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Original article

The Effectiveness of Shockwave Therapy and Stretching Exercises in Chronic Neck Pain

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Abstract
This study investigates the effectiveness of stretching exercises combined with radial shockwave therapy in alleviating myofascial trigger points (MTrPs) in a patient diagnosed with mechanical neck pain. The primary objectives were to relieve MTrPs, strengthen cervical musculature, improve range of motion, and enhance functional neck performance. To achieve these goals, the researchers employed an experimental single-subject design, utilizing pre- and post-intervention measurements to evaluate treatment outcomes. The study sample consisted of a 38-year-old male patient presenting with four MTrPs in the upper trapezius muscle. The intervention was conducted at Alhilal Center in Gharyan, Libya, comprising 12 physiotherapy sessions administered over four weeks on alternate days. Assessment tools included the Numerical Pain Rating Scale (NPRS) for pain intensity, a goniometer for cervical range of motion, manual muscle testing grades for muscle strength, and the Functional Pain Scale to evaluate improvements in daily activities. Percentage improvement was used to analyze the results. The findings revealed a 60% reduction in pain levels, a 26.74% improvement in range of motion, a 22.5% increase in muscle strength, and a 66% enhancement in functional pain scores. These results demonstrate that the combined treatment protocol effectively alleviates myofascial trigger points and improves clinical outcomes in patients with mechanical neck pain.
Keywords. Redial Shock Waves Therapy, Myofascial Trigger Points, Mechanical Neck Pain.

Introduction

Mechanical neck pain is recognized as a significant economic burden on healthcare systems, with substantial repercussions on physical functional performance. The rapid changes in social lifestyles, including the increased use of modern electronic devices, have been identified as a major contributing factor to the rising prevalence of neck pain. Mechanical neck pain can adversely affect physical, social, and psychological health, often resulting in increased stiffness and pain in the upper neck [1,2].

One of the primary causes of non-specific neck pain is myofascial pain, which is characterized by hyperirritable nodules in taut muscle bands. These nodules, referred to as myofascial trigger points (MTrPs), lead to pain, functional disability, and a decreased range of motion. Among muscles affected by MTrPs, the upper trapezius muscle is the most commonly involved due to its critical role in neck movement and stability [3]. Myofascial pain is estimated to account for 54% of chronic head and neck pain, with approximately 34.7% of cases involving the upper trapezius muscle. These MTrPs contribute not only to pain and functional limitations but also to changes in surrounding blood vessels and metabolic processes [4].

MTrPs are defined as highly sensitive points within taut muscle fibers that are painful upon pressure and can induce referred pain and involuntary phenomena. Symptoms typically include muscle stiffness, spasms, and restricted movement in adjacent joints. MTrPs are also associated with central nervous system changes and autonomic nervous system activation, which are indicators of prolonged muscle fatigue. Biochemical changes accompany the formation of MTrPs, including excessive secretion of acetylcholine and reduced acetylcholinesterase activity. These changes precede the development of tight muscle bands, leading to sustained muscle contraction and pain [5,6].

Various therapeutic approaches have been explored to manage mechanical neck pain and myofascial pain syndrome. Stretching exercises are known to correct improper postures, whether during sleep or work. These exercises, especially when combined with light stretching, help restore full range of motion and muscle strength, alleviating pain [7]. Additionally, extracorporeal shock wave therapy (ESWT) has gained popularity as a non-surgical method for addressing musculoskeletal disorders. Studies have shown that ESWT can positively influence the inflammatory phase by stimulating stem cell regeneration, reducing neurotransmission in the affected area, and enhancing fibroblast activity, which supports tissue healing [8].

Several studies have investigated the effectiveness of interventions for managing MTrPs in mechanical neck pain. For example, Anwar et al. (2022) examined the combined effectiveness of extracorporeal radial shock wave therapy (rESWT) and ultrasound-guided trigger point injection of lidocaine in patients with upper trapezius myofascial pain syndrome. This experimental study, involving 45 participants aged 20–65, concluded that radial shock wave therapy combined with lidocaine injection was more effective than either treatment alone in reducing pain and stiffness in the upper trapezius muscle [9]. Similarly, Chunfeng Xia

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et al. (2024) compared ESWT and manual therapy (MT) in patients with cervicogenic headache caused by active trigger points in the sternocleidomastoid muscle. Their randomized controlled trial of 42 patients concluded that both treatments were equally effective in pain relief, functional recovery, and muscle stiffness reduction, suggesting that ESWT can serve as an alternative to MT for such cases [10].
In another study, Abdelhamid et al. (2020) compared myofascial trigger point release (TPR) and instrument-assisted soft tissue mobilization (IASTM) using a massage blade (M2T) in patients with mechanical neck pain and MTrPs in the upper trapezius muscle. Their randomized clinical trial demonstrated that both TPR and IASTM effectively reduced pain and improved the range of motion for patients with mechanical neck pain [11]. Furthermore, Kvalvaag et al. (2017) investigated the effectiveness of rESWT combined with supervised exercises in patients with subacromial shoulder pain. While this study primarily focused on shoulder pain, it highlighted the potential of rESWT to improve outcomes in patients with musculoskeletal disorders, particularly those with rotator cuff calcification [12].
Despite these advancements, current research often overlooks the critical role of myofascial trigger points in the management of mechanical neck pain. This study aims to address this gap by focusing on MTrPs to develop more effective treatment and rehabilitation strategies for patients suffering from mechanical neck pain. This study seeks to explore the synergistic effects of stretching exercises and radial shock wave therapy on myofascial trigger points in patients suffering from mechanical neck pain. By examining this combined intervention, the research aims to assess improvements in pain levels, range of motion, and overall functional performance. Through this investigation, the study aspires to contribute valuable insights into effective treatment strategies for managing mechanical neck pain and enhancing patient outcomes.

Methods

Study Design and participants

The researcher adopted an experimental approach utilizing a one-group design, with a measurement framework that included both pre-test and post-test assessments. The study was conducted on a single male patient, randomly selected from Al-Hilal Center, who presented with mechanical neck pain accompanied by four myofascial trigger points. The participant was 38 years old, measured 1.70 meters in height, and weighed 80 kilograms.

Therapeutic Program

The therapeutic program consisted of twelve (12) sessions conducted over four weeks, with a frequency of three (3) sessions per week, scheduled on alternate days. It incorporated radial shockwave therapy, delivered in four sessions at a rate of once per week, alongside stretching exercises, which were administered in eight sessions on the remaining treatment days.

Measurement Tools

The tools used to measure the study variables included the Numeric Pain Rating Scale (NPRS), which was utilized to assess pain intensity at the trigger points; a goniometer, employed to measure cervical range of motion; manual muscle test grades, applied to evaluate neck muscle strength; and the Functional Pain Scale, used to comprehensively assess neck performance in daily activities.

Data Analysis

For data analysis, the researchers relied on the improvement ratio to evaluate the study outcomes (see Table 1).

Results

The table (1) revealed significant enhancements across multiple domains, underscoring its effectiveness in terms of pain perception, the Numerical Pain Scale Index showed a marked decrease in average pain levels, dropping from 5 to 2, This substantial reduction reflects a 60% improvement, indicating that patients experienced meaningful alleviation of pain, The assessment of Range of Motion (ROM) demonstrated an overall improvement of 26.74%.
Specific movements showed notable increases: downward flexion improved by 29.82%, moving from 57° to 74°, while upward extension saw an 18.42% increase, rising from 38° to 45°, Lateral flexion improved by 20.58% to the right and 21.8% to the left, indicating enhanced lateral mobility Additionally, rotational movements increased significantly, with right rotation improving by 29.31% and left rotation by 34% Muscle strength assessments revealed an overall improvement rate of 22.5% Key muscle groups exhibited notable gains, with flexors and extensors both showing a 20% increase in strength. Lateral flexors showed a modest improvement of 10%, suggesting areas for further targeted intervention, while rotators demonstrated a favorable 20% enhancement on both sides. Finally, the Neck Functional Pain Index illustrated a remarkable improvement, with scores decreasing from 3 to 1. This change represents a 66%

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enhancement in functional capability, allowing patients to engage more fully in daily activities without discomfort.

Table 1. Pre- and post-measurements and the percentage of improvement for the study sample table

Variable	Pre-Test	Post-Test	Normal	% Improvement rate
Numerical Pain Scale Index	5	2	0	60%
Range of Motion (ROM):				26.74%
- Flexion (Downward)	57°	74°	80°	29.82%
- Extension (Upward)	38°	45°	50°	18,42%
- Lateral Flexion (Right)	34°	41°	45°	20.58%
- Lateral Flexion (Left)	32°	39°	45°	21.8%
- Rotation (Right)	58°	75°	80°	29.31%
- Rotation (Left)	53°	70°	80°	34%
Muscle Strength				22.5%
- Flexors (Downward)	4	4+	5	20%
- Extensors (Upward)	3+	4	5	20%
- Lateral Flexors (Right)	3+	4-	5	10%
- Lateral Flexors (Left)	4-	4	5	10%
- Rotators (Right)	4-	4+	5	20%
- Rotators (Left)	3+	4	5	20%
Neck Functional Pain Index	3	1	0	66%

Discussion

Our recent study investigated the effects of stretching exercises combined with radial shock wave therapy (ESWT) on patients with Myofascial Trigger points. The results were promising, showing a substantial reduction in pain and noticeable improvements in functional ability. This aligns well with the broader literature on ESWT, which highlights its potential as a valuable non-pharmacological intervention. Participants in our study reported a remarkable 60% reduction in pain levels, along with significant enhancements in range of motion (ROM) and muscle strength. These findings resonate with the scoping review conducted by Paoletta et al. [13], which synthesized evidence from 19 studies. Their review underscored the beneficial role of ESWT in improving clinical and functional outcomes for patients with MPS, although evidence supporting its efficacy for Fibromyalgia (FM) remains limited.

Further supporting our findings, Zhang et al. [14] conducted a systematic review and meta-analysis that demonstrated ESWT's effectiveness in alleviating pain compared to sham treatments. However, they noted that it did not surpass conventional therapies such as dry needling or trigger point injections. This suggests that while ESWT is effective, it may be best utilized as an adjunct to established treatment methods rather than as a standalone solution. Comparative studies on ESWT versus other treatment modalities provide additional context. Yalçın [15] found that combining ESWT with exercise therapy yielded superior results in pain reduction and functional improvement compared to kinesiological taping (KT) alone. This mirrors our own findings, where the integration of stretching exercises with ESWT led to significant enhancements in pain perception and mobility. Moreover, a study by Scaturro et al. [16] compared the efficacy of ESWT with mesotherapy. Their results indicated that ESWT was more effective in reducing pain and improving functional capacity. This further supports our emphasis on the importance of combining various therapeutic approaches to optimize patient outcomes.

The collective evidence suggests that ESWT, particularly when used alongside other treatment strategies, can significantly enhance pain management and functional outcomes in patients suffering from MPS. Given the growing concerns regarding the long-term use of medications like NSAIDs, which can carry risks of adverse effects, the non-pharmacological nature of ESWT becomes increasingly appealing. However, the lack of substantial evidence regarding ESWT's efficacy in treating FM, as highlighted by Paoletta et al. [13], underscores the urgent need for further research. Future studies should aim to clarify the mechanisms by which ESWT modulates pain and explore its long-term effects on both MPS and FM.

Conclusion

In conclusion, our findings contribute to the expanding body of literature supporting the use of ESWT as an effective intervention for Myofascial Trigger points. While it may not replace conventional treatments, it offers a valuable adjunctive option that enhances patient care. Continued exploration of ESWT's role in managing myofascial pain, alongside other therapeutic modalities, is essential for optimizing treatment protocols and improving patient outcomes.

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Conflict of interest. Nil

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