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Mulligan and Proprioceptive Neuromuscular Facilitation Techniques in the Treatment of Neck Pain: An Evidence-Based Evaluation

Boyun Ağrısının Tedavisinde Mulligan ve Proprioseptif Nöromüsküler Fasilitasyon Teknikleri: Kanıta Dayalı Bir Değerlendirme

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ABSTRACT

Neck pain is a worldwide common health problem that significantly affects quality of life. The aim of this review is to evaluate the efficacy of Mulligan mobilization and Proprioceptive Neuromuscular Facilitation techniques, which are physical therapy methods used in the treatment of neck pain, in the light of the existing literature and to provide evidence-based recommendations for clinical applications. Literature analysis indicates that both Mulligan mobilization and Proprioceptive Neuromuscular Facilitation techniques increase range of motion, reduce pain, and enhance functional performance. Additionally, these methods improve muscle strength, endurance, coordination, and proprioceptive control, thereby contributing to greater functional capacity. Although both techniques have been found effective in the management of neck pain, they appear to operate through different mechanisms of action. Further high-quality studies are needed to compare the long-term effects of these interventions.

Keywords: Neck Pain, Mulligan Mobilization, Proprioceptive Neuromuscular Facilitation, PNF

ÖZET

Boyun ağrısı, dünya çapında yaygın görülen, yaşam kalitesini önemli ölçüde etkileyen bir sağlık problemidir. Bu derlemenin amacı, boyun ağrısının tedavisinde kullanılan fizik tedavi yöntemlerinden Mulligan mobilizasyon ile Proprioseptif Nöromüsküler Fasilitasyon tekniklerinin etkinliklerini mevcut literatür ışığında değerlendirmek ve klinik uygulamalar için kanıta dayalı öneriler sunmaktır. Yapılan literatür incelemesinde Mulligan mobilizasyon ve Proprioseptif Nöromüsküler Fasilitasyon tekniklerinin eklem hareket açıklığını artırdığı, ağrıyı azalttığı, fonksiyonel performansı iyileştirdiği, kas kuvveti, endurans, koordinasyon ve proprioseptif kontrolü geliştirerek fonksiyonelliği artırdığı ortaya konmuştur. Her iki yöntemin de boyun ağrısı tedavisinde etkili olduğu ancak farklı etki mekanizmalarına sahip olduğu belirlenmiştir. Bu yöntemlerin uzun vadeli etkilerinin karşılaştırıldığı yüksek kaliteli araştırmalara ihtiyaç duyulmaktadır.

Anahtar Kelimeler: Boyun Ağrısı, Mulligan Mobilizasyon, Proprioseptif Nöromüsküler Fasilitasyon, PNF

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INTRODUCTION

Neck pain is an increasingly prevalent health issue worldwide. Studies indicate that approximately 71% of adults experience neck pain at some point in their lives (Fejer et al., 2006). As the second most common musculoskeletal condition following low back pain, the prevalence of neck pain in the general population ranges between 12.1% and 71.5% (Mauro et al., 2022; Parikh et al., 2019). Furthermore, 50% to 85% of individuals with neck pain report persistent symptoms, and in 47% of cases, the pain becomes chronic (Carroll et al., 2009; Côté et al., 2004). Chronic neck pain is often resistant to treatment, contributing to both direct and indirect healthcare costs, and leading to significant losses in workforce productivity (Haldeman et al., 2010; Kääriä et al., 2012). Burden of Disease study emphasizes the rising economic burden that neck pain imposes on healthcare systems (Vos et al., 2012).

Although neck pain may result from specific causes such as infection, trauma, or tumors, in many cases, no clear underlying etiology can be identified. Such cases are commonly referred to as "nonspecific chronic neck pain" or "mechanical neck pain" (Hoving et al., 2002). Sedentary lifestyles and psychosocial stressors have been shown to play a significant role in the development of mechanical neck pain (Hoy et al., 2010). Particularly, a sedentary lifestyle combined with a fast-paced and stressful daily routine may increase muscle tension in the cervical and thoracic regions, thereby triggering pain (Binder, 2007). Additionally, muscle weakness in the cervical region, reduced muscular endurance, and limitations in range of motion (ROM) are among the leading factors contributing to chronic neck pain (Javanshir et al., 2010; Jull et al., 2002; Lee et al., 2005). Chronic neck pain negatively affects daily living activities, recreational engagements, and occupational performance, resulting in diminished quality of life and increased healthcare expenditure (Saturno et al., 2003).

Conservative treatments for neck pain commonly include exercise, pharmacological therapy, electrotherapy, manual therapy, proprioceptive neuromuscular facilitation (PNF), mobilization, and manipulation techniques (Parikh et al., 2019). One of the mobilization methods, the Mulligan Mobilization Technique—also known as Mobilization With Movement (MWM)—is widely employed to alleviate musculoskeletal pain and improve joint mobility. In this technique, the therapist applies a sustained passive glide to the restricted joint while the patient performs the movement actively. This simultaneous application aims to facilitate joint mobility and reduce pain (Büyükturan et al., 2018; Ganesh et al., 2015; Hussain et al., 2016; Mulligan, 2015). Research has shown that Mulligan mobilization techniques are

effective in reducing pain in individuals with neck pain, while also improving Range Of Motion (ROM), muscle endurance, functionality, and quality of life (Duymaz, 2018; Geetanjali Devi & Dutta, 2015).

Proprioceptive Neuromuscular Facilitation techniques, on the other hand, activate neuromuscular mechanisms through the stimulation of proprioceptors. The underlying principle is that movements performed against maximum resistance can elicit stronger neuromuscular responses, thereby enhancing movement capacity and functional performance (Altuğ et al., 2019; Livanelioğlu et al., 2011). PNF techniques incorporate various muscle contractions—including isometric, concentric, and eccentric—to improve muscle strength, endurance, coordination, and ROM. Studies on individuals with neck pain have demonstrated that PNF techniques help reduce pain, improve functional performance, and increase ROM (Satria Nugraha et al., 2021; Suresh et al., 2023).

Although numerous studies have independently examined these two methods, there is a limited number of studies directly comparing Mulligan Mobilization and PNF techniques (Büyükturan et al., 2018; Lee & Han, 2013; Lee et al., 2013). A shared characteristic of both methods is their concurrent application with joint movement. While the Mulligan technique aims to improve joint function and reduce pain by correcting positional faults within the joint, PNF techniques aim to enhance functional improvement by strengthening, activating, or relaxing specific muscle groups through various muscle contractions (Livanelioğlu et al., 2011; Mulligan, 2015). Comparing the efficacy of these distinct therapeutic approaches in managing neck pain is crucial for developing individualized and more effective treatment plans. Furthermore, it is essential to investigate the effects of these methods on parameters such as pain intensity, pressure pain threshold, functionality, ROM, muscle performance, quality of life, kinesiophobia, and emotional state through evidence-based data.

The aim of this review is to evaluate the effectiveness of Mulligan Mobilization and PNF techniques in the treatment of neck pain based on current literature, and to provide evidence-based recommendations for clinical practice based on the findings obtained.

METHOD

In this review study, literature searches were conducted using electronic databases such as PubMed, Scopus, Web of Science, Google Scholar, and the Turkish Citation Index. During the search, keywords such as "neck pain," "Mulligan mobilization," "proprioceptive

neuromuscular facilitation," "mobilization with movement," and "PNF techniques" were used in both English and Turkish. Articles, systematic reviews, randomized controlled trials (RCTs), meta-analyses, and clinical studies published between 2010 and 2024 were included in the review. The effectiveness of Mulligan Mobilization and PNF techniques on parameters such as pain, pressure pain threshold, joint range of motion (ROM), functionality, muscle performance, kinesiophobia, mood, and quality of life were assessed in the included studies. Additionally, references from the cited sources were reviewed to access other relevant studies. This review aims to provide current information on the subject and to develop recommendations for clinical practice and future research.

Applications of Proprioceptive Neuromuscular Facilitation Technique in Neck Pain

The PNF technique is a physiotherapy approach based on neurophysiological principles, developed in the 1940s and 1950s by Dr. Herman Kabat and Margaret Knott. This technique uses peripheral inputs such as stretching, traction, resistance, and approximation, combined with auditory and visual stimuli, to facilitate the central nervous system. The aim of PNF is to enhance functional movement ability by activating neurophysiological mechanisms. Traction, resistance, stretch reflex, spreading, and other proprioceptive stimuli can influence muscle response. Thus, PNF applications were designed to improve neuromuscular activation and coordination based on the stimulation of proprioceptive senses (Altuğ et al., 2019; Livanelioğlu et al., 2011).

The physiological movements in the human body exhibit two fundamental characteristic patterns: spiral (rotational) and diagonal (oblique). The exercise approach that combines these two movement patterns is known as PNF. Based on the specific spiral and diagonal patterns of movement, PNF involves various superimposed techniques and methods aimed at muscle contraction, relaxation, and strengthening. The goal of this approach is to enhance neuromuscular control and coordination by activating functional movement patterns (Altuğ et al., 2019; Livanelioğlu et al., 2011).

In PNF patterns, movements performed with maximum resistance allow for stronger neuromuscular responses. Throughout the application, visual stimuli through eye tracking, tactile stimuli through hand contact, and auditory cues through verbal instructions are continuously provided. These multi-sensory inputs help maintain high levels of attention, supporting the learning, perception, and correct execution of the movement (Livanelioğlu et al., 2011).

In PNF, the term "pivot" is used instead of "joint." The shoulder and hip joints are referred to as "proximal pivots," the elbow and knee as "intermediate pivots," the wrist as "distal pivot," and the fingers as "digital pivots." Intermediate pivots have independent movement ability, while distal and digital pivots generally move simultaneously with proximal pivots (Altuğ et al., 2019; Livanelioğlu et al., 2011).

PNF applications aim to restore functional movement through the controlled use of isometric, eccentric, and concentric muscle contractions, resulting in inhibition, relaxation, strengthening, and facilitation in the target muscle groups (Livanelioğlu et al., 2011).

The concepts of facilitation and inhibition in physiology were initially established by Sherrington, who discovered that afferent stimuli from peripheral receptors and nerves increase the excitability of spinal alpha motor neurons. According to Sherrington, each stimulus that reaches the motor neurons activates a limited number of motor neurons while producing sub-threshold stimuli on surrounding motor neurons. Repeated sub-threshold stimuli reduce the excitation threshold, leading to neuronal discharge, a phenomenon known as "facilitation." On the other hand, an increase in the excitation threshold of motor neurons leads to decreased excitability, which is referred to as "inhibition." These physiological changes, induced by repetitive stimuli in the central nervous system, are thought to support the formation of new synaptic connections by reducing synaptic resistance, forming the basis of learning processes (Altuğ et al., 2019; Livanelioğlu et al., 2011).

Facilitation increases the activation of weak muscles, strengthening them, while inhibition is a mechanism aimed at reducing muscle tone. In this direction, the therapist’s primary goal is to modify the inputs from peripheral receptors to affect the excitability of alpha motor neurons and, consequently, improve functional movements. PNF is a comprehensive approach that involves the use of isometric, isotonic, and eccentric muscle contractions in various combinations, which can be applied alone or in combination, depending on the individual’s needs (Altuğ et al., 2019; Livanelioğlu et al., 2011).

PNF techniques are a dynamic therapeutic approach used in the evaluation and treatment of neuromuscular problems and are based on neurophysiological principles such as the sensorimotor system. This technique offers an effective treatment method by targeting both neuromuscular and structural dysfunctions. Neuromuscular dysfunction is typically characterized by the inability of the motor system to function purposefully and efficiently due to neuronal irritation or damage, while structural dysfunction results from impaired

myofascial structures and joint mobility, affecting postural balance (Satria Nugraha et al., 2021).

In individuals with neck pain, PNF techniques are preferred to reduce symptoms through the facilitation of both the structural and neuromuscular systems, improve force distribution, and eliminate functional stresses caused by weak neuromuscular control (Satria Nugraha et al., 2021).

Studies by Jung-Ho et al. demonstrated that Proprioceptive Neuromuscular Facilitation (PNF) techniques were more effective than conventional physiotherapy methods in reducing neck pain, increasing pain threshold, and improving functional capacity (Lee & Han, 2013; Lee et al., 2013). Similarly, a study by Parisa et al. compared PNF techniques with stabilization exercises in 44 individuals with chronic neck pain, finding that PNF interventions provided superior results in both pain reduction and functionality improvement (Parisa et al., 2016).

Rezasoltani et al. studied 31 patients with neck pain, dividing them into three groups to compare the effectiveness of PNF techniques with traditional neck exercises. Both the PNF and traditional exercise groups showed decreases in pain scores and increases in muscle strength, but the PNF group demonstrated significantly higher effectiveness (Rezasoltani et al., 2010).

In a study by Kumari et al., 45 patients were randomized into three groups, with treatment protocols consisting of muscle energy techniques, PNF, and isometric self-stretching exercises, each group receiving 12 sessions over 4 weeks. Significant improvements were observed in pain, ROM, and functionality across all groups, but no statistically significant superiority was found between the groups (Kumari et al., 2016).

Suresh et al. conducted a study with 66 patients with chronic neck pain, dividing them into two groups to receive either PNF or cranio-cervical flexor exercises for four weeks. Both groups showed significant improvements in pain, functionality, and active ROM, but no significant differences were found between the groups. The researchers concluded that PNF was as effective as cranio-cervical flexor exercises (Suresh et al., 2023).

Maicki et al. studied 80 patients with cervical spinal osteoarthritis, dividing them into two groups. One group received TENS and laser therapy combined with PNF techniques, while the other group received manual therapy techniques. Functional capacity and pain were evaluated before and after the 10 sessions of 45-minute treatments. Both groups showed

significant improvements, but the PNF group exhibited higher levels of improvement compared to the manual therapy group (Maicki et al., 2017).

Kang et al. conducted a study with 20 patients who had suffered whiplash injuries, comparing PNF techniques with a control group. Pain, functionality, and endurance were assessed before and after a two-week treatment period. Significant improvements in pain, functionality, and endurance were observed in the PNF group, showing statistically significant superiority over the control group (Kang et al., 2018).

Mulligan Mobilization Technique in Neck Pain

The Mulligan Mobilization technique, developed by New Zealand physiotherapist Brian Mulligan, is one of the commonly used manual therapy approaches today. This method combines the gliding (slide) techniques from the Kaltenborn principles of physiological joint movement with positional release techniques. Developed in the 1980s, the Mulligan techniques include Natural Apophyseal Glide (NAGs), Sustained Natural Apophyseal Glide (SNAGs), and Mobilization With Movement (MWM), all of which have direct effects on joints as well as the neuromuscular system (Mulligan, 2015; Wilson, 2001).

The primary goal of Mulligan mobilization is to correct positional and biomechanical errors that lead to secondary joint displacement. This approach aims to restore proper alignment of the joint, eliminate positional dysfunction, and return the movement to its physiological range (Mulligan, 2015).

The NAGs technique, included in this approach, is a form of mobilization where passive movements are applied to the patient, involving the Natural Apophyseal Glide (NAG). The application is based on the principle of gently sliding the adjacent facet of the spinal joint in an anterocranial direction with passive oscillatory movements. This mobilization is performed while the patient is seated, bearing their body weight, and the direction of the glide is typically adjusted upward, forward, and toward the patient's eyes. The NAGs technique has proven to be effective, especially when applied to the lower and middle cervical vertebrae and upper thoracic vertebrae. The technique can be performed in the neutral position of the spinal segment or along the direction of restricted movement, either centrally or unilaterally. This approach plays a significant role in rehabilitation due to its ability to provide pain-free mobilization and its applicability in accordance with the patient's tolerance. (Mulligan, 2015).

During the application, the therapist supports the patient's head with one hand while positioning the little finger of the same hand on the spinous process of the target vertebra to stabilize it. The thenar area of the other hand is placed on the stabilizing finger, and the mobilization is performed through a controlled sliding motion directed toward the patient's eye level. This technique is particularly preferred for elderly individuals, irritated patients, those in the acute phase post-injury, and patients with multiple joint problems in the cervical region (Mulligan, 2015).

SNAGs is an approach that involves the patient’s active participation and continuous natural apophyseal glide. This technique is applied within the painful and restricted ROM, creating a continuous glide at the facet joint level and aiming to restore physiological motion at the end of the movement. It is also used for differential diagnosis purposes and is typically performed in three repetitions, depending on symptom severity, irritability, and underlying pathology. This technique, which is generally applied in weight-bearing positions, is considered safe in clinical practice due to its low risk of contraindications. It has been shown to effectively and painlessly increase cervical extension range of motion (Mulligan, 2015).

During the application, the therapist stands behind the patient. Both thumbs are placed on the spinous process of the target vertebra, and the index fingers stabilize the patient's head bilaterally through the temporal bones. If the patient is sensitive to direct contact, the contact area can be supported with a soft pad. During the application, a glide force is applied in the anterosuperior direction toward the upper spinous process. The thumb and index finger positions are directed toward the patient's eye level. The glide is facilitated not by the directly contacting finger, but by the supporting thumb. As the therapist performs the glide, the patient slowly completes the movement in the restricted direction. If applied correctly, the patient can complete the movement painlessly. At the end of the movement, the therapist applies "overpressure" (extra pressure) for a few seconds without turning the patient’s head off-center. This maneuver can be repeated several times to reinforce the effect (Mulligan, 2015).

MWM (Mobilization with Movement) is a manual therapy technique used primarily in peripheral joints. This approach combines the patient’s active joint movement with a simultaneous accessory glide applied by the therapist. The goal of the application is to achieve a pain-free and functional range of motion in the joint (Mulligan, 2015).

Research to date shows that the effectiveness of Mulligan mobilization techniques is based on correcting faulty joint positions caused by mechanical dysfunctions. These techniques aim to

realign the joint, improve mobility, and reduce pain (Collins et al., 2004; Kavanagh, 1999; Vicenzino et al., 2007).

The applied manual therapy techniques represent a specific approach aimed at correcting minimal biomechanical deviations in joint positioning and movement patterns. Under normal physiological conditions, various factors ensure joint stability and movement coordination. These include the morphology of the joint surfaces, the thickness of articular cartilage, the orientation of capsular and ligamentous structures, the pull vectors of surrounding muscles, and the neuromechanical control systems that regulate free movement. The sustainability of this homeostatic structure is supported by continuous afferent feedback provided by the proprioceptive system. However, alterations in these parameters, such as ligament laxity, muscle imbalances, and proprioceptive dysfunction, can negatively affect joint mechanics, leading to misalignment and deviations in movement patterns. These disorders can manifest through symptoms such as pain, muscle weakness, and restricted movement. Therefore, achieving proper alignment through provocation that does not provoke pain and involves minimal biomechanical corrections is essential (Wilson, 2001).

The foundation of Mulligan mobilization techniques is based on a mechanical model. This model suggests that minor positioning errors, often secondary to injuries and associated with disturbances in joint movements, can lead to symptoms such as pain, muscle weakness, and stiffness over time. The Mulligan approach is built on the assumption that these positional disturbances can negatively affect joint function. In this context, the technique aims to increase joint range of motion, restore function, and reduce symptoms through the correction of positional errors (Wilson, 2001).

Mulligan mobilization techniques aim to restore normal biomechanical balance by realigning the joint surfaces physiologically. With this approach, the goal is to reduce pain and functional limitations resulting from positional deviations. The techniques are based on arthrokinematic principles, which involve correcting abnormal joint motion patterns and regaining pain-free joint range of motion. As a result, a reduction in pain levels and significant improvement in joint function and mobility are expected (Mulligan, 2015; Wilson, 2001).

In a study conducted by Büyükturan and colleagues, the Mulligan mobilization technique was found to significantly reduce pain intensity, depression levels, and kinesiophobia in

individuals with neck pain. At the same time, it led to significant improvements in joint range of motion, functionality, and quality of life (Büyükturan et al., 2018).

Another study by Ganesh et al. involving individuals with neck pain reported that the Mulligan mobilization technique improved joint range of motion and functional levels, while also significantly reducing pain intensity (Ganesh et al., 2015).

Duymaz and colleagues found that Mulligan mobilization techniques had positive effects on pain, joint range of motion, muscle strength, performance level, disability, depressive symptoms, and quality of life (Duymaz, 2018).

In a study by Abdelgalil and colleagues with 40 patients with neck pain, the efficacy of Mulligan mobilization was compared with low-amplitude manipulation techniques. Significant reductions in pain scores were observed in both groups, with a more pronounced decrease in the Mulligan group (Abdelgalil et al., 2015).

Devi and colleagues conducted a study with 40 individuals with neck pain, where patients were randomly assigned to two groups. One group performed self-administered SNAG exercises, while the other group engaged in dynamic isometric exercises using resistance bands. Both groups underwent daily sessions for 6 weeks and were assessed for pain and functionality before and after treatment. Both groups showed reductions in pain and disability; however, SNAG was found to be more effective than dynamic isometric exercises in reducing pain and improving functionality (Geetanjali Devi & Dutta, 2015).

In a study by Gautam and colleagues with 30 patients with neck pain, patients were randomly divided into three groups: a control group receiving only conventional therapy, a Mulligan group receiving conventional therapy along with Mulligan mobilization techniques, and a Maitland group receiving conventional therapy along with Maitland mobilization techniques. Evaluations were made before the treatment program, and on the 15th and 30th days, assessing pain, cervical range of motion (ROM), and functionality. Both treatment groups showed improvements in all parameters, with no general superiority between the groups; however, the Mulligan group had a more significant reduction in pain and greater increases in ROM and functionality (Gautam et al., 2014).

In a study by El-Sodany and colleagues, 49 patients were treated with Mulligan mobilization and high-speed, low-amplitude spinal manipulation techniques, with their effectiveness compared to a control group. Patients were divided into three randomized groups and treated

twice a week for 6 weeks. Functional levels related to the neck were assessed before and after treatment. Significant improvements were observed in all groups, with the Mulligan and manipulation groups showing similar improvements that were significantly more effective than the exercise group (El-Sodany et al., 2014).

Abdallah and colleagues evaluated the effects of Mulligan mobilization and low-level laser therapy on pain intensity, dermatomal somatosensory-evoked potentials measured by EMG, and functional levels in patients with unilateral cervical radiculopathy. Patients were treated three times a week for 4 weeks and assessed before and after treatment, with significant improvements observed in all groups (Abdallah et al., 2017).

A distinctive feature that separates Mulligan mobilization and PNF techniques from other treatment approaches is that both methods are applied simultaneously with joint movement. Mulligan mobilization aims to correct positional abnormalities by promoting movement in a pain-free position, thereby enhancing functionality. On the other hand, PNF techniques facilitate functional recovery through isometric, eccentric, and concentric muscle contractions, promoting inhibition, strengthening, and facilitation of muscle groups (Livanelioğlu et al., 2011; Mulligan, 2015).

CONCLUSION AND RECOMMENDATIONS

Neck pain is a prevalent health issue in the general population, significantly affecting quality of life. Mulligan Mobilization and PNF techniques have gained popularity as conservative treatment methods, with their efficacy supported by various studies. Both methods have shown positive results in reducing pain, increasing range of motion (ROM), and improving functionality and quality of life in individuals with neck pain.

The literature review emphasizes that the Mulligan mobilization technique is particularly effective in reducing pain during active movement and increasing ROM by correcting joint positional errors. It is also reported to have positive effects on reducing depression, kinesiophobia, and functional limitations, especially in chronic individuals.

On the other hand, PNF techniques promote neuromuscular facilitation by stimulating proprioceptors, leading to significant improvements in muscle strength, endurance, coordination, and joint ROM. This method stands out as an effective approach for enhancing functional performance and reducing pain, particularly in patients with chronic neck pain.

Based on the current evidence, it is difficult to determine the superiority of one technique over the other, as both Mulligan mobilization and PNF techniques are effective for treating neck pain but operate through different mechanisms. Mulligan mobilization mainly focuses on joint mechanical problems, while PNF techniques concentrate on neuromuscular rehabilitation of the muscles. Therefore, in clinical practice, it is essential to decide which technique or combination of techniques to use based on the individual assessment of the patient, as this greatly influences treatment efficacy.

Future research should include high-quality randomized controlled trials comparing the long-term effects of Mulligan mobilization and PNF techniques. Additionally, examining the impact of both methods on psychosocial factors and conducting cost-effectiveness analyses will contribute to developing more comprehensive and holistic treatment strategies for clinical applications.

In conclusion, Mulligan mobilization and PNF techniques stand out as proven effective methods in treating neck pain. In clinical practice, creating individualized treatment programs based on patient characteristics and utilizing these techniques within an evidence-based approach will improve patient outcomes and reduce the economic burden on the healthcare system.

Clinical Contribution

This review examines the place of PNF and Mulligan mobilization techniques in the current literature, highlighting the clinical effectiveness of both methods. The findings may serve as a guide for clinicians in selecting appropriate techniques for the treatment of neck pain. Both PNF and Mulligan mobilization techniques appear to be effective in reducing pain and enhancing muscle strength, endurance, and overall functionality. In this context, with appropriate patient selection, both methods are considered to potentially contribute to clinical success. This review aims to support clinicians in adopting evidence-based practices in assessment and treatment planning.

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