EFFICACY OF MAITLAND MOBILIZATION AND PRT VERSUS MULLIGAN MOBILIZATION AND PRT ON PAIN AND CERVICAL ROM IN PATIENTS WITH MECHANICAL NECK PAIN

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Abstract

The aim of the current study was to determine the immediate effects of maitland mobilization and PRT versus SNAGs and PRT on cervical range of motion and pain in patients with mechanical neck pain. A pretest-posttest experimental study was conducted. 54 subjects, including both males and females, were randomly allocated into three groups. Group A had maitland mobilization and PRT in addition to conventional therapy, Group B received Mulligan mobilization (SNAGs) and PRT in addition to conventional therapy. A universal goniometer was used to quantify cervical range of motion, and the numeric pain rating scale (NPRS) was used to rate the intensity of pain, both pre- and post-intervention. There was significant improvement in both Group A and B. Statistical comparison of the result showed that Group A had exhibited better improvement in pain as compared to Group B. However, Group B appeared to be more effective in improving cervical ROMs than Group A in patients with mechanical neck pain.

Keywords: *Mechanical neck pain, Maitland Mobilization, Mulligan Mobilization, Sustained Natural Apophyseal Glides (SNAGs), Positional Release technique (PRT), Universal Goniometer, Numeric Pain Rating Scale (NPRS).*

1. Introduction

Mechanical neck pain (MNP) is a type of generalized neck pain that can be brought on by prolonged neck posture, movements, or muscle palpation. It can also appear with or without shoulder pain [1]. After low back pain, neck pain is the second most prevalent condition in both the general population and musculoskeletal practices [2]. 67% of people in the age of 20–69 report having neck pain [3]. One common condition associated with head and neck posture is mechanical neck pain (MNP), which is often referred to as "non-specific neck pain" [4]. Reduced range of motion (ROM), functional limitations, and neck pain are the hallmarks of mechanical neck pain [1, 5]. Long-term neck postures or movements often result in a subjective impression of stiffness, which may coexist with this limited range of motion and pain. People labour less productively as a result, which puts a financial strain on society [5]. It is estimated that the lifetime prevalence of mechanical neck pain in the general population is around 70% [7], with a point frequency of 20% [6]. According to the Global Burden of Disease Study, neck pain accounted for the fourth-highest number of years lived with disability [6, 7]. The multifactorial aetiology of mechanical neck pain (MNP), which is poorly understood, includes a number of factors, including poor posture, anxiety, depression, neck strain, and participation in employment or sports [8]. The body's various components are affected by every mechanical stress, injury, or asymmetry it endures, regardless of their connection to the initial cause. According to Janda, postural muscles typically get shorten in both healthy and unhealthy situations [9]. In the past, risk factors for cervical pain have been classified into distinct groups. These groups have been classified as risk factors associated with or unrelated to the workplace. These categories can be further divided into three fundamental subgroups: Three categories of risk variables exist: (1) physical, (2) psychological, and (3) individual (i.e., coping behaviour) [10].

A number of factors, such as the increased use of computers, prolonged periods of time spent sitting at a desk or computer, the use of chairs or desks that are not appropriate for the user's body type, beds that are not suitable for maintaining proper posture, and a lack of exercise, which can result in poor posture, can be blamed for the rise in the prevalence of neck pain in recent years. The link between muscle length, tension, and flexibility is thrown off when someone has bad posture, which interferes with normal biomechanics. As a result, muscle spasm and range of motion becomes excruciatingly restricted in all directions [5]. Disorders of the neural tissue, discs, bones, periosteum, muscles, ligaments, uncovertebral or intervertebral joints, and discs can all cause mechanical neck pain. People are more prone to musculoskeletal injuries as a result of abnormal muscle and ligamentous strength, endurance, and abnormal joint mobility with limitation in all cervical ranges of motion. These abnormalities can also result in abnormal body movement biomechanics, which can put an abnormal physical load on different tissues and set off a vicious cycle of pain and dysfunction [11].

One of the most prevalent symptoms affecting the cervical muscles, particularly the upper fiber of the trapezius, in individuals with mechanical neck dysfunction (MND) is the presence of myofascial trigger points (MTrPs) [11]. The overactivity of superficial neck flexors, such as the sternocleidomastoid and scalene muscles, is one of the most frequently reported muscle abnormalities in people with neck pain, and there is evidence to corroborate this observation [12]. In the impacted muscles, this hyperactivity may cause trigger points (TrPs) to become activated. A taut band of skeletal muscle that has a hypersensitive region that is uncomfortable when stimulated, causes referred pain, and causes motor abnormalities is known as a trigger point (TrP) [13].

According to a number of studies, manual therapy is a significant and the best course of action for treating and curing the symptoms of mechanical neck pain/discomfort [16].The phrase "mobilization/manipulation" refers to a "manual therapy technique comprising a continuum of skilled passive movements to the joints and/or related soft tissues that are applied at varying speeds and amplitudes, including a small amplitude/high-velocity therapeutic movement," according to the American Physical Therapy Association's Guide to Physical Therapist Practice (2001) [14]. Applying a passive oscillatory approach over the hypomobile vertebral level, Maitland mobilization is regarded as a legitimate treatment [1]. In order to address spinal discomfort brought on by stiffness and pain, Mulligan recommended using Sustained Natural Apophyseal Glides (SNAG), mobilization with movement, and Natural Apophyseal Glides (NAGs) [11]. Sustained natural apophyseal accessory glides, or SNAGS, include the patient attempts to actively move a painful or stiff joint through its range of motion whilst the therapist overlays an accessory glide parallel with the treatment plane [15]. According to Mulligan, a SNAG's ability to promote pain-free range of motion not only affects the local spinal level being mobilized but also the overall spinal functioning system [11].

The goal of manual treatment is to relieve tension in the soft tissue components of the neck. Positional release technique was proposed by Lawrence H. Jones (PRT). PRT is an osteopathic therapy method in which the part is positioned to maximize comfort, reduce tender point irritation, and to normalize the tissue associated with dysfunction. "Spontaneous release by positioning" was the original term for this technique; "stress and counterpressure" was added subsequently. Eventually, "positional release" became the term for it. In the therapy of both musculoskeletal and visceral dysfunctions, this approach pulls the affected muscles and joints out from behind their constriction and places them in a comfortable position [16, 11]. Therefore, the aim of the current study was to determine the immediate effects of maitland mobilization and PRT versus SNAGs and PRT on cervical range of motion and pain in patients with mechanical neck pain.

Methodology

Ethical approval: The institutional review board at Sanskriti University granted ethical approval for the study. The study followed the National Ethical Guidelines for Biomedical and Health Research involving Human Participants established by the Indian Council of Medical Research in 2017 and the Helsinki Declaration (2013).

Study design: A pre-post experimental study design was used for the study. Fifty-four subjects (21 females and 33 males) were recruited from Palwal Hospital, Palwal – 121102, Sohna. The eligibility of subjects with mechanical neck pain who were referred for physical therapy management from the Orthopaedic departments was assessed. The study was single-blinded, as the therapist knew the intervention was being delivered to the subject, but the subjects were not aware of it. With the aid of random allocation and simple random selection, the subjects were divided into three groups (Group A, B and C). The chit method was used for random allocation.

Selection Criteria: Both males and females, aged from 21 to 45, reported having non-specific neck pain as their main complaint. The pain had to be severe enough (more than two out of ten on a numerical pain scale) to allow for the demonstration of a clinically meaningful effect. Individuals who have had pain and stiffness for a minimum of two weeks, those whose symptoms worsen with mobility. The study comprised subjects who were willing to follow treatment and measurement regimens [15]. Subjects with a history of recent neck injuries or motor vehicle accident history; subjects with kyphosis, scoliosis, or any structural malformation of the spine; subjects with osteophytes observed in the cervical spine; subjects with indications of a specific or severe pathology, such as cancer, infection, inflammatory disease, or fracture; patients receiving any additional care for their mechanical neck pain. The study excluded those subjects with psychological issues [17,15].

Equipment used

A universal goniometer, hydrocollator unit, couch, chair, towel, paper, pen, NPRS [15].

Procedure

Subjects who met the inclusion criteria were included in the study. After being thoroughly informed about the study, each subject provided the informed consent. The therapist informed the subject that consent had been given in advance and that, in line with the need for therapy, the part to be treated should be exposed during the session. This study was done in Physiotherapy Outpatient Department of Palwal Hospital in Palwal, Sohna. Every subject chosen for the research underwent evaluation, first by an Orthopaedic surgeon and then by a physiotherapist. The subjects were divided into three groups: Group A (n = 18) received maitland mobilization and PRT along with conventional physical therapy; Group B (n = 18) received mulligan mobilization and PRT along with conventional physical therapy; and Group C (n = 18) received conventional physical therapy which include isometric exercises, hot packs, and stretching exercises.

For each subject, all outcome variables were evaluated at the beginning of the study in the following order: NPRS, Cervical ROMs i.e. the first movement was flexion, which was then followed by extension, lateral flexion toward right followed by left then rotation to the right and rotation to the left. There were three consecutive measurements for each measure. The subjects were given a minute of rest in between each test. 45 minutes of therapy were given to the subjects after baseline data was collected. Each outcome variables were measured at baseline and immediately post intervention (Figure.1). Analysis was done using the appropriate statistical tool to interpret the results.

Protocol

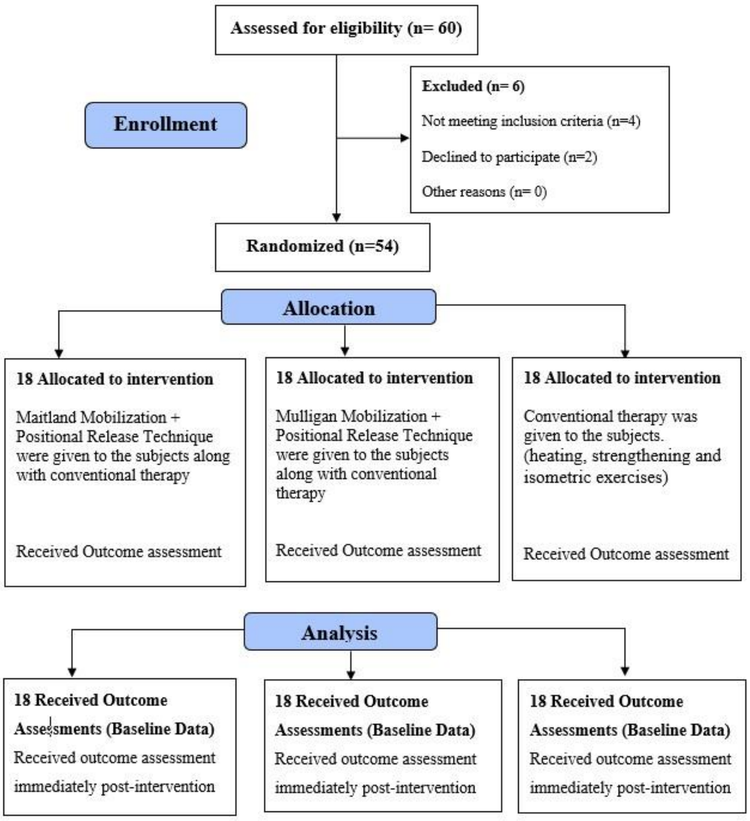

FIGURE 1: CONSORT FLOW DIAGRAM OF PARTICIPANTS

Outcome measures

Cervical Range of Motion

Universal goniometer

Cervical range of motion (ROM) (flexion, extension, lateral flexion and rotation) was measured with it. Cervical ROM can be evaluated with this valid and dependable instrument [11]. The good intra- and inter-rater reliability of the goniometer in determining cervical range of motion has been validated by several research [1].

Assessment Procedure

When executing any range of motion, the American Association of Orthopaedic Surgeons (AAOS) recommendations were adhered to. A simple protocol is provided here. The subject had to sit in a neutral position with their eyes facing front, their spine straight, their ankles, knees, and hips were positioned at the right angle, and their arms crossed across their chests to reduce any substitution from the thoracic area before starting each range-of-motion measurement. The subject was asked to perform the following movements from this neutral position: cervical flexion (chin towards sternum), cervical extension (looking up at the ceiling), cervical lateral flexion toward right side (bringing the right ear close to the right shoulder), cervical lateral flexion toward left side (bringing the left ear close to the left shoulder), Right side rotation (turn 90 degrees to right, or as close to it as possible), Left side rotation (turn 90 degrees to left, or as close to it as possible). The goniometer was placed above the subject's mastoid process for cervical flexion and extension, the stationary arm was positioned perpendicular to the base of the nose, and the motion arm aligned with it. The base of the goniometer was placed over C7 to allow for lateral bending, and both arms were aligned with the occipital prominence. For rotation the base of the goniometer was positioning over the occipital prominence and the arms were aligned with the midline of the nose. When the active motions were carried out from the nose and occiput, the motion arm of the goniometers tracked the landmark of interest. Each movement was performed once to ensure the subject understood the procedure, and the range was assessed three times with each tool. The mean value of the three efforts (measured in degrees) was used to evaluate the cervical spine range of motion [18].

Numeric pain rating scale (NPRS)

An eleven-point rating scale, with a range of 0 to 10, was used to measure the intensity of pain. Use scores 0 and 10 for "no pain" and "worst pain," accordingly. Using a scale with a point system to indicate the level of pain intensity, each subject was asked to rate their pain levels at their worst, best, and current points throughout the previous 24 hours [16]. Using the NPRS, a subject can score his/her pain on a range of 0 to 10, with 0 denoting no pain, 3 mild, 5 moderate, 7 severe, and 9+ denoting excruciating agony [5]. The NPRS is a reliable instrument with a high threshold/sensitivity for measuring pain [11].

Intervention

GROUP A - Maitland mobilization and positional release technique

Along with conventional therapy, eighteen subjects had Maitland mobilization to the cervical spine and positional release technique on the trapezius and sternocleidomastoid (SCM) muscle.

Maitland technique: The subject was in the prone position, and the therapist stood at the level of the head of the subject, placing his thumbs opposite each other at the level of the vertebra's facet or spinous process of the corresponding cervical vertebrae. A PA oscillating pressure was applied across the process of the hypomobile vertebra through the thumbs. Grades I and II were given for situations where pain came on before the motion barrier; grades III and IV were given for situations where the motion barrier was encountered before pain. Each joint mobilization frequency lasted around 30 seconds, and the oscillatory mobilization was performed at a speed of 2-3 oscillations per second under metronome control. Every mobilization had a one-minute break in between [1,15].

Application of PRT

Upper trapezius: Prior to the session, the therapist used the pincer palpation method to identify the trigger points in the upper trapezius muscle and marked them with dots on the skin. Tender spots were found along the top fibers of the trapezius while the subject was supine and the therapist stood on the side that was injured. Then the therapist applied the pressure by pinching the muscle in between the thumb and fingers. The therapist grasps the patient's forearm, abducts the shoulder to about 90°, and then adds a small degree of flexion or extension to fine-tune the subject's

head lateral flexion towards the side of a painful area. The body part's passive return to an anatomically neutral posture was then maintained for five minutes after the most comfortable position was retained for ninety seconds [11,16].
Sternocleidomastoid: The therapist was standing on the side that was injured while the subject lay in a comfortable supine position. Once the therapist had located the muscle's painful point, he rotated the subject's head in that direction, applied pressure with his thumb for ninety seconds to release the tension, and then passively moved the head back to its neutral position [11]. The PRT was repeated either for upper trapezius or sternocleidomastoid for 3 times with 20 seconds relaxation time as intervals between repetitions [11].

GROUP B - Mulligan mobilization and positional release technique
18 participants who received Mulligan SNAGs and positional release technique on trapezius and sternocleidomastoid (SCM) muscle along with conventional therapy.

Mulligan mobilization (Cervical SNAGs)

For limited flexion or extension: The subject asked to sit in a low back support chair with the therapist standing behind them, allowing the cervical region to be erect in a vertical position. To examine the subject's emotions (facial expressions) throughout the initial stages of the procedure, the therapist recommended having them sit facing a huge wall-mounted mirror. Gently apply a posteroanterior (PA) glide in line with the facet plane to the spinous process of any motion segment between C3-7. Place the medial border of the right thumb on the spinous process, and the pad of the left thumb perpendicular to the right thumb nail. The therapist used a sustained passive accessory intervertebral movement from the facet joint toward the eyeball. While maintaining the glide, the individual was asked to perform active flexion or extension, then apply overpressure at the end of the range before returning to the starting position. The therapist released the "glide" after the subject returned to their starting position for active movement. In the absence of symptoms, the subject applied overpressure to the limit of the restricted range of flexion, extension, rotation, and side bending. This application was repeated six times across three sets.

For limited rotation or side bending: The therapist stood behind the subject, who was sitting upright on a chair. The right thumb was supported by the back of the left thumb, and the posterior part of the facet marked the medial border of the right thumb's distal phalanx. The glide was applied laterally from the facet joint in the direction of the eyeball. The subject was instructed to deliberately rotate or bend to the painful side while continuing to glide, apply pressure until it reached its maximum, and then come back to the initial position. When the subject had moved back to the initial position for the active exercise, the therapist released the "glide." The subject exerted overpressure to the end of the limited range of side bending, rotations, flexion, and extension in the symptom-free condition. This application was repeated six times for three sets [1,11].

Group C - Conventional physical therapy
The regimen consisted of a moist heat pack for fifteen minutes, followed by isometric exercises for the same muscles that were held for six seconds each to

prevent muscle fatigue and stretching exercises for the neck flexors, extensors, and side bending muscles that were performed for ten repetitions in three sets [16].
In order to reduce pain and muscular spasm and promote tissue extensibility, each subject in the three groups received a hydrocollator pack for 15 minutes on the neck, upper trapezius muscle on both sides, and the tender point area. The temperature of the hydrocollator pack was appropriate for the designated location. Mackintosh sheet was used to gently cover the hydrocollator pack. At this point, the therapist asked the subject about the hydrocollator pack's temperature and his/her suitability towards the procedure [16].

Data Analysis

IBM Statistical Package for Social Sciences 27 (SPSS) was used to examine the collected data. The results of the Shapiro-Wilk test indicated that the data was evenly distributed. At baseline, all variables were compared between groups using a one-way ANOVA. Repeated Multivariate Measures All of the variables were compared between the three groups' pre- and post-intervention using ANOVA. Pairwise analysis was performed using post-hoc analysis for multiple comparisons (Tukey HSD).

Results

Subject characteristics: Table (1) showed the subject characteristics of the group A, B and C. There was no significant difference between groups in age, weight, height and BMI ($p > 0.05$).

Table 1. Basic characteristics of participants

Variables	Experimental Group A (N=18)		Experimental Group B (N=18)		Control Group C (N=18)	
	Mean	SD	Mean	SD	Mean	SD
AGE (in years)	32	7.21	32.2	6.85	32.33	7.37
HEIGHT (in centimeters)	167.87	11.1	165.2	7.53	165.93	9.12
WEIGHT (in Kilograms)	72.2	10.63	57.2	11.42	61.2	13.23
BMI	24.67	1.04	20.8	4.14	21.93	3.12

Note. Group A – Maitland Mobilization + PRT + Conventional Treatment; Group B – Mulligan Mobilization + PRT + Conventional Treatment; Group C – Conventional Treatment; SD – Standard Deviation.

Table 2. Comparison of Parameters Within and Between the Groups (Group A, B and C)

Outcome variables		Experimental Group A	Experimental Group B	Control Group C		
		Mean±SD	Mean±SD	Mean±SD	P value	F value
NPRS	Pre-NPRS	5.56±0.92	5.17±0.78	5.17±0.78	0.28	
	Post-NPTRS	2.39±1.09	2.94±0.80	4.28±0.89	0.001*	19.29
Flexion	Pre-Flexion	48.28±4.54	49.11±4.67	49.06±3.91	0.817	
	Post-Flexion	52.67±4.31	54.28±4.43	50.06±3.78	0.001*	4.67
Extension	Pre-Extension	49.17±2.74	49.67±4.51	49.11±3.49	0.882	
	Post-Extension	52.11±2.67	55.6±3.72	50.0±3.51	0.001*	12.98
Right-Side Bending	Pre- Bending	37.63±2.20	37.41±2.21	37.22±2.77	0.875	
	Post-Bending	40.56±2.09	43.06±1.92	38.33±2.82	0.001*	18.74
Left-Side Bending	Pre-Bending	36.61±2.63	37.72±2.44	37.50±2.99	0.432	
	Post-Bending	39.05±2.87	42.88±1.74	38.63±3.27	0.001*	13.44
Right-Side Rotation	Pre- Rotation	75.16±4.12	75.66±4.65	74.61±5.25	0.798	
	Post-Rotation	77.72±4.30	81.17±4.63	75.44±5.44	0.001*	6.43
Left-Side Rotation	Pre-Rotation	77.0±4.03	77.77±4.30	75.44±5.44	0.376	
	Post-Rotation	78.6±5.46	81.12±4.63	76.71±4.73	0.002*	6.79

Note. *Indicates significant difference in post-intervention than pre-intervention with p<0.05; NPRS: Numeric Pain Rating Scale; SD: Standard Deviation; Group A – Maitland Mobilization + PRT + Conventional Treatment; Group B – Mulligan Mobilization + PRT + Conventional Treatment; Group C – Conventional Treatment.

Within group comparison

There was a significant increase in neck ROM post intervention compared with that pre intervention in the groups A, B and C ($p < 0.001$). Group B showed the highest percent of improvement and was followed by group A, while group C showed the lowest percent of improvement (Table 2).

Table 3: Pairwise Mean Difference and Significance Value of Control Group and Experimental Groups (A & B)

Outcome variables		**Group A v/s Group C**		**Group B v/s Group C**		**Group A v/s Group B**	
		MD	P value	MD	P value	MD	P value
NumericPain Rating Scale	Post-NPRS	-1.889	0.001*	-1.333	0.001*	-0.556	0.187
Flexion	Post-Flexion	2.616	0.157	4.222	0.001*	-1.611	0.485
Extension	Post-Extension	2.111	0.190	5.611	0.001*	-3.50	0.008
Right-Side Bending	Post-Bending	2.222	0.160	4.722	0.001*	-2.50	0.006
Left-Side Bending	Post-Bending	0.416	0.890	4.250	0.001*	-3.83	0.006
Right-Side Rotation	Post-Rotation	2.278	0.339	5.722	0.002*	-3.44	0.095
Left-Side Rotation	Post-Rotation	2.556	0.277	6.056	0.002*	-3.50	0.095

Note. *Indicates significant difference in post-intervention than pre-intervention with $p<0.05$; NPRS: Numeric Pain Rating Scale; SD: Standard Deviation; Group A – Maitland Mobilization + PRT + Conventional Treatment; Group B – Mulligan Mobilization + PRT + Conventional Treatment; Group C – Conventional Treatment; MD: Mean Difference.

Between groups comparison

There was no significant difference between groups in all pre-intervention parameters ($p > 0.05$). There was a significant increase in neck ROM of group B compared with that of group A and C post-intervention ($p < 0.001$) and a significant increase in neck ROM of group A compared with that of group C post-intervention. There was a significant decrease in NPRS of group A compared with that of group B and C post-intervention ($p < 0.001$). (Table 3).

Discussion

This study determined the efficacy of Maitland mobilization and PRT versus Sustained Natural Apophyseal Glides and PRT on pain and cervical ROM in patients with mechanical neck pain. The findings of our current study showed that the participants' post-cervical range of motion and pain intensity (NPRS) were significantly improved by the Mulligan mobilization (SNAGs) and PRT along with conventional therapy given to the experimental group (Group B), and the Maitland mobilization and PRT along with conventional treatment given to the experimental group (Group A). Statistical comparison of the result showed that Group A had exhibited better improvement in pain as compared to Group B. Over the same period, however, Group B interventions appeared to be more effective in improving cervical ROMs than Group A and C in patients with mechanical neck pain.

The current study's results are consistent with Rajesh et al. (2014) report that Mulligan mobilization is more effective than Maitland and traditional exercises in improving cervical ROM in patients with mechanical neck pain. The study also examined the impact of mulligan mobilization on pain and function [15]. This outcome is also consistent with Kotb et al. (2020) findings, which indicated that SNAGs mobilization significantly improved lumbar spine range of motion and pain levels compared to Maitland mobilization [11]. These results also align with those of Ahmed et al. (2014) who found that in 49 males with chronic cervical pain, SNAGs mobilization with movement could improve range of motion and reduce discomfort/pain in the cervical spine [19]. Following SNAGs, a combination of mechanical and reflexogenic responses may relieve symptoms in the cervical spine. The rapid mechanical action of pain relief is based on the misaligned bone and SNAG's ability to move and correct it. Application of the sustained glide in cervical SNAG may cause repositioning of the superior facet by distracting the ipsilateral functional spinal unit, which, in turn, helps decrease pain during active ROM [20].

Cervical ROM and pain intensity significantly improved with positional release treatment plus the mulligan mobilization chosen for this investigation. Based on the available data, positional release treatment time of 90 seconds was selected for the current study. Because 90s time of treatment decreases gamma firing level and muscle spindle activity, it has been indicated by earlier studies to be used for PRT [21,22]. According to Bode's Pardo et al. (2013) patients with trigger points in the sternocleidomastoid and upper trapezius muscles can get more active cervical range of motion (ROM) with active trigger point therapy than with simulated therapy [22]. D'Ambrogio et al. (1997) reported that PRT can produce a normalization of muscle hypertonicity and flexibility of the restricted fascia that, in turn, improve ROM and circulation, decrease pain, and functional disability [23]. Wong et al. (2004) conducted a study on 49 subjects with bilateral hip tender points, they were divided randomly into 3 groups; group received PRT and group received stretching, strengthening and isometric exercises and the last group received PRT plus previous exercises. It was stated that pain and functional disability were improved in all groups with favor to PRT plus exercise group [24].

Lewis et al. (2001) demonstrated that all patients receiving PRT for low back pain experienced a reduction in pain and functional disability after PRT intervention. They recommended that further research be done to determine the effectiveness of PRT in treating pain and function, particularly in cases of low back pain [25]. Denise Deig recorded alterations in the upper trapezius fiber before and after positional release treatment (PRT) and discovered that PRT improves cervical range of motion and reduces discomfort in individuals with upper trapezius trigger point syndrome.

The improvement in results that was shown after PRT treatment may have been caused by a decrease in gamma discharge activity, which in turn suppressed the facilitated region of the spinal cord. Thus, between extrafusal and intrafusal muscle fiber, normal nerve conduction velocity can be restored [11].

According to the Korr model, a muscle's spindle activity may decrease with muscular shortening, allowing the central nervous system to reduce gamma discharge activity. This blocks the spinal cord's facilitated area. Korr's idea states that when the extrafusal fibers are shortened or positioned more easily, the gamma discharge is inhibited and the disparity between the intrafusal and extrafusal fibers decreases. The overactive muscle spindles cease to fire as a result, enabling the muscle to return to its normal resting length. This kind of passive approximation is known as positional release [26]. The impact of the sympathetic nervous system on local circulation, inflammatory response, and neurophysiologic control of an activity also plays a role in the effects of PRT. PRT improves circulation, lessens muscle spasms, trigger points, edema, and other mobility-limiting conditions [11,26]. Based on the results of the current study statistical analysis results supported the alternative hypothesis, demonstrating that mulligan mobilization (SNAGs) and PRT combined with conventional treatment is the most cost-effective and effective in reducing pain and improving cervical range of motions.

Conclusion

The study's findings demonstrated that mulligan mobilization (SNAGs) and Positional Release Technique (PRT) can help patients with mechanical neck pain by reducing pain and increasing range of motion. However, maitland mobilization has been found more effective for reducing pain when compared to mulligan mobilization whereas mulligan mobilization (SNAGs) has been found more effective in improving cervical range of motion when compared to Maitland mobilization.

Limitations

Firstly, the sample size was smaller, to start. Secondly, the study included participants between the age group of 21 and 45. As a result, the findings cannot be generalized across all age groups. Lastly, the duration of the observed increase in CROM and decrease in pain intensity cannot be determined because the present study only recorded the immediate effects.

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Declaration of conflict interest

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List of Abbreviations

MNP: Mechanical Neck pain

PRT: Positional Release Technique

SNAGs: Sustained Natural Apophyseal Glides

NAGs: Natural Apophyseal Glides

ROM: Range of Motion

NPRS: Numeric Pain Rating Scale

TrPs: Trigger Points

MTrPs: Myofascial Trigger Points

MND: Mechanical Neck Dysfunction

SFU: Spinal Functional Unit
SCM: Sternocleidomastoid

AAOS: American Association of Orthopaedic Surgeons (AAOS)

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