



# African Journal of Biological Sciences



## Application of Hot Pack and Stretching Exercise In Treating Chronic Neck Pain Among University Students

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### Article Info

Volume 6, Issue Si3, 2024

Received: 25 May 2024

Accepted: 25 June 2024

Published: 10 July 2024

DOI:

10.48047/AFJBS.6.Si3.2024.2953-2970

### Abstract:

Neck pain has a complicated etiology and is thought to arise from a biopsychosocial issue. Previous studies have identified a number of risk factors for neck discomfort, including gender, age, a greater BMI, smoking, excessive use of electronic devices, uncomfortable or prolonged positions, a lack of physical activity, negative emotional states, and a lack of social support. The study was evaluated using paired T test and there are 55 participants whose age is between 18–25 years participated in which there are 28 boys and 27 girls respectively. The pain is evaluated using NPRS questionnaire. The participants that meets the inclusion and exclusion criteria were included in the study. The consent form was taken from the participants. The data was analysed using IBM SPSS Statistics 21 Software. The Average mean age is 21 years and the standard deviation is 0.5. The average mean and standard deviation for Pre NPRS score is  $6.6182 \pm 1.25449$  and the average mean and standard deviation for Post NPRS score is  $4.7091 \pm 1.03051$  was observed.

**Keywords:** Neck Pain, Hot pack, stretching exercise, Numerical Pain rating scale (NPRS)

### INTRODUCTION:

With a high yearly prevalence rate, neck pain is a significant global health issue. As a result of their employment, health care providers have developed a variety of therapies and preventative strategies for neck pain, yet ironically, neck discomfort is very common among them (Zhu Yuxiang et al., 2022). The prevalence of musculoskeletal discomfort among undergraduate students pursuing careers in healthcare, particularly neck pain, has been shown to be disproportionately excessive. Due to the high expense of therapy, the disruption to one's quality of life, and productivity loss, neck discomfort may be quite burdensome for both people and society. Thus, it is crucial to pinpoint neck pain health risks and provide efficient therapies for youth and vulnerable groups.

Neck pain has a complicated etiology and is thought to arise from a biopsychosocial issue. Previous studies have identified a number of risk factors for neck discomfort, including gender, age, a greater BMI, smoking, excessive use of electronic devices, uncomfortable or prolonged

positions, a lack of physical activity, negative emotional states, and a lack of social support (Lin et al., 2022). The worldwide COVID-19 epidemic has significantly altered people's everyday activities, and medical students have been particularly impacted. Their academic, lifestyle, and mental health have all suffered as a result of the epidemic and its constraints, which may have caused or made their neck discomfort worse. Unfortunately, there is no data to support the creation of therapeutic techniques, and investigations of potential risk variables for neck discomfort are largely discordant. (Yifang et al., 2022) Moreover, there are conflicting and unsatisfactory results on the psychological causes of neck discomfort in students studying medicine. While some studies revealed no significant correlation, others indicated that psychiatric illnesses are related to a higher occurrence of neck discomfort. Several studies have revealed gendered variations in lifestyle choices and psychological health among healthcare students. Female students spend more time in sedentary activity while being less likely to engage in physical activity than male students, according to published data (Liu et al., 2022). Also, female students at medical school frequently have higher mental health issues due to the demanding learning environment.

There may be some variations, therefore, in the correlation between neck discomfort and associated variables. We don't have a lot of information on gender differences in neck pain risk factors because the majority of research on neck pain in health care workers is based on the simultaneous analysis of mixed-sex samples. Many studies have noted sex differences in the incidence of musculoskeletal pain, particularly neck discomfort, among different populations. Such discrepancies are assumed to be a result of gender-specific variations in pain thresholds and muscle composition. Also, several writers have pointed out that there are gender differences in social and cognitive vulnerability variables that could impact myofascial pain, such as the idea that women are more likely to have body alignment and have mental anguish than men. (Zheng et al., 2022) These findings can aid in maximizing each person's preventative and therapeutic plans for musculoskeletal symptoms. Since social and cognitive components, despite descriptors, may be modifiable, the present study, which focused specifically on gender being specific, sought to fill this knowledge gap by examining the prevalence of neck pain among medical students in connection to behavioural and psychological factors. We proposed that sex differences may be related to the causes of neck discomfort in this group.

Neck discomfort, a complicated illness, is a major problem in modern life. Not always the most common orthopedic ailment is neck discomfort. Neck discomfort has a significant financial impact that involves medical expenses, work loss, and work-related issues. There isn't a single, proven method to manage neck discomfort. Nevertheless, a variety of pharmaceutical and quasitherapies, such as phototherapy, relaxation, acupressure, meditation, and marine therapeutics, have been suggested. The main goal to be achieved of the present study is to give a summary of the most important recent figures about the epidemiology and trends of neck discomfort (Kazeminasab et al., 2022). This analysis will identify the information gap to energize and concentrate prospective medical decision-makers and professionals to avoid and manage this condition, in addition to conducting research. Several modifiable and non-modifiable health issues for neck pain, such as the aging population, gender, limited social aid, and a background of neck pain, have been examined in research. Knowing the risk variables can assist with the detection and avoidance of neck discomfort, which has a propensity to develop into a serious issue. Being a complicated issue, there are a number of medical variables that might influence the onset of neck pain. Nevertheless, here is greater proof of several threat factors that includes not doing any activity, regular internet use time, feelings of anxiety, and gender (Zhu et al., 2022). The avoidance, detection, cure, and administration of neck pain can be influenced by recognizing defensive or causative agents, catalysts, and results. The paper indicates a definite connection between

psychosocial processes and neck pain. Randomized trials have shown that psychosocial processes are connected to the beginning and degree of pain. Neck pain has indeed been discovered to be largely influenced by tension, worry, attitude and emotions, cognitive performance, and ache behaviors. Character characteristics like maltreatment can also be possible contributors to risk, even if there is little evidence for them (Barreto TW et al., 2019). Altogether, anxiety, painful overthinking, mood disorders, poor sleep, and alcoholic use may have some influence on how the spine, brain, or cortex levels perceive core discomfort that might result in distant autonomic dysfunction. Nevertheless, additional research is required to fully understand how well these intellectual, affective, and cultural aspects affect the coding of pain in quasi-neck pain. Comprises emotions, ideas, thoughts, and feelings in connection to pain, handicap, and psychological health. This psychological affective component, which has discomfort, tension, and melancholy as its three main components, is a secondary topic. Finally, there is a basis in society where neck discomfort appears to be linked to troubles at the workplace and in the community, albeit the evidence for this is less strong (Svec et al., 2019). Lastly, a behavioral dimension has been developed, which emphasizes the significance of tolerance, discomfort behaviors, and lifestyle habits. Injuries and disabilities are linked to stress.

## **LITERATURE REVIEW:**

### **2.1 Neck Pain among undergraduate healthcare students**

Around the world, neck discomfort is a serious health issue. The goal of the study was to evaluate neck pain in undergraduate students, both males and females, as both play important roles in their lives. The cross-sectional study, which was assisted by the university and included 2355 healthcare students, was drawn using a cluster sampling technique. Using the Nordic Musculoskeletal Questionnaire, neck discomfort was evaluated. The questionnaire was filled out online by the students. The average student took between 6 and 10 minutes to finish the questionnaire. The study revealed that the students whose ages are between 17 and 23 have neck pain at about 31.3 percent. The result of the study is that females suffer more neck discomfort and pain than males. (Zheng et al., 2022)

The aim of this research is to find various factors and causes of neck pain, and for this, Various Search engines and databases were used to collect characteristics and other information related to neck pain. This study revealed that there are multiple different factors that can cause neck pain in both genders. This study concluded with a multipurpose outline that can help in preventing neck pain and, if it occurs, in diagnosis and ultimately treatment or rehabilitation of neck pain. (Kazeminasab et al., 2022)

### **2.2 Non-pharmacological Management of Chronic Neck Pain**

Exercise that combines three of the four exercise types—muscle effectiveness, movement, muscle re-education, and aerobic—slightly reduces discomfort and improves function in the short term. Function and pain are temporarily and moderately improved by low-level laser treatment, however, it does marginally enhance performance in different ranges. In the short and long term, function is only marginally improved by the body-mind exercise known as the Alexander technique. Short- or long-term functional improvements are not made by massage. The effectiveness of relaxation techniques taught by a healthcare practitioner is not greater than that of therapy or representation alone (Barreto TW et al., 2019). The Alexander approach calls for altering posture, breathing, balance, and coordination to relieve tension in the body. The physical modality used was low-level laser therapy, which includes using lasers with wavelengths ranging from red to infrared light to stimulate tissue healing. The improvements ranged from modest to significant across all

interventions. Function was assessed using the Northwick Park Questionnaire, and various other questionnaires, which quantify limitations caused by discomfort in daily activities. Patients who experienced functional improvement were better able to carry out everyday tasks and other activities with less difficulty. Two trials indicated that combination exercise provided modest gains in both long-term function and short-term pain, despite the fact that no one kind of exercise reduced pain or increased function in the immediate future, pain and function were moderately improved by low-level laser treatment. Several studies have contrasted pharmacologic and nonpharmacologic therapy. Comparing acupuncture to non-steroidal anti-inflammatory medications did not reveal any scientifically significant variations in pain in two studies (Svec et al., 2019). When compared to ibuprofen and thicolchicoside, one exercise study revealed no statistically significant change in pain or function. Because there are few hazards connected with these therapies and known concerns linked to non-steroidal anti-inflammatory medicines, it is fair to engage in shared decision-making with patients who have persistent neck pain and talk to them about non-pharmacologic choices. Based on the findings of this analysis, family doctors may want to recommend low-level laser treatment, acupressure, a mix of exercises, and the Alexander approach to patients who have persistent neck discomfort.

### **2.3 Effect of cryotherapy and thermotherapy on neck pain**

The use of cold therapy and thermotherapy as adjuvant therapies for musculoskeletal ailments is beneficial. Clinicians who manage these illnesses ought to be familiar with the most recent studies on these techniques since whatever technique they choose might have an impact on the individual's final prognosis. Therapists can enhance their current interventions by having a greater grasp of these techniques. Both cold and hot therapy approaches reduce discomfort and muscular spasm, but they have different effects on the metabolism of the tissues, circulation, swelling, edema, and flexibility of connective tissue (Weingand et al., 2004). While thermotherapy intensifies these consequences, cryotherapy lessens them. Both treatments have minimal adverse effects and effectively reduce pain. When compared to cold therapy or thermotherapy alone, contrast therapy, which switches between both cold and hot modalities of treatment, offers no extra therapeutic advantages. Nerve injury, frostbite, Raynaud's syndrome, and sluggish wound healing are among the side effects of cold therapy. Skin burns can happen during thermotherapy, especially in individuals with spinal cord injuries, multiple sclerosis, diabetes, or poor circulation. Deep heating techniques should be used cautiously in those with arthritis, such as rheumatoid arthritis, since greater inflammation may result. The urogenital, pulmonary, and cutaneous systems have all been infected as a result of whirlpool therapy and other forms of hydrotherapy. Additionally, people who have joint prostheses shouldn't have ultrasonic imaging (Nadler et al., 2004). Nociceptors are specialized nerve endings that become active in reaction to tissue damage. The brain recognizes the pain feeling after receiving nerve impulses from nociceptors that pass via the spinal cord. In addition, neurotransmitters set off a spinal reflex, which elevates muscle tonicity and motor activity at the site of damage and causes a reactionary muscle contraction. If the rise in muscular tone continues, it may result in excruciating muscle spasms that, along with the surrounding tissues reduced flow of blood and oxygen levels, may cause more tissue damage. In turn, pain grows. The pain-spasm-pain loop describes this damage process. To prevent more tissue damage from occurring and to lessen the discomfort, this vicious circle must be broken. The study concluded that Management of a variety of musculoskeletal problems frequently involves the use of therapeutic methods (Kruse et al., 2004). Any doctor treating musculoskeletal pain must have a good awareness of how these modalities affect the outermost and central nerve systems, particularly in relation to the pain-spasm-pain cycle. Recent studies have shown that cold therapy

and thermotherapy are more effective in treating pain than intermittent therapy. It's critical for pain specialists to be up-to-date on the latest research on the various therapy methods that patients could employ throughout their care and at home.

#### **2.4 Effect of Cervical exercises with massage for chronic neck pain**

Chronic pain in the neck is characterized as widespread neck or shoulder discomfort that is brought on by movements of the neck, positions of the neck, or examination of the neck's muscles. It now affects larger populations in an expanding number of ways, resulting in functional impairment. Chronic neck discomfort has unknown root causes that are not entirely understood (Kaya et al., 2016). There is compelling evidence linking neck discomfort to biomechanical variables such as extended computer usage, posture, and repeated motions. Stress at the psychological and biomechanical levels may also play a role in neck discomfort. Trapezius muscle motor cells have been seen to become active during cognitively demanding activities carried out without any kind of physical requests, and it has been shown that the combined effects of physical and mental strain raise trapezius activity levels more than the total of the effects of each stressor separately. As a result, discomfort and muscular spasm might possibly arise from long-term interaction with biomechanical and psychological stresses (Celenay et al., 2016). Functioning circumstances, activity levels, and work performance may all decline over time, and psychological issues like anxiety and depression may emerge. These factors all have a detrimental impact on one's quality of life. The impact of cervical exercise therapy massage on patients with chronic neck pain in terms of pain, anxiety, and quality of life. 60 individuals with persistent neck discomfort were enlisted and randomly assigned to Group 1 for exercise with massage and Group 2 for exercise without massage. The course was run for 12 sessions over 3 days each week for 4 weeks. Before and after the therapy, the quality of life was assessed using the Short Form-36, as was the pressure-pain threshold and degree of anxiety measured using the Spielberger State Trait Anxiety Inventory. Following the training, it was discovered that Groups 1 and 2's physical health improved while pain intensity and anxiety levels decreased (Akbayrak et al., 2016). The study shows that Only Group 1 showed an increase in physical threshold for pain and mental wellbeing. The intergroup comparison revealed a substantial difference favouring Group 1 in terms of severity of pain at midnight, stress pain threshold, state anxiety, and mental health.

#### **2.5 Therapeutic exercise in chronic neck pain**

Psychosocial variables have a significant impact on persistent neck pain, which is a very prevalent illness. The technique that is most commonly used is based on manual therapy and particular therapeutic exercise, which have demonstrated a moderate benefit for people with persistent neck discomfort among the several methods of therapy reported for its treatment. However, it is not clear how long these therapies will take to take effect (Gerez et al., 2020). In this study, the results of two investigational methods, manual therapy and therapeutic exercise therapy, will be broken down and compared. On participants with persistent pain in their necks, the short- and long-term effects of various therapies were investigated. Three groups were created randomly from the sample: manual treatment, therapeutic exercise, and we investigated cervical impairment using the Neck Impairment Index and (a) pain using the visual analog scale and the amount of pressure pain limit, respectively. Results were recorded during the first, fourth, and twelfth weeks. If there are differences between the experimental groups and the control group relative to the control group, they are not statistically significant. Nevertheless, we discovered that therapeutic exercise decreased cervical impairment before manual treatment, whereas the latter reduced subjective pain before the former (Blanco et al., 2020). For both experimental interventions, the effect sizes

are medium and large. In the short and medium terms, there are virtually no distinctions among the groups. Compared to therapeutic exercise, manual treatment reduces pain perception more quickly. Compared to manual treatment, therapeutic exercise reduces impairment more quickly. Central mechanisms may have an impact on improvements in medicine. (Bernal–Utrera et al., 2020). The most typical orthopaedic condition is chronic neck discomfort. Neck discomfort has been estimated to have a mean point prevalence of 7.6%, a mean annual prevalence of 37.2%, and a mean overall prevalence of 48.5% in adults. Annually, 14.1% of workers indicate that their ability to work has been restricted by neck pain (Park et al., 2014). Numerous studies have looked at the risk factors for the emergence of persistent neck discomfort. These include being a woman, being older, having a demanding job, having little social or professional support, having previously smoked, and having previous experiences with neck or lower back problems. Furthermore, neck discomfort is connected to metabolic syndrome, which involves an elevated body mass index, particularly in men. However, less is understood about why people may experience neck discomfort, especially when it comes to physiological variables. According to a number of studies, neck discomfort and head position are closely associated. Because the assessment is dependent on surface anatomy, there is debate regarding the validity and reliability of this component (Kim et al., 2014). The significance of axial orientation for healthy spine functioning and its role in the emergence of different illnesses have emerged during the past twenty years. It has been demonstrated that pelvic morphology and orientation can have an impact on lordosis of lumbar spine, which is being proven to be important in continuing a straight spine. The cervical vertebrae were included in this theory in the current investigation as an anatomical component that could affect the start of neck pain. He concentrated on the architecture of the thoracic upper cage, the curve created by first rib, the 1st thoracic vertebra (T1), and the surrounding region. As far as we know, no research has been done that compares the coronal alignment and the size of the thoracic inlet in males and females, regardless of persistent neck discomfort. Using magnetic resonance imaging, we investigated the cervicothoracic junction in individuals with and without persistent neck discomfort to discover the morphological determinants of this condition. Patients (23 males and 25 females) who had axial neck pain for more than 6 months and participants (23 males and 25 females) who had no pain acquired cervicothoracic spine mid–sagittal axial magnetic resonance (MRI) images for the identification and measurement of four straight and four angular parameters. (Lee et al., 2014). In young people, measuring the cervicothoracic junctional elements is a practical and dependable way to estimate possible predictors of persistent neck discomfort. Significant predictors included a hollow thoracic cage in females and anterior tilt of the thoracic inlet in males.

## **2.6 Proprioception Impairment in Persistent Neck Pain**

Proprioceptive retraining therapies are frequently used to treat persistent neck discomfort, although there isn't any proof that this group of people has proprioceptive dysfunction. The choice of treatment clearly depends on whether proprioceptive dysfunction is present in persistent neck discomfort (Leake et al., 2016). By conducting a meta–analysis and a systematic review, the study aims to integrate and critically evaluate all available research on proprioceptive dysfunction in people with persistent neck pain. There are some of the several sources of information from which data is searched. Two independent reviewers independently retrieved pertinent demographic and proprioception data from the data and used a modified STROBE statement to evaluate the methodological quality (Chalmers et al., 2016). The thirteen studies that were part of the current review's data were combined. With an average standard deviation of 0.44, a meta–analysis of 10 trials revealed that those who suffer from persistent neck discomfort perform considerably worse

on "head to neutral" repositioning tests. In two investigations, head repositioning without active head movement was assessed with the intention of removing vestibular input. The findings were inconsistent. Three studies looked at complicated postural repositioning tests; neither postural repositioning nor complex movement tests were affected by persistent neck discomfort unless the movement's error was continually assessed (Stanton et al., 2016). In comparison to asymptomatic controls, the study's findings show that people who have persistent neck pain have a modest deficit in "head-to-neutral" repositioning tests.

## **2.7 Improvements in the identification and treatment of neck pain**

The most frequent medical ailment and the primary cause of worldwide disability is neck pain. Even though neck discomfort places a heavy burden on public, and thus receives small portion of study funding also attention allocated to neck discomfort. The prevalence, evaluation, and management of neck discomfort are all discussed in this article. In this investigation, the search phrases "cervical pain," "neck pain," "cervical radiculopathy," "cervical radicular pain," and "cervical myelopathy" were used in the research database, without any limitations. Using the aforementioned databases, key phrases associated with the pertinent themes for each segment were found and cross-referenced with the original search keywords (Cohen et al., 2017). A differentiate cervical pain evaluation pain that is not radiating often develops slowly, although pain transmission patterns may aid in differentiating between common pain causes. Axial neck discomfort, for instance, that radiates to the shoulder, midback, or occipital areas may be caused by pain in the cervical facet joints. In particular, pain from the cervical joints can radiate into the various brain parts, while pain from the discomfort in the cervical joint often travels to the shoulder. Assessment of neck discomfort because therapy choices depend on either the pain is nerve related or other factors are contributing to it, a thorough physical and medical history is required. Neck discomfort can result from a variety of systemic and regional diseases, the majority of which are neuropathic or musculoskeletal in origin. The reasons and remedies for persistent neck pain that can be challenging to pinpoint the cause of pain. This is especially true in the absence of a diagnostic method of diagnosis. Many therapies are based on accurate diagnoses, frequently in the substitute of "diagnostic blocks." However, validity regarding the diagnosing injections cannot be fully established in the absence of any corroborating reference standard. Most people presumably have numerous contemporaneous pain generators because of the interdependent link between nearby structures. Rehabilitation frequently depends generalizations from researches done for neck pain since non-specific neck discomfort is characterized by a few research studies that have assessed medications for neck pain. This is pain that, sometimes as a result of inadequate inquiry, cannot be linked to a particular cause (Hooten et al., 2017). It is unknown if medications that relieve non-specific spinal pain would have a comparable impact on a group of people who have discogenic pain and are more homogenous. According to the study's findings, neck discomfort places a significant personal and societal cost on society, with prevalence rates that are comparable to low back discomfort and disability rates that are among the highest in the US. Nevertheless, neck pain has only gotten a small percentage of the fund and attention allocated to low back pain. Most cases of acute neck pain, whether radicular in origin or not, endure for around three months, and a significant portion of the population may either to experience less findings or have frequent recurrences.

## **2.8 Office employees' risk factors for persistent neck pain**

The study main finding is that every job exposes people to variety of unusual circumstances. It is known that a worker health is influenced by the type of job. The existence of occupation specific predictors for persistent neck pain is uncertain. In a cohort study of office employees, this study sought to determine risk factors for persistent neck pain. In this research study a research is performed that includes workers, a questionnaire and routine physical examination were used to evaluate risk variables (Sitthipornvorakul et al., 2016). A patient with having symptoms is termed as someone that experience discomfort that measure more than thirty mm on a scale of one hundred mm, and persistent pain is termed persistence neck pain that lasted more than 3 months over the previous 6 months. The results of the study was that out of the sample, office employees who reported recently developing symptoms of neck pain experienced chronicity in 17% and 27% of cases, respectively. More body weight, regular neck expansion at the day, beginning levels of pain, and psychosocial job were all predictors of persistent neck pain (Paksaichol et al., 2016) The study came to the conclusion that the factors that predict chronic pain in the musculoskeletal system in a subpopulation could represent a selected group of the predictors found in the general population or in a particular vocation. In order to successfully manage chronic musculoskeletal pain, it may also be necessary to take the patient's line of work into account. (Sihawong et al., 2016)

### **2.9 The success of various neck exercises for neck pain**

One of the most prevalent types of discomfort is neck pain. It typically has a significant impact on day-to-day functioning and leads to a high demand on medical services. It is crucial to recognize which structures might cause pain and impairment in order to enhance the functioning and standard of life of patients (Ozturk et al., 2009). Many research conducted in the last ten years have demonstrated a link between neck discomfort and a decline in the cervical muscles' strength and endurance ability. It has been shown that several cervical spine muscles, most commonly the ones in the middle and front neck flexors, tend to weaken when a person has neck discomfort. Front and back neck muscles in an investigation of osteoarthritis patients had more prominent fatigue curves than the muscles in the control group. Exercise is therefore one of the most often utilized methods in the recovery process of patients with neck pain in order to increase muscular strength, flexibility, and endurance, to recover tissues that have been injured, and to improve the capacity to sustain normal living activities (Atamaz et al., 2009). Exercise regimens vary in terms of length, duration, level of difficulty, and kind of exercise for treating neck discomfort. Conditioning and isometric exercises have been demonstrated to be beneficial for treating neck discomfort in earlier research. As part of the recovery process, neck stabilization exercises (NSE) were also included to reduce discomfort, increase function, and stop new injuries. There are a number of workouts that are physically challenging yet fairly simple to complete in terms of time and material (Dusunceli et al., 2009).

### **2.10 Mechanical Treatments for Conditions Related to Neck Pain**

The main treatment for neck discomfort is conservative measures. These management treatments commonly include physical modalities. Acupressure, electrical stimulation, scans, manual traction, treatment with lasers, and other types of both hot and cold treatment are examples of interventions (Gross et al., 2013). Although therapeutic ultrasonography constitutes one of its most often utilized modalities, its usefulness is supported by inconsistent or little data. Prior to the current review, several studies discovered that for both acute and chronic neck pain, heat agents were frequently utilized in alongside manual therapy, exercise, education, and medication treatments. Physical agents are often utilized as supplementary therapies, therefore it can be



challenging to assess how much of an impact they have on enhancing treatment outcomes. The value of physical agents has been questioned in earlier evaluations (Carlesso et al. 2013). While some discovered no proof that using hot packs to relieve chronic pain over the long term or to enhance function was beneficial. Furthermore, neither spray nor stretch nor infrared light helped to reduce discomfort in the near term. Electrical stimulation has long been a well-liked physiotherapeutic method for addressing neck pain. There's not enough solid scientific information to determine how beneficial most of these subcategories are. Several reviews were still unable to determine the unique impact of electrical stimulation since research had not examined its effects on loneliness. Another therapy with scant evidence of efficacy is manual traction. In outpatient recovery, multidisciplinary approaches are typical, with physical therapies being included as a part of the overall intervention (Santaguida et al., 2013). Usually, treatments not the only usage. Because of this, a lot of controlled studies look at paradigms in conjunction with other forms of treatment, including rehabilitation or exercise, rather than just by itself. One collection of therapies is frequently contrasted with an entirely separate set of integrated actions. These kinds of research might identify a therapy group that works better than another. While this does make medical sense, designs that may divide the individual therapy effects are rarely employed, and the unique impact of a certain mode alone cannot be examined (Graham, 2013).

### **2.11 The identification and treatment of whiplash injuries to the neck**

The majority of neck pain studies focus on treatment rather than stratifying on the kind of start or length of symptoms, yet overall is some proof that these variables affect the result. In actuality, the majority of research on nonspecific neck pain involves people with subacute diseases, which last 1–2 months, or chronic diseases, which last 3 months or more. Research on acute neck pain, on the other hand, only looks at neck pain that occurs fewer than 4 weeks after injury. It will address the determination of neck discomfort, emphasizing the variations in symptoms after whiplash injury, and it will also provide an overview of the data supporting the various treatment choices; however, treatment is going to be covered in more depth in other sections (BINDER A. 2007). The cervical spine is the most flexible and least stable part of the human spine. It is made up of seven different-sized and shaped vertebrae that are connected by intervertebral discs and a complex network of soft tissue structures to allow for a large degree of movement diversity. Although degenerative changes most typically originate in the cervical discs and spread to adjacent tissues, any of these structures may be the source of discomfort. An abrupt accelerated or slowed of the neck, such as that seen in auto accidents or athletic incidents, must occur before symptoms appear. Even though the pain's origin is frequently unknown, its manifestations are frequently quite severe. In the majority of whiplash patients, a thorough medical examination reveals no particular disease. Even with MRI scanning, soft tissue damage is seen to be the most plausible reason for the indicators, although it is challenging to verify. It has been shown that brachial plexus involvement or abnormalities of the zygapophyseal joint occur in certain patients with persistent whiplash. Whiplash injuries are quite prevalent worldwide, however there are significant differences across nations, even among the same area or socioeconomic group, in terms of the frequency of reported indicators, those who develop a permanent impairment, and those who seek recompense. The literature on the epidemiological nature and the natural world of whiplash is inconsistent, in part due to the low caliber of the investigations.

### **2.12 Use of therapeutic ultrasound in managing chronic neck pain.**

Improving quality of life and assisting the individual in returning to their preferred level of everyday activity are the main objectives of neck discomfort therapy. While many methods of

therapy are employed, numerous practice recommendations suggest various approaches that places more of an emphasis on cognitive and physical interventions as well as managing oneself, with a decreased reliance on drug usage and operations. One technique that is frequently utilized in the treatment of muscular injuries is therapeutic ultrasonography. It has been suggested that the administration of ultrasonic energy by therapeutic ultrasound affects deep tissue locations mechanically and thermally (Noori et al., 2020). The heating effects of ultrasonography are caused by soft tissue molecules vibrating in response to the acoustic wave and producing frictional heat. In adult individuals who have ongoing neck pain, this systematic review aimed to determine if continuous ultrasonography substantially improved pain levels compared to conventional treatment or no therapy at all. This investigation shows that, even immediately following therapy, therapeutic ultrasonography is frequently unsuccessful in lowering the intensity of neck discomfort (Jung B et al., 2020).

### **2.13 Efficacy of manual therapy in the rehabilitation of chronic neck pain.**

Human misery and enormous financial costs are linked to neck discomfort. Physical therapy for treating neck pain has gained a lot of interest recently due to studies of a high frequency of neck discomfort in people of all ages. Many physiotherapy modalities have been used to treat patients with neck discomfort; however, cervical manual therapy (CMT) has been shown to be successful in treating patients with neck pain (Iqbal M. et al., 2020). It has been claimed that some physical therapy professionals are using methods of manual therapy to treat neck discomfort in the upper thoracic area, despite the fact that there isn't enough solid data to support the use of this approach. This practice may be due in part to the strong physiological and functional link between the cervical and thoracic area, as well as the neuronal connections between the two regions of the spine. It is interesting that initial studies on the handling of neck pain have revealed encouraging results for Thoracic manual therapy, notwithstanding the absence of massive amounts clinical trials on the efficacy of this treatment method (Ullah et al., 2020). For the latter, it was hypothesized that patients with neck discomfort who received manual treatment to the thoracic and cervical spines would fare differently from those who received manual therapy to the cervical spine (Arsh et al., 2020).

### **2.14 Neuromuscular exercises for chronic neck pain.**

The clinical appearance of pain in the cervical region syndrome has a large sociological frequency and is caused by a variety of etiological variables. These include degenerative modifications of the neck tissues, bruises of the muscles and ligaments. Conditions of the cervical region are treated using various approaches, such as physical therapy, flexing soft-tissue therapies, and physical rehabilitation. (Angelopoulos et al., 2021). Some techniques includes use of metal instruments to provide soft tissue mobilization that is also an effective method to reduce pain. The crucial treatments for the management of neck discomfort is neurological retraining, a type of physical therapy that can enhance structural movement, boost motor and tissue elasticity, and guard against tissue damage. Although the use of massage and strengthening exercises has resulted in the previously indicated beneficial physiological adjustments, no study has examined the attempt to improve the general alignment of human beings using both of these treatments (Tsepis et al., 2021). The goal of this study is to compare the immediate impacts of potential body positional corrections on individuals with neck pain who also have concomitant abnormal physical modifications in light of the currently existing gap. This study's primary goal is to determine how well those suffering from physical neck discomfort condition and associated head position problems can improve their spinal alignment and ability to perform by combining various methods

for the vertebral regions with a regimen for motor enhancing in specific biological areas (Mylonas et al., 2021).

**RESULTS:**

In this study, 55 participants whose age is between 18–25 years participated in which there are 28 boys and 27 girls respectively. The participants that meet the inclusion and exclusion criteria were included in the study. The consent form was taken from the participants, although there were no complaints or left out in between due to the study intervention. The data was analyzed using IBM SPSS Statistics 21 Software. The Average mean age is 21 years and the standard deviation is 0.5.

**Table 4.1 Paired Samples Statistics for Pre and Post NPRS**

	Mean	N	Standard Deviation	Standard Error Mean
Pair1 PRE	6.6182	55	1.25449	0.16915
POST	4.7091	55	1.03051	0.13895

The average mean and standard deviation for Pre NPRS score is  $6.6182 \pm 1.25449$  and the average mean and standard deviation for Post NPRS score is  $4.7091 \pm 1.03051$  was observed.

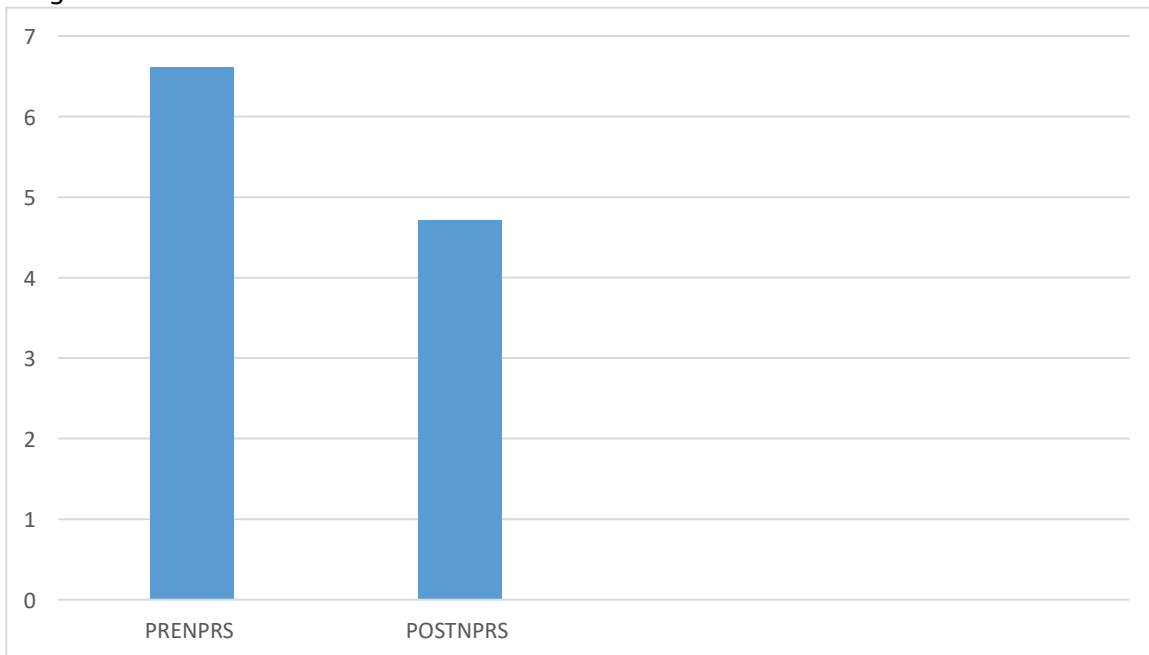


Figure 3.1 Demonstrates the difference within Neck pain evaluated using NPRS before and after using the Hot Pack and Stretching Exercise.

**Table 4.2 Paired Samples Correlations for pre and post numerical pain rating scale.**

	N	Correlations	Significance
Pair1 PRE & POST	55	0.758	0.000

N=No. of Participants, The observed value for correlation for NPRS is 0.758

**Table 4.3 Paired Samples Test for pre and post NPRS**

	Paired Differences			
	Mean	Standard Deviation	Standard Error Mean	95% Confidence Interval of the Difference
				Lower

Pair 1 PRE -POST	1.909	0.82266	0.11093	1.68670	2.13149
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The Mean is 1.909

The Standard Deviation is 0.82266

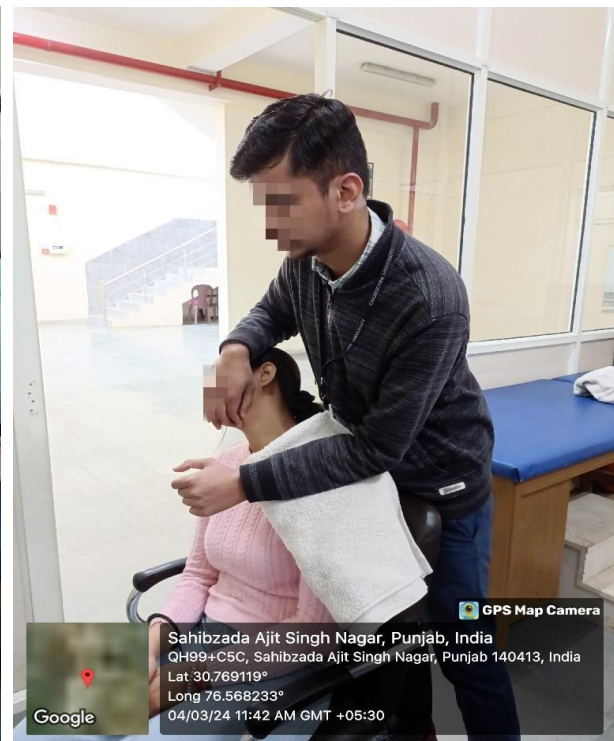
The Standard Error Mean is 0.11093

**Table4.4 Paired Samples Test for pre and post NPRS**

	t	df	Sig.(2-tailed)
Pair1PRE -POST	17.210	54	0.000

The value to t is 17.219

The value of degree of freedom (df) is 54



**Figure 3.2 & 3.3** showing application of hot pack and upper trapezius stretching on a female participant.



**Figure 3.4 & 3.5** showing application of hot pack and upper trapezius stretching on a male participant.

## OUTCOMES

1. The main outcome of the study is the pain the level of pain or the intensity of the pain is significantly reduced
2. Secondly the main outcomes are the restriction in performing movement of the neck that is decreased which is affected due to pain before the intervention. Several participants reported and have explained about the pain free neck movement's and therefore increase in the range of motion of neck.

## DISCUSSION:

Neck pain has a complicated etiology and is thought to arise from a biopsychosocial issue. Previous studies have identified a number of risk factors for neck discomfort, including gender, age, a greater Body mass index, smoking, excessive use of electronic devices, uncomfortable or prolonged positions, lack of physical activity, negative emotional states, and a lack of social support. Unfortunately, there is no data to support the creation of therapeutic techniques, and investigations of potential risk variables for neck discomfort are largely discordant. Moreover, there are conflicting and unsatisfactory results on the psychological causes of neck discomfort in students studying medicine.

While some studies revealed no significant correlation, others indicated that psychiatric illnesses are related to a higher occurrence of neck discomfort. Several studies have revealed gendered variations in lifestyle choices and psychological health among healthcare students. Female students spend more time in sedentary activity while being less likely to engage in physical activity than male students, according to published data. This study's goal was to investigate the link

between applications of both hot pack and stretching exercise will reduce the chronic neck pain in individuals having pain from more than three months or more. The present study shows that the PRE NPRS mean value is 6.6182 and the POST NPRS mean value is 4.7091 for the total 55 participants.

The main variable used in this study is numerical pain rating scale (NPRS) to measure the pain intensity. It has been demonstrated that changes in pain intensity could be detected with the highest degree of reliability using a composite scoring system that included the greatest, worst, and current level of pain over the previous 24 hours. This study shows that combination of hot pack and stretching exercise could show a positive effect in reducing the chronic neck pain when followed a 21 day treatment protocol.

Moreover a previous study by (Shin et al., 2020) has reported the benefits of thermotherapy plus neck stabilization exercise on non specific chronic neck pain compared to neck stabilization exercise alone. Our study also observed that both hot pack and stretching exercise had significant effects in reducing pain intensity, improving disability. Interestingly, the intervention group also demonstrated noticeably better control over neck discomfort when compared to neck stabilization exercise alone. The results of the study by (Cramor et al.) revealed that the additional thermotherapy significantly reduced non specific neck pain. Throughout the trial period, the standard pharmaceutical and physical therapy regimens were administered to both the heat therapy and non-heat therapy groups. The thermotherapy group received thermotherapy using mud packs (Shin et al., 2020). For those with chronic neck discomfort, thermotherapy has been demonstrated to be a helpful means of reducing pain and enhancing somatosensory function.

On the other hand, other research contrasted massage and stretching techniques used on the neck region's muscles in accordance with various treatment plans. In the present investigation, the sternocleidomastoid and the upper trapezius muscle were the only muscles to receive stretching exercises and heat packs, as opposed to the cervical area as a whole (Phadke et al., 2016; Tunwattanapon et al., 2016). In other study, by Rajabi et al. (2011) said that while exercise by itself can be a successful treatment for persistent neck discomfort, massage in addition to exercise may be more successful in easing pain because massage promotes muscle tranquility, which reduces discomfort.

It is hypothesised that the present study's pain decrease resulted from the stretching and heat pack given to the sternocleidomastoid and upper trapezius muscle, indicating a medically significant influence of hot pack and stretching exercises to the SCM and upper trapezius muscle. Prior research has demonstrated that range of motion may be increased by massage and stretching exercises due to variables involving the muscles and brain. (Behm et al., 2013; Kwon et al., 2010). In the current study, we think that applying a heat pack and stretching just to the SCM and upper trapezius muscle lengthened the muscles, increasing range of motion and, ultimately, reducing chronic neck discomfort.

#### **LIMITATIONS:**

- This study cover only two muscles that is upper trapezius and SCM muscle it does not cover the other neck muscles that can also be a cause of neck pain
- This study was not a randomized controlled trial
- In this study the sample size is small

- In this study Range of motion is not measured

#### **FUTURE SCOPE**

- RCT's can be done
- Sample size can be increased
- It can be done on people of different age group.
- Other combination of intervention can also be done

#### **CLINICAL IMPLICATION**

Less knowledgeable participants may choose to heed the advice of the coaches and physiotherapists regarding tight muscles and neck stiffness. Adequate training and therapies will be facilitated by this investigation.

#### **CONCLUSION:**

In this study Hot Pack and Stretching Exercises were used to treat chronic neck pain on both male and female participants, having upper trapezius and sternocleidomastoid muscle pain. According to this study, there was a considerable improvement in the reduction of chronic neck discomfort in both male and female students. However, compared to using merely a hot pack, stretching exercises shown a far greater effect in lowering discomfort and increasing length of muscles. The use of a heated pack and stretching exercises improved muscle length, increased range of motion, and decreased muscle stress and spasm. Stretching exercises or correcting poor posture can be used in cases of acute pain and neck muscular tightness to avoid the formation of additional neck discomfort involving other muscles, such as pain in the scalene muscles.

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