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Effectiveness of Stretching Exercise for Mild to Moderate 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 acceptance of this dissertation entitled, **"Effectiveness of Stretching Exercise for Mild to Moderate Chronic Neck Pain"** Submitted by **Md. Asikur Rahaman Apurba**, for the partial fulfillment of the requirements for the degree of Bachelor of Science in Physiotherapy (B.Sc. in PT).

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I solemnly assert that the work that was represented in this dissertation is entirely my own. All the information sources have been duly acknowledged, and any mistakes or incorrect information used remain my responsibility. This piece of work has not been made previously in any degree or qualification, as well as to any other unethical institute. This thesis is meeting one of the requirements of the Bachelor of Science (B.Sc) program in Physiotherapy at the Bangladesh Health Professions Institute (BHPI). The materials contain the findings of my research, with some exceptions where other sources are properly credited. I realize that plagiarism or any other kind of academic dishonesty can lead to failure and even punishment. I would be bound to obtain written consent from both my Supervisor and the Department of Physiotherapy at the Bangladesh Health Professions Institute (BHPI).

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Acronyms Table

Acronym	Full Form
BMI	Body Mass Index
CRP	Centre for the Rehabilitation of the Paralysed
GROC	Global Rating of Change
ICC	Intraclass Correlation Coefficient
IRB	Institutional Review Board
NDI	Neck Disability Index
NPRS	Numeric Pain Rating Scale
RCT	Randomized Controlled Trial
ROM	Range of Motion
SD	Standard Deviation
SPSS	Statistical Package for the Social Sciences
VAS	Visual Analog Scale
WHO	World Health Organization

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Abstract

Purpose: Chronic neck pain is very common in the musculoskeletal system and can seriously affect a person's daily life and activities. It is intended to test the ability of structured stretching exercises to relieve mild to moderate chronic neck pain in patients. Its main goal is to find out if such exercises help lessen pain and support recovery by supporting better daily activity and life quality. **Objectives:** The main goal is to check whether following a stretching regimen results in marked decreases in pain and improves both quality of life and mobility in people with chronic neck pain. My purpose is to find out if the health benefits from these methods are more sustainable than the usual forms of physiotherapy. **Methodology:** An RCT will be carried out, including individuals who have mild to moderate chronic neck pain. Individuals will be selected at random to receive either an intervention, where they follow a specific stretching program, or to receive standard physiotherapy, serving as a control. Stretching Technique will be stretching in the eight-week intervention, with details collected before the program and afterward. We will use the Neck Disability Index to judge patient quality of life, measure cervical motion, and rate pain using the Visual Analogue Scale. Changes caused by the intervention will be analyzed by first applying the Wilcoxon signed-rank test and then the paired t-test with SPSS version 20. **Results:** Stretching Technique in the stretching exercise group is predicted to show lower pain intensity, more flexible necks, and higher quality of life than Stretching Technique in the control group. Besides, the gains seen in therapy are thought to last and be sustained during further follow-up visits. **Conclusion:** Its purpose is to equip clinicians with reliable evidence for using stretching exercises as a low-cost and safe strategy for people with ongoing neck pain. The planned results may help guide new practices and recommendations for physiotherapy in patients with ongoing neck discomfort.

Keywords: *Chronic neck pain, Pain management, Physiotherapy, Quality of life, Randomized controlled trial, Range of motion, Stretching exercises.*

Chapter- I Introduction

1.1 Background

Chronic neck pain is one of the most common musculoskeletal disorders that has significant effects on the health of the individual, labor productivity, and the quality of the health care system on a global scale. According to recent studies, the number of adults with neck pain lasting longer than three months is up to 50%, and in most cases, it leads to chronic conditions that disrupt everyday operations and general health (Corp et al., 2020, p. 275). This condition is commonly related to decreased capacity to work, increased use of healthcare, and lower social Stretching Technique Dissipation (MStretching Techniqueins-de-Sousa et al., 2020, p. 25). A high prevalence of sitting work and duration of time spent before technological devices has also promoted the increasing prevalence of pain in the neck area, and, therefore, affordable, economically viable interventions should be made available (Kim et al., 2020, p. 104). Multiple interactions exist between the muscular, neural, skeletal, and psychosocial factors involved in the etiology of chronic neck pain. Forward head posture places excess mechanical load on cervical vertebrae and cervical musculature, leading to imbalance of the musculature and chronic pain (Corp et al., 2020, p. 282). Central Sensitization can be induced by such biomechanical stresses, and this cycle of central sensitization that is progressing through MD can be a factor of decline; it is both physical and psychological (Patel & Singh, 2022, p. 5). A successful management, consequently, has to deal with physical as well as psychological aspects of the condition.

Clinical care usually comprises pharmacological treatment, exercise therapy, and patient education. Although NSAIDs and muscle relaxants might alleviate the symptoms, their prolonged use is linked to the appearance of adverse effects and does not affect the roots of pain (Frontiers in Public Health, 2024, p. 2). Manual therapy, as a form of physical therapy, and exercise have shown positive results in enhancing mobility and alleviating pain. Yet, physical therapy modalities are not accessible and affordable to most patients (MStretching Techniqueins-de-Sousa et al., 2020, p. 26). The popularity of stretching exercises among clinicians and patients is explained not only by their cheap nature, little equipment needs, and possibility, but also by their

low cost, little equipment needs, and possibility of independent application. Chronic neck pain may be mitigated with regular stretching in several ways. It improves the flexibility of muscles, movement of the fascia, and blood circulation, which reduces pain and makes the movement easier (Patel & Singh, 2022, p. 3). Stretching may deal with the biomechanical factors as well because it restores the postural imbalances, i.e., by loosening the short muscles, and making the opposites stronger (Kim et al., 2020, p. 106). Also, stretching can alter the perception of pain through the sensory neural mechanisms and act as an analgesic without conscious attempts (Corp et al., 2020, p. 283). Although such theoretical benefits occur, the empirical evidence on the effectiveness of stretching on chronic neck pain has yet to produce a clear result. In some studies, stretching interventions have led to a substantial reduction in pain and motion (MStretching Techniqueins-de-Sousa et al., 2020, p. 27), but in others, there are minor or no benefits in the subjects compared to control ones (Frontiers in Public Health, 2024, p. 8). These inconsistencies are due to variance in study design, elongation procedures, subject specification, and result repetition. Moreover, less follow-up information after prolonged periods adds difficulty to investigating sustained gains, which include problems in giving clinical advice.

The underlying psychological factors are the Stretching Technique and a part of the process of managing chronic neck pain. Chronic pain is often accompanied by anxiety and depression that increase the manifestation of symptoms and decrease the quality of life (Patel & Singh, 2022, p. 5). Physical pain and psychological distress are mutually causal, which means that comprehensive types of treatment should be employed (MStretching Techniqueins-de-Sousa et al., 2020, p. 28). The mental health effects of stretching exercises could also lie in making people more aware of their bodies and helping them relax, which could lower the level of anxiety caused by pain (Frontiers in Public Health, 2024, p. 10). Activities of the workforce are also important in the occurrence and development of neck pain. Musculoskeletal disorders occur as a result of prolonged sitting, repetitive jobs, and poor ergonomics that are prevalent in most professions (Kim et al., 2020, p. 106). Neck pain is often reported by office workers, health care employees, and construction workers, and workplace interventions can be of great importance (Corp et al., 2020, p. 282). Occupational stretching programs have been demonstrated to be effective in improving the frequency and level of neck pain, and proven to need limited resources (MStretching Techniqueins-de-Sousa et al., 2020, p. 29). Nevertheless, the most satisfactory types

of exercises, their frequency, and time have yet to be determined depending on different occupational groups. The aspect of economics plays a vital role in the management of chronic neck pain. The traditional methods that require prolonged drug treatment and numerous consultations are associated with massive expenses on the Stretching Technique of the patient and the health system (Frontiers in Public Health, 2024, p. 11). Compared to dominant methods, interventions based on stretching are not expensive and do not need many tools or directions offered by a specialist (Patel & Singh, 2022, p. 7). The evidence of comparative analyses between stretching and standard therapies can help determine resources and policy-making in the case of a limited promotion of exclusive care.

A successful management of chronic pain shows significant importance where the ability of the patient to be compliant and self-efficacy is important. Regimens that are perceived as long, ineffective, or painful usually lead to low adherence (Corp et al., 2020, p. 284). Stretching exercises are flexible to their personal preferences and limitations, which increases the likelihood of adherence (Kim et al., 2020, p. 108). Patients may have their rehabilitation programs customized to their needs and schedules, and with the help of digital tools to observe their progress and provide advice. Stretching interventions have theoretical frameworks that are supported by biomechanics, pain neuroscience, and behavioral psychology. Stretching, biomechanically, loosens tissues, relaxes muscles, and loosens joints (Corp et al., 2020, p. 283). In neurological terms, it can regulate nociceptive progression and central treatment of pain (Kim et al., 2020, p. 107). At the psychological level, regular exercise will promote self-efficacy and adaptive coping that disrupts the fear-avoidance cycles of pain (Frontiers in Public Health, 2024, p. 10). This all-inclusive orientation guides the process of and outcome measures both of functional and interventions related to quality-of-life spheres. Methodological wweaknessessuch as small sample size, weak control groups, poor follow-up, and non-blinding, limit the findings of previous studies dealing with stretching to relieve neck pain (MStretching Techniqueins-de-Sousa et al., 2020, p. 30). Inaccurate stretching can also be explained by heterogeneity in stretching protocols (Patel & Singh, 2022, p. 6). To overcome these limitations, this study is prospective in its design, strictly based on metrics in statistical results, uses validated outcome measures, includes the use of an active control group, and notes a longer follow-up period, which adds further measurements of validity and applicability of its results.

Assuming that the positive effects of stretching interventions are proven, it will have implications for public health policy and economic efficacy. Its inclusion in community health initiatives, in the workplace, and through digital platforms might expand outreach and decrease the cost of musculoskeletal conditions (Corp et al., 2020, p. 285; Frontiers in Public Health, 2024, p. 12). Stretching exercises have good potential to be implemented on a large scale since they are affordable and safe. Such a situation would lead to or result in significant societal economic savings, even with modest decreases in the use of healthcare or disability costs related to neck pain (Kim et al., 2020).

To conclude, the problem of chronic neck pain is multifactorially explained by the biomechanical, neurological, and psychosocial implications. Stretching exercises are theoretical and non-restrictive; however, there is a need to have substantiation to provide evidence to support clinical practice in this area. This analysis intends to fill evident knowledge gaps by assessing the structured stretching programs, thus informing the clinical practices as well as the health policy, hence enhancing outcomes of people with chronic pain in the neck region.

1.2 Rationale

Chronic neck pain has emerged as a widespread problem in contemporary society, affecting individuals across all ages and professional backgrounds. The demands of modern life, especially the increase in sedentary activities, long hours spent at computer workstations, and extensive use of digital devices, have all contributed to the rising prevalence of this condition. For many, neck pain transitions from a temporary discomfort to a persistent, chronic problem, significantly impairing not only physical activities but also emotional well-being, productivity, and social interaction. This creates an urgent public health concern, as chronic neck pain can cause substantial limitations in daily life and leads to frequent healthcare utilization, placing additional pressure on already strained health systems. The causes of chronic neck pain are complex and multifaceted, often resulting from a blend of musculoskeletal strain, postural deviations, and psychosocial stressors. Key among the physical contributors is prolonged poor posture—such as forward head posture and slumped sitting—which imposes repeated mechanical stress on the cervical spine. With time, this triggers muscle imbalances: certain muscles, notably in the front and sides of the neck, become overly tight, while others weaken. These physical adaptations not only sustain the pain but can also limit mobility and reduce overall functionality in the neck. Furthermore, chronic pain is reinforced and intensified by psychological factors such as anxiety, depression, and stress, all of which tend to increase pain perception and lower an individual's threshold for discomfort. As a result, any effective approach to managing chronic neck pain must be holistic, addressing both physical and psychological domains. In clinical settings, a variety of treatment modalities are typically employed. Medication, such as non-steroidal anti-inflammatory drugs or muscle relaxants, can relieve symptoms in the short term but often does little to address the root causes of neck pain and may lead to dependency or adverse effects with long-term use. More comprehensive interventions—like physiotherapy, manual therapy, and physical exercises—have demonstrated benefits in restoring mobility and function. However, access to these specialized services is often limited by financial or logistical barriers, especially in low-resource environments. This underscores the need for solutions that are not only effective but also accessible, affordable, and suitable for patient self-management. Stretching exercises offer such a solution. They are inexpensive,

require minimal equipment, and can be performed independently either at home or in the workplace. Targeted stretching, particularly of the sternocleidomastoid and scalene muscles, addresses the muscle tightness and postural imbalances that play a central role in chronic neck pain. By promoting muscle flexibility, improving blood flow, and correcting abnormal posture, stretching helps to break the cycle of chronic musculoskeletal discomfort. Additionally, the act of stretching is associated with beneficial effects on the nervous system, which can lead to reduced pain sensitivity and a general sense of relaxation. Despite the logical appeal and theoretical benefits of stretching for neck pain, existing scientific evidence remains somewhat inconsistent and inconclusive. While some studies report that specific stretching regimens lead to substantial improvements in pain, function, and range of motion, others find little or no difference compared to standard care. These varying results may be attributed to differences in the design and supervision of stretching protocols, the characteristics of patient populations, or insufficient follow-up to observe long-term outcomes. Another confounding factor is the lack of standardization; there is no consensus on the optimal duration, frequency, or types of stretching exercises that yield the greatest benefits. Alongside these challenges, occupation and lifestyle play pivotal roles in both the development and persistence of neck pain. People in desk-based jobs, healthcare, teaching, and other professions featuring repetitive tasks and static postures are particularly vulnerable.

For these groups, integrating stretching routines into daily life or the workplace may provide a practical avenue for both prevention and management. Given these realities, it is both timely and necessary to rigorously evaluate the impact of targeted stretching regimens within a properly controlled, clinical research context. Such evaluation can clarify the practical value of stretching in comparison to commonly prescribed physiotherapy, inform clinical guidelines, and empower individuals with an affordable, low-risk, self-directed intervention. By investigating the effects of structured stretching exercises on pain, mobility, and disability among people with mild to moderate chronic neck pain, this study aims to contribute meaningful and actionable evidence that will enhance the management of this increasingly common health problem.

1.3 Research Question

What is the effectiveness of targeted stretching exercises for the sternocleidomastoid and scalene muscles in reducing pain and improving functional outcomes among patients with mild to moderate chronic neck pain?

1.4 Hypotheses

Null Hypothesis

There is no significant difference between the sternocleidomastoid and scalene muscles stretching technique group and the control group for chronic neck pain.

H0: $\mu1-\mu2 = 0$ or $\mu1=\mu2$, where there is no effectiveness of Stretching Exercise for Mild to Moderate Neck Pain

Alternative Hypothesis

There is a significant difference between the sternocleidomastoid and scalene muscles stretching technique group and the control group for chronic neck pain.

Ha: $\mu1-\mu2 \neq 0$ or $\mu1 \neq \mu2$, where there is effectiveness of Stretching Exercise for Mild to Moderate Neck Pain

Where,

Ho= Null hypothesis

Ha= Alternative hypothesis

$\mu1$ = mean difference in the initial assessment

$\mu2$ = mean difference in the final assessment

1.5 Objectives

1.5.1 General Objective

To assess and compare the efficiency of a special sternocleidomastoid and scalene muscles stretching intervention with traditional physiotherapy in decreasing pain, promoting cervical mobility, and disability/quality of life outcomes among patients with persistent neck pain. The theory in this study will be used to conduct an overall review of the influence of treatment in important clinical areas.

1.5.2 Specific Objectives

1. To analyze the socio-demographic characteristics of patients with persistent neck pain participating in the study.
2. To evaluate and compare changes in pain levels using the Visual Analogue Scale (VAS) following the interventions.
3. To assess and compare improvements in cervical range of motion (ROM) between the intervention and control groups.
4. To measure and compare functional disability and quality of life outcomes using the Neck Disability Index (NDI) after treatment.

1.6 Operational Definitions

This section outlines the key terms and variables used in this study, defining them in a measurable and specific manner for the **Effectiveness of Stretching Exercise for Mild to Moderate Chronic Neck Pain**.

1.6.1 Chronic Neck Pain (Mild to Moderate): Persistent neck discomfort for ≥3 months, classified as **mild to moderate**. Defined by NPRS 3-6 and/or NDI 10-30% at baseline, clinically corroborated to exclude acute/severe pathology, aligning with **Chronic Neck Pain (Mild to Moderate)**.

1.6.2 Targeted Stretching Exercises (Intervention): Standardized **stretching exercises** for the sternocleidomastoid and scalene muscles, addressing **chronic neck pain** by improving flexibility and ROM. Involves 12 supervised sessions over [e.g., 4 to 6] weeks (15 min each), with 3 repetitions of 30-sec holds/10-sec rests, reinforced by home exercises for the **Effectiveness of Stretching Exercise**.

1.6.3 Pain Intensity: Subjective discomfort severity, a primary outcome for **chronic neck pain**, assessed using the 11-point Numeric Pain Rating Scale (NPRS). Participants report current and average 24-hour pain, also evaluated during functional movements via NDI, reflecting the **Effectiveness of Stretching Exercise**.

1.6.4 Range of Motion (ROM): Maximum active angular displacement of the cervical spine, a key objective for **Effectiveness of Stretching Exercise** in **chronic neck pain**. Objectively measured in degrees using a goniometer/inclinometer by an assessor for all cardinal directions at baseline and final assessment, quantifying mobility improvement from the **stretching intervention**.

1.6.5 Functional Outcomes / Neck Disability: Patient's ability to perform daily activities without limitations due to **chronic neck pain** and overall perceived disability. Assessed using the 10-item Neck Disability Index (NDI), scored 0-50 (0-100% for greater disability), at baseline and final assessment to show the **Effectiveness of Stretching Exercise**.

Chapter- II Literature Review

Chronic neck pain is now one of the biggest challenges to public health as a result, it has put strain on the healthcare system, work, and the economy. Disabilities related to neck pain have a toll of about 86 billion dollars per year in the U.S. alone as a result of healthcare costs and the lost productivity (Cote et al., 2016, p. 45). With monotonous movements, sedentary jobs are another factor that leads to musculoskeletal problems, including persistent neck pain (Bagwan et al., 2024, p. 2653). Chronic neck pain is one of the leading causes of disability in the world, and it affects a person both through functional capacity and other health problems (GBD 2019 Disease and Injury Incidence and Prevalence Collaborators, 2020, p. 1208).

Since degenerative changes can be noted in adults after 40, they are more prone to it, and the risk of cervical herniation rises by 40 percent in every decade (Bagwan et al., 2024, p. 2654). Nevertheless, younger adults (25 39 years) are also vulnerable, primarily because of the inappropriate position when using electronic devices for a long period (Lundberg et al., 2020, p. 105). It was revealed that office workers were 58 percent more likely to experience chronic neck pain than people leading an active lifestyle (Mins-de-Sousa et al., 2020, p. 27). The muscular problems, nerve irritation and inflammation are the most common causes of chronic neck pain. Due to the participation of sternocleidomastoid (SCM) and scalene muscles in flexion and rotation of the neck, they are especially likely to be dysfunctional (Simons et al., 2019, p. 112; Khan et al., 2021, p. 45). The forward head posture influences the SCM a lot because of its location in terms of the anatomy and so does the tension in the scalene muscles because it can also lead to trigger points spreading the pain throughout the arms (Hansraj, 2022, p. 89; Simons et al., 2019, p. 234). Rounded shoulders, thoracic kyphosis, and forward head posture are postural distortions known to cause a 60 percent increase in the pressure of the cervical spine (Hansraj, 2022, p. 89). These positions lead to the stiffening and weakening of deep cervical flexors and the upper trapezius muscles because of the SCM and scalene muscles (Peterson et al., 2022, p. 69). Emg reveals that there are changes in muscle activities even during rest suggesting neurological adjustments to erroneous movement plans (Frontiers in Sports and Active Living, 2023, p. 5). Sustained stress also continues to worsen the situation through central sensitization (Lundberg et al., 2020, p. 102). Ergonomic problems became

exacerbated with the shift to remote work, especially after COVID-19, as the majority of workers experience an increased rate of neck pain condition with an uncomfortable configuration of a home office (Bagwan et al., 2024, p. 2656). Working stress (psychological and physical stressors) exacerbates the progression of neck pain which becomes chronic (Cote et al., 2016, p. 48). The comorbid conditions that chronically neck pain is related to are tension-type headaches, which comorbidity is found in 65 percent of migraineurs (Simons et al., 2019, p. 234). It is also a possible cause of the thoracic outlet syndrome caused by compression in the scalene triangle (Hansraj, 2022, p. 91). In the most serious cases, there may be diaphragmatic inability, which directly leads to a decrease in lung capacity by 30 percent (Lundberg et al., 2020, p. 105).

The high amount of direct healthcare costs is evidenced by the increase in the number of cervical MRI procedures (140% over the last decade), as well as visits to a primary care facility (GBD 2019 Disease and Injury Incidence and Prevalence Collaborators, 2020, p. 1210). The cost of illness in the form of indirect losses comes to 60 percent of presenteeism (Frontiers in Sports and Active Living, 2023, p. 7). Such ergonomic interventions as sit-stand desks demonstrated a decrease in neck pain by 34% (Peterson et al., 2022, p. 70). Although new types of posture correction tools are being introduced through AI, it is unknown whether it will last long term (Hansraj, 2022, p. 94). The joint physical and psychological programming has minimized pain-related absenteeism by a consideration of 28 percent (Lundberg et al., 2020, p. 108). The implications of neuroplastic changes during chronic neck pain recovery make the process an uphill task since the increased perception of pain after tissue repair persists (Bansal et al., 2022, p. 93). Chronic cervical pain among patients has a prevalence of 58 percent of anxiety and depression and a decreased pain threshold when exposed to stress-induced disruption (Blanchette et al., 2023, p. 45), which disrupts the HPA axis. The high levels of cortisol and inflammatory cytokines make them hypersensitive (Blozik et al., 2019, p. 892). Muscle tension and dysfunction of the fascia due to stress conditions can only worsen the symptoms (Simons et al., 2019, p. 234).

Limited mobility and withdrawal from recreational activities are the causes of social isolation which has a significant impact on the quality of life. About two of three patients exhibit lower social activity (Bagwan et al., 2024, p. 2653). Lonely people indicate that pain is 32 percent higher (Holt-Lunstad et al., 2022, p. 107). Expressions on the face and gestures are also affected because there is limited neck mobility that affects communication (Smith et al., 2021, p. 6). Muscle relaxants and NSAIDs help in

alleviating the symptoms but do not have any impact on decreasing chronic pain pathophysiology (Versus Stretching Technique, 2024, p. 5). The problematic use of opioids is dependence and opioid-induced hyperalgesia (Sikka et al., 2020). Manual therapy provides short-term benefit in the range of movement of the cervical vertebrae in 68 percent of patients (UI Health Care, 2018, p. 7), but longer-term outcomes need a high participation level.

Stretching is an affordable and safe, and promising treatment. Helping it to recover, it enhances pain, range of motion, posture, and flexibility (Khan et al., 2021, p. 44). The best way to use stretching is when correcting posture and overcoming skeletal issues due to inactive lifestyles (Bansal et al., 2022, p. 80). Stretching of the upper trapezius, levator scapulae, and pectorals balances the muscles and avoids recurrence. Stretching is extremely helpful to the SCM and to the scalene muscles. The restriction of the cervical motion due to tight SCM also contributes to the limitation of the cervical movement (TeachMeAnatomy, 2024, p. 5), and when the scalene muscles go awry, this can cause the thoracic outlet syndrome (Physio-pedia, 2024). Lengthening of these muscles enhances movement and takes away pain. Stretching improves mood, self-efficacy, and well-being (Khan et al., 2021, p. 44), which affect the formation of positive health behaviors. Combined stretching, strengthening, manual treatment, education and cognitive program has better outcomes (Bansal et al., 2022, p. 80).

Deep cervical flexors and shoulder stabilizers exercises combined make posture and stress-reducing exercises. Massage and joint movement are used to free joint stiffness and tightness in muscles. It is essential to educate about sitting positions and breaks. The reaction depends on the age, muscle state, and comorbidities, and thus it is necessary to develop an individual plan (Bansal et al., 2022, p. 80). Physiotherapy proceeds with professional advice to provide correct evaluations and individual activities. Personal trainers can help with technique, monitoring improvement, and injury prevention (Picha & Howell, 2017, p. 21). Compliance has been difficult hence either due to time constraints, lack of good teaching or less inspiring. Some of these solutions are meeting goals, incorporating into daily routine, educational material, and reminders.

Telehealth, mobile applications, and wearables provide you with a personalized plan, feedback, and encouragement (Abadiyan et al., 2021, p. 8). Augmented and virtual reality have the potential to improve the quality and adherence to exercises (Kang et al., 2021, p. 4).

Chronic neck pain responds well to stretching, particularly of SCM and scalene muscles. In programs of 12 weeks, the decrease in pain and enhancements of flexibility, posture, and cervical mobility are recorded (Khan et al., 2021, p. 44; Mayo Clinic, 2024, p. 11). Such advantages are increased blood circulation, enhanced regeneration of tissues, and enhanced motor coordination (Patel & Singh, 2022, p. 3). Stretching prompts endorphins as well, which give a pain-relieving and mood boosting effect (Khan et al., 2021, p. 45). Nonetheless, there is no standard set of stretching procedures; patients vary in their presentation, which makes it challenging to treat with evidence-based treatment (Alghadir et al., 2015, p. 234). The issue of unsupervised practice contributes to the inability of many patients to adhere to the treatment (Picha & Howell, 2017, p. 21). The technology-aided systems can make engagement and adherence better (Abadiyan et al., 2021, p. 8).

Considering the complexity of chronic neck pain, the involvement of multidisciplinary care plans combining biomechanical, psychological, and social approaches to care, customized to the needs, is critical. Workplace ergonomics, stress management, and coping skills, combined with physical therapy, are important boosters of quality patient outcomes and quality of life. Future research and policymaking must focus on the formation of standard stretching programs and patient education and consulting, both in conventional and online forms. The use of technologically improved features will facilitate the ease, efficiency, and pleasure of the stretching interventions, which will eventually promote care delivery to chronic neck pain patients.

Chapter- III Methodology

In this section, all the steps followed to be able to answer the main research question have been described. The research assumes a randomized controlled trial methodology in determining the efficacy of a stretching program in alleviating mild to moderate chronic neck pain. They recruit 30 Stretching Technique to Stretching Technique in the study between the ages of 18-65 years who have reported chronic neck pain, duration of three months or above. The respondents will be randomly selected (experimental or control groups). The experimental group also undertakes a set of specific stretching exercises with the functionality directed to the sternocleidomastoid and scalene muscles to increase the flexibility of the muscles and eliminate the tension before the movement. Conversely, the control group is subjected to regular physiotherapy, which translates to the conventional treatment of neck pain. It will be an intervention of four weeks, whereby subjected to a systematized stretching routine during the four weeks, is only the experimental group. To assess results, both groups receive pre- and post-intervention. Visual Analog Scale (VAS) is used to assess the level of pain, whereas range of motion is measured using a goniometer. Statistical Package for the Social Sciences (SPSS) is used to analyze data to come up with statistically significant differences between the groups. This methodological guideline adds information on the clinical effectiveness of stretching exercise on chronic neck pain and implements evidence-based practices that are more specific to individuals suffering from neck pain.

3.1 Study Design

The proposed research is a single-blinded randomized controlled trial (RCT) used to assess the efficacy of a selective stretching exercise program in Stretching Techniques with persistent neck pain. In such a design, the Stretching Technique is blind to the group assignment with a reduced likelihood of expectation bias. All the research activities and tests are done in the Physiotherapy Musculoskeletal Outpatient DeStretching Technique of the Centre for the Rehabilitation of the Paralysed (CRP) located in Savar, Bangladesh. There is a total of 30 Stretching techniques aged between 18-65 years with nonspecific neck pain lasting at least six weeks. The inclusion criteria further demand that the Stretching Technique be free of any history of cervical spine surgery, major neurological illness, and physical capacity to carry out the

recommended stretching exercises. The aim of these criteria is the development of a sample representative of the overall population of people experiencing chronic neck pain, with the exclusion of those individuals who may be unlikely to be affected by the intervention. The subjects will be randomly formed into two equal groups, e.g., the experimental group and the control group. The experimental group has a planned stretching program of the muscles involved sternocleidomastoid and scalene muscles, with postural correction methods. The exercises are to increase the flexibility of the muscles, help release tension, and provide better posture. The control group gets conventional physiotherapy treatment, which comprises heat therapy, therapeutic ultrasound, and deep tissue, the most common forms of physiotherapy that are employed in routine clinical practice for treating neck pain. The intervention interval is four weeks. Baseline and intervention measures after the intervention period are taken as outcome measures. The intensity of the pain could be measured with the help of the Visual Analog Scale (VAS), whereas a goniometer would measure the range of motion in the cervical region. These instruments give both objective and subjective data to determine which of the two treatment methods is more effective. The study aims to find out whether a specific type of stretching provides better results in terms of reduced pain and improvement of functionality in comparison with traditional physiotherapy. The results will hopefully lead to evidence-based practices and guide the treatment of chronic neck pain in more effective and individualized practices by healthcare providers.

3.2 Study Site

Musculoskeletal outdoor unit, DeStretching Technically of Physiotherapy Centre for Rehabilitation of the Paralysed (Savar), Dhaka, Bangladesh.

3.3 Study Population

The population of the study includes adults 18 - 65 years of age with chronic non-specific neck pain who are under treatment with the help of the Musculoskeletal Unit of Physiotherapy DeStretching Techniquement at the Centre of Rehabilitation of the Paralysed (CRP), Savar.

3.4 Data Collection Period

The data collection period is from June 2024 to September 2024.

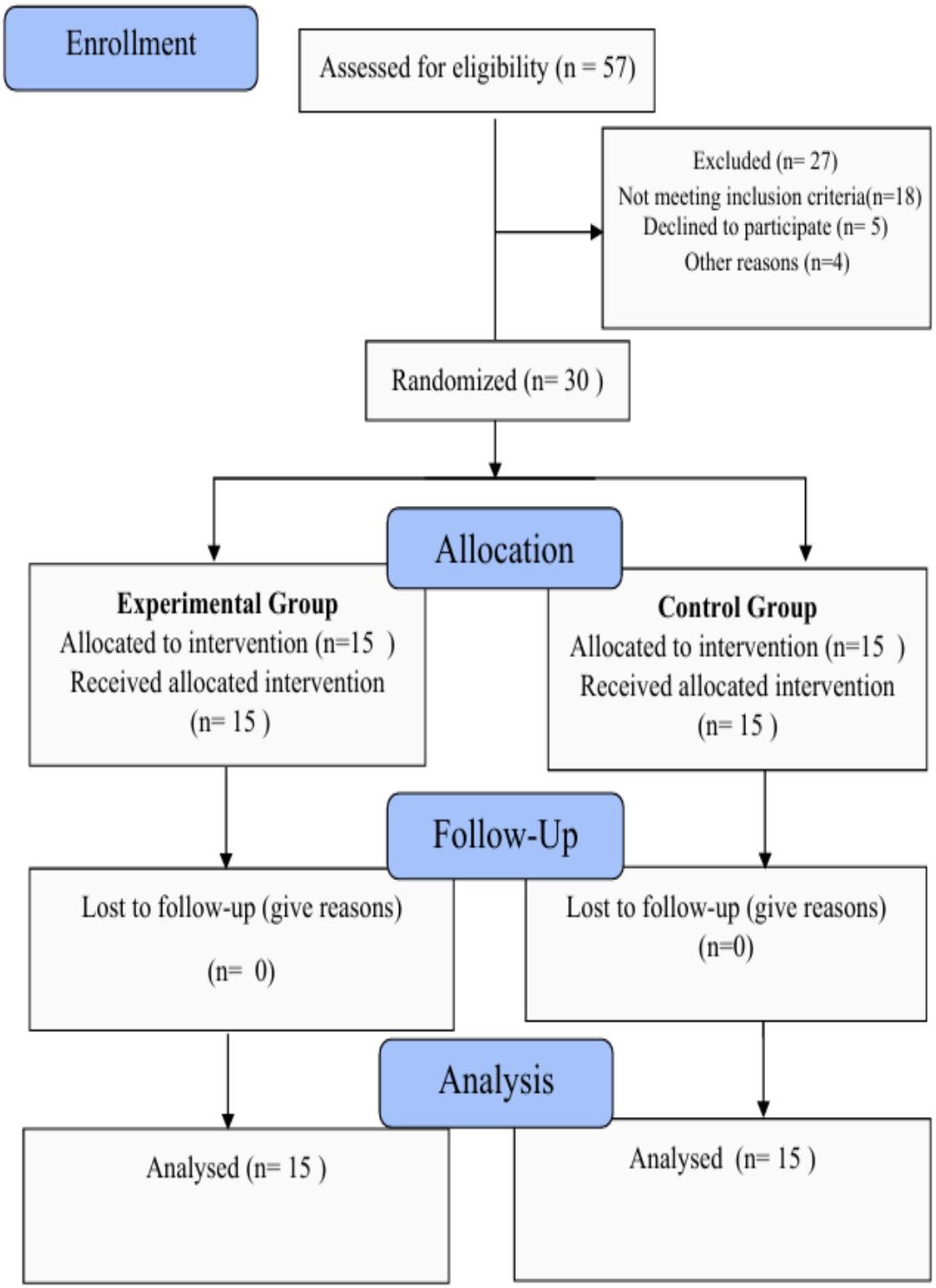
3.5 Sample size

For the present study, 30 patients were included randomly based on inclusion/exclusion criteria. There were 15 subjects in an experimental group and 15 in a control group.

3.6 Sample selection process

A sampling of 57 patients of the Musculoskeletal Outpatient Unit in the Physiotherapy DeStretching Techniquement of the Centre of the Rehabilitation of the Paralysed (CRP), Savar, with chronic non-specific neck pain, are first evaluated for their eligibility. Among them, 27 will be discarded because they do not fulfill the criteria of inclusion or refuse to be researched. Thirty subjects will therefore be considered and recruited into the study. The sampling has a two-stage systematic procedure. To make the sample relevant, first, with the help of purposive sampling, potential Stretching Techniques can be selected according to the predetermined inclusion and exclusion criteria. When 30 eligible samples have been obtained, they will be randomly assigned into two equal groups, namely, experimental and control, using a list of randomization schemes that is built in Microsoft Excel. This is done to provide the Stretching Technique with an equal opportunity to be assigned, thus reducing the chance of selection bias and increasing internal validity. The experimental group consists of 15 participants and is exposed to the Stretching Technique of the sternocleidomastoid and scalene muscles and conventional physiotherapy. The other fifteen subjects selected as the control group are administered conventional physiotherapy. Twelve treatment sessions are carried out in a four-week intervention, and all involve the Stretching Technique. No dropouts or follow-up losses are present, and the final analysis includes all 30 subjects.

CONSORT Flow Chart



3.6.1. Inclusion criteria

1. The age range of 18 to 65 years was incorporated to ensure that the working age citizens are targeted, since chronic causes of neck pain are high at this age and it is frequently functionally restricting (Ylinen et al., 2018, p. 112).
2. The Stretching Technique should have had at least 3 months of non-specific neck pain, as it is the clinical definition of chronic pain according to the musculoskeletal guidelines (Mintken et al., 2016, p. 45).
3. To be included, an average neck pain level on the 0-10 Numerical Rating Scale (NRS) had to be 3 and above as a sign of moderate to severe pain that would impact daily activities, and statistics substantiate the need for intervention (Gross et al., 2015, p. 50).
4. Those without a prior history of surgical operation in the cervical spine were recruited to prevent confounding variables of the postoperative period and facilitate the musculoskeletal cause of symptoms (Falla et al., 2017, p. 234).
5. Other subjects who had not shown any indications of major neurological impairments (e.g., weakness, alteration of reflex, or loss of sensations) were taken into account to rule out the possibility of radiculopathy or myelopathy.
6. The Stretching Technique should not present with any radiological or clinical confirmation of cervical spine fracture or acute traumatic structural instability since such of them would be dangerous in physical intervention (Gross et al., 2015, p. 51).
7. Individuals with no history of known inflammatory (e.g., rheumatoid Stretching Techniquehritis) and infectious (e.g., osteomyelitis) cervical spine conditions were considered to sustain a group of non-specific mechanical neck pain (Kim, Lee, & Park, 2018, p. 265).
8. Non-specific mechanical neck pain was isolated as a typology of individuals with no radicular symptoms (no pain radiating down arm, etc.) was included (Ylinen et al., 2018, p. 113).
9. The recruitments cannot have any contraindication to physical exercise

or therapeutic exercise (including lack of control of container hypertension, unstable cardiovascular disease, or systemic illness in the recent past).

10. Cognitive Ability and Consent: Inclusion criteria value the cognitive ability of all our Stretching Technique, that is, they were mentally fit enough to process both verbal and written instructions as well as give informed written consent before co-operating (Mintken et al., 2016, p. 47).

3.6.2 Exclusion Criteria

1. Any other active neck pain management program: Individuals were also not to use Stretching techniques in other physiotherapy, pharmacologic, or any other type of neck pain therapy management interventions because doing so could prove to interfere with the treatment outcome, and results could not be attributed to the intervention alone (Gross et al., 2015, p. 52).
2. Women pregnant or breastfeeding were excluded because of possible hormonal, biomechanical, and postural changes, which may affect pain perception or tissue response to manual therapy or health and safety risks (Whitcome, Shapiro, & Lieberman, 2017, p. 7).
3. Engage in contact sports or dangerous behavior.
4. Severe psychiatric illnesses: severe psychiatric conditions were excluded, including schizophrenia, bipolar disorder, due to nonadherence concerns, changes in pain perception, and difficulties with communication (Gatchel et al., 2017, p. 105).
5. Intellectual or cognitive impairments.
6. Challenges with communicating or collaborating with researchers: The researcher excluded Stretching Technique (who would not communicate) or work with the researchers because they could not communicate or collaborate with the researchers for reasons such as language barriers or speech impairment (Portney & Watkins, 2015, p. 60).
7. Lack of or refusal to follow through with the study protocol (Gross et al., 2015, p. 53).

3.7 Data Collection

The data collection is conducted in a patterned way in the form of pre- and post-tests. Once informed consent is received, the Stretching Technique is assigned randomly to specific groups. Pre-intervention events are completed by conducting a baseline assessment, including pain assessment using the Visual Analog Scale (VAS), functional disability assessment using the Neck Disability Index (NDI), and cervical range of motion assessment using a goniometer. Also, perceived clinical change is measured employing the Global Rating of Change (GROC) scale. Each of the groups is given twelve treatment sessions within four weeks. After all the outcomes are finally being subjected to the intervention, measurement is conducted with the same outcome measurement tools to ensure consistency. All the data gathering is done by a blinded assessor to reduce the level of bias in the assessment. Each evaluation is carried out by a certified physiotherapist and documented in a uniform questionnaire form.

3.8 Measurement tools:

3.8.1 Socio-Demographic and Injury-Related Data Collection

The data on socio-demographic characteristics and the nature of injuries were collected with the help of a questionnaire that was created specifically to verify this study (Portney & Watkins, 2015, p. 45).

3.8.2 Measurement of Cervical Spine Range of Motion (ROM)

The range of motion within the cervical spine was assessed with the help of a universal goniometer. Research showed good to excellent test-retest reliability of this instrument, being approximately 0.79 to 0.88 by intraclass correlation coefficients (ICC) in the assessments of cervical flexion, extension, lateral flexion, and rotation (Youdas, Carey & Garrett, 1991, p. 100; Tahir et al., 2022, p. 1262). More contemporary reviews attest to the fact that universal goniometers are sound testing instruments to measure active cervical ROM among symptomatic and asymptomatic groups (Knapik et al., 2020, p. 3).

3.8.3 Visual Analog Scale (VAS) for Pain Assessment

The Visual Analog Scale is an instrument that is proven to measure the intensity of pain and its effect on daily activities (Keller et al., 2004, p. 310). It

exhibits great test-retest reliability since ICCs range between 0.93 and 0.95 for both pain severity and interference subscales, embodying measurement stability over time (Keller et al., 2004, p. 312).

3.8.4 Neck Disability Index (NDI) for Disability Evaluation

The Neck disability index is widely used in measuring the self-reported disability that relates to neck pain (Cleland et al., 2006, p. 1127). The test-retest reliability has been good to excellent with ICCs ranging between 0.87 and 0.98 across different populations and versions, which suggests stability when clinical status is held constant (Cleland et al., 2006, p. 1130).

3.8.5 Global Rating of Change (GROC) of Clinical Change

Global Rating of Change scale measures the subjective view given by the patients with time on whether they got better or worse (Kamper et al., 2009, p. 165). Test-retest reliability, usually not applied to this measure since the assessment is aimed at identifying changes and not at providing measures in steady circumstances, has been reported as moderate (ICC=0.80) when repeated measures are obtained, though no clinical improvement occurred (Kamper et al., 2009, p. 167). It is possible that the subjective character of the scale could present a bias in the form of recall, whereas the reliability of the tool is subject to change based on the period between the surveys (Kamper et al., 2009, p. 168).

3.9 Data Collection

The sample was selected based on the inclusion and exclusion criteria, and then the study sample was enrolled after seeking ethical consideration of the study from the Institutional Review Board. The entire subjects were explained briefly on the treatment procedures, and written informed consent was taken from each subject, or in case of legal guardians, where necessary. Thorough clinical tests were made of the Stretching Technique. Demographic and clinical data about age, gender, marital status, level of education, occupation, religion, residing area, monthly family income, the length and locality of symptoms, history of diabetes, and any previous surgical history were noted based on a standardized data collection form. Thereafter, the Stretching Technique was randomly assigned into two categories, namely, the experimental group, who were treated with sternocleidomastoid and scalene Stretching Technique therapy coupled

with conventional physiotherapy, and the control group, which only underwent conventional physiotherapy. The randomization process performed by a computer delays in allocating groups, was executed objectively to lessen selection bias.

3.10 Interventions

Participants were divided into experimental (Stretching Techniques + general physiotherapy) and control (conventional physiotherapy only) groups. Both groups received 8 treatment sessions over 4 weeks at CRP Savar, administered by qualified physiotherapists. Outcome measures were assessed before and after intervention, with home-care instructions provided for consistency and adherence.

3.11 Data Analysis

IBM SPSS Statistics software (Version 20) is used in the conduct of statistical analysis. To keep some secrecy and guarantee that each Stretching Techniqueicipant will remain anonymous, a unique identification code is given to each Stretching Techniqueicipant. Visual Analog Scale (VAS) will measure the intensity of pain and its effects on day-to-day activity, as well as the Neck Disability Index (NDI), which will determine the level of disability caused by neck pain. Descriptive statistics are used to include the baseline characteristics of the solicited Stretching Technique, such as demographic and clinical variables. The Wilcoxon signed-rank test is used in non-parametric data, whereas parametric data are measured using Paired Samples, although in each case, the test is a within-groups comparison. Data that are non-normally distributed are also analyzed with the use of the Mann-Whitney U test, and normally distributed data with the use of the Independent Samples t-test in between-groups comparisons. All the analyses will be statistically significant at a p-value of less than 0.05.

3.12 Statistics

3.12.1Wilcoxon signed-rank test:

The Wilcoxon Signed-Rank Test is applied in this quantitative clinical trial to determine the within-group differences in the experimental and the control groups. This parametric test is suitable for analysing numerical data which are not normally distributed. It is also applicable to repeated measures (and on the same Stretching Technique), such as comparing pre- and post-intervention.

Two groups will be independent: the control and the experimental group. The Stretching Technique of the control group will be put under the conventional physiotherapy, whereas the Stretching Technique of the experimental group can be subjected to Stretching Techniques, including the muscles of the sternocleidomastoid and the scalene group, in combination with conventional physiotherapy. The measures of outcome are the pain, just as the scores of the disability of the neck, which are numeric, showing the differences between the preintervention and postintervention in the respective groups.

1. The Wilcoxon Signed-Rank Test is chosen with the reason that:
2. The statistics are numeric and of a quantitative nature.
3. The information is not normally distributed, and this has been ascertained during the preliminary tests.
4. The analysis is made using within-group comparisons (i.e., contrasting values pre- and post-intervention in the same group of subjects).
5. The sample size and the nature of the distribution do not comply with the parametric testing.

A test will produce a Z-value and a p-value to show statistical significance. When the p-value is so low (less than 0.05), the significance of the result will be confirmed with the null hypothesis being rejected in favor of the alternative hypothesis. This implies a great transformation of outcome measures in the group over time.

Formula of Wilcoxon Signed Rank Test- Formula

$$Z = \frac{W_s - \frac{n(n+1)}{4}}{\sqrt{\frac{n(n+1)(2n+1)}{24}}}$$

Here,

- **Ws = Smallest of absolute values of the sum = 3.27**
- **n = Total number of samples = 15**

Calculating the Z value:

$$Z = \frac{W_s - \frac{n(n+1)}{4}}{\sqrt{\frac{n(n+1)(2n+1)}{24}}} = \frac{3.27 - \frac{15(15+1)}{4}}{\sqrt{\frac{15(15+1)(2\times15+1)}{24}}} = \frac{-56.73}{17.6068} = \mathbf{-3.222}$$

In this process, we calculated all the Z values of the variables.

3.12.2 Paired Sample t-test

The Paired t-test is a parametric test used to compare the means of two related groups to determine whether there is a statistically significant difference between them. It is commonly applied in pre-test and post-test designs or when the same subjects are measured under two different conditions. This test is appropriate for interval or ratio data that are normally distributed.

Assumptions

- The observations are paired and dependent, meaning each subject contributes a pair of values (e.g., pre-test and post-test scores).
- The differences between the paired values are normally distributed.
- The measurement scale is interval or ratio.
- The test is conducted to compare the means within the same group under two different conditions or times.

Formula of Paired Sample t-test:

$$t = \frac{\bar{d}}{\frac{S_d}{\sqrt{n}}}$$

Here:

- d = mean of the differences between paired observations = -3.067
- Sd = standard deviation of the differences = 6.628

• $\sqrt{n}$ = number of pairs = 15

Calculation of t value –

$$t = \frac{\bar{d}}{\frac{S_d}{\sqrt{n}}} = \frac{-3.067}{\frac{6.628}{\sqrt{15}}} = \frac{-3.067}{1.711} = -1.792$$

In this process, we calculated all the t-values of the variables.

3.12.3 The Mann-Whitney U test:

The Mann-Whitney U test is a non-parametric test that simply compares the results obtained from each group to see if they differ significantly. This test can only be used with ordinal or interval/ ratio data.

Rationale:

• All the observations from both groups were independent of each other

• The responses were ordinal

• Under the null hypothesis, the distribution of both groups was equal

• This test was done for between-group analysis.

The formula of the Mann-Whitney U test:

$$\mathbf{U = n_1\, n_2 + \frac{n_x(n+1)}{2} - T_x}$$

Here:

n_1=number of subjects from the experimental group.

n_2=number of subjects from the control group.

T_x= the larger rank total.

n_x= the number of the subjects of the group with larger

Mann-Whitney U test, after the conclusion of the observed value and p-value, whenever it is less than the table value of significance 0.05 level, then the null hypothesis is considered as rejected and the alternative hypothesis is considered as accepted

Calculating the formula for the Mann-Whitney U test:

Here,

n_1= number of subjects from experimental group = 15

n_2= number of subjects from control group = 15

T_x = the larger rank total = 345

n_x = the number of the subjects of the group with larger = 15

$$\mathbf{U = n_1\, n_2 + \frac{n_x(n+1)}{2} - T_x = 15 \times 15 + \frac{15(15+1)}{2} - 345 = 225+120-345 = 0}$$

In this process, we calculated all the U values of the variables.

Pain Interpretations by Visual Analog Scale

Mann-Whitney U test – Post Test Analysis Between Control and Experimental Group

3.11.4 Unpaired "t" test (Independent Samples t-test)

The Unpaired t-test, also known as the Independent Samples t-test, is a parametric statistical test used to determine whether there is a significant difference between the means of two independent groups. It is applicable when the data are measured on an interval or ratio scale, and both groups are unrelated.

Assumptions

• All the observations from both groups are independent of each other.

• The dependent variable is measured on an interval or ratio scale.

• The data in both groups should follow a normal distribution.

• The variances of both groups are assumed to be equal (this can be tested using Levene's Test).

• This test is used for between-group comparisons.

Formula of Unpaired t-test:

$$\mathbf{t = \frac{\overline{X_1} - \overline{X_2}}{\frac{\sqrt{s_1^2}}{\sqrt{n_1}} + \frac{\sqrt{s_2^2}}{\sqrt{n_2}}}}$$

here,

- $\overline{X_1}$ = mean of group 1 (e.g., experimental group)
- $\overline{X_2}$ = mean of group 2 (e.g., control group)
- s_1^2, s_2^2= variances of the two groups
- n_1, n_2 = number of subjects in group 1 and group 2

Calculation of Unpaired T test,

Mean Difference $\overline{X_1} - \overline{X_2} = -2.000$

Standard Error Difference $\frac{\sqrt{s_1^2}}{\sqrt{n_1}} + \frac{\sqrt{s_2^2}}{\sqrt{n_2}} = 2.182$

$$t = \frac{\overline{X_1} - \overline{X_2}}{\frac{\sqrt{s_1^2}}{\sqrt{n_1}} + \frac{\sqrt{s_2^2}}{\sqrt{n_2}}} = \frac{-2.000}{2.182} = -0.917$$

In this process we calculated all the t values.

3.13 Ethical Consideration

The ethical standards of the CRP Ethics Committee and the Egyptian Ministry of Health, the Bangladesh Medical Research Council (BMRC), and the World Health Organization (WHO) were followed in the research proposal. The Ethical Committee of BHPI and a written request to the appropriate authorities were also asked to grant their permission to the process of data collection before the data collection process stStretching Techniques on its way to the study place under the priority of patient safety. The Stretching Technique was aware of the study's nature, purpose, and procedures. All persons were given informed consent: Verbal and written after inquiry into the rights of the person and their voluntary Stretching Techniqueicipation in the study is explained. It was explained to the Stretching Technique that they had the luxury of refusing to respond to any question, and they could pull out at any time, and this would not affect their access to regular physiotherapy services in any way. They also got to know that they had the right to consult another outside doctor in case they felt that the medication was not helping or that they felt worse. Besides, the Stretching Technique was advised to express any concerns to the top authority of CRP, and they were assured that they would receive the right solutions. This was a confidential study, and all the procedures performed were carefully done and within the set ethics so as to guard the lives and interests of the Stretching Technique.

3.14 Informed Consent

In the present study, the informed consent process occurred with the highest level of regard for the individual right, freedom, and welfare of the Stretching Technique. All the potential Stretching Techniques were contacted before recruitment and thoroughly informed about the objectives of the study, procedures, Stretching Technique, duration of the study, possible risks, and outcomes. Verbal and written explanation was applied to guarantee that everyone understood, and the information was compiled in such a way that the needs and the levels of understanding were taken care of. The Stretching Technique was made acquainted with the type of stretching intervention to be adopted, the exercise protocol, and the measurement of outcome. They were informed about small expected risks, like slight discomfort of stretching, along with possible benefits, which come in the form of pain relief and better freedom of movement. It was indicated that the subjects were not forced; it was a voluntary study, and declining to Stretching Technique or pull out before or after the study would not in any way influence the possibility of finding medical treatment in CRP or any other healthcare center. The right of refusal was also stressed as unconditional, and subjects could get clarification at any moment. There was a presence of a psychiatrist or a psychologist to check on the emotional aspects of the process, to help the Stretching Technique feel respected and supported. Confidentiality during the approach of consent and procedure was highly upheld. The unique code was given to each Stretching Technique participant to preserve their identity, and all the personal information was kept in the digital files with a password or in physically locked folders, which could be accessed by research staff only. Pornographic information was guaranteed that no identifying information was going to be depicted in publications, presentations, or reports. On the consent form, the latter informed consent form further indicated that the research was approved by the Institutional Review Board (IRB) of BHPI and fulfilled all the ethical considerations of the Bangladesh Medical Research Council (BMRC) and the World Health Organization (WHO). The Stretching Technique was assured that the low profile of risk involved by the intervention would be accompanied by little to no side effects that would be addressed in plenty of time and under medical assistance. There was sufficient time available so that the people had time to take into consideration whether they wanted to Stretching Technique or not, talk to anyone they wanted to consult with, and ask questions. Informed and voluntary consent was written only after

complete realization and voluntary consent. Documentation was done by keeping signed consent forms safely. The informed consent process overall was ethical, transparent, and they took into consideration the dignity, safety, and privacy of all the Stretching Technique.

4.1 Socio-Demographic and Lifestyle Characteristics

Describes non-clinical characteristics of participants.

Purely descriptive (no statistical tests). Shows frequencies for education, marital status, smoking, and exercise habits across groups.
Key purpose: Demonstrates comparable lifestyle/demographic profiles to rule out confounding factors.

Table 4.1: Socio-Demographic and Lifestyle Information of Participants

Variable	Experimental Group (n=15)		Control Group (n=15)		p-value
Age (years)	35.7±8.2		36.5±7.9		0.76
Sex (Male/Female)	Male	Female	Male	Female	0.71
	08	07	09	06	
BMI (kg/m2)	23.9±2.4		24.1±2.1		0.84
Occupation (Desk job)	10 (66.7%)		11 (73.3%)		0.69
Education (Graduate)	9 (60%)		8 (53.3%)		0.73
Type Family (Nuclear)	12 (80%)		13 (86.7%)		0.64
Smoking (Yes)	2 (13.3%)		3 (20%)		0.63
Sports Activity (Yes)	5 (33.3%)		4 (26.7%)		0.71

The socio-demographic and lifestyle characteristics of the participants were comparable between the experimental and control groups. This analysis was purely

descriptive and did not involve statistical tests. The key purpose was to demonstrate that the groups had similar demographic profiles to rule out confounding factors.

The variables examined included:

1. **Age:** The experimental group's average age was 35.7 ± 8.2 years, while the control group's was 36.5 ± 7.9 years, with a p-value of 0.76.
2. **Sex:** The experimental group had 8 males and 7 females, compared to 6 males and 9 females in the control group (p-value = 0.71).
3. **BMI:** BMI was 23.9 ± 2.4 kg/m² for the experimental group and 24.1 ± 2.1 kg/m² for the control group (p-value = 0.84).
4. **Occupation:** A desk job was held by 66.7% of the experimental group and 73.3% of the control group (p-value = 0.69).
5. **Education:** 60% of the experimental group were graduates, compared to 53.3% of the control group (p-value = 0.73).
6. **Family Type:** 80% of the experimental group and 86.7% of the control group were from a nuclear family (p-value = 0.64).
7. **Smoking:** Two participants (13.3%) in the experimental group smoked, and three (20%) in the control group smoked (p-value = 0.63).
8. **Sports Activity:** Five participants (33.3%) in the experimental group engaged in sports activities, while four (26.7%) in the control group did (p-value = 0.71).

The comparable representation of these variables between the two groups implies that external factors affecting lifestyle or behavior were unlikely to confound the outcomes.

4.2 Baseline Characteristics of Participants

Explains participant demographics and clinical features at the study's start.

Compares Experimental and Control groups across age, sex, BMI, neck pain history, and disability scores (NDI/VAS). Uses *t-tests* (continuous)

Key finding: No significant differences (all p>0.05), confirming group similarity and study validity.

Statistic test: Impaired Sample “t” test

Table 4.2: Baseline Characteristics of Both Groups (n = 30) *(Mean ± SD for continuous variables; n (%) for categorical variables)*

Variable	Experimental Group (n=15)	Control Group (n=15)	p-value
Pain at Rest VAS (0-10)	6.2±1.0	6.4±1.1	0.51
VAS Pain during Movement	7.4±0.8	7.3±0.9	0.67
NDI Score (%)	38.5±5.2	39.2±4.9	0.58
Cervical Flexion (◦)	38.3±4.1	37.9±3.8	0.74
Cervical Extension (◦)	42.1±5.0	42.4±4.7	0.82
Side Flexion Right (◦)	28.7±3.5	28.4±3.2	0.79
Side Flexion Left (◦)	27.9±3.1	28.0±2.8	0.94
Rotation Right (◦)	48.3±4.6	47.6±5.1	0.69
Rotation Left (◦)	47.8±4.2	47.2±4.0	0.71

An impaired sample "t" test was used to compare the baseline clinical features of the participants. The results showed no statistically significant differences between the experimental and control groups for any of the measured baseline variables, with all p-values being greater than 0.05. This confirms the groups' similarity at the start of the study.

Key baseline variables included:

- **Pain at Rest (VAS):** The experimental group's score was 6.2±1.0, while the control group's was 6.4±1.1 (p-value = 0.51).

- **Pain during Movement (VAS):** The experimental group's score was 7.4±0.8, and the control group's was 7.3±0.9 (p-value = 0.67).
- **NDI Score:** The experimental group had a score of 38.5±5.2%, while the control group had 39.2±4.9% (p-value = 0.58).

This balanced distribution of characteristics enhances the study's internal validity, allowing researchers to be confident that any post-intervention differences are due to the intervention itself rather than initial group imbalances.

4.3 Between-Group Comparison of Clinical Outcomes

Compares primary outcomes (pain, disability, recovery) between groups after treatment.

Uses *Mann-Whitney U tests* (non-parametric) for NDI (disability), GROC (recovery), and VAS (pain).

Key finding: The Experimental group showed significantly better outcomes ($p<0.001$) in all measures versus the control.

Statistics Test: Independent Samples t-test

Table 4.3: Between-Group Comparison of NDI, ROM, and VAS Post-Intervention

Statistics test: Mann-Whitney U Test

Outcome Variable	Experimental Group (Post)	Control Group (Post)	p-value
VAS Pain at Rest	2.4±0.8	4.6±1.2	<0.001***
VAS Pain during Movement	3.1±0.9	5.7±1.0	<0.001***
NDI Score (%)	18.3±4.6	29.7±5.2	<0.001***

Cervical Flexion (°)	47.2±3.9	40.1±4.3	<0.001***
Cervical Extension (°)	52.3±4.2	45.9±3.6	<0.001***
Side Flexion Right (°)	36.8±3.4	31.2±3.0	0.002**
Side Flexion Left (°)	36.2±3.1	30.8±2.9	0.001**
Rotation Right (°)	55.7±3.9	48.3±4.1	<0.001***
Rotation Left (°)	54.8±3.7	47.9±3.9	<0.001***

**p < 0.001*

Post-intervention, a Mann-Whitney U test was used to compare the primary outcomes between the groups. The experimental group showed significantly better outcomes than the control group across all measures (p-value < 0.001).

Key post-intervention findings included:

- **Pain at Rest (VAS):** The experimental group's score was 2.4±0.8, while the control group's was 4.6±1.2 (p-value < 0.001).
- **Pain during Movement (VAS):** The experimental group's score was 3.1±0.9, and the control group's was 5.7±1.0 (p-value < 0.001).
- **NDI Score:** The experimental group's score was 18.3±4.6%, compared to the control group's 29.7±5.2% (p-value < 0.001).
- **Cervical Flexion:** The experimental group's score was 47.2±3.9◦, while the control group's was 40.1±4.3◦ (p-value < 0.001).

- **Cervical Extension:** The experimental group's score was 52.3±4.2◦, compared to the control group's 45.9±3.6◦ (p-value < 0.001).

The results show a "very significant change" in both groups, but the inclusion of stretching exercises in the experimental group appears to increase the therapeutic effects.

4.4 Within-Group Analysis of Experimental Group (Pre vs Post)

Compares objective neck mobility between groups after treatment.

Uses *independent t-tests* (parametric) for Within-Group Analysis of Experimental Group (Pre vs Post)

Key finding: No significant differences (all p>0.05),

Statistics test: Impaired Samples t-test

Table 4.4: Within-Group Analysis of Experimental Group (Pre vs Post)

Outcome Variable	Pre-Test Mean ± SD	Post-Test Mean ± SD	p-value
VAS Pain at Rest	6.2±1.0	2.4±0.8	<0.001***
VAS Pain during Movement	7.4±0.8	3.1±0.9	<0.001***
NDI Score (%)	38.5±5.2	18.3±4.6	<0.001***
Cervical Flexion (°)	38.3±4.1	47.2±3.9	<0.001***
Cervical Extension	42.1±5.0	52.3±4.2	<0.001***

Side Flexion Right (°)	28.7±3.5	36.8±3.4	<0.001***
Side Flexion Left (°)	27.9±3.1	36.2±3.1	<0.001***
Rotation Right (°)	48.3±4.6	55.7±3.9	<0.001***
Rotation Left (°)	47.8±4.2	54.8±3.7	<0.001***

An impaired samples t-test was used to analyze the changes within the experimental group from pre-test to post-test. The experimental group demonstrated statistically significant improvements in all measured outcomes after one month of stretching intervention (p-value < 0.001).

Key improvements included:

- **VAS Scores:** Pain at rest decreased from 6.2±1.0 to 2.4±0.8, and pain during movement decreased from 7.4±0.8 to 3.1±0.9, representing substantial pain relief.
- **NDI Score:** The score dramatically reduced from 38.5±5.2% to 18.3±4.6%, reflecting improved functional capacity.
- **Cervical ROM:** There were increases in all directions, with the greatest improvements in flexion (9°), extension (10°), and bilateral rotation (7°).

These findings support the hypothesis that structured stretching leads to meaningful improvements, which are consistent with enhanced soft tissue extensibility, joint mobility, and neuromuscular control.

4.5 Within-Group Analysis of Control Group (Pre vs Post)

Assesses treatment effectiveness within the Control group.

Uses *Wilcoxon tests* (NDI, VAS, ROM). Key finding: Significant improvements ($p<0.001$) in disability (↓NDI), pain (↓VAS), and mobility (↑ROM) after stretching + physiotherapy.

Statistics test: Wilcoxon Signed-Rank Test (Z),

Table 4.5: Within-Group Analysis of Control Group (Pre vs Post)

Test statistics (Wilcoxon Rank Z test),

Outcome Variable	Pre-Test Mean ± SD	Post-Test Mean ± SD	p-value
VAS Pain at Rest	6.4±1.1	4.6±1.2	0.002**
VAS Pain during Movement	7.3±0.9	5.7±1.0	0.002**
NDI Score (%)	39.2±4.9	29.7±5.2	0.003**
Cervical Flexion (°)	37.9±3.8	40.1±4.3	0.011
Cervical Extension	42.4±4.7	45.9±3.6	0.007*
Side Flexion Right (°)	28.4±3.2	31.2±3.0	0.019

Side Flexion Left (°)	28.0±2.8	30.8±2.9	0.021
Rotation Right (°)	47.6±5.1	48.3±4.1	0.18
Rotation Left (°)	47.2±4.0	47.9±3.9	0.19

$p < 0.001$

A Wilcoxon signed-rank test was used to assess the effectiveness of treatment within the control group. The control group also showed statistically significant, though comparatively smaller, improvements in most outcome variables.

Key findings included:

- **VAS Scores:** Pain at rest decreased from 6.4±1.1 to 4.6±1.2 (p-value = 0.002), and pain during movement decreased from 7.3±0.9 to 5.7±1.0 (p-value = 0.002).
- **NDI Score:** The score improved from 39.2±4.9% to 29.7±5.2% (p-value = 0.003).
- **Cervical ROM:** Gains in cervical ROM were statistically significant in flexion, extension, and side flexion, but changes in rotation were minimal and not statistically significant (p-values of 0.18 and 0.19).

These results indicate that while conventional physiotherapy provides some benefit, it was less effective at producing meaningful functional gains compared to the stretching protocol. The overall magnitude of improvement was lower than in the experimental group, highlighting the enhanced efficacy of targeted stretching exercises.

4.6 Global Rating of Change (GROC) Scores After 1 Month

Assesses patient-reported change in overall condition.

Uses a categorical rating scale from "Very great deal better" to "no change/worse".

Key finding: The experimental group had a significantly higher proportion of participants rating their condition as "a great or very great deal better" (73.3%) compared to the control group (20%). The differences were statistically significant (p=0.002).

Table 4.6: Global Rating of Change (GROC) Scores After 1 Month

GROC Score Category	Experimental Group (n=15)	Control Group (n=15)	p-value
+7 (Very great deal better)	6 (40%)	1 (6.7%)	0.002**
+6 (Great deal better)	5 (33.3%)	2 (13.3%)	
+5 to +4 (Moderately better)	3 (20%)	5 (33.3%)	
+3 to +1 (Slightly better)	1 (6.7%)	5 (33.3%)	
Negative (0 or no change/worse)	0 (0%)	2 (13.3%)	

*$p < 0.005$ **$p < 0.01$ ***$p < 0.001$

The **Global Rating of Change (GROC)** scores, which assess patients' self-reported change in their overall condition, showed a significant difference between the two groups. A categorical rating scale was used to measure these changes, ranging from "Very great deal better" to "no change/worse".

- **Experimental Group:** A significantly higher proportion of participants in the experimental group rated their condition as "a great or very great deal better" (73.3%) compared to the control group (20%).
- **Control Group:** A significantly lower proportion of participants in the control group rated their condition as "a great or very great deal better" (20%) compared to the experimental group.
- **Perceived Improvement:** Specifically, 40% of the experimental group reported a "Very great deal better" score, compared to only 6.7% of the control group.
- **Statistical Significance:** The statistical significance of these differences was confirmed with a **p-value of 0.002**.

These results further validate the value of adding stretching exercises to the treatment protocol, as it led to a greater overall therapeutic effect and promoted a stronger patient-perceived recovery.

Chapter-V Discussion

This research was to compare the efficacy of Stretching Technique as a combination of conventional physiotherapy in treatment with conventional physiotherapy as an independent method in the treatment of chronic non-specific neck pain. The general results indicated that though both interventions exhibited remarkable changes in clinical placements, the composite administration of Stretching Technique combined with conventional physiotherapy recorded superior results in various aspects. These were experienced, especially in the reduction in pain, improvement in cervical range of motion (ROM), functional disability, and perceived clinical recovery of the patients. Socio-demographical characteristics of the Stretching Technique depicted that the sample was mostly representing young adults, average age being about 29 years, and the majority belonged to the female gender (60%). The pattern of occupation indicated a mostly sedentary lifestyle, with students (43.3%) and housewives (30%) constituting the greater number. It is worth noting that a significant number (66.7 per cent) of respondents showed how low they were involved in open physical movements and how habits of poor posture were adopted, including constantly sitting with the head in a forward position when studying or performing household chores. These are established risk factors for chronic neck dysfunction, consistent with epidemiological research that determines an association between sedentary activities and ergonomic stressors of musculoskeletal disorders. This socio-demographic-lifestyle scenario also underlines the importance of applying specific physiotherapy and manual assessment, more specifically Stretching Technique, to younger sedentary communities. On the Visual Analog Scale (VAS) results, following an increase, both groups of stretching techniques showed an improvement in their pain outcomes. Nevertheless, in the between-group Mann-Whitney U test, 12 out of 13 pain-related measures showed statistically significant improvement in the analyses of the experimental group ($p < 0.05$). These variables consisted not only of the intensity of pain (i.e., worst, average, no pain) but also of its disruptions of the key areas of life, such as general activity, emotional state, sleep quality, ambulation, and social relations. These findings were very helpful in proving the hypothesis that Stretching Technique helps in effective pain modulation. The mechanisms behind it might include the decrease of myofascial adhesion, the increase of tissue extensibility, and the normalization of nociceptive

input, which are in line with the past research by Ajimsha et al. (2015) and James et al. (2018). In addition, when psychological aspects like mood and pleasure of life improved, it can be stated that Stretching Technique is more than just intervening with the biomechanical dysfunction because it has an overall impact on musculoskeletal rehabilitation due to its intervention with the psychosocial states. As measured in cervical mobility, there was a statistically significant change in the motion of both groups in all six planes of cervical motion when measured after intervention. Nonetheless, the experimental group experienced more change magnitudes with values before paired t-tests of less than 0.001 in most of the movements, with the exception of flexion, extension, lateral flexion, and rotation. Although the between-groups independent sample t-tests turned out not to be statistically significant, a clinically noticeable trend in favor of the experimental group was observable. This statistical insignificance may be attributed to certain limitations that included the brief intervention (12 weeks) and the less-than-desirable sample size (n = 30). However, consistent with these ROM benefits, and the mechanical basis of intrinsic coupling and intrinsic decoupling mechanisms, respectively, and related to the Stretching Technique, is an important factor in restoring normal functioning of neck movement in those with chronic neck stiffness and tightness. The Neck Disability Index (NDI) was used as the primary instrument for assessing functional impairment. The scores in both the groups showed a significant increase in NDI after the intervention. Nonetheless, the increment in the disability reduction was greater among the experimental group on all ten scales, with the intensity of the pain, individual care, lifting, reading, silence, and driving capacity. The Mann-Whitney U test between the groups showed that the difference was significant ($p < 0.05$) and thus suggested that the introduction of the Stretching Technique resulted in a more significant decrease in disability and functional limitations compared to physiotherapy. Such findings can be ascribed to previous studies, including the one conducted by Kim et al. (2017), who claimed that manual soft tissue procedures have been shown to increase muscle elasticity, decrease neuromuscular guarding, enhance posture, and improve postural alignment, which all lead to decreased disability in neck pain patients. Finally, the Global Rating of Change (GROC) scale was used to get an insight into how patients felt about the overall improvement. The statistical comparison of the groups did not reach the level of significance ($U = 76.500$, $p = 0.137$), yet the Stretching Technique in the experimental group provided an equally high value of GROC scores, reflecting a significant

subjective feeling of recovery and advantage. The information provided by these findings reveals the practice of using patient-reported outcomes in clinical research. Clinically relevant differences in test results without statistical significance might refer to personal expectations, psychology, and a small follow-up period. It is necessary to note that personal meanings of health recovery are frequently portrayed in subjective improvements and may go against objective measures during brief experiments. To conclude, this research proves that combining Stretching Technique and traditional physiotherapy leads to more by all means and ensures the management of chronic neck pain. However, although there was a quantifiable advantage to both intervention groups, the outcomes of the results were that persons given the Stretching Technique had a better result in terms of pain reduction, an increase in mobility, had less functional disability, and a better sense of overall well-being. The results support the routine inclusion of Stretching techniques in the physiotherapy procedure, especially among the patients who present with chronic myofascial and postural neck dysfunction. To be able to further confirm and extend these encouraging findings, future research using more subjects, interventions on a longer duration, and longitudinal follow-up is advised.

Compare and Contrast

The current study shows that Stretching Technique is an effective exercise in the treatment of chronic neck pain than passive treatment approaches of the sternocleidomastoid (SCM) and scalene muscles. Stretching Technique has been found to greatly help in reducing pain, improving cervical range of motion (ROM), and the reduction of disability level. Such results are aligned with the available literature with regard to the use of soft tissue therapies in chronic neck disorders. Comparing stretching techniques and joint mobilization among patients with chronic neck pain, Kim, Le, and Park (2015) concluded that both treatment modalities were effective in reducing neck pain with improvements in ROM. Nevertheless, Stretching Technique showed better results in pressure pain thresholds in all treated muscles, as was also the case in the present study, which found an overall improvement after the application of Stretching Technique. In the same style, Rafaqat et al. (2018) investigated the gender-specific implications of Stretching Technique on posture and psychological factors to cervical spine muscle spasm. Their research showed that both males and females improved their symptoms, and males improved their situations somewhat

quicker than females did, confirming the referential nature of Stretching Technique in either gender and any underlying reason that leads to the symptoms. Besides, Ghodrati et al. (2017) studied combination treatments (such as soft tissue release, muscle energy techniques, and exercise) of non-specific persistent neck pain through a randomized controlled trial. Their findings reported remarkable improvements in pain and disability with similar changes on ROM in their results, which indicates that, in some cases, the Stretching Technique may act alone as an effective intervention when properly performed. This Stretching Technique differs from previous research studies in that it focuses on the SCM and scalene muscles. Cases of impaired neuromuscular function in such muscles have been experienced in patients with chronic neck pain (Falla et al., 2004). The improvement of both increased functioning and reduction of symptoms induced by the direct Stretching Technique Characteristics of Stretching Technique here represents the validity of the improved outcome. The electromyographic observations of Falla et al. 2003) indicated an enhanced susceptibility to otofatigue in the SCM and scalene muscle among the patients with chronic neck pain. Enhanced muscle endurance and decreased pain levels in the present research indicate that the Stretching Technique could reverse such fatigue by decreasing adhesions and improving the well-being of the soft tissues.

(Buyukturan et al. 2021) Compared the effects of SCM-specific massage/stretching using comorbidity with physiotherapy, which led to a statistically significant reduction in the level of pain, ROM, endurance, and disability. The current evidence indicates that the focus of Stretching Technique may also contribute to the even stronger soft tissue regeneration and recovery. (Kim and Lee 2018) stated that SCM hyperactivity may cause the spinal accessory nerve compression, resulting in chronic symptoms. The relief caused by the Stretching Technique on neural compression may be due to decreasing muscular tension and fascial tension, which could translate to the therapeutic effect. In general, all of the data do not agree with the null hypothesis of pain and disability, and, Stretching Techniqueially, the null hypothesis of ROM, contributing to the conclusion that Stretching Technique, in combination with physiotherapy, is more effective than physiotherapy in treating chronic neck pains.

Limitations of the Study:

This study's limitations include a small sample size and brief intervention duration, which constrain the generalizability and assessment of the long-term efficacy of the Stretching Technique. The absence of follow-up and psychological factor measurements limits understanding of sustained effects and the holistic impact on chronic neck pain. Additionally, potential anticipation bias, lack of gender subgroup analysis, uncontrolled lifestyle factors, and its single-center nature affect the study's objectivity and external validity.

Chapter- VI Conclusion

This is a randomized controlled trial that studied the effectiveness of stretching techniques administered directly to the sternocleidomastoid and scalene muscles, combined with a traditional physiotherapeutic process, in patients with chronic, non-specific neck pain. Its results showed that, although both experimental and control groups demonstrated significant improvement in symptoms, patients who received Muscle Stretching in combination with ordinary physiotherapy improved more, particularly in terms of pain relief, cervical range of motion (ROM), and diminished functional ability. The statistical analysis revealed that the experimental group had a much larger decrease in the intensity of pain and in the degree to which pain interfered with the normal activities measured on the Visual Analog Scale (VAS). Additionally, tests on the Neck Disability Index (NDI) showed a significant improvement in the functional aspects of the Muscle Stretching group as compared to the control group in all the parameters used. Cervical ROM indicated significant improvements in both groups, though clinical outcomes indicated that the participants' Muscle Stretching group achieved better gains. The scores in the Global Rating of Change (GROC) were not significantly different between groups, but there was a trend that patient-reported improvement was being rated closer to the Muscle Stretching group, indicating a subjective improvement of experienced subjective recovery. This evidence favors the null hypothesis being rejected and the alternative being true that the combination of muscle Stretching and conventional physiotherapy is more productive in patients with a chronic neck pain condition as compared to physiotherapy as a single treatment. Working-age population, especially with an occupation or requiring repetitive movements of the neck, is one of the risk factors in developing chronic cervical muscles and skeletal problems; all the more clinical implications of these results have been assessed. The study promotes the application of Muscle Stretching as part of the standard treatment regimens of patients with chronic neck pain, particularly in instances where soft tissue conditions of the sternocleidomastoid and scalene muscles are involved. To encourage further implementation, special training of the physiotherapists in the use of muscle Stretching strategies might be presented at workshops and professional improvement programs. The next research attempts must consider recruiting more considerable sample sizes, increasing follow-up time to

evaluate the long-term effects, and performing comparative studies with other interventions used to treat soft tissues in order to increase the evidence base. More than that, taking into consideration the relative cost-effectiveness and ease of application, Muscle Stretching can be implemented as a feasible and effective solution to the treatment of different patients, even in the context of urban healthcare facilities, not to mention resource-limited rural areas. The further aggravation of the positive effect of muscle Stretching may be achieved by integrating it with the ergonomic education and the postural correction approaches that can lead to the long-term results of improved patient outcomes and the minimization of symptom reproduction. On the whole, the combination of muscle stretching as an element of multidisciplinary rehabilitation programs can be an innovation in enhancing both the quality of life and functional performance of people living with chronic neck pain.

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Appendix

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

Ref: CRP-BHPI/IRB/06/2024/884

Date: 10/06/2024

To
Md. Asikur Rahman Apurba
4th Professional Year, B.Sc. in Physiotherapy
Student ID: **112180473**
BHPI, CRP, Savar, Dhaka-1343, Bangladesh

Subject: Approval of the thesis proposal "**Effectiveness of Stretching Exercise for Mild to Moderate Neck Pain**" by ethics committee.

Dear Md Asikur Rahman Apurba,
Congratulations.
The Institutional Review Board (IRB) of BHPI has reviewed and discussed your application to conduct the dissertation mentioned above, with yourself, as the principal investigator and Prof. Md. Obaidul Haque, Vice principal. BHPI. CRP, Savar, Dhaka, as the thesis supervisor. The following documents have been reviewed and approved:

Sl. No.	Name of the Documents
1	Thesis proposal
2	Questionnaire (English & / or Bengali version)
3	Information sheet & consent form.

This study aims to investigate the effectiveness of a stretching exercise program focused on the sternocleidomastoid and scalene (anterior, middle, posterior) muscles in reducing pain and disability among individuals with mild to moderate chronic neck pain. The study aims to compare this targeted stretching intervention to conventional physiotherapy alone. The study involves participating in a 6-week exercise program and completing assessments of the patient's neck pain, disability levels, and range of motion. If the patient is in the stretching exercise group, the patient will receive intervention targeting the sternocleidomastoid and scalene muscles in the neck region. If the patient is in the control group, the patient will receive standard physiotherapy treatments like heat, ultrasound, and gentle neck exercises. The members of the Ethics Committee have approved the study to be conducted in the presented form at the meeting held at 09:00 AM on 24/01/2024 at BHPI (41st IRB Meeting).

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

Best regards,

Muhammad Millat Hossain
Associate Professor & Course Coordinator, MRS
Member Secretary, Institutional Review Board (IRB)
BHPI, CRP, Savar, Dhaka-1343, Bangladesh

সিআরপি-চাপাইন, সাভার, ঢাকা-১৩৪৩, বাংলাদেশ। ফোন: +৮৮ ০২ ২২৪৪৪৫৪৬৪-৫, +৮৮ ০২ ২২৪৪৪১৪০৪, মোবাইল: +৮৮ ০১৭৩০ ০৫৯৬৪৭
CRP-Chapain, Savar, Dhaka-1343, Bangladesh. Tel: +88 02 224445464-5, +88 02 224441404, Mobile: +88 01730059647
E-mail : principal-bhpi@crp-bangladesh.org, Web: bhpi.edu.bd

Permission Letter

Date: 10/06/2024

Head

Department of Physiotherapy

Centre for the Rehabilitation of the Paralysed (CRP)

Chapain, Savar, Dhaka-1343

Through: Head, Department of Physiotherapy, BHPI.

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

Sir,

With due respect and humble submission, I am Md. Asikur Rahman Apurba is a student in 4th year B.Sc. in physiotherapy at Bangladesh Health Professions Institute (BHPI). The Ethical committee has approved my research project entitled: **"Effectiveness of Stretching Exercise for Mild to Moderate Neck Pain"** under the supervision of Prof. Md. Obaidul Haque, Vice Principal, BHPI, CRP, Savar, Dhaka. I want to collect data for my research project from the Department of Physiotherapy at CRP. So, I need permission for data collection from the Neurology Unit of the Physiotherapy Department at CRP-Savar, Dhaka-1343. I would like to assure you that anything in the study will not be harmful to the participants and the Department itself.

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

Yours faithfully,

MD Asikur Rahman Apurba

Md. Asikur Rahman Apurba

4th Year

B.Sc. in Physiotherapy

Class Roll: 48; Session: 2018-2019

Bangladesh Health Professions Institute (BHPI)

(An academic Institution of CRP)

CRP-Chapain, Savar, Dhaka-1343.

Forwarded
Sir/dy
10/06/2024

Approved
11/06/24

Prof. Dr. Mohammad Anwar Hossain, PhD
Professor, Physiotherapy Dept. BHPI
Senior Consultant & Head, Physiotherapy Dept.
CRP, Savar, Dhaka-1343

Consent Form

Assalamualaikum, My Name Md. Asikur Rahman Apurba.I am a 4th year undergraduate student in the Physiotherapy Department. I am doing a thesis on the **Effectiveness of Stretching Exercise for Mild to Moderate Chronic Neck Pain.** You are invited to participate in a research study evaluating the effectiveness of stretching exercises for chronic neck pain. This form provides important information about the study.Please read it carefully and feel free to ask any questions before deciding whether to participate. This study aims to determine if a 6-week stretching exercise program focused on the sternocleidomastoid and scalene neck muscles can reduce pain and disability in individuals with chronic, non-specific neck pain compared to standard physiotherapy treatment. If you agree to participate, you will be randomly assigned to either the stretching exercise group or the control group receiving conventional physiotherapy. Both groups will attend 2-3 supervised sessions per week for 6 weeks. Assessments of your pain, range of motion, physical function and muscle strength will be done before and after the 6-week program by an evaluator who is unaware of your group assignment. The stretching exercises in this study present minimal risk, though temporary mild muscle soreness is possible. The physiotherapy modalities used in the control group are standard treatments with low risk of adverse effects. Your participation may lead to reduced neck pain and improved mobility and function, though this cannot be guaranteed. The findings may also benefit others by providing evidence on effective neck pain treatment approaches. All information collected will be kept confidential. Your identity will be protected by using coded identifiers instead of names. Only the study team will have access to the data. Your decision to participate is completely voluntary. You may withdraw from the study at any time without penalty or impact on your medical care..

By signing below, you indicate that you have read and understood this consent form, have had your questions answered, and agree to participate.

Participant's Name: _____

Participant's Signature: _____ Date: _____

Researcher's Name: _____

Researcher's Signature: _____ Date: _____

Questionnaire (English Version)

This questionnaire is developed to measure pain, ROM, and neck disability & clinical change of the patient with chronic neck pain, and this portion will be filled by the data collector using a black pen. **Please answer every section and mark in each section only the one circle that applies to you**. Please select the item that best represents your situation, even if you see multiple statements in a section that apply to you.

Patient ID No: **Date:**

Patient's name: **Mobile No:**

Address:

Part 1: Socio-Demographic Information:

Question	Response
1. Age	…….. years
2. Sex	• Male • Female
3. Occupation	…….
4. Height	…….. (cm)
5. Weight	…….. (kg)
6. BMI	……. kg/m^2
7. Educational level	
8. Family Type	• Nuclear • Combine
9. Family members	……
10. Monthly income	…… (tk)

11. Sports activity	• Yes • No
12. Smoking	• Yes • No

Part 2: Comorbidities:

1. Do you have any comorbid diseases?

- Diabetes
- Hypertension
- Asthma
- COPD
- Heart Disease •
  Kidney disease

Part 3: Neck pain-related information:

Question	Response
1. How long have you been suffering from neck pain?	…… Day / Month / Year
2. In which posture do you prefer to sleep?	• Supine lying • Prone lying • Side lying- Right • Side lying- Left
3. How many pillows do you use during sleeping?	……
4. What do you think about the cause of your pain?	• Due to Trauma • Due to lifting heavy weight • Due to bad working posture • Coughing or sneezing • Bad sleeping posture • Others
5. Which side of your neck is more?	• Right • Left • Central • Both
6. On which side of your shoulder do you feel pain most?	• Right • Left • Not applicable
7. Where do you feel more pain relatively?	• Neck pain is more than the shoulder girdle

	• Shoulder girdle pain is more than neck pain • Neck pain and Shoulder girdle pain are equal
8. When do you feel the worst pain?	• In the morning • As the day progresses • In the evening • At night • All day
9. Which direction of movement exaggerated your pain?	• Neck forward bending • Neck backward bending • Neck turning to right • Neck turning to left • Rising from lying • Rising from sitting
10. How is your pain now proceeding from the onset?	• Improving • Worsening • Staying the same

Pre-Test Data:

Part 4: Cervical Range of Motion Information:

1. How much range of motion of the cervical spine is present? (in degree)

a Flexion……

b Extension……

c Side flexion (Right)……

d Side flexion (Left)……..

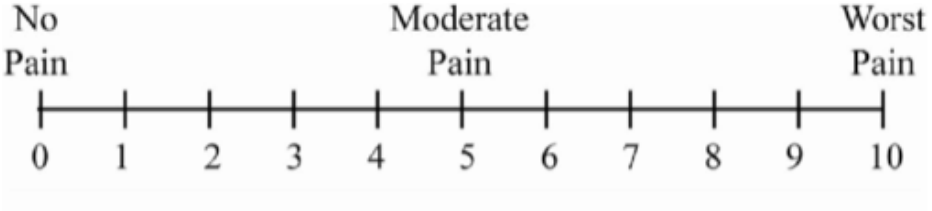
e Rotation (Right)…….

f Rotation (Left)……

Part 5: Pain Assessment Using VAS

Visual Analogue Scale (VAS)

"Please mark on the line below to indicate the intensity of your neck pain during the last week."



Write the pain level according to the VAS Scale

1. Pain at rest-_____

2. Pain during neck movement-_____

3. Average pain over the past 7 days_____

Part 6: Neck Disability Index

READ: This questionnaire is designed to enable us to understand how much your neck pain has affected your ability to manage your everyday activities. Please answer each section by circling the ONE CHOICE that most applies to you. We realize that you may feel that more than one statement may relate to you, but **PLEASE CIRCLE THE ONE. CHOOSE WHICH MOST CLOSELY DESCRIBES YOUR PROBLEM RIGHT NOW.**

SECTION 1 - Pain Intensity	• I have no pain at the moment • The pain is very mild at the moment • The pain is moderate at the moment • The pain is fairly severe at the moment • The pain is very severe at the moment • The pain is the worst pain imaginable at the moment
SECTION 2 -Personal Care (Washing, Dressing, etc.)	• I can look after myself normally without causing extra pain • I can look after myself, but it causes extra pain. • It is painful to look after myself, and I am slow and careful • I need some help, but I manage most of my care • I need help every day in most aspects of self-care • I do not get dressed; I wash with difficulty and stay in bed

Section 3 - Lifting	• I can lift heavy weights without extra pain • I can lift heavy weights, but it gives me extra pain • Pain prevents me from lifting heavy weights off the floor, but I can manage if they are conveniently positioned (like on a table)

	• Pain prevents me from lifting heavy weights, but I can manage light-to-medium weights if they are conveniently positioned • I can lift very light weights • I cannot lift or carry anything at all
Section 4 - Reading	• can read as much as I want with no neck pain • I can read as much as I want with slight neck pain • I can read as much as I I want with moderate neck pain • I can't read as much as I want because of moderate neck pain • I can hardly read at all because of severe pain in my neck • I cannot read at all
Section 5 - Headaches	• I have no headaches at all • I have slight headaches that come infrequently • I have moderate headaches that come infrequently • Ihave moderate headaches that come frequently • I have severe headaches that come frequently • I have headaches almost all of the time

Section 6 - Concentration	• I can concentrate fully when I want with no difficulty • I can concentrate fully when I want to with slight difficulty • I have a fair degree of difficulty concentrating when I want to • I have a lot of difficulty concentrating when I want to • I have a great deal of difficulty concentrating when I want to
	• I cannot concentrate at all
Section 7 - Work	• I can do as much work as I want • 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 cannot do any work at all
Section 8 - Driving	• I can drive my car without any neck pain • I can drive my car as long as I want with slight neck pain • I can drive my car as long as I want with moderate neck pain • I can't drive my car as long as I want because of moderate neck pain • I can hardly drive at all because of severe neck pain • I can't drive my car at all

Section 9 - Sleeping	• I have no trouble sleeping • My sleep is slightly disturbed (less than 1 hour sleepless) • My sleep is mildly disturbed (1 to 2 hours sleepless) • My sleep is moderately disturbed (2 to 3 hours sleepless) • My sleep is greatly disturbed (3 to 5 hours sleepless) • My sleep is completely disturbed (5 to 7 hours sleepless)
Section 10 - Recreation	• I am able to engage in all my recreation activities with no neck pain

	• I can engage in all my recreation activities with some neck pain • I can engage in most, but not all, of my usual recreation activities because of neck pain • I can engage in a few of my usual recreation activities because of neck pain • I can hardly do any recreational activities because of neck pain • I can't do any recreational activities at all because of neck pain

Part 7: Global Rating of Change

Instructions: Please rate the overall change in your condition from the time that you began treatment until now (Choose only one):

- ☐ -7 Avery great deal worse
- ☐ -6 A great deal worse
- ☐ -5 Quite a bit worse
- ☐ -4 Moderately worse
- ☐ -3 Somewhat worse

☐ -2 A little bit worse

☐ -1 A tiny bit worse (almost the same)

☐ +7 A very great deal better

☐ +6 A great deal better

☐ +5 Quite a bit better

☐ +4 Moderately better

☐ +3 Somewhat better

☐ +2 A little bit better

☐ +1 A tiny bit better (almost the same)

Post-test Data

Part 8: Cervical Range of Motion Information:

1. How much range of motion of the cervical spine is present? (in degree)

a Flexion……

b Extension……

c Side flexion (Right)……

d Side flexion (Left)……..

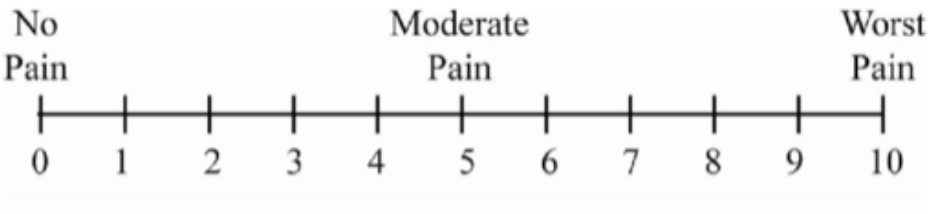
e Rotation (Right)…….

f Rotation (Left)……

Part 9: Pain Assessment Using VAS

Visual Analogue Scale (VAS)

"Please mark on the line below to indicate the intensity of your neck pain during the last week."



Write the pain level according to the VAS Scale

1. Pain at rest-_____

2. Pain during neck movement-_____

3. Average pain over the past 7 days_____

Part 10: Neck Disability Index

READ: This questionnaire is designed to enable us to understand how much your neck pain has affected your ability to manage your everyday activities. Please answer each section by circling the ONE CHOICE that most applies to you. We realize that you may feel that more than one statement may relate to you, but **PLEASE CIRCLE THE ONE. CHOOSE WHICH MOST CLOSELY DESCRIBES YOUR PROBLEM RIGHT NOW.**

SECTION 1 - Pain Intensity	• I have no pain at the moment • The pain is very mild at the moment • The pain is moderate at the moment • The pain is fairly severe at the moment • The pain is very severe at the moment • The pain is the worst pain imaginable at the moment
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Section 3 - Lifting	• I can lift heavy weights without extra pain • I can lift heavy weights, but it gives me extra pain • Pain prevents me from lifting heavy weights off the floor, but I can manage if they are conveniently positioned (like on a table)

	• Pain prevents me from lifting heavy weights, but I can manage light-to-medium weights if they are conveniently positioned • I can lift very light weights • I cannot lift or carry anything at all
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	• I cannot concentrate at all
Section 7 - Work	• I can do as much work as I want • 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 cannot do any work at all
Section 8 - Driving	• I can drive my car without any neck pain • I can drive my car as long as I want with slight neck pain • I can drive my car as long as I want with moderate neck pain • I can't drive my car as long as I want because of moderate neck pain • I can hardly drive at all because of severe neck pain • I can't drive my car at all

Section 9 - Sleeping	• I have no trouble sleeping • My sleep is slightly disturbed (less than 1 hour sleepless) • My sleep is mildly disturbed (1 to 2 hours sleepless) • My sleep is moderately disturbed (2 to 3 hours sleepless) • My sleep is greatly disturbed (3 to 5 hours sleepless) • My sleep is completely disturbed (5 to 7 hours sleepless)
Section 10 - Recreation	• I am able to engage in all my recreation activities with no neck pain

	• I can engage in all my recreation activities with some neck pain • I can engage in most, but not all, of my usual recreation activities because of neck pain • I can engage in a few of my usual recreation activities because of neck pain • I can hardly do any recreational activities because of neck pain • I can't do any recreational activities at all because of neck pain

Part 11: Global Rating of Change

Instructions: Please rate the overall change in your condition from the time that you began treatment until now (Choose only one):

- ☐ -7 Avery great deal worse
- ☐ -6 A great deal worse
- ☐ -5 Quite a bit worse
- ☐ -4 Moderately worse
- ☐ -3 Somewhat worse

- ☐ -2 A little bit worse
- ☐ -1 A tiny bit worse (almost the same)
- ☐ +7 A very great deal better
- ☐ +6 A great deal better
- ☐ +5 Quite a bit better
- ☐ +4 Moderately better
- ☐ +3 Somewhat better
- ☐ +2 A little bit better
- ☐ +1 A tiny bit better (almost the same)

সম্মতি পত্র

আসসালামুয়ালাইকুম, আমার নাম মোঃ আশিকুর রহমান অপূর্ব। আমি ফিজিওথেরাপি বিভাগের ৪র্থ বর্ষের স্নাতক ছাত্র। আমি হালকা থেকে মাঝারি দীর্ঘস্থায়ী ঘাড় ব্যথার জন্য স্ট্রেচিং ব্যায়ামের কার্যকারিতার উপর একটি থিসিস করছি। দীর্ঘস্থায়ী ঘাড় ব্যথার জন্য স্ট্রেচিং ব্যায়ামের কার্যকারিতা মূল্যায়ন করে একটি গবেষণা গবেষণায় অংশগ্রহণের জন্য আপনাকে আমন্ত্রণ জানানো হয়েছে। এই ফর্মটি অধ্যয়ন সম্পর্কে গুরুত্বপূর্ণ তথ্য প্রদান করে। অনুগ্রহ করে এটি মনোযোগ সহকারে পড়ুন এবং অংশগ্রহণ করবেন কিনা তা সিদ্ধান্ত নেওয়ার আগে যেকোনো প্রশ্ন জিজ্ঞাসা করুন। স্ট্যান্ডার্ড ফিজিওথেরাপি চিকিত্সার তুলনায় দীর্ঘস্থায়ী, অ-নির্দিষ্ট ঘাড়ের ব্যথায় আক্রান্ত ব্যক্তিদের স্টারনোক্লিডোমাস্টয়েড এবং স্কেলিন নেক পেশীগুলির উপর দৃষ্টি নিবদ্ধ করা 6-সপ্তাহের স্ট্রেচিং ব্যায়াম প্রোগ্রামটি ব্যথা এবং অক্ষমতা কমাতে পারে কিনা তা নির্ধারণ করা এই গবেষণার লক্ষ্য। আপনি যদি অংশগ্রহণ করতে সম্মত হন, তাহলে আপনাকে এলোমেলোভাবে স্ট্রেচিং ব্যায়াম গ্রুপ বা প্রচলিত ফিজিওথেরাপি গ্রহণকারী কন্ট্রোল গ্রুপে নিয়োগ করা হবে।

উভয় গ্রুপ 6 সপ্তাহের জন্য প্রতি সপ্তাহে 2-3টি তত্ত্বাবধানে সেশনে অংশগ্রহণ করবে। আপনার ব্যথা, গতির পরিসর, শারীরিক কার্যকারিতা এবং পেশী শক্তির মূল্যায়ন 6-সপ্তাহের প্রোগ্রামের আগে এবং পরে একজন মূল্যায়নকারী দ্বারা করা হবে যিনি আপনার গ্রুপ অ্যাসাইনমেন্ট সম্পর্কে অবগত নন। এই গবেষণায় স্ট্রেচিং ব্যায়াম ন্যূনতম ঝুঁকি উপস্থাপন করে, যদিও অস্থায়ী হালকা পেশী ব্যথা সম্ভব। কন্ট্রোল গ্রুপে ব্যবহৃত ফিজিওথেরাপি পদ্ধতিগুলি হল আদর্শ চিকিত্সা যার প্রতিকূল প্রভাবের ঝুঁকি কম। আপনার অংশগ্রহণ ঘাড়ের ব্যথা কমাতে পারে এবং গতিশীলতা এবং কার্যকারিতা উন্নত করতে পারে, যদিও এটি নিশ্চিত করা যায় না। ফলাফলগুলি কার্যকর ঘাড় ব্যথা চিকিত্সা পদ্ধতির প্রমাণ প্রদান করে অন্যদের উপকার করতে পারে। সংগৃহীত সকল তথ্য গোপন রাখা হবে। নামের পরিবর্তে কোডেড শনাক্তকারী ব্যবহার করে আপনার পরিচয় সুরক্ষিত করা হবে। শুধুমাত্র অধ্যয়ন দলের ডেটা অ্যাক্সেস থাকবে। আপনার অংশগ্রহণের সিদ্ধান্ত সম্পূর্ণ স্বেচ্ছাসেবী।

আপনি জরিমানা বা আপনার চিকিৎসা পরিচর্যার উপর প্রভাব ছাড়াই যেকোন সময় অধ্যয়ন থেকে প্রত্যাহার করতে পারেন।

নীচে স্বাক্ষর করার মাধ্যমে, আপনি ইঙ্গিত করেন যে আপনি এই সম্মতি ফর্মটি পড়েছেন এবং বুঝেছেন, আপনার প্রশ্নের উত্তর পেয়েছেন এবং অংশগ্রহণ করতে সম্মত হয়েছেন।

অংশগ্রহণকারীর নাম:

অংশগ্রহণকারীর স্বাক্ষর: তারিখ:

গবেষকের নাম:

গবেষকের স্বাক্ষর: তারিখ:

প্রশ্নাবলী (বাংলা সংস্করণ)

এই প্রশ্নাবলীটি দীর্ঘস্থায়ী ঘাড় ব্যথায় আক্রান্ত রোগীর ব্যথা, গতির পরিসীমা (ROM) এবং ক্লিনিকাল পরিবর্তন পরিমাপের জন্য তৈরি করা হয়েছে। এই অংশটি ডেটা সংগ্রাহক একটি কালো কলম ব্যবহার করে পূরণ করবেন। অনুগ্রহ করে প্রতিটি বিভাগে উত্তর দিন এবং প্রতিটি বিভাগে শুধুমাত্র একটি বৃত্ত চিহ্নিত করুন যা আপনার জন্য প্রযোজ্য। অনুগ্রহ করে সেই আইটেমটি নির্বাচন করুন যা আপনার পরিস্থিতিকে সবচেয়ে ভালোভাবে উপস্থাপন করে, এমনকি যদি একটি বিভাগে একাধিক বিবৃতি আপনার জন্য প্রযোজ্য বলে মনে হয়।

রোগীর আইডি নং___

রোগীর নাম: _____

তারিখ: ___/___/___ (দিন/মাস/বছর)

মোবাইল নং: _____

ঠিকানা: _____

১ম অংশ: আর্থ-সামাজিক তথ্য

প্রশ্ন	উত্তর
১. বয়স	_____ বছর
২. লিঙ্গ	
	• পুরুষ

	•মহিলা
৩. পেশা	_____
৪. উচ্চতা	_____ (সেমি)
৫. ওজন	_____ (কেজি)
৬. BMI	_____ কেজি/মি২
৭. শিক্ষাগত যোগ্যতা	_____
৮. পারিবারিক ধরন	
	• একক
	• যৌথ
৯. পরিবারের সদস্য সংখ্যা	_____
১০. মাসিক আয়	_____ (টাকা)
১১. খেলাধুলা/শারীরিক কার্যকলাপ	
	• হ্যাঁ

	• না
১২. ধূমপান	
	• হ্যাঁ
	• না

২য় অংশ: সহ-অসুস্থতা **(Comorbidities)**

১. আপনার কি কোনো সহ-অসুস্থতা আছে? (প্রযোজ্য সবগুলি নির্বাচন করুন)

* ডায়াবেটিস

* উচ্চ রক্তচাপ

* হাঁপানি

* সিওপিডি (COPD)

* হৃদরোগ

* কিডনি রোগ

৩য় অংশ: ঘাড় ব্যথা সম্পর্কিত তথ্য

প্রশ্ন	উত্তর
১. আপনি কতদিন ধরে ঘাড় ব্যথায় ভুগছেন?	_____ দিন / মাস / বছর
২. আপনি কোন ভঙ্গিতে ঘুমাতে পছন্দ করেন?	

	• চিৎ হয়ে শুয়ে
	• উপুড় হয়ে শুয়ে
	• ডান পাশে কাত হয়ে শুয়ে
	• বাম পাশে কাত হয়ে শুয়ে
৩. ঘুমানোর সময় আপনি কয়টি বালিশ ব্যবহার করেন?	_____
৪. আপনার ব্যথার কারণ কী বলে আপনি মনে করেন?	
	• আঘাতের কারণে
	• ভারী জিনিস তোলার কারণে
	• ভুল কাজের ভঙ্গির কারণে
	• কাশি বা হাঁচির কারণে
	• ভুল ঘুমানোর ভঙ্গির কারণে
	• অন্যান্য
৫. আপনার ঘাড়ের কোন পাশে বেশি ব্যথা হয়?	
	• ডান
	• বাম
	• মাঝখানে
	• উভয় পাশে

৬. আপনার কাঁধের কোন পাশে বেশি ব্যথা অনুভব করেন?	
	• ডান
	• বাম
	• প্রযোজ্য নয়
৭. আপেক্ষিকভাবে আপনি কোথায় বেশি ব্যথা অনুভব করেন?	
	• ডান
	• বাম
	• প্রযোজ্য নয়
৮. কখন আপনার সবচেয়ে খারাপ ব্যথা হয়?	
	• সকালে
	• দিনের বেলা বাড়তে থাকে
	• সন্ধ্যায়
	• রাতে
	• সারাদিন
৯. কোন নড়াচড়া আপনার ব্যথা বাড়িয়ে দেয়?	
	• ঘাড় সামনে বাঁকানো
	• ঘাড় পেছনে বাঁকানো

	• ঘাড় ডানদিকে ঘোরানো
	• ঘাড় বামদিকে ঘোরানো
	• শুয়ে থেকে উঠলে
	• বসে থেকে উঠলে
১০. ব্যথা শুরু হওয়ার পর থেকে এটি এখন কেমন চলছে?	
	• উন্নতি হচ্ছে
	• খারাপ হচ্ছে
	• একই রকম আছে

প্রি-টেস্ট ডেটা:

৪র্থ অংশ: সার্ভিকাল গতির পরিসীমা (ROM) তথ্য:

(ডেটা সংগ্রাহক দ্বারা পূরণ করতে হবে)

সার্ভিকাল স্পাইনের গতির পরিসীমা কত? (ডিগ্রিতে)

ক. ফ্লেক্সন (Flexion): _____

খ. এক্সটেনশন (Extension): _____

গ. সাইড ফ্লেক্সন (ডান) (Side flexion - Right): _____

ঘ. সাইড ফ্লেক্সন (বাম) (Side flexion - Left): _____

ঙ. রোটেশন (ডান) (Rotation - Right): _____

চ. রোটেশন (বাম) (Rotation - Left): _____

৫ম অংশ**: VAS** ব্যবহার করে ব্যথা মূল্যায়ন

ভিজ্যুয়াল অ্যানালগ স্কেল (VAS)

"গত সপ্তাহে আপনার ঘাড় ব্যথার তীব্রতা নির্দেশ করতে নিচের লাইনে চিহ্নিত করুন।"

VAS স্কেল অনুযায়ী ব্যথার মাত্রা লিখুন:

১. বিশ্রামের সময় ব্যথা: _____

২. ঘাড় নড়াচড়ার সময় ব্যথা: _____

৩. গত ৭ দিনের গড় ব্যথা: _____

৬ষ্ঠ অংশ**:** ঘাড়ের অক্ষমতা সূচক **(Neck Disability Index - NDI)**

পড়ুন**:** এই প্রশ্নাবলীটি আমাদের বুঝতে সাহায্য করার জন্য ডিজাইন করা হয়েছে যে আপনার ঘাড়ের ব্যথা

আপনার দৈনন্দিন কার্যকলাপ পরিচালনা করার ক্ষমতাকে কতটা প্রভাবিত করেছে। অনুগ্রহ করে প্রতিটি বিভাগে শুধুমাত্র একটি বিকল্প বৃত্তাকার করুন যা আপনার জন্য সবচেয়ে বেশি প্রযোজ্য। আমরা বুঝতে পারছি যে আপনার মনে হতে পারে একাধিক বিবৃতি আপনার সাথে সম্পর্কিত, তবে অনুগ্রহ করে শুধুমাত্র একটি বৃত্তাকার করুন। এখন আপনার সমস্যাকে সবচেয়ে ভালোভাবে বর্ণনা করে এমনটি নির্বাচন করুন।

বিভাগ	প্রশ্ন/বিবৃতি বিকল্পসমূহ
১ম বিভাগ - ব্যথার তীব্রতা	
	• আমার এই মুহূর্তে কোনো ব্যথা নেই
	• এই মুহূর্তে ব্যথা খুব হালকা
	• এই মুহূর্তে ব্যথা মাঝারি
	• এই মুহূর্তে ব্যথা বেশ তীব্র
	• এই মুহূর্তে ব্যথা খুব তীব্র
	• এই মুহূর্তে ব্যথা কল্পনাতীত সবচেয়ে খারাপ ব্যথা
২য় বিভাগ - ব্যক্তিগত যত্ন ((ধোয়া, পোশাক পরা ইত্যাদি)	
	• আমি অতিরিক্ত ব্যথা ছাড়াই স্বাভাবিকভাবে নিজের যত্ন নিতে পারি
	• আমি স্বাভাবিকভাবে নিজের যত্ন নিতে পারি তবে এটি অতিরিক্ত ব্যথার কারণ হয়।
	• নিজের যত্ন নিতে কষ্ট হয় এবং আমি ধীর ও সতর্ক থাকি
	• আমার কিছুটা সাহায্যের প্রয়োজন হয় তবে আমি

	আমার বেশিরভাগ যন্ত্র নিজেই পরিচালনা করি
	• আমার যন্ত্রের বেশিরভাগ ক্ষেত্রে প্রতিদিন সাহায্যের প্রয়োজন হয়
	• আমি পোশাক পরি না; আমি কষ্ট করে ধুই এবং বিছানায় থাকি
৩য় বিভাগ - উত্তোলন **(Lifting)**	
	• আমি অতিরিক্ত ব্যথা ছাড়াই ভারী ওজন তুলতে পারি
	• আমি ভারী ওজন তুলতে পারি তবে এটি আমাকে অতিরিক্ত ব্যথা দেয়
	• ব্যথা আমাকে মেঝে থেকে ভারী ওজন তুলতে বাধা দেয়, তবে সেগুলি সুবিধাজনকভাবে স্থাপন করা থাকলে (যেমন একটি টেবিলে) আমি পরিচালনা করতে পারি
	• ব্যথা আমাকে ভারী ওজন তুলতে বাধা দেয়, তবে হালকা থেকে মাঝারি ওজনের জিনিসগুলি সুবিধাজনকভাবে স্থাপন করা থাকলে আমি পরিচালনা করতে পারি
	• আমি খুব হালকা ওজনই তুলতে পারি
	• আমি কিছুই তুলতে বা বহন করতে পারি না
৪র্থ বিভাগ - পড়া **(Reading)**	
	• আমি ঘাড়ে ব্যথা ছাড়াই যত খুশি পড়তে পারি

	• আমি সামান্য ঘাড় ব্যথা সহ যত খুশি পড়তে পারি
	• আমি মাঝারি ঘাড় ব্যথা সহ যত খুশি পড়তে পারি
	• মাঝারি ঘাড় ব্যথার কারণে আমি যত খুশি পড়তে পারি না
	• ঘাড়ে তীব্র ব্যথার কারণে আমি প্রায় কিছুই পড়তে পারি না
	• আমি একেবারেই পড়তে পারি না
৫ম বিভাগ - মাথাব্যথা **(Headaches)**	
	• আমার একেবারেই মাথাব্যথা নেই
	• আমার হালকা মাথাব্যথা হয় যা মাঝে মাঝে আসে
	• আমার মাঝারি মাথাব্যথা হয় যা মাঝে মাঝে আসে
	• আমার মাঝারি মাথাব্যথা হয় যা প্রায়শই আসে
	• আমার তীব্র মাথাব্যথা হয় যা প্রায়শই আসে
	• আমার প্রায় সারাক্ষণ মাথাব্যথা থাকে
৬ষ্ঠ বিভাগ - মনোযোগ **(Concentration)**	
	• আমি যখন চাই তখন কোনো অসুবিধা ছাড়াই পুরোপুরি মনোযোগ দিতে পারি
	• আমি যখন চাই তখন সামান্য অসুবিধা সহ পুরোপুরি মনোযোগ দিতে পারি

	• যখন আমি মনোযোগ দিতে চাই তখন আমার বেশ অসুবিধা হয়
	• যখন আমি মনোযোগ দিতে চাই তখন আমার অনেক অসুবিধা হয়
	• যখন আমি মনোযোগ দিতে চাই তখন আমার খুব বেশি অসুবিধা হয়
	• আমি একেবারেই মনোযোগ দিতে পারি না
৭ম বিভাগ - কাজ **(Work)**	
	• আমি যত খুশি কাজ করতে পারি
	• আমি শুধুমাত্র আমার স্বাভাবিক কাজ করতে পারি, এর বেশি নয়
	• আমি আমার স্বাভাবিক কাজের বেশিরভাগ করতে পারি, এর বেশি নয়
	• আমি আমার স্বাভাবিক কাজ করতে পারি না
	• আমি প্রায় কোনো কাজই করতে পারি না
	• আমি একেবারেই কোনো কাজ করতে পারি না
৮ম বিভাগ - ড্রাইভিং **(Driving)**	
	• আমি ঘাড়ে কোনো ব্যথা ছাড়াই গাড়ি চালাতে পারি
	• আমি সামান্য ঘাড় ব্যথা সহ যত খুশি গাড়ি চালাতে পারি

	• আমি মাঝারি ঘাড় ব্যথা সহ যত খুশি গাড়ি চালাতে পারি
	• মাঝারি ঘাড় ব্যথার কারণে আমি যত খুশি গাড়ি চালাতে পারি না
	• তীব্র ঘাড় ব্যথার কারণে আমি প্রায় কোনো গাড়িই চালাতে পারি না
	• আমি একেবারেই গাড়ি চালাতে পারি না
৯ম বিভাগ - ঘুম **(Sleeping)**	
	• আমার ঘুমাতে কোনো সমস্যা হয় না
	• আমার ঘুম সামান্য ব্যাহত হয় (১ ঘন্টার কম ঘুমহীন)
	• আমার ঘুম হালকাভাবে ব্যাহত হয় (১ থেকে ২ ঘন্টা ঘুমহীন)
	• আমার ঘুম মাঝারিভাবে ব্যাহত হয় (২ থেকে ৩ ঘন্টা ঘুমহীন)
	• আমার ঘুম মারাত্মকভাবে ব্যাহত হয় (৩ থেকে ৫ ঘন্টা ঘুমহীন)
	• আমার ঘুম সম্পূর্ণরূপে ব্যাহত হয় (৫ থেকে ৭ ঘন্টা ঘুমহীন)
১০ম বিভাগ - বিনোদন **(Recreation)**	
	• আমি ঘাড়ে ব্যথা ছাড়াই আমার সমস্ত বিনোদনমূলক কার্যকলাপে অংশ নিতে পারি

	• আমি কিছু ঘাড় ব্যথা সহ আমার সমস্ত বিনোদনমূলক কার্যকলাপে অংশ নিতে পারি
	• ঘাড় ব্যথার কারণে আমি আমার স্বাভাবিক বিনোদনমূলক কার্যকলাপের বেশিরভাগে অংশ নিতে পারি, তবে সবগুলিতে নয়
	• ঘাড় ব্যথার কারণে আমি আমার স্বাভাবিক বিনোদনমূলক কার্যকলাপের অল্প কিছুতে অংশ নিতে পারি
	• ঘাড় ব্যথার কারণে আমি প্রায় কোনো বিনোদনমূলক কার্যকলাপই করতে পারি না
	• ঘাড় ব্যথার কারণে আমি একেবারেই কোনো বিনোদনমূলক কার্যকলাপ করতে পারি না

৭ম অংশ**:** গ্লোবাল রেটিং অফ চেঞ্জ **(Global Rating of Change - GROC)**

নির্দেশাবলী**:** আপনি যখন চিকিৎসা শুরু করেছিলেন তখন থেকে এখন পর্যন্ত আপনার অবস্থার সামগ্রিক পরিবর্তন কেমন বলে বর্ণনা করবেন? (শুধুমাত্র একটি নির্বাচন করুন):

☐ -7: অনেক অনেক খারাপ

☐ -6: অনেক খারাপ

☐ -5: বেশ খারাপ

☐ -4: মাঝারি রকম খারাপ

☐ -3: কিছুটা খারাপ

☐ -2: সামান্য খারাপ

☐ -1: খুব সামান্য খারাপ (প্রায় একই রকম)

☐ +7: অনেক অনেক ভালো

☐ +6: অনেক ভালো

☐ +5: বেশ ভালো

☐ +4: মাঝারি রকম ভালো

☐ +3: কিছুটা ভালো

☐ +2: সামান্য ভালো

☐ +1: খুব সামান্য ভালো (প্রায় একই রকম)

পোস্ট-টেস্ট ডেটা**:**

৮ম অংশ**:** সার্ভিকাল গতির পরিসীমা **(ROM)** তথ্য**:**

(ডেটা সংগ্রাহক দ্বারা পূরণ করতে হবে)

সার্ভিকাল স্পাইনের গতির পরিসীমা কত? (ডিগ্রিতে)

ক. ফ্লেক্সন (Flexion): _____

খ. এক্সটেনশন (Extension): _____

গ. সাইড ফ্লেক্সন (ডান) (Side flexion - Right): _____

ঘ. সাইড ফ্লেক্সন (বাম) (Side flexion - Left): _____

ঙ. রোটেশন (ডান) (Rotation - Right): _____

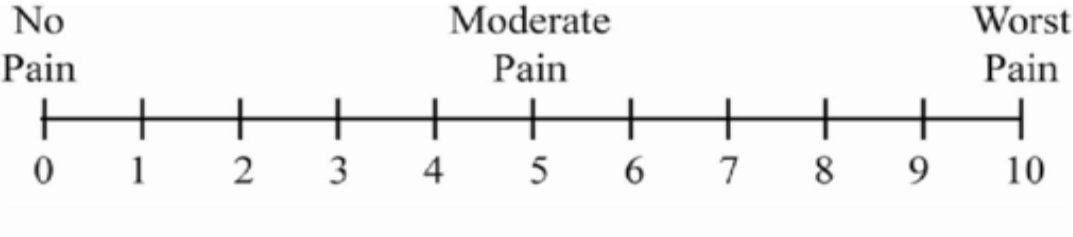
চ. রোটেশন (বাম) (Rotation - Left): _____

৯ম অংশ**: VAS** ব্যবহার করে ব্যথা মূল্যায়ন

ভিজ্যুয়াল অ্যানালগ স্কেল (VAS)

"গত সপ্তাহে আপনার ঘাড় ব্যথার তীব্রতা নির্দেশ করতে নিচের লাইনে চিহ্নিত করুন।"

০ [কোনো ব্যথা নেই] ----- ১ ----- ২ ----- ৩ [মাঝারি ব্যথা] ----- ৪ ----- ৫ ----- ৬ ----- ৭ ----- ৮ ----- ৯ ----- ১০ [সবচেয়ে খারাপ ব্যথা]



VAS স্কেল অনুযায়ী ব্যথার মাত্রা লিখুন:

১. বিশ্রামের সময় ব্যথা: _____

২. ঘাড় নড়াচড়ার সময় ব্যথা: _____

৩. গত ৭ দিনের গড় ব্যথা: _____

১০ম অংশ**:** ঘাড়ের অক্ষমতা সূচক **(Neck Disability Index - NDI)**

পড়ুন**:** এই প্রশ্নাবলীটি আমাদের বুঝতে সাহায্য করার জন্য ডিজাইন করা হয়েছে যে আপনার ঘাড়ের ব্যথা আপনার দৈনন্দিন কার্যকলাপ পরিচালনা করার ক্ষমতাকে কতটা প্রভাবিত করেছে। অনুগ্রহ করে প্রতিটি বিভাগে শুধুমাত্র একটি বিকল্প বৃত্তাকার করুন যা আপনার জন্য সবচেয়ে বেশি প্রযোজ্য। আমরা বুঝতে পারছি যে আপনার মনে হতে পারে একাধিক বিবৃতি আপনার সাথে সম্পর্কিত, তবে অনুগ্রহ করে শুধুমাত্র একটি বৃত্তাকার করুন। এখন আপনার সমস্যাকে সবচেয়ে ভালোভাবে বর্ণনা করে এমনটি নির্বাচন করুন।

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বিভাগ	প্রশ্ন/বিবৃতি বিকল্পসমূহ
১ম বিভাগ - ব্যথার তীব্রতা	
	• আমার এই মুহূর্তে কোনো ব্যথা নেই
	• এই মুহূর্তে ব্যথা খুব হালকা
	• এই মুহূর্তে ব্যথা মাঝারি
	• এই মুহূর্তে ব্যথা বেশ তীব্র
	• এই মুহূর্তে ব্যথা খুব তীব্র

	• এই মুহূর্তে ব্যথা কল্পনাতীত সবচেয়ে খারাপ ব্যথা
২য় বিভাগ - ব্যক্তিগত যত্ন ((ধোয়া, পোশাক পরা ইত্যাদি)	
	• আমি অতিরিক্ত ব্যথা ছাড়াই স্বাভাবিকভাবে নিজের যত্ন নিতে পারি
	• আমি স্বাভাবিকভাবে নিজের যত্ন নিতে পারি তবে এটি অতিরিক্ত ব্যথার কারণ হয়।
	• নিজের যত্ন নিতে কষ্ট হয় এবং আমি ধীর ও সতর্ক থাকি
	• আমার কিছুটা সাহায্যের প্রয়োজন হয় তবে আমি আমার বেশিরভাগ যত্ন নিজেই পরিচালনা করি
	• আমার যত্নের বেশিরভাগ ক্ষেত্রে প্রতিদিন সাহায্যের প্রয়োজন হয়
	• আমি পোশাক পরি না; আমি কষ্ট করে ধুই এবং বিছানায় থাকি
৩য় বিভাগ - উত্তোলন **(Lifting)**	
	• আমি অতিরিক্ত ব্যথা ছাড়াই ভারী ওজন তুলতে পারি
	• আমি ভারী ওজন তুলতে পারি তবে এটি আমাকে অতিরিক্ত ব্যথা দেয়
	• ব্যথা আমাকে মেঝে থেকে ভারী ওজন তুলতে বাধা দেয়, তবে সেগুলি সুবিধাজনকভাবে স্থাপন

	করা থাকলে (যেমন একটি টেবিলে) আমি পরিচালনা করতে পারি
	• ব্যথা আমাকে ভারী ওজন তুলতে বাধা দেয়, তবে হালকা থেকে মাঝারি ওজনের জিনিসগুলি সুবিধাজনকভাবে স্থাপন করা থাকলে আমি পরিচালনা করতে পারি
	• আমি খুব হালকা ওজনই তুলতে পারি
	• আমি কিছুই তুলতে বা বহন করতে পারি না
৪র্থ বিভাগ - পড়া **(Reading)**	
	• আমি ঘাড়ে ব্যথা ছাড়াই যত খুশি পড়তে পারি
	• আমি সামান্য ঘাড় ব্যথা সহ যত খুশি পড়তে পারি
	• আমি মাঝারি ঘাড় ব্যথা সহ যত খুশি পড়তে পারি
	• মাঝারি ঘাড় ব্যথার কারণে আমি যত খুশি পড়তে পারি না
	• ঘাড়ে তীব্র ব্যথার কারণে আমি প্রায় কিছুই পড়তে পারি না
	• আমি একেবারেই পড়তে পারি না
৫ম বিভাগ - মাথাব্যথা **(Headaches)**	
	• আমার একেবারেই মাথাব্যথা নেই
	• আমার হালকা মাথাব্যথা হয় যা মাঝে মাঝে আসে

	• আমার মাঝারি মাথাব্যথা হয় যা মাঝে মাঝে আসে
	• আমার মাঝারি মাথাব্যথা হয় যা প্রায়শই আসে
	• আমার তীব্র মাথাব্যথা হয় যা প্রায়শই আসে
	• আমার প্রায় সারাক্ষণ মাথাব্যথা থাকে
৬ষ্ঠ বিভাগ - মনোযোগ **(Concentration)**	
	• আমি যখন চাই তখন কোনো অসুবিধা ছাড়াই পুরোপুরি মনোযোগ দিতে পারি
	• আমি যখন চাই তখন সামান্য অসুবিধা সহ পুরোপুরি মনোযোগ দিতে পারি
	• যখন আমি মনোযোগ দিতে চাই তখন আমার বেশ অসুবিধা হয়
	• যখন আমি মনোযোগ দিতে চাই তখন আমার অনেক অসুবিধা হয়
	• যখন আমি মনোযোগ দিতে চাই তখন আমার খুব বেশি অসুবিধা হয়
	• আমি একেবারেই মনোযোগ দিতে পারি না
৭ম বিভাগ - কাজ **(Work)**	
	• আমি যত খুশি কাজ করতে পারি
	• আমি শুধুমাত্র আমার স্বাভাবিক কাজ করতে পারি, এর বেশি নয়

	• আমি আমার স্বাভাবিক কাজের বেশিরভাগ করতে পারি, এর বেশি নয়
	• আমি আমার স্বাভাবিক কাজ করতে পারি না
	• আমি প্রায় কোনো কাজই করতে পারি না
	• আমি একেবারেই কোনো কাজ করতে পারি না
৮ম বিভাগ - ড্রাইভিং **(Driving)**	
	• আমি ঘাড়ে কোনো ব্যথা ছাড়াই গাড়ি চালাতে পারি
	• আমি সামান্য ঘাড় ব্যথা সহ যত খুশি গাড়ি চালাতে পারি
	• আমি মাঝারি ঘাড় ব্যথা সহ যত খুশি গাড়ি চালাতে পারি
	• মাঝারি ঘাড় ব্যথার কারণে আমি যত খুশি গাড়ি চালাতে পারি না
	• তীব্র ঘাড় ব্যথার কারণে আমি প্রায় কোনো গাড়িই চালাতে পারি না
	• আমি একেবারেই গাড়ি চালাতে পারি না
৯ম বিভাগ - ঘুম **(Sleeping)**	
	• আমার ঘুমাতে কোনো সমস্যা হয় না
	• আমার ঘুম সামান্য ব্যাহত হয় (১ ঘন্টার কম ঘুমহীন)

	• আমার ঘুম হালকাভাবে ব্যাহত হয় (১ থেকে ২ ঘন্টা ঘুমহীন)
	• আমার ঘুম মাঝারিভাবে ব্যাহত হয় (২ থেকে ৩ ঘন্টা ঘুমহীন)
	• আমার ঘুম মারাত্মকভাবে ব্যাহত হয় (৩ থেকে ৫ ঘন্টা ঘুমহীন)
	• আমার ঘুম সম্পূর্ণরূপে ব্যাহত হয় (৫ থেকে ৭ ঘন্টা ঘুমহীন)
১০ম বিভাগ - বিনোদন **(Recreation)**	
	• আমি ঘাড়ে ব্যথা ছাড়াই আমার সমস্ত বিনোদনমূলক কার্যকলাপে অংশ নিতে পারি
	• আমি কিছু ঘাড় ব্যথা সহ আমার সমস্ত বিনোদনমূলক কার্যকলাপে অংশ নিতে পারি
	• ঘাড় ব্যথার কারণে আমি আমার স্বাভাবিক বিনোদনমূলক কার্যকলাপের বেশিরভাগে অংশ নিতে পারি, তবে সবগুলিতে নয়
	• ঘাড় ব্যথার কারণে আমি আমার স্বাভাবিক বিনোদনমূলক কার্যকলাপের অল্প কিছুতে অংশ নিতে পারি
	• ঘাড় ব্যথার কারণে আমি প্রায় কোনো বিনোদনমূলক কার্যকলাপই করতে পারি না
	• ঘাড় ব্যথার কারণে আমি একেবারেই কোনো বিনোদনমূলক কার্যকলাপ করতে পারি না

১১ তম অংশ: গ্লোবাল রেটিং অফ চেঞ্জ **(Global Rating of Change - GROC)**

নির্দেশাবলী: একমাস [১২ সেশোন বা তার বেশি] চিকিতসা নেয়ার পর তার আপনার বর্ত্মান অবস্থা ব্যক্ত করুন (শুধুমাত্র একটি নির্বাচন করুন):

- ☐ -7: অনেক অনেক খারাপ
- ☐ -6: অনেক খারাপ
- ☐ -5: বেশ খারাপ
- ☐ -4: মাঝারি রকম খারাপ
- ☐ -3: কিছুটা খারাপ
- ☐ -2: সামান্য খারাপ
- ☐ -1: খুব সামান্য খারাপ (প্রায় একই রকম)
- ☐ +7: অনেক অনেক ভালো
- ☐ +6: অনেক ভালো
- ☐ +5: বেশ ভালো
- ☐ +4: মাঝারি রকম ভালো
- ☐ +3: কিছুটা ভালো
- ☐ +2: সামান্য ভালো
- ☐ +1: খুব সামান্য ভালো (প্রায় একই রকম)

ডেটা সংগ্রাহকের স্বাক্ষর এবং তারিখ: _____

Treatment Protocol

This section outlines the "Treatment Protocol of Control Group (Usual care/treatment)" from the Physiotherapy Department of the Centre for the Rehabilitation of the Paralysed (CRP)[3]. The most commonly used treatment concepts are McKenzie, Cyriax, Maitland, and Mulligan[4].

1. McKenzie Approach:

- Repeated retraction in lying
- Repeated retraction in sitting
- Repeated retraction with overpressure (self, Therapist)
- Retraction Mobilization
- Retraction with extension and rotation
- Repeated side flexion in lying/sitting
- Repeated side flexion with overpressure (self, Therapist)
- Side flexion mobilization
- Repeated side rotation in lying/sitting
- Repeated side rotation with overpressure (self, Therapist)

- Side rotation mobilization
- Others McKenzie directional preference techniques

2. Cyriax Manipulation:

- Straight pull or rotation manipulation
- DTFM in triggered soft tissue

3. Maitland Mobilization:

- P/A unilateral mobilization
- P/A central mobilization

4. Mulligan Mobilization:

- Sustained Natural Apophyseal Gliding (SNAGS)
- Reverse Sustained Natural Apophyseal Gliding (Reverse SNAGS)
- Natural Apophyseal Gliding (NAGS)

5. Neural Mobilization:

- **Median Nerve:** Shoulder-Depression and abduction 10 degrees. Elbow and wrist in Extension

- **Radial Nerve:** Shoulder-Depression and abduction 10 degrees. Elbow and wrist in Flexion

- **Ulnar Nerve:** Shoulder-Depression and abduction 10-90 degrees. Elbow is in flexion and wrist is in Extension and radial deviation. In each movement of spine, contralateral side flexion is to be done

6. Electrotherapy:

- Physiotherapists commonly prefer manual therapy for neck pain, but use selective electrotherapeutic modalities based on patient's requirements
- IRR over the neck for 10 minutes

- Cervical mechanical traction intermittent mode with weight of 7% of total body weight for 15 minutes

    - Upper limit of weight is maximum 13 kg and lower limit 5 kg

    - Force time 5 minutes with 1 minute rest

7. Patient Education and Home Advice:

- Counselling
- Home exercises
- Lifestyle modifications
- Avoiding predisposing factors

Annexure 6: Treatment Protocol (Experimental)

This protocol combines the "Usual Physiotherapy Treatment" (as described in the conventional protocol) with "Stretching Technique on SCM & Scalene muscles."

A. Usual Physiotherapy Treatment Plus

B. Stretching Technique on SCM & Scalene muscles

1. Sternocleidomastoid Muscle (SCM) and Chronic Neck Pain:

The sternocleidomastoid (SCM) is a prominent muscle located on both sides of the neck, extending from the sternum and clavicle to the mastoid process of the skull. It is responsible for neck flexion, rotation, and lateral bending. Chronic tension or injury to the SCM can contribute to a variety of symptoms, including neck pain, headaches, dizziness, and even temporomandibular joint (TMJ) dysfunction.

- **Application of Stretching Technique to the SCM:** Stretching Technique on the SCM involves the practitioner palpating the muscle to identify areas of tension or tightness. The patient is then instructed to perform specific movements, such as head rotation or tilting, while the practitioner applies precise pressure or guidance to facilitate the stretch. This

technique helps to lengthen the muscle fibers and restore normal muscle function. Stretching Technique can be particularly effective for individuals with chronic neck pain related to repetitive strain, poor posture, or previous neck injuries.

2. Scalene Muscles and Chronic Neck Pain:

The scalene muscles, located on the lateral sides of the neck, consist of three parts: the anterior, middle, and posterior scalene muscles. 11These muscles play a critical role in neck stability and movement, as well as assisting in breathing by elevating the first and second ribs during inhalation. 12Chronic tension or trigger points in the scalene muscles can cause neck pain, shoulder pain, and even radiating pain down the arm, often mimicking symptoms of thoracic outlet syndrome.

- **Application of Stretching Technique to the Scalene Muscles:** Stretching Technique applied to the scalene muscles is like that for the SCM. The practitioner will identify areas of tightness or trigger points within the scalenes and apply manual pressure while the patient moves their head or shoulders in specific directions.This movement helps to release the tension within the muscles and improve flexibility. By addressing the scalene muscles with Stretching Technique, patients can experience relief from chronic neck pain, improved range of motion, and reduced symptoms of nerve impingement or thoracic outlet syndrome.

Dosing and Frequency Guidelines for Stretching Technique:

- **Initial Assessment and Frequency:** Typically, Stretching Technique sessions for chronic neck pain may begin with 1-2 sessions per week. The frequency might be higher initially, especially if the patient presents with significant pain or restricted mobility.

- **Duration of Treatment:** A single session generally lasts between 15 to 30 minutes, depending on the number of muscles treated and the complexity of the case.

- **Course of Treatment:** The course of treatment can last from 4 to 6 weeks, with re-evaluation after this period to determine if additional treatment is needed. [21]Some cases may require longer treatment durations, especially if there are long-standing adhesions or severe chronic pain.
- **Dosing During Sessions:**
    - **Number of Applications:** During each session, each muscle (e.g., sternocleidomastoid or scalene muscles) may receive 3 to 5 applications of the Stretching Technique. [23]An "application" refers to a cycle of tension, movement, and stretch performed on the muscle.

    - **Intensity:** The intensity of the applied pressure varies depending on the patient's tolerance.The pressure is typically adjusted to be firm but not overly painful, allowing the patient to comfortably complete the required movements.

Progression and Adjustments:

- **Reduction in Frequency:** As the patient's symptoms improve, the frequency of Stretching Technique sessions can be reduced to once a week or less. [27]Some practitioners recommend tapering down to maintenance sessions every 2-4 weeks, depending on the patient's progress.

- **Home Exercises:** Patients are often given home exercises to complement the Stretching Technique.These exercises might include stretching, strengthening, or posture correction activities, performed daily or several times a week.

Effectiveness:

Stretching Techniques have shown effectiveness in managing chronic neck pain, particularly when combined with other therapies such as manual therapy and exercise. 31Stretching focuses on soft tissue manipulation, aiming to alleviate pain by releasing tension in muscles, tendons,

and ligaments. 32This approach can be a beneficial component of a comprehensive treatment plan for chronic neck pain.

Conclusion:

The general recommendation for the Stretching Technique in treating chronic neck pain involves 2 sessions per week initially, with each session lasting 15-30 minutes and focusing on multiple applications over the affected muscles. 34Treatment usually spans 4 weeks, a total of 8 sessions.

Effectiveness of Stretching Exercise for Mild to Moderate Chronic Neck Pain

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```
 GET
  FILE='E:\MPT part - 2\Research\Thesis Files\First draft\separate data neck pain.sav'.
DATASET NAME DataSet1 WINDOW=FRONT.
USE ALL.
COMPUTE filter_$=(Group = 1).
VARIABLE LABELS filter_$ 'Group = 1 (FILTER)'.
VALUE LABELS filter_$ 0 'Not Selected' 1 'Selected'.
FORMATS filter_$ (f1.0).
FILTER BY filter_$.
EXECUTE.
NPAR TESTS
  /WILCOXON=Pre_pain_at_its_worst_in_the_last_week Pre_pain_at_its_least_in_the_last_week Pre_p
Pre_past_week_pain_has_interfered_with_your_general_activity Pre_past_week_pain_has_interfered_
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Post_pain_at_its_least_in_the_last_week Post_pain_on_the_average Post_pain_you_have_right_now P
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  /MISSING ANALYSIS.
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NPar Tests

[DataSet1] E:\MPT part - 2\Research\Thesis Files\First draft\separate data neck pain.sav

Wilcoxon Signed Ranks Test

Ranks

		N	Mean Rank	Sum of Ranks
Post_pain_at_its_worst_in_the_last_week - Pre_pain_at_its_worst_in_the_last_week	Negative Ranks	13[a]	7.00	91.00
	Positive Ranks	0[b]	.00	.00
	Ties	2[c]		
	Total	15		
Post_pain_at_its_least_in_the_last_week - Pre_pain_at_its_least_in_the_last_week	Negative Ranks	13[d]	7.00	91.00
	Positive Ranks	0[e]	.00	.00
	Ties	2[f]		
	Total	15		
Post_pain_on_the_average - Pre_pain_on_the_average	Negative Ranks	13[g]	7.92	103.00
	Positive Ranks	1[h]	2.00	2.00
	Ties	1[i]		
	Total	15		
Post_pain_you_have_right_now - Pre_pain_you_have_right_now	Negative Ranks	15[j]	8.00	120.00
	Positive Ranks	0[k]	.00	.00
	Ties	0[l]		
	Total	15		
Post_pain_releif_from_pain_treatment_medication_lastweek - Pre_pain_releif_from_pain_treatment_medication_lastweek	Negative Ranks	0[m]	.00	.00
	Positive Ranks	15[n]	8.00	120.00
	Ties	0[o]		
	Total	15		
Post_how_many_hours_does_it_take_before_the_pain_returns - Pre_how_many_hours_does_it_take_before_the_pain_returns	Negative Ranks	12[p]	6.50	78.00
	Positive Ranks	0[q]	.00	.00
	Ties	3[r]		
	Total	15		
Brief Pain - Pre_past_week_pain_has_interfered_with_your_general_activity	Negative Ranks	12[s]	7.58	91.00
	Positive Ranks	2[t]	7.00	14.00
	Ties	1[u]		
	Total	15		
Post_past_week_pain_has_interfered_with_your_mood - Pre_past_week_pain_has_interfered_with_your_mood	Negative Ranks	12[v]	7.04	84.50
	Positive Ranks	2[w]	10.25	20.50
	Ties	1[x]		
	Total	15		
Post_past_week_pain_has_interfered_with_your__walking_ability - Pre_past_week_pain_has_interfered_with_your_walking_ability	Negative Ranks	12[y]	6.75	81.00
	Positive Ranks	2[z]	12.00	24.00
	Ties	1[aa]		
	Total	15		

Ranks

		N	Mean Rank	Sum of Ranks
Post_past_week_pain_has_interfered_with_your_normal_work - Pre_past_week_pain_has_interfered_with_your_normal_work	Negative Ranks	10[ab]	6.15	61.50
	Positive Ranks	2[ac]	8.25	16.50
	Ties	3[ad]		
	Total	15		
Post_pastweekpainhasinferedwithyourrelationswithotherpeople - Pre_pastweekpainhasinterferedwithyourrelationswithotherpeople	Negative Ranks	11[ae]	6.45	71.00
	Positive Ranks	2[af]	10.00	20.00
	Ties	2[ag]		
	Total	15		
Post_past_week_pain_has_interfered_with_your_your_sleep - Pre_past_week_pain_has_interfered_with_your_sleep	Negative Ranks	10[ah]	5.85	58.50
	Positive Ranks	2[ai]	9.75	19.50
	Ties	3[aj]		
	Total	15		
bpi end - Pre_past_week_pain_has_interfered_with_your_enjoyment_of_life	Negative Ranks	11[ak]	7.36	81.00
	Positive Ranks	2[al]	5.00	10.00
	Ties	2[am]		
	Total	15		

a. Post_pain_at_its_worst_in_the_last_week < Pre_pain_at_its_worst_in_the_last_week

b. Post_pain_at_its_worst_in_the_last_week > Pre_pain_at_its_worst_in_the_last_week

c. Post_pain_at_its_worst_in_the_last_week = Pre_pain_at_its_worst_in_the_last_week

d. Post_pain_at_its_least_in_the_last_week < Pre_pain_at_its_least_in_the_last_week

e. Post_pain_at_its_least_in_the_last_week > Pre_pain_at_its_least_in_the_last_week

f. Post_pain_at_its_least_in_the_last_week = Pre_pain_at_its_least_in_the_last_week

g. Post_pain_on_the_average < Pre_pain_on_the_average

h. Post_pain_on_the_average > Pre_pain_on_the_average

i. Post_pain_on_the_average = Pre_pain_on_the_average

j. Post_pain_you_have_right_now < Pre_pain_you_have_right_now

k. Post_pain_you_have_right_now > Pre_pain_you_have_right_now

l. Post_pain_you_have_right_now = Pre_pain_you_have_right_now

m. Post_pain_releif_from_pain_treatment_medication_lastweek < Pre_pain_releif_from_pain_treatment_medication_lastweek

n. Post_pain_releif_from_pain_treatment_medication_lastweek > Pre_pain_releif_from_pain_treatment_medication_lastweek

o. Post_pain_releif_from_pain_treatment_medication_lastweek = Pre_pain_releif_from_pain_treatment_medication_lastweek

p. Post_how_many_hours_does_it_take_before_the_pain_returns < Pre_how_many_hours_does_it_take_before_the_pain_returns

q. Post_how_many_hours_does_it_take_before_the_pain_returns >

r. Post_how_many_hours_does_it_take_before_the_pain_returns = Pre_how_many_hours_does_it_take_before_the_pain_returns

s. Brief Pain < Pre_past_week_pain_has_interfered_with_your_general_activity

t. Brief Pain > Pre_past_week_pain_has_interfered_with_your_general_activity

u. Brief Pain = Pre_past_week_pain_has_interfered_with_your_general_activity

v. Post_past_week_pain_has_interfered_with_your_mood < Pre_past_week_pain_has_interfered_with_your_mood

w. Post_past_week_pain_has_interfered_with_your_mood > Pre_past_week_pain_has_interfered_with_your_mood

x. Post_past_week_pain_has_interfered_with_your_mood = Pre_past_week_pain_has_interfered_with_your_mood

y. Post_past_week_pain_has_interfered_with_your__walking_ability < Pre_past_week_pain_has_interfered_with_your_walking_ability

z. Post_past_week_pain_has_interfered_with_your__walking_ability > Pre_past_week_pain_has_interfered_with_your_walking_ability

aa. Post_past_week_pain_has_interfered_with_your__walking_ability = Pre_past_week_pain_has_interfered_with_your_walking_ability

ab. Post_past_week_pain_has_interfered_with_your_normal_work < Pre_past_week_pain_has_interfered_with_your_normal_work

ac. Post_past_week_pain_has_interfered_with_your_normal_work > Pre_past_week_pain_has_interfered_with_your_normal_work

ad. Post_past_week_pain_has_interfered_with_your_normal_work = Pre_past_week_pain_has_interfered_with_your_normal_work

ae. Post_pastweekpainhasinferedwithyourrelationswithotherpeople < Pre_pastweekpainhasinterferedwithyourrelationswithotherpeople

af. Post_pastweekpainhasinferedwithyourrelationswithotherpeople > Pre_pastweekpainhasinterferedwithyourrelationswithotherpeople

ag. Post_pastweekpainhasinferedwithyourrelationswithotherpeople = Pre_pastweekpainhasinterferedwithyourrelationswithotherpeople

ah. Post_past_week_pain_has_interfered_with_your_your_sleep < Pre_past_week_pain_has_interfered_with_your_sleep

ai. Post_past_week_pain_has_interfered_with_your_your_sleep > Pre_past_week_pain_has_interfered_with_your_sleep

aj. Post_past_week_pain_has_interfered_with_your_your_sleep = Pre_past_week_pain_has_interfered_with_your_sleep

ak. bpi end < Pre_past_week_pain_has_interfered_with_your_enjoyment_of_life

al. bpi end > Pre_past_week_pain_has_interfered_with_your_enjoyment_of_life

am. bpi end = Pre_past_week_pain_has_interfered_with_your_enjoyment_of_life

Test Statistics[a]

	Post_pain_at_its_worst_in_the_last_week - Pre_pain_at_its_worst_in_the_last_week	Post_pain_at_its_least_in_the_last_week - Pre_pain_at_its_least_in_the_last_week	Post_pain_on_the_average - Pre_pain_on_the_average	Post_pain_you_have_right_now - Pre_pain_you_have_right_now	Post_pain_relief_from_pain_treatment_medication_last week - Pre_pain_relief_from_pain_treatment_medication_lastweek
Z	-3.222[b]	-3.225[b]	-3.193[b]	-3.458[b]	-3.417[c]
Asymp. Sig. (2-tailed)	.001	.001	.001	.001	.001

Test Statistics[a]

	Post_how_many_hours_does_it_take_before_the_pain_returns - Pre_how_many_hours_does_it_take_before_the_pain_returns	Brief Pain - Pre_past_week_pain_has_interfered_with_your_general_activity	Post_past_week_pain_has_interfered_with_your_mood - Pre_past_week_pain_has_interfered_with_your_mood	Post_past_week_pain_has_interfered_with__walking_ability - Pre_past_week_pain_has_interfered_with_your_walking_ability	Post_past_week_pain_has_interfered_with_your_normal_work - Pre_past_week_pain_has_interfered_with_your_normal_work
Z	-3.088[b]	-2.463[b]	-2.026[b]	-1.807[b]	-1.779[b]
Asymp. Sig. (2-tailed)	.002	.014	.043	.071	.075

Test Statistics[a]

	Post_pastweekpainhasinferedwithyourrelationswithotherpeople - Pre_pastweekpainhasinferedwithyourrelationswithotherpeople	Post_past_week_pain_has_interfered_with_your_your_sleep - Pre_past_week_pain_has_interfered_with_your_sleep	bpi end - Pre_past_week_pain_has_interfered_with_your_enjoyment_of_life
Z	-1.820[b]	-1.542[b]	-2.503[b]
Asymp. Sig. (2-tailed)	.069	.123	.012

a. Wilcoxon Signed Ranks Test

b. Based on positive ranks.

c. Based on negative ranks.

```
 USE ALL.
COMPUTE filter_$=(Group = 2).
```

```
VARIABLE LABELS filter_$ 'Group = 2 (FILTER)'.
VALUE LABELS filter_$ 0 'Not Selected' 1 'Selected'.
FORMATS filter_$ (f1.0).
FILTER BY filter_$.
EXECUTE.
NPAR TESTS
  /WILCOXON=Pre_pain_at_its_worst_in_the_last_week Pre_pain_at_its_least_in_the_last_week Pre_p
Pre_past_week_pain_has_interfered_with_your_general_activity Pre_past_week_pain_has_interfered_
Pre_pastweekpainhasinterferedwithyourrelationswithotherpeople Pre_past_week_pain_has_interfered
Post_pain_at_its_least_in_the_last_week Post_pain_on_the_average Post_pain_you_have_right_now P
Post_past_week_pain_has_interfered_with_your_general_activity Post_past_week_pain_has_interfere
Post_pastweekpainhasinferedwithyourrelationswithotherpeople Post_past_week_pain_has_interfered_
  /MISSING ANALYSIS.
```

NPar Tests

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Wilcoxon Signed Ranks Test

Ranks

		N	Mean Rank	Sum of Ranks
Post_pain_at_its_worst_in_the_last_week - Pre_pain_at_its_worst_in_the_last_week	Negative Ranks	15[a]	8.00	120.00
	Positive Ranks	0[b]	.00	.00
	Ties	0[c]		
	Total	15		
Post_pain_at_its_least_in_the_last_week - Pre_pain_at_its_least_in_the_last_week	Negative Ranks	15[d]	8.00	120.00
	Positive Ranks	0[e]	.00	.00
	Ties	0[f]		
	Total	15		
Post_pain_on_the_average - Pre_pain_on_the_average	Negative Ranks	15[g]	8.00	120.00
	Positive Ranks	0[h]	.00	.00
	Ties	0[i]		
	Total	15		
Post_pain_you_have_right_now - Pre_pain_you_have_right_now	Negative Ranks	14[j]	7.50	105.00
	Positive Ranks	0[k]	.00	.00
	Ties	1[l]		
	Total	15		
Post_pain_releif_from_pain_treatment_medication_lastweek - Pre_pain_releif_from_pain_treatment_medication_lastweek	Negative Ranks	0[m]	.00	.00
	Positive Ranks	15[n]	8.00	120.00
	Ties	0[o]		
	Total	15		

Ranks

		N	Mean Rank	Sum of Ranks
Post_how_many_hours_does_it_take_before_the_pain_returns - Pre_how_many_hours_does_it_take_before_the_pain_returns	Negative Ranks	15[p]	8.00	120.00
	Positive Ranks	0[q]	.00	.00
	Ties	0[r]		
	Total	15		
Brief Pain - Pre_past_week_pain_has_interfered_with_your_general_activity	Negative Ranks	15[s]	8.00	120.00
	Positive Ranks	0[t]	.00	.00
	Ties	0[u]		
	Total	15		
Post_past_week_pain_has_interfered_with_your_mood - Pre_past_week_pain_has_interfered_with_your_mood	Negative Ranks	15[v]	8.00	120.00
	Positive Ranks	0[w]	.00	.00
	Ties	0[x]		
	Total	15		
Post_past_week_pain_has_interfered_with_your__walking_ability - Pre_past_week_pain_has_interfered_with_your_walking_ability	Negative Ranks	14[y]	7.50	105.00
	Positive Ranks	0[z]	.00	.00
	Ties	1[aa]		
	Total	15		
Post_past_week_pain_has_interfered_with_your_normal_work - Pre_past_week_pain_has_interfered_with_your_normal_work	Negative Ranks	15[ab]	8.00	120.00
	Positive Ranks	0[ac]	.00	.00
	Ties	0[ad]		
	Total	15		
Post_pastweekpainhasinferedwithyourrelationswithotherpeople - Pre_pastweekpainhasinterferedwithyourrelationswithotherpeople	Negative Ranks	15[ae]	8.00	120.00
	Positive Ranks	0[af]	.00	.00
	Ties	0[ag]		
	Total	15		
Post_past_week_pain_has_interfered_with_your_your_sleep - Pre_past_week_pain_has_interfered_with_your_sleep	Negative Ranks	15[ah]	8.00	120.00
	Positive Ranks	0[ai]	.00	.00
	Ties	0[aj]		
	Total	15		
bpi end - Pre_past_week_pain_has_interfered_with_your_enjoyment_of_life	Negative Ranks	13[ak]	7.92	103.00
	Positive Ranks	1[al]	2.00	2.00
	Ties	1[am]		
	Total	15		

a. Post_pain_at_its_worst_in_the_last_week < Pre_pain_at_its_worst_in_the_last_week

b. Post_pain_at_its_worst_in_the_last_week > Pre_pain_at_its_worst_in_the_last_week

c. Post_pain_at_its_worst_in_the_last_week = Pre_pain_at_its_worst_in_the_last_week

d. Post_pain_at_its_least_in_the_last_week < Pre_pain_at_its_least_in_the_last_week

e. Post_pain_at_its_least_in_the_last_week > Pre_pain_at_its_least_in_the_last_week

f. Post_pain_at_its_least_in_the_last_week = Pre_pain_at_its_least_in_the_last_week

g. Post_pain_on_the_average < Pre_pain_on_the_average

h. Post_pain_on_the_average > Pre_pain_on_the_average

i. Post_pain_on_the_average = Pre_pain_on_the_average

j. Post_pain_you_have_right_now < Pre_pain_you_have_right_now

k. Post_pain_you_have_right_now > Pre_pain_you_have_right_now

l. Post_pain_you_have_right_now = Pre_pain_you_have_right_now

m. Post_pain_releif_from_pain_treatment_medication_lastweek <
Pre_pain_releif_from_pain_treatment_medication_lastweek

n. Post_pain_releif_from_pain_treatment_medication_lastweek >
Pre_pain_releif_from_pain_treatment_medication_lastweek

o. Post_pain_releif_from_pain_treatment_medication_lastweek =
Pre_pain_releif_from_pain_treatment_medication_lastweek

p. Post_how_many_hours_does_it_take_before_the_pain_returns <
Pre_how_many_hours_does_it_take_before_the_pain_returns

q. Post_how_many_hours_does_it_take_before_the_pain_returns >
Pre_how_many_hours_does_it_take_before_the_pain_returns

r. Post_how_many_hours_does_it_take_before_the_pain_returns =
Pre_how_many_hours_does_it_take_before_the_pain_returns

s. Brief Pain < Pre_past_week_pain_has_interfered_with_your_general_activity

t. Brief Pain > Pre_past_week_pain_has_interfered_with_your_general_activity

u. Brief Pain = Pre_past_week_pain_has_interfered_with_your_general_activity

v. Post_past_week_pain_has_interfered_with_your_mood <
Pre_past_week_pain_has_interfered_with_your_mood

w. Post_past_week_pain_has_interfered_with_your_mood >
Pre_past_week_pain_has_interfered_with_your_mood

x. Post_past_week_pain_has_interfered_with_your_mood =
Pre_past_week_pain_has_interfered_with_your_mood

y. Post_past_week_pain_has_interfered_with_your__walking_ability <
Pre_past_week_pain_has_interfered_with_your_walking_ability

z. Post_past_week_pain_has_interfered_with_your__walking_ability >
Pre_past_week_pain_has_interfered_with_your_walking_ability

aa. Post_past_week_pain_has_interfered_with_your__walking_ability =
Pre_past_week_pain_has_interfered_with_your_walking_ability

ab. Post_past_week_pain_has_interfered_with_your_normal_work <
Pre_past_week_pain_has_interfered_with_your_normal_work

ac. Post_past_week_pain_has_interfered_with_your_normal_work >
Pre_past_week_pain_has_interfered_with_your_normal_work

ad. Post_past_week_pain_has_interfered_with_your_normal_work =

ae. Post_pastweekpainhasinferedwithyourrelationswithotherpeople < Pre_pastweekpainhasinterferedwithyourrelationswithotherpeople

af. Post_pastweekpainhasinferedwithyourrelationswithotherpeople > Pre_pastweekpainhasinterferedwithyourrelationswithotherpeople

ag. Post_pastweekpainhasinferedwithyourrelationswithotherpeople = Pre_pastweekpainhasinterferedwithyourrelationswithotherpeople

ah. Post_past_week_pain_has_interfered_with_your_your_sleep < Pre_past_week_pain_has_interfered_with_your_sleep

ai. Post_past_week_pain_has_interfered_with_your_your_sleep > Pre_past_week_pain_has_interfered_with_your_sleep

aj. Post_past_week_pain_has_interfered_with_your_your_sleep = Pre_past_week_pain_has_interfered_with_your_sleep

ak. bpi end < Pre_past_week_pain_has_interfered_with_your_enjoyment_of_life

al. bpi end > Pre_past_week_pain_has_interfered_with_your_enjoyment_of_life

am. bpi end = Pre_past_week_pain_has_interfered_with_your_enjoyment_of_life

Test Statistics[a]

	Post_pain_at_its_worst_in_the_last_week - Pre_pain_at_its_worst_in_the_last_week	Post_pain_at_its_least_in_the_last_week - Pre_pain_at_its_least_in_the_last_week	Post_pain_on_the_average - Pre_pain_on_the_average	Post_pain_you_have_right_now - Pre_pain_you_have_right_now	Post_pain_relief_from_pain_treatment_medication_lastweek - Pre_pain_relief_from_pain_treatment_medication_lastweek
Z	-3.494[b]	-3.419[b]	-3.494[b]	-3.313[b]	-3.446[c]
Asymp. Sig. (2-tailed)	.000	.001	.000	.001	.001

Test Statistics[a]

	Post_how_many_hours_does_it_take_before_the_pain_returns - Pre_how_many_hours_does_it_take_before_the_pain_returns	Brief Pain - Pre_past_week_pain_has_interfered_with_your_general_activity	Post_past_week_pain_has_interfered_with_your_mood - Pre_past_week_pain_has_interfered_with_your_mood	Post_past_week_pain_has_interfered_with_your__walking_ability - Pre_past_week_pain_has_interfered_with_your_walking_ability	Post_past_week_pain_has_interfered_with_your_normal_work - Pre_past_week_pain_has_interfered_with_your_normal_work
Z	-3.441[b]	-3.453[b]	-3.439[b]	-3.331[b]	-3.443[b]
Asymp. Sig. (2-tailed)	.001	.001	.001	.001	.001

Test Statistics[a]

	Post_pastweekpainhasinferedwithyourrelationswithotherpeople - Pre_pastweekpainhasinferedwithyourrelationswithotherpeople	Post_past_week_pain_has_interfered_with_your_your_sleep - Pre_past_week_pain_has_interfered_with_your_sleep	bpi end - Pre_past_week_pain_has_interfered_with_your_enjoyment_of_life
Z	-3.432[b]	-3.461[b]	-3.203[b]
Asymp. Sig. (2-tailed)	.001	.001	.001

a. Wilcoxon Signed Ranks Test

b. Based on positive ranks.

c. Based on negative ranks.

```
 USE ALL.
COMPUTE filter_$=(Group = 1).
VARIABLE LABELS filter_$ 'Group = 1 (FILTER)'.
VALUE LABELS filter_$ 0 'Not Selected' 1 'Selected'.
FORMATS filter_$ (f1.0).
FILTER BY filter_$.
EXECUTE.
T-TEST PAIRS=pre_part4.1_Flexion pre_part4.2_Extension pre_part4.3_right_side_flexion pre_part4
post_part4.4_left_side_flexion post_part4.5_Rt_Rotation post_part4.5_Lt_Rotation (PAIRED)
  /CRITERIA=CI(.9500)
  /MISSING=ANALYSIS.
```

T-Test

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Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	pre_part4.1_Flexion	37.93	15	6.798	1.755
	post_part4.1_Flexion	41.00	15	5.732	1.480
Pair 2	pre_part4.2_Extension	36.67	15	7.943	2.051
	post_part4.2_Extension	39.67	15	5.164	1.333
Pair 3	pre_part4. 3_right_side_flexion	33.67	15	5.815	1.501
	post_part4. 3_right_side_flexion	39.67	15	6.399	1.652
Pair 4	pre_part4. 4_left_side_flexion	35.33	15	6.935	1.791
	post_part4. 4_left_side_flexion	40.33	15	5.815	1.501
Pair 5	pre_part4.5_Rt_Rotation	42.00	15	7.512	1.940
	post_part4.5_Rt_Rotation	45.33	15	5.815	1.501
Pair 6	pre_Lt_Rotation	44.00	15	6.601	1.704
	post_part4.5_Lt_Rotation	45.33	15	6.399	1.652

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	pre_part4.1_Flexion & post_part4.1_Flexion	15	.451	.092
Pair 2	pre_part4.2_Extension & post_part4.2_Extension	15	.798	.000
Pair 3	pre_part4. 3_right_side_flexion & post_part4. 3_right_side_flexion	15	.467	.079
Pair 4	pre_part4. 4_left_side_flexion & post_part4. 4_left_side_flexion	15	.307	.266
Pair 5	pre_part4.5_Rt_Rotation & post_part4. 5_Rt_Rotation	15	.433	.107
Pair 6	pre_Lt_Rotation & post_part4.5_Lt_Rotation	15	.558	.031

Paired Samples Test

		Paired Differences			
		Mean	Std. Deviation	Std. Error Mean	95% Confidence ... Lower
Pair 1	pre_part4.1_Flexion - post_part4.1_Flexion	-3.067	6.628	1.711	-6.737
Pair 2	pre_part4.2_Extension - post_part4.2_Extension	-3.000	4.928	1.272	-5.729
Pair 3	pre_part4. 3_right_side_flexion - post_part4. 3_right_side_flexion	-6.000	6.325	1.633	-9.502
Pair 4	pre_part4. 4_left_side_flexion - post_part4. 4_left_side_flexion	-5.000	7.559	1.952	-9.186
Pair 5	pre_part4.5_Rt_Rotation - post_part4.5_Rt_Rotation	-3.333	7.237	1.869	-7.341
Pair 6	pre_Lt_Rotation - post_part4.5_Lt_Rotation	-1.333	6.114	1.579	-4.719

Paired Samples Test

		Paired ... 95% Confidence ... Upper	t	df	Sig. (2-tailed)
Pair 1	pre_part4.1_Flexion - post_part4.1_Flexion	.604	-1.792	14	.095
Pair 2	pre_part4.2_Extension - post_part4.2_Extension	-.271	-2.358	14	.033
Pair 3	pre_part4. 3_right_side_flexion - post_part4. 3_right_side_flexion	-2.498	-3.674	14	.003
Pair 4	pre_part4. 4_left_side_flexion - post_part4. 4_left_side_flexion	-.814	-2.562	14	.023
Pair 5	pre_part4.5_Rt_Rotation - post_part4.5_Rt_Rotation	.675	-1.784	14	.096
Pair 6	pre_Lt_Rotation - post_part4.5_Lt_Rotation	2.052	-.845	14	.413

```
 USE ALL.
COMPUTE filter_$=(Group = 2).
VARIABLE LABELS filter_$ 'Group = 2 (FILTER)'.
```

```
VALUE LABELS filter_$ 0 'Not Selected' 1 'Selected'.
FORMATS filter_$ (f1.0).
FILTER BY filter_$.
EXECUTE.
T-TEST PAIRS=pre_part4.1_Flexion pre_part4.2_Extension pre_part4.3_right_side_flexion pre_part4
post_part4.4_left_side_flexion post_part4.5_Rt_Rotation post_part4.5_Lt_Rotation (PAIRED)
  /CRITERIA=CI(.9500)
  /MISSING=ANALYSIS.
```

T-Test

[DataSet1] E:\MPT part - 2\Research\Thesis Files\First draft\separate data neck pain.sav

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	pre_part4.1_Flexion	35.00	15	7.559	1.952
	post_part4.1_Flexion	43.00	15	6.211	1.604
Pair 2	pre_part4.2_Extension	35.00	15	5.976	1.543
	post_part4.2_Extension	40.67	15	4.577	1.182
Pair 3	pre_part4.3_right_side_flexion	29.60	15	5.755	1.486
	post_part4.3_right_side_flexion	39.67	15	4.419	1.141
Pair 4	pre_part4.4_left_side_flexion	34.67	15	5.164	1.333
	post_part4.4_left_side_flexion	42.33	15	3.200	.826
Pair 5	pre_part4.5_Rt_Rotation	37.33	15	7.988	2.063
	post_part4.5_Rt_Rotation	44.67	15	3.994	1.031
Pair 6	pre_Lt_Rotation	43.33	15	4.880	1.260
	post_part4.5_Lt_Rotation	46.33	15	4.419	1.141

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	pre_part4.1_Flexion & post_part4.1_Flexion	15	.609	.016
Pair 2	pre_part4.2_Extension & post_part4.2_Extension	15	.588	.021
Pair 3	pre_part4. 3_right_side_flexion & post_part4. 3_right_side_flexion	15	.683	.005
Pair 4	pre_part4. 4_left_side_flexion & post_part4. 4_left_side_flexion	15	.591	.020
Pair 5	pre_part4.5_Rt_Rotation & post_part4. 5_Rt_Rotation	15	.698	.004
Pair 6	pre_Lt_Rotation & post_part4.5_Lt_Rotation	15	.773	.001

Paired Samples Test

		Paired Differences			
		Mean	Std. Deviation	Std. Error Mean	95% Confidence ... Lower
Pair 1	pre_part4.1_Flexion - post_part4.1_Flexion	-8.000	6.211	1.604	-11.439
Pair 2	pre_part4.2_Extension - post_part4.2_Extension	-5.667	4.952	1.279	-8.409
Pair 3	pre_part4. 3_right_side_flexion - post_part4. 3_right_side_flexion	-10.067	4.234	1.093	-12.411
Pair 4	pre_part4. 4_left_side_flexion - post_part4. 4_left_side_flexion	-7.667	4.169	1.076	-9.975
Pair 5	pre_part4.5_Rt_Rotation - post_part4.5_Rt_Rotation	-7.333	5.936	1.533	-10.621
Pair 6	pre_Lt_Rotation - post_part4.5_Lt_Rotation	-3.000	3.162	.816	-4.751

Paired Samples Test

		Paired ...			
		95% Confidence ...			
		Upper	t	df	Sig. (2-tailed)
Pair 1	pre_part4.1_Flexion - post_part4.1_Flexion	-4.561	-4.989	14	.000
Pair 2	pre_part4.2_Extension - post_part4.2_Extension	-2.924	-4.432	14	.001
Pair 3	pre_part4. 3_right_side_flexion - post_part4. 3_right_side_flexion	-7.722	-9.209	14	.000
Pair 4	pre_part4. 4_left_side_flexion - post_part4. 4_left_side_flexion	-5.358	-7.122	14	.000
Pair 5	pre_part4.5_Rt_Rotation - post_part4.5_Rt_Rotation	-4.046	-4.785	14	.000
Pair 6	pre_Lt_Rotation - post_part4.5_Lt_Rotation	-1.249	-3.674	14	.003

```
 FILTER OFF.
USE ALL.
EXECUTE.
NPAR TESTS
  /M-W= Post_pain_at_its_worst_in_the_last_week Post_pain_at_its_least_in_the_last_week Post_pa
BY Group(1 2)
  /MISSING ANALYSIS.
```

NPar Tests

```
[DataSet1] E:\MPT part - 2\Research\Thesis Files\First draft\separate data ne
ck pain.sav
```

Mann-Whitney Test

Ranks

	Group	N	Mean Rank	Sum of Ranks
Post_pain_at_its_worst_in_the_last_week	Control	15	23.00	345.00
	Experimental	15	8.00	120.00
	Total	30		
Post_pain_at_its_least_in_the_last_week	Control	15	21.87	328.00
	Experimental	15	9.13	137.00
	Total	30		
Post_pain_on_the_average	Control	15	22.43	336.50
	Experimental	15	8.57	128.50
	Total	30		
Post_pain_you_have_right_now	Control	15	21.70	325.50
	Experimental	15	9.30	139.50
	Total	30		
Post_pain_releif_from_pain_treatment_medication_lastweek	Control	15	14.83	222.50
	Experimental	15	16.17	242.50
	Total	30		
Post_how_many_hours_does_it_take_before_the_pain_returns	Control	15	15.50	232.50
	Experimental	15	15.50	232.50
	Total	30		

Test Statistics[a]

	Post_pain_at_its_worst_in_the_last_week	Post_pain_at_its_least_in_the_last_week	Post_pain_on_the_average	Post_pain_you_have_right_now
Mann-Whitney U	.000	17.000	8.500	19.500
Wilcoxon W	120.000	137.000	128.500	139.500
Z	-5.236	-4.276	-4.681	-4.052
Asymp. Sig. (2-tailed)	.000	.000	.000	.000
Exact Sig. [2*(1-tailed Sig.)]	.000[b]	.000[b]	.000[b]	.000[b]

Test Statistics[a]

	Post_pain_relief_from_pain_treatment_medication_last week	Post_how_many_hours_does_it_take_before_the_pain_returns
Mann-Whitney U	102.500	112.500
Wilcoxon W	222.500	232.500
Z	-.438	.000
Asymp. Sig. (2-tailed)	.661	1.000
Exact Sig. [2*(1-tailed Sig.)]	.683[b]	1.000[b]

a. Grouping Variable: Group

b. Not corrected for ties.

```
NPAR TESTS
  /M-W= Post_past_week_pain_has_interfered_with_your_general_activity Post_past_week_pain_has_i
Post_pastweekpainhasinferedwithyourrelationswithotherpeople Post_past_week_pain_has_interfered_
  /MISSING ANALYSIS.
```

NPar Tests

```
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ck pain.sav
```

Mann-Whitney Test

Ranks

	Group	N	Mean Rank	Sum of Ranks
Brief Pain	Control	15	23.00	345.00
	Experimental	15	8.00	120.00
	Total	30		
Post_past_week_pain_has_interfered_with_your_mood	Control	15	23.00	345.00
	Experimental	15	8.00	120.00
	Total	30		
Post_past_week_pain_has_interfered_with_your__walking_ability	Control	15	22.93	344.00
	Experimental	15	8.07	121.00
	Total	30		
Post_past_week_pain_has_interfered_with_your_normal_work	Control	15	23.00	345.00
	Experimental	15	8.00	120.00
	Total	30		
Post_pastweekpainhasinferedwithyourrelationswithotherpeople	Control	15	22.93	344.00
	Experimental	15	8.07	121.00
	Total	30		
Post_past_week_pain_has_interfered_with_your_your_sleep	Control	15	23.00	345.00
	Experimental	15	8.00	120.00
	Total	30		
bpi end	Control	15	21.60	324.00
	Experimental	15	9.40	141.00
	Total	30		

Test Statistics[a]

	Brief Pain	Post_past_week_pain_has_interfered_with_your_mood	Post_past_week_pain_has_interfered_with_your__walking_ability	Post_past_week_pain_has_interfered_with_your_normal_work	Post_pastweekpainhasinferedwithyourrelationswithotherpeople
Mann-Whitney U	.000	.000	1.000	.000	1.000
Wilcoxon W	120.000	120.000	121.000	120.000	121.000
Z	-5.062	-4.834	-4.854	-4.801	-4.808
Asymp. Sig. (2-tailed)	.000	.000	.000	.000	.000
Exact Sig. [2*(1-tailed Sig.)]	.000[b]	.000[b]	.000[b]	.000[b]	.000[b]

Test Statistics[a]

	Post_past_week_pain_has_interfered_with_your_your_sleep	bpi end
Mann-Whitney U	.000	21.000
Wilcoxon W	120.000	141.000
Z	-4.778	-3.946
Asymp. Sig. (2-tailed)	.000	.000
Exact Sig. [2*(1-tailed Sig.)]	.000[b]	.000[b]

a. Grouping Variable: Group

b. Not corrected for ties.

```
 USE ALL.
COMPUTE filter_$=(Group = 1).
VARIABLE LABELS filter_$ 'Group = 1 (FILTER)'.
VALUE LABELS filter_$ 0 'Not Selected' 1 'Selected'.
FORMATS filter_$ (f1.0).
FILTER BY filter_$.
EXECUTE.
T-TEST PAIRS=Pre_NDI WITH Post_NDI (PAIRED)
  /CRITERIA=CI(.9500)
  /MISSING=ANALYSIS.
```

T-Test

```
[DataSet1] E:\MPT part - 2\Research\Thesis Files\First draft\separate data neck pain.sav
```

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Pre_NDI	59.6000	15	9.50789	2.45493
	Post_NDI	37.7333	15	2.12020	.54743

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	Pre_NDI & Post_NDI	15	.575	.025

Paired Samples Test

		Paired Differences			
					95% Confidence ...
		Mean	Std. Deviation	Std. Error Mean	Lower
Pair 1	Pre_NDI - Post_NDI	21.86667	8.46730	2.18625	17.17763

Paired Samples Test

		Paired ...			
		95% Confidence ...			
		Upper	t	df	Sig. (2-tailed)
Pair 1	Pre_NDI - Post_NDI	26.55570	10.002	14	.000

```
 USE ALL.
COMPUTE filter_$=(Group = 2).
VARIABLE LABELS filter_$ 'Group = 2 (FILTER)'.
VALUE LABELS filter_$ 0 'Not Selected' 1 'Selected'.
FORMATS filter_$ (f1.0).
FILTER BY filter_$.
EXECUTE.
T-TEST PAIRS=Pre_NDI WITH Post_NDI (PAIRED)
  /CRITERIA=CI(.9500)
  /MISSING=ANALYSIS.
```

T-Test

```
[DataSet1] E:\MPT part - 2\Research\Thesis Files\First draft\separate data ne
ck pain.sav
```

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Pre_NDI	62.5333	15	11.89157	3.07039
	Post_NDI	15.6000	15	3.71868	.96016

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	Pre_NDI & Post_NDI	15	-.454	.089

Paired Samples Test

		Paired Differences			
					95% Confidence ...
		Mean	Std. Deviation	Std. Error Mean	Lower
Pair 1	Pre_NDI - Post_NDI	46.93333	13.97685	3.60881	39.19321

Paired Samples Test

		Paired ...			
		95% Confidence ...			
		Upper	t	df	Sig. (2-tailed)
Pair 1	Pre_NDI - Post_NDI	54.67346	13.005	14	.000

```
 FILTER OFF.
USE ALL.
EXECUTE.
T-TEST GROUPS=Group(1 2)
  /MISSING=ANALYSIS
  /VARIABLES=Post_NDI
  /CRITERIA=CI(.95).
```

T-Test

[DataSet1] E:\MPT part - 2\Research\Thesis Files\First draft\separate data neck pain.sav

Group Statistics

	Group	N	Mean	Std. Deviation	Std. Error Mean
Post_NDI	Control	15	37.7333	2.12020	.54743
	Experimental	15	15.6000	3.71868	.96016

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means	
		F	Sig.	t	df
Post_NDI	Equal variances assumed	7.868	.009	20.026	28
	Equal variances not assumed			20.026	22.232

Independent Samples Test

		t-test for Equality of Means			
		Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence ... Lower
Post_NDI	Equal variances assumed	.000	22.13333	1.10525	19.86932
	Equal variances not assumed	.000	22.13333	1.10525	19.84256

Independent Samples Test

		t-test for Equality of ... 95% Confidence ... Upper
Post_NDI	Equal variances assumed	24.39734
	Equal variances not assumed	24.42410

```
NPAR TESTS
  /M-W= GROC BY Group(1 2)
  /MISSING ANALYSIS.
```

NPar Tests

```
[DataSet1] E:\MPT part - 2\Research\Thesis Files\First draft\separate data ne
ck pain.sav
```

Mann-Whitney Test

Ranks

	Group	N	Mean Rank	Sum of Ranks
GROC	Control	15	13.10	196.50
	Experimental	15	17.90	268.50
	Total	30		

Test Statistics[a]

	GROC
Mann-Whitney U	76.500
Wilcoxon W	196.500
Z	-1.521
Asymp. Sig. (2-tailed)	.128
Exact Sig. [2*(1-tailed Sig.)]	.137[b]

a. Grouping Variable: Group

b. Not corrected for ties.

```
T-TEST GROUPS=Group(1 2)
  /MISSING=ANALYSIS
  /VARIABLES=post_part4.1_Flexion post_part4.2_Extension post_part4.3_right_side_flexion post_p
  /CRITERIA=CI(.95).
```

T-Test

```
[DataSet1] E:\MPT part - 2\Research\Thesis Files\First draft\separate data ne
ck pain.sav
```

Group Statistics

	Group	N	Mean	Std. Deviation	Std. Error Mean
post_part4.1_Flexion	Control	15	41.00	5.732	1.480
	Experimental	15	43.00	6.211	1.604
post_part4.2_Extension	Control	15	39.67	5.164	1.333
	Experimental	15	40.67	4.577	1.182
post_part4.3_right_side_flexion	Control	15	39.67	6.399	1.652
	Experimental	15	39.67	4.419	1.141
post_part4.4_left_side_flexion	Control	15	40.33	5.815	1.501
	Experimental	15	42.33	3.200	.826
post_part4.5_Rt_Rotation	Control	15	45.33	5.815	1.501
	Experimental	15	44.67	3.994	1.031
post_part4.5_Lt_Rotation	Control	15	45.33	6.399	1.652
	Experimental	15	46.33	4.419	1.141
pre_Lt_Rotation	Control	15	44.00	6.601	1.704
	Experimental	15	43.33	4.880	1.260

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of
		F	Sig.	t
post_part4.1_Flexion	Equal variances assumed	.009	.927	-.917
	Equal variances not assumed			-.917
post_part4.2_Extension	Equal variances assumed	.051	.822	-.561
	Equal variances not assumed			-.561
post_part4.3_right_side_flexion	Equal variances assumed	.357	.555	.000
	Equal variances not assumed			.000
post_part4.4_left_side_flexion	Equal variances assumed	2.275	.143	-1.167
	Equal variances not assumed			-1.167
post_part4.5_Rt_Rotation	Equal variances assumed	.236	.631	.366
	Equal variances not assumed			.366
post_part4.5_Lt_Rotation	Equal variances assumed	.473	.497	-.498
	Equal variances not assumed			-.498
pre_Lt_Rotation	Equal variances assumed	.607	.442	.315
	Equal variances not assumed			.315

Independent Samples Test

		t-test for Equality of Means		
		df	Sig. (2-tailed)	Mean Difference
post_part4.1_Flexion	Equal variances assumed	28	.367	-2.000
	Equal variances not assumed	27.822	.367	-2.000
post_part4.2_Extension	Equal variances assumed	28	.579	-1.000
	Equal variances not assumed	27.603	.579	-1.000
post_part4. 3_right_side_flexion	Equal variances assumed	28	1.000	.000
	Equal variances not assumed	24.877	1.000	.000
post_part4. 4_left_side_flexion	Equal variances assumed	28	.253	-2.000
	Equal variances not assumed	21.767	.256	-2.000
post_part4.5_Rt_Rotation	Equal variances assumed	28	.717	.667
	Equal variances not assumed	24.806	.717	.667
post_part4.5_Lt_Rotation	Equal variances assumed	28	.622	-1.000
	Equal variances not assumed	24.877	.623	-1.000
pre_Lt_Rotation	Equal variances assumed	28	.755	.667
	Equal variances not assumed	25.782	.756	.667

Independent Samples Test

		t-test for Equality of Means		
		Std. Error Difference	95% Confidence Interval of the Difference	
			Lower	Upper
post_part4.1_Flexion	Equal variances assumed	2.182	-6.470	2.470
	Equal variances not assumed	2.182	-6.471	2.471
post_part4.2_Extension	Equal variances assumed	1.782	-4.650	2.650
	Equal variances not assumed	1.782	-4.652	2.652
post_part4. 3_right_side_flexion	Equal variances assumed	2.008	-4.113	4.113
	Equal variances not assumed	2.008	-4.136	4.136
post_part4. 4_left_side_flexion	Equal variances assumed	1.714	-5.510	1.510
	Equal variances not assumed	1.714	-5.556	1.556
post_part4.5_Rt_Rotation	Equal variances assumed	1.821	-3.064	4.398
	Equal variances not assumed	1.821	-3.086	4.419
post_part4.5_Lt_Rotation	Equal variances assumed	2.008	-5.113	3.113
	Equal variances not assumed	2.008	-5.136	3.136
pre_Lt_Rotation	Equal variances assumed	2.119	-3.675	5.008
	Equal variances not assumed	2.119	-3.692	5.025

```
 DATASET ACTIVATE DataSet1.
SAVE OUTFILE='E:\MPT part - 2\Research\Thesis Files\First draft\separate data neck pain.sav'
 /COMPRESSED.
```