

Effectiveness of Myofascial Release Along with Conventional Physiotherapy for Chronic Neck Pain Patients: A Randomized Controlled Trial

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ABSTRACT

Background: Chronic neck pain ranks as the fourth most common cause of disability globally. However, the treatment for this condition is expensive and lacks substantial proof of its efficacy.

Objectives: The study aimed to identify the effectiveness of myofascial release (MFR) on the upper trapezius and scalene muscles for chronic neck pain.

Methods and Materials: The study was a double-blind, randomized controlled trial. A total of 40 individuals with persistent neck pain were allocated randomly to an experimental and a control group. The trial group provided MFR along with conventional physiotherapy. The control group got just conventional physiotherapy. The total number of therapy sessions was nine, with a frequency of three sessions per week for duration of three weeks. The visual analogue scale (VAS) was used to measure pain, universal goniometer to measure range of motion (ROM), and the neck disability index (NDI) to measure neck function and disability.

Results: The experimental group revealed significant differences ($p < 0.05$) and had a positive correlation between the pre- and post-NDI scores. Statistically significant changes ($p < 0.05$) were seen in pain intensity and ROM. The results also showed that paired t-test within group analysis for NDI has positive effects on both groups. Patients' pain intensity and NDI scores improved considerably compared to the control group.

Conclusion: Myofascial release therapy has shown to be beneficial in lowering pain intensity and increasing ROM in different directions for individuals with chronic neck pain.

Keywords: Chronic Neck Pain, Myofascial Release, Myofascial Release Therapy, Physical Therapy

Introduction

Neck pain is arguably one of the more frequently experienced ailments observed in healthcare facilities [1]. It is a multifaceted

condition that involves biological, psychological, and social factors and is worsened by movements or prolonged positions of the neck [2]. Chronic neck discomfort persists for a minimum of three months and may or may not extend to one or both upper limbs [3]. A majority of people, over 80%, will have neck discomfort at some point in their lives. All over the world, neck

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pain prevalence ranges from 6% to 39% [4]. The prevalence of neck pain is greater (15%) in females compared to males [5]. Chronic neck pain ranks as the fourth most common reason for disability globally and significantly affects people, their families, communities, and healthcare systems [3].

In the United States of America, neck pain is prevalent in 41.5% of the population, making it the eighth leading cause of disability. In the United Kingdom, the frequency of neck pain is 34% [6]. In Australia, the prevalence of neck pain was 27.1% [7]. Neck discomfort is prevalent across many occupational categories, affecting around 11 to 14% of workers and leading to limitations in their daily activities [8]. In Bangladesh, there has been lack of relevant study on prevalence of neck pain among the general Bangladeshi population. There was only one study, which focuses on the link between COVID-19 and neck pain, suggesting that COVID-19 infection is associated with neck pain. Their results forecast a possible upcoming wave of neck pain burden among the general Bangladeshi population [9].

Myofascial release is a form of manual massaging method used to loosen connections between the skin, muscles, and bones to stretch the fascia, intending to minimize discomfort, increase range of motion (ROM), and body balance [10]. In conjunction with maintaining routine function and muscle length, these strategies also have the benefits of minimizing pain in the muscles, releasing stress on joints, lowering neuromuscular hyperactivity, expanding the musculotendinous junction's extensibility, enhancing neurological efficiency, and resolving the imbalance of muscles [11]. Additionally, it reduces muscle tension, weakness, fatigue, and autonomic abnormalities [12]. Myofascial trigger points (TrPs) are frequently present in individuals with neck discomfort; hence, myofascial release therapy (MRT) may be a useful therapeutic approach [1].

Due to the existing lack of clarity on the most effective physiotherapy intervention, more study is required in this field to explore the combination of various approaches in patients with a particular clinical profile. Myofascial release may decrease active TrPs, enhancing the flexibility and function of the fascia. We hypothesized that an active intervention targeting the myofascial release of the upper trapezius and scalene muscles associated with chronic neck discomfort would enhance cervical ROM, eliminate pain, and improve overall neck function. The objective of this research was to investigate the impact of a nine-session active intervention using myofascial release on the examination, pain levels, ROM, and functionality of patients suffering from chronic neck discomfort.

Methods

Design and Ethics

The investigation adopts a double-blind, randomized controlled methodology. From March 2021 until May 2022, the ethical requirements of the World Health Organization (WHO), Bangladesh Medical Research Council (BMRC), and Centre for the Rehabilitation of the Paralysed (CRP) were adhered by. Prior to participation, patients were informed about the research aims and protocol and provided signed informed consent. Administrative entities of the CRP ethics committee of Bangladesh Health Professions Institute (BHPI) and the Institutional Review Board (IRB) authorized the project. The

registration number is CRP/BHPI/IRB/11/2021/539. In addition, the trial was registered by Clinical Trials Registry- India (CTRI: REF/2021/12/049572).

Population

Community participants who came to CRP to seek physiotherapy rehabilitation for their severe persistent neck pain were recruited. Patient eligibility criteria were: age between 20 and 60 years, both genders, chronic neck pain for at least 3 months, and being diagnosed with mechanical neck pain [3,13]. Subjects were excluded if they had previous neck surgery, upper motor neuron disease, a red flag of neck pain, spinal cord injury, malignancy, congenital torticollis, and cognitive impairments that prevented them from following instructions [14-16].

Randomization

Participants were randomly allocated to experimental or control groups. Patients who matched and were satisfied with the inclusion criteria were randomly recruited from the outpatient musculoskeletal unit of the physiotherapy department, CRP. The patients, assessor and physiotherapist were blinded here. Initially, one trained assessor was tasked to assess the patient's condition and collect pre-test information about the patients. Post-investigation, a different trained assessor was tasked to evaluate patient's condition to ensure fair judgment and maintenance of proper blinding process. Double-blinding was used in this investigation. The patients and physiotherapist, who provided interventions, are unaware of the group allocation. The trial and control group received interventions from two different physiotherapists and seek the therapy from the same physiotherapist throughout the nine sessions. Initially, the assessor collected pretest data from 40 participants which ensured all the participants bear the same baseline characteristics. It was also confirmed that they were not taking any other therapies outside of CRP or medications during the trial. It was ensured that all the participants involved were of similar socioeconomic status and maintained more or less similar lifestyles based on information on record. After sampling, the researcher randomly allocated individuals to trial and control groups to increase the internal validity of the thesis. Figure 1 depicts the research design and group distribution.

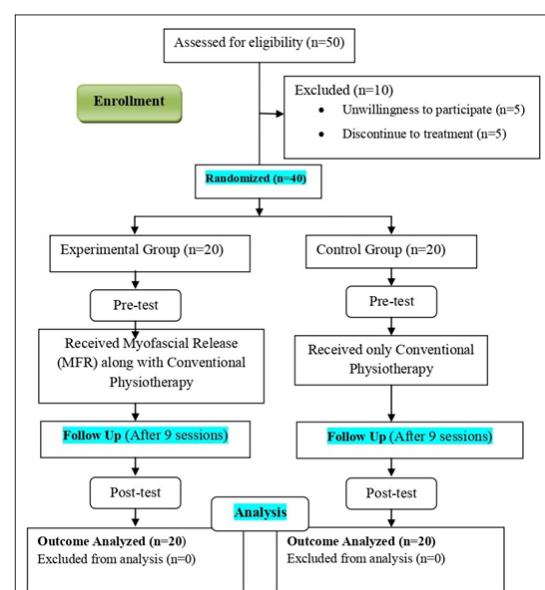


Figure 1: Flowchart of participants and group allocation

Outcome Measurements

An impartial assessor blinded to the patient allocation group assessed baseline and intervention program measurements. Participants were instructed to avoid analgesics and muscle relaxants for 24 hours before the assessment. Participants were told to continue their current medication and exercise routine and not start any new ones throughout the trial.

A blinded assessor with over 5 years of clinical expertise in the scalene and upper trapezius muscles examined MFR bilaterally [17]. Different individuals received points in random order after a 2-minute muscular rest. These criteria were used to evaluate MFR, including a hypersensitive area in a palpable skeletal muscular spasm. Patients were asked whether they felt discomfort locally or elsewhere and if it triggered any familiar or unexpected sensations [17]. Spasm was active when local and referred pain matched clinical pain symptoms and was known to individuals.

The visual analogue scale (VAS) was used to measure pain intensity, which was comprised of a 10-centimeter line, with 0 indicating the absence of pain and 10 indicating the most severe agony possible [18]. We instructed patients to indicate the intensity of their discomfort on a regular basis. As well, ROM was evaluated with a universal goniometer by a physiotherapist [11].

Another study showed that the neck disability index (NDI) scale measured the disability status and function of the neck [19]. It is a reliable, valid, and responsive measure of self-reported impairment for neck pain patients [20]. Subscales included symptoms, pain intensity, personal care, lifting, reading, headaches, attention, work, driving, sleeping, and leisure. The capacity to handle daily life was normalized at each point to establish how neck discomfort has impacted it: 30-48% is mild, 50-68% is severe, and 72% or more is total.

Intervention

Patients in the experimental group received myofascial release therapy and traditional physiotherapy based on their pain scale. MFR procedures were conducted three times a week, totaling nine. In the trial group, each 30-minute intervention session included MFR (5 minutes), Mckenzi (5 sets, 10 repetitions), Maitland concepts (1-3 minutes, 6 sets), Mulligan concepts (2-4 minutes, 6 sets with 10 repetitions), stretching and strengthening exercise (5 minutes), and electrotherapy (10 minutes) based on patient needs.

Myofascial release therapy for the scalene and trapezius muscles was given by a physical therapist at every gathering. The therapist stood behind the chaired patient and will determine the trigger point and patient posture (sitting) using gentle and manual pressure. The thumb (or strong finger) was pushed squarely on the trigger point to provide bearable, painful, prolonged pressure. For reinforcement, a thumb or finger from the opposite hand was added to enhance pressure. As much pressure was applied for 1.5 minutes. For persistent trigger point soreness, the technique was repeated until complete release. A 5-year-experienced physical therapist conducted MRF with pincer compressing and stripping for five minutes [2,21].

Patients assigned to the control group received traditional physiotherapy for persistent neck discomfort. Following a regimen of 3 sessions each week for a duration of 3 weeks, the cumulative number of sessions amounted to 9. Subsequently, the assessor collected data from the patients once more as a post-test. Following the conclusion of the research, the same assessor, who was unaware of the details, repeated the outcome measures. We advised patients not to reveal their training program.

Data analysis

The statistical analysis was conducted using IBM's Statistical Program for Social Science (SPSS) version 22. Paired and independent t-tests were used to evaluate pain, neck ROM, and NDI within and between groups. Two-sided 95% confidence intervals were generated. A p-value < 0.05 was deemed significant.

Results

The randomized controlled trial finally enrolled 40 patients as a sample. All patients completed the trial. This study has shown that MRF along with conventional treatment relieved pain, increased ROM, and decreased impairment in patients with chronic neck pain. Table 1 shows the research participants' initial clinical characteristics. Baseline characteristics were similar across groups. All individuals tolerated the intervention well, as it was safe from complications. All baseline primary and secondary outcome indicators indicated no significant differences between groups. Participant's severity of pain feeling was measured at pre- and post-intervention outcomes at different positions, including long-time sitting, lying, sleeping, sitting, standing, walking, traveling, bending, and weight lifting positions.

Table 1: Sociodemographic information's of the participants

	Control Group	Experimental Group	P value
Sex %(n) (Men; Women)	30%(12); 20%(8)	37.5%(15); 12.5%(5)	-
Age (years) (Mean ± SD)	42.90 ± 14.98	41.85 ± 10.63	0.172
BMI (kg/cm ²) (Mean ± SD)	24.4 ± 2.74	23.85 ± 2.26	0.945
Duration of symptoms (Mean ± SD)	10.95 ± 9.7	7.50 ± 5.95	1.86
Dominant hand of participant (%)			-
- Right hand	42.5	45	
- Left hand	7.5	5	

Type of work (%)			-
- Static work	2.5	2.5	
- Minimal work	17.5	15.0	
- Moderate work	10.0	17.5	
- Heavy work	15.0	15.0	
- Not applicable	5	0.0	
Type of sleep (%)			-
- Supine lying	25.0	17.5	
- Prone lying	2.5	0.0	
- Side lying (Right)	17.5	12.0	
- Side lying (Left)	5.0	1.0	
Cases of pain (%)			-
- Heavy weight lifting	7.5	12.5	
- Bad working posture	17.5	17.5	
- Bad sleeping posture	7.5	10.0	
- Others	17.5	10.0	
Side of neck pain (%)			-
- Right	32.5	25.0	
- Left	12.5	20.0	
- Middle	2.5	0.0	
- Both	2.5	5.0	
Pain exaggerated by motion (%)			-
- Neck forward bending	32.5	17.5	
- Neck backward bending	5.0	10.0	
- Turning (Right)	10.0	7.5	
- Turning (Left)	0.0	12.5	
- Raising from lying	2.5	2.5	
NDI (Mean ± SD)	53.9 ± 7.0	33.6 ± 8.5	0.000*

The study demonstrated that after completing the trail through providing interventions, post-test values of pain were significantly reduced in all positions compared to the pre-test intervention values. Table 2 illustrates the pain intensity paired sample t-test results for both the control and experimental groups at pre- and post-test, and participants felt pain in varied positions. Long-term sitting positions caused substantial discomfort in the experimental group ($p < 0.05$), with a mean ± SD of 3.75 ± 1.75 and a paired t-value of 13.50. Significant pain feeling during lying position was seen in the control group ($p < 0.05$, mean ± SD = 3.2 ± 1.46 , paired t-value = 13.92). In contrast, the experimental group showed more severe discomfort during lying position ($p < 0.05$, mean ± SD = 3.2 ± 1.45 , paired t-value = 13.92). As such, both groups mattered. Significant pain feeling in sleeping position was seen in the control group ($p < 0.05$, mean ± SD = 3.2 ± 1.58 , paired t-value = 12.87). In contrast, the experimental group showed a substantial increase in pain during sleep ($p < 0.05$, mean ± SD = 3.2 ± 1.45 , paired t-value = 12.88). So, both groups mattered. Significant pain felling while in sitting position was seen in the control group ($p < 0.05$, mean ± SD = 3.05 ± 1.32 , paired t-value = 14.62). In contrast, the experimental group showed more severe discomfort during sitting ($p < 0.05$, mean ± SD = 3.04 ± 1.31 and paired t-value = 14.60). So, both groups mattered. In the experimental group, only standing pain feeling was significant ($p < 0.05$), with mean ± SD = 2.88 ± 1.81 and paired t-value = 10.02.

Table 2: Paired t- test within group analysis for pain intensity and range of motion

Pain intensity	Control Group			Experimental group		
	Mean ± SD	Paired t value	p value	Mean ± SD	Paired t value	p value
Pain during sitting	3.75 ± 1.7	13.55	.059*	3.75 ± 1.75	13.50	.023*
Pain during lying position	3.20 ± 1.46	13.92	.051*	3.2 ± 1.45	13.92	.000*

Pain during sleeping	3.20±1.58	12.87	.030*	3.2±1.58	12.88	.001*
Filling pain during sitting	3.05±1.32	14.62	.045*	3.04±1.32	14.62	.015*
Pain during standing	2.87±1.81	10.02	.067	2.88±1.81	10.02	.026*
Pain during walking	2.9±1.88	9.77	.069	2.9±1.88	9.77	.057
Pain during travelling	3.57±1.82	12.40	.077	3.58±1.82	12.30	.062
Pain at forward bending	3.42±1.72	12.58	.089	3.43±1.72	12.58	.072
Pain during weight lifting	3.78±1.82	13.13	.084	3.63±1.80	13.10	.067
Range of motion (ROM)	Control group			Experimental group		
Pair sample t-test	Mean ± SD	Paired t value	p value	Mean ± SD	Paired t value	p value
Cervical spine was Flexion	-9.90±2.1	-20.5	.078	8.6±2.7	13.9	.001*
Cervical spine was Extension	-9.10±1.6	23.8	.021*	8.3±1.7	21.4	.016*
Cervical spine was right side flexion	-8.30±2.0	-18.3	.097	7.0±1.8	17.4	.068
Cervical spine was left side flexion	-7.70±1.5	-22.8	.100	6.7±1.3	22.9	.023*
Cervical spine was right side rotation	-10.8±2.4	-20.0	.088	8.7±1.7	22.7	.057
Cervical spine was left side rotation	-10.3±1.7	-26.8	.982	7.9±1.7	20.4	.030*

(* p < 0.05 level of significance)

The ROM of the experimental group showed substantial cervical spine flexion ($p < 0.05$), with a mean $\pm$ SD (8.6 $\pm$ 2.7) and a t-value of 13.9. In cervical spine extension, both control and experimental groups showed significant differences ($p < 0.05$), with the control group having a mean $\pm$ SD (-9.10 $\pm$ 1.6) and a t-value of 23.8. In comparison, the experimental group had a mean $\pm$ SD (8.3 $\pm$ 1.7) and a 21.4 t-value. In the experimental group, cervical spine ROM in left side flexion was significant ($p < 0.05$), with a mean $\pm$ SD (6.7 $\pm$ 1.3) and a t-value of 22.9. The experimental group showed substantial cervical spine ROM in left side rotation ($p < 0.05$), with a mean $\pm$ SD (7.9 $\pm$ 1.7) and a t-value of 20.4 (Table 2).

The experimental values before and after NDI are correlated with a Pearson correlation coefficient of 0.818 and a corresponding p-value of 0.019. The paired t-test within-group analysis for NDI in both the control and experimental groups was effective. It also described that independent t-test between group analyses for NDI, the means difference was 22.2, F-value 1.71 and t-value was 10.6 ($p < 0.05$). The study illustrates the correlation

coefficient [r], which quantifies the linear association between the experimental pre-NDI and post-NDI variables. Given that "r" is positive and the p-value is less than 0.05, it can be concluded that the experimental data before and after NDI exhibit a significant positive correlation.

Discussion

This research examined how myofascial release and traditional physiotherapy impacted the upper trapezius and scalene muscles in chronic neck pain patients. After the intervention, the experimental group patients had much less pain in varied situations and an increased ROM of the cervical spine. Patients' pain intensity and NDI scores improved considerably compared to the control group. Rodríguez-Huguet investigated the effectiveness of MFR compared to a physiotherapy multimodal program that includes ultrasound (US), transcutaneous electrical nerve stimulation (TENS), and massage for the treatment of patients with neck pain [22]. Both the physiotherapy and MRF groups showed an improvement in pain and pressure pain thresholds (PPTs) of the upper trapezius and splenius

capitis myofascial TrPs. However, the improvement was more significant in the MFR therapy group. In general, MFR therapy demonstrated a 20% greater improvement in PPTs compared to physiotherapy-based multimodal regimens.

In this study, the patients of the experimental group aged between 24-61 years and the control group aged between 21-69 years, with a mean age of 41.85 ± 10.63 and 42.90 ± 14.98 years respectively which indicating that neck pain is most common in the second to third decade of life. We included working age groups between 20 and 60 years old since many prevalence studies have demonstrated a rise in neck pain among this population [23,24]. This study found that both groups had normal BMI (62.5%) and most of the participant was job holder in both groups. There is a strong link between neck pain and age, BMI, and level of physical work. BMI classifies the patients in the research as borderline overweight for Indian and Asian populations [25].

The results of the study revealed that among the 40 participants, the majority (67.5%) of the participants were male. In contrast, neck pain was more common in women than in men [26]. Another study found that about 85% of the patients were women [2]. The research found that 87.5% of participants were right-handed and 12.5% left-handed. Some chronic neck pain patients had experience pain at the center and both sides of the neck, whereas 57.5% only experienced pain on the right side. The dominant side's increased pain referral rate may have been due to challenging work postures, repeated precision-demanding handgrips, and overuse [27].

After nine sessions of interventions, the experimental group found improvement in ROM of cervical spine. This research demonstrated substantial improvements in cervical flexion, extension, side flexion, and rotation, whereas the control group improved cervical extension. A similar study conducted by Rodríguez-Huguet MFR was found to be more effective in reducing pain, advancing ROM, and decreasing pain for participants with sub-acute and persistent neck pain, than traditional physical treatment, which included therapeutic ultrasound, electric stimulation, and frequent massage therapy [22].

The severity of the neck pain and cervical spine movement restrictions directly correlate with cervical postural change [22,28]. We found no research on MRF's effect on neck dysfunction in different body and head postures. This research found MRF treatment better for treating neck pain that occur in various positions. After MRF treatment, prolonged sitting, lying, sleeping, and standing postures show substantial benefits, whereas traditional physiotherapy only shows significant results in a few situations. Lau conducted a study to compare both MRF and general physiotherapy to treat persistent neck pain [29]. Both strategies were examined and the results showed that MRF was more effective in correcting the forward head position after five sessions ($p=0.014$).

This study highlighted that combining MRF with standard treatment decreased impairment. The research also revealed that only MRF worked to relieve pain and increased ROM. The

comparison indicated a considerable decrease in patient NDI. Group analysis showed a substantial disability decrease in both trials and control groups. A similar study by Arun, demonstrated that MFR group had more decreased NDI than conventional physiotherapy group [30]. Nonetheless, several drawbacks of the study such as limitation in the measurement technique and small sample size may limit the generalizability of the findings. However, the promising results could shed light on the benefits of MFR and influence current treatment protocols for chronic neck pain. The integration of MFR into routine clinical practice could potentially reduce the need for pharmacological interventions or lead to quicker rehabilitation times although more studies need to be conducted to validate this.

Limitations

Several limitations of the study should be noted. Due to the study's limited sample size, additional controlled clinical studies with longer duration should be conducted especially since chronic pain conditions often require long-term evaluation to understand the sustained impact of treatments. Further studies should also explore larger sample sizes through conducting multi-center trials. In the lack of a gold standard for TrPs measurement, we included active TrPs. We suggest future research with comparable patient features, emphasizing ergometry variables, to improve MRF outcomes in combination with standard chronic neck pain treatments. This thesis discovery might be used for the ICF core sets. Physiotherapists have seldom employed MRF outside of this research; however, this thesis may help them build chronic neck pain care recommendations. Future research can also investigate the potential physiological mechanisms by which MFR improves ROM and reduces pain, which could provide deeper insights into the treatment's effectiveness.

Conclusion

The findings of the research demonstrated that conventional physiotherapy and myofascial release techniques both alleviate discomfort. Nevertheless, MRF may be superior to the sole physiotherapy program. Active intervention for nine sessions was effective in reducing the presence of pain severity and increasing ROM in multiple directions among patients with chronic neck pain. The implications of the findings for patients suffering from chronic neck pain are encouraging. The result of the study indicated that MRF with conventional physiotherapy could be an effective therapeutic approach for patients with chronic neck pain. Nonetheless, further studies should explore the long-term effects of MFR, perhaps over a six-month to one-year period, to assess whether the benefits are sustained.

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Data Availability Statement

Data is available from corresponding author on reasonable demand and requirements.

Ethical Approval

The article paid attention in all ethical concepts.

Conflict of Interest: The authors declared no conflict of interest regarding the publication of this paper.

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References

- Shewail F, Abdelmajeed S, Farouk M, Abdelmegeed M. Instrument-assisted soft tissue mobilization versus myofascial release therapy in treatment of chronic neck pain: a randomized clinical trial. *BMC Musculoskeletal Disord.* 2023. 24: 457.
- Cabrera-Martos I, Rodríguez-Torres J, López-López L, Prados-Román E, Granados-Santiago M, et al. Effects of an active intervention based on myofascial release and neurodynamics in patients with chronic neck pain: a randomized controlled trial. *Physiotherapy Theory and Practice.* 2022. 38: 1145-1152.
- Hoy D, March L, Woolf A, Blyth F, Brooks P, et al. The global burden of neck pain: estimates from the global burden of disease 2010 study. *Ann Rheum Dis.* 2014. 73: 1309-1315.
- Côté P, Wong JJ, Sutton D, Shearer HM, Randhawa K, et al. Management of neck pain and associated disorders: a clinical practice guideline from the Ontario Protocol for Traffic Injury Management (OPTIMA) Collaboration. *Eur Spine J.* 2016. 25: 2000-2022.
- Fejer R, Kyvik KO, Hartvigsen J. The prevalence of neck pain in the world population: a systematic critical review of the literature. *Eur Spine J.* 2006. 15: 834-848.
- Sherman KJ, Cook AJ, Wellman RD, Hawkes RJ, Kahn JR, et al. Five-week outcomes from a dosing trial of therapeutic massage for chronic neck pain. *Ann Fam Med.* 2014. 12: 112-120.
- Hayes MJ, Smith DR, Taylor JA. Musculoskeletal disorders and symptom severity among Australian dental hygienists. *BMC Res Notes.* 2013. 6: 1-5.
- Skillgate E, Magnusson C, Lundberg M, Hallqvist J. The age-and sex-specific occurrence of bothersome neck pain in the general population—results from the Stockholm public health cohort. *BMC Musculoskeletal Disord.* 2012. 13: 1-9.
- Ali M, Mehjabin T. Prevalence and predictors of neck pain among Bangladeshi community dwellers during COVID-19 pandemic: analysis of a matched case-control data. *Ann Med Surg.* 2023. 85: 2304-2312.
- El-Gendy M, Lasheen Y, Rezkalla W. Multimodal approach of electrotherapy versus myofascial release in patients with chronic mechanical neck pain: a randomized controlled trial. *Physiotherapy Quarterly.* 2019. 27: 6-12.
- Gauns SV, Gurudut PV. A randomized controlled trial to study the effect of gross myofascial release on mechanical neck pain referred to upper limb. *Int J Health Sci.* 2018. 12: 51.
- Fernandez-de-las-Penas C, Alonso-Blanco C, Miangolarra JC. Myofascial trigger points in subjects presenting with mechanical neck pain: a blinded, controlled study. *ManTher.* 2007. 12: 29-33.
- Sciotti VM, Mittak VL, DiMarco L, Ford LM, Plezbert J, et al. Clinical precision of myofascial trigger point location in the trapezius muscle. *Pain.* 2001. 93: 259-266.
- Dweik A, Van den Brande E, Kossmann T, Maas AI. History of cervical spine surgery: from nihilism to advanced reconstructive surgery. *Spinal Cord.* 2013. 51: 809-814.
- D'amico E, Pasmantier M, Lee YW, Weimer L, Mitsumoto H. Clinical evolution of pure upper motor neuron disease/dysfunction (PUMMD). *Muscle Nerve.* 2013. 47: 28-32.
- Teichtahl AJ, McColl G. An approach to neck pain for the family physician. *Aust Fam Physician.* 2013. 42: 774-778.
- Travell JG, Simons DG. Myofascial pain and dysfunction: the trigger point manual. 2nd ed. Lippincott Williams & Wilkins. 1992.
- Miller MD, Ferris DG. Measurement of subjective phenomena in primary care research: the Visual Analogue Scale. *Fam Pract Res J.* 1993. 13: 15-24.
- Vernon H, Humphreys K, Hagino C. Chronic mechanical neck pain in adults treated by manual therapy: a systematic review of change scores in randomized clinical trials. *J Manipulative Physio ITher.* 2007. 30: 215-227.
- Agarwal S, Allison GT, Agarwal A, Singer KP. Reliability and validity of the Hindi version of the Neck Pain and Disability Scale in cervical radiculopathy patients. *Disabil Rehabil.* 2006. 28: 1405-1411.
- Kim SJ, Lee JH. Effects of sternocleidomastoid muscle and suboccipital muscle soft tissue release on muscle hardness and pressure pain of the sternocleidomastoid muscle and upper trapezius muscle in smartphone users with latent trigger points. *Medicine.* 2018. 97: 12133.
- Rodríguez-Huguet M, Gil-Salú JL, Rodríguez-Huguet P, Cabrera-Afonso JR, Lomas-Vega R. Effects of myofascial release on pressure pain thresholds in patients with neck pain: a single-blind randomized controlled trial. *Am J Phys Med Rehabil.* 2018. 97: 16-22.
- Nitsure P, Welling A. Effect of gross myofascial release of upper limb and neck on pain and function in subjects with mechanical neck pain with upper limb radiculopathy: A clinical trial. *Int J Dental Med Res.* 2014. 1: 8-16.
- Norkin CC, White DJ. Measurement of joint motion: a guide to goniometry. 5th ed. FA Davis. 2016.
- Mäkela M, Heliövaara M, Sievers K, Impivaara O, Knekt P, et al. Prevalence, determinants, and consequences of chronic neck pain in Finland. *Am J Epidemiol.* 1991. 134: 1356-1367.
- Johnston V, Souvlis T, Jimmieson NL, Jull G. Associations between individual and workplace risk factors for self-reported neck pain and disability among female office workers. *Appl Ergon.* 2008. 39: 171-182.
- Falla D, Jull G, Rainoldi A, Merletti R. Neck flexor muscle fatigue is side specific in patients with unilateral neck pain. *Eur J Pain.* 2004. 8: 71-77.
- Fernandez-de-Las-Penas C, Alonso-Blanco C, Cuadrado ML, Pareja JA. Forward head posture and neck mobility in chronic tension-type headache: a blinded, controlled study. *Cephalalgia.* 2006. 26: 314-319.

29. Lau KT, Cheung KY, Chan MH, Lo KY, Chiu TT. Relationships between sagittal postures of thoracic and cervical spine, presence of neck pain, neck pain severity and disability. *Man Ther.* 2010. 15: 457-462.
30. Arun B. Effects of myofascial release therapy on pain related disability, quality of sleep and depression in older adults with chronic low back pain. *Int J Physiother Res.* 2014. 2: 318-323.