EFFECTIVENESS OF SCAPULAR MUSCLE STRETCHING AND STRENGTHENING EXERCISES FOR CHRONIC NECK PAIN PATIENTS ATTENDED AT CRP

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We, the under signed certify that we have carefully read and recommended to the Faculty of Medicine, University of Dhaka, for the acceptance of this dissertation entitled.

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Declaration

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

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Acronyms

BHPI	Bangladesh Health Professions Institute
CRP	Centre for the Rehabilitation of the Paralyzed
Lt	Left
MS	Musculo-skeletal
MWM	Movement with Mobilization
NSAID's	Non-Steroidal Anti-inflammatory Drugs
PT	Physiotherapy
RCT	Randomized Control trail
ROM	Range of Movement
Rt	Right
TENS	Transcutaneous Electrical Nerve Stimulation
UST	Ultrasound Therapy
VAS	Visual Analogue Scale
WHO	World Health Organization

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Abstract

Purpose: The purpose of the study was to explore the effectiveness of Scapular stretching and strengthening exercises with conventional physiotherapy compare to only conventional physiotherapy for chronic Neck Pain. *Objectives:* To evaluate the effect of pain and range of motion at Scapular strengthening and stretching exercises for chronic neck pain patients using pre and post test assessment with conventional physiotherapy and conventional Physiotherapy alone in Patients with Chronic Neck Pain. *Methodology:* Fourteen patients with chronic neck pain were randomly selected from outdoor musculo-skeletal unit, CRP and then7 patients with Chronic Neck Pain were selected and randomly assigned to Scapular stretching and strengthening exercises with conventional physiotherapy group and 7 patients to the only conventional physiotherapy group for this randomize control trial study. The study was conducted at musculoskeletal department of CRP, Savar. Visual Analogue Scale was used to measure pain intensity in different functional position and Goniometer to measure ROM. Unrelated "t" test was used to compare the result in ROM analysis and Pain was analyzed by Calculating mean difference between two groups. *Results:* Following treatment the study found significant improvement of pain. In Experimental group, Mean difference of reduction of resting pain was 4.28 which were 2.29 more than Mean difference in control group. Also there was significant improvement of pain in sitting, forward bending, turning, travelling and sleeping, as the mean difference were consecutively 2.56, 1.57, 1.85, 0.86 and 0.86 more than control group. Researcher also found significant Improvement of ROM In case of neck flexion ($p<.0.001$), extension ($p<0.01$), right side bending ($p<0.02$), left side bending ($p<0.001$), left side rotation ($p<0.001$) but not statistically significant improvement has been found in Right side rotation of neck. *Conclusion:* This experimental study shows that Scapular stretching and strengthening exercises with conventional physiotherapy is more effective than conventional physiotherapy alone for patients with Chronic Neck Pain.

Key words: Chronic Neck Pain, Scapular stretching and strengthening exercise, Conventional physiotherapy.

CHAPTER-I : INTRODUCTION

1.1 Background Information

The cervical spine is the most mobile section of the vertebral column (Vernon, 1988) and has adapted to allow for maximum mobility at the cost of stability. This makes it the most vulnerable part of the spine particularly to injuries (Magee, 2006).

Bangladesh is one of the least development and most densely populated countries in the world. According to the official census held in 2001, the total population was 123.2 million compared to 109.9 million as recorded in 1991 censes (Bangladesh Buru of statistics, 2009).

Neck pain is a common disorder. About 70% of adults are experience neck pain during their lifetime, and its point prevalence in the general population is around 22% (Gemmell & Miller, 2010).

Neck pain is the second most common complaint presenting to clinical practices (Ferrari & Russell, 2003). This stems from either mechanical or degenerative problems. Any condition or event leading to altered joints or muscle structure and weakness for example, incorrect posture, injury, aging, congenital abnormalities (Haslett et al., 2002). It can result in mechanical neck pain (Bergmann et al., 1993). If excessive stress is placed on any tissue, it will also lead to pain, inflammation, protective spasms and or neurological reflex patterns (Vernon, 1988). This will in turn cause neck pain. Mechanical neck pain is frequently associated with asymmetrical restriction of the cervical range of motions and often has a history of abnormal posture or trauma (Haslett et al., 2002). There is often no single cause for the pain and the pain is regularly just a symptom and not the diagnosis of the neck problem (Bergmann et al., 1993).

Neck pain is responsible for huge personal and societal costs, and major cause of work disability. Traditionally it is belief that neck pain is a problem that always resolves itself. Recurrences are usual and their course is very variable (Moffett & Mclean, 2006).

Every joint complex has multi systemic involvement: structural (joints), supportive (muscles and ligaments) neural elements and an emotional status (Lee, 2004).When treating a spinal region it is apparent from the above researches, the surrounding structures (muscles and joints) should also be addressed (Vernon, 1988).

The upper cross syndrome is a dysfunction, which has both muscular hypertonicity (upper trapezius, pectoralis major and levator scapulae) and hypotonicity rhomboids, serratus anterior, middle and lower trapezius and deep neck flexors (Liebenson,1996). It will reduce scapula stabilization and can cause an altered scapulo-humeral rhythm, which will lead to excessive postural stress on the cervical spine (Hammer, 1991).

Many treatments are available to treat the neck pain patient. This are include medication, physiotherapy and education of the patient. Various physiotherapy treatment protocols have been established such as, stretching, mobilization, traction, ultrasound, IRR, and Myofascial release (Magee, 2006).

The scapular musculature is often neglected in designing a rehabilitation protocol for the shoulder. Weakness of the scapular stabilizers and resultant altered biomechanics could result in: 1) abnormal stresses to the anterior capsular structures of the shoulder, 2) increased possibility of rotator cuff compression, and 3) decreased performance. This article presents known facts about the biomechanics of the scapula and surrounding muscles and suggests methods for evaluation of scapular muscle weakness. Exercise techniques to maximally strengthen the scapular musculature are also described. As our ability to document strength of these muscles improves, we will be able to determine the effect of scapular strengthening on improving symptoms related to impingement and instability. Scapular strengthening exercises are usually nonstressful to the rotator cuff and are easily implemented into a rehabilitation program for the shoulder (Magee, 2006).

1.2 Rationale

Neck pain is a common problem in adults and is the most common musculoskeletal problem in people with sedentary jobs. It is also quite common in college students. Neck pain prevalence has been increasing during the past several years, behind low back pain as the most common musculoskeletal disorder.

Studies have shown an increase in neck pain with increased computer usage. College students therefore are susceptible to having neck and upper back pain because of many hours spent studying, reading, working on computers, and playing video games. They do these activities while sitting in a static position with the head bent forward, often in poorly designed chairs in classrooms, dorm rooms, or apartments. Using laptops can contribute to neck pain since the keyboard and monitor is close together, resulting in a slouched posture.

Neck pain from poor posture can be explained as follows: in an upright position the head is supported by the spinal vertebrae. Once the head is flexed forward, for instance while using a laptop, the vertebrae do not support the weight of the head as much. Muscles, tendons, and ligaments work harder to hold up the head, which is roughly the weight of a bowling ball. Over time the muscles and other soft tissues tighten up due to the excessive workload required to hold the head in position. The anterior neck muscles become weak from being stretched, and neural structures are kept in less than optimal positions. This chronic overload and tightening of soft tissues may eventually result in decreased blood flow and oxygen to the soft tissues, ultimately causing pain. Besides this, neck joints may be kept in abnormal positions which may eventually cause joint pain and muscle weakness. The manifestation of the above frequently is tension headaches and painful “knotty” spots in the neck and upper trapezius muscles (muscles that run from the neck to the shoulder blade). One may feel that just holding up the head is difficult, i.e., the head “feels so heavy.”

Scapular strengthening and stretching exercises are used to increase muscle power of neck, shoulder and to increase ROM of Neck, shoulder. It also used to maintain correct posture of spine and neck. Thus it may decrease neck muscles pain.

There is no research investigation to find out the effectiveness of scapular strengthening and stretching exercises of scapular muscles with conventional physiotherapy comparing with only for the patients with neck pain. This study is

designed to investigate the efficacy of Scapular strengthening and stretching exercises with conventional physiotherapy alone. The result of this study may help to guide Physiotherapists to give the best treatment in chronic neck pain.

1.3 Operational Definition

1.3.a Neck pain

It is a pain full condition in the neck and remote which may be localized or referred**.**

1.3.b Stretching and strengthening exercise of scapular muscles

Some programmed systemic exercises performed for enhancing gleno-humeral rhythm and joint mobility along with strengthen the muscles performing particular joint play.

1.3.c Conventional physiotherapy

Physiotherapeutic interventions that are widely accepted and commonly practiced by medical community.

1.4 List of variable

- Independent variable: Scapular Strengthening and Stretching exercise
- Dependent variable: Chronic Neck pain

1.5 Aim

Identify the effectiveness of Scapular Strengthening and stretching exercise with conventional physiotherapy for neck pain.

1.6 Objectives

1.6.a General objective

- To identify the effectiveness of Scapular Strengthening and Stretching exercises for chronic Neck pain

1.6.b Specific objective

- To evaluate the effect of pain at Scapular strengthening and stretching exercises for chronic neck pain patients using pre and post test assessment.
- To identify the improvement of range of motion for chronic neck pain patients.

1.7 Hypothesis

Scapular Strengthening and stretching exercises along with conventional physiotherapy is better than only conventional physiotherapy for the treatment of neck pain patients.

1.8 Null hypothesis

Scapular Strengthening and Stretching exercises along with conventional physiotherapy are no more effective then only conventional physiotherapy for the treatment of neck pain patients.

CHAPTER- II: LITERATURE REVIEW

2.1 Epidemiology

Neck pain of a mechanical nature is a common complaint seen by practitioners of manual medicine, who use a multitude of methods to treat the condition. It can come from a number of disorders and diseases of any structure in the neck (Gemmell & Miller, 2010). Neck pain is also referred to as cervical pain. In a More than half of people develop about of neck pain at some time in their life. A survey done in the UK found that show that adults aged 45-75 years, about 1 in 4 women and about 1 in 5 men had current neck pain (Neck pain in adults, 2006).

Average ten percent of the Canadian population reported having neck pain for one week every month (Ferrari & Russell, 2003). These researchers also stated that neck pain of unspecified duration occurred in at least 80% of the population. An epidemiological study and revealed that neck pain for longer than six months had 54.2% incidence (Cote et al., 2000). This was lower than in Finland, Norway and Sweden where an incidence of 72% was found. In America, a survey on a twelve-month prevalence of neck pain ranged from 12.1% - 71.5% in the unemployed people and in workers it ranged from 27.1% - 47.8% (Haldeman et al., 2008).

Neck pain is a common condition. Neck pain comes from a number of disorders and diseases of any structure in the neck (William, 2005). Chronic neck pain is a distressing condition with high emotional and personal costs, negatively impacting on quality of life (FTCM, 2004). "Neck pain is one of the most common problems affecting the health of Americans and is a leading reason for using complementary or alternative medical (CAM) therapies" (Evaluating Therapeutic Massage for Chronic Neck Pain, 2005).

Systematic reviews of commonly used treatments for neck pain, including medication, physiotherapy, exercise, local injections and patient education, have shown that their effectiveness remains open to question. At any specific time, 12% of the adult female population and 9% of the adult male population experience pain in the neck, with or without associated arm pain and 35% of people can recall an episode of neck pain (Bland, 1994).

About 15% of people in a hospital based physiotherapy service and 30% of patients in a chiropractic service are being treated for neck pain (Gross et al., 2000). So neck pain is a very common condition and is more frequently seen in women than men (Pillinger & Rutherford, 2005). More than half of the population develops about of neck pain at some time in their life. Acute (Sudden onset) bouts of neck pain are seen due to minor injuries or bad posture and full recovery occurs in most cases. The usual advice is to keep the neck active as possible. Chronic (Persistent) pain develops in some cases and future treatment may then be needed (Patient UK, 2005).

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).

Pain in the neck is such an everyday events that it is often used to describe a situation, certain people an unpleasant job to be done, or an institution (Bland, 1987). Neck is made up of bones, muscles, ligaments, nerves, and blood vessels that help to support the head. Muscles in the neck and shoulders play an important role in maintaining a healthy neck. Many different structures in the neck are capable of causing pain. Poor posture, injuries, arthritis or stress may contribute to your neck problems, causing

pain and Hunting the ability to perform the daily activities. (National Healthcare Group, 2003).

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 patients who present with neck pain have "non-specific (simple) neck pain," where symptoms have a postural or mechanical basis. Etiological factors are poorly understood and are usually multifactorial, including poor posture, anxiety, depression, neck strain, and sporting or occupational activities. Neck pain after whiplash injury also fits into this category, provided no bony injury or neurological deficit is present. When mechanical factors are prominent, the condition is often referred to as "cervical Spondylosis," Randomized controlled trials identified by systematic reviews provide moderate evidence that various exercise regimens using proprioceptive, strengthening, endurance, or coordination exercises are more effective than usual care (analgesics, non-steroidal anti-inflammatory drugs, or muscle relaxants (Ylinen, 2003).

2.2 Anatomy of cervical spine

Functional anatomy by definition is the interpretation of physical properties of anatomical structure according to their functional purpose (Bland,1994).

The anatomy of the cervical spine has characteristics quite different from those of the thoracic or lumbar spine (Kesson, 1995). 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 (Bland, 1994). The cervical spine permits a wide range of motion for the head in relation to the trunk (McKenzie, 1989).

The neck contains the top end of the spinal column or spine, which supports the head and also protects the spinal cord. The 7 bones in the neck are known as cervical vertebrae. Between the bones are discs of gristle (cartilage) known as intervertevral discs. The sides of the bones are linked by facet joints. Many ligaments and muscles are attached to the spine and fan out from the neck to the shoulder blades and back (Frankel, 1989).

There are seven vertebrae that are the bony building blocks of the spine in the neck (the cervical vertebrae) that surround the spinal cord and canal. Between these

vertebrae are discs, and nearby pass the nerves of the neck. Within the neck, structures include the neck muscles, arteries, veins, lymph glands, thyroid gland, parathyroid glands, esophagus, larynx, and trachea (Shiel, 2005).

In other word we can say that the neck (cervical spine) is composed of vertebrae which begin in the upper torso and end at the base of the skull. The bony vertebrae along with the ligaments (like thick rubber bands) provide stability to the spine. The muscles allow for support and motion. The neck has a significant amount of motion and supports the weight of the head (Neck Pain, 2000).

2.3 Definition of pain

Pain is a specific sensation brought about by damage or threat of damage. Although of causes there is no outside form of energy called pain. International Association of the Study of Pain (ASP) defines as "An unpleasant sensory and emotional experience associated with actual or potential tissue damage or described in term of such damage. It state explicitly that pain always has a subjective component. It is both of physiologic sensation and an emotional reaction to that sensation" (Komald & Kanner, 1997).

Pain is a sensation plus is action to that sensation either physical or psychological issue is at play in suffering and pain may be only a small component In the concept of (Komald & Kanner, 1997). Defining pain is somewhat difficult. Pain has been described as the perception of noxious stimuli or the distressing sensations that result from tissue damage. Perhaps the most useful definition is that suggested by Margo mccaffery, pain is "Whatever the experiencing person says it is and exists whenever he says it does" (Wallace, 1980)

2.4Types of pain

The report of the Quebec Task Force recommends the adoption of a revised formula for classifying acuteness of spinal disorders (Mckenzie, 1990). Acute pain is usually temporary, of sudden onset and localized (Fritz, 2000). Acute pain present for less than seven days. Sub acute pain present for seven days to seven weeks. Chronic pain is pain present for longer than seven weeks (Mckenzie, 1990).

When pain lasts for a long time, it is called chronic pain (ANS, 2005). Chronic pain is that persists or recurs for indefinite periods, usually for longer than 6 months (Fritz, 2000). Others say that pain is often of less intensity than acute pain but is of long duration (Wallace, 1980). Chronic pain can take away our strength and sprit and can

put relationships with the people closest to you at risk. Chronic pain is a major health problem for appropriately 25% of the population (ANS, 2005)

Chronic pain is defined as “Pain lasting for long periods of time and commonly persists beyond the time of healing of an injury and frequently there may not be any clearly identifiable cause” (Ready & Edwards, 1992)

Today, chronic pain is one of the most critical healthcare issues in the world. In the United States alone, more than 100 million people suffer with some type of chronic pain. More than half of these chronic pain sufferers are particularly or totally disabled. In fact, chronic pain disables more people than cancer or heart disease. Chronic pain takes its tool on personal lives, healthcare resources and the economy. This has led to the United States Congress to declare this decade the “Decade of Pain Control and Research” (ANS, 2005).

2.5 Mechanism of pain production

Pain is produced either by chemical or mechanical stimulus of free nerve ending. Chemical, mechanical trauma, tissue damage and deformation, postural stress and abnormal forces are causes pain (Mckenzie, 1990).

2.6 Causes of neck pain

Neck pain may result from abnormalities in the soft tissues. Soft tissues are the muscles, ligaments and nerves around the spine. The most common causes of neck pain are soft tissue abnormalities due to injury or prolonged wear and tear. In rare cases, infection or tumors may cause neck pain. In some people, neck problems may be the source of pain in the upper back, shoulders or arms. Degenerative and inflammatory diseases that cause of neck pain include osteoarthritis and rheumatoid arthritis. Osteoarthritis usually occurs in older people as a result of wear of the joints in the neck. Both of these major types of arthritis can cause stiffness and pain. Cervical disc degeneration also can cause pain. The disc act as a shock absorber between the bones in the neck. In cervical disc degeneration (typically age 40 onwards), the normal gelatin like centre of the disc degenerates and the space between the vertebrae narrows. As the disc space narrows, added stress is applied to the joints of the spine causing further wear and degenerative disease. The cervical disc may also protrude and cause pressure on the spinal cord or nerve roots when the rim of the disc weakens. This is known as a herniated cervical disc (AAOS, 2000)

Falling asleep in an awake position and prolong use of a computer keyboard also causes of neck pain (Pillinger & Rutherford, 2005). The neck is so flexible and because it supports the head, it is extremely vulnerable to injury. Motor vehicle or diving accidents, contact sports and falls may result in the neck injury (AAOS, 2000).

There are several theories about why so many people suffer neck pain, but they are not supported by scientific proof. For most people, no specific reason for the pain can be found (Pillinger & Rutherford, 2005)

2.7 Mechanical cause of neck pain

Mechanical neck pain is the most common type of chronic neck pain. Causes include minor injuries or sprains to muscles or ligaments in the neck. Poor posture is also a common cause. Neck pain is more common in people who spend much of their working day at a desk with a bend forward posture (Patient UK, 2005).

Pain is experience as soon as mechanical deformation of innervated structure is sufficient to irritate free nerve endings. Pain will arise by the application of forces sufficient to stress or deform the structures. It is not necessary to actually damage tissues containing the free nerve ending in order to provoke pain. Pain will disappear when the application of the force is terminated and this often occurs by a mere change of position. A good example is the pain incurred during prolonged sitting which disappears on standing upright (Mckenzie, 1990).

Whiplash is a mechanical cause of neck pain. This type of injury often follows a rear-end collision in a car. In this type of collision, first the body is carried forward and the head flips backwards. Then, as the body stops, the head is thrown forwards. Following a whiplash injury there is often a delay before the pain and stiffness start (What is in this booklet, 2004). "A whiplash injury, most commonly due to a car crash, causes neck pain" (Neck pain in adults, 2006).

2.8Common symptoms of mechanical neck pain

- “General pain located in the neck area as well as stiffness in the neck muscles.
- The pain may radiate down to the shoulder or between the shoulder blades.
- It may also radiate out into the arm, the hand or up into the head causing a one sided or double side headache.
- The muscles in the neck are tense, sore and feel hard to the touch.

- Acute pain can give rise to abnormal neck posture in which the head is forced to turn to one side and the condition is known as torticollis.
- There may be a prickly or tingling sensation in the arms and fingers" (Pillinger & Rutherford, 2005)

2.9 Pathological causes of neck pain

Injury or degeneration affecting muscles or ligaments, soft tissue strain [The term cervical Spondylosis is commonly used for these conditions. Degenerative diseases that cause neck pain include osteoarthritis and rheumatoid arthritis. Cervical disk degeneration also can cause neck pain (Neck Pain, 2000). Osteoarthritis is one of the most common types of arthritis. Anyone can be affected; however, since osteoarthritis is the result of high usage of the joints of the body. Osteoarthritis is characterized by the breakdown of cartilage, the firm cushion found between two bones to stop them from grinding together (Neck and shoulder pain, 2006).

- Inflammation, for example, rheumatoid arthritis, ankylosing spondylitis.
- Infection, for example, discitis, epidural abscess, meningitis.
- Infiltration, for example, metastatic carcinoma, osteoid osteoma, spinal cord tumors (Tsang, 2001)

2.10 Other causes of neck pain

When these muscles work too hard it can cause neck pain and tension headaches (What is in this booklet, 2004). Does not mean that your neck is damaged and often it happens in people whose necks 'would appear completely normal under an x-ray. It is the most common type of neck pain and often disappears after a few days (What is in this booklet, 2004). The bad posture can cause neck pain by putting extra strain on ligaments and muscles. Standing with the shoulders slouched and chin jutted forward, working with your head down for long periods of time, slumping while seated and sleeping face-down are common postural problems that affect the neck"(Neck and shoulder pain, 2006).

There is also some cause as like If severe neck pain occurs following an injury (motor vehicle accident, diving accident, fall), a trained professional, such as a paramedic, should immobilize the patient to avoid the risk of further injury and possible paralysis. Medical care should be sought immediately (Neck Pain, 2000).

2.11 Incidence/Prevalence

"About two thirds of people will experience neck pain at some time in their lives. Prevalence is highest in middle age. In the United Kingdom about 15% of hospital based physiotherapy and in Canada 30 percent of chiropractic referrals are for neck pain. In the Netherlands, neck pain contributes up to 2 percent of general practitioner consultations" (Binder, 2005). Neck pain is a common complaint with a point prevalence from 10% to 18% and life time prevalence from 30% to 50 (Irnich et al., 2001). Neck pain is common, especially among women, and around 67% of adults will have neck pain sometime during their life. Neck pain is particularly prevalent in certain occupations, such as office work. The cost of treating neck pain in the Netherlands in 1996 was around $868m (£620m; €540m) (Viljanen et al., 2003)

"Chronic neck pain is a common complaint in the Netherlands with a point prevalence of 14.3%. Neck pain is a common complaint that causes substantial morbidity in western countries with a reported prevalence ranging from 9.5 to 22%. Of all musculoskeletal pains in the Netherlands, neck pain are one of the three most reported with a point prevalence of 21 % "(Vonk et al., 2004).

Neck pain is a common complaint, with a point prevalence of nearly 13% and lifetime prevalence of nearly 50 % (Aker et al., 1996).

2.12 Risk Factors

Most uncomplicated neck pain is associated with poor posture, anxiety and depression, neck strain, occupational injuries, or sporting injuries. With chronic pain, mechanical and degenerative factors (often referred to as cervical Spondylosis) are more likely. Some neck pain results from soft tissue trauma, most typically seen in whiplash injuries. Rarely, disc prolapsed and inflammatory, infective, or malignant conditions affect the cervical spine and present as neck pain with or without neurologic features (Binder, 2005).

2.13 Prognosis

Neck pain usually resolves within days or weeks but can recur or become chronic. In some industries, neck-related disorders account for as much time off work as low

back pain. The percentage of people in whom neck pain becomes chronic depends on the cause but is, thought to be about 10 percent, 1 similar to low back pain. Neck pain causes severe disability in 5 percent of affected people (Binder, 2005).

2.14 Effects of Scapula

The upper cross syndrome is defined as tightness of the upper trapezius, pectoralis major and levator scapulae muscles and weakness of rhomboids, serratus anterior, middle and lower trapezius and deep neck flexors (Liebenson, 1996). Tight pectoralis muscles and weakened or lengthened lower trapezius and serratus anterior cause increased protraction of the scapula and thus lack of scapula stabilization (Magee, 2006). Other postural signs of upper cross syndrome include rounded shoulders (due to shortened pectoral muscles), anterior head carriage (occurs with kyphosis of the upper thoracic spine) and elevated shoulders (as a result of shortened upper trapezius and levator scapulae and weak lower and middle trapezius muscles). All of these lead to deviation from the correct spinal posture and thus place mechanical strain on the vertebral joints (Liebenson, 1996).

The loss of scapula control as being comprised of:

a) Altered scapula-humeral rhythm. The definition of Scapula-humeral rhythm is: During 180˚ of abduction, there is a 2:1 ratio of movement of the humerus to the scapula, 120˚ of movement occurs at the glenohumeral joint and 60˚ at the scapulathoracic joint (Magee, 2006).
b) Scapula protraction along the chest wall, especially under load. Tight pectoralis muscles and weakened or lengthened lower trapezius and serratus anterior cause increased protraction of the scapula (Magee, 2006).
c) Early contraction of the upper trapezius muscle on abduction of the upper limb. When the lower trapezius muscle is weak there is an increased depression of the scapula and to counteract this fault the upper trapezius fibers have to contract early to elevate the scapula for further movement (Magee, 2006).

Poor scapula stabilization or an altered scapulo-humeral rhythm would lead to excessive stress on the cervical spine. When there is hypertonicity of levator scapulae muscle (as occurs in the upper cross syndrome) there is also a loss of cervical lordosis

and an increased occurrence of cervical degeneration (Hammer, 1991). Minor alterations in head posture have been shown to change the cervical curve when viewed on lateral radiographs (Hinwood & Richardson, 1991). Any deviation from normal posture, in which there is minimal additional stress, is capable of causing adverse strain and subsequently pain in the spinal structures (Kendal, 1993).

2.15 Management

2.14. A. Pharmacological Management

Painkillers are often helpful in the medical management of neck pain. It is best to take painkillers regularly until the pain cases. This better than taking them now and again just when the pain is very bad. If you take them regularly, that may prevent the pain from getting severe and enable you to exercise and keep your neck active (Patient UK, 2005).

There are few randomized controlled trials specifically testing drug treatments for neck pain. Paracetamol is safe and effective for the treatment of mild to moderate pain when used correctly (Prodigy Knowledge, 2005). We found insufficient evidence on the effects of analgesics, NSAIDs, antidepressants, or muscle relaxants for neck pain, although they are widely used (Binder, 2005).

There is a lack of good evidence to support the use of one NSAID over another in the treatment of neck pain. Consequently Ibuprofen, Diclofenac and Naproxen are recommended on the basis of the balances between their general efficacy and adverse effect profile, which are more favorable than for other NSAIDs. Several muscle relaxants have been studied for neck pain. Diazepam is usually the preferred choice. A short course of Diazepam is recommended because the risk of developing Benzodiazepine dependency is high (Prodigy Knowledge, 2005).

2.14. B. Physiotherapy Management

Physiotherapy is the mainstay of treatment of neck pain (David et al., 1998). Neck pain is a common complaint managed by physiotherapist (Costello & Jull, 2002). Common treatment of neck pain consists of drugs, manual treatments, physiotherapy and exercise, local and epidural injections and patient education (Irnich et al., 2001).

How neck pain is treated depends on what the diagnosis reveals. However, most patients are treated successfully with rest, medication, immobilization, physical therapy, exercise, activity modification or a combination of these methods (AAOS, 2000). Early mobilization and return to a normal active lifestyle will improve the outcomes. Poor posture should be corrected if the range of motion of the neck is restricted. A firm pillow may provide comfort at night (Prodigy Knowledge, 2005).

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 abolish pain and where appropriate, to restore normal function- that is, to regain full mobility in the neck or much movement as possible under the given circumstances. Postural correction and maintenance of the correct posture should always follow the exercise (McKenzie, 1983).

2.14. B.1. Conventional physiotherapy for neck pain

There is no clear definition of conventional physiotherapy. But Oxford Advanced Learner dictionary (1995) states that conventional means tending to follow what is done or considered 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. Groups are electrotherapy, manual therapy or mobilization and advice (Moffett, 2004)

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

In CRP outdoor physiotherapy department used traditionally, in conventional treatment

- Mechanical directional movements:
- Cervical Mobilization
- Accessory movement
- Cervical Traction
- Mulligan approach
- Infra red radiation
- Transcutaneous electrical nerve stimulation (TENS)

2.14. B.1.a. Mechanical directional movements

The McKenzie method is popular amongst physiotherapists as a management approach for spinal pain (Clare, Adams & Maher, 2004). In McKenzie 12 procedures and techniques are applied for neck pain. Those are

- Retraction (With overpressure, sitting or standing)
- Retraction and extension (With overpressure, sitting or standing)
- Retraction and extension (With overpressure, lying supine or prone)
- Retraction and extension with traction and rotation (Lying supine)
- Extension mobilization (Lying prone)
- Retraction and lateral flexion (With overpressure, sitting , standing or lying supine)
- Lateral flexion mobilization (Sitting lying supine)
- Retraction and rotation (With overpressure, sitting or standing)
- Rotation mobilization (Sitting or lying supine)
- Flexion (With overpressure, sitting or standing)
- Flexion mobilization (Lying supine)
- Cervical traction (Lying supine) (McKenzie, 1990).

2.14. B.1.b. Cervical Mobilization

A number of different mobilization techniques are used in the treatment of neck pain. There are three commonly used technique for upper cervical and seven com techniques for lower cervical spine problem.

For upper cervical spine:

- Longitudinal movement
- Posterior anterior (PA) central pressure
- PA unilateral pressure

For lower cervical spine:

- The above three
- Lateral flexion
- Transverse vertebral pressure
- Rotation
- Anterior posterior (AP) unilateral pressure (Brukner & Khan, 1993).

2.14. B.1.c. Traction

Traction may be an effective technique in any patient with neck pain. It is the treatment of choice in the cervical disc prolapsed. Traction can be performed manually by the therapist or by the machine (Brukner & Khan, 1993).

2.14. B.1.d. Mulligan approach

Sustained natural apophyseal glides (SNAGs) are described by Mulligan as useful techniques for treatment of the spinal column. However the understanding of the how or why the procedures are able to benefit patient has not widely researched (Mulligan, 2002)

Unique to this concept is the mobilization of the spine whilst is in a weight bearing position and directing the mobilization parallel to the spinal facet plan (Mulligan, 2002).

2.14. B.1.e. Infra red radiation

Therapeutic uses of infrared radiation (IRR) are pain relief and reduction of muscle spasm (Low & Reed, 2000).

2.14. B.1.f. TENS

Evidence from two small trials suggests that Transcutaneous Electrical Nerve Stimulation (TENS) or pulsed electromagnetic field therapy may provide relief from neck pain in the short term (Akter, PD et al., 1996).

2.14. B.1.g. Scapular Muscle Stretching and Strengthening Exercise Parameters

A. Exercise 1

Starting position: Stand Upright, raise your hands, keep the elbows extended, grip a therabelt over your head.

Steps:

1) Slowly try to put down your hands sideways.
2) Put it untill your both hands are in a parallel position.
3) Aboid bending your elbows.
4) Perform it 10 times per set, three sets a day.
5) Stop performing beyond painful range.

Starting position ending position

B. Exercise 2

Starting position: Stand Upright, grip one therabelt down by your unaffected hand, grip another therabelt near your neck.

Steps:

1) Slowly try to put up your affected hand upright.
2) Put it untill your elbow straight up over head.
3) Aboid bending your elbows.
4) Perform it 10 times per set, three sets a day.

5) Stop performing beyond painful range.

Starting position Ending Position

C. Exercise 3

Starting position: Stand Upright, grip one end of therabelt by your affected hand keeping elbow bend, another end tied with a piller.

Steps:

1) Slowly try to pull it back.
2) Pull it upto the last limit of your shoulder moving back.
3) Aboid keeping your elbows straight.
4) Perform it 10 times per set, three sets a day.
5) Stop performing beyond painful range.

Starting position ending position

D. Exercise 4

Starting position: Stand Upright, grip one end of therabelt by your affected hand keeping elbow straight, another end tied with a piller.

Steps:

1) Slowly try to pull it back.
2) Pull it upto the last limit of your shoulder moving back.
3) Aboid keeping your elbows bend.
4) Perform it 10 times per set, three sets a day.
5) Stop performing beyond painful range.

Starting position ending position

E. Exercise 5

Starting position: Stand Upright, grip one therabelt down by your unaffected hand beyond your neck, grip another therabelt by your affected hand in front of face.

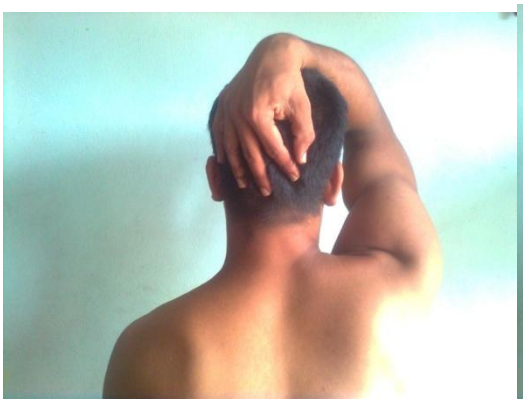
Steps:

1) Slowly try to pull your affected hand iforward.
2) Pull it untill your elbow straight in front of your face.
3) Aboid bending your elbows.
4) Perform it 10 times per set, three sets a day.
5) Stop performing beyond painful range.

Starting position ending position

Scapular Stretching Exercises

F. Exercise 6:- Scapular Stretching Exercises.



Starting position ending position

G. Exercise 7:-

Starting Position ending position

H. Exercise 8:-

Starting position ending position

CHAPTER-III: METHODOLOGY

3.1 Study Design

The study was conducted by using a quantitative randomized control trial design with two different subject groups.

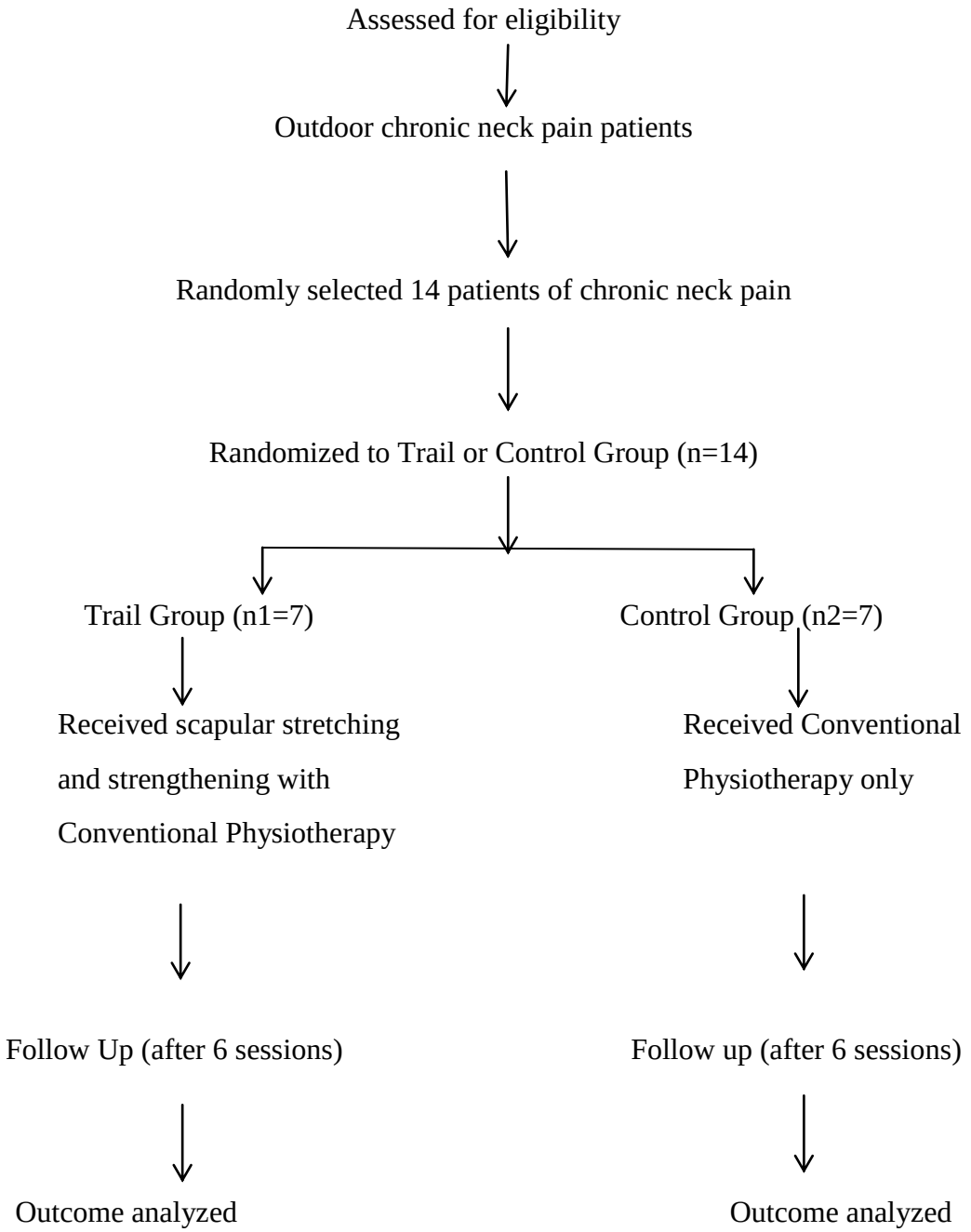
The study was randomized control trial between different subject designs. Both groups received a common treatment regimen except one intervention. Only the experimental group received the scapular strengthening and stretching exercises while in control group only conventional physiotherapy treatment program was given.

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

r o x o (experimental group)

r o o (control group)

Flowchart of the phases of randomized controlled trial:-



A flowchart for a randomized controlled trial of a treatment program including conventional physiotherapy with stretching and strengthening exercise of scapular muscles for patient with Chronic Neck pain.

3.2 Study area

Physiotherapy musculoskeletal outdoor department of Centre for the Rehabilitation of the Paralyzed (Savar), Dhaka-1343.

3.3 Study Population

A population refers to the entire group of people or items that meet the criteria set by the researcher. The populations of this study were the chronic neck pain patients.

3.4 Sample selection

Subjects, who met the inclusion criteria, were taken as sample in this study. Fourteen patients with neck pain were selected from outdoor musculoskeletal physiotherapy department of CRP (Savar). From the outdoor patients with chronic neck pain, 14 patients randomly selected from outdoor musculo-skeletal unit, CRP and then 7 patients with chronic neck pain were randomly assigned to Scapular stretching and strengthening exercises with conventional physiotherapy group and 7 patients to the only conventional physiotherapy group for this randomize control trial study. The study was a single blinded study. When the samples were collected, the researcher randomly assigned the participants into experimental and control group, because it improves internal validity of experimental research. The samples were given numerical number C1, C2, C3 etcfor the control and E1, E2, E3 etc for experimental group.Total 14 samples included in this study, among them 7 patients were selected for the experimental group (received scapular strengthening and stretching exercises with conventional physiotherapy) and rest 7 patients were selected for control group (conventional physiotherapy only).

3.5 Inclusion criteria

- The participants were those individuals who continued physiotherapy treatment and completed at least six sessions.
- Patients with all age range.
    - Both sexes.
    - Voluntary participants.
    - Participants with having central neck pain.
    - Any neck pain patients with dysfunction.

3.6 Exclusion criteria

- Subjects who had not completed six session of physiotherapy treatment.
- Pain radiating to the limb.
- The participants had any experienced of recent trauma.
- Any Contraindication are found-

✓ Vertebral malignancy

✓ Bone infections

✓ Fracture

✓ Joint irritability

✓ Osteoporosis

✓ Osteopenia

✓ Pregnancy

✓ Hypertension

✓ Spinal tumors

- Structural abnormality or any deformity.
- Subject who had the history of taking oral NSAID, muscles relaxants or corticosteroid injection previously.
- Any pathological lesion on cervical, thoracic or shoulder joint.
- Surgery to the neck or thoracic spine.

3.7 Survey a conventional physiotherapy

Survey is a preliminary run of the main study to highlight any problems which can then be corrected and it is important always to run some pilot study before beginning the experiment. So, the researcher performed a survey before beginning the main study and the aim of this survey was to define the list of conventional physiotherapy treatment is provided by musculoskeletal department of CRP for managing the case of neck pain. Researcher took one week for survey and visited the CRP musculoskeletal department of physiotherapy and consulted with relevant qualified physiotherapist to identify the conventional physiotherapy used for neck pain. The researcher formulated a list of evidence based physiotherapy interventions of neck pain and provided those

to the physiotherapist to mark the interventions commonly used as conventional physiotherapy for neck pain. After finishing the survey, researcher became able to find out the conventional physiotherapy interventions used for neck pain and their frequency of use, with the consent of eight clinical physiotherapists.

List of the conventional Physiotherapy treatment for neck pain:-

1) Mechanical directional movements,

2) Cervical Mobilization,

3) Myofascial release,

4) Accessory movement,

5) Cervical Traction,

6) Mulligan approach,

7) Infra red radiation,

8) Transcutaneous electrical nerve stimulation (TENS) were the most commonly used interventions,

9) Cervical manipulation,

10) Oral NSAID were the second most commonly used interventions and the frequency was 75-99%.

3.8 Method of data collection

3.8.1 Data collection tools

A written questionnaire, pen, paper and thera bend, goniometer were used as data collection tools in this study.

3.8.2 Questionnaire

The questionnaire was developed under the advice and permission of the supervisor following certain guidelines. There were six close ended questions with visual analogue scale (VAS) and

6 another questions for measuring range of motion of neck in different directional movement. First 6 questions were formulated to identify the change of pain with each activity and 6 another question for range of motion measurements. All questions were related to pain, functional activity and range of motion of neck.

3.8.3 Measurement tool

Visual Analogue Scale (VAS)-In this study researcher used visual analogue scale for measuring the intensity of pain. The VAS is a simple and accurate way of subjectively assessing pain along a continuous visual spectrum. VAS consists of a straight line on which the individual being assessed marks the level of pain. The ends of the straight line are the extreme limits of pain with 0 representing no pain and 10 representing the worst pain ever experienced. According to Myles (1999: 1517), the visual analog scale (VAS) is a tool widely used to measure pain and a change in the visual analog scale score represents a relative change in the magnitude of pain sensation.In this study researcher used Goniometer for measuring the Range of Movement (ROM) of neck flexion, extension, right side flexion, left side flexion, and both rotation. The Goniometer is a simple and accurate way of objective assessment of ROM.

3.8.4 Data collection procedure

The study procedure was conducted through assessing the patient, initial recording, treatment and final recording. After screening the patient at department, the patients were assessed by qualified physiotherapist. Four sessions of treatment was provided for every subject. Fourteen subjects were chosen for data collection according to the inclusion criteria. The researcher divide all participants into two groups and coded C1 (7) for control group and E1 (7) for experimental group. Experimental group received conventional physiotherapy with scapular stretching and stretching exercises and control group received only conventional physiotherapy.

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

At the end of the study, specific test was performed for statistical analysis.

3.8.5 Intervention protocol (Trial Group)

A common intervention program was executed for both groups as conventional physiotherapy, it includes-Mechanical directional movements, Mobilization, myofascial release, Accessory movement, Traction, Mulligan approach, Infra red radiation, Transcutaneous electrical nerve stimulation (TENS), which are the most frequently, used interventions. In this study, the experimental group was treated with scapular strengthening and stretching exercises in addition with conventional physiotherapy. Scapular strengthening and stretching exercises and conventional physiotherapies both were given by clinical physiotherapist. Each group got 6 sessions of treatment, where the experimental group was provided with scapular strengthening and stretching exercises for 6 times along with conventional physiotherapy treatment.

Repetition for strengthening - 10 times in 1 time and gradually increased 15-20 times and 3 times per day.

Repetition for stretching – hold 10 seconds at a time and gradually increase 15-30 seconds. 3 time per day.

3.9 Ethical consideration

Research proposal was submitted for approval to the administrative bodies of ethical committee of CRP. Again before beginning the data collection, researcher was obtained the permission from the concerned authorities ensuring the safety of the participants. In order to eliminate ethical claims, the participants were set free to receive treatment for other purposes as usual. Each participant was informed about the study before beginning and given written consent.

3.10 Informed Consent

The researcher obtained 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 were completely free to decline answering any question during the study and were free to withdraw their consent and terminate participation at any time. Withdrawal of participation from the study would not affect their treatment in the physiotherapy department and they would 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.

3.11 Data analysis

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

All participants were code according to group to maintain participant's confidentiality. All subjects of both experimental and control group score their pain intensity on visual analogue scale before starting treatment and after completing treatment. Reduction of pain intensity for both groups is the difference between pre-test and post-test score.

Experimental studies with the different subject design where two groups are used and each tested in two different conditions and the data is interval or ratio should be analyzed with unrelated ‟t„ test. As it was experimental and had unmatched groups of different subjects, who was randomly assigned to conventional physiotherapy with Scapular stretching and strengthening exercises and only conventional physiotherapy group and the measurement of the outcome came from collecting VAS score, with considering interval or ratio data, so the parametric unrelated ‟t„ test was used in this study to calculate the level of significance. Unrelated ‟t„ test and mean difference was calculated to test the hypothesis on the basis of following assumptions-

- Data were ratio
- Two different set of subjects in two conditions

The ‟t„ formula-

$$t = \frac{\bar{x}_1 - \bar{x}_2}{\left[\sqrt{\frac{\left(\sum x_1{}^2 - \frac{(\sum x_1)^2}{n_1}\right) + \left(\sum x_2{}^2 - \frac{(\sum x_2)^2}{n_2}\right)}{(n_1 - 1) + (n_2 - 1)}} \times \sqrt{\left(\frac{1}{n_1} + \frac{1}{n_2}\right)}\right]}$$

Where

$\overline{x}_1$ = mean of scores from treatment group.

$\overline{x}_2$ = mean of scores from control group.

$\sum x_1{}^2$= the square of the each individual score from treatment group totaled.

$\sum x_2{}^2$= the square of the each individual score from control group totaled.

$(\sum x_1)^2$= the total of the individual score from treatment group squared.

$(\sum x_2)^2$= the total of the individual score from control group squared.

n_1= number of subjects from treatment group.

n_2= number of subjects from control group.

3.12 Significant level

In order to find out the significance of the study, the researcher calculated the 'p' value. The p values refer 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 levels, the results are said to be significant.

Calculating the degree of freedom from the formula:

Degrees of freedom (df) = (n1-1) + (n2-1) = (7-1) + (7-1) = 12

df	.1	.05	.025	.01	.005	.005
12	1.356	1.782	2.179	2.681	3.005	4.318

Table-1: Level of significance for one tailed hypothesis

3.13 Elimination of confounding variables

Confounding variable has an effect on the study variables which can affect the result of the study. There were some confounding variables in this study such as patient's age, history of taking recent physiotherapy intervention, oral NSAID, steroid injection or other treatment which could influence the result of the study. Researcher found no significant difference between the mean age of two groups and the mean age of control group was 43year and mean age of trial group was 44year, so there was no effect of age which can influence the result. To control the confounding variables, researcher set the inclusion criteria as to include only those subjects who have no history of taking recent physiotherapy intervention, oral NSAID, steroid injection or other treatment.

3.14 Limitations

- The main limitation of this study was its short duration.
- The study was conducted with 14 patients of chronic neck pain, which was a very small number of samples in both groups and was not sufficient enough for the study to generalize the wider population of this condition.
- It is limited by the fact daily activities of the subject were not monitored which could have influenced. Researcher only explored the effect of scapular strengthening and stretching exercise after 6 sessions, so the long term effect of treatment was not explored in this study.
- The research was carried out in CRP Savar such a small environment, so it was difficult to keep confidential the aims of the study for blinding procedure. Therefore, single blinding method was used in this study.
- There was no available research done in this area in Bangladesh. So, relevant information about chronic neck pain with scapular strengthening and stretching exercises for Bangladesh was very limited in this study.

Fourteen patients with chronic neck pain were enrolled in the study. 7 in the scapular strengthening and stretching exercises with conventional physiotherapy treatment group (experimental group) and 7 in the only conventional physiotherapy treatment group (control group). The all subjects of both experimental and control group scored their pain on visual analogue scale before and after completing treatment.

Mean age of the participants

Experimental group		**Control group**	
Subjects	**Age(Year)**	**Subjects**	**Age(Year)**
E1	38	C1	34
E2	45	C2	50
E3	58	C3	42
E4	42	C4	45
E5	48	C5	38
E6	32	C6	43
E7	47	C7	52
Mean Age	**44 Year**	**Mean Age**	**43 Year**

Table 1:- Mean age of the participants of experimental and control group

Sex of the participants

14 patients with Chronic neck pain were included as sample of the study, among them almost 57% (n=8) were male and about 43% (n=6) were female.

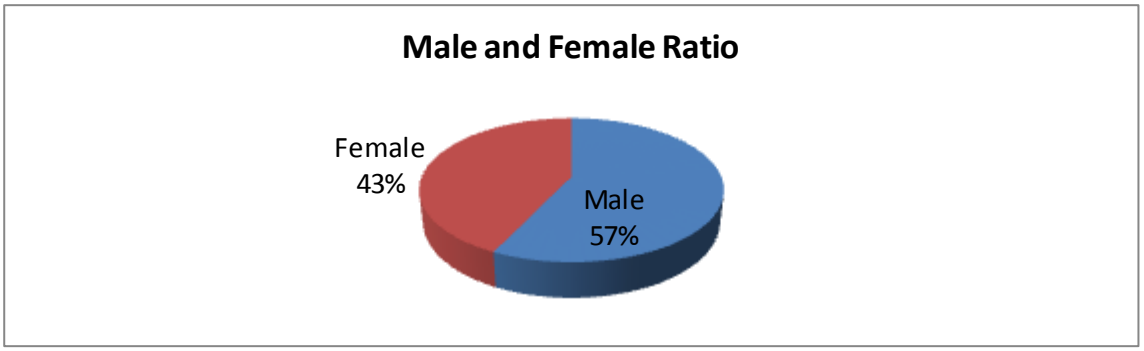


Figure 1: - Involvement of Sex

Pain at Neck resting position

Reduction of pain scores in conventional physiotherapy with scapular strengthening and stretching exercises of scapular muscles and only conventional physiotherapy group in the general pain intensity were differences between pre-test and post-test pain scores.

Control Group:-

Pain Level at Vas Scale	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Pre test				1 Person (14%)		2 Persons (29%)	2 Persons (29%)	1 Person (14%)	1 Person (14%)	
Post test		1 Person (14%)		3 Persons (43%)	1 Person (14%)	2 Persons (29%)				

Table 2:- Pain level percentage pre and post test during rest at control group

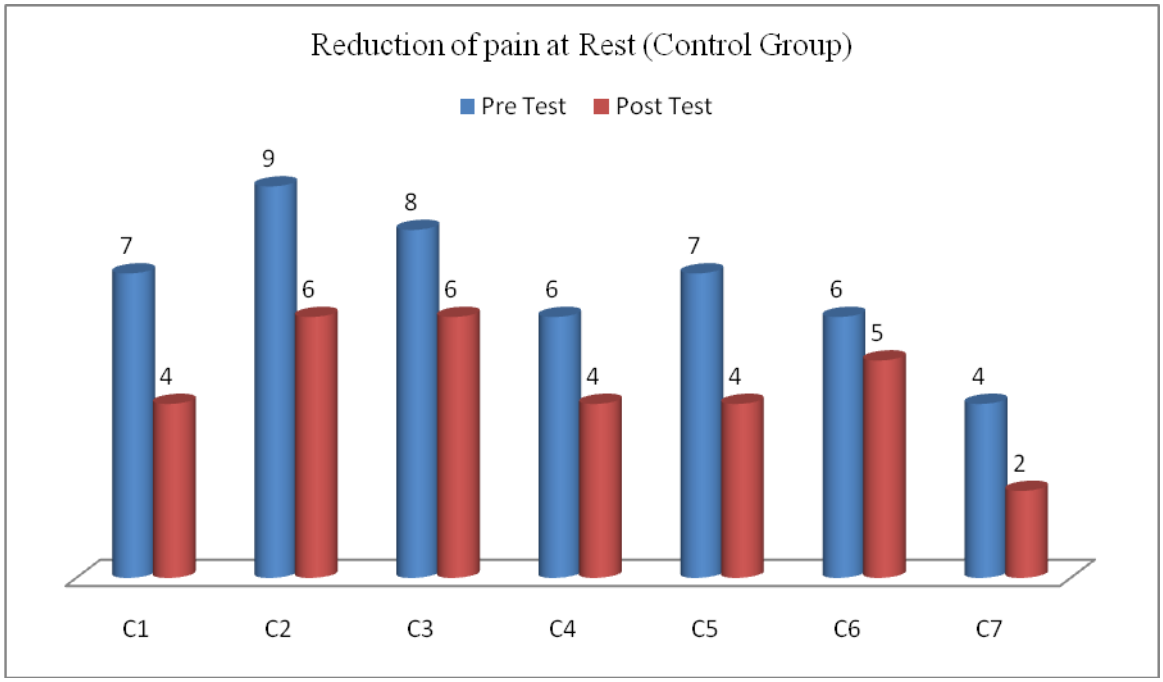


Figure 2:- Comparison pre and post test pain level during rest (Control Group)

Experimental Group

Pain level at VAS Scale	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Pre test						3 Persons (43%)	2 Persons (28%)	2 Persons (29%)		
Post test	1 Person (14%)	2 Persons (29%)	3 Persons (43%)	1 person (14%)						

Table 3:- Pain level percentage pre and post test during rest at experimental group

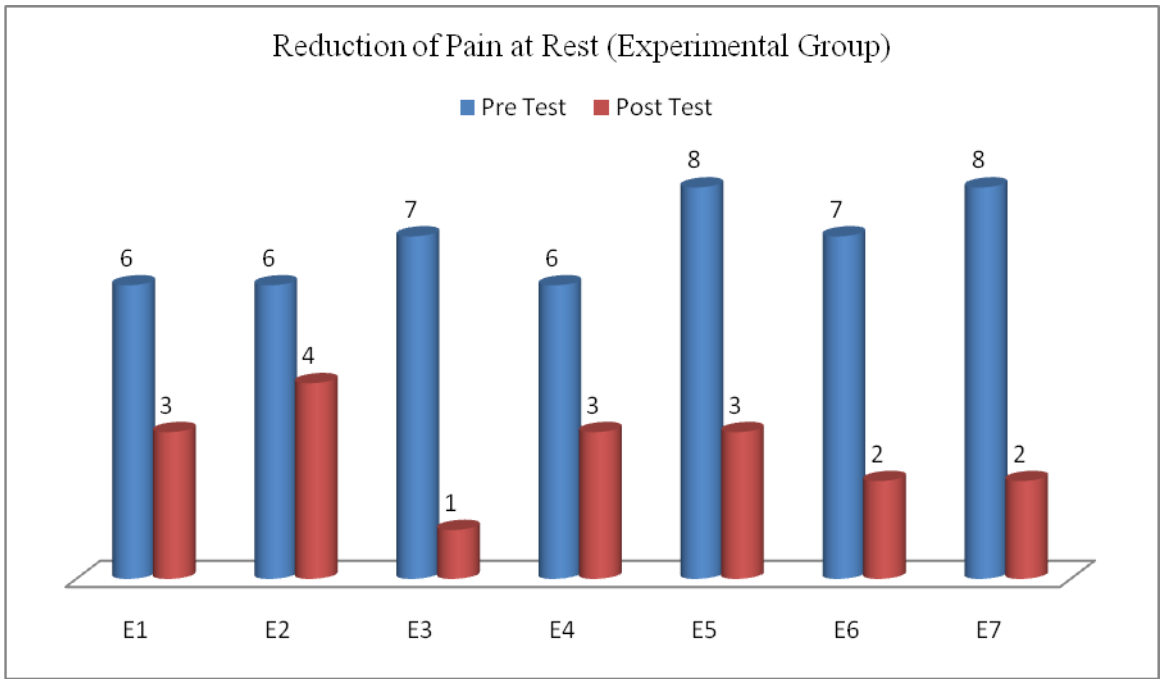


Figure 3:- Comparison pre and post test pain level during rest (Experimental Group)

Pain at Neck during sitting

Reduction of pain scores in conventional physiotherapy with scapular strengthening and stretching exercises of scapular muscles and only conventional physiotherapy group in the general pain intensity were differences between pre-test and post-test pain scores.

Control Group

Pain level at VAS Scale	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Pre test					1 Person (14%)	2 persons (29%)	1 person (14%)	2 persons (29%)	1 person (14%)	
Post test		1 person (15%)		1 person (14%)	3 persons (43%)	1 person (14%)	1 person (14%)			

Table 4:- Pain level percentage pre and post test during sitting at control group

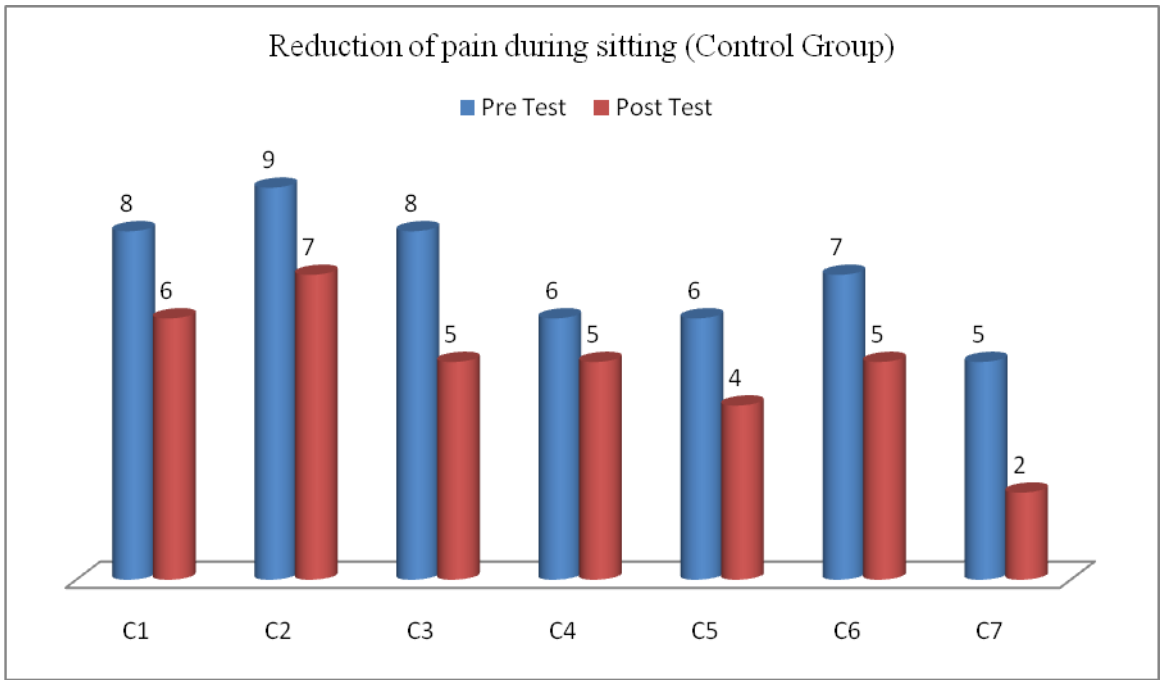


Figure 4:- Comparison pre and post test pain level during sitting (Control Group)

Experimental Group

Pain level at VAS Scale	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Pre test						4 persons (57%)	1 person (14%)	2 persons (29%)		
Post test	2 persons (28%)	2 persons (29%)	3 persons (43%)							

Table 5:- Pain level percentage pre and post test during sitting at experimental group

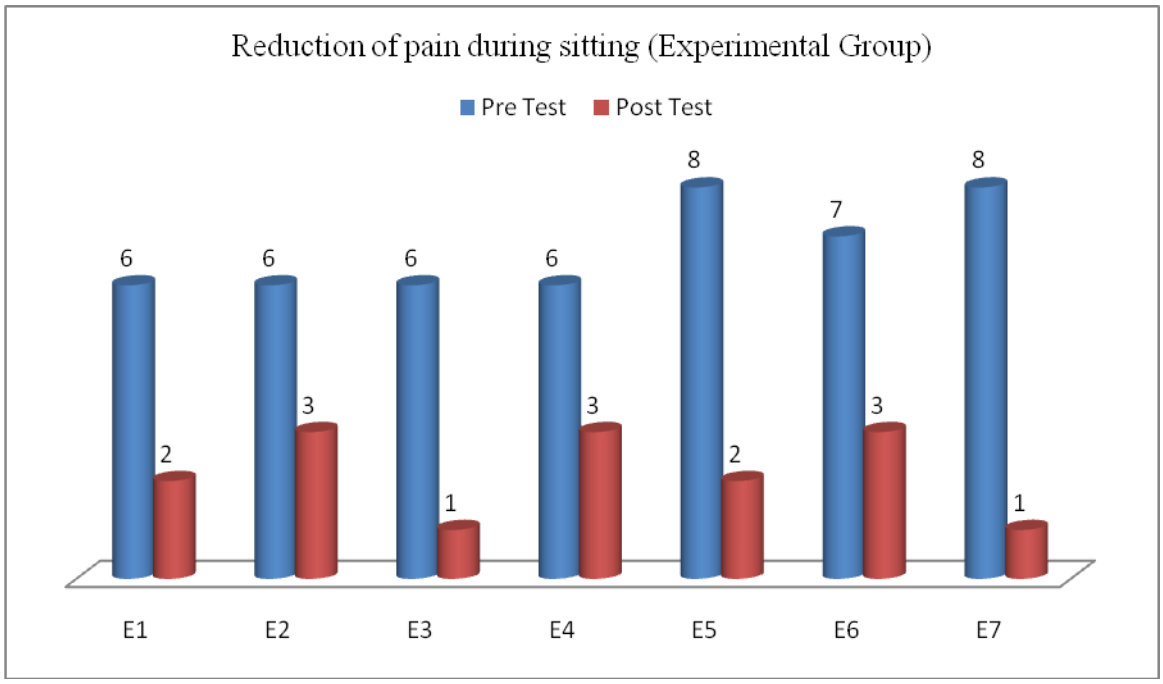


Figure 5:- Comparison pre and post test pain level during sitting (Experimental Group)

Pain at Neck during forward bending

Reduction of pain scores in conventional physiotherapy with scapular strengthening and stretching exercises of scapular muscles and only conventional physiotherapy group in the general pain intensity were differences between pre-test and post-test pain scores.

Control Group

Pain level at VAS Scale	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Pre test						1 person (14%)	1 person (14%)	2 persons (29%)	2 persons (29%)	1 person (14%)
Post test				3 persons (43%)	1 person (14%)	1 person (14%)	2 persons (29%)			

Table 6:- Pain level percentage pre and post test during forward bending at control group

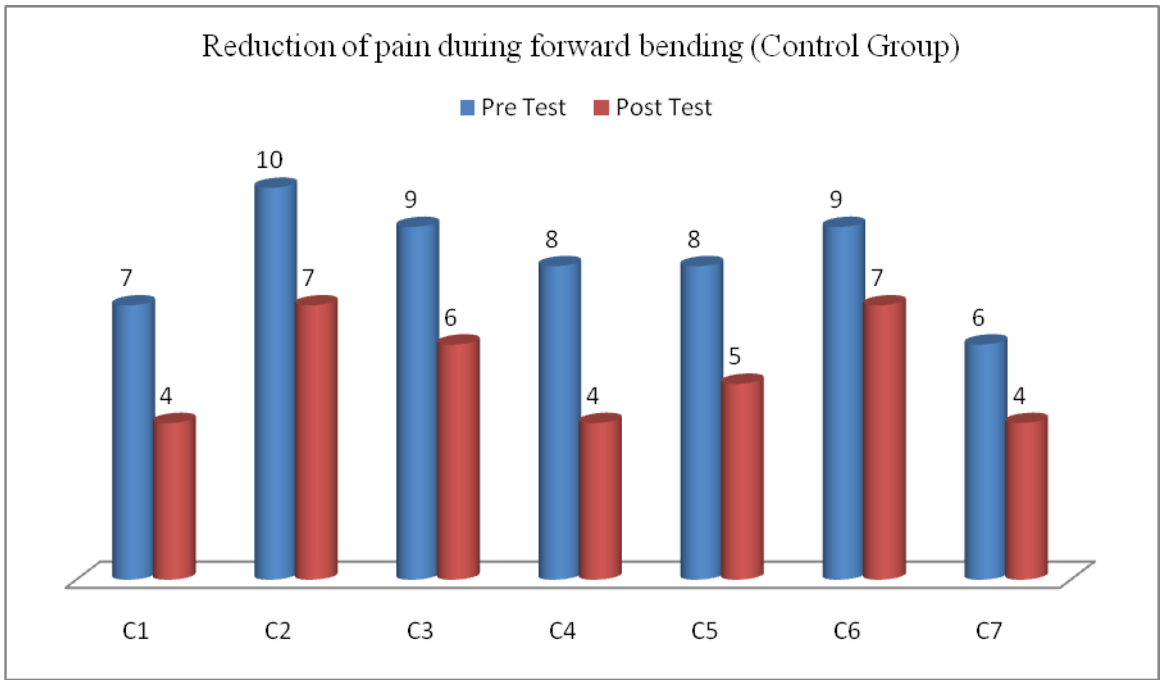


Figure 6:- Comparison pre and post test pain level during forward bending (control Group)

Experimental Group

Pain level at VAS Scale	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Pre test							1 person (14%)	3 persons (43%)	3 persons (43%)	
Post test		1 person (14%)	2 persons (29%)	2 persons (29%)	1 person (14%)	1 person (14%)				

Table 7:- Pain level percentage pre and post test during forward bending at experimental group

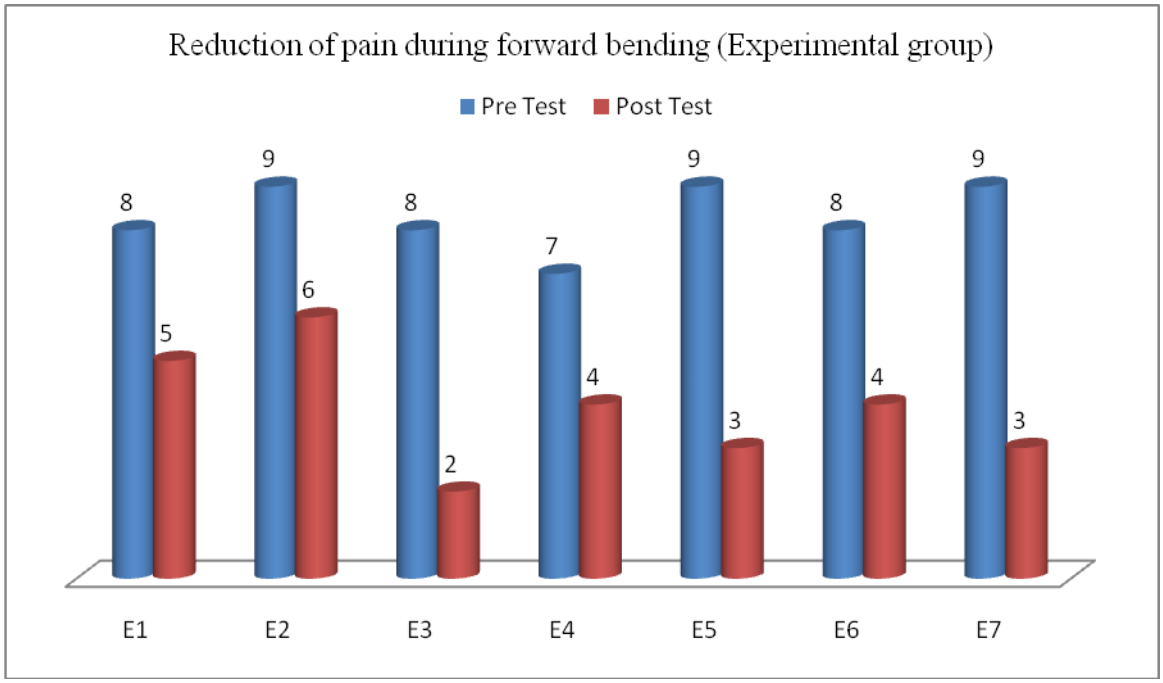


Figure 7:- Comparison pre and post test pain level during forward bending (Experimental Group)

Pain at Neck during turning

Reduction of pain scores in conventional physiotherapy with scapular strengthening and stretching exercises of scapular muscles and only conventional physiotherapy group in the general pain intensity were differences between pre-test and post-test pain scores.

Control Group

Pain level at VAS Scale	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Pre test						1 person (14%)	2 persons (29%)	3 persons (43%)	1 person (14%)	
Post test				1 person (15%)	4 persons (57%)	1 person (14%)	1 person (14%)			

Table 8:- Pain level percentage pre and post test during turning at control group

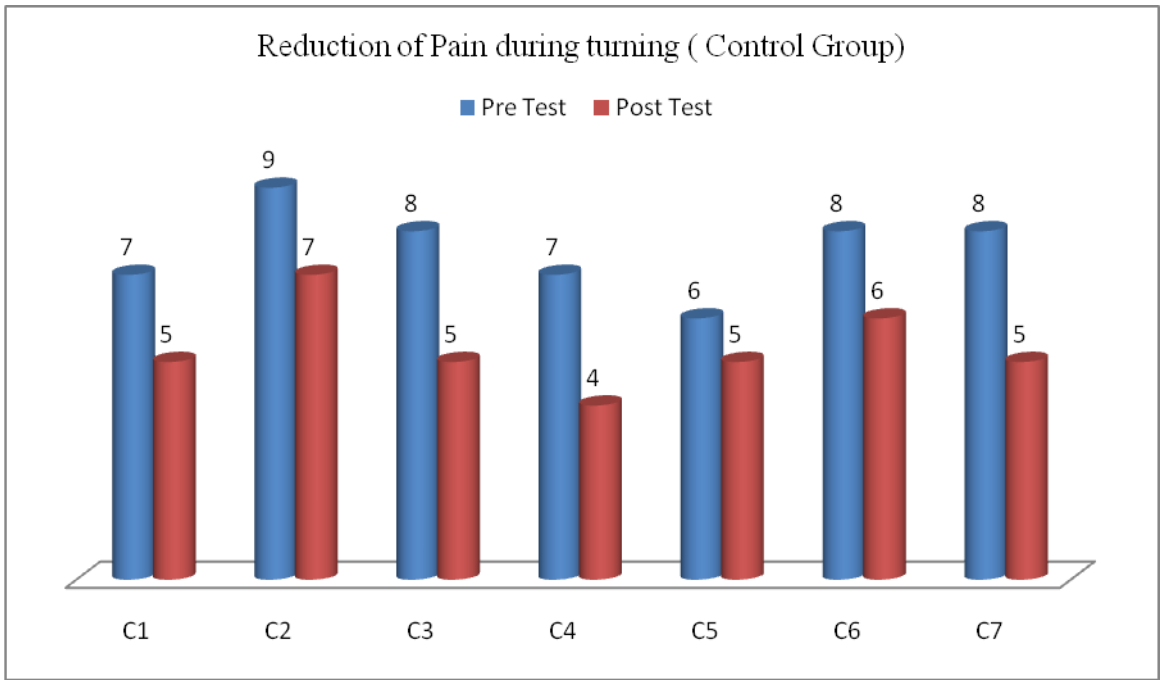


Figure 8:- Comparison pre and post test pain level during turning (Control Group)

Experimental Group

Pain level at VAS Scale	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Pre test						1 person (14%)	3 persons (43%)	3 persons (43%)		
Post test	1 person (14%)	1 person (14%)	3 persons (43%)		2 persons (29%)					

Table 9:- Pain level percentage pre and post test during turning at experimental group

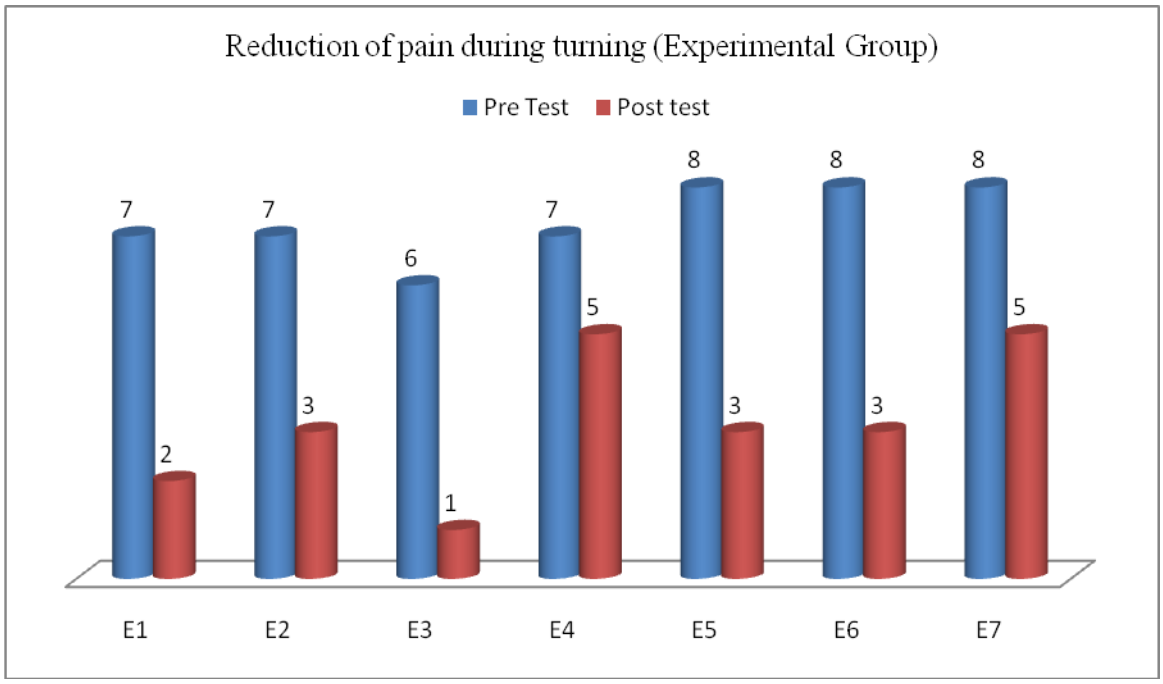


Figure 9:- Comparison pre and post test pain level during turning (Experimental Group)

Pain at Neck during travelling

Reduction of pain scores in conventional physiotherapy withscapular strengthening and stretching exercisesof scapular muscles and only conventional physiotherapy group in the general pain intensity were differences between pre-test and post-test pain scores.

Control Group

Pain level at VAS Scale	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Pre test						2 persons (28%)	2 persons (29%)	1 person (14%)	2 persons (29%)	
Post test			1 person (15%)		4 persons (57%)	1 person (14%)	1 person (14%)			

Table 10:- Pain level percentage pre and post test during travelling at control group

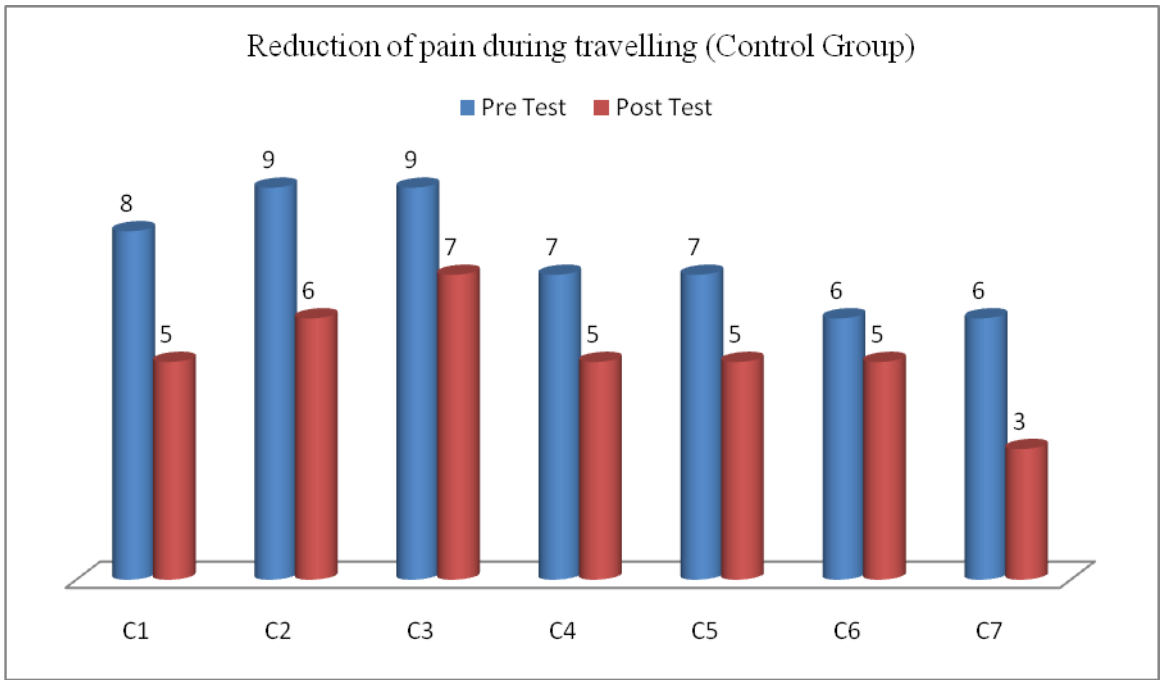


Figure 10:- Comparison pre and post test pain level during travelling (Control Group)

Experimental Group

Pain level at VAS Scale	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Pre test						1 person (14%)	3 persons (43%)	2 persons (29%)	1 person (14%)	
Post test		1 person (14%)	1 person (14%)	2 persons (29%)	2 persons (29%)	1 person (14%)				

Table 11:- Pain level percentage pre and post test during travelling at experimental group

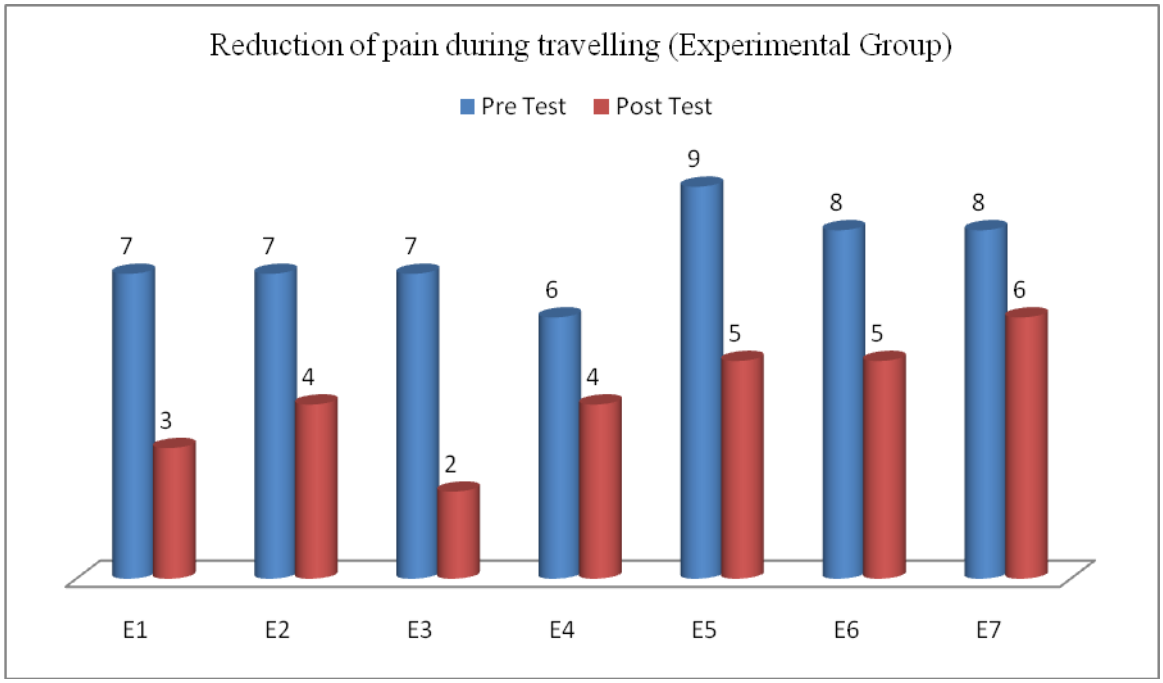


Figure 11:- Comparison pre and post test pain level during travelling (Experimental Group)

Pain at Neck during sleeping

Reduction of pain scores in conventional physiotherapy withscapular strengthening and stretching exercisesof scapular muscles and only conventional physiotherapy group in the general pain intensity were differences between pre-test and post-test pain scores.

Control Group

Pain level at VAS Scale	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Pre test				1 person (14%)	1 person (14%)	3 persons (43%)	2 persons (29%)			
Post test		1 person (14%)	2 persons (29%)	3 persons (43%)	1 person (14%)					

Table 12:- Pain level percentage pre and post test during sleeping at control group

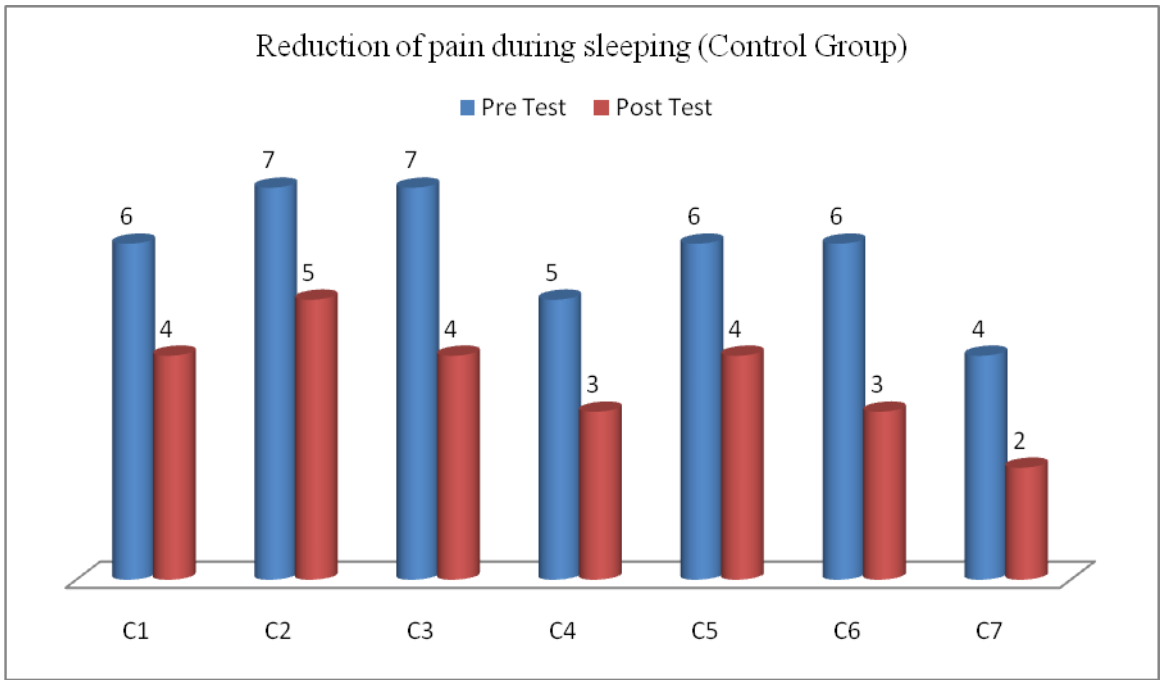


Figure 12:- Comparison pre and post test pain level during sleeping (Control Group)

Experimental Group

Pain level at VAS Scale	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Pre test				1 person (15%)	4 persons (57%)			1 person (14%)	1 person (14%)	
Post test	3 persons (43%)	2 persons (29%)	1 person (14%)		1 person (14%)					

Table 13:- Pain level percentage pre and post test during travelling at experimental group

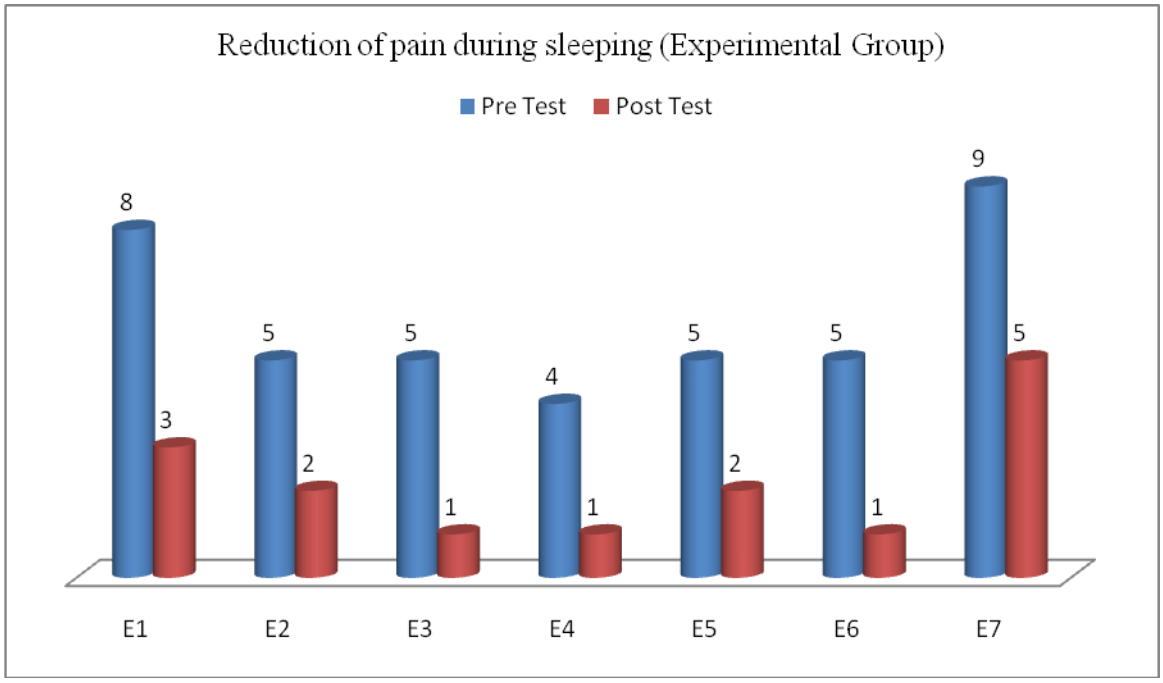


Figure 13:- Comparison pre and post test pain level during sleeping (Experimental Group)

Subjects		Mean Difference of Pain Reduction in Control group											
		Rest		**sitting**		**Forward Bending**		**Turning**		**Travelling**		**Sleeping**	
		Pre	**Post**	**Pre**	**Post**	**Pre**	**Post**	**Pre**	**Post**	**Pre**	**Post**	**Pre**	**Post**
	C1	7	4	8	6	7	4	7	5	8	5	6	2
	C2	9	6	9	7	10	7	9	7	9	6	7	3
	C3	8	6	8	5	9	6	8	5	9	6	7	4
	C4	6	4	6	5	8	4	7	4	7	5	5	3
	C5	7	4	6	4	8	5	6	5	7	5	6	4
	C6	6	5	7	5	9	7	8	6	6	5	6	3
	C7	4	2	5	2	6	4	8	5	6	3	4	2
Total	**7**	47	31	49	34	57	37	53	37	52	35	41	21
Mean		6.71	4.42	7.00	4.85	8.14	5.28	7.57	5.28	7.42	5	5.85	3.00
Mean difference		**2.29**		**2.15**		**2.86**		**2.29**		**2.42**		**2.85**	

Subjects		Mean Difference of Pain Reduction in Experimental group											
		Rest		**Sitting**		**Forward bending**		**Turning**		**travelling**		**Sleeping**	
		Pre	**Post**	**Pre**	**Post**	**Pre**	**Post**	**Pre**	**Post**	**Pre**	**Post**	**pre**	**Post**
	E1	6	3	6	2	8	5	7	2	7	3	8	3
	E2	6	4	6	3	9	6	7	3	7	4	5	2
	E3	7	1	6	1	8	2	6	1	7	2	5	1
	E4	6	3	6	3	7	4	7	5	6	4	4	1
	E5	8	3	8	2	9	3	8	3	9	5	5	2
	E6	7	2	7	3	8	4	8	3	8	5	5	1
	E7	8	2	8	1	9	3	8	5	8	6	9	5
Total	**7**	48	18	49	15	58	27	51	22	52	29	41	15
Mean		6.85	2.57	7	2.14	8.28	3.85	7.28	3.14	7.42	4.14	5.85	2.14

Mean difference	**4.28**	**4.71**	**4.43**	**4.14**	**3.28**	**3.71**

Mean difference in pain reduction of both groups

Name of the variables	**Experimental group**	**Control group**
Pain during resting position	4.28	2.29
Pain during sitting position	4.71	2.15
Pain during forward bending	4.43	2.86
Pain during turning	4.14	2.29
Pain during travelling	3.28	2.42
Pain during sleeping	3.71	2.85

Table 14:- Mean difference in pain reduction of both groups.

Flexion: Increased range of motion scores in conventional physiotherapy with scapular strengthening and stretching exercises and only conventional physiotherapy group in flexion were differences between pre-test and post-test ROM scores.

Conventional physiotherapy with Scapular strengthening and stretching exercises			**Only Conventional physiotherapy group**		
Subjects	**ROM scores (X_1)**	**X_1^2**	**Subjects**	**ROM scores (X_2)**	**X_2^2**
E_1	10	100	C_1	5	25
E_2	12	144	C_2	10	100
E_3	15	225	C_3	4	16
E4	5	25	C4	3	9
E_5	20	400	C_5	6	36
E_6	8	64	C_6	5	25
E_7	11	121	C_7	5	25
	$\sum X_1=81$	**$\sum X_1^2=1079$**		**$\sum X_2=38$**	**$\sum X_2^2=236$**

$\bar{X}_1=11.6$

$\sum X_1^2=1079$

$(\sum X_1)^2=6561$

$n_1=7$

$\bar{X}_2=5.43$

$\sum X_2^2=236$

$(\sum X_2)^2=1441$

$n_2=7$

Calculating the degree of freedom from the formula

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

$$= (7-1) + (7-1) = 12$$

Now 't' formula-

$$t = \frac{\bar{x}_1-\bar{x}_2}{\left[\sqrt{\frac{\left(\sum x_1{}^2-\frac{(\sum x_1)^2}{n_1}\right)+\left(\sum x_2{}^2-\frac{(\sum x_2)^2}{n_2}\right)}{(n_1-1)+(n_2-1)}}\times\sqrt{\left(\frac{1}{n_1}+\frac{1}{n_2}\right)}\right]}$$

$$t = \frac{11.6-5.43}{\left[\sqrt{\frac{1079-\frac{6561}{7}+236-\frac{1441}{7}}{(7-1)+(7-1)}}\times\sqrt{\left(\frac{1}{7}+\frac{1}{7}\right)}\right]}$$

t= 3.80

Extension: Increased range of motionscores in conventional physiotherapy withscapular strengthening and stretching exercises group and only conventional physiotherapy group in Extension were differences between pre-test and post-test ROM scores.

Conventional physiotherapy with scapular strengthening and stretching exercises group			**Only Conventional physiotherapy group**		
Subjects	**ROM scores (X_1)**	X_1^2	**Subjects**	**ROM scores (X_2)**	X_2^2
E_1	15	225	C_1	7	49
E_2	20	400	C_2	5	25
E_3	12	144	C_3	8	64
E4	5	25	C4	6	36
E_5	11	121	C_5	10	100
E_6	14	196	C_6	5	25
E_7	5	25	C_7	4	16
	$\sum X_1=82$	**$\sum X_1^2=1136$**		**$\sum X_2=45$**	**$\sum X_2^2=315$**

$\bar{X}_1=11.71$

$\sum X_1^2=1136$

$(\sum X_1)^2=6724$

$n_1=7$

$\bar{X}_2=6.42$

$\sum X_2^2=315$

$(\sum X_2)^2=2025$

$n_2=7$

Calculating the degree of freedom from the formula

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

$$= (7-1) + (7-1) = 12$$

Now 't' formula-

$$t = \frac{\bar{x}_1-\bar{x}_2}{\left[\sqrt{\frac{\left(\sum x_1{}^2-\frac{(\sum x_1)^2}{n_1}\right)+\left(\sum x_2{}^2-\frac{(\sum x_2)^2}{n_2}\right)}{(n_1-1)+(n_2-1)}}\times\sqrt{\left(\frac{1}{n_1}+\frac{1}{n_2}\right)}\right]}$$

$$t = \frac{11.71-6.42}{\left[\sqrt{\frac{1136-\frac{6724}{7}+315-\frac{2025}{7}}{(7-1)+(7-1)}}\times\sqrt{\left(\frac{1}{7}+\frac{1}{7}\right)}\right]}$$

t= 2.83

Side bending (rt) Increased range of motionscores in conventional physiotherapy withscapular strengthening and stretching exercises group and only conventional physiotherapy group in Side bending (Rt**)** were differences between pre-test and post-test ROM scores.

Conventional physiotherapy with scapular strengthening and stretching exercises group			**Only Conventional physiotherapy group**		
Subjects	**ROM scores (X_1)**	**X_1^2**	**Subjects**	**ROM scores (X_2)**	**X_2^2**
E_1	8	64	C_1	5	25
E_2	8	64	C_2	5	25
E_3	15	225	C_3	7	49
E4	6	36	C4	6	36
E_5	10	100	C_5	5	25
E_6	5	25	C_6	10	100
E_7	8	64	C_7	5	25
	$\sum X_1=60$	**$\sum X_1^2=578$**		**$\sum X_2=43$**	**$\sum X_2^2=285$**

$\bar{X}_1=8.57$ $\bar{X}_2=6.14$

$\sum X_1^2=578$ $\sum X_2^2=285$

$(\sum X_1)^2=3600$ $(\sum X_2)^2=1849$

$n_1=7$ $n_2=7$

Calculating the degree of freedom from the formula

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

$$= (7-1) + (7-1) = 12$$

Now 't' formula-

$$t = \frac{\bar{x}_1-\bar{x}_2}{\left[\sqrt{\frac{\left(\sum x_1{}^2-\frac{(\sum x_1)^2}{n_1}\right)+\left(\sum x_2{}^2-\frac{(\sum x_2)^2}{n_2}\right)}{(n_1-1)+(n_2-1)}}\times\sqrt{\left(\frac{1}{n_1}+\frac{1}{n_2}\right)}\right]} \qquad t=\frac{8.57-6.14}{\left[\sqrt{\frac{578-\frac{3600}{7}+285-\frac{1849}{7}}{(7-1)+(7-1)}}\times\sqrt{\left(\frac{1}{7}+\frac{1}{7}\right)}\right]}$$

t= 2.43

Side bending (Lt) Increased range of motionscores in conventional physiotherapy withscapular strengthening and stretching exercises group and only conventional physiotherapy group in Side bending (Lt**)** were differences between pre-test and post-test ROM scores.

Conventional physiotherapy with scapular strengthening and stretching exercises group			**Only Conventional physiotherapy group**		
Subjects	**ROM scores (X_1)**	**X_1^2**	**Subjects**	**ROM scores (X_2)**	**X_2^2**
E_1	8	64	C_1	4	16
E_2	8	64	C_2	5	25
E_3	15	225	C_3	10	100
E4	7	49	C4	5	25
E_5	10	100	C_5	5	25
E_6	5	25	C_6	10	100
E_7	7	49	C_7	5	25
	$\sum X_1=60$	**$\sum X_1^2=576$**		**$\sum X_2=44$**	**$\sum X_2^2=316$**

$\bar{X}_1=8.57$ $\bar{X}_2=6.29$

$\sum X_1^2=576$ $\sum X_2^2=316$

$(\sum X_1)^2=3600$ $(\sum X_2)^2=1936$

$n_1=7$ $n_2=7$

Calculating the degree of freedom from the formula

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

$$= (7-1) + (7-1) = 12$$

Now 't' formula-

$$t = \frac{\bar{x}_1-\bar{x}_2}{\left[\sqrt{\frac{\left(\sum x_1^2-\frac{(\sum x_1)^2}{n_1}\right)+\left(\sum x_2^2-\frac{(\sum x_2)^2}{n_2}\right)}{(n_1-1)+(n_2-1)}}\times\sqrt{\left(\frac{1}{n_1}+\frac{1}{n_2}\right)}\right]} \qquad t=\frac{8.57-6.29}{\left[\sqrt{\frac{576-\frac{3600}{7}+316-\frac{1936}{7}}{(7-1)+(7-1)}}\times\sqrt{\left(\frac{1}{7}+\frac{1}{7}\right)}\right]}$$

t= 3.16

Rotation (Rt) Increased range of motionscores in conventional physiotherapy withscapular strengthening and stretching exercisesgroup and only conventional physiotherapy group in Rotation (Rt) were differences between pre-test and post-test ROM scores.

Conventional physiotherapy with scapular strengthening and stretching exercises group			**Only Conventional physiotherapy group**		
Subjects	**ROM scores (X_1)**	X_1^2	**Subjects**	**ROM scores (X_2)**	X_2^2
E_1	15	225	C_1	10	100
E_2	20	400	C_2	5	25
E_3	13	169	C_3	7	49
E4	20	400	C4	7	49
E_5	12	144	C_5	6	36
E_6	8	64	C_6	5	25
E_7	15	225	C_7	7	49
	$\sum X_1=103$	**$\sum X_1^2=1627$**		**$\sum X_2=47$**	**$\sum X_2^2=333$**

$\bar{X}_1=14.71$ $\bar{X}_2=6.71$

$\sum X_1^2=1627$ $\sum X_2^2=333$

$(\sum X_1)^2=10609$ $(\sum X_2)^2=2209$

$n_1=7$ $n_2=7$

Calculating the degree of freedom from the formula

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

$$= (7-1) + (7-1) = 12$$

Now 't' formula-

$$t = \frac{\bar{x}_1-\bar{x}_2}{\left[\sqrt{\frac{\left(\sum x_1^2-\frac{(\sum x_1)^2}{n_1}\right)+\left(\sum x_2^2-\frac{(\sum x_2)^2}{n_2}\right)}{(n_1-1)+(n_2-1)}}\times\sqrt{\left(\frac{1}{n_1}+\frac{1}{n_2}\right)}\right]} \quad t = \frac{14.71-6.71}{\left[\sqrt{\frac{1627-\frac{10609}{7}+333-\frac{2209}{7}}{(7-1)+(7-1)}}\times\sqrt{\left(\frac{1}{7}+\frac{1}{7}\right)}\right]}$$

t= 5.40

Rotation (Lt) Increased range of motionscores in conventional physiotherapy withscapular strengthening and stretching exercisesgroup and only conventional physiotherapy group in Rotation (Lt) were differences between pre-test and post-test ROM scores.

Conventional physiotherapy with scapular strengthening and stretching exercises group			**Only Conventional physiotherapy group**		
Subjects	**ROM scores (X_1)**	**X_1^2**	**Subjects**	**ROM scores (X_2)**	**X_2^2**
E_1	15	225	C_1	10	100
E_2	17	289	C_2	15	225
E_3	15	225	C_3	10	100
E4	15	225	C4	7	49
E_5	5	25	C_5	10	100
E_6	10	100	C_6	5	25
E_7	15	225	C_7	10	100
	$\sum X_1=92$	**$\sum X_1^2=1314$**		**$\sum X_2=67$**	**$\sum X_2^2=699$**

$\bar{X}_1=13.14$

$\sum X_1^2=1314$

$(\sum X_1)^2=8464$

$n_1=7$

$\bar{X}_2=9.57$

$\sum X_2^2=699$

$(\sum X_2)^2=4489$

$n_2=7$

Calculating the degree of freedom from the formula

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

$$= (7 -1) + (7 - 1) =12$$

Now ‘t’ formula-

$$t = \frac{\bar{x}_1 - \bar{x}_2}{\left[\sqrt{\frac{\left(\sum x_1{}^2 - \frac{(\sum x_1)^2}{n_1}\right) + \left(\sum x_2{}^2 - \frac{(\sum x_2)^2}{n_2}\right)}{(n_1-1)+(n_2-1)}} \times \sqrt{\left(\frac{1}{n_1} + \frac{1}{n_2}\right)}\right]} \quad t = \frac{13.14 - 9.57}{\left[\sqrt{\frac{1314 - \frac{8464}{7} + 699 - \frac{4489}{7}}{(7-1)+(7-1)}} \times \sqrt{\left(\frac{1}{7} + \frac{1}{7}\right)}\right]}$$

t= 3.4

Table no 15

Variables in the study statistically significance at the following level of significance:

No	Variables	Observed ‘t’ value	Observed P value
1.	Flexion	3.80	0.001
2.	Extension	2.83	0.01
3.	Side bending(Rt)	2.43	0.02
4.	Side bending(Lt)	3.16	0.001
5.	Rotation(Rt)	5.40	
6.	Rotation(Lt)	3.4	0.001

CHAPTER-V: DISCUSSION

The purpose of this study was to evaluate the effectiveness of Stretching and strengthening exercise of scapular muscles with conventional physiotherapy compare to only conventional physiotherapy for Chronic Neck pain. In this experimental study 14 patients with Chronic Neck pain were randomly assigned to the experimental group and to the control group. Among these 14 patients, 7 patients were included in the experimental group who received Stretching and strengthening exercise of scapular muscles with conventional physiotherapy and the rest of the 7 patients were included in the control group, who received conventional physiotherapy only. Each group attended for 6sessions of treatment within two weeks in the physiotherapy outdoor department of CRP Savar in order to demonstrate the improvement. The outcome was measured by using visual analogue scale for pain intensity in different functional position, and goniometer for measuring ROM.

The outcome of the researched reveals significant improvement of pain. In Experimental group, Mean difference of reduction of resting pain was 4.28 which were 2.29 more than Mean difference in control group. Also there was significant improvement of pain in sitting, forward bending, turning, travelling and sleeping, as the mean difference were consecutively 2.56, 1.57, 1.85, 0.86and 0.86 more than control group.

(Grieve, 1988;Bergmann *et al*.,1993) did a research where flexion, extension, right lateral flexion and left lateral flexion the intervention group (Group B) did not have as great an improvement during the treatment period as Group A (reference) did. Group B however, continued to improve after the treatment and during the follow-up period while the SMT group was decreasing. Dysfunctions within the neck equate to mechanical neck pain and restricted movements (which when treated by SMT will improve considerably (Cassidy *et al*., 1992 a, b).

This could be a possible reason as to why Group A (reference) had improved results. The intervention group received this treatment however they were also dealing with the effects of teaching their muscles “new functioning”. Muscle dysfunctions (pain, inhibition) may cause a decrease in range of motion (ROM) (Grieve,1988;Gatterman,1990;Kendall, 1993&Liebenson,1996).

Therefore the intervention group did not have as great an improvement during treatment but continued to show improvement post treatment protocol, as the muscles were now no longer allowing a possible cause of the mechanical neck pain to occur i.e. rounded shoulders, anterior head carriage and the upper cross syndrome (Grieve, 1988; Gatterman,1990; Kendall *et al*.,1993;Liebenson, 1996;Humphreys *et al*.,2004). This may have alleviated further dysfunctions, maintain or even improved range of motion further had a longer follow up period occurred. For flexion ($p = 0.008$), extension ($p < 0.001$), right rotation ($p < 0.001$), left rotation ($p < 0.001$), right lateral flexion ($p < 0.001$) and left lateral flexion ($p < 0.001$), SMT had significant improvements in the degree of movement during the treatment period. This decreased slightly in the follow up period though.

The outcome of the researched reveals also significant Improvement of ROM In case of neck flexion (p<.0.001), extension (p<0.01), right side bending (p<0.02), left side bending (p<0.001), left side rotation (p<0.001) but not statistically significant improvement has been found in Right side rotation of neck.

CHAPTER-VI: CONCLUSION AND RECOMMANDATIONS

6.1 Conclusion

The result of this experimental study have identified the effectiveness of conventional physiotherapy with scapular strengthening and stretching exercises are better treatment than the conventional physiotherapy alone for reducing pain and increase range of motion of chronic neck pain patient. Participants in the conventional physiotherapy with scapular strengthening and stretching group showed a greater benefit than those in the only conventional physiotherapy group, which indicate that the conventional physiotherapy with scapular strengthening and stretching exercises can be an effective therapeutic approach for patient with chronic neck pain.

Scapular strengthening ad stretching exercises technique is used along with conventional physiotherapy that aims to reduce pain, increase functional activity and also increase range of motion of neck, to facilitate rehabilitation program. It is a cost effective treatment alternative for many common injuries & overuse syndrome which is effective for restoring the joint play and for establishing proper structural alignment. So it may become helpful for patients with neck pain to determine Scapular strengthening ad stretching exercises with conventional physiotherapy as intervention for reducing the features of neck pain. From this research the researcher wishes to explore the effectiveness of Scapular strengthening ad stretching exercises along with conventional physiotherapy to reduce the features of patient with chronic neck pain, which will be helpful to facilitate their rehabilitation and to enhance functional activities.

6.2 Recommendations

As a consequence of this researcher it is recommended to do further study including comparison of the conventional physiotherapy and Scapular strengthening ad stretching exercises with conventional physiotherapy alone to assess the effectiveness of these interventions with well-controlled blinding procedure. It is also is recommended to include the functional outcome assessment of patient and to identify the average number of sessions that are needed to be discharged from treatment to validate the treatment technique.

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APPENDIX 1: CONSENT FORM (English)

CONSENT FORM (English)

Assalamu-alaikum/ Namasker. My name is A.T.M Thouhidul Islam student of B. Sc. in physiotherapy at Bangladesh Health Professions Institute (BHPI), CRP. I am conducting a study for partial fulfillment of Bachelor of Science in Physiotherapy degree, titled, "Effectiveness of Scapular Muscle Stretching & Strengthening exercise for Chronic Neck Pain patients attended at CRP".

Through this research, I will see the efficacy of Stretching and strengthening exercises for scapular muscle along with existing physiotherapy for the cases of Chronic Neck Pain. For this regard, I would need to collect data from the patient having Chronic Neck Pain.

Considering the area of research, you have met the inclusion criteria and i would like to invite you as a subject of my study. If you participate in this study, I will evaluate for a particular intervention (Effectiveness of Scapular Muscle Stretching & Strengthening exercise for Chronic Neck Pain). The interventions that would be given are safe and will not cause any harm.

I want to meet you a few couple of sessions during your as usual therapy. Your participation will be voluntary. You have the right to withdraw consent and discontinue participation at any time.

If you have any query about the study or your right as a participant, you may contact with, researcher A.T.M Thouhidul Islam or Nasirul Islam, Assistant professor & Course coordinator, Master in Physiotherapy programme, Department of physiotherapy, BHPI,CRP,Savar, Dhaka-1343.

Do you have any questions before I start?

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

Yes: ☐ No: ☐

Signature of the Interviewer _____

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

Signature of the participant _____

APPENDIX II: Questioner (English)

Data Collection Form

Code No:-

Name of Participant: Occupation:

Age: Address:

Sex: Date:

How long have you had neck pain?

Year ……. Month …….. Day ……

This questionnaire is designed for Chronic Neck pain patients who have Neck pain. Each question (QN 1- QN 6) has a long line presenting your pain. Left hand end that is Zero (0) means no pain, as you move along the line the pain you feel is increasing. At the right hand end that is Ten (10) means extreme pain. Please locate your pain by circling on the line. The Answer of other questions (QN 7- QN 12) will be enlisted by examiner by using some measurement tools.

1. How severe is your neck pain at present?

Pre test

0 1 2 3 4 5 6 7 8 9 10

Post test

0 1 2 3 4 5 6 7 8 9 10

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

Pre test

0 1 2 3 4 5 6 7 8 9 10

Post test

0 1 2 3 4 5 6 7 8 9 10

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

Pre test

0 1 2 3 4 5 6 7 8 9 10

Post test

0 1 2 3 4 5 6 7 8 9 10

4. How severe is your Pain at neck during turning?

Pre test

0 1 2 3 4 5 6 7 8 9 10

Post test

0 1 2 3 4 5 6 7 8 9 10

5. How severe is your Pain at neck during travelling?

Pre test

0 1 2 3 4 5 6 7 8 9 10

Post test

0 1 2 3 4 5 6 7 8 9 10

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

Pre test

0 1 2 3 4 5 6 7 8 9 10

Post test

0 1 2 3 4 5 6 7 8 9 10

7. Passive ROM of flexion of neck. (Measured by examiner)

Pre- treatment …….. Degrees

Post- treatment …….. Degrees

8. Passive ROM of extension of neck (Measured by examiner)

   Pre- treatment …….. Degrees

   Post- treatment …….. Degrees

9. Passive ROM of right side flexion of neck (Measured by examiner)

   Pre- treatment …….. Degrees

   Post- treatment …….. Degrees

10. Passive ROM of left side flexion of neck (Measured by examiner)

    Pre- treatment …….. Degrees

    Post- treatment …….. Degrees

11. Passive ROM of right side rotation of neck (Measured by examiner)

    Pre- treatment …….. Degrees

    Post- treatment …….. Degrees

12. Passive ROM of left side rotation of neck (Measured by examiner)

    Pre- treatment …….. Degrees

    Post- treatment …….. Degrees

Thank you

A.T.M Thouhidul Islam

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