



DYNAMIC VERSUS STATIC STRETCHING ON FLEXIBILITY AND IMPAIRMENT IN ADULTS SUFFERING FROM NECK PAIN

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Abstract: Neck pain is among the most common musculoskeletal disorders. Neck pain is among the most common musculoskeletal disorders characterized by a reduced cervical range of motion (ROM), suffering pain, and suffering functional impairment. Stretching is one of the most common physical therapy techniques, yet it does not have certain comparative effectiveness of dynamic as it assumes better results than static stretching. To compare dynamic and static stretching in terms of neck pain reduction, ROM improvement, and disability level in adults with non-specific neck pain. A six-month randomized clinical trial was conducted at physiotherapy clinics in Sindh, Pakistan. Thirty participants (20–40 years) with non-specific neck pain were allocated into two groups (n=15 each): Group A (dynamic stretching + TENS/heating pad) and Group B (static stretching + TENS/heating pad). NPRS and NDI were used to assess pain and disability; data were analyzed using SPSS v24, significance set at $p < 0.05$. Both groups showed significant improvement; dynamic stretching showed significantly greater gains (NPRS mean difference: 6.06 ± 0.13 vs. 2.33 ± 0.45 ; NDI mean difference: 4.36 ± 3.45 vs. 2.22 ± 3.31 ; $p < 0.05$), along with greater cervical ROM improvements. Both interventions are effective, but dynamic stretching shows superior clinical effectiveness and may be preferred in rehabilitation programs.

Key words: Dynamic stretching, Static stretching, Neck pain, Cervical range of motion, Neck Disability Index, Physical therapy

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INTRODUCTION

Neck pain is one of the most common musculo-skeletal disorders in adults around the world. It is characterised by pain, stiffness and limited movement of the cervical region, often radiating to the shoulders, upper back and head. (Kazeminasab *et al*, 2022). Modern lifestyles, including prolonged use of computers, poor posture, inactive work patterns and psychological stress have significantly contributed to the growing incidence of neck pain (Phadke, *et al.*, 2016). In many people, neck pain not only interferes with physical functioning, but also compromises quality of life by interfering with work, leisure and daily activities. Stretching exercises are widely used in physical therapy as part of conservative treatment strategies to improve flexibility, reduce pain and restore the cervical mobility (ROM) (Behm *et al*, 2023). Stretching interventions can generally be divided into two main categories: static stretching and dynamic stretching. Static stretching involves holding the muscle in a prolonged position for a certain time, while dynamic stretching involves controlled, active movement over a range of motion (Tunwattanapong *et al.*,

2016). Although both techniques are routinely prescribed to patients with neck pain, there is still limited evidence to compare their effectiveness. This article reviews the comparative effects of dynamic and static stretching on pain relief, cervical mobility and disability in adults with non-specific cervical pain in a randomised clinical study conducted in Sindh, Pakistan (Opplert, *et al.*, 2016). Neck pain has become increasingly prevalent due to occupational and lifestyle-related factors. Research indicates that the annual prevalence of neck pain ranges from 30% to 50% among adults. Office workers, students, drivers, and individuals who maintain prolonged sitting postures are especially vulnerable. Recurrent neck pain is also common, with many patients experiencing repeated episodes over several years. Neck pain is a highly widespread condition, with an age-standardized incidence of 807 per 100,000 globally (Safiri, *et al.*, 2020). Neck discomfort results in severe pain, losses in ability, and financial burdens causing considerable social and economic hardship around the world (Hoy, *et al.*, 2010). In the United States, according to research during the year 2016, neck and low back pain

caused the greatest healthcare spending among 154 diseases at \$134.5 billion (Dieleman, *et al.*, 2020). The Chinese statistics from 2019 reveal that neck pain ranks in the top five causes of disability, preceded only by low back pain, age-related hearing loss, headache disorders, and depression. An equivalent example comes from Brazil, where 7.2% of disability pensions for workers suffering from musculoskeletal disorders are due to neck discomfort (Xia, *et al.*, 2024). The causes of neck pain are multifactorial. Common contributing factors include muscle strain, poor posture, cervical spondylosis, degenerative disc changes, and psychological stress. Forward head posture associated with prolonged mobile phone and computer use places excessive stress on cervical muscles and ligaments, resulting in pain and reduced mobility (Deligne, *et al* 2021). Patients with neck pain commonly report stiffness, headaches, limited neck movement, muscle tightness, and functional disability. (Cohen, 2015). Anxiety, sleep disturbances, and work productivity can also be affected by chronic symptoms. In most cases of neck pain, a neurological exam will be performed, which often includes looking at your muscle strength, skin sensation, and reflexes, as well as performing maneuvers or tests. The Spurling test or maneuver, which is positive if the maneuver reproduces the pain or other sensory disturbances such as tingling, is particularly useful in demonstrating the signs of cervical radiculopathy (Spurling's test.2023). Certain exercises to reduce neck pain, strengthen neck muscles (with cervical traction) and increase the range of motion of your neck. For cervical spondylosis, your physical therapist may include stretching exercises, as well as posture therapy and a soft cervical collar. Static stretching involves placing a muscle in a stretched position and holding it for approximately 15-60 seconds. This method promotes muscle relaxation and elongation, gradually improving flexibility. Static stretching is often used after exercise or during rehabilitation to reduce stiffness and maintain muscle length. Dynamic stretching consists of active, repetitive movements through the full range of motion. It's not like static stretching. It's flexibility training and neuromuscular activation with functional movement patterns." Dynamic stretching is often done prior to physical activity as it is thought to increase blood circulation, muscle temperature and joint mobility

MATERIALS AND METHODS

Study Design/Type

Randomized clinical trial

Study Setting

This study was conducted in multiple physical therapy clinics throughout Sindh, Pakistan.

Study Duration

The study was six months after the research synopsis and ethical considerations were approved

Sample size

A total of 30 participants were included in the study. The participants were equally divided into two groups, with 15 participants in each group.

Sampling Technique

Convenient sampling technique was used to recruit participants based on their availability and willingness to participate in the study.

Study Population

The target population consisted of male and female adults aged between 20 and 40 years who were experiencing non-specific neck pain.

Inclusion Criteria

Participants meeting the following criteria were included in the study:

- Adults aged 20–40 years.
- Both male and female participants
- Individuals diagnosed with non-specific neck pain.
- Participants willing to provide informed consent

Exclusion Criteria

Participants with the following conditions were excluded:

- Neurological manifestations.
- Previous cervical spine surgery.
- Gross cervical deformities.

Study Groups

Study groups Patients were randomly assigned to two groups:

Group A – Dynamic Stretching Group

Participants were given dynamic stretching exercises together with the same basic treatment of TENS and heating pad application.

Group B – Static Stretching Group

Participants were given static stretching exercises together with the same basic treatment of TENS and heating pad application

Data Collection Procedure

The following tools have been used for the assessment:

- the Numeric Pain Rating Scale (NPRS) for the evaluation of pain
- The neck disability index (NDI) for functional disability assessment
- Universal goniometer for measuring the cervical range of motion.

Data Collection Procedure

After obtaining informed consent, baseline assessments were performed for pain, disability, and cervical ROM. Both groups first received baseline treatment with TENS and heating pad application for 10–15 minutes. Following this:

Group A performed dynamic stretching exercises involving controlled active cervical movements.

Group B performed static stretching exercises by holding stretches at end range positions for a fixed duration.

Post-intervention assessments were recorded using the same outcome measures.

Data Analysis Process

Data were analyzed using SPSS version 24. Descriptive statistics (i.e., mean and standard deviation) were calculated, and inferential statistical tests were used to compare pre- and post-intervention outcomes within and between groups. Statistical significance was set at $p < 0.05$.

RESULTS

The findings demonstrated significant improvements in both groups after intervention. However, dynamic stretching produced greater improvements compared to static stretching in pain reduction, disability, and cervical range of motion.

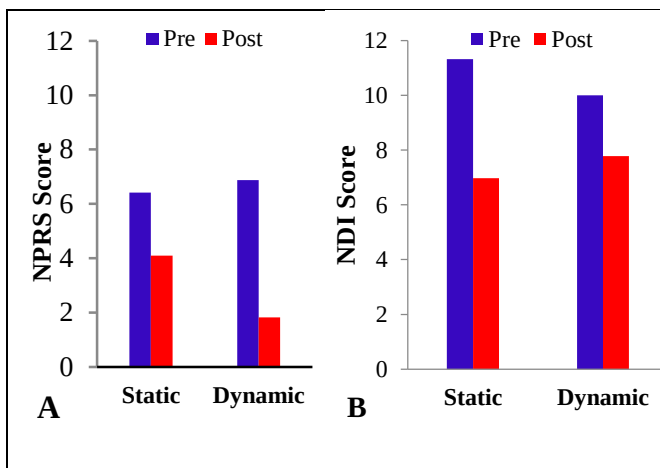


Figure 1: NPRS and NDI Scores

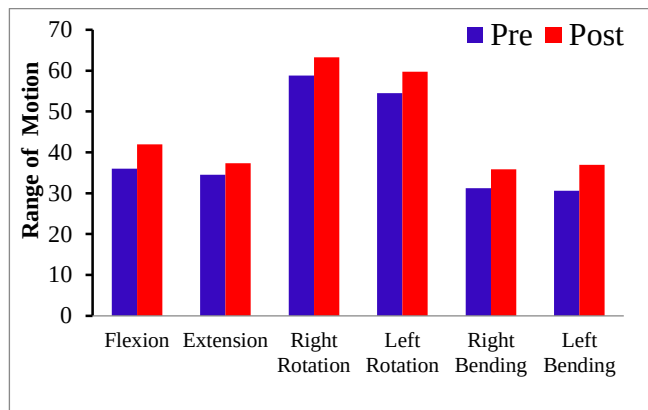


Figure 2: : Static Stretching Range of Motion Analysis

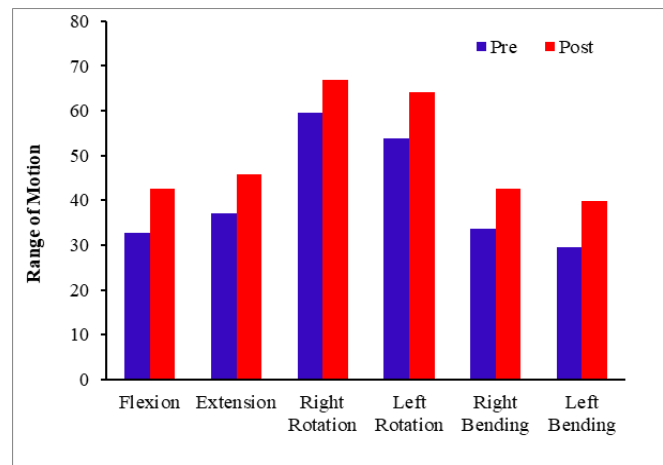


Figure 3: Dynamic Stretching Range of Motion Analysis

CONCLUSIONS

Overall both static and dynamic stretching led to substantial pain reduction, improved cervical range of motion and reduced neck disability for adults with non-specific neck pain. Nevertheless dynamic stretching produced greater effect in a large majority of outcome parameters studied. Through combination of dynamic active motion sequences, dynamic flexibility work and dynamic neuromuscular activation it resulted in more optimal restoration of cervical functional capacity.

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