন্য সবসময় ঘুমাতে পারি না

### ৮. যৌন জীবন

- আমার যৌন জীবন স্বাভাবিক এবং কোন ব্যথা তৈরী করে না
- আমার যৌন জীবন স্বাভাবিক এবং কিছুটা ব্যথা তৈরী করে
- আমার স্বাভাবিক এবং অনেক ব্যথা তৈরী করে
- আমার যৌন জীবন ব্যথার জন্য গুরুতরভাবে সীমাবদ্ধ
- আমার যৌন জীবন ব্যথার জন্য অনেকটাই গুরুতরভাবে সীমাবদ্ধ
- আমার যৌন জীবন ব্যথার জন্য পুরোটাই গুরুতরভাবে সীমাবদ্ধ

### ৯. সামাজিক জীবন

- আমার সামাজিক জীবন স্বাভাবিক এবং এটা কোন ব্যথা তৈরী করে না
- আমার সামাজিক জীবন স্বাভাবিক কিন্তু এটা কিছুটা ব্যথা তৈরী করে
- ব্যথা আমার সামাজিক জীবনের উপর কোন প্রভাব ফেলে না কিন্তু উদ্দিপনামূলক কাজকর্ম হতে বিরত রাখে
- ব্যথা আমার সামাজিক জীবনকে বাধাগ্রস্ত করে এবং বাহিরে যেতে পারি না
- ব্যথা আমার জীবনকে চার দেয়ালের মধ্যে সীমাবদ্ধ করেছে
- ব্যথার জন্য আমার কোন সামাজিক জীবন নেই

### ১০. ভ্রমন

- আমি ব্যথা ছাড়াই যে কোন জায়গায় ভ্রমন করতে পারি
- আমি যে কোন জায়গায় ভ্রমন করতে পারি, কিন্তু এটা কিছুটা ব্যথার সৃষ্টি করে
- আমি অতিরিক্ত ব্যথা নিয়ে দুই ঘন্টার বেশি ভ্রমন করতে পারি
- আমি অতিরিক্ত ব্যথা নিয়ে এক ঘন্টার বেশি ভ্রমন করতে পারি
- ব্যথার জন্য আমি ত্রিশ মিনিটের বেশি ভ্রমন করতে পারি না
- ব্যথার জন্য আমি চিকিৎসার প্রয়োজন ব্যতীত ভ্রমন করি না

**Data Collection Form**  
**Questionnaire (English)**  
Questionnaire sheet

**Title: “Effectiveness of Trunk Proprioceptive Neuromuscular Facilitation Training for pain and disability on Mechanical Low Back Pain attended at CRP”**

Patient’s identification (To be collected from medical record/respondent):

|     |  |
|-----|--|
| 1.1 | Identification number:   |
| 1.2 | Date of interview:   |
| 1.3 | Name of respondent:  |
| 1.4 | Address:<br>House number/Village:<br>P.O:<br>P.S:<br>District: |
| 1.5 | Contact number:  |
| 1.6 | Place of data collection:                                      |
| 1.7 | Consent taken:   |

**Part 1: Socio-demographic information (To be collected from medical record/respondent):**

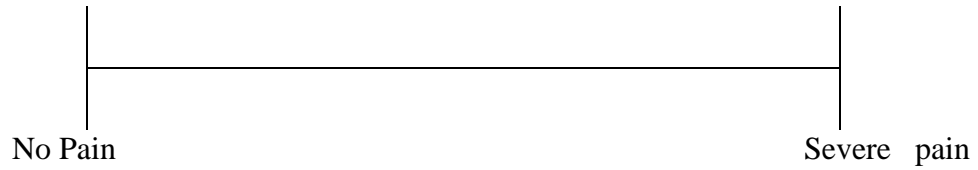
| <b>QN</b> | <b>Question and filters</b>    | <b>Response</b>   |
|-----------|--------------------------------|---|
| 2.1       | Age                            | .....years  |
| 2.2       | Sex                            | 1= Male<br>2= Female  |
| 2.3       | Body weight                    | .....kg   |
| 2.4       | Height                         | .....m<br>(1 feet = .3048 meter)  |
| 2.5       | Body mass index                | 1= Under weight (<18.50 kg/m <sup>2</sup> )<br>2= Normal (18.50-24.99 kg/m <sup>2</sup> )<br>3= Overweight (25-29.99 kg/m <sup>2</sup> )<br>4= Obese (≥30kg/m <sup>2</sup> )    |
| 2.6       | What is your marital status?   | 1= Married<br>2= Unmarried<br>3= Divorced<br>4= Separated   |
| 2.7       | What is your religion?         | 1= Islam<br>2= Hinduism<br>3= Christian<br>4= Buddha  |
| 2.8       | What is your education status? | 1= Never attended school<br>2= Some primary education<br>3= Complete primary education<br>4= Some secondary education<br>5= Complete secondary education<br>6= Higher secondary |



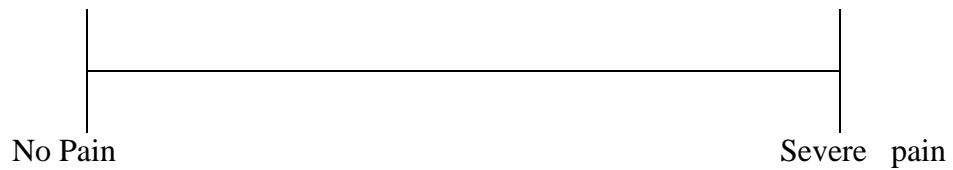
|      |                                |   |
|------|--------------------------------|---|
|      |                                | <p>7= Bachelor or above</p> <p>8= Others (specify)</p>  |
| 2.9  | What is your occupation?       | <p>1= Rickshaw puller</p> <p>2= Service holder</p> <p>3= Farmer</p> <p>4= Driver</p> <p>5= Businessman</p> <p>6= Day laborer</p> <p>7= Housewife</p> <p>8= Teacher</p> <p>9= Student</p> <p>10= Doctor</p> <p>11= Physiotherapist</p> <p>12= Others (specify)</p> |
| 2.10 | What is your residential area? | <p>1= Urban</p> <p>2= Rural</p>   |

**Part :2 Back pain related Questions**

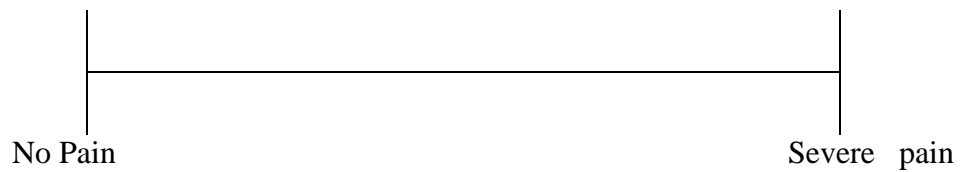
1. How severe is your back pain at present?



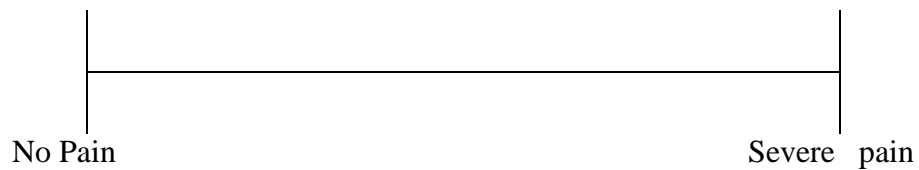
2. How severe is your Pain at back during sitting?



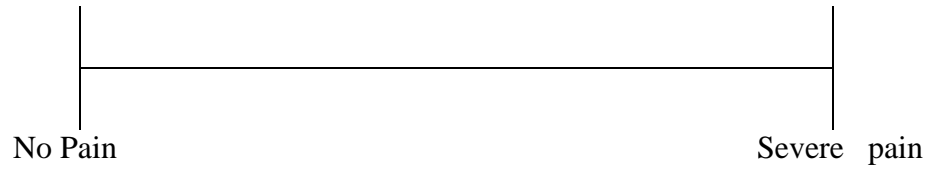
3. How severe is your Pain at back during forward bending?



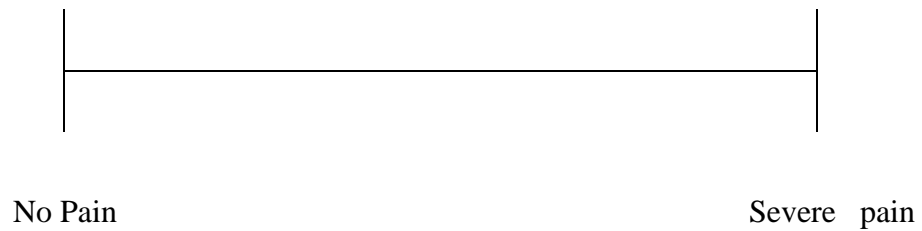
4. How severe is your Pain at back during twisting ?



5. How severe Pain at back during resting?



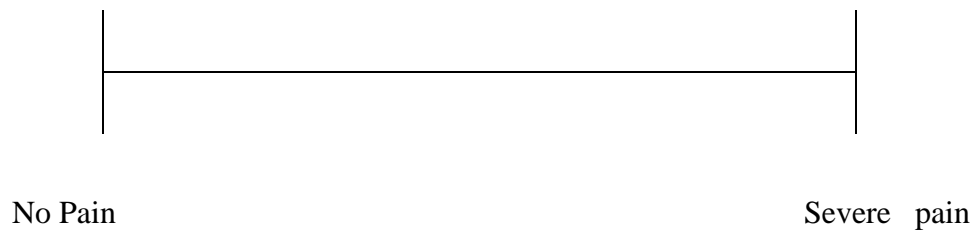
6. How severe is your Pain at back during sleeping?



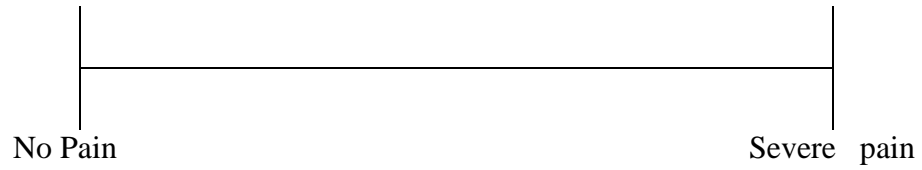
7. How severe pain at back during standing?



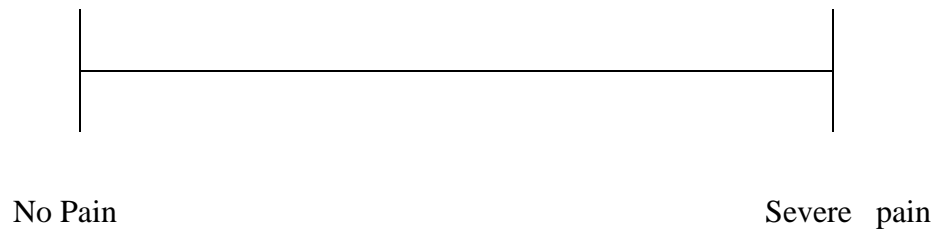
8. How Severe is Pain at back during walking ?



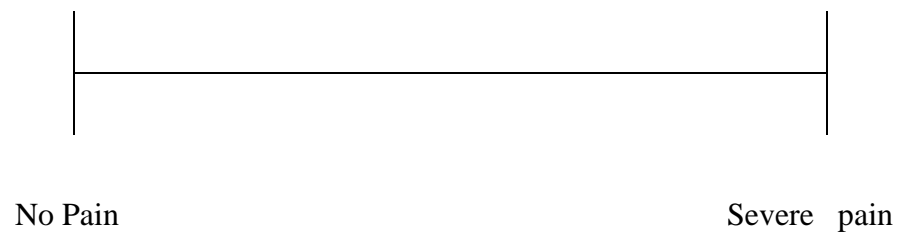
9. How severe is your Pain at back during travelling?



10. How severe pain at back during lifting?



11. How severe pain at back during ADL(Activity of Daily living) activity?



### **Part 3: Oswestry Low Back Pain Disability Questionnaire**

#### 1 – Pain Intensity

- I can tolerate the pain I have without having to use pain medication.
- The pain is bad but I manage without having to take pain medication.
- Pain medication provides me complete relief from pain.
- Pain medication provides me moderate relief from pain.
- Pain medication provides me little relief from pain.
- Pain medication has no effect on the pain

#### 2 – Standing

- I can stand as long as I want without increased pain.
- I can stand as long as I want but increases my pain.
- Pain prevents me from standing for more than 1 hour.
- Pain prevents me from standing for more than ½ hour.
- Pain prevents me from standing for more than 10 mins.
- Pain prevents me from standing at all.

#### 3– Personal Care (Washing, Dressing, etc.)

- I can take care of myself normally without causing increased pain.
- I can take care of myself normally but it increases my pain.
- It is painful to take care of myself and I am slow and careful.
- I need help but I am able to manage most of my personal care.
- I need help every day in most aspects of my care.
- I do not get dressed, wash with difficulty and stay in bed.

#### 4 – Sleeping

- Pain does not prevent me from sleeping well.
- I can sleep well only by using pain medication.
- Even when I take pain medication, I sleep less than 6 hours.
- Even when I take pain medication, I sleep less than 4 hours.
- Even when I take pain medication, I sleep less than 2 hours.
- Pain prevents me from sleeping at all

#### 5 – Lifting

- I can lift heavy weights without increased pain.
- I can lift heavy weights but it causes increased pain.
- Pain prevents me from lifting heavy weights off the floor, but I can manage if weights are conveniently positioned, e.g. 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 lift only very light weights.
- I cannot lift or carry anything at all.

#### 6 – Social Life

- My social life is normal and does not increase my pain.
- My social life is normal, but it increases my level of pain.
- Pain prevents me from participating in more energetic activities (ex sports, Dancing etc.
- Pain prevents me from going out very often.
- Pain has restricted my social life to my home.
- I have hardly any social life because of my pain.

### 7 - Walking

- Pain does not prevent me walking any distance.
- Pain prevents me walking more than 1 mile.
- Pain prevents me walking more than ½ mile
- Pain prevents me walking more than ¼ mile
- I can only walk using crutches or a cane.
- I am in bed most of the time and have to crawl to the toilet.

### 8 – Traveling

- I can travel anywhere without increased pain.
- I can travel anywhere but it increases my pain.
- Pain restricts travel over 2 hours.
- Pain restricts travel over 1 hour.
- Pain restricts my travel to short necessary journeys under ½ hour.
- Pain prevents all travel except for visits to the doctor/therapist or hospital.

### 9 - Sitting

- I can sit in any chair as long as I like.
- I can only sit in my favorite chair as long as I like.
- Pain prevents me sitting more than 1 hour.
- Pain prevents me from sitting more than ½ hour.
- Pain prevents me from sitting more than 10 mins.
- Pain prevents me from sitting at all.

## 10 – Employment/Homemaking

- My normal homemaking/job activities do not cause pain.
- My normal homemaking/job activities increase my pain, but I can still perform all that is required of me.
- I can perform most of my homemaking/job duties, but pain prevents me from performing more physically stressful activities (ex. Lifting, vacuuming).
- Pain prevents me from doing anything but light duties.
- Pain prevents me from doing even light duties.
- Pain prevents me from performing any job/homemaking chores.