EFFECTIVENESS OF CERVICOTHORACIC STABILIZATION EXERCISE ALONG WITH CONVENTIONAL PHYSIOTHERAPY AMONG PATIENTS WITH CHRONIC NECK PAIN

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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 CERVICOTHORACIC STABILIZATION EXERCISES ALONG WITH CONVENTIONAL PHYSIOTHERAPY AMONG PATIENTS WITH CHRONIC NECK PAIN

Submitted by Zakia Rahman for partial fulfillment of the requirements for the degree of Bachelor of Science in Physiotherapy (B. Sc. PT)

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DECLERATION

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

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Acknowledgement

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Acronyms

BHPI- Bangladesh Health Professions Institute

BMRC- Bangladesh Medical Research Council

CNP- Chronic Neck Pain

CRP- Centre for the Rehabilitation of the Paralysed

CTSE- Cervicothoracic Stabilization Exercise

IRB- Institutional Review Board

MS- Musculoskeletal

NDI- Neck Disability Index

NPRS- Numerical Pain Rating Scale

NSAID- Non-Steroidal Anti-Inflammatory Drug

SPSS- Statistical Package for Social Science

WHO- World Health Organization

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Abstract

Background: Chronic neck pain is a pain that affects the skin, ligaments and muscles on the movement of both active and passive movement with widespread sensation as well as hyperalgesia that last more than three months. Nowadays its been a common and major problem in our country which has a tendency to recurrent injury where cervicothoracic stabilization exercise seems to be effective to prevent recurrency. **Objectives:** the objective of the study is to determine and compare patient rated general neck pain, neck ROM, neck muscle strength and disability before and after application of CTSE along with conventional physiotherapy among patients with CNP. **Methodology:** Experimental study design was used in this study. 22 patients with Chronic Neck Pain were randomly allocated into two groups from outdoor musculo-skeletal unit, CRP. Among them 11 patients were assigned into trial group received CTSE with conventional physiotherapy and another 11 into control group received only conventional physiotherpy. Total treatment sessions were 9 comprising of 3 sessions per week for 3 weeks. Double blinding procedure was used during data collection. **Outcome measurement tools**: Numerical pain rating scale (NPRS) was used to measure pain and universal goniometer to measure ROM, manual muscle testing to measure muscle strength and NDI to measure neck disability. **Analysis of data**: Inferential statistics such as Mann-Whitney U test for between groups pain, muscle strength and NDI, Unpaired t test for between groups ROM, Paired t test for within group ROM and Wilcoxon test was done for within group pain, muscle strength and NDI using SPSS version 20. **Results:** It was found that pain and neck disability had reduced and ROM and muscle strength improved both between and within group ($P<.05$). **Conclusion**: Cervicothoracic stabilization Exercise (CTSE) along with conventional physiotherapy has the ability to improve the effects than only conventional physiotherapy in chronic neck pain. This exercise proved beneficial when combined with conventional physiotherapy to minimize disability level and prevent recurrence, reduction of pain and improvement of range of motion and muscle strength.

Keywords: Chronic neck pain, Cervicothoraicic stabilization exercise (CTSE) and Conventional physiotherapy.

CHAPTER –I INTRODUCTION

1.1. Background

Anatomically the cervicothoracic junction is a complex region where important neurovascular structures passes transversely which create repeated injury. For this cervicothoracic stabilization exercises can be effective. Important neurovascular structures passes within this area transversely. Any abnormalities in this cervicothoracic junction wrench the normal anatomy of this area and create different unusual symptom (Canale & Beaty, 2012)

Any mechanical or degenerative changes can cause neck pain. Neck pain is one of the common problems which have different prevalence range around the whole world. The rate of neck pain is high in work force population around 30% to 50% (Bertozzi et al., 2013).67% of adults go through neck at different stages of their life (Viljanen et al., 2003)It passes through a history of recurrences and chronicity. Neck pain is individualize by exacerbations and most of the patients almost one third patients neck pain build chronic symptoms after 6 month (Bertozzi et al., 2013) To cure this condition its necessary to know what are producing this neck pain and should avoid the influencing factors (Dusunceli et al., 2009)

Chronic neck pain started showing symptom after 6 month of acute neck pain. It is a costly musculoskeletal condition of the western society. The mean lifetime of prevalence of neck pain is estimated about 50% and 1 month prevalence is 25%. In the population of Europe, around 15% and 19% of cases expand to chronic state. Also in Ireland 13% of the population experienced chronic neck pain. On the other hand in Finland 10% male and 14% female and in Norway 14% are suffering with chronic neck pain (Clare et al., 2004) Around the whole world, this chronic neck pain percentage is almost 20% among the whole population who suffer this state at least one time in their whole life. In United States of America, the annual prevalence was 41.5% in which individuals with chronic neck pain were middle-aged (mean age 48.9 years) and the majority of subjects were women (Driessen, et al., 2012) and it was the eight leading cause of disability in United States of America (Sberman, et al., 2014). In United Kingdom, the annual incidence was

34%. Incidence of neck pain is increasing and it is estimated that up to 50% of the population experienced neck pain in last 1 year in which majority of the participants were middle age and female gender were associated with risk factors for the development and reporting of neck pain (Joslin, et al., 2014) The mechanism of the chronic neck pain are still now not revealed fully (O'Riordan et al., 2014).

This mechanical or degenerative changes occurs due to incorrect posture, injury, aging ,congenital abnormalities (Croft et al., 2001) and excessive stress which leads to pain, inflammation, protective spasms and or neurological reflex patterns that ultimately causes chronic neck pain (Vos, 2006). Different type of occupation has different way to work. So there are different postures to do work. This pattern of postures has a big impact on neck pain. There are many researches where it has been proved that occupation types have impact in neck pain. In a Sweden's study the researchers found that the type of occupation where people work in same posture for a long time are suffering from neck pain, it can be also the household activities (Fredriksson, 2002).

In different studies it was found that there are risk factors which have great impact on chronic neck pain. Age, gender, unbearable physical workload, work related emotional exhaustion, smoking, diabetes, disturbed sleeping provoke chronic neck pain. Women are more affected than men due to bad working posture. There was variation in age between male and female. Females aged between 35-44 had a higher risk of having long and medium-term neck pain and ≥ 65 aged males had a higher risk of having long and medium term neck pain symptoms (Linder, et al., 2012).

According to evidence, to minimize or control this neck pain conservative management is very effective. Conservative management includes medication, physical medicine method (such as massage, exercises, heat etc); manual treatment(such as mobilization, manipulation, exercises, ice, traction etc) and education of patients (Croft et al., 2001)

As it is found that the weakness of the neck muscles and reduction of strength causes neck pain so maximizing the muscle weakness and increase the neck stability are effective to decrease the neck pain by restoring the neck muscles. Stabilization exercises can play a important role not to recurrent the chronic neck pain. It is the exercises that are

meant to maximize function and prevent injury progression or reinjures. It needs coordination and training of the anterior and posterior cervical and shoulder girdle muscle (Kaka et al., 2015). Stabilization exercise is a part of rehabilitations program which assist to minimize pain, maximize function and prevent further injury. It is designed to improve the mechanism by which the cervical spine maintain a stable and injury Free State. There is a poor well designed randomized controlled trial that explore the efficacy of cervicothoracic stabilization exercise along with conventional physiotherapy for chronic neck pain (Dusunceli et al., 2009).

1.2. Rationale

Chronic neck pain is a problem of the whole world and also common in Bangladesh. Neck pain due to mechanical origin is most prevalent around the world. It is expressed by any tension, fatigue or pain on the neck which can radiate the upper extremities. It is probably due to frequently use of computers, phones or maintain prolong time of sitting position in their work. According to systemic review based evidence which confined that different types of dynamic, isometric, stabilization, strengthening and stretching exercises, mobilization, manipulation, traction and sometimes electrotherapy are worldwide used treatment for neck pain.

A large number of evidence found positive correlation between neck muscle weakness and chronic neck pain. Different types of exercise programs to manage chronic neck pain can differ with the duration, frequency, intensity and mode of exercises. Among the different types of exercises stabilization exercises can reduce pain and prevent reinjures. If the stabilization exercises are given combined with the conventional physiotherapy it will be more fruitful.

As it is found that the weakness of the neck muscles and reduction of strength causes neck pain so maximizing the muscle weakness and increasing the neck stability are effective to decrease the neck pain by restoring the neck muscles There is lack of evidence in the treatment techniques that applies cervicothoracic stabilization exercises along with the conventional physiotherapy.

This study is intended to pursue the usefulness of this combined treatment. Also there is no published research in our country that directly overview of this combined treatment protocol. This research aims is to explore the effectiveness of cervicothoracic stabilization exercise along with conventional physiotherapy in patients with chronic neck pain.

1.3. Objectives

1.3. a. General Objective:

To identify the effectiveness of cervicothoracic stabilization exercises combined with conventional physiotherapy among the patients with chronic neck pain.

1.3. b. Specific Objectives:

- To evaluate the between and within group demographic states of chronic neck pain patients.
- To measure the between and within group pain intensity of chronic neck pain patients.
- To estimate the between and within group range of motion of chronic neck pain patients.
- To evaluate the between and within group muscle power of the chronic neck pain patients.
- To explore the between and within group disability of the patients of chronic neck pain.

1.4. Hypothesis

Null-Hypothesis

Cervicothoracic stabilization exercise along with conventional physiotherapy is no more effective than only conventional physiotherapy for the patients with chronic neck pain.

Ho: μ1-μ2 = 0 or μ1=μ2, where the experimental group and control group initial and final mean difference is same

Alternative-Hypothesis

Cervicothoracic stabilization exercises along with conventional physiotherapy are more effective than only conventional physiotherapy for the patients with chronic neck pain.

Ha: μ1- μ2 ≠ 0 or μ1 ≠ μ2, where the experimental group and control group initial and final mean difference is not same.

1.5. Variables

- **Dependent variables:**
    1. Chronic neck pain
    2. Range of motion
    3. Muscle strength
    4. Neck disability index
- **Independent variables:**
    1. Cervicothoracic stabilization exercises
    2. Conventional physiotherapy

1.6: Operational Definition

Neck Pain: Neck pain is the sensation of discomfort in the neck area. Neck pain can result from disorders of any of the structures in the neck. Neck pain arises from numerous different conditions and is sometimes referred to as cervical pain

Chronic neck pain: Any pain in the anatomical region of the neck with or without radiation to the head, trunk and upper limbs more than 12 weeks is known as chronic neck pain. It is often present on palpation and in both passive and active movements of neck and shoulder regions.

Stabilization Exercise: Stabilization exercises are an active form of physical therapy designed to strengthen muscles to support the spine and help to prevent any type of abnormalities. It requires coordination and training of the anterior and posterior cervical and shoulder girdle musculature.

Conventional physiotherapy: It is defined as the treatment of movement disorders caused by impairments of joints and muscles. It is an intervention that are widely accepted and commonly practiced by medical community.

CHAPTER- II LITERATURE REVIEW

According to the functional purpose, functional anatomy is the analysis of physical properties of anatomical structure. The anatomy of the cervical spine has characteristics quite different from those of the thoracic or lumbar spine (Canale & Beaty 2012). The cervical spine has great range of motion in all direction and placed by supporting ligaments, capsular, muscular, and cartilaginous structure. The cervical spine is the most complicated articular structure of the body (Aarabi & Shainline 2007). The cervical spine permits a wide range of motion for the head in relation to the trunk (McKenzie, 1989).

Neck supports the head and protects the spinal cord as it contains the top end of the spinal column or spine. It has seven vertebrae which known as cervical vertebrae and there are intervertebral disc or cartilage. Facet joints link the side of the bones. There are so many ligaments and muscles which are supporting the spine and spread out from the neck to the shoulder blades and back (Cramer &Darby, 2005)

Pain is a normal protection mechanism and physiological reaction of the body to an abnormal stimulus and the main presenting symptom of patients with low back trouble. There are several symptoms of this condition such as pins and needles, numbness, weakness, stiffness and instability which are common but the most important symptom is pain. Pain has been defined by the International Association for the Study of Pain (IASP) as “an unpleasant sensory and emotional experience associated with actual or potential tissue damage or described in terms of such damage” (Merskey & Bogduk, 2008).

Mechanical nature is a common complain of neck pain which was seen by practitioners of manual medicine and they use a great number of methods to treat the condition. Neck pain can occur by a number of disorders and diseases of any structure of the neck (Gemmell & Miller, 2010). It is also known to as cervical pain. Neck pain is a common thing in every people’s life which can happen at any time of their life and the amount is more than half of the people. A survey of Finland found that adults aged 25-53 years, 7% women and 5% men affected by chronic neck pain (Ylinen et al., 2003)

The population of Canada has reported that about ten percent of people are having neck pain for one week every month (Ferrari & Russell, 2003). These researchers also stated that at least 80% of the population suffered from unspecified duration of neck pain. An epidemiological study has revealed that 54.2% incidence had neck pain for longer than six months. This was lower than in72% people of Finland, Norway and Sweden are - suffering from neck pain which is more than Canada people (Cassidy et al., 2000).

Neck pain is a common condition. This can be acute or chronic. The pain which is extend less than three month is acute pain and if the pain extend more than three month is known as chronic neck pain (Kellicker, 2011). Chronic neck pain is a distressing condition with high emotional and personal costs, negatively impacting on quality of life.

Men and women both are affected with chronic neck pain. But in different study researchers found that women are more affected than men. Women are affected more than men due hormonal imbalance, bad posture etc. It is found that women are mostly affected because of degenerative disc diseases. It is a very common cause of neck pain. In a study out of 133 patient 91 were woman who means 68% (Fillingim et al., 2009). Another research of Sherman 2010 stated that 10-40% adults are facing problem by neck pain each year,10-15% of adults complain neck pain that has lasted more than 6 months in the past year, 2- 5% of adults are experiencing disability for neck pain.

There are many factors that provoke chronic neck pain such as age, occupation, marital status, pillows, posture etc. there are age limitations which was founded by different study. In a study of France, it is found that people over 37 years old face chronic neck pain most, mid generations are also affected (Cassou et al., 2002)

Different type of occupation has different way to work. So there are different postures to do work. This pattern of postures has a big impact on neck pain. There are many researches where it has been proved that occupation types have impact in neck pain. In a Sweden's study the researchers found that the type of occupation where people work in same posture for a long time are suffering from neck pain, it can be also the household activities (Fredriksson, 2002).

Sometimes after taking patient's history it's found that maximum people with chronic pain use more than one pillow or soft pillow. In different studies it's found that the height of pillow and type of pillow is a very influencing factor for neck pain. Pillow used to stabilize the neck during sleep. It supports the cervical spine in a neutral position. But soft pillows disturb the normal alignment of the neck. People use soft pillows for their comfortness but after sometime it became their reason of neck pain (Gordon & Susan, 2010). Another researchers found that people spend third of their life in sleeping so sleeping quality and comfortless is must for everyone's life. For this reasons they use high and more number of pillow which increase or develop neck pain (Ren et al., 2016)

From a journal of Mayo Clinic it was found that to diagnosis neck pain x-ray, MRI, CT scan, electromayography (EMG) was done at the early stage. To identify chronic neck pain, Mintken and Cleland (2012) stated that history of the duration of symptoms, behavior of pain and deformity of cervical spine and presence of neck disability should be focused.

The treatment of chronic neck pain varies person to person in different symptoms. Pharmacological and physiotherapy are the two management protocol to treat chronic neck pain. (Southerst et al., 2014)

Chronic neck pain patients are often referred to a Physiotherapist and although many treatments are available, it remains unclear which type of treatment is to be preferred. We have found that in Netherlands In 1996 total related costs were estimated to be US $686.2 million, which is about 1% of the total Dutch health care expenditures (Vonk et al., 2004).

In the condition of neck pain accounts for 15% of all soft tissue problems seen in general practice and are a common reason for referral for Physiotherapy treatment. In any one year, 30% of adults will report neck pain, and 5-10% will be disabled with it. Although neck pain has been regarded as self limiting and benign, it consumes a substantial proportion of healthcare resources. A recent survey of 10 community Physiotherapy departments in the east Yorkshire area has shown that of 7899 subjects referred, 1060 (13.4%),had neck complaints (Moffett et al., 2005).

So the neck pain is very common problem and the physiotherapy profession is a very new and developing profession in Bangladesh, to mention about this we need to some up to date information that can help both the patient and therapist. Although there is very little research for neck pain patients in Bangladesh from the physiotherapy point of view, if this area is explore then it could produce good result for our profession (Islam, 2005).

Neck pain is a very common condition and is more frequently seen in women than men. Most people will experience pain in the neck at some point in their life (Pillinger & Rutherford, 2003).

Most of the patient of neck pain comes with "non-specific type of neck pain and non specific neck pain defined by postural or mechanical symptoms. Etiological factors are poorly understood and are usually multifactor, including poor posture, anxiety, depression, neck strain, and sporting or occupational activities. Neck pain after whiplash injury also suits in this category where no bony injury or neurological deficit is present. When mechanical factor is first in the priority list, the condition is often known as "cervical spondylosis(Ylinen, 2003).” Common treatment for neck pain is drugs, manual treatments, physiotherapy and exercise, local and epidural injections and patient education (Irnich et al., 2001).

Neck pain is a common complain treated by physiotherapist. Physiotherapy is the main and effective treatment protocol to treat a neck pain patient (Costello et al., 2016). The treatment of neck pain is depending on the diagnosis. However, most patients are treated successfully with rest, medication, immobilization, physical therapy, exercise, activity modification or a combination of these methods (AAOS, 2000). Mckenze treatment approach is the most popular management approach among the physiotherapists. It includes proper assessment .This approach based on giving individual treatment according to patient’s clinical symptoms. Mckenzie method includes traction, mobilization, manipulation, protraction etc.(Clare et al., 2004) Poor postural correction is needed if the range of motion of the neck is restricted. A firm pillow can give comfort to the patient at night (Ren et al., 2016)

When neck pain persists or is chronic, the orthopedist may recommend a rehabilitation program that includes exercise program and various types of physical therapy to help you relieve your pain and prevent it from coming back (AAOS, 2000). People with weak neck muscles are more prone to neck problems and in such cases, an exercise programme to strengthen the neck is a good idea (Pillinger & Rutherford, 2005). The purpose of the exercise is to diminish pain and to restore normal function and to regain full mobility in the neck as soon as possible under the given circumstances. Postural correction and maintenance of the correct posture should always follow the Mckenzie concept (McKenzie, 1983).

There is no clear definition of conventional physiotherapy. But Oxford Advanced Learner dictionary (1995) states that conventional means tending to follow acceptable or following what is traditional or the way that has been that has been done for a long time. Therefore conventional physiotherapy refers to what is done or following traditional physiotherapy treatment that has been done for a long time in the department of physiotherapy. Traditionally, in conventional treatment rest is prescribed for back pain. A physiotherapist may use mobilization techniques backed by ultrasound, laser, or heat treatment. Treatment can include traction, a collar or corset, TENS. For most neck pain patient, usual physiotherapy is the superior treatment (Moffett, 2004).

Usual physiotherapy treatments are groups of specific treatments. Exercise therapy primarily focused on neck pain patients are isometric exercise, range of motion exercise, dynamic resistance exercise, cranio-cervical exercise, upper limb strengthening exercise, neck stabilization exercise, proprioceptive exercise and neck endurance exercise (Bertozzi et al., 2013).

So we can say that conventional physiotherapy is a combination of different treatment approach which is used in the physiotherapy department.

Another study Martel et al. (2011) stated that home exercise program can also play very important role in the condition of chronic neck pain. Home exercise program includes general range of motion (ROM) exercises that served for warm up and cool down purposes, followed by stretching /mobilization and strengthening exercises of the cervical

and upper thoracic spine, principally flexion/extension, lateral flexion and rotation of the cervical spine.

As it revealed due to chronic neck pain, pain increases, range of motion and muscle strength decreases and disability creates. So to measure this things numeric pain rating scale, Goniometer, Oxford muscle grade and neck disability scale usually used.

Numeric Pain Rating Scale (NPRS): McCaffery et al. (1999) used a numeric scale to rate the pain status experienced by patients. It is known as Numeric Pain Rating Scale. The scale is a 10 cm long scale ranging from 0-10. Cleland et al. (2008) examined the test reliability of the NPRS for a subgroup of patients with mechanical neck pain. The results of this study suggest that the NPRS exhibited moderate test-retest reliability, which is similar to the test-retest reliability identified in a patient population with cervical radiculopathy or mechanical causes of neck pain. Most recently the results of the study of Young et al. (2010) exhibited fair test-retest reliability in patients with Cervical Radiculopathy.

Neck Disability Index (NDI): This is a set of questionnaire that has been designed to provide information regarding how the patient's neck pain affects his/her ability to manage in everyday life. Neck Disability Index (NDI) is developed by Vernon & Mior (1991). NDI contains 10 different sections of questions, each of which has 6 grades of defined statements. For each section the total possible score is 5: if the first statement is marked the section score = 0, if the last statement is marked the section score = 5. Cleland et al. (2008) examined the test-retest reliability of the NDI for a subgroup of patients with mechanical neck pain. The results of this study suggest that the NDI exhibits only fair test-retest reliability. Similarly the results of the study by Young et al. (2010) suggest that the NDI exhibits only fair test-retest reliability, which is lower than the values reported by Cleland et al. (2008) in patients with mechanical neck pain or cervical radiculopathy.

The cervical spine is the top portion of the spine in the back of the neck. Muscles of the neck, including the suboccipital, longus capitis, colli, multifidi, semispinalis cervicis and longissimus cervicis, stabilize the neck. The upper back and shoulder muscles, including the lower trapezius and the serratus anterior, are also important for spinal stabilization.

Stabilization exercises increase the strength of these muscles as well as improve stabilization (Sarkar et al., 2017).

Stabilization exercises are exercises that are meant to maximize function, and prevent injury progression or re-injury. They require coordination and training of the anterior and posterior cervical and shoulder girdle musculature (Kaka et al., 2015). As it is found that the weakness of the neck muscles, reduction of strength and neck muscles causes neck pain so minimizing the muscle weakness and increasing the neck stability are effective to decrease the neck pain by restoring the neck muscles (Dusunceli et al., 2009).

CHAPTER –III METHODOLOGY

This study was an experimental design to evaluate the effectiveness of conventional physiotherapy along with cervicothoracic stabilization exercises and also to compare their effectiveness conventional physiotherapy alone for the management of the patients with chronic neck pain. To identify the effectiveness of this treatment regime, Numeric Pain Rating Scale (NPRS) was used to measure pain, Universal Goniometer was used to measure range of motion, Oxford Grade Scale was used to measure muscle power and Neck Disability Index (NDI) was measured to identify the disability rate.

3.1: Study Design

Experimental study design has been used .

According to DeyPoy & Gitlin (2013) the deign could be shown by

Experimental Group: r_1 O_1 X_1 O_2

Control Group: r_2 O_3 X_2 O_4

The study was a trial between two subject designs. Cervicothoracic stabilization exercise and conventional Physiotherapy treatment were applied to the trial group and only conventional Physiotherapy treatment were applied to the control groups.

A pre-test (before intervention) and post-test (after intervention) was administered with each subject of both groups to compare the pain, range of motion, muscle strength and functional disability of the subject before and after the treatment.

3.2 Study Area

Musculo-skeletal Unit of Physiotherapy Department at Center for the Rehabilitation of Paralysed, Savar, Dhaka-1343.

3.3 Study Population

The study population was the patients diagnosed with chronic neck pain attended in the Musculo-skeletal Unit of Physiotherapy Department at CRP, Savar, Dhaka.

3.4Sample Size

22 patients were selected from musculoskeletal unit CRP, Savar by computer generated random number than 11 patients were randomly assigned to Experimental group who received cervicothoracic stabilization exercise along with conventional physiotherapy and 11 patients in control group who received only conventional physiotherapy.

3.5 Selection Criteria

3.5.1 Inclusion criteria

- **Mechanical cervical pain that radiate shoulder:** Mechanical nature of pain is a common complain among the most neck pain patients (Gemmell & Miller, 2010).
- **Age range between 20 to 45 years**: This age range was selected because most of the people around the age range showed most prevalent time of neck pain in their life (Gautam et al., 2014).
- **Both male and female**: men and women both affected with chronic neck pain and it was found in a study of Fillingim et al., (2009) stated that both are affected but women are more affected than men.
- **Chronic neck pain:** Chronic neck pain suffering people were taken for this research. The pain which extend more than 3 three month is known as chronic neck pain (Kellicker, 2011)
- **Not any history of previous physiotherapy**: patients who never take any type of physiotherapy were taken for this study(Hinz, et al., 2008; Warden, 2010)
- **Willingness:** Patients were provided by written consent form and might be helpful or might not leave treatment during the study (Gautam et al., 2014).

3.5.2 Exclusion Criteria

- **Subjects who were not interested**: Some patients were excluded as they have the chance to drop out during the study. That can have bad impact on the results of the study (Halvorsen et al., 2014).
- **Acute or sub-acute neck pain:** In this state of pain, cranio-cervical exercise was not recommended as it might increase irritability in cervical spine (Jull et al., 2009).
- **Red flags for neck pain**: Diagnosis of secondary complications such as tumour, TB spine, fracture, dislocation and severe osteoporosis, Paget's disease Vertibro-basillary artery insufficiency, Vascular abnormality where stabilization exercises cannot be given; infections, cauda equine lesions, cord signs & syndrome are also contraindicated (McColl, 2013).
- Surgery to the neck spine.
- Mentally retard patients.

3.6: Sampling Technique

Simple Random sampling technique was used for group allocation of this study.

Subjects, who met the inclusion criteria, were taken as sample in this study. 22 patients were conveniently selected from population. Group allocations were conducted by using computer generated random number in the process of simple random sampling technique as it improves internal validity of experimental research. For this process 11 patients were randomly assigned to Experimental group comprising of treatment approaches of cervicothoracic stabilization exercise along with conventional physiotherapy and 11 patients only conventional physiotherapy for this study. So the divided number of experimental group were 21, 09, 17, 03, 15, 13, 01, 07, 19, 05 &11 and control group were 22, 14, 02, 10, 20, 16, 06, 18, 04, 12 & 08

3.7 Data processing

3.7.1 Data collection tools

- Record or Data collection form
- Informed consent form
- Structured questionnaire
- Pen, Paper.

3.7.2 Measurement Tools

- 10 cm numeric pain rating scale for measuring pain intensity in resting position
- Universal Goniometer to measure range of motion of cervical spine.
- Manual muscle testing technique by using OXFORD muscle grade scale to assess the muscle strength of cervical spine.
- 50 points Neck disability scale to measure the disability status among patients with chronic neck pain.

3.7.3 Data Collection Procedure:

The study procedure was conducted by taking face to face interview. After taking the interview of the patient at department, the patients were assessed by a graduate qualified physiotherapist.

Data was gathered through a pre-test, intervention and post-test and the data was collected by using a written questionnaire form. Pre-test was performed before beginning the treatment and the intensity of pain was noted with NPRS score and NDI questionnaire form. The same procedure was performed to take post-test at the end of 9 sessions of treatment. The assessment form was provided to each subject before starting treatment and after 9 sessions of treatment patient was instructed to put mark on the line of NPRS according to their intensity of pain. The data were collected from both in experimental and control group in front of a graduate qualified physiotherapist and verified by a witness selected by the Head of clinical setting in order to reduce the biasness. At the end

of the study, for statistical analysis different tests were carried out to perform statistical analysis.

3.8 Data Analysis:

Data was calculated by using descriptive statistics for demographic quesnnaire and inferential statistics for group differences through statistical package for social science (SPSS) version 20.

3.8.1 Statistical Test:

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 nominal or scale and should be analyzed with unrelated t test. Between groups range of motion was analyzed by unrelated t test and pain, muscle strength and neck disability was analyzed by Mann-Whitney U-test. The within group analysis of pain, muscle strength and neck disability was done by Wilcoxon signed rank test and range of motion was analyzed by related t test.

3.8.2 Level of Significance:

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.

Experimental Group

Experimental Group was given both cervicothoracic stabilization exercise and conventional physiotherapy. Conventional physiotherapy was common treatment protocol for both groups. But cervicothoracic stabilization exercise was given along with conventional physiotherapy given by single qualified physiotherapist who is expertised in cervicothoracic stabilization technique.

3.9 Ethical Issues

The proposal of the dissertation including methodology was approved by Institutional Review Board and obtained permission from the concerned authority of ethical committee of Bangladesh Health Professions Institute (BHPI). 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. 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.

3.10 Informed Consent

The researcher obtained informed consent to participate from every subject. A signed informed consent form was received from each participant. The participants were informed that they have the right to meet with outdoor doctor if they think that the treatment is not enough to control the condition or if the condition become worsen. The participants were also informed that they are completely free to decline answering any question during the study and are free to withdraw their consent and terminate participation at any time. Withdrawal of participation from the study should not affect their treatment in the physiotherapy department and they should still get the same facilities. Every subject had the opportunity to discuss their problem with the senior authority or administration of CRP and have any questioned answer to their satisfaction.

CHAPTER –IV RESULTS

Table: 1- Baseline characteristics of the participants

Variable	Trial group (n=11)	Control group (n=11)	p
Mean age ,mean(SD)	35.09±12.05	39.36±14.48	0.998
Gender (%)	Male=3(27.03) Female=8(72.07)	Male=7(63.06) Female=4(36.04)	0.670
Pillows(SD)	1±.00	1±.00	-----
Mean Weight(kg)(SD)	63.45±13.26	60.64±9.94	1.00
Mean Height ($m^{2)}$ (SD)	1.6±.06	1.63±.07	0.143
Mean BMI(kg/m^2)(SD)	23.27±4.54	22.09±2.23	0.063

Table 1 compares the baseline characteristics of participants between trial and control group. In addition, two groups did not show significant differences at baseline regarding demographic characteristics and disease-related parameters. In trial group, the mean age (± SD) of the participants was 35.09 (± 12.05) years and in control group 39.36 (± 14.48) years. In trial group the mean ratio of male was 27.03 and female ratio was72.07 and in control group the man ratio was 63.06 and female was 36.04. The mean number of pillow (± SD) was similar in both trial and control group was (1±0. In addition, mean weight (± SD) in trial group was 63.45 (± 13.26) kg and 60.64 (±9.94) kg. Mean height (± SD) was 1.6 (± .06) cm in trial group and in contrast 1.63 (± .07) in control group participants. Mean (± SD) BMI in trial group was 23.27 (± 4.54) and in contrast mean (± SD) in control was 22.09 ± 2.23.

1: Socio demographic information:

1.1: Gender distribution of participants:

Figure 1 showed that there were 8 female and 3 male in trial group and 4 female and 7 male in control group.

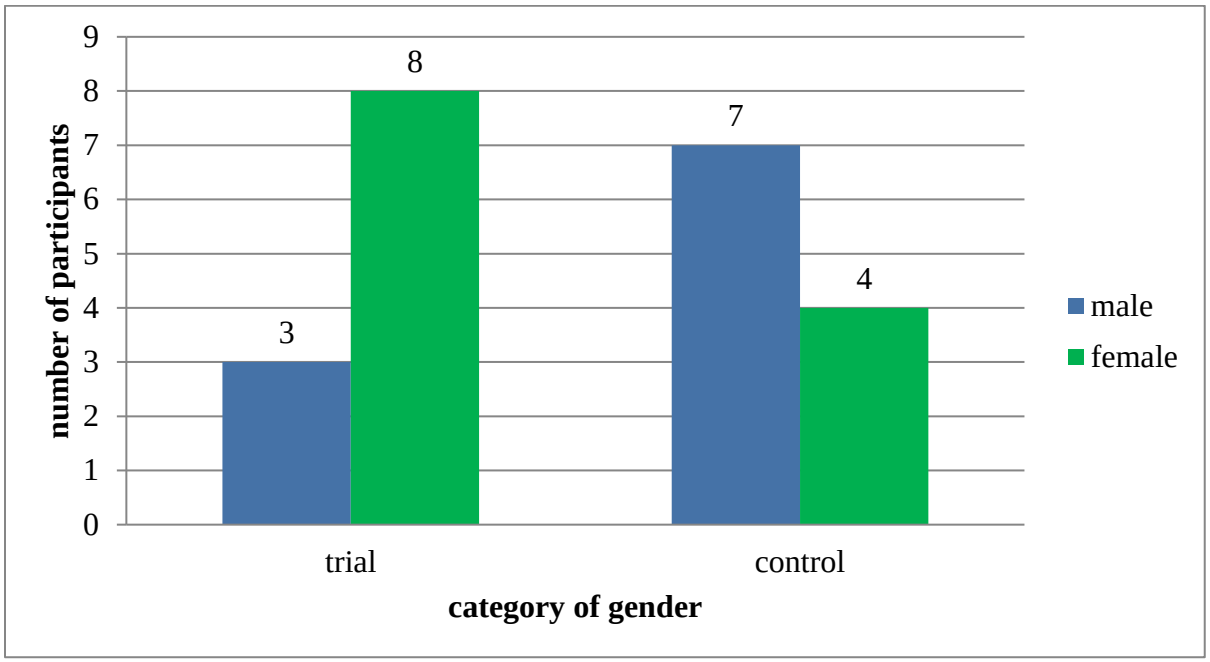

Figure 1: category of gender among the participants

1.2: Occupation of participants:

Occupation	Frequency	Percentage
Housewife	8	36.4
Service	3	13.6
Student	4	18.7
Farmer	1	4.5
Business	3	7.1
Teacher	2	9.1
Politics	1	4.5

In table 2 showed, among the 22 participants, housewife was 8 (36.4%), service 3 (13.6%), student 4 (18.7%), farmer 1 (4.5%), teacher 2 (9.1%), business 3 (7.1%), politics 1(4.5%).

1.3: Educational level of both groups' participants with frequencies:

Among 22 participants, 1 participant passed in PSC in trial group and 2 participants passed PSC in control group 3 participant passed S. S. C examination in trial group and 5 participants passed in control group. There were 3 participants who passed H. S. C. level in trial group whereas no participants passed HSC in control group. At degree/Honors level, there were 2 in trial and 2 in control group and in Masters Level 2 was from trial and 2 participants from control group (figure-2).

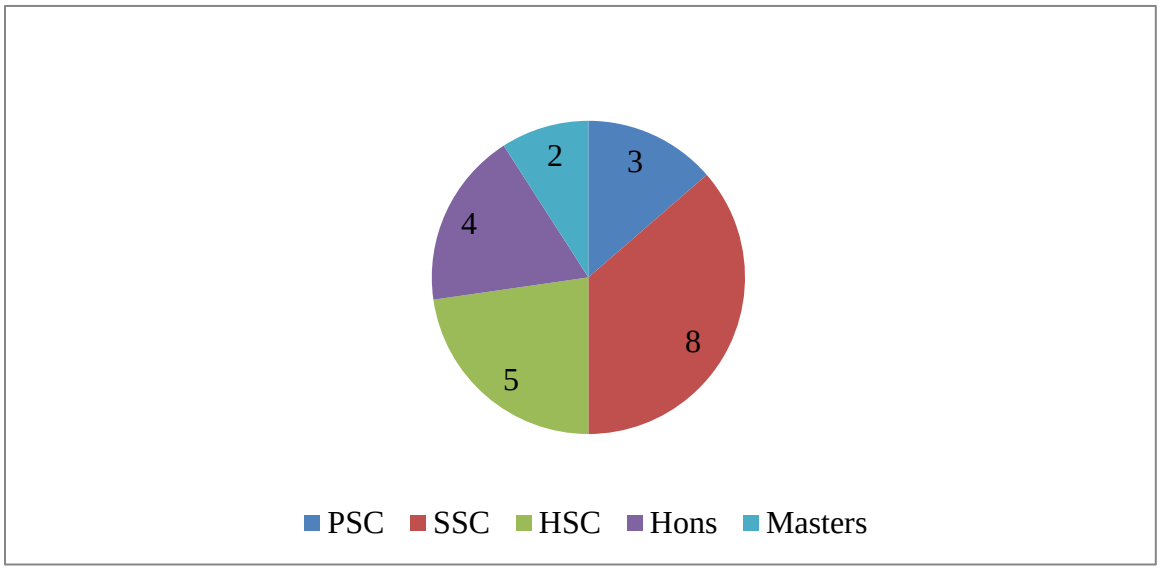

Figure2: educational status of participants

1.4. Marital status of patients:

In figure 3, 72.7% (n=8) are married in trial group and 81.8% (n=9) in control group where as 27.3% (n=3) are unmarried in trial group and 18.2% in control group.

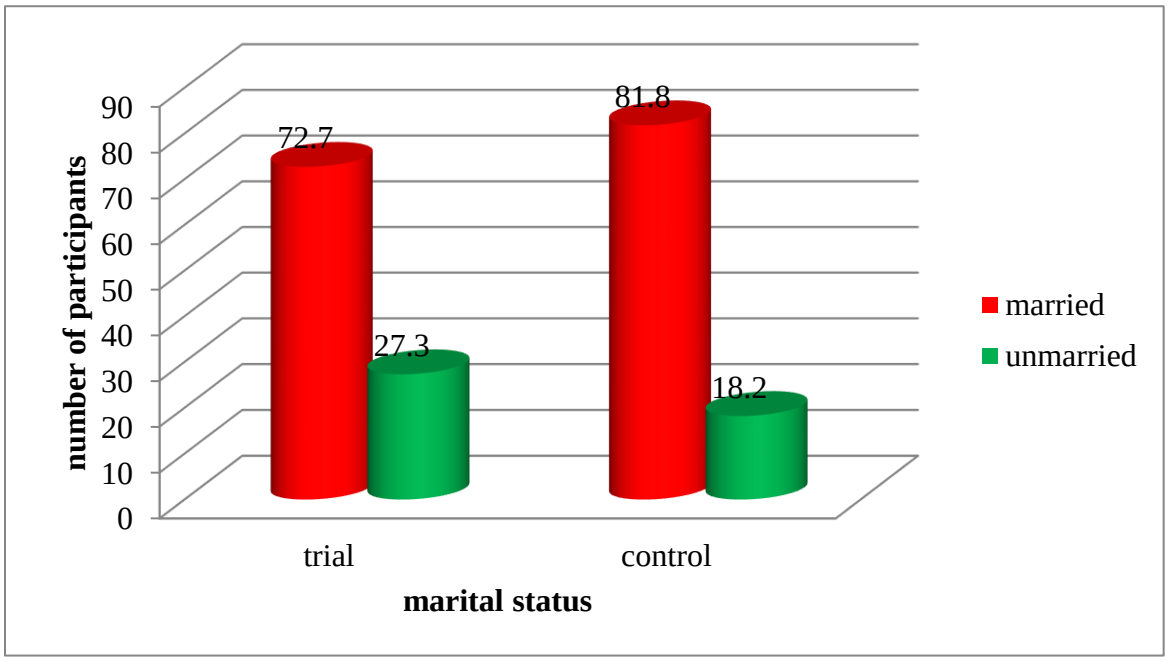

Figure 3: marital status of participants

1.5. BMI of the participants

Among 11 participants in the trial group, no participant was underweight, 9 participants (81.82%) is in normal weight, no participants were in overweight and 2 participant (18.18%).s were obese. In contrast, among 11 participants in the control group, one participant (9.9%) was underweight, 9 (81.82%) was in normal weight as well as overweight range is 9.9% and no participant was obese (figure-4).

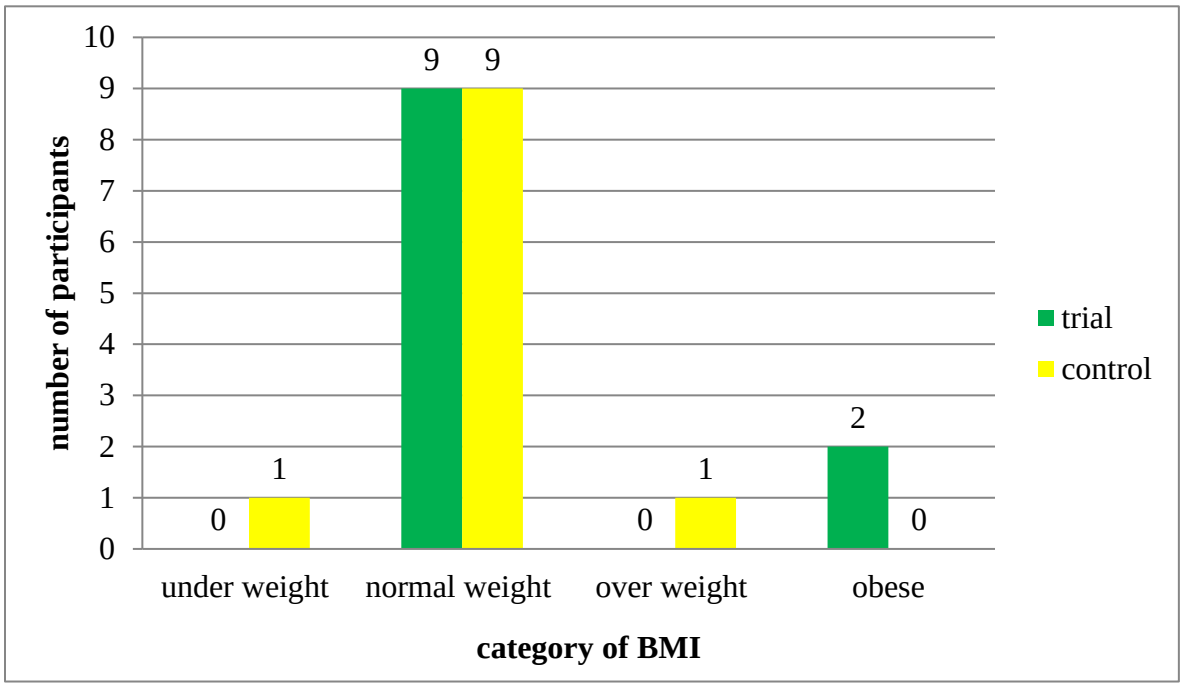

Figure 4: BMI among trial and control group participants

2. Medical related information

2.1. Diabetes mellitus among participants

In figure 5showed that among 11 participants of trial group, 9.1% (n=1) had been suffering from diabetes, 90.9% (n=10) did not have diabetes. On the other hand, among 11 participants of control group, 27.3% (n=3) were aware about their diabetes, 72.7% (n=8) did not have diabetes.

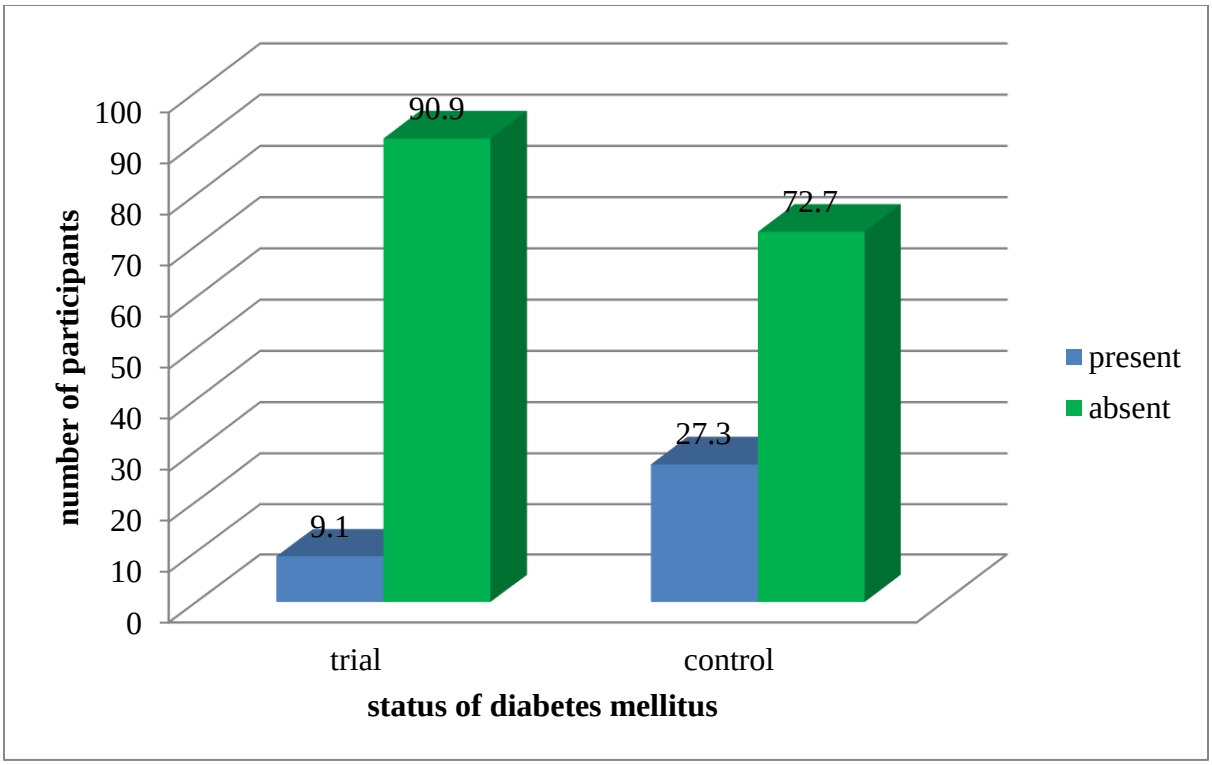

Figure 5: status of diabetes mellitus among trial and control group participants

2.2. Hypertension among of participants

Among 11 participants of trial group, 36.4% (n=4) have been suffering from hypertension, 63.6% (n=7) did not have hypertension. On the other hand, among 11 participants of control group, 28.57% (n=4) were aware about their hypertension, 18.2% (n=2) have hypertension and 81.8% (n=7) did not have hypertension (figure-6)

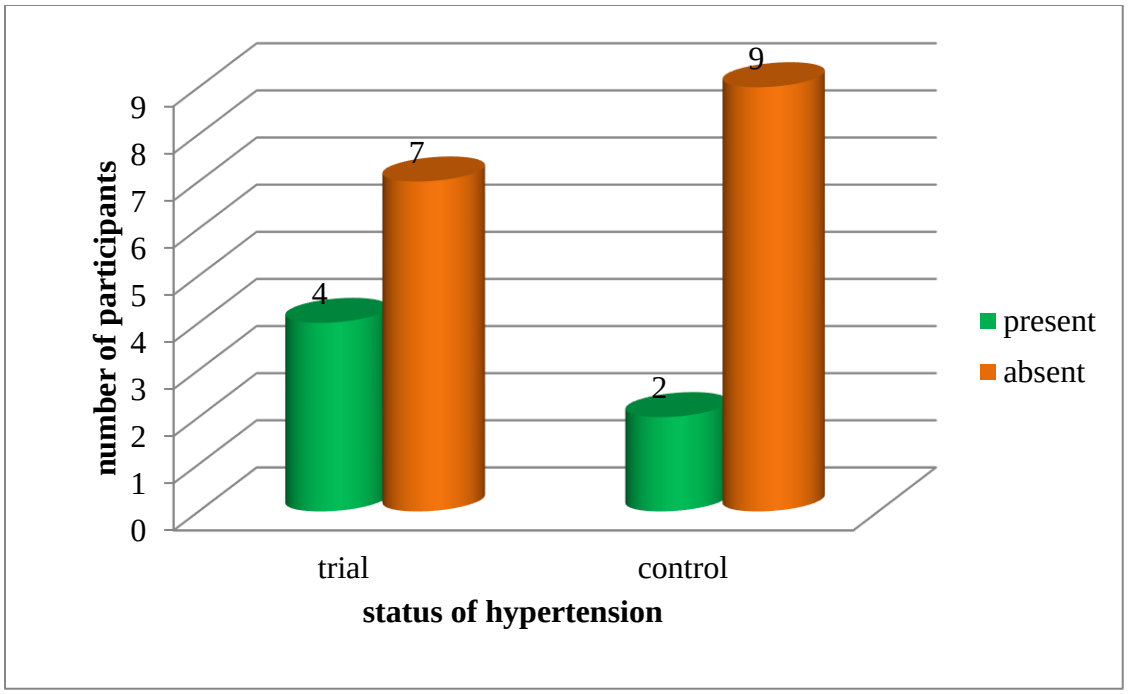

Figure 6: status of hypertension among trial and control group participants

3. Pain related information:

3.1. Causes of pain among category of participants

Among 11 participants of trial group 36.4% (n=4) have neck pain due to traumatic cause and 63.6% (n=7) due to nontraumatic cause. On the other hand, in the control group, 9.1 (n= 1) have traumatic cause and 90.9% (n=10) have non traumatic cause (figure-7)

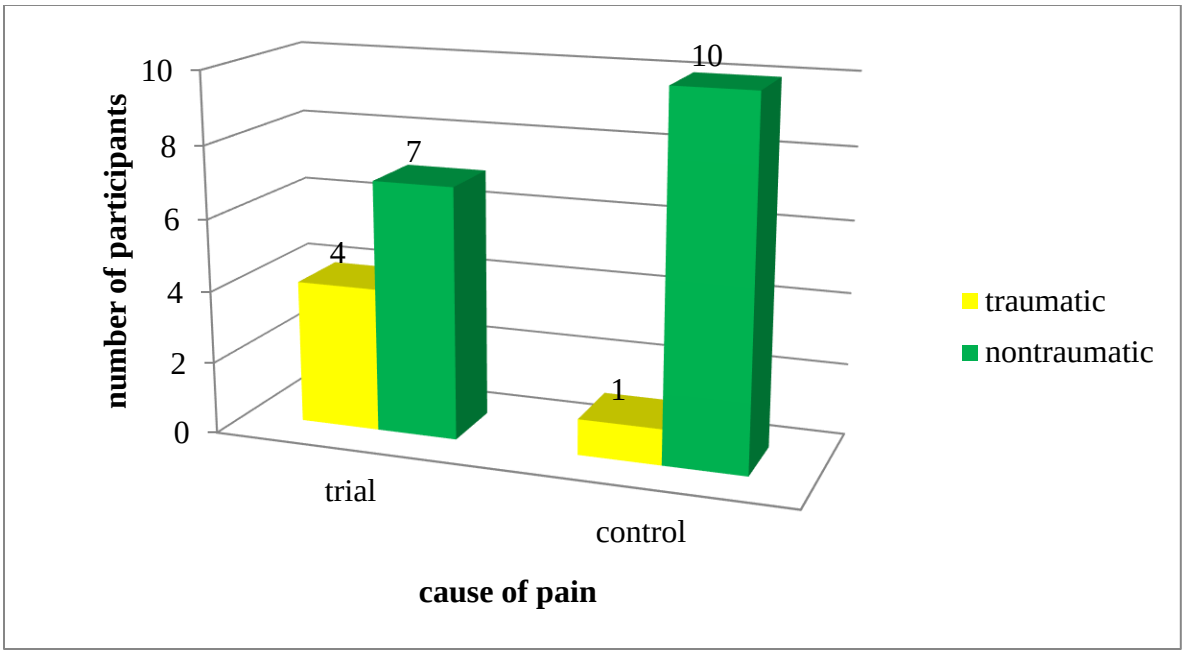

Figure 7: cause of pain

3.2. Area of pain:

Location	Trial group	Control group
Neck pain	45.5	18.2
Neck pain radiate to right shoulder	27.3	36.4
Neck pain radiate to left shoulder	27.3	45.5
Total	100	100

Table 3 described that among 22 participants, 45.5% (n=5) participants in trial group and 18.2% (n=2) participants of control group have pain only in neck. 27.3% (n=3) participants of trial group and 36.4% (n=4) participants of control group pain radiate to right shoulder. In addition, 27.3% (n=3) of trial and 45.5% (n=5) of control group have pain which radiate to left shoulder.

3.3. Duration of pain

Among 11 participants in trial group 9.1% (n=1) had worse pain at morning, 54.5% (n=6) had as the day progress, 18.2% (n=2) at evening, 18.2% (n=2) at night. Besides, among 11 participants in control group, 0% at morning, 72.7%% (n=8) had as the day progress, 7.1% (n=1) at evening, no one 18.2% (n=2) had worse pain at night (figure-8).

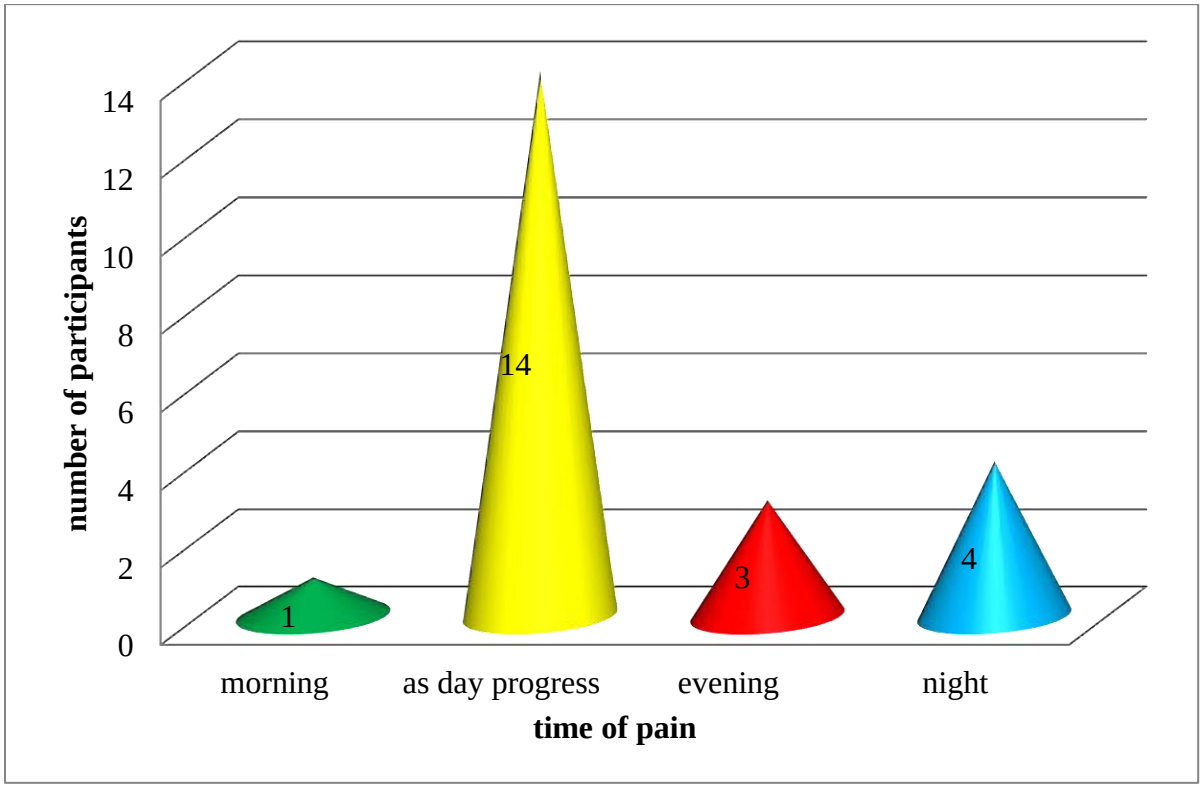

Figure 8: most consistent duration of pain

3.4. Exaggerate of pain

Movement	Trial group	Control group
Neck forward bending	27.3	0
Neck backward bending	18.2	9.1
Neck turning to right	9.1	27.3
Neck turning to left	27.3	36.4
Raising from lying	18.2	27.3
Raising from sitting	0	0

Table 4 described that among 22 participants, 0 in control and 27.3% in trial group neck forward bending movement exaggerated pain, 3 participants (2 in trial and 1 in control) neck backward bending, 4 participant (3 in control and 1 in trial) neck turning to right, 7 participants (4 in control and 3 in trial) neck turning to left and 5 participants (3 in control and 2 in trial) raising from lying, 0 participants raising from sitting exaggerated pain.

3.5. Movement that relieve pain:

Among 22 participants, 3 participants (1 in control and 2 in trial) neck forward bending movement relieved pain, 7 participants (5 in trial and 2 in control) neck backward bending, 8 participant (5 in control and 3 in trial) neck turning to right, 2 participants (2 in control and 0 in trial) neck turning to left and 1 participants (1 in control and 0 in trial) raising from lying, 1 participants of trial group raising from sitting relieved pain (figure-9).

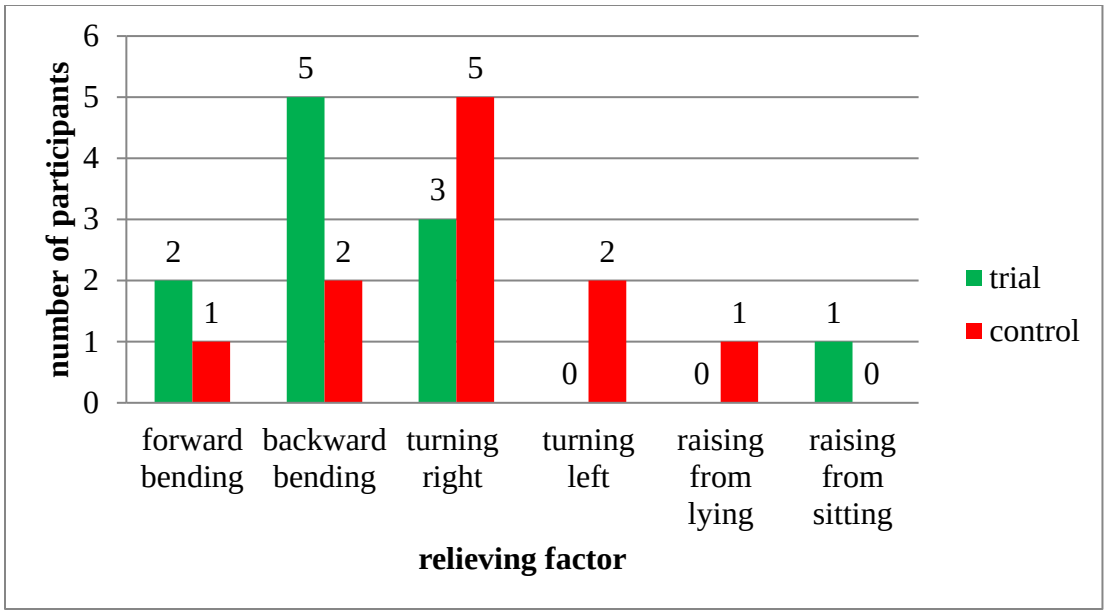

Figure 9: most relieved movement

3.6. Pretest and posttest score of patient rated pain (cm) in general:

Serial no of trial group	Pretest	Posttest	Difference	Serial no of control group	Pretest	Posttest	Difference
T1	8	6	4	C1	5	3	1
T2	7	5	4	C2	5	4	1
T3	6	5	4	C3	5	4	2
T4	7	4	4	C4	6	4	1
T5	8	5	4	C5	7	6	3
T6	6	5	3	C6	6	4	3
T7	8	5	3	C7	5	3	3
T8	7	5	5	C8	6	5	2
T9	8	6	4	C9	5	4	2
T10	7	5	2	C10	6	4	1
T11	8	5	4	C11	5	3	3
Mean	7.27	5.09	3.73	Mean	5.55	4.00	2.00

Table 5 demonstrated the level of pretest and posttest pain score between trial and control group. Mean pretest pain score was 7.27 cm and posttest was 5.09 cm with a mean difference of 3.73 cm in the trial group. In contrast, the mean pretest pain score of the control group was 5.55 cm and posttest was 4.00 cm with a mean difference of 2.00 cm. In this part, data analysis was done using U test as numerical pain rating scale was regarded as non-parametric scale and there was two different groups. Conversely, the effectiveness of trial group treatment as well as control group treatment was analyzed by Wilcoxon signed- rank test (within group analysis).

3.7. Patient rated general pain (cm) between trial and control group

Table 4.2.1: Rank and test statistics of patient rated general pain (cm) between trial and control group

	Category of participants	N	Mean of post test pain	Mean rank	Mann Whitney U score	P
Patient rated general pain	Trial	11	5.09	15.36	18	0.004
	control	11	4.00	7.64		

Table 6 showed that the calculated value of U is 18 for pain in resting position and the table value of U for n1= 11 and n2= 11 is 22 for 0.004 in one tailed hypothesis. From the calculated value (U= 18), it is clear that U value between trial and control groups have an associated probability level which is equal to .004 (0.4%). Therefore, the result is significant for one tailed hypothesis. Since the p value is equal to 0.4%, the result is said to be significant and the null hypothesis (no relationship) is now can be rejected and the experimental hypothesis is supported.

This means that difference between trial group treatment (cervicothoracic stabilization exercise along with conventional physiotherapy) and control group treatment (conventional physiotherapy only) was significant i. e. improvement occur in the trial group were not same with control group. They differ significantly as trial group improvement was more than control group.

3.8. Patient rated pain in general within control group

Table 4.3.1: Rank and test statistics of patient rated general pain in control group

Pain at resting position (post)-pain at resting position(pre)	N	Mean rank	Sum of rank	Wilcoxon signed rank test based on Z	P
Negative rank	11	6	66	-3.017	0.003
Positive rank	0	.00	.00		
Ties	0				
Total	11				

Table 7 described the comparison of participant's before (pre) and after (post) pain score. The table's legend showed that any participants did not have increased pain after application of conventional physiotherapy. 11 participants had higher pain score before application of conventional physiotherapy compare with after usual care. In addition, no participants had equal amount of pain before and after treatment in control group.

By examining the final test statistics portion of table by Wilcoxon signed-rank test it was discovered that control group for 3 weeks, twice weekly usual care treatment course showed a statistically significant change in neck pain among individuals with chronic neck pain ($Z= -2.94$, $p= 0.003$).

3.8.1. Patient rated pain in general within trial group

Table 8: Rank and test statistics of patient rated general pain in trial group

Pain at resting position(post)-pain at resting position(pre)	N	Mean rank	Sum of rank	Wilcoxon signed rank test based on Z rank	P
Negative rank	11	6	66	-2.98	0.001
Positive rank	0	.00	.00		
Ties	0				
Total	11				

Table 8 described the date on the comparison of participants' before (pre) and after (post) pain score. The table's legend showed that any participants did not have increased pain after application of cervicothoracic exercise along with conventional physiotherapy (trial group). 11 participants had higher pain score before application of Cervicothoracic stabilization exercise combined with conventional physiotherapy compare with after same treatment. Conversely, no participants had equal amount of pain before and after treatment in trial group. By examining the final test statistics portion of table by Wilcoxon signed-rank test it was discovered that the trial group for 3 weeks, twice weekly CCE combined with usual care (trial group) treatment course showed a statistically significant change in neck pain among individuals with chronic neck pain ($Z= -2.98$, $p= 0.001$)

4.1. Cervical Spine Range of Motions (degree) in Pretest and Posttest Score of Trial and Control Group

Table 9: Cervical spine range of motions (ROM) (degree) at pretest and posttest level with mean difference

Movements		Pretest	Posttest	Mean difference		Pretest	Posttest	Mean difference
Flexion		28.82	37.36	8.54		28	31.82	3.82
Extension		28.64	35.45	6.81		33.64	37.00	3.36
Right side flexion	Trial group	31.55	37.91	6.36	Control group	30.18	33.36	3.21
Left side flexion		29.91	37.18	7.27		32.27	35.71	3.44
Right side rotation		35.73	43.18	7.45		39.27	44.09	4.82
Left side rotation		36.07	44.09	8.02		40.27	44.36	4.09

Table 9 showed mean differences of cervical range of motion (degree) between trial and control group. In addition, each type of movements showed higher mean difference in trial group compared with control group.

4.1.1. Pretest and posttest range of motion in trial group:

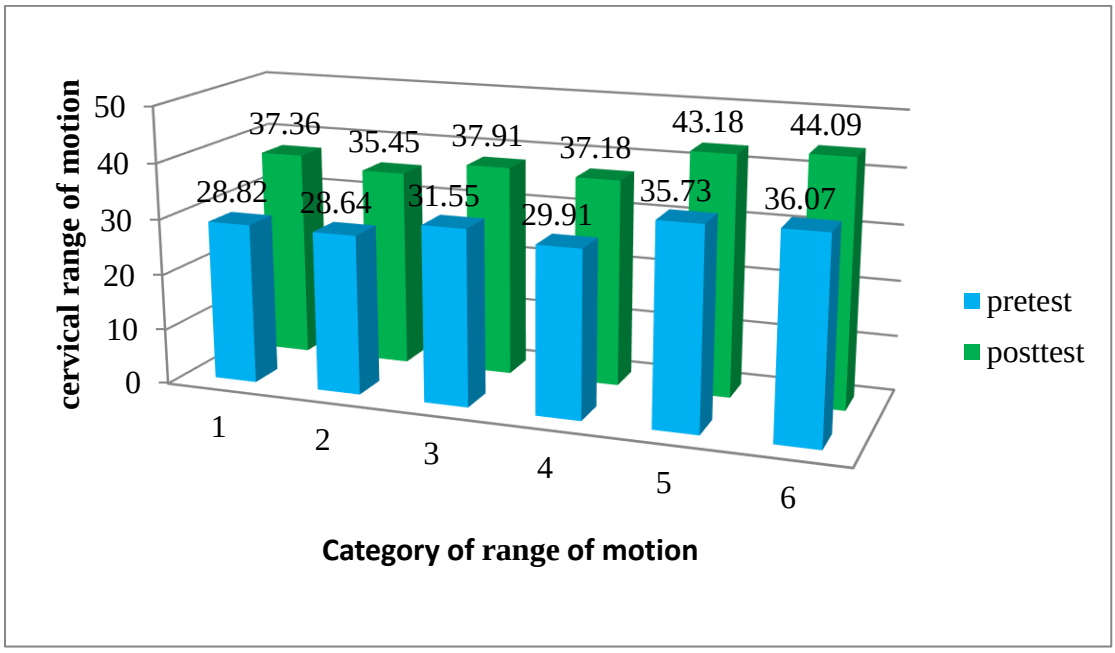

Figure 10: pretest and post test comparison of cervical range of motion in trial group

4.1.1. Pretest and posttest range of motion in control grou :

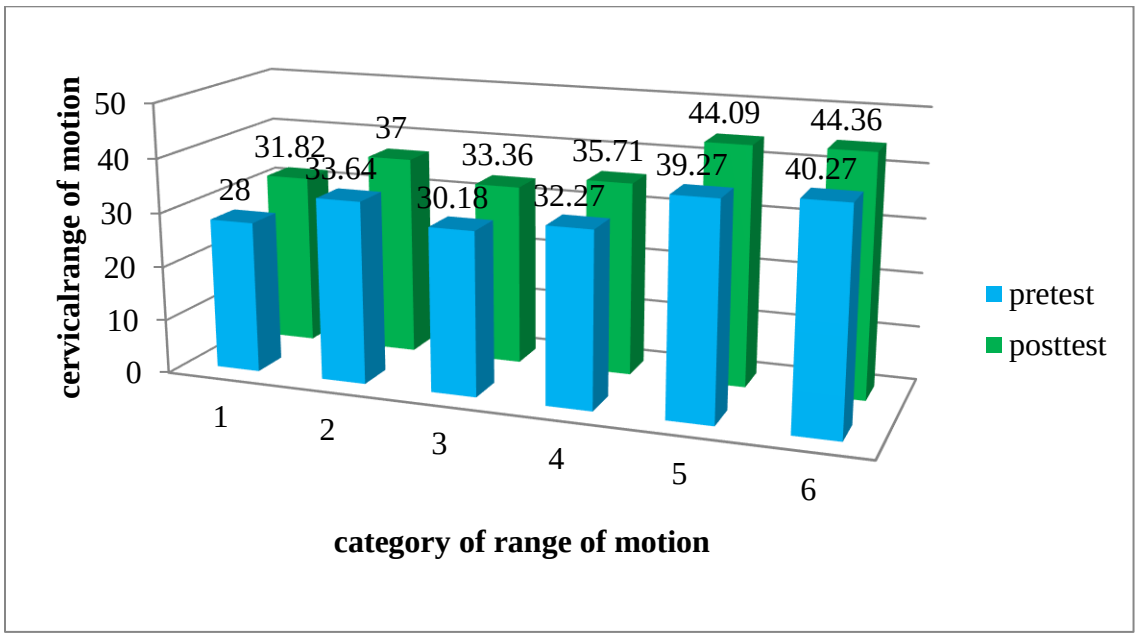

Figure 11: pretest and post test comparison of cervical range of motion in control group

4.2. Flexion of cervical spine between trial and control group

Table 10: Statistical outcome of flexion (degree) between trial and control group

Difference between trial and control group (flexion)	Unpaired t	df	P
	3.869	4.75	0.001

Table 10 described that the calculated t value is 3.869 and for df= 4.75, This means that the probability of random error being responsible for the outcome of this experiment is 1 in 100. As the usual cut- off point for claiming support for the experimental hypothesis was 1% and it could be said that the result was not significant. Thus, cervicothoracic stabilization exercise along with conventional physiotherapy was more effective than only conventional physiotherapy among patients with chronic neck pain.

4.2.1. Flexion of cervical spine within trial and control group

Table 11: Statistical outcome of flexion (degree) within trial and control group

	Mean	Std. deviation	Paired t	df	P
Flexion of cervical spine in trial group	-8.54	3.110	-9.113	10	0.000
Flexion of cervical spine in control group	-3.818	1.079	-11.739	10	0.006

Table 11 showed that within group analysis of cervical flexion (degree), the improvement of ROM was highly significant and in fact in control group (p= 0.006) and trial group (p= 0.000).

4.2.1. Pretest and posttest flexion (degree) in trial group:

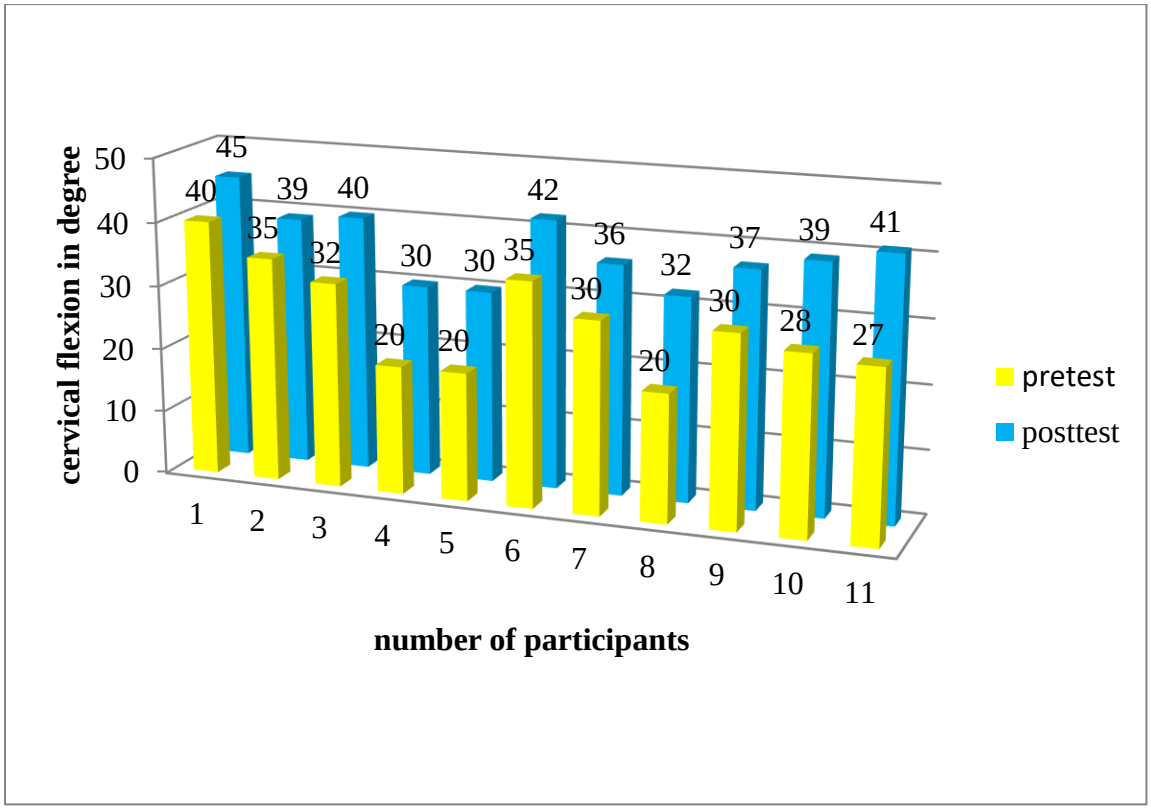

Figure 12: Pretest and posttest score comparison of flexion (degree) in trial group

4.2.2. Pretest and posttest flexion (degree) in control group:

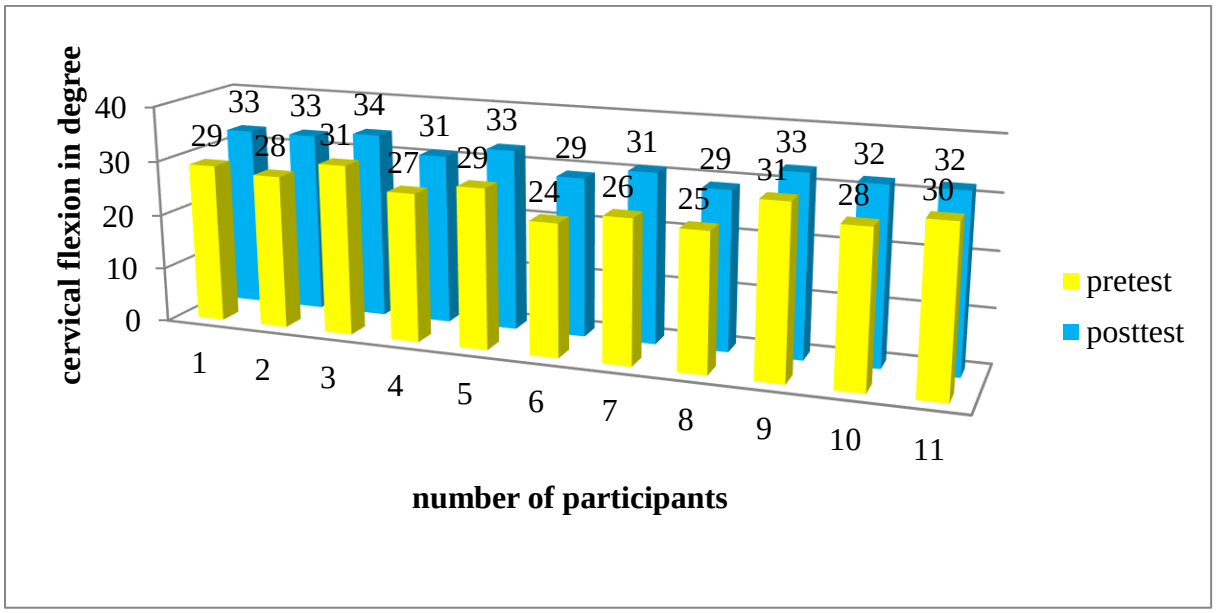

Figure 13: Pretest and posttest score comparison of flexion (degree) in control group

4.3.1. Extension of cervical spine between trial and control group

Table 12: Statistical outcome of extension (degree) between trial and control group

	Unpaired t	df	P
Difference between trial and control group	3.657	20	0.004

Table 12 showed that the calculated t value is 3.657 and for df= 20, This means that the probability of random error being responsible for the outcome of this experiment was 0.004 in 100. As the usual cut- off point for claiming support for the experimental hypothesis was 0.5% and it could be said that the result was significant. Thus, cervicothoracic stabilization along with conventional physiotherapy was effective than only conventional physiotherapy among patients with chronic neck pain.

4.3.2. Extension of cervical spine within control and trial group

Table 13: Statistical outcome of extension (degree) within trial and control group

	Mean	Std. deviation	Paired t	df	P
Extension of cervical spine in trial group	-6.818	2.676	-8.449	10	0.002
Extension of cervical spine in control group	-3.364	1.629	-6.847	10	0.000

Table 13 showed that within group analysis of cervical extension (degree), the improvement of was highly significant and in fact trial group (significance level= 0.002) and control group (significance level= 0.000).

4.3.3. Pretest and posttest extension (degree) in trial group:

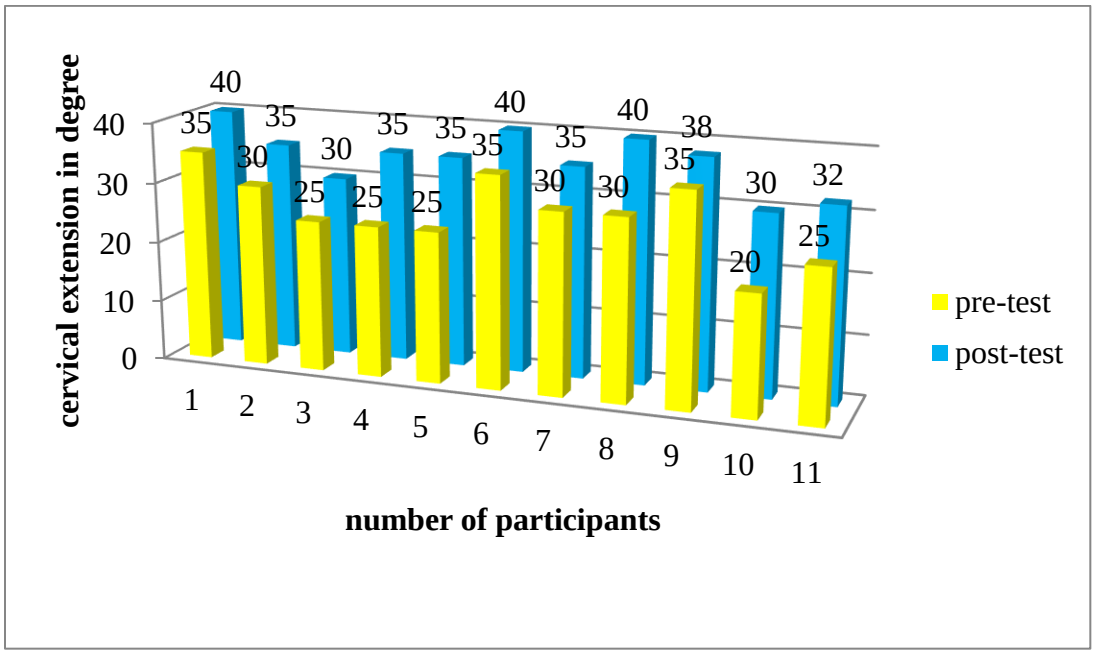

Figure 14: Pretest and posttest score comparison of extension (degree) in trial group

4.3.4. Pretest and posttest extension (degree) in control group:

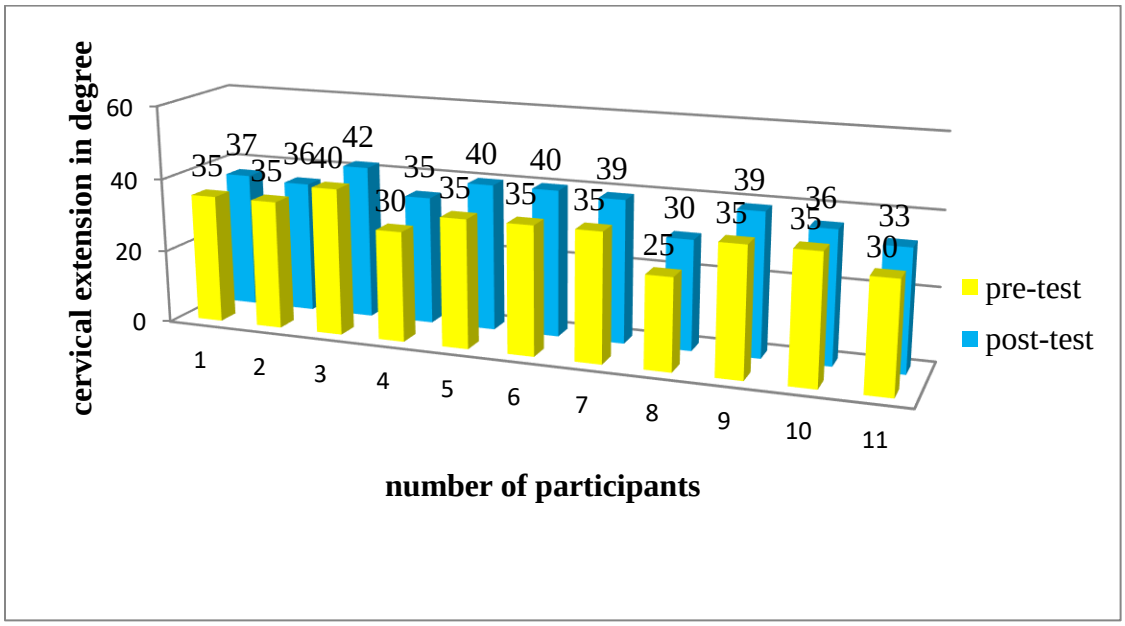

Figure 15: Pretest and posttest score comparison of extension (degree) in control group

4.4. Right Side flexion of cervical spine between trial and control group

Table 14: Statistical outcome of right side flexion (degree) between trial and control group

Difference between trial and control group in right side flexion	Unpaired t	df	P
	3.452	20	0.006

Table 14 showed that the calculated t value is 3.452 and for df= 20, has an associated significance level of 0.006%. This means that the probability of random error being responsible for the outcome of this experiment was 0.006 in 100. As the usual cut- off point for claiming support for the experimental hypothesis was 0.006% and it could be said that the result was significant. Thus, cervicothoracic exercise combined with conventional physiotherapy was not effective than usual care among patients with chronic neck pain.

4.4.1. Right Side flexion of cervical spine within control and trial group

Table 15: Statistical outcome of right side flexion (degree) within trial and control group

	mean	Std deviation	Paired t	df	P
Right side flexion of cervical spine in trial group	-6.364	2.541	-8.307	10	0.000
Right side flexion of cervical spine in control group	-3.182	1.250	-8.439	10	0.004

Table 15 showed that within group analysis of right side flexion (degree) of cervical spine, the improvement of ROM was highly significant and in fact control group (p= 0.004) and trial group (p= 0.000).

4.4.2Pretest and posttest right side flexion (degree) in trial group

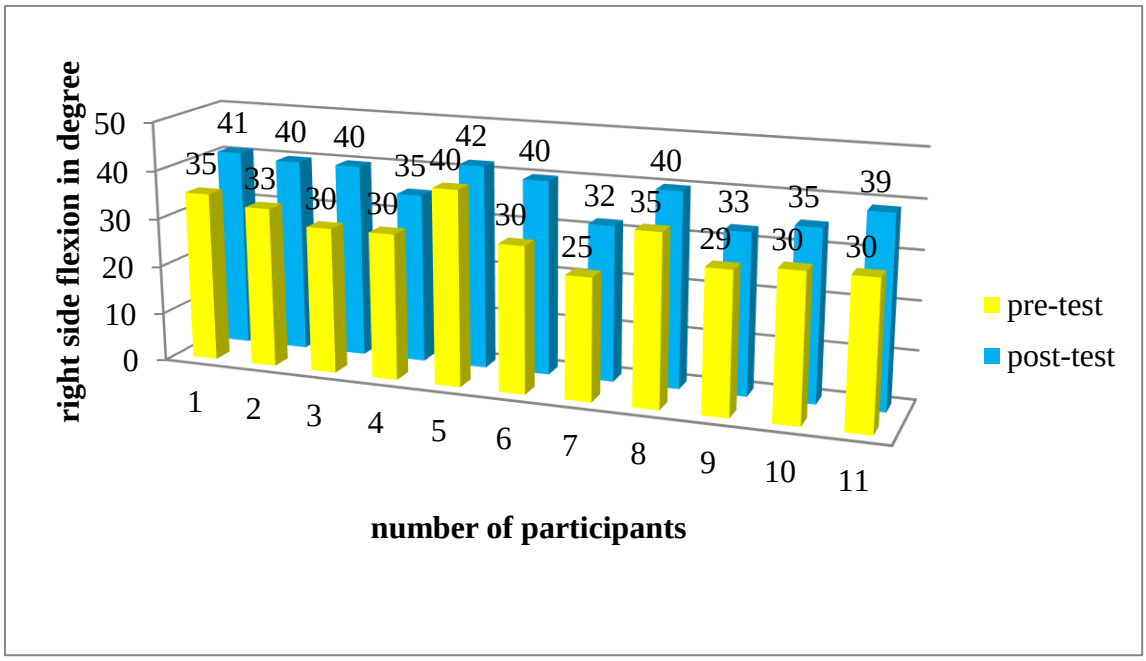

Figure 16: pretest and posttest score in comparison of right side flexion in trial group

Pre test and posttest right side flexion in control group:

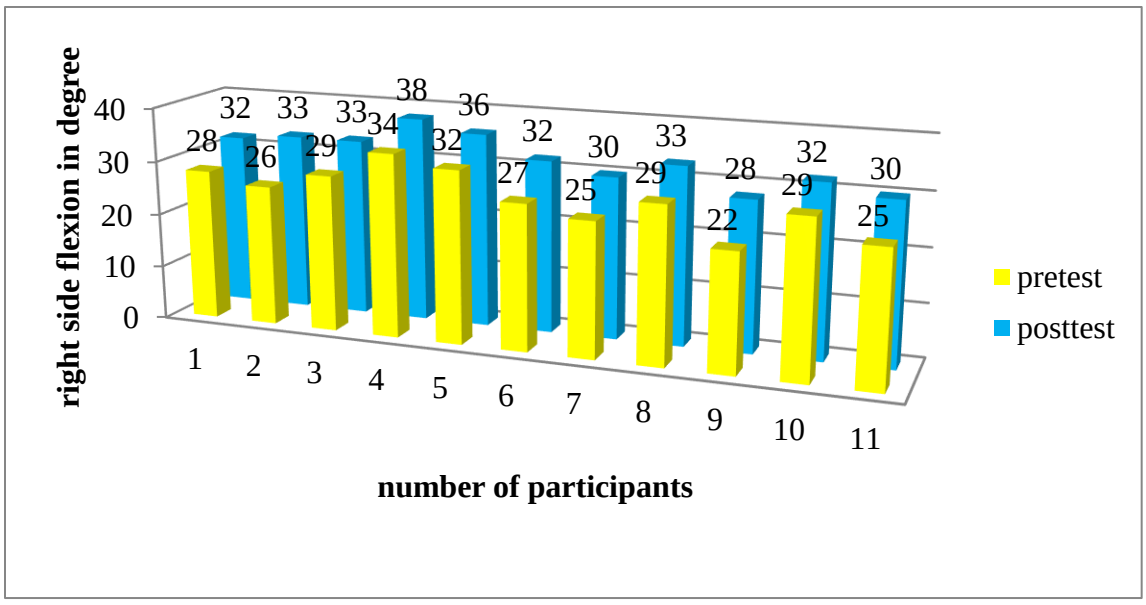

Figure 17: pretest and post test score in comparison of right side flexion in control group

4.5. Left Side flexion of cervical spine between trial and control group

Table 16: Statistical outcome of left side flexion (degree) between trial and control group

Difference between trial and control group in left side flexion	Unpaired t	df	P
	3.471	20	0.004

Table 16 described that the calculated t value is 3.471 and for df= 20, has an associated significant level of 0.004%. This means that the probability of random error being responsible for the outcome of this experiment was 0.04 in 100. As the usual cut- off point for claiming support for the experimental hypothesis was 0.04% and it could be said that the result was significant. Thus, cervicothoracic stabilization exercise was effective than only conventional physiotherapy among patients with chronic neck pain.

4.5.1. Left side flexion of cervical spine within control and trial group

Table 17: Statistical outcome of left side flexion (degree) within trial and control group

	Mean	Std deviation	Paired t	df	P
Left side flexion of cervical spine (trial)	-7.273	3.259	-7.402	10	0.000
Left side flexion of cervical spine (control)	-3.636	1.206	-10.00	10	0.000

Table 17 proved that within group analysis of left side flexion (degree), the improvement was highly significant and in fact control group (p= 0.000) and trial group (p= 0.000).

4.5.2. Pre and posttest left side flexion in trial group

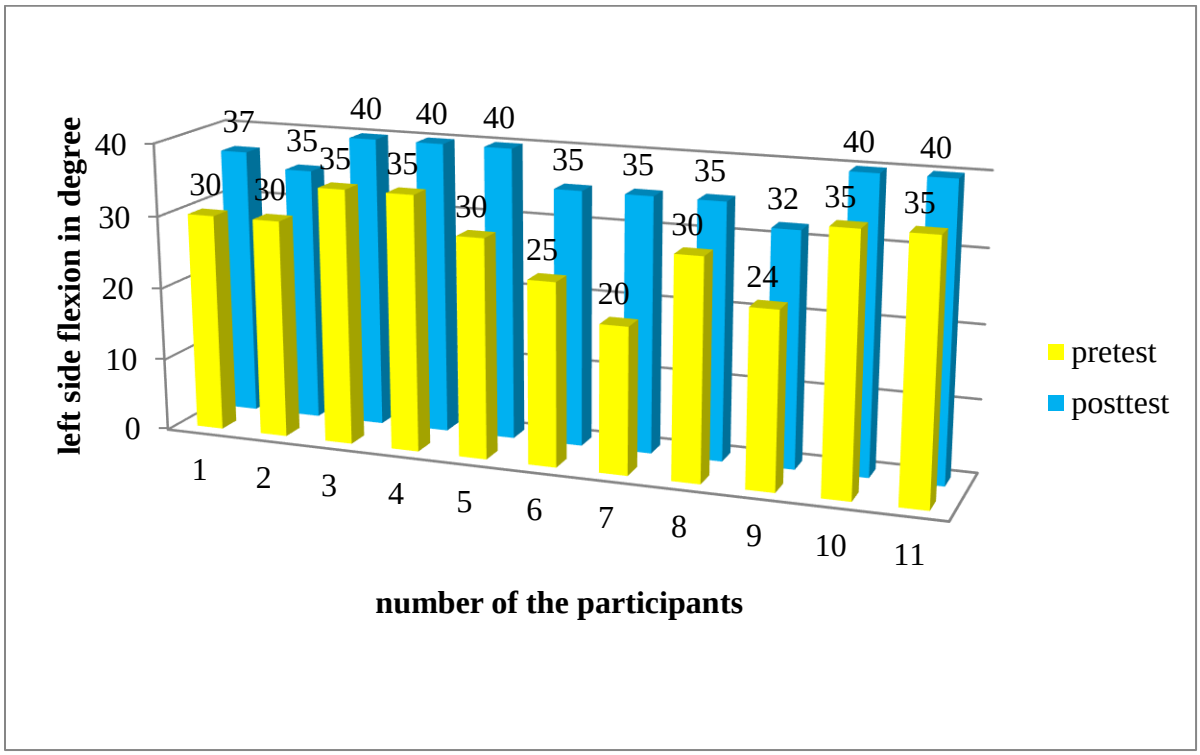

Figure 18: pretest and posttest score in comparison of left side flexion in trial group

4.5.3. Pre and posttest left side flexion in control group

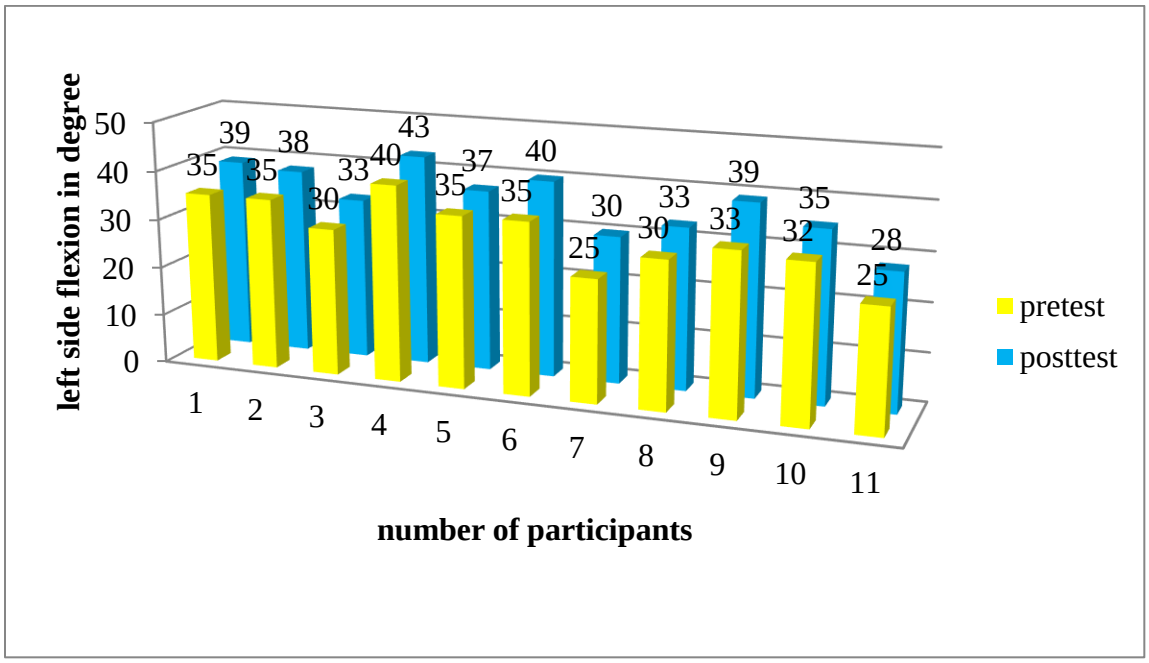

Figure 19: pretest and posttest score of comparison of left side flexion in control group

4.6. Right side rotation of cervical spine between trial and control group

Table 18: Statistical outcome of right side rotation (degree) between trial and control group

Difference between trial and control group in right side rotation	Unpaired t	df	P
	2.02	20	0.056

Table 18 showed that the calculated t value is 2.636 and for df= 20, has an associated probability level of 0.05%. This means that the probability of random error being responsible for the outcome of this experiment was 0.05 in 100. As the usual cut- off point for claiming support for the experimental hypothesis was 0.05% and it could be

said that the result was not significant. Thus, cervicothoracic stabilization exercise combined with conventional physiotherapy was not effective than conventional physiotherapy here among patients with chronic neck pain

4.6.1. Right Side flexion of cervical spine within trial and control group

Table 19: Statistical outcome of right side flexion (degree) within trial and control group

	Mean	Std deviation	Paired t	df	P
Right side flexion of cervical spine(trial)	-7.455	3.778	-6.544	10	0.002
Right side flexion of cervical spine(control)	-4.818	2.089	-7.650	10	0.004

Table 19 showed that within group analysis of right side flexion (degree) of cervical spine, the improvement of ROM was highly significant and in fact control group (p= 0.004) and trial group (p= 0.002).

4.6.2. Pre and posttest of right side rotation in trial group

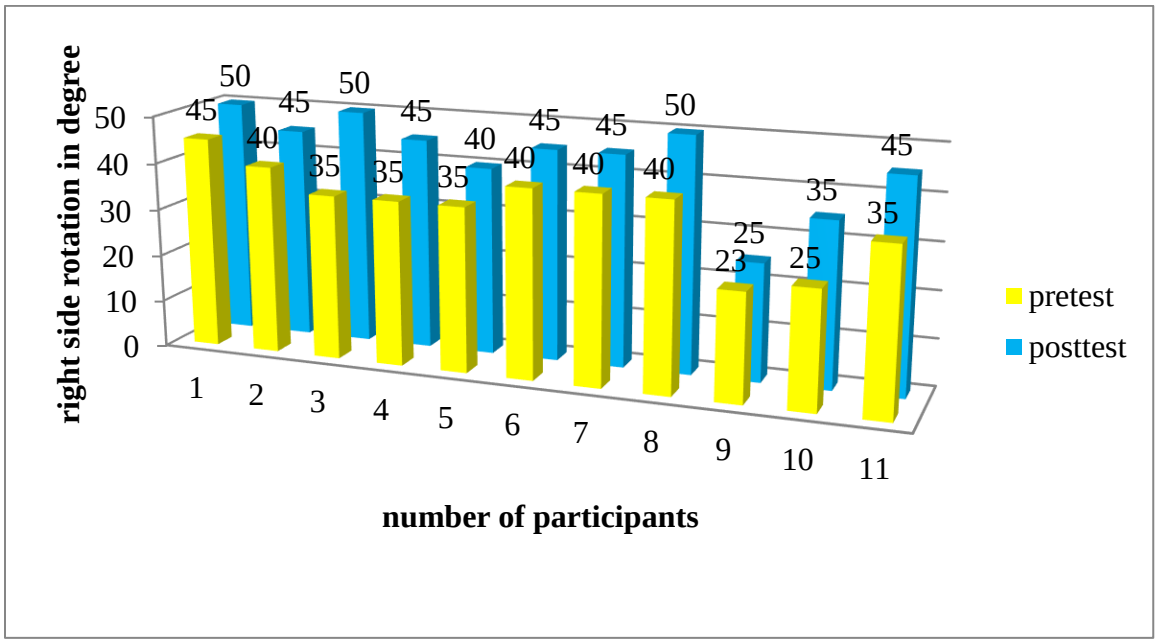

Figure 20: pretest and posttest score of comparison of right side rotation in trial group

4.6.3. Pre and posttest of right side rotation in control group

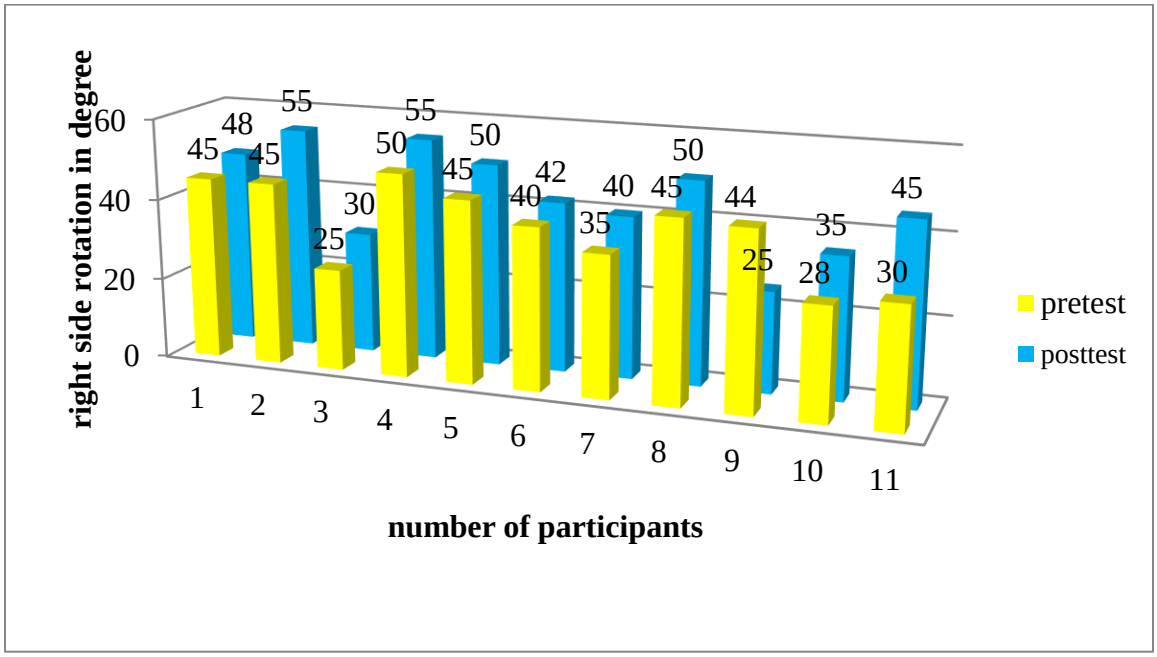

Figure 21: pretest and posttest score of comparison of right side rotation in control group

4.7. Left Side rotation of cervical spine between trial and control group

Table 20: Statistical outcome of left side rotation (degree) between trial and control group

Difference between trial and control group in left side rotation	Unpaired t	df	P
	3.476	20	0.002

Table 20 described that the calculated t value is 3.476 and for df= 20, has an associated probability level of 0.002%. This means that the probability of random error being responsible for the outcome of this experiment was 0.002 in 100. As the usual cut- off point for claiming support for the experimental hypothesis was 0.002% and it could be said that the result was significant. Thus, cervicothoracic stabilization exercise along with conventional physiotherapy was effective than conventional physiotherapy among patients with chronic neck pain

4.7.1. Left side rotation of cervical spine within control and trial group

Table 21: Statistical outcome of left side rotation (degree) within trial and control group

	Mean	Std deviation	Paired t	df	P
Left side rotation of cervical spine (trial)	-7.818	2.523	-10.279	10	0.000
Left side rotation of cervical spine (control)	-4.636	1.690	-9.101	10	0.000

Table 21 showed that within group analysis of left side rotation (degree), the improvement was highly significant and in fact, control group (p= 0.000) and trial group (p= 0.000).

4.7.2. Pre and posttest of left side rotation in trial group:

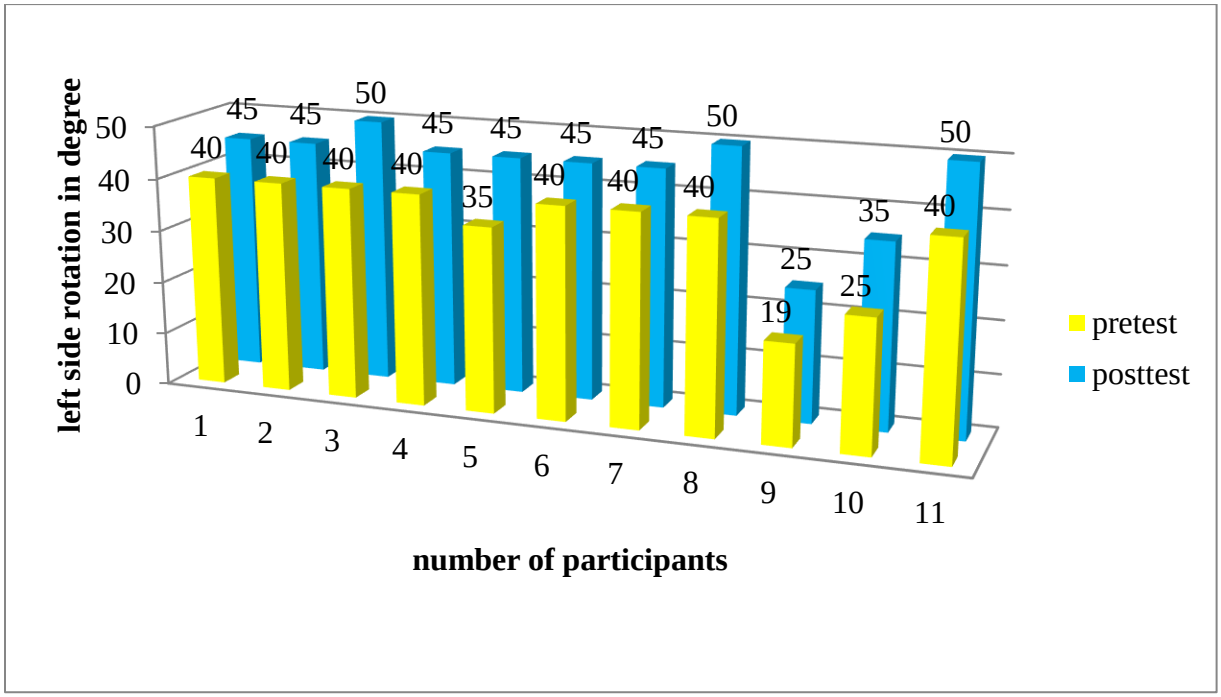

Figure 22: pretest and posttest score of comparison of left side rotation in trial group

4.7.3. Pre and posttest of left side rotation in control group:

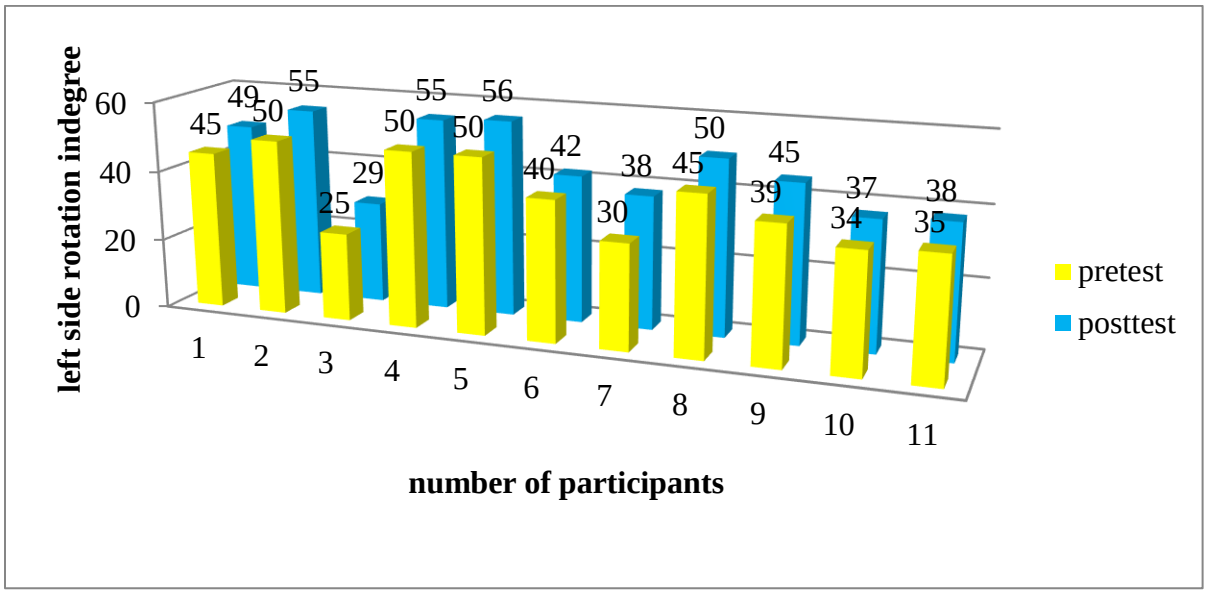

Figure 23: pretest and posttest score of comparison of left side rotation in control group

5. Cervical Spine Muscle Strength (OXFORD GRADE) in Pretest and Posttest Score of Trial and Control Group

Table 22: Mean pretest and posttest changes of muscle strength (manual muscle testing score) of cervical spine between trial and control group

Cervical muscle		Pretest	Posttest	Mean		Pretest	Posttest	Mean
Flexor		13.68	15.77	2.09		9.32	7.23	2.09
Extensor		14.00	16.45	2.45		9.00	6.55	2.45
Right side flexor		16.18	17.00	.82		6.82	6.00	.82
Leftside flexor	Trial	16.32	17.00	.68	Control	6.68	6.00	.68
Rightsiderotator	group	14.23	15.45	1.22	group	8.77	6.55	2.22
Leftside rotator		16.36	16.64	.28		6.64	6.36	.28

Table 22 showed mean differences of cervical muscle strength (manual muscle testing by OXFORD muscle grade scale) between trial and control group. In addition, each muscle group showed higher mean difference in trial group compared to control group.

5.1. Cervical spine flexor muscle strength between trial and control group

Table 23: Rank and test statistics of cervical flexor muscle strength between trial and control group

Difference between trial and control group in cervical spine flexor strength	Category of participants	N	Mean of posttest flexor	Mean rank	Mann – Whitney U score	P
	Trial group	11	3.82	15.77	13.50	0.001
	Control group	11	2.82	7.23		

Table 23 described that the calculated value of U is 13.50 for flexor muscle strength and the table value of U for n1= 11 and n2= 11 is 61 for 0.05 in one tailed hypothesis. From the calculated value (U= 13.50), it is clear that U value between trial and control groups did not have an associated probability level which was more than 0.05. Therefore, the result was not significant for one tailed hypothesis. Since the p value was more than 5% the result was said to be not significant. This means that difference between trial group treatment (cervicothoracic stabilization exercise combined with conventional physiotherapy) and control group treatment (conventional physiotherapy only) was not significant.

5.1.1. Cervical spine flexor muscle strength within trial group

Table 24: Rank and test statistics of cervical flexor muscle strength within trial group

Flexor muscle strength (posttest) - Flexor muscle strength (pretest)	N	Mean rank	Sum of ranks	Wilcoxon signed rank test based on Z	P
Negative ranks	0	.00	.00	-3.017	0.006
Positive ranks	11	6.00	66.00		
Ties	0				
Total	11				

Table 24 described the grade on the comparison of participant's before (pre) and after (post) cervical flexor muscle strength score. The table's legend showed that any participants did not have decreased muscle strength after application of CTSE combined with conventional physiotherapy in trial group. In addition, 11 participants had higher muscle strength deficit score before application of CTSE combined with conventional physiotherapy compare with after application of CTSE combined with conventional physiotherapy. Besides, 11 participants had equal amount of muscle strength before and after treatment in trial group. By examining the final test statistics portion of table by Wilcoxon signed-rank test it was discovered that the control group for 3 weeks, twice weekly CTSE combiner with conventional physiotherapy treatment course showed a statistically significant change in cervical flexor muscle strength among individuals with chronic neck pain ($Z= -3.017$, $p= 0.006$).

5.1.2. Cervical spine flexor muscle strength within control group

Table 25: Rank and test statistics of cervical flexor muscle strength within control group

Flexor muscle strength (posttest) - Flexor muscle strength (pretest)	N	Mean rank	Sum of ranks	Wilcoxon signed rank test based on Z	P
Negative ranks	0	.00	.00	-3.207	0.002
Positive ranks	11	6.00	66.00		
Ties	0				
Total	11				

Table 25 described the grade on the comparison of participant's before (pre) and after (post) cervical flexor muscle strength score. The table's legend showed that any participants did not have decreased muscle strength after application of usual care. In addition, 11 participants had higher muscle strength deficit score before application of usual care compare with after conventional physiotherapy. Besides, 11 participants had equal amount of muscle strength before and after treatment in control group. By examining the final test statistics portion of table by Wilcoxon signed-rank test it was discovered that the control group for 3 weeks, twice weekly conventional physiotherapy treatment course showed a statistically significant change in cervical flexor muscle strength among individuals with chronic neck pain ($Z= -3.207$, $p= 0.002$).

5.2.2. Pre and posttest of flexor muscle strength in trial group:

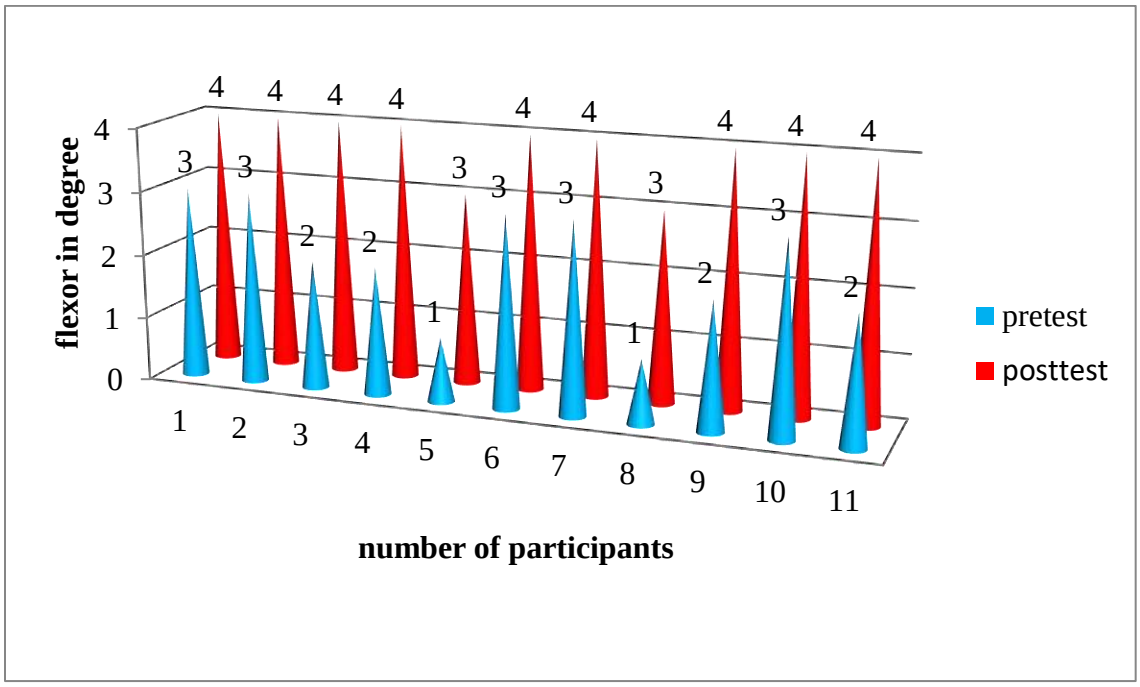

Figure 24: pretest and posttest score of comparison of flexor muscle in trial group

5.2.3Pretest and posttest of flexor muscle strength in control group

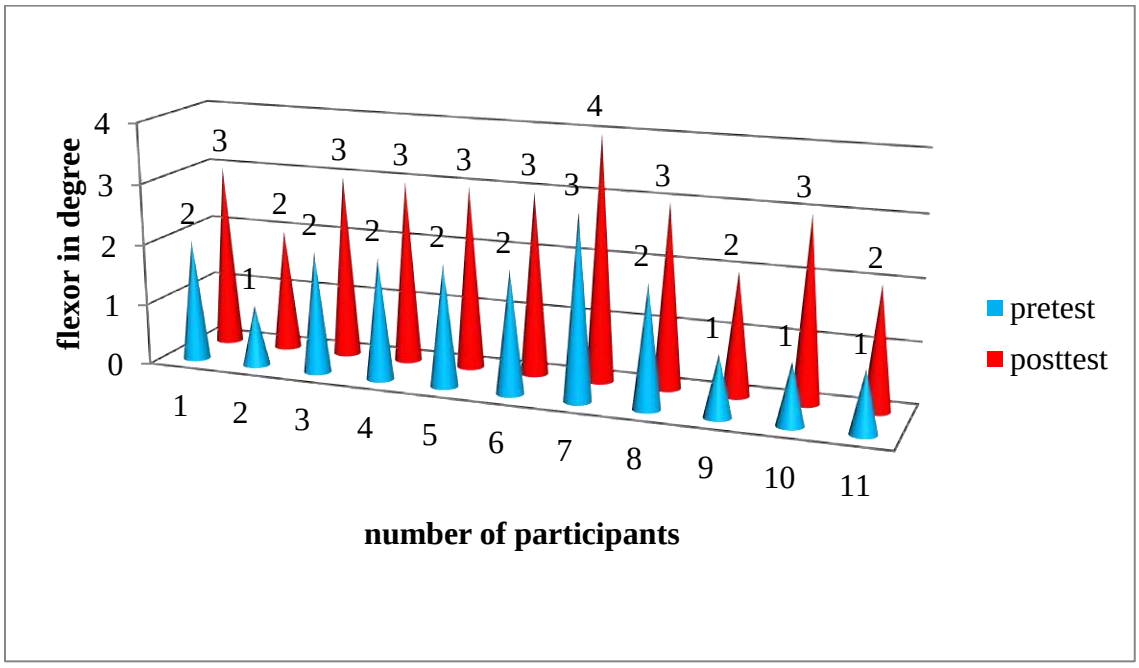

Figure 25: pretest and posttest score of comparison of flexor muscle in control group

5.3. Cervical spine extensor muscle strength between trial and control group

Table 26: Rank and test statistics of cervical extensor muscle strength between trial and control group

Difference between trial and control group in cervical spine extensor muscle strength	Category of participants	N	Mean of posttest extensor strength	Mean rank	Mann-Whitney U score	P
	Trial	11	3.41	16.45	6.00	0.002
	Control	11	4.27	6.55		

Table 26 showed that the calculated value of U is 6 for extensor muscle strength and the table value of U for n1= 11 and n2= 11 is 6 for 0.002 in one tailed hypothesis. From the calculated value (U= 6), it was clear that U value between trial and control groups had an associated probability level which was less than 0.05 (5%). Therefore, the result was significant for one tailed hypothesis. This means that difference between trial group treatment cervicothoracic stabilization exercise combined with conventional physiotherapy) and control group treatment (conventional physiotherapy only) was significant i. e. improvement occur in the trial group were not same. They differ significantly as trial group improvement was more than control group.

5.3.1. Cervical spine extensor muscle strength within trial group

Table 27: Rank and test statistics of cervical extensor muscle strength within trial group

Extensor of cervical spine (posttest) - Extensor of cervical spine (pretest)	N	Mean rank	Sum of ranks	Wilcoxon signed rank test based on Z	P
Negative ranks	0	.00	.00	-3.022	0.006
Positive ranks	11	6	66.00		
Ties	0				
Total	11				

Table 27 described the grade on the comparison of participant's before (pre) and after (post) cervical extensor muscle strength score in trial group. The table's legend showed that any participants did not have decreased muscle strength after application of CTSE combined with usual care. In addition, 11 participants had higher muscle strength deficit score before application of CTSE combined usual care. Besides, 3 participants had equal amount of muscle strength before and after treatment in trial group. By examining the final test statistics portion of table by Wilcoxon signed-rank test it was discovered that the trial group for 3 weeks, twice weekly CTSE combined with usual care treatment course showed a statistically significant change in cervical extensor muscle strength among individuals with chronic neck pain ($Z= -3.022$, $p= 0.006$).

5.3.2. Cervical spine extensor muscle strength within control group

Table 28: Rank and test statistics of cervical extensor muscle strength within control group

Extensor of cervical spine (posttest) - Extensor of cervical spine (pretest)	N	Mean rank	Sum of ranks	Wilcoxon signed rank test based on Z	P
Negative ranks	0	.00	.00	-3.317	0.002
Positive ranks	11	6	66.00		
Ties	0				
Total	11				

Table 28 described the grade on the comparison of participant's before (pre) and after (post) cervical extensor muscle strength score. The table's legend showed that any participants did not have decreased muscle strength after application of usual care. In addition, 11 participants had higher muscle strength deficit score before application of usual care compare with after usual care. By examining the final test statistics portion of table by Wilcoxon signed-rank test it was discovered that the control group for 3 weeks, twice weekly usual care treatment course showed a statistically significant change in cervical extensor muscle strength among individuals with chronic neck pain (Z= -3.317, p= 0.002).

5.3.3. Pre test and posttest extensor muscle strength in trial group

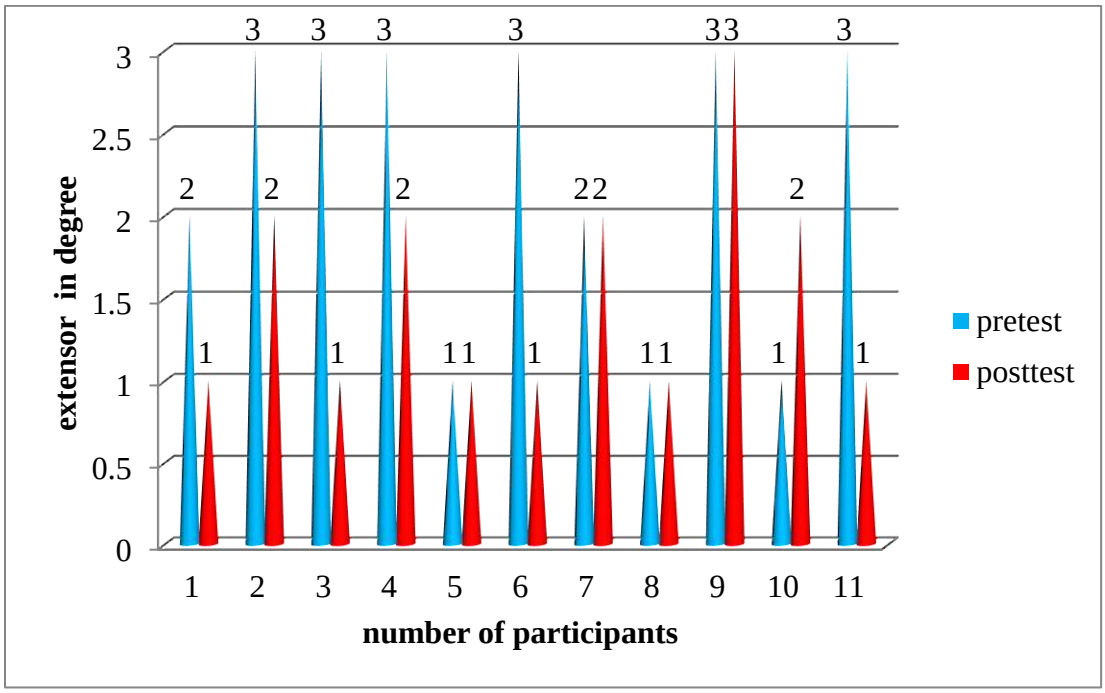

Figure 26: pretest and posttest score of comparison of extensor muscle in trial group

5.3.4. Pretest and posttest extensor muscle strength in control group

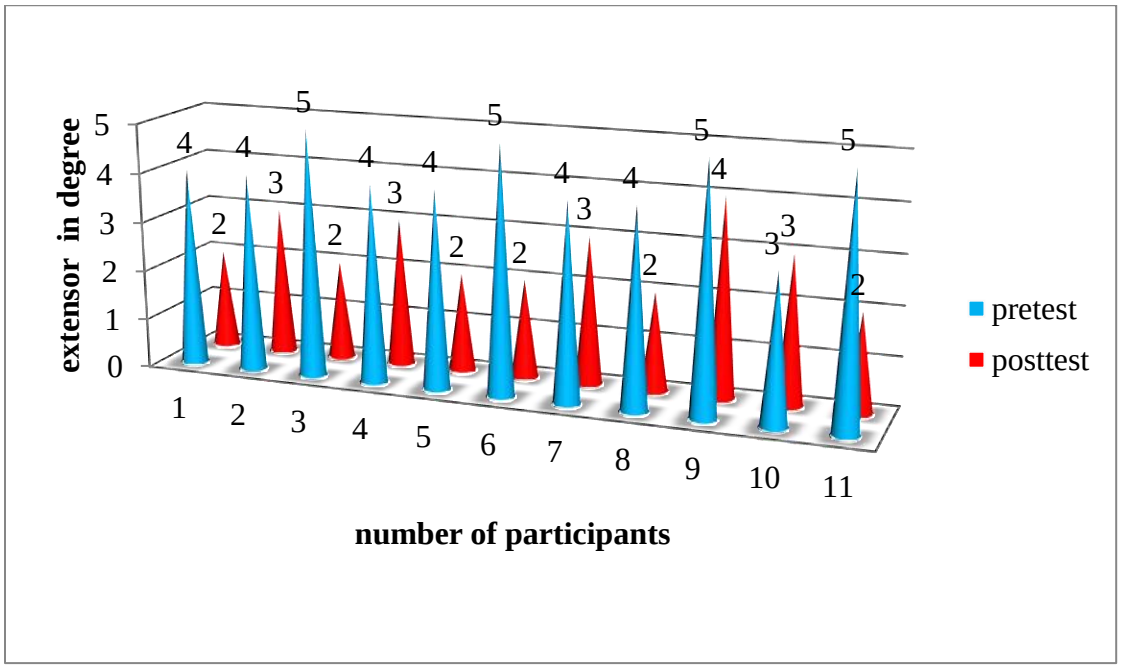

Figure 27: pretest and posttest score of comparison of extensor muscle in control group

5.6. Cervical spine right side flexor muscle strength between trial and control group

Table 29: Rank and test statistics of cervical right side flexor muscle strength between trial and control group

Difference between trial and control group in right Side flexor muscle strength	Category of participants	N	Mean of posttest right side flexor	Mean rank	Mann – Whitney U score	P
	Trial	11	3.50	17.00	0.000	0.000
	Control	11	3.41	6.00		

Table 29 described that the calculated value of U is 0 for side flexor (right) muscle strength and the table value of U for n1= 11 and n2= 11 is 0 for 0.000 in one tailed hypothesis. From the calculated value (U= 0), it was clear that U value between trial and control groups had an associated probability level which was less than 0.05 (5%). Therefore, the result was significant for one tailed hypothesis. This means that difference between trial group treatment (cervicothoracic stabilization exercise combined with conventional physiotherapy) and control group treatment (conventional physiotherapy only) was significant i. e. improvement occur in the trial group were not same. They differ significantly as trial group improvement was more than control group.

5.6.1. Cervical spine right side flexor muscle strength within trial group

Table 30: Rank and test statistics of cervical right side flexor muscle strength within trial group

Right side flexor of cervical spine (posttest) - Right side flexor of cervical spine (pretest)	N	Mean rank	Sum of ranks	Wilcoxon signed rank test based on Z	P
Negative ranks	0	.00	.00	-2.994	0.006
Positive ranks	11	6.00	66.00		
Ties	0				
Total	11				

Table 30 described the grade on the comparison of participant's before (pre) and after (post) cervical right side flexor muscle strength score. The table's legend showed that any participants did not have decreased muscle strength after application of CTSE combined with conventional physiotherapy. In addition, 11 participants had higher muscle strength deficit score before application of CTSE combined with conventional physiotherapy compare with after application of CTSE combined with conventional physiotherapy. By examining the final test statistics portion of table by Wilcoxon signed-rank test it was discovered that the trial group for 3 weeks, twice weekly CTSE combined with usual care treatment course showed a statistically significant change in cervical right side flexor muscle strength in individuals with chronic neck pain ($Z= -2.994$, $p= 0.006$).

5.6.2. Cervical spine right side flexor muscle strength within control group

Table 31: Rank and test statistics of cervical right side flexor muscle strength within control group

Right side flexor of cervical spine (posttest) - Right side flexor of cervical spine (pretest)	N	Mean rank	Sum of ranks	Wilcoxon signed rank test based on Z	P
Negative rank	0	.00	.00	-3.035	0.004
Positive rank	11	6	66.00		
Ties					
Total					

Table 31 described the grade on the comparison of participant's before (pre) and after (post) cervical right side flexor muscle strength score. The table's legend showed that any participants did not have decreased muscle strength after application of usual care. In addition, 11participants had higher muscle strength deficit score before application of usual care compare with after usual care. By examining the final test statistics portion of table by Wilcoxon signed-rank test it was discovered that the control group for 3 weeks, twice weekly usual care treatment course showed a statistically significant change in cervical right side flexor muscle strength among individuals with chronic neck pain (Z= -3.035, p= 0.004).

5.6.3. Pretest and posttest right side flexor in trial group

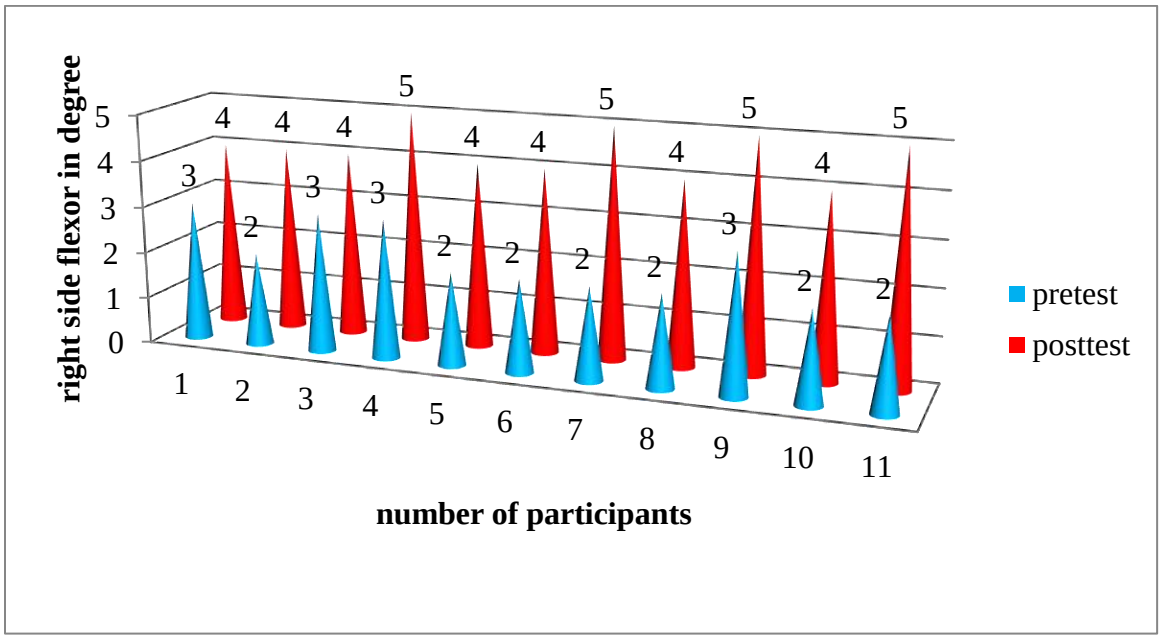

Figure 28: pretest and posttest score of comparison of right side flexor muscle in trial group

5.6.4. Pretest and posttest right side flexor in control group

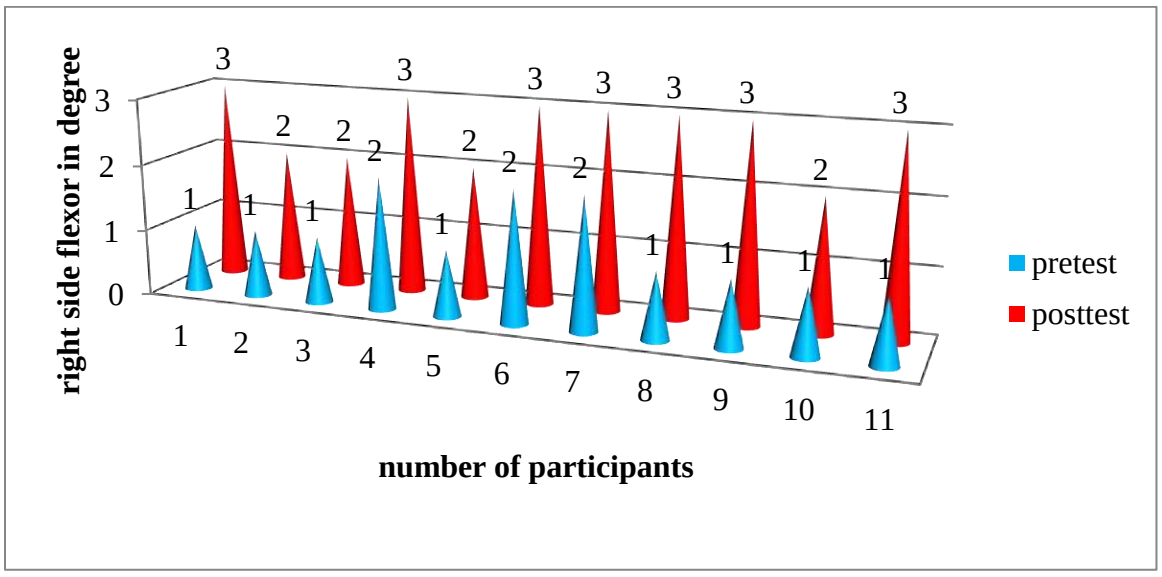

Figure 29: pretest and posttest score of comparison of right side flexor muscle in control group

5.7. Cervical spine left side flexor muscle strength between trial and control group

Table 32: Rank and test statistics of left side flexor muscle strength between trial and control group

Difference between trial and control group in cervical spine left side flexor muscle strength	Category of participants	N	Mean of posttest left Side flexor strength	Mean rank	Mann-Whitney U score	P
	Trial	11	4.27	17.00	.000	0.000
	Control	11	2.64	6.00		

Table 32 demonstrated that the calculated value of U is 0 for side flexor (left) muscle strength and the table value of U for n1= 11 and n2= 11 is 0 for 0.000 in one tailed hypothesis. From the calculated value (U= 0), it was clear that U value between trial and control groups had an associated probability level which was less than 0.05 (5%). Therefore, the result was significant for one tailed hypothesis. This means that difference between trial group treatment (cervicothoracic stabilization exercise combined with conventional physiotherapy) and control group treatment (conventional physiotherapyonly) was significant i. e. improvement occur in the trial group were not same. They differ significantly as trial group improvement was more than control group.

5.7.1. Cervical spine left side flexor muscle strength within trial group

Table 33: Rank and test statistics of left side flexor muscle strength within trial group

left side flexor of cervical spine (posttest) - left side flexor of cervical spine (pretest)	N	Mean rank	Sum of rank	Wilcoxon signed rank test based on Z	P
Negative rank	0	.00	.00	-3.035	0.004
Positive rank	11	6.00	66.00		
Ties	0				
Total	11				

Table 33 described the grade on the comparison of participant's before (pre) and after (post) cervical left side flexor muscle strength score. The table's legend showed that any participants did not have decreased muscle strength after application of CTSE combined with usual care. In addition,11 participants had higher muscle strength deficit score before application of CTSE combined with conventional physiotherapy compare with after application of CTSE combined with conventional physiotherapy. By examining the final test statistics portion of table by Wilcoxon signed-rank test it was discovered that the trial group for 3 weeks, twice weekly CCE exercise combined with usual care treatment course showed a statistically significant change in cervical left side flexor muscle strength among individuals with chronic neck pain (Z= -3.035, p= 0.004).

5.7.2. Cervical spine left side flexor muscle strength within control group

Table 34: Rank and test statistics of left side flexor strength in control group

Left side flexor of cervical spine (posttest) - Left side flexor of cervical spine (pretest)	N	Mean rank	Sum of ranks	Wilcoxon signed rank test based on Z	P
Negative rank	0	.00	.00	-3.035	0.004
Positive rank	11	6	66.00		
Ties	0				
Total	11				

Table 34 described the grade on the comparison of participant's before (pre) and after (post) cervical left side flexor muscle strength score. The table's legend showed that any participants did not have decreased muscle strength after application of conventional physiotherapy. In addition, all the 11 participants had higher muscle strength deficit score before application of conventional physiotherapy compare with after conventional physiotherapy. By examining the final test statistics portion of table by Wilcoxon signed-rank test it was discovered that the control group for 3 weeks, twice weekly conventional physiotherapy treatment course showed a statistically significant change in left side flexor muscle strength among individuals with chronic neck pain ($Z= -3.035$, $p= 0.004$).

5.7.3. Pre test and posttest left side flexor muscle strength in trial group

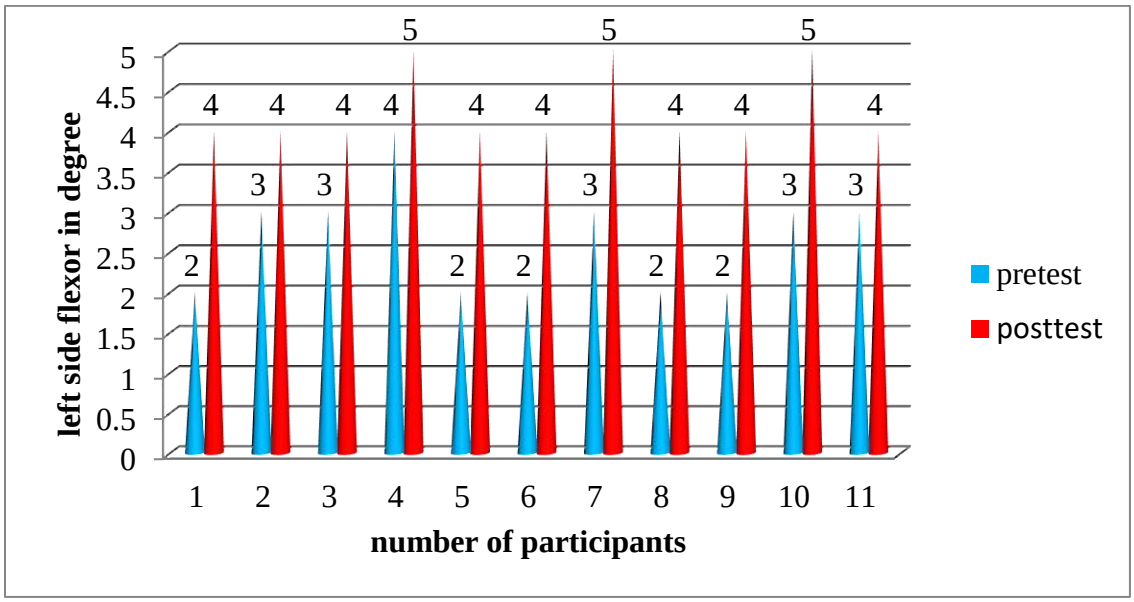

Figure 30: pretest and posttest score of comparison of left side flexor muscle in trial group

5.7.4. Pre test and posttest of left side flexor in control group

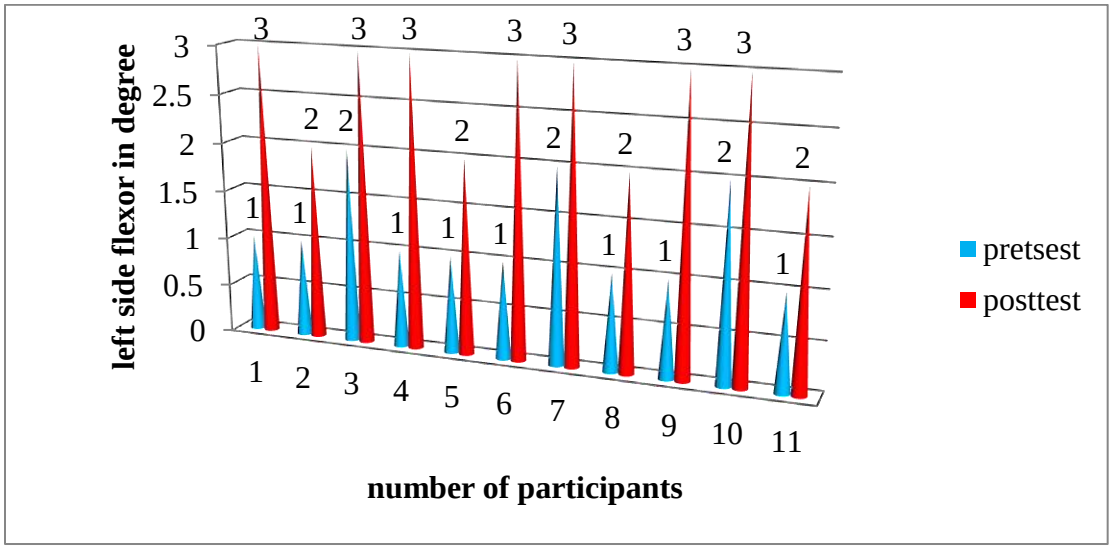

Figure 31: pretest and posttest score of comparison of left side flexor muscle in control group.

5.8. Cervical spine right rotator muscle strength between trial and control group

Table 35: Rank and test statistics of cervical right rotator muscle strength between trial and control group

Difference between trial and control group in cervical spine rotator (right) muscle strength	Category of participants	N	Mean of posttest of right rotator strength	Mean rank	Mann – Whitney U score	P
	Trial	11	3.45	15.45	17.00	0.006
	Control	11	2.94	7.55		

Table 35 showed that the calculated value of U is 17 for rotator (right) muscle strength and the table value of U for n1= 11 and n2= 11 is 17 for 0.006 in one tailed hypothesis. From the calculated value (U= 17), it was clear that U value between trial and control groups have an associated probability level which was less than 0.05 (5%). Therefore, the result was significant for one tailed hypothesis. This means that difference between trial group treatment (cervicothoracic stabilization exercise combined with conventional physiotherapy) and control group treatment (conventional physiotherapy only) was significant i. e. improvement occur in the trial group were not same. They differ significantly as trial group improvement was more than control group.

5.8.1. Cervical spine right rotator muscle strength within trial group

Table 36: Rank and test statistics of right rotator muscle strength in trial group

Right side rotator of cervical spine (posttest) – Right side rotator of cervical spine (pretest)	N	Mean rank	Sum of rank	Wilcoxon signed rank test based on Z	P
Negative rank	0	.00	.00	-3.127	0.004
Positive rank	11	6	66.00		
Ties	0				
Total	11				

Table 36 described the grade on the comparison of participants' before (pre) and after (post) cervical right rotator muscle strength score. The table's legend showed that any participants did not have decreased muscle strength after application of CTSE combined with usual care. In addition, 11 participants had higher muscle strength deficit score before application of CTSE combined with conventional physiotherapy compare with after application of CTSE combined with conventional physiotherapy. By examining the final test statistics portion of table by Wilcoxon signed-rank test it was discovered that the trial group for 3 weeks, twice weekly CTSE exercise combined with conventional physiotherapy treatment course showed a statistically significant change in cervical right rotator muscle strength in individuals with chronic neck pain ($Z= -3.127$, $p= 0.004$).

5.8.2. Cervical spine right rotator muscle strength within control group

Table 37: Rank and test statistics of right rotator muscle strength within control group

Right side rotator of cervical spine (posttest) – Right side rotator of cervical spine (pretest)	N	Mean rank	Sum of rank	Wilcoxon signed rank test based on Z	P
Negative rank	0	.00	.00	-3.035	0.004
Positive rank	11	6	66.00		
Ties	0				
Total	11				

Table 37 described the grade on the comparison of participant's before (pre) and after (post) cervical right side rotator muscle strength score. The table's legend showed that any participants did not have decreased muscle strength after application of usual care. In addition, 11 participants had higher muscle strength deficit score before application of conventional physiotherapy compare with after application of conventional physiotherapy. By examining the final test statistics portion of table by Wilcoxon signed-rank test it was discovered that the control group for 3 weeks, twice weekly usual care treatment course showed a statistically significant change in right rotator muscle strength among individuals with chronic neck pain ($Z= -3.035$, $p= 0.004$).

5.8.3. Pre test and posttest of right rotator muscle strength in trial group:

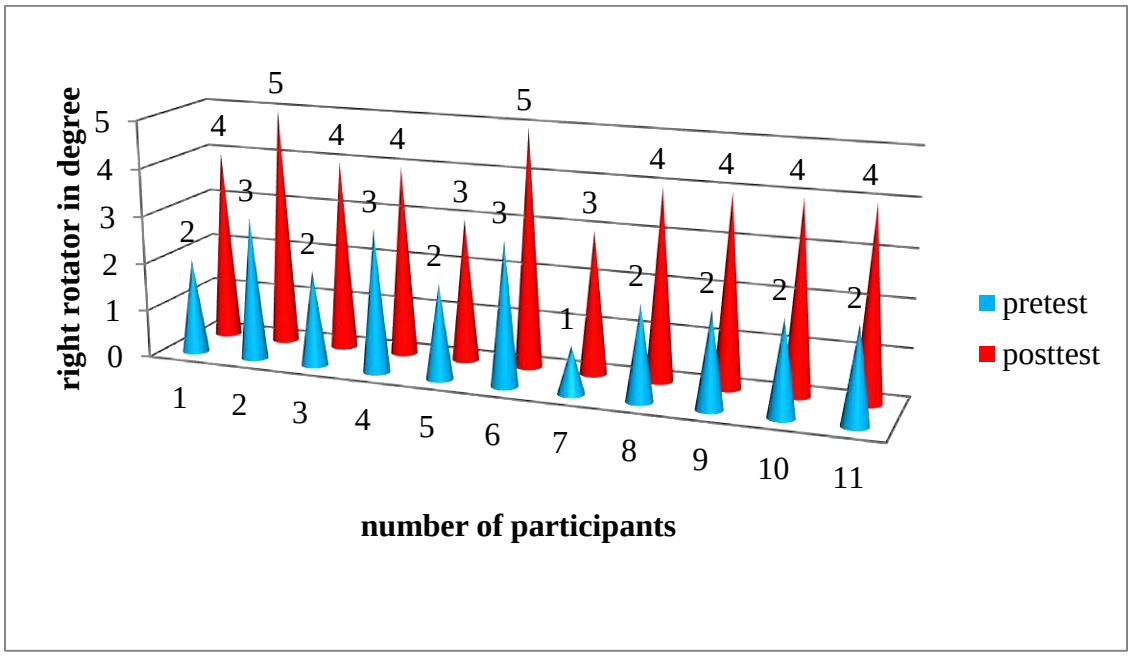

Figure 32: pretest and posttest score of comparison of right rotator muscle in trial group

5.8.4. Pre test and posttest of right rotator muscle strength in control group:

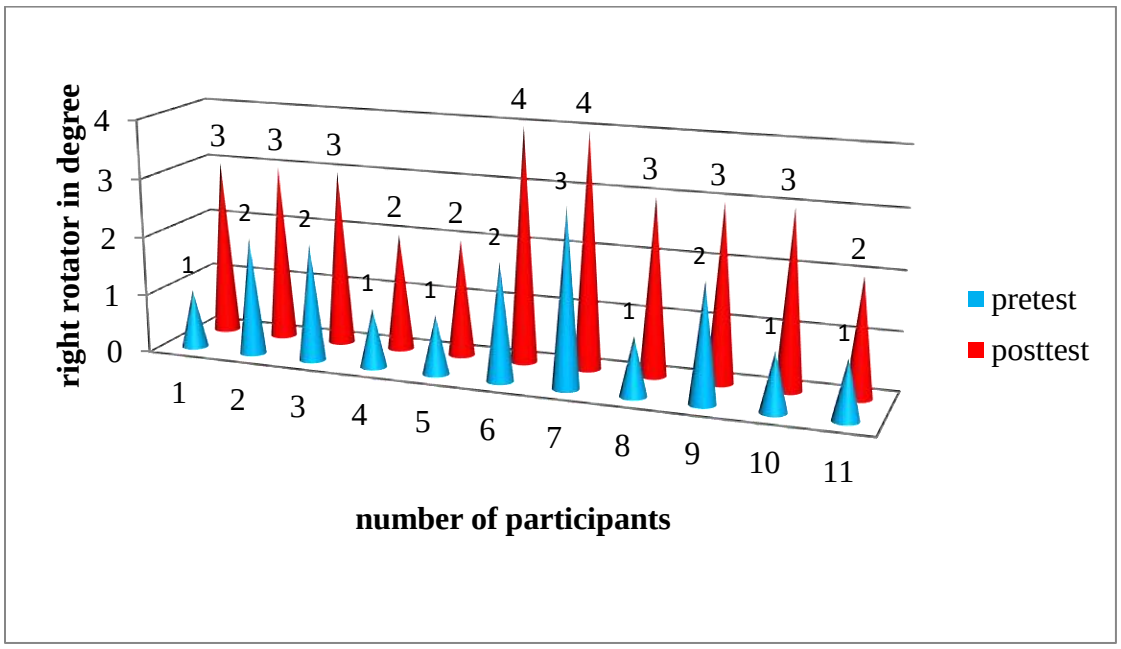

Figure 33: pretest and posttest score of comparison of right rotator muscle in control group

5.9. Cervical spine left rotator muscle strength between trial and control group

Table 38: Rank and test statistics of cervical left rotator muscle strength between trial and control group

Difference between trial and control group in cervical spine rotator (left) muscle strength	Category of participants	N	Mean of posttest rotator (left) strength	Mean rank	Mann – Whitney U score	P
	Trial	11	3.23	16.64	4.00	0.000
	Control	11	2.36	6.36		

Table 38 described that the calculated value of U is 4 for rotator (left) muscle strength and the table value of U for n1= 11 and n2= 11 is 4 for 0.000 in one tailed hypothesis. From the calculated value (U= 4), it was clear that U value between trial and control groups had an associated probability level which was less than 0.05 (5%). Therefore, the result was significant for one tailed hypothesis. This means that difference between trial group treatment (cervicothoracic stabilization exercise combined with conventional physiotherapy) and control group treatment (conventional physiotherapy only) was significant i. e. improvement occur in the trial group were not same. They differ significantly as trial group improvement was more than control group.

5.9.1. Cervical spine left rotator muscle strength within trial group

Table 39: Rank and test statistics of left side rotator muscle strength within trial group

Left side rotator of cervical spine (posttest) – Left side rotator of cervical spine (pretest)	N	Mean rank	Sum of ranks	Wilcoxon signed rank test based on Z	P
Negative rank	0	.00	.00	-3.071	0.004
Positive rank	11	6	66.00		
Ties	0				
Total	11				

Table 39 described the grade on the comparison of participants' before (pre) and after (post) cervical left rotator muscle strength score. The table's legend showed that any participants did not have decreased muscle strength after application of CTSE combined with conventional physiotherape. In addition, 11 participants had higher muscle strength deficit score before application of CTSE combined with conventional physiotherapy compare with after application of CTSE combined with conventional physiotherapy. By examining the final test statistics portion of table by Wilcoxon signed-rank test it was discovered that the trial group for 3 weeks, twice weekly CCE exercise combined with usual care treatment course showed a statistically significant change in cervical right rotator muscle strength among individuals with chronic neck pain (Z= -3.071, p= 0.004).

5.9.2. Cervical spine left rotator muscle strength within control group

Table 40: Rank and test statistics of left side rotator muscle strength within control group

Left side rotator of cervical spine (posttest) – left side rotator of cervical spine (pretest)	N	Mean rank	Sum of rank	Wilcoxon signed rank test based on Z	P
Negative rank	0	.00	.00	-3.127	0.004
Positive rank	11	6.00	66.00		
Ties	0				
Total	11				

Table 40 described the grade on the comparison of participant's before (pre) and after (post) cervical left side rotator muscle strength score. The table's legend showed that any participants did not have decreased muscle strength after application of usual care. In addition, 11 participants had higher muscle strength deficit score before application of conventional physiotherapy compare with after application of conventional physiotherapy.

By examining the final test statistics portion of table by Wilcoxon signed-rank test it was discovered that the control group for 3 weeks, twice weekly usual care treatment course showed a statistically significant change in right rotator muscle strength among individuals with chronic neck pain ($Z= -3.127$, $p= 0.004$).

5.9.3. Pretest and posttest left rotator muscle strength in trial group:

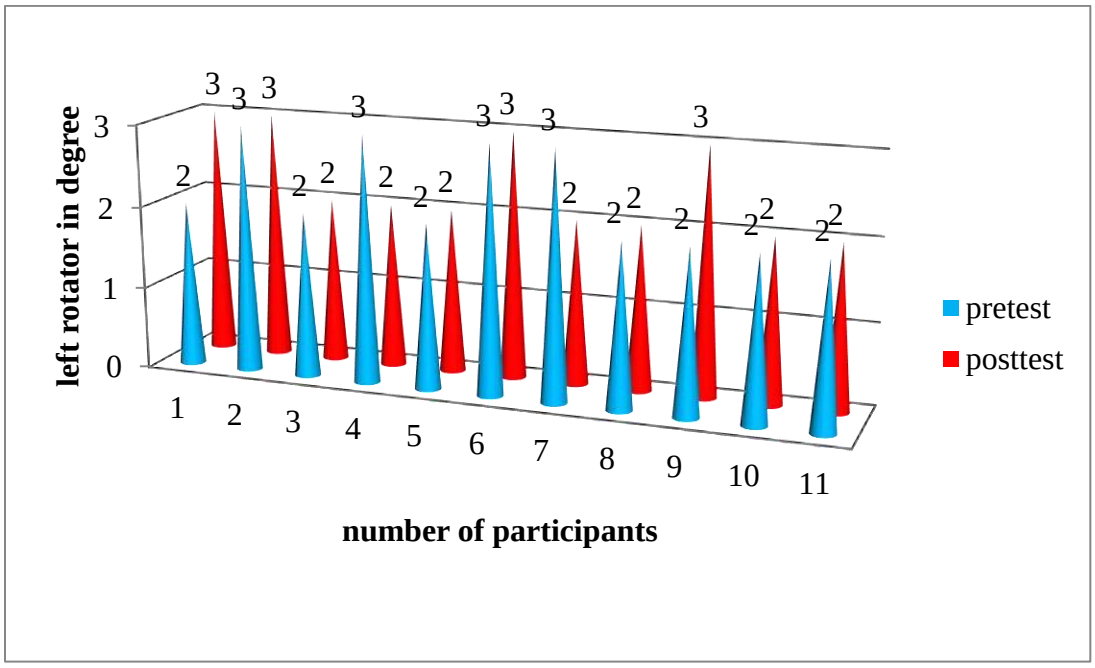

Figure 34: pretest and posttest score of comparison of left rotator muscle in trial group

5.9.4. Pretest and posttest left rotator muscle strength in control group:

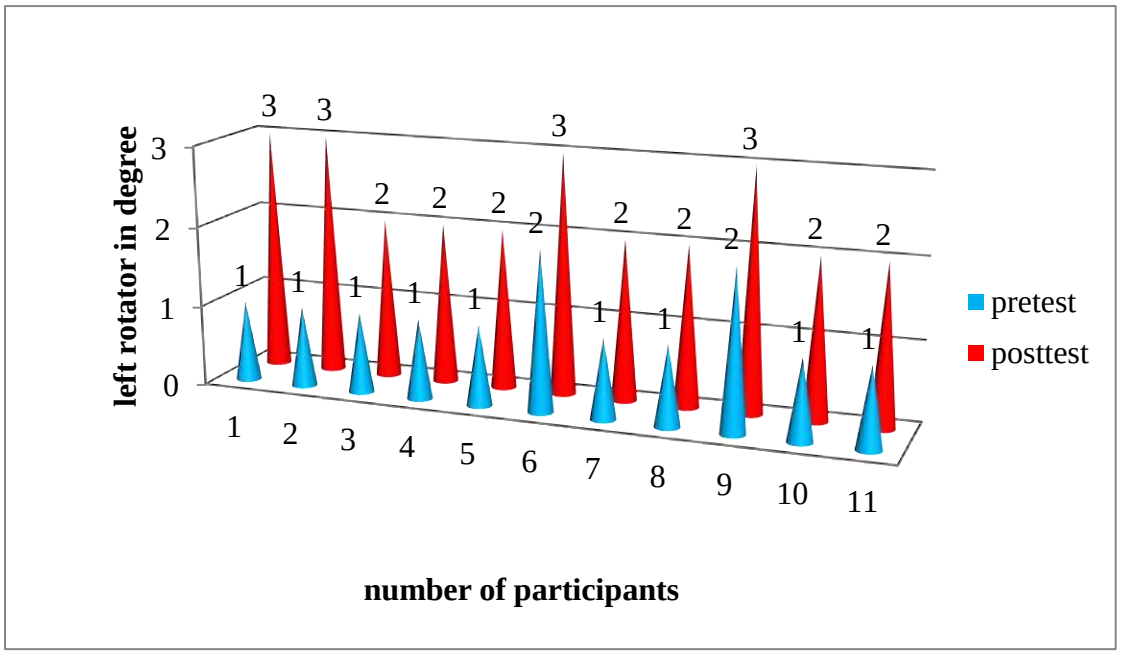

Figure 35: pretest and posttest score of comparison of left rotator muscle in control group

6. Cervical Spine Disability Information

6.1. Pretest and posttest score of neck disability score in trial and control group

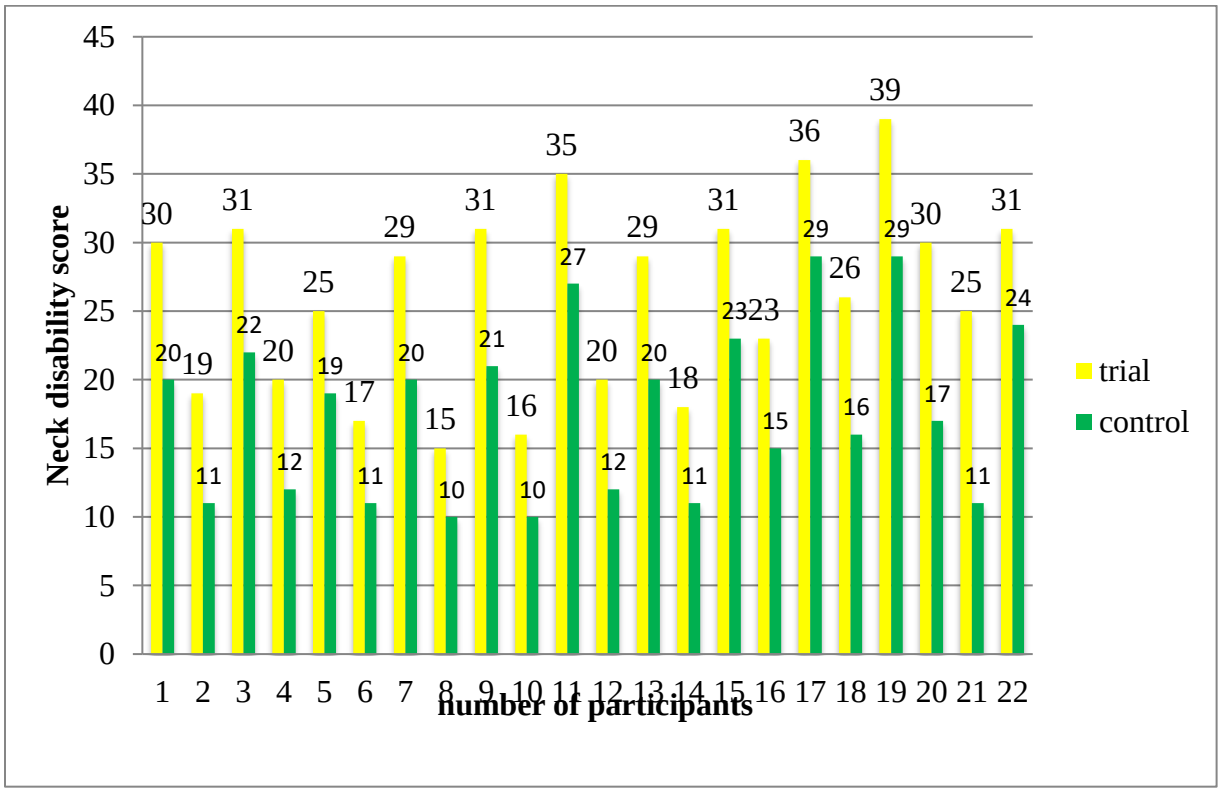

Figure 36: Pre and post test score among trial and control group

6.1. Neck disability index (NDI) between trial and control group

Table 41: Rank and test statistics of neck disability index between trial and control group

Difference between neck disability index	Category of participants	N	Mean rank	Mann Whitney U score	P	Mean of posttest
	Trial	11	15.68	14.50	0.001	21.91
	Control	11	7.32			13.55

Table 41 showed that the calculated value of U is 14.50 for neck disability index. From the calculated value (U= 14.50), Therefore, the result was significant for one tailed

hypothesis. This means that difference between trial group treatment (cervicothoracic stabilization exercise combined with conventional physiotherapy) and control group treatment (conventional physiotherapy only) was significant i.e. improvement occur in the trial group were not same than control group. They differ significantly as trial group improvement was more than control group. Thus, cervicothoracic stabilization exercise along with conventional physiotherapy was effective than conventional physiotherapy among patients with chronic neck pain.

6.2. Neck disability index (NDI) within trial group

Table 42: Rank and test statistics of neck disability index within trial group

Neck disability index posttest –neck disability index pretest	N	Mean rank	Sum of rank	Wilcoxon signed rank test Based on Z	P
positive ranks	11	6	66.00	-2.947	0.005
negative ranks	0	0	0		
Ties	0				

Table 42 described the comparison of participant's before (pre) and after (post) neck disability index score. The table's legend showed that any participants did not have increased disability after application of conventional physiotherapy. In addition, 11 participants had higher disability score before application of conventional physiotherapy compare with after application of conventional physiotherapy. Besides, no participants had equal amount of neck disability before and after treatment in control group. By examining the final test statistics portion of table by Wilcoxon signed-rank test it was discovered that the control group for 3 weeks, twice weekly conventional physiotherapy treatment course showed a statistically significant change in neck disability among individuals with chronic neck pain ($Z= -2.947$, $p= 0.005$).

6.3. Neck disability index (NDI) within control group

Table 43 Rank and test statistics of neck disability index within control group

Neck disability index(posttest)-neck disability index (pretest)	N	Mean rank	Sum of rank	Wilcoxon signed rank test based on Z	P
posiive rank	11	6	66	-2.952	0.004
negative rank	0	0	0		
Ties	0				

Table 43 described the comparison of participants' before (pre) and after (post) neck disability index score. The table's legend showed that any participants did not have increased disability after application of Cervicothoracic stabilization exercise combined with conventional physiotherapy. In addition, 11 participants had higher neck disability index score before application of this treatment combined with conventional physiotherapy compare with after application of the treatment combined with conventional physiotherapy. Besides, no participants had equal amount of disability before and after treatment in control group. By examining the final test statistics portion of table by Wilcoxon signed-rank test it was discovered that the control group for 3 weeks, twice weekly cervicothoracic stabilization exercise combined with conventional physiotherapy treatment course showed a statistically significant change in nick disability in individuals with chronic neck pain ($Z= -2.952$, $p= 0.004$).

CHAPTER –V DISCUSSION

In this chapter the results are discussed in relation to the aim and objectives of the study as well as relevant literature. The present study found different characteristics on baseline in age, gender, duration of neck pain, mean weight, mean height, body mass index (BMI) and neck disability index (NDI) pretest score between both trial and control groups of participants. Similarities in baseline characteristics between both groups confirmed successful randomization (de Boer, et al. 2015). In this study it was revealed that there are 27.03 % men and 72.07 % women in trial group and in control group the men ratio was 63.06% and women was 36.04%. Also found that women are most affected than men.

In terms of BMI, majority of the participants in the trial group were normal weight (81.81%) followed by obese 18.18% and in contrast control group had similar 81.81% normal weight and underweight participants 9.9% and 9.9%% obese participants. Nilsen, et al. (2011) found significant association between physical exercise, BMI and risk of chronic neck pain significantly.

In the study of Dosunceli, et al (2009), participants of trial group and control group received 3 sessions per week and totaling 24 sessions of treatment at the time of treatment period of study. But here participants of both group taken 3 sessions per week and totaling 9 sessions of treatment due to time limitation. The researcher found effectiveness of neck stabilization exercise along with dynamic exercise among the patients with chronic nonspecific neck pain included neck pain for more than 3 months (Kellicker, 2011). In this way, above criteria matched with the current study to prove the hypothesis and disprove the null hypothesis.

Different studies found (Gupta, et al., 2013; Sambyal and Kumar, 2013; Clare et al., 2004) conventional physiotherapy as an effective treatment for patients with chronic neck pain. Neck stabilization exercise found effective to reduce pain and to improve neck disability rate (Kaka et al., 2015) This study shows that cervicothoracic stabilization exercise is effective to decrease pain, improve range of motion and muscle strength and reduce disability rate. The exercise program was carried out for 8 sessions in both groups.

However, cervicothoracic stabilization exercise combined with conventional physiotherapy shown effective than only conventional physiotherapy and statistical test was conducted between the groups to identify which intervention was more effective than others. Data was also analyzed within trial and control group and found both trial and control had reduced pain, improved ROM, muscle strength and NDI scores but in most of the variables trial group outcomes were highly significant.

This study also found that patient rated pain was not associated with BMI (p= 0.980), Age (p= .998), Gender (p=.670), Height (p= .143) and Weight (p= 1) of the participants. Manchikanti and Cash (2008) also found that there are no significant differences in gender, age, height and weight but there is some study such as Fillingim RB et al., 2009 where it is found that women are more affected than men. However Nilsen and Holtermann (2011) discovered association between pain and BMI in their study where overweight and obese patient has high risk of chance to occur chronic neck pain. This study also discovered that diabetes mellitus (p=.003) and hypertension (p=.033) were associated with patient rated pain.

Patient rated general pain was measured in the pre-test part and post test was taken after completing of 9 sessions of treatment. Nevertheless, patient rated general pain intensity between group was highly significant (p=0.004). Though, exercise significantly decreased pain in trail group (p= 0.001) and control group (p = 0.003). Although cervicothoracic stabilization exercise along with conventional physiotherapy has significant effect than only conventional physiotherapy since both exercise has significant effect in decreasing pain. Meanwhile, Gupta, et al. (2013) evaluated the efficacy of pain, deep cervical muscle strength training program and found significant outcome (p=0.001) in between group and within group (trail group, p= 0.000; control group p= 0.000). In contrast, the present study outcomes on patient rated general pain intensity was similar as Gupta and his colleagues study but there was difference in outcome of pain intensity between trial and control group results.

In cervical range of motion variable, between group analyses was significant in both group such as flexion (p=.001), extension (p=.004), right side flexion (p=.000), left side rotation (p=.004), left side rotation (p=.002) except right side rotation (p=.056) where p value is more than .005. Senthilnathan et al. (2015) conducted an experimental study compared between trial and control group by giving isometric neck exercises where significant result was found in flexion, extension, right side rotation but no significant difference in left side flexion. But in my study all these movement were significant except right side rotation and they have given isometric exercises which is also important for stabilizing the neck.

In another study of Seung-hyean & Kyung-tae (2016) they found that sling stabilization exercise has a significant difference in right side rotation and streaching exercise has a significant result in left side rotation as they did this study comparing between sling stabilization exercise and streaching exercise. But in this study the right side rotation movement was not significant where left side rotation has a significant level.

In the present thesis, significant improvement was observed in the cervical spine muscles including flexor, extensor, right side flexor, left side flexor, right rotator and left rotator muscles during between group analyses and within group analysis and showed significant improvement in both groups. Several study found that loss of muscle strength can be happened by neck pain. A Hakkinen et al. (2004) stated that impairment of neck muscle strength is a result of chronic pain. Neck pain is a reason of inability to move and strain the neck normally and might cause the subjects to avoid exercising. At worst, pain can significantly restrict an individual's activities of daily living.

In the present study, pain was felt more often in forward bending of neck, neck turning to left or rising from lying, although every directional muscle strength was significant. Here between group flexor muscle significant level h p=.001, extensor was p=.002, right side flexor p=.000, left side flexor p=.000, right rotator=.006 and left rotator was .000 All these value were significant. Jari (2007) found significant improvement in extensor muscle but no improvement in flexor muscles after giving neck training exercise.

One study (Salo, et al., 2006) suggested that chronic neck pain patients showed significant ($p<0.01$) isometric neck muscle strength deficits in cervical flexor and extensors. There was still cervical muscle weakness in the side flexors and rotators but they were not statistically significant. In the present study, majority of the participants had almost normal muscle strength in both side flexors and rotators at pretest score. Within trial group analysis, significant value was found such as cervical flexor ($p=.006$), cervical extensor ($p=0.006$), cervical right side flexor (0.006), cervical left side flexor ($p= 0.004$), cervical right rotator ($p= 0.004$), cervical left rotator ($p= 0.004$) and within control group cervical flexor ($p=0.002$), cervical extensor ($p=0.002$), cervical right side flexor ($p=0.004$), cervical left side flexor ($p=0.004$), cervical right rotator ($p= 0.004$) cervical left rotator ($p= 0.004$). There was variation of results in this study in compare with Salo and his colleagues study because they measured muscle strength by isometric neck contraction with a dynamometer. In contrast, muscle strength was measured in similar techniques but the methods were done manually by physiotherapist in this study.

According to the results of the study disability has decreased significantly after application of cervicothoracic stabilization exercise combined with conventionalphysiotherapy. Between groups results in terms of neck disability index (NDI) showed significant ($p=0.001$) improvement of disability. In addition, within group analysis (within trial, $p=0.005$ and within control, $p= 0.004$) also found significant improvement in disability. In recent past, several studies assessed NDI after application of only stabilization exercise and found improvement of disability in the study of Kaka et al. (2015). Similar findings emerged in the study conducted by Jeyanthi and his colleague. The authors focused on craniocervical exercise that reduce neck disability. Despite of similar results, the age range was (22-67 years) of their study participant's was far below than the current thesis participant's age range was (20-45 years). Conversely, the researchers did not follow the blinding procedure such as participants or researcher blinded. This point could mimic the changes of variation in a trustworthy way in compare with kaka and his colleague study. Components of NDI were not analyzed between and within group. The researcher also did not have any study which analyzed each components of NDI.

LIMITATIONS:

Despite of the effectiveness of cervicothoracic stabilization exercise combined with conventional physiotherapy on dependent variables in this study, there were some limitations. The main limitation was unable to develop a sampling frame to which the study lacks external validity. Physiotherapists could not be blinded to the interventions. The other main limitation of the study was that the trial therapists were not blinded to the treatment allocation. The researcher is unaware of a method to blind therapists in trials of exercise. The researcher tried to minimize the effect of unbinding by training the trial therapists As samples were collected only from CRP- Savar, it could not represent the wider chronic neck pain population and the study lacks in generalize ability of results to wider population. In addition, the study was conducted with 22 patients of chronic neck pain, which was a very small size of samples in compare with the real world prevalence. Also patient get only 9 sessions of treatment, it can be more effective and accurate if they get more sessions. Data were collected only two times during study and it created study limitation as there is no follow up session. The study did not offer any follow up for participants which was essential component to find out effectiveness of treatment for longer period of time. However, participants were only blinded and it lacks the absolute minimization of physiotherapist's bias during delivering treatment. There were no available researches representing effectiveness of this intervention before this one in Bangladesh. So timeline comparison of the particular exercise's effectiveness couldn't be possible.

CHAPTER –VI CONCLUSION & RECOMMENDATION

Chronic neck pain regarded as the source of impairments within the structure of cervical spine. After this study it has come out that the trial group treatment which is cervicothoracic stabilization exercise along with conventional physiotherapy is more effective to minimize pain and recurrence of injury than only conventional physiotherapy. This treatment is also effective in increase range of motion and muscle strength and in minimize disability rate. In clinical practice the usual treatment for an example manual therapy, exercise therapy electrotherapy is used frequently. After doing this study a new treatment approach is introduced to everyone which is effective and can be applicable for the benefit of the patients. Conversely, the aim and objectives of this study has been fulfilled and the null hypothesis was rejected favouring the cervicothoracic stabilization exercise combined with conventional physiotherapy for chronic neck pain patients. In contrast, the techniques and procedures of cervicothoracic stabilization exercise encouraged involving patients actively as the resistance of muscle force can be progressed in accordance with patient's ability. Chronic neck pain affects the body system as well as the entire personnel daily activities. Since cervicothoracic stabilization exercise has been practicing by physiotherapist in limiting manner outside of this study setting, the outcomes of thesis would help practitioners outside the study setting to formulate a management guideline to treat patients with chronic neck pain.

In this study, the patient was benefited by 9 session of treatment in 3 sessions per week for 3 weeks to both groups. It is recommended to give to sessions of cervicothoracic stabilization exercise for further research. Here 22 participants were taken for completing this thesis project. More participants were recommended for the future study to get more effective result. Future study should include large sample size and should follow the randomization process while selecting sample from population.

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Appendix-A

IRB Permission Letter

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

Ref. CRP-BHPI/IRB/11/18/1272 Date: 13/11/2018

To
Zakia Rahman
B.Sc. in Physiotherapy
Session: 2013-2014 Student ID: 112130219
BHPI, CRP, Savar, Dhaka-1343, Bangladesh

Subject: Approval of the thesis proposal "Effectiveness of Cervicothoracic Stabilization Exercise along with Conventional Physiotherapy among Patients with Chronic Neck Pain" by ethics committee.

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

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

The purpose of the study is to determine the effectiveness of cervicothoracic stabilization exercise among patients with chronic neck pain. The study involves use of a self structured questionnaire to explore the intensity of pain, muscle power and strength and disability of the patients with chronic neck pain that may take 20 to 25 minutes to answer the questionnaire. The members of the Ethics committee have approved the study to be conducted in the presented form at the meeting held at 9.30 AM on 5th February, 2018 at BHPI.

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

Best regards,

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

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

Appendix-B

Permission Letter

July 01 , 2018

Head

Department of Physiotherapy

Center for the Rehabilitation of the Paralysed (CRP)

CRP - Savar , Dhaka-1343

Through : Head, Department of Physiotherapy , BHPI

Subject : Seeking permission for collecting data to conduct my research project.

Dear Sir ,

With due respect and humble submission I am Zakia Rahman , student of 4th Professional B.Sc in Physiotherapy at Bangladesh Health Professions Institute (BHPI).The ethical board of BHPI has approved my research project title on " Effectiveness of Cervicothoracic Stabilization Exercise along with Conventional Physiotherapy among Patients with Chronic Neck Pain" under the supervision of Muhammad Habibur Rahman, Associate Professor, Department of Physiotherapy , BHPI , CRP. Conducting this research project is a partial requirement for the degree of B.Sc in Physiotherapy. For that I want to collect data for my research project at Musculoskeletal unit of CRP. So I need permission for data collection from Musculoskeletal Unit of CRP-Savar. I would like to assure that anything of my study will not be harmful for the participants.

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

Sincerely Yours ,

Zakia Rahman

Zakia Rahman

4th Professional B.Sc in Physiotherapy

Class Roll – 24 , Session :2013-14

Bangladesh Health Professions Institute (BHPI)

CRP , Savar, Dhaka - 1343

Forwarded
Habib
01.07.2018

01.07.18
Prof. Md. Obaidul Haque
Head, Department of Physiotherapy
BHPI, CRP, Savar, Dhaka-1343

Approved
02/07/18
Mohammad Anwar Hossain
Associate Professor & Head
Physiotherapy Dept., CRP
CRP-Chapain, Savar, Dhaka-1343

Appendix-C

সম্মতিপত্র

আসসালামু আলাইকুম/নমস্কার,

আমি জাকিয়া রহমান বাংলাদেশ হেলথ প্রফেশন্স ইন্সটিটিউট (বিএইচপিআই), এর বি,এস সিকোর্সের ৪র্থ বর্ষের একজন নিয়মিত শিক্ষার্থী। স্নাতক ডিগ্রী পাবার জন্য আমার একটিগবেষণামূলক প্রকল্প সম্পাদন করতে হবে এবং এটা আমার প্রাতিষ্ঠানিক শিক্ষার একটি অংশ। নিম্নোক্ত তথ্যাদি পাঠ করার পর অংশগ্রহণকারীদের অধ্যয়নে অংশগ্রহণের জন্য অনুরোধ করা হলো।

আমার গবেষণার শিরোনাম ”দীর্ঘস্থায়ী ঘাড়ে ব্যাথার রোগীদের প্রচলিত ফিজিওথেরাপির পাশাপাশি সারভাইকো-থোরাসিক স্থিতিশীল ব্যায়াম এর কার্যকারিতা।“ এই গবেষণার মাধ্যমে আমি সারভাইকো থোরাসিকস্থিতিশীল ব্যায়াম এর কার্যকারিতা খুজে বের করার চেষ্টা করবো।যার ফলে দীর্ঘস্থায়ী ঘাড়ে ব্যাথারপুনরাবৃত্তি কমে যেতে পারে। আমার গবেষণামূলোক প্রকল্পটি বাস্তবায়নের জন্য সি আর পি এর মাস্কুলোস্কেলেটাল ফিজিওথেরাপি ইউনিট থেকে তথ্য সংগ্রহ করতে হবে। অতএব, এই প্রকল্পটির জন্য আপনি একজন সম্মতি অংশগ্রহণকারীদের একজন হতে পারেন। আমি প্রতিশ্রুতিবদ্ধ যে এ গবেষণায় আপনার কোন ক্ষতি বা ঝুকি হবে না। আপনি চাইলে যে কোন সময় কোন দ্বিধা ছাড়াই নিজেকে এই গবেষণা থেকে প্রত্যাহার করতে পারবেন। আমি নিশ্চিত করছি সকল উপাত্তসমুহ গোপনীয় রাখা হবে এবং আপনার ব্যাক্তিগত সনাক্তকরণটি কোথাও প্রকাশিত হবে না। গবেষণা নিয়ে আপনার যদি কোন জিজ্ঞাসা থাকে তবে আপনি আমার সাথে অথবা আমার সুপারভাইজার মোহাম্মদ হাবিবুর রহমান,সহযোগী অধ্যাপক, বি এইচ পি আই, সি আর পি, সাভার, ধাকা-১৩৪৩ এর সাথে যোগাযোগ করতে পারেন

আমি শুরু করার আগে আপানার কোন প্রশ্ন আছে?

আমি কি শুরু করতে পারি?

হ্যাঁ ☐ না ☐

অংশগ্রহনকারীর স্বাক্ষর ও তারিখ……

গবেষকের স্বাক্ষর ও তারিখ .....

স্বাক্ষীর স্বাক্ষর ও তারিখ.....

Consent Form (English)

Assalamu-alaikum/Namasker

I am Zakia Rahman ,4th year student of B.Sc in Physiotherapy at Bangladesh Health Professions Institute (BHPI) . To obtain my bachelor degree, I shall have to conduct a research project and it is a part of my study. The participants are requested to participate in the study after reading followings.

My research title is "Effectiveness of Cervicothoracic Stabilization Exercises along with Conventional Physiotherapy among Patients with Chronic Neck Pain" through this study I will find out the usefulness of this cervicothoracic stabilization exercise so that recurrence injury of chronic neck paint can be minimized. To implement my research project, I need to collect data from Musculoskeletal unit of CRP-Savar. Therefore, you could be one of my valuable participants for the study .

I am committed that the study will not pose any harm or risk to you. You have the absolute right to withdraw or discontinue at any time without any hesitation. I will keep all the informations confidential which I obtained from you and personal identification of the participant would not be published anywhere.

If you have any query about the study, you may contact with me or my supervisor Mohammad Habibur Rahman , Associate Professor , Department of Physiotherapy , BHPI, CRP , Savar, Dhaka -1343.

Do you have any question before I start?

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

☐ Yes ☐ No

1. Signature of the participant & date ……..
2. Signature of the researcher & date …….
3. Signature of the witness & date ……..

APPENDIX-D

প্রশ্নাবলী(বাংলা)

এই প্রশ্নাবলী দীর্ঘস্থায়ী ঘাড়ে ব্যাথা রোগীদের ব্যাথা,মাংস পেশীর সক্ষমতা,ঘাড়ের জয়েন্টের গতি এবং ঘাড়ের অক্ষমতা নির্ণয়ের জন্য তৈরি করা হয়েছে এবং এই অংশ কালো কলম দ্বারা তথ্য সংগ্রহকারী পূরন করবেন। দয়া করে প্রত্যেকটি অংশ পূরন করবেন এবং বক্সের সেই অংশটুকু পূরন করবেন যা আপনার জন্য প্রযোজ্য। ইহা অনুমান করা যায় যে ,কোন প্রশ্নের একাধিক অংশ আপনার নিকট কাছাকাছি মনে হতে পারে কিন্তু সেই উত্তর টি দিবেন যা আপনার সমস্যার খুব কাছাকাছি অবস্থিত।

কোড :তারিখ :

রোগীর নাম : রোগীর আইডি:

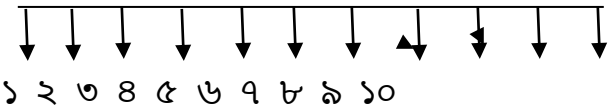
মোবাইল নং : ঠিকানা :

প্রশ্নসমূহ	উত্তর
পর্ব ১০ঃসামাজিক-বৈষয়িক তথ্যবলিঃ	
১। রোগীর বয়স	..... বছর
২।লিংগ	□পুরুষ □মহিলা
৩।বৈবাহিক অবস্থা	□বিবাহিত □অবিবাহিত

৪।পেশা	.....
৫।শিক্ষাগত যোগ্যতা	□প্রাথমিক □মাধ্যমিক □উচ্চমাধ্যমিক □স্নাতক □স্নাতকোত্তর
৬।উচ্চতা	.....মিটার
৭।ওজন	.....কেজি
৮।বি এম আই	.....কেজি/মিটার২
৯।ঘুমানোর সময় আপনি কয়টি বালিশ ব্যবহার করেন?	.....
১০।আপনি ঘুমানোর সময় কোন অবস্থান পছন্দ করেন?	□চিত হয়ে □উপর হয়ে □ কাত হয়ে – ডান □ কাত হয়ে – বাম

প্রশ্নসমূহ	উত্তর
পর্ব ২০ঃমেডিকেল তথ্যবলি	
১১।আপনি কি ডায়াবেটিক রোগে ভুগছেন?	□হ্যাঁ □না
১২।আপনি কি উচ্চরক্তচাপ রোগে ভুগছেন?	□হ্যাঁ □না
পর্ব ৩০ঃব্যাথা সম্পর্কিত তথ্যাবলি	
১৩।আপনার কি মনে হয় আপনার ব্যাথার কারণ কি?	□আঘাতের কারণে □আঘাত ছাড়া অন্য কোন কারণে

১৪।আপনার শরীরের কোন অংশে সবচেয়ে বেশী ব্যাথা অনুভব করেন?	□ঘাড়ে ব্যাথা □ডান কাধে বেশী ব্যাথা □বাম কাধে বেশী ব্যাথা
১৫।কোন সময়ে আপনি বেশী ব্যাথা অনুভব করেন?	□সকালে □দিন বাড়ার সাথে □সন্ধ্যায় □রাতে
১৬।কোনদিকে নড়াচড়ায় আপনার বেশী ব্যাথা হয়?	□ঘাড়ের সামনের দিকে □ঘাড়ের পিছনের দিকে □ঘাড় ডান দিকে ঘুরালে □ঘাড় বাম দিকে ঘোরালে □শোয়া থেকে উঠতে গেলে □বসা থেকে উঠতে গেলে
১৭।কোন দিকে নড়াচড়ায় আপনার ব্যাথা কম হয়?	□ঘাড় সামনের দিকে ঝুঁকলে □ঘাড় পেছনের দিকে ঝুঁকলে □ঘাড় ডান দিকে ঘুরালে □ঘাড় বাম দিকে ঘুরালে □শোয়া থেকে উঠতে গেলে □বসা থেকে উঠতে গেলে

চিকিৎসা পূর্ববর্তী উপাত্তসমূহ	
প্রশ্নসমূহ	উত্তর
পর্ব ৪ঃসামগ্রিকভাবে রোগী কর্তৃক নির্ণীত ব্যাথার হার	
১৮।বিশ্রামরত অবস্থায় আপনি কি পরিমান ব্যাথা অনুভব করেন?	 ০ ১ ২ ৩ ৪ ৫ ৬ ৭ ৮ ৯ ১০
পর্ব ৫ঃঘাড়ের জয়েন্টে মোশন এবং মাংশপেশির সক্ষমতার তথ্যবলি	
১৯।ঘাড়ের গতি বর্তমানে কতটুকু আছে?(দয়া করে ডিগ্রি	□ফ্লেক্সন □এক্সটেনশন

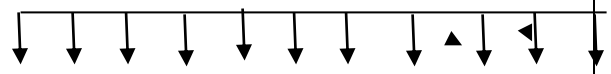
দিয়ে লিখবেন)	□সাইড ফ্লেক্সন(ডান) □সাইড ফ্লেক্সন(বাম) □রোটেশন(ডান) □রোটেশন(বাম)
২০।ঘাড়ের মাংশপেশীর সক্ষমতার বর্তমানে কতটুকু আছে?(অক্সফোর্ড গ্রেড স্কেল)	□ফ্লেক্সর □এক্সেনসর □সাইড ফ্লেক্সর(ডান) □সাইড ফ্লেক্সর(বাম) □রোটেটর(ডান) □রোটেটর(বাম)
পর্ব ৬ঃঘাড়ের অক্ষমতা সম্পর্কিত তথ্যবলী (এই প্রশ্নাবলী তৈরি করা হয়েছে যাতে আমি জানতে পারি যে আপনার ঘাড়ের সমস্যা আপনার প্রতিদিনের কাজে কি পরিমান বাধাগ্রস্থ করে) নেক ডিসএবিলিটি ইনডেক্স এর প্রতিটি অংশের সর্বনিম্ন নম্বর ০ এবং সর্বোচ্চ নম্বর ৫।মোট নম্বর =৫০।প্রাপ্ত নম্বর=(.....।)	
২১।আজকে আপনার ব্যাথার তীব্রতা কি পরিমান?	□আমার এই মূহুর্তে কোন ব্যাথা নেই □আমার এই মূহুর্তে হালকা ব্যাথা আছে □আমার এই মূহুর্তে হালকা ব্যাথা আছে □আমার এই মূহুর্তের ব্যাথা মোটামুটি গুরুত্বপূর্ণ □আমার এই মূর্তে ব্যাথা খুব গুরুতর □আমার এই মূর্তে ব্যাথা সবচেয়ে খারাপ
২২। ব্যক্তিগত কাজে (পরিচ্ছন্নতা, জামাকাপড় পরিধান ইত্যাদি) আপনি কি পরিমান স্বাবলম্বী ?	□আমি সাধারণত অতিরিক্ত ব্যথা ছাড়াই নিজেকে দেখাশোনা করার কাজ করতে পারি □আমি সাধারণত নিজেকে দেখাশোনা করতে পারি কিন্তু এতে অতিরিক্ত ব্যথা হয় □আমি নিজেকে দেখাশোনা করার কাজ করতে গেলে ভ্যথা অনুভব করি এবং আমি ধীরগতি এবং সতর্কতা অবলম্বন করি □আমাকে সামান্য সাহায্য করলে আমি আমার ব্যক্তিগত যত্নের অধিকাংশ কাজই পরিচালনা

	করতে পারি □আমার নিজের যন্ত্রের অধিকাংশ ক্ষেত্রেই প্রতিদিনই সাহায্য প্রয়োজন হয় □আমি কাপড় পরিধান করতে পারি না, আমার কাপড় ধৌত করতে অসুবিধা হয় এবং বিছানায় শুয়ে থাকতে হয়
২৩। কোন বস্তু উঠানোর ক্ষেত্রে আপনি কি পরিমান স্বাবলম্বী ?	□আমি অতিরিক্ত ব্যথা ছাড়াই ভাড়ী ওজন উত্তোলন করতে পারি □আমি ভারী ওজন উত্তোলন করতে পারি কিন্তু এটা অতিরিক্ত ব্যথা দেয় □ব্যথা আমাকে মেঝে থেকে ভারী ওজন উত্তোলন করতে বাধা দেয়, কিন্তু আমি তা পারি যদি সেটা সুবিধামত কোথাও স্থাপন করা থাকে, উধাহরণস্বরুপ, কোন একটি টেবিলের উপর থেকে □ব্যথা আমাকে মেঝে থেকে ভাড়ী ওজন উত্তোলন করতে বাধা দেয়, কিন্তু আমি মাঝারি থেকে হালকা ওজন উত্তোলন করতে পারি যদি সেটা সুবিধামত কোথাও স্থাপন করা থাকে □আমি শুধুমাত্র খুব হালকা ওজন উত্তোলন করতে পারি □আমি কোন কিছু উত্তোলন বা কিছু বহন করতে পারি না
২৪। খবরের কাগজ অথবা বই পড়ার সময় আপনি কি রকম অনুভব করেন?	□আমি আমার ঘাড়ে কোন ব্যথা ছাড়াই যতটা আমি চাই ততটাই পড়তে পারি □আমি আমার ঘাড়ে সামান্য ব্যথা নিয়ে যতটা আমি চাই পড়তে পারি □আমি আমার ঘাড়ে সহনীয় ব্যথা নিয়ে যতটা আমি চাই পড়তে পারি □আমি আমার ঘাড়ে মাঝারি ব্যথার কারণে আমি যতটা চাই পড়তে পারি না

	□আমি আমার ঘাড়ে তীব্র ব্যথার কারণে খুব কমই পড়তে পারি □আমি ব্যথার কারণে একদমই পড়তে পারি না
২৫। আপনি ঘাড়ে ব্যথার জন্য কি পরিমান মাথা ব্যথা অনুভব করেন?	□আমার কোন মাথাব্যথা নেই □আমার সামান্য মাথাব্যথা আছে, যা কদাচিৎ আসে □আমার সহনীয় মাথাব্যথা আছে, যা কদাচিৎ আসে □আমার সহনীয় মাথাব্যথা আছে, যা ঘনঘন আসে □আমার তীব্র মাথাব্যথা আছে, যা ঘনঘন আসে □আমার প্রায় সব সময় মাথাব্যথা হয়
২৬। ঘাড়ে ব্যথা ছাড়া আপনি কাজে কি পরিমান মনোযোগ দিতে পারেন?	□আমি কোন অসুবিধা ছাড়াই যখন চাই তখনই আমি সম্পূর্ণরূপে মনোযোগ দিতে পারি □আমি সামান্য অসুবিধার সঙ্গে যখন চাই তখনই আমি সম্পূর্ণরূপে মনোযোগ দিতে পারি □আমি যখন মনোযোগ দিতে চাই তখন চলনসই মাত্রার অসুবিধা হয় □আমি যখন মনোযোগ দিতে চাই তখন অনেক অসুবিধা হয় □আমি যখন মনোযোগ দিতে চাই তখন গুরুতর অসুবিধা হয় □আমি একদমই মনোযোগ দিতে পারি না
২৭। ঘাড়ে ব্যথা আপনার প্রতিদিনের কাজে কি পরিমানে প্রভাবিত করে?	□আমি যত চাই তত কাজ করতে পারি □আমি শুধুমাত্র আমার স্বাভাবিক কাজ করতে পারি, কিন্তু এর বেশি না □আমি আমার অধিকাংশ স্বাভাবিক কাজ করতে পারি, কিন্তু এর বেশি না

	□আমি আমার স্বাভাবিক কাজ করতে পারি না □আমি খুব কমই কোন কাজ করতে পারি □আমি একদমই কোন কাজ করতে পারি না
২৮। গাড়িতে ভ্রমনের সময় আপনার ঘাড়ে কি পরিমান ব্যথা অনুভূত হয়?	□আমি কোন ঘাড়ে ব্যথা ছাড়াই আমার গাড়িতে ভ্রমন করতে পারি □আমি আমার ঘাড়ে সামান্য ব্যথা নিয়ে যতক্ষন দীর্ঘ খুশি ততক্ষণ ভ্রমন করতে পারি □আমি আমার ঘাড়ে সহনীয় ব্যথা নিয়ে যতক্ষন দীর্ঘ খুশি ততক্ষণ ভ্রমন করতে পারি □আমি আমার ঘাড়ে মাঝারি ব্যথা নিয়ে যতক্ষন দীর্ঘ খুশি ততক্ষণ পারি □আমি আমার ঘাড়ে তীব্র ব্যথার কারণে ভ্রমন করতে পারি না □আমি একদমই ভ্রমন করতে পারি না
২৯। ঘুমানোর সময় ঘাড়ে ব্যথা আপনার ঘুমকে কি পরিমান প্রভাবিত করে?	□আমার ঘুম আসতে কোন কষ্ট হয় না □আমার ঘুম আসতে সামান্য সমস্যা হয় (১ ঘন্টার কম সময় নির্ঘুম কাটে) □আমার ঘুম আসতে সমস্যা হয় (১ থেকে ২ ঘন্টা নির্ঘুম কাটে) □আমার ঘুম পরিমিতরূপে নষ্ট হয় (২ থেকে ৩ ঘন্টা নির্ঘুম কাটে) □আমার ঘুম ব্যপক ভাবে নষ্ট হয় (৩ থেকে ৫ ঘন্টা নির্ঘুম কাটে) □আমার ঘুম সম্পূর্ণভাবে নষ্ট হয় (৫ থেকে ৭ ঘন্টা নির্ঘুম কাটে)
৩০। ঘাড়ে ব্যথা আপনার চিত্তবিনদনের কার্যক্রমকে কি পরিমান প্রভাবিত করে?	□আমি আমার ঘাড়ে কোন ব্যথা ছাড়াই সব চিত্তবিনদন কার্যক্রমে অংশগ্রহন করতে পারছি □আমি আমার ঘাড়ে কিছু ব্যথা নিয়ে সব চিত্তবিনদন কার্যক্রমে অংশগ্রহন করতে পারছি □আমি আমার ঘাড়ে ব্যথার কারণে অধিকাংশ

	কার্যক্রমে অংশগ্রহন করতে পারছি, কিন্তু আমার সকল স্বাভাবিক চিত্তবিনোদন কার্যক্রমে অংশগ্রহন করতে পারছি না □আমি আমার ঘাড়ে ব্যথার কারণে স্বাভাবিক চিত্তবিনদন কার্যক্রমের কয়েকটি কাজে নিয়োজিত হতে পারছি □আমি আমার ঘাড়ে ব্যথার কারণে আমার স্বাভাবিক চিত্তবিনোদন কার্যক্রমের খুবই কম কাজে নিয়োজিত হতে পারছি □আমি একদমই কোন চিত্তবিনোদন কার্যক্রমে অংশগ্রহন করতে পারছি না

চিকিৎসা পরবর্তী উপাত্ত সমূহ	
প্রশ্ন	**উত্তর**
পর্ব-৪ সামগ্রিকভাবে রোগী কর্তৃক নির্ণীত ব্যাথার হার	
১৮। স্বাভাবিকভাবে বিশ্রামরত অবস্থায় আপনি কতটুকু ব্যাথা অনুভব করেন?	
পর্ব-৫ঃঘাড়ের জয়েন্টের মোশন এবং মাংসপেশীর সক্ষমতার তথ্যাবলিঃ	
১৯।ঘাড়ের গতি বর্তমানে কতটুকু আছে?(দয়া করে ডিগ্রি দিয়ে লিখবেন)	□ফ্লেক্সন □এক্সটেনশন □সাইড ফ্লেক্সন(ডান) □সাইড ফ্লেক্সন(বাম) □রোটেশন(ডান) □রোটেশন(বাম)
২০।ঘাড়ের মাংশপেশীর সক্ষমতার বর্তমানে কতটুকু আছে?(অক্সফোর্ড গ্রেড স্কেল)	□ফ্লেক্সর □এক্সেনসর □সাইডফ্লেক্সর(ডান) □সাইডফ্লেক্সর(বাম) □রোটেটর(ডান) □রোটেটর(বাম)

পর্ব ৬ঃঘাড়ের প্রতিবন্ধিতা সম্পর্কিত তথ্যবলী (এই প্রশ্নাবলী তৈরি করা হয়েছে যাতে আমি জানতে পারি যে আপনার ঘাড়ের সমস্যা আপনার প্রতিদিনের কাজে কি পরিমান বাধাগ্রস্থ করে) নেক ডিসএবিলিটি ইনডেক্স এর প্রতিটি অংশের সর্বনিম্ন নম্বর ০ এবং সর্বোচ্চ নম্বর ৫।মোট নম্বর =৫০।প্রাপ্ত নম্বর=(.....।)	
২১।আজকে আপনার ব্যাথার তীব্রতা কি পরিমান?	□আমার এই মূহুর্তে কোন ব্যাথা নেই □আমার এই মূহুর্তে হালকা ব্যাথা আছে □আমার এই মূহুর্তে হালকা ব্যাথা আছে □আমার এই মূহুর্তের ব্যাথা মোটামুটি গুরুত্বপূর্ণ □আমার এই মূর্তে ব্যাথা খুব গুরুতর □আমার এই মূর্তে ব্যাথা সবচেয়ে খারাপ
২২। ব্যক্তিগত কাজে (পরিচ্ছন্নতা, জামাকাপড় পরিধান ইত্যাদি) আপনি কি পরিমান স্বাবলম্বী ?	□আমি সাধারণত অতিরিক্ত ব্যথা ছাড়াই নিজেকে দেখাশোনা করার কাজ করতে পারি □আমি সাধারণত নিজেকে দেখাশোনা করতে পারি কিন্তু এতে অতিরিক্ত ব্যথা হয় □আমি নিজেকে দেখাশোনা করার কাজ করতে গেলে ভ্যথা অনুভব করি এবং আমি ধীরগতি এবং সতর্কতা অবলম্বন করি □আমাকে সামান্য সাহায্য করলে আমি আমার ব্যক্তিগত যত্নের অধিকাংশ কাজই পরিচালনা করতে পারি □আমার নিজের যত্নের অধিকাংশ

	ক্ষেত্রেই প্রতিদিনই সাহায্য প্রয়োজন হয় □আমি কাপড় পরিধান করতে পারি না, আমার কাপড় ধৌত করতে অসুবিধা হয় এবং বিছানায় শুয়ে থাকতে হয়
২৩। কোন বস্তু উঠানোর ক্ষেত্রে আপনি কি পরিমান স্বাবলম্বী ?	□আমি অতিরিক্ত ব্যথা ছাড়াই ভাড়ী ওজন উত্তোলন করতে পারি □আমি ভারী ওজন উত্তোলন করতে পারি কিন্তু এটা অতিরিক্ত ব্যথা দেয় □ব্যথা আমাকে মেঝে থেকে ভারী ওজন উত্তোলন করতে বাধা দেয়, কিন্তু আমি তা পারি যদি সেটা সুবিধামত কোথাও স্থাপন করা থাকে, উধাহরণস্বরুপ, কোন একটি টেবিলের উপর থেকে □ব্যথা আমাকে মেঝে থেকে ভাড়ী ওজন উত্তোলন করতে বাধা দেয়, কিন্তু আমি মাঝারি থেকে হালকা ওজন উত্তোলন করতে পারি যদি সেটা সুবিধামত কোথাও স্থাপন করা থাকে □আমি শুধুমাত্র খুব হালকা ওজন উত্তোলন করতে পারি □আমি কোন কিছু উত্তোলন বা কিছু বহন করতে পারি না
২৪।খবরের কাগজ অথবা বই পড়ার সময় আপনি কি রকম অনুভব করেন?	□আমি আমার ঘাড়ে কোন ব্যাথা ছাড়াই যতটা চাই ততটা পড়তে পারি □আমি আমার ঘাড়ে সামান্য ব্যাথা নিয়ে যতটা চাই ততটা পড়তে পারি

	□আমি আমার ঘাড়ে সহনীয় ব্যাথা নিয়ে যতটা চাই পড়তে পারি □আমি আমার ঘাড়ে মাঝারি ব্যাথার কারণে যতটা চাই ততটা পড়তে পারি না □আমি আমার ঘাড়ে তীব্র ব্যাথার কারণে খুব কমই পড়তে পারি □আমি ব্যাথার কারণে একদমই পড়তে পারি না
২৫।আপনি ঘাড়ে ব্যাথার জন্য কি পরিমান মাথা ব্যাথা অনুভব করেন?	□আমার কোন মাথা ব্যাথা নেই □আমার সামান্য মাথা ব্যাথা আছে যা কদাচিত আসে □আমার সহনীয় মাথা ব্যাথা আছে যা কদাচিত আসে □আমার সহনীয় মাথা ব্যাথা আছে যা ঘন ঘন আসে □আমার তীব্র মাথা ব্যাথা আছে যা ঘন ঘন আসে □আমার প্রায় সবসময় মাথা ব্যাথা হয়
২৬।ঘাড়ে ব্যাথা ছাড়া আপনিক কাজে কি পরিমান মনোযোগ দিতে পারেন?	□আমি কোন অসুবিধা ছাড়াই যখন চাই তখনই সম্পূর্ণ মনোযোগ দিতে পারি □আমি সামান্য অসুবিধার সংগে যখন চাই তখনই মনোযোগ দিতে পারি □আমি যখন মনোযোগ দিতে চাই তখন চলনসই মাত্রার অসুবিধা হয় □আমি যখন মনোযোগ দিতে চাই তখন অনেক অসুবিধা হয় □আমি যখন মনোযোগ দিতে চাই

	তখন অনেক গুরুতর অসুবিধা হয় □আমি একদমই মনোযোগ দিতে পারি না
২৭।ঘাড়ে ব্যাথা আপনার প্রতিদিনের কাজে কি পরিমান প্রভাবিত করে?	□আমি যত চাই তত কাজ করতে পারি □আমি শুধুমাত্র আমার স্বাভাবিক কাজ করতে পারি,কিন্তু এর বেশী না □আমি আমার অধিকাংশ স্বাভাবিক কাজ করতে পারি,কিন্তু এর বেশী না □আমি স্বাভাবিক কাজ করতে পারি না □আমি খুব কমই আমার স্বাভাবিক কাজ করতে পারি □আমি একদমই কোন কাজ করতে পারি না
২৮।গাড়িতে ভ্রমনের সময় আপনার ঘাড়ে কি পরিমান ব্যাথা হয়?	□আমি কোন ঘাড়ে ব্যাথা ছাড়াই গাড়িতে ভ্রমন করতে পারি □আমি আমার ঘাড়ে সামান্য ব্যাথা নিয়ে যতক্ষন দীর্ঘ ততক্ষন ভ্রমন করতে পারি □আমি আমার ঘাড়ে সহনীয় ব্যাথা নিয়ে যতক্ষন দীর্ঘ ততক্ষন ভ্রমন করতে পারি □আমি আমার ঘাড়ে মাঝারি ব্যাথার কারণে যতক্ষন খুশী ততক্ষন ভ্রমন করতে পারি □আমি আমার ঘাড়ে তীব্র ব্যাথার কারণে ভ্রমন করতে পারি না □আমি একদমই আমার গাড়িতে ভ্রমন করতে পারি না
২৯।ঘুমানোর সময় ঘাড়ে ব্যাথা	□আমার ঘুম আসতে কোন কষ্ট হয়

আপনার ঘুমকে কতটুকু প্রভাবিত করে?	না □আমার ঘুম আসতে সামান্য সমস্যা হয়(১ ঘন্টার কম সময় নির্ঘুম কাটে) □আমার ঘুম আসতে সমস্যা হয়(১ থেকে ২ ঘন্টা নির্ঘুম কাটে) □আমার ঘুম পরিমিত রূপে নষ্ট হয়(২ থেকে ৩ ঘন্টা নির্ঘুম কাটে) □আমার ঘুম ব্যাপক ভাবে নষ্ট হয়(৩ থেকে ৫ ঘন্টা নির্ঘুম কাটে) □আমার ঘুম সম্পূর্ণ্রূপে নষ্ট হয়(৫ থেকে ৭ ঘন্টা নির্ঘুম কাটে)
৩০।ঘাড়ে ব্যাথা আপনার চিত্ত বিনোদনের কার্যক্রমকে কি পরিমান প্রভাবিত করে?	□আমি আমার ঘাড়ে কোন ব্যাথা ছাড়াই সব চিত্তবিনোদন কার্যক্রমে অংশগ্রহন করতে পারছি □আমি আমার ঘাড়ে কিছু ব্যাথা নিয়ে সদব চিত্তবিনোদন কার্যক্রমে অংশগ্রহন করতে পারছি □আমি আমার ঘাড়ে ব্যাথার কারণে অধিকাংশ কার্যক্রমে অংশগ্রহন করতে পারছি,কিন্তু আমার সকল স্বাভাবিক চিত্তবিনোদন কার্যক্রমে অংশগ্রহন করতে পারছি না □আমি আমার ঘাড়ে ব্যাথার কারণে আমার স্বাভাবিক চিত্তবিনোদন কার্যক্রমের কয়েকটি কাজে নিয়োজিত হতে পারছি □আমি আমার ঘাড়ে ব্যাথার কারণে আমার স্বাভাবিক চিত্তবিনোদন কার্যক্রমের খুব কম কাজে নিয়োজিত হতে পারছি □আমি একদমই কোন চিত্তবিনোদন

	কার্যক্রমে অংশগ্রহন করতে পারছি না

Questionnaire (English Version)

This questionnaire is developed to measure pain, muscle strength, ROM and neck disability of the patient with chronic neck pain and this portion will be filled by data collector using a black pen. Please answer every section and mark in each section only the one box that applies to you. It is realized that you may consider two or more

statements in any one section relate to you, but please just mark the box that most closely describes your problem.

Code No: Date:

Patient's name: Patient ID No:

Mobile No: Address:

Question	**Response**
Part-1 : Socio - Demographic Information	
1. Patient's Age	…… Years
2. Sex	□ Male □ Female
3. Marital Status	□ Married □ Unmarried
4. Occupation	……
5. Educational Status	□ PSC □ SSC □ HSC □ Hons □ Masters and above it
6. Height (miter)	……
7. Weight (kg)	……
8. BMI (kg/m^2)	……
9. How many pillows do you use at the time of sleeping?	……
10. In which posture do you prefer to sleep?	□ Supine lying □ Prone lying □ Side lying- right □ Side lying- left

Question	**Response**
Part -2 : Medical Information	
11. Do you have Diabetes	□ Yes

Mellitus ?	□ No
12. Do you have Hypertension ?	□ Yes □ No
Part -3 : Pain related Information	
13. What is the cause of your neck pain?	□ Traumatic □ Non traumatic
14. Which of your body area exhibit dominate pain?	□ Neck pain □ Neck pain radiate to right shoulder □ Neck pain radiate to left shoulder
15. At when your pain get more worse?	□ At morning □ As the day progress □ At evening □ At night
16. Which direction of movement exaggerated your pain?	□ Neck forward bending □ Neck backward bending □ Neck turning to right □ Neck turning to left □ Raising from lying □ Raising from sitting
17. Which direction of movement relieved your pain?	□ Neck forward bending □ Neck backward bending □ Neck turning to right □ Neck turning to left □ Raising from lying □ Raising from sitting

Pre-test data :	
Question	**Response**
Part- 4 : Patient rated pain in general	
18. How much pain do you feel in general at resting position?	
Part- 5 : Range of motion and Muscle strength related question	

19. How much range of motion of cervical spine present? (in degree)	□ Flexion……. □ Extension…… □ Side flexion (Right)……. □ Side flexion (Left)……. □ Rotation (Right)……. □ Rotation (Left)……
20. In which state muscle strength of cervical spine lies at present? (OXFORD Grade Scale)	□ Flexor……. □ Extensor…… □ Side flexor (Right)……. □ Side flexor (Left)……. □ Rotator (Right)……. □ Rotator (Left)……
Part- 6: Disability Information (This questionnaire has been designed to give us information as to how your neck pain has affected your ability to manage in everyday life). Each section of Neck Disability Index (NDI) consists of lowest 0 point and highest 5 points. Total Score= 50 (Obtained Score……)	
21. How much pain do you have today?	□ I have no pain at the moment □ The pain is very mild at the moment □ The pain is moderate at the moment □ The pain is fairly severe at the moment □ The pain is very severe at the moment □ The pain is the worst imaginable at the moment
22. How independent are you at personal care (washing, dressing etc.)	□ I can look after myself normally without causing extra pain □ I can look after myself normally but it causes extra pain □ It is painful to look after myself and I am slow and careful □ I need some help but can manage most of my personal care □ I need help every day in most aspects of self care □ I do not get dressed, I wash with difficulty and stay in bed
23. How independent are you during lifting object?	• I can lift heavy weights without extra pain • I can lift heavy weights but it gives extra pain • Pain prevents me lifting heavy weights off the floor, but I can manage if they are conveniently placed, for example on a table • Pain prevents me from lifting heavy weights

	but I can manage light to medium weights if they are conveniently positioned • I can only lift very light weights • I cannot lift or carry anything
24. How do you feel while reading newspaper or books?	• I can read as much as I want to with no pain in my neck • I can read as much as I want to with slight pain in my neck • I can read as much as I want with moderate pain in my neck • I can't read as much as I want because of moderate pain in my neck • I can hardly read at all because of severe pain in my neck • I cannot read at all
25. To which state of headache do you feel?	• I have no headaches at all • I have slight headaches, which come infrequently • I have moderate headaches, which come infrequently • I have moderate headaches, which come frequently • I have severe headaches, which come frequently • I have headaches almost all the time
26. To which level of concentration do you keep during working despite of neck pain?	• I can concentrate fully when I want to with no difficulty • I can concentrate fully when I want to with slight difficulty • I have a fair degree of difficulty in concentrating when I want to • I have a lot of difficulty in concentrating when I want to • I have a great deal of difficulty in concentrating when I want to • I cannot concentrate at all
27. To which state neck pain affect your daily work?	• I can do as much work as I want to • I can only do my usual work, but no more • I can do most of my usual work, but no more • I cannot do my usual work • I can hardly do any work at all • I can't do any work at all
28. How do you feel your neck pain during travelling?	• I can travel without any neck pain • I can travel as long as I want with slight pain

	in my neck • I can travel as long as I want with moderate pain in my neck • I can't travel as long as I want because of moderate pain in my neck • I can hardly travel at all because of severe pain in my neck • I can't travel at all
29. To which state neck pain affect your sleep?	• I have no trouble sleeping • My sleep is slightly disturbed (less than 1 hr sleepless) • My sleep is mildly disturbed (1-2 hrs sleepless) • My sleep is moderately disturbed (2-3 hrs sleepless) • My sleep is greatly disturbed (3-5 hrs sleepless) • My sleep is completely disturbed (5-7 hrs sleepless)
30. To which state your neck pain affect your recreational activities?	• I am able to engage in all my recreation activities with no neck pain at all • I am able to engage in all my recreation activities, with some pain in my neck • I am able to engage in most, but not all of my usual recreation activities because of pain in my neck • I am able to engage in a few of my usual recreation activities because of pain in my neck • I can hardly do any recreation activities because of pain in my neck • I can't do any recreation activities at all

Post-test data:	
Question	**Response**
Part-4 : Patient rated pain (in general)	
18. How much pain do you feel in general at resting position?	
Part- 5: Range of Motion and Muscle Strength Information:	

19. How much range of motion of cervical spine present? (in degree)	• Flexion……. • Extension…… • Side flexion (Right)……. • Side flexion (Left)……. • Rotation (Right)……. • Rotation (Left)……
20. In which state muscle strength of cervical spine lies at present? (OXFORD Grade Scale)	• Flexor……. • Extensor…… • Side flexor (Right)……. • Side flexor (Left)……. • Rotator (Right)……. • Rotator (Left)……
Part-6: Disability Information (This questionnaire has been designed to give us information as to how your neck pain has affected your ability to manage in everyday life). Each section of Neck Disability Index (NDI) consists of lowest 0 point and highest 5 points. Total Score= 50 (Obtained Score……)	
21. How much pain do you have today?	• I have no pain at the moment • The pain is very mild at the moment • The pain is moderate at the moment • The pain is fairly severe at the moment • The pain is very severe at the moment • The pain is the worst imaginable at the moment
22. How independent are you at personal care (washing, dressing etc)	• I can look after myself normally without causing extra pain • I can look after myself normally but it causes extra pain • It is painful to look after myself and I am slow and careful • I need some help but can manage most of my personal care • I need help every day in most aspects of selfcare • I do not get dressed, I wash with difficulty and stay in bed
23. How independent are you during lifting object?	• I can lift heavy weights without extra pain • I can lift heavy weights but it gives extra pain • Pain prevents me lifting heavy weights off the floor, but I can manage if they are conveniently placed, for example on a table

	• Pain prevents me from lifting heavy weights but I can manage light to medium weights if they are conveniently positioned • I can only lift very light weights
24. How do you feel while reading newspaper or books?	• I can read as much as I want to with no pain in my neck • I can read as much as I want to with slight pain in my neck • I can read as much as I want with moderate pain in my neck • I can't read as much as I want because of moderate pain in my neck • I can hardly read at all because of severe pain in my neck • I cannot read at all
25. To which state of headache do you feel?	• I have no headaches at all • I have slight headaches, which come infrequently • I have moderate headaches, which come infrequently • I have moderate headaches, which come frequently • I have severe headaches, which come frequently • I have headaches almost all the time
26. To which level of concentration do you keep during working despite of neck pain?	• I can concentrate fully when I want to with no difficulty • I can concentrate fully when I want to with slight difficulty • I have a fair degree of difficulty in concentrating when I want to • I have a lot of difficulty in concentrating when I want to • I have a great deal of difficulty in concentrating when I want to • I cannot concentrate at all
27. To which state neck pain affect your daily work?	• I can do as much work as I want to • I can only do my usual work, but no more • I can do most of my usual work, but no more • I cannot do my usual work • I can hardly do any work at all • I can't do any work at all

28. How do you feel your neck pain during travelling?	• I can travel without any neck pain • I can travel as long as I want with slight pain in my neck • I can travel as long as I want with moderate pain in my neck • I can't travel as long as I want because of moderate pain in my neck • I can hardly travel at all because of severe pain in my neck • I can't travel at all
29. To which state neck pain affect your sleep?	• I have no trouble sleeping • My sleep is slightly disturbed (less than 1 hr sleepless) • My sleep is mildly disturbed (1-2 hrs sleepless) • My sleep is moderately disturbed (2-3 hrs sleepless) • My sleep is greatly disturbed (3-5 hrs sleepless) • My sleep is completely disturbed (5-7 hrs sleepless)
30. To which state your neck pain affect your recreational activities?	• I am able to engage in all my recreation activities with no neck pain at all • I am able to engage in all my recreation activities, with some pain in my neck • I am able to engage in most, but not all of my usual recreation activities because of pain in my neck • I am able to engage in a few of my usual recreation activities because of pain in my neck • I can hardly do any recreation activities because of pain in my neck • I can't do any recreation activities

Appendix- E

Treatment Protocol of Control Group (Conventional Physiotherapy)

CRP
Centre for the Rehabilitation of the Paralysed

Centre for the Rehabilitation of the Paralysed (CRP)
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Ref: Date:

Ref: CRP/PT/2102/10/26.02.2018 Date : 26/02/2018

Treatment Protocol for Chronic Neck Pain

1. Repeated retraction
2. Repeated retraction with over pressure
3. Repeated retraction with extension
4. Traction retraction extension rotation mobilization
5. Mechanical traction
6. Manual traction
7. Neck muscle stretching exercise
8. Movement with mobilization exercise
9. Neck muscle strengthening exercise
10. Soft tissue release technique
11. Maitland mobilization technique
    -posterior anterior side
    -lateral side
12. NAGS
13. SNAGS
14. Neural stretching
15. PNF stretching
16. Side gliding mobilization
17. Side flexion mobilization
18. Core neuro dynamic
19. Neural mobilization

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As a donor to CRP you qualify for a tax rebate as the Government of Bangladesh have approved CRP as a Philanthropic Institution from February 2008

Appendix-F

Treatment Protocol of Trial Group

1. **Conventional physiotherapy along with**
2. **Cervicothoracic Stabilization Exercise:**

- ✓ **Chin tuck**: In standing position, participant pulls back the chin (as if trying to make a double chin) while keeping the eyes level. This was done for 15 repetitions.
- ✓ **Cervical extension**: In standing position, participant grasps the base of the neck, with both hands while extending the neck as far as possible. This was done for 15 repetitions.
- ✓ **Shoulder shrugs**: In standing position, participant shrugs the shoulders, bringing them up towards the ears. This was done for 15 repetitions.
- ✓ **Shoulder rolls**: In standing position, participant rolls the shoulders forward in a circle. Then, rolls the shoulders backwards in a circle. Then participant relaxes and repeats the procedure for 15 times.
- ✓ **Scapular retraction**: In standing position, participant brings the shoulder blades together in the back; participant then relaxes and repeats the procedure for 15 times.