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Mulligan technique versus McKenzie technique on patients with non- specific neck pain

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Abstract:

This study aimed to assess the effects of McKenzie and Mulligan techniques on pain management, range of motion (ROM), and disability in neck pain cases. Conducted at the physiotherapy department of the Allied Medical Science Faculty, 24 patients underwent Numeric Rating Scale (NRS) assessments for pain severity and Neck Disability Index (NDI) evaluations to gauge the impact of neck pain on daily life and self-rated disability. Randomly divided into two groups, each comprising 12 patients, participants received specific technique sessions twice weekly for three weeks. Post-treatment, outcomes were assessed through routine methods by examining various variables. Results revealed no significant effect on ROM with the Mulligan technique in neck flexion and extension (p-values 0.094 and 0.095, respectively). However, positive effects were noted in right and left rotation, as well as side flexion. The Mulligan technique led to decreased pain intensity and improved neck function. Conversely, the McKenzie Technique showed no ROM effect but demonstrated increased side flexion. No significant differences were found between groups in pain reduction or neck function improvement. This study evaluates the effectiveness of McKenzie and Mulligan techniques for neck pain management. Through rigorous assessment methods, it offers valuable insights into their impact on pain, range of motion, and disability. The findings contribute to evidence-based practice, guiding clinical decision-making and enhancing patient care in this population.

Keywords: *Mckenzie Technique; Mulligan Technique; Non-Specific Neck Pain; Physiotherapy.*

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تقنية موليجان مقابل تقنية ماكنزي على المرضى الذين يعانون من آلام الرقبة غير المحددة

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ملخص:

هدفت الدراسة إلى تقييم تأثير تقنيات ماكنزي وموليجان على إدارة الألم ونطاق الحركة والإعاقة في حالات ألم الرقبة. أجريت الدراسة في قسم العلاج الطبيعي بكلية العلوم الطبية المتحدة. خضع 24 مريضًا للتقييم باستخدام مقياس تقييم شدة الألم الرقمي NRS ومقياس مؤشر إعاقة الرقبة NDI لتحديد تأثير ألم الرقبة على حياة المريض اليومية وتقييم الإعاقة الذاتية للمرضى الذين يعانون من ألم الرقبة. تم تقسيم 24 مريضًا بشكل عشوائي إلى مجموعتين، حيث تلقت كل مجموعة تقنية محددة، جلسة واحدة كل أسبوع لمدة 3 أسابيع. بعد العلاج، تم تقييم النتائج بطرق روتينية من خلال فحص بعض المتغيرات. ثم خضع المرضى المشاركون لنفس الفحص وقارنت النتائج قبل العلاج وبعدها. أظهرت النتائج عدم وجود تأثير على نطاق الحركة باستخدام تقنية موليجان في الانحناء والامتداد بقيم p قدرها 0.094 و0.095 على التوالي. بالمقابل، أشارت النتائج إلى تأثير إيجابي في نطاق الحركة للتدوير الأيمن بقيمة P 0.046 والتدوير الأيسر بقيمة P 0.036 وكذلك إنحناء الجانب الأيمن والأيسر. أظهرت النتائج تقليلًا في شدة الألم وتحسنًا في وظيفة الرقبة باستخدام تقنية موليجان. أشارت النتائج إلى عدم وجود تأثير على نطاق الحركة باستخدام تقنية ماكنزي، ولكن وجدت زيادة في نطاق الإنحناء الجانبي، كما لم تظهر فروقات معنوية بين الفرق في القدرة على تقليل الألم أو تحسين وظيفة الرقبة. تُقيّم هذه الدراسة فعالية تقنيات ماكنزي وموليجان لإدارة آلام الرقبة. من خلال أساليب التقييم الصارمة، فإنه يقدم رؤى قيّمة حول تأثيرها على الألم، ونطاق الحركة، والإعاقة، إذ تسهم النتائج في الممارسة القائمة على الأدلة، وتوجيه عملية صنع القرار السريري وتعزيز رعاية المرضى في هذه الفئة من السكان.

الكلمات المفتاحية: *تقنية ماكنزي؛ تقنية موليجان؛ آلام الرقبة غير المحددة. العلاج الطبيعي.*

1. Introduction

Any injury, damage or pathology that affects any tissue, muscle, joint or ligament of the body is known as a musculoskeletal disorder whose prevalence is increasing due to workload, bad posture, and activities of daily living (ADLs) (Razzaq et al., 2022). Low back pain and neck pain are among the most common musculoskeletal complaints and leading causes for patients to seek medical care (Fillipo et al., 2022). Due to the job that needs prolonged static postures and the exception movements of the upper limbs with aggravate of neck pain.

Neck pain is a multifactorial disease, and is a major problem in modern society (Kazeminasab et al., 2022). Non-Specific neck pain is used to describe neck pain with un-known reason (Wiangkham et al., 2019). Neck pain can be association with traumatic whiplash, inflammatory diseases, metabolic and neoplastic. most neck pain has no discernable cause and is considered to be idiopathic (Peng et al., 2021). there are several factors are related of neck pain for example work, stress and depression. (Kazeminasab et al., 2022).

There is no one definitive treatment for neck pain. However, different treatments have been recommended, including Muscle energy technique, dry needling, manipulation and mobilization exercises (Maitland, McKenzie and Mulligan). Mulligan mobilization with movement (MWM) is a manual technique application of sustained accessory mobilization in which manual gliding is painful joint. (Kazeminasab et al., 2022).

Brian Mulligan's theory of joint "positional fault" suggests that malpositions between joint surfaces may cause patient symptoms. These "positional faults" are primarily diagnosed through clinical examination using the Mulligan Concept, and correcting them can alleviate symptoms. Manual therapy techniques, including those from the Mulligan Concept, may activate the sympathetic nervous system, leading to pain reduction, especially on the same side of the body where the technique is applied. For peripheral joints, the Mulligan Concept employs "mobilization with movement (MWM)" techniques, which involve specific directions and repetitions to resolve pain. The key aspects of the Mulligan Concept are patient participation and pain elimination, making it a safe and effective method with no significant adverse effects reported (Westad et al., 2019).

McKenzie exercises improve self-awareness of discomfort posture and spinal movement. In patients with spinal pain, conducting repetitive neck retraction exercises significantly reduces the pain and restores the lordosis curve of the cervical spine (Avaghade et al., 2023).

The literature on the comparison between the Mulligan technique and the McKenzie technique for patients with non-specific neck pain is limited. There is a gap in research specifically addressing the effectiveness and outcomes of these two techniques in treating non-specific neck pain.

While both techniques are commonly used in physical therapy for neck pain management, the evidence supporting their comparative effectiveness is lacking. It is important to note that the Mulligan technique focuses on mobilization with movement, while the McKenzie technique emphasizes movement-based exercises and postural correction. Aim of the study was planned to compare the effect of Mulligan and McKenzie on pain, disability and range of motion (ROM) in neck pain patients.

2. Methods

It was a pilot comparative study conducted in the physiotherapy department of Allied Medical Science Faculty. Ethical permission was obtained from the Faculty Ethical Committee, Allied Medical Science Faculty, Palestine Ahliya University, Palestine. The sample study was calculated

by the following equation: $n=(Z\alpha/2+Z\beta)2*2*\sigma2/d2$, where $Z\alpha/2$ is the critical value of the normal distribution at $\alpha/2$, $Z\beta$ is the critical value of the normal distribution at β, $\sigma2$ is the population variance, and d is the difference you would like to detect.

A total of twenty –four patients (4 males and 20 female) all between the ages of twenty and fifty years. In the orthopedic clinic, patients were chosen based on inclusion and exclusion criteria. The physical therapy department at Palestine University released a special message on neck discomfort. Patients were asked to visit the specialist for a complimentary assessment. The study methods were discussed and written informed permission was acquired. To screen the patients, a thorough musculoskeletal examination was conducted. After being equally split into two groups, participants were recruited in the study and allocated at random to one of the groups. A baseline therapy was administered to each group. Mulligan technique (N=12, M=1, F=11) was used to group A, and McKenzie technique (N=12, M=3, F=8) was used to group B. All patients were split up at random. The Neck Disability Index scale (NDIS), the Numeric Rating Scale (NRS), and the range of motion (ROM) were used to compare the two therapies. For three weeks, there were two one-hour sessions every week.

Inclusion criteria are, (1) age limit 25 -50 Years, (2) decreased neck ROM, (3) degenerative disc disease, (4) cervical radiculopathy, (5) myofascial pain syndromes, (6) Muscular strain. Exclusion criteria consist (1) serious spinal pathology, (2) Patient with chronic diseases (heart, lung, and malignant tumors). (3) patient with age above and below of (25-50), (4) whiplash injuries, (5) cervical surgery, (6) infection, (7) fracture of the cervical spine, (8) vertigo, (9) spinal stenosis and (10) thoracic outlet syndromes.

3.1 Instrumentations

The physiotherapist was used applied techniques of treatment in neck pain and the physiotherapist employed techniques for treating neck pain and administered a distraction test, this test is similar to the foraminal compression test, but it is administered in a way that is essentially the opposite of the foraminal compression test. To perform this test, The test involves the client sitting, the therapist placing the client's thenar eminences inferior to the temporal bones' mastoid processes, and then lifting the client's head superiorly to traction the head and neck and open the intervertebral foramina (Fig. 1). Alternatively, the client may be supine (Muscolino, 2013) (Fig. 2). Physiotherapist was used spurling and compression test, the foraminal compression test, also known as Spurling test, is used to evaluate and diagnose a cervical spine space-occupying condition. The client's head is in the neutral position when the test is conducted (Fig.3). The pressure should be directed directly downward.

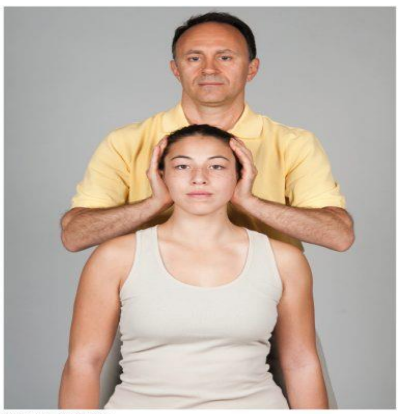

Figure 1. Distraction test.

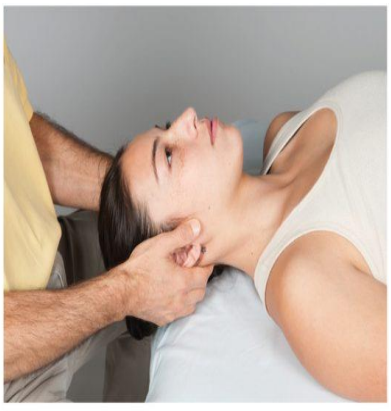

Figure 2. Distraction test.

The test can be repeated with the client's head extended, laterally flexed to the side, and rotated to the same side (the lateral flexion and rotation should be to the side that is suspected of having the space-occupying lesion) in order to increase the compression and, consequently, the sensitivity of the assessment procedure. This position for performing the test is commonly known as maximal foraminal compression. pressure can be applied laterally to the side that the client laterally flexes, as well as downward or even slightly posteriorly (Muscolino, 2013) (Fig.4).

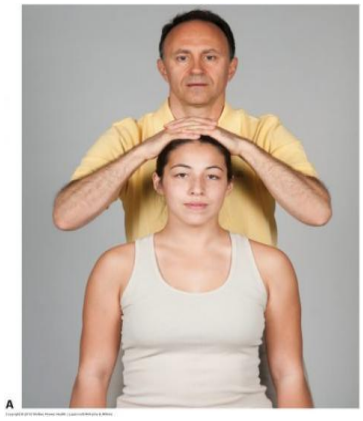

Figure 3. Compression test.

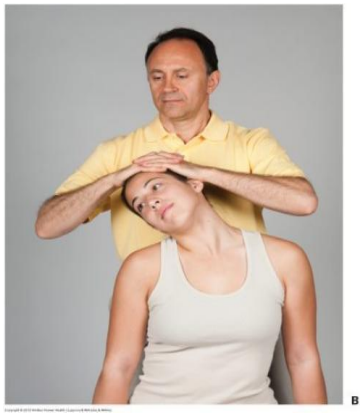

Figure 4. Spurling test.

3.2 Measurements

The first outcome measure is range of motion, bedside instruments were used to measure rotation, lateral flexion, and cervical flexion-extension. This would help in determining the cervical range of motion during a clinical examination by improving the accuracy and precision of objective measurement. One tool that can be used at the bedside is a goniometer (Pontes-Silva et al., 2021). Normal ranges include cervical flexion of about 50º, cervical extension of about 80°, flexion from the starting point on either side of the head at 45°, right and left rotation of 80°, and the total angle of maximal lateral head flexion of 45°.

The Numeric Rating Scale (NRS) served as the second outcome measure. The NRS scale is suitable, valid, and dependable for use in clinical practice. In general, the NRS has high sensitivity and produces data that can be examined. In this numeric version of a visual analog scale with segments, the respondent chooses the whole number that most accurately represents the degree of the trait under investigation, which is typically pain or symptoms. The most widely used range of numbers is 0 to 10, where 0 denotes no pain and 10 the highest possible pain. The patient selects either the written version or the oral version (Bonacchi et al., 2021) (Fig.5).

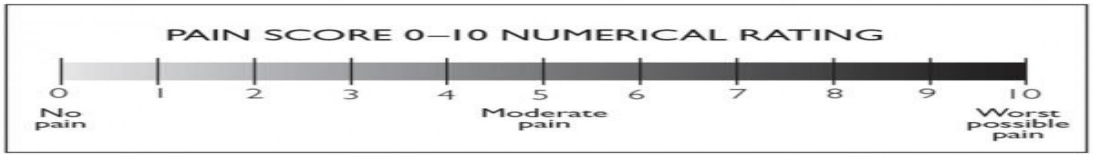

Figure 5. Numerical Rating scale.

The third outcome measure is Neck Disability Index scale (NDI), it is the most popular assessment instrument for determining disability resulting from both acute and chronic neck pain or neck injuries. Excellent reliability was demonstrated by the NDI (ICC = 0.88; [0.63 to 0.95]) (Pontes-Silva et al., 2021). International and Australian guidelines have recommended it as a useful tool for evaluating patients with acute disorders related to whiplash and other types of neck pain. It can also be used to categorize the recovery status of chronic whiplash-associated disorder and track the effects of treatments over time.

Instructions and scoring, The NDI has a total score of out of 50. With semantic variations depending on the section, each of the ten sections is rated as none, slight, moderate, fairly severe, very severe, and worst imaginable. A higher total score denotes a higher degree of disability because these options correlate with scores ranging from 0 to 5 in ascending order of severity. By simply doubling the total score, one can convert it to a percentage (Pontes-Silva et al., 2021). Patients were divided into four groups: 5 to 14 for mild, 15 to 24 for moderate, 25 to 34 for severe, and over 34 for complete. The patients received two sessions per week for three weeks.

3.3 Interventions

Group (A) Twelve patients received two sessions a week for three weeks. During the Three mulligan techniques were used to ensure that the patients' joints moved to their end point without causing any pain, the time of the session is forty-five minutes each, mobilization exercises using oscillatory movements with six repetitions were performed For three weeks, group (B) consisted of twelve patients who received two sessions per week and three Mackenzie exercises applied for seven minutes ,that took one minute each to complete.

Patients in group (A) were provided Subjects were seated during, Mulligan mobilization with upper limb movement for cervical regain. The movements were always done in a painless, comfortable manner against resistance. This was moved forward silently for at least ten seconds, or until the end range was felt. Active movement was used to mobilize people, followed by passive pressure applied to the restricted movement. The following was how the mulligan mobilization techniques were used.

Figure 6. C5-C6 and C6-C7 Snags for cervical motion restriction Flexion

Figure 7. C5-C6 and C6-C7 Snag for cervical motion restriction Rotation

Figure 8. C5-C6 and C6-C7 Snag for cervical motion restriction Extension

Figure 9. MWM C5-C6/C6-C7, Positional SNAGS

Patients in group (B) underwent McKenzie exercises involving neural mobilization while where is supine position, remaining relaxed with the feet uncrossed. Chin tucks, or retraction exercises, were the first procedure. Under the occiput, a small pillow was positioned to sustain a slight amount of flexion. The exercises were done three to four sets of three at a time, a frequency of ten – fifteen times f, with the clinician applying excessive pressure. Ergonomic guidance on the significance of maintaining appropriate spinal mechanics was given to the patient.

The person was instructed to complete the at-home exercise while avoiding a forward head or chin poking posture. (1) the exercises involve having the patient bend their head backwards as far as possible to look at the ceiling before returning to the neutral position (Fig. 10). (2) "Bend your head down and put your chin on your chest, and then return to the neutral position" is the patient's instruction (Fig. 11). (3) To return to the neutral position, the patient is told to "draw your head backwards as you tuck your chin in" (Fig..12).

Figure 10. Neck extension in sitting position

Figure 11. Neck flexion in sitting position

Figure 12. Retraction with patient over pressure

3.4 Statistical analysis

The SPSS 26.0 software (Statistical Package for Social Sciences) will use to study the difference in groups and within groups. Descriptive and frequency statistics will use to study the main characteristic of the sample. Means, standard deviation, and percentages. Continuous variables will give as mean ± standard deviation while categorical variables will give as number and percentage. Independent samples t-test will use to study the similarity of demographic data between groups. Wilcoxon Signed Ranks Test will use to study the change between pre- and post-diagnosis within groups and Mann Whitney test will use to the change between pre- and post-diagnosis between groups.

3. Results

For current study of the twelve (n=12) subjects in the current study, 17% were men and 83% were women. Following that, these participants were split into two groups at random: group A (n = 12) and group B (n = 12). 50% of the group falls under the age of 39, and 50% falls over the age of 40.

The results were shown there were no significant differences at α=0.05 for the level of the ROM flexion, ROM extension according to the group. The results reported that there were significant differences at α=0.05 for the level of the ROM Rt rotation. The differences in favor of post group with mean (70.0), inverses of pre group with mean (61.0), the results revealed that there were significant differences at α=0.05 for the level of the ROM Lt rotation. The differences in favor of post group with mean (68.50), inverses of pre group with mean (59.83), the findings indicated that there were significant differences at α=0.05 for the level of the ROM Rt side flexion. The differences in favor of post group with mean (38.17), inverses of pre group with mean (33.33), the results showed that there were significant differences at α=0.05 for the level of the ROM Lt side flexion. The differences in favor of post group with mean (39.83), inverses of pre group with mean (33.00), the results indicated that there were significant differences at α=0.05 for the level of the NRS. The differences in favor of post group with mean (3.17), inverses of pre group with mean (8.00) and the results reported that there were significant differences at α=0.05 for the level of the NDI. The differences in favor of post group with mean (13.33), inverses of pre group with mean (22.50). The results are shown in table 1.

Table 1. The effect of Mulligan Technique of management non- specific neck pain according to the group.

	Group	Mean	Std. Deviation	DF	T	Sig
ROM flexion	Pre	42.33	7.78		-1.849	
	Post	49.50	5.43	10		0.094
ROM	Pre	56.17	8.01		-1.843	0.094
Extension	Post	65.17	8.88	10		
ROM Rt	Pre	61.0	6.00		-2.274	0.046
Rotation	Post	70.0	7.61	10		
Rom Lt	Pre	59.83	5.52		-2.428	0.036
Rotation	Post	68.50	6.77	10		
ROM Rt Side	Pre	33.33	2.06		-3.471	0.006
Flexion	Post	38.17	2.71	10		
Rom Lt side	Pre	33.00	2.28		-5.054	0.001
flexion	Post	39.83	2.40	10		
NRS	Pre	8.00	0.89		8.043	0.001
	Post	3.17	1.16	10		
NDI	Pre	22.50	8.09	10	2.665	0.024
	Post	13.33	2.33			

The results indicated that there were no significant differences at α=0.05 for the level of the ROM flexion, ROM extension, ROM Rt rotation, ROM Lt rotation according to the group. The results reported that there were significant differences at α=0.05 for the level of the ROM Rt side flexion. The differences in favor of post group with mean (39.83), inverses of pre group with mean (34.33). The results approved that there were significant differences at α=0.05 for the level of the Rom Lt side flexion. The differences in favor of post group with mean (43.00), inverses of pre group with mean (37.17). The results revealed that there were significant differences at α=0.05 for the level of the NRS. The differences in favor of post group with mean (4.00), inverses of pre group with mean (7.50) and the results indicated that there were significant differences at α=0.05 for the level of the NDI. The differences in favor of post group with mean (13.50), inverses of pre group with mean (21.17). The results are shown in table 2.

Table 2. The effect of McKenzie Technique of management non- specific neck pain according to the group.

	Group	Mean	Std. Deviation	DF	T	Sig
ROM flexion	Pre	42.50	6.86		-1.454	
	Post	48.00	6.22	10		0.177
ROM	Pre	44.67	9.28		-1.100	0.297
Extension	Post	50.33	8.54	10		
ROM Rt	Pre	60.00	5.62		-1.615	0.137
Rotation	Post	64.83	4.70	10		
Rom Lt	Pre	60.67	4.54		-2.101	0.062
Rotation	Post	66.00	4.24	10		
ROM Rt Side	Pre	34.33	2.42		-3.284	0.008
Flexion	Post	39.83	3.31	10		
Rom Lt side	Pre	37.17	2.78		-4.315	0.002
flexion	Post	43.00	1.78	10		
NRS	Pre	7.50	1.22		5.217	0.000
	Post	4.00	1.09	10		
NDI	Pre	21.17	5.34	10	2.755	0.020

The results were shown that there were no significant differences at α=0.05 for the level of the ROM flexion, ROM Rt Rotation, ROM Lt rotation, ROM Rt side flexion, NRS, NDI. The results indicated that there were significant differences at α=0.05 for the level of the ROM extension. The differences in favor of mulligan Technique with mean (65.17), inverses of McKenzie Technique with mean (50.33) and the results reported that there were significant differences at α=0.05 for the level of the Rom Lt side flexion. The differences in favor of McKenzie Technique with mean (43.00), inverses of mulligan Technique with mean (39.83). The results are shown in table 3.

Table 3. Mulligan Technique Versus McKenzie Technique of management non- specific neck pain.

	Group	Mean	Std. Deviation	DF	T	Sig
ROM flexion	Mulligan	49.50	5.43	10	0.445	0.666
	McKenzie	48.00	6.22			
ROM Extension	Mulligan	65.17	8.88	10	2.947	0.015
	McKenzie	50.33	8.54			
ROM Rt Rotation	Mulligan	70.00	7.61	10	1.413	0.188
	McKenzie	64.83	4.70			
Rom Lt Rotation	Mulligan	68.50	6.77	10	0.766	0.461
	McKenzie	66.00	4.24			
ROM Rt Side Flexion	Mulligan	38.17	2.71	10	-0.953	0.363
	McKenzie	39.83	3.31			
Rom Lt side flexion	Mulligan	39.83	2.40	10	-2.590	0.027
	McKenzie	43.00	1.78			
NRS	Mulligan	3.17	1.16	10	-1.274	0.231
	McKenzie	4.00	1.09			
NDI	Mulligan	13.33	2.33	10	-0.084	0.934

4. Discussion

Neck pain is the most common disorder of musculoskeletal pain types. Manual techniques are very important part of treatment plan, due to its effectiveness on decreasing pain and gaining improvement in ROM. Knowing how much is their effectiveness helps us to achieve goals in less time. McKenzie and Mulligan are two famous techniques used in physiotherapy treatment. Few studies but not enough focused on comparing these two techniques in Non-specific neck pain.

The purpose of this study was to compare between two groups of patients McKenzie exercises and Mulligan technique on management non-specific neck pain, this study will increase quality of treatment provided to patients and increase the scientific content of physiotherapists, and do other studies to develop the technique.

The current study results showed no effect on ROM by using mulligan technique in neck flexion and extension and the results indicated that there is positive effect in ROM for right rotation and left and so the results found effect on Rt and Lt side flexion the results were showed declining on pain severity and improving neck function by using mulligan technique. The results reported that no effect of McKenzie technique on neck flexion, extension, rotation ROM. Otherwise results showed a positive significant in Rt and Lt side flexion ROM. The results also were showed declining in pain and improving in neck function by using McKenzie technique. Finally, the results were showed no significant difference between groups by applying McKenzie and mulligan on flexion, Rt Rotation, Lt Rotation, Rt Side Flexion ROM except in extension and Lt side flexion.

Also, findings found no significant variations between groups on declining pain and improve neck function.

Mulligan's Mobility with Upper Limb Movement and McKenzie Mobility with Neural Mobility in Cervical Spondylitis Patients (Kotagiri, 2018) In this study, 60 participants were divided into two groups (A and B) with 30 patients each. Patients were randomly assigned to each of the pretest measurement groups using two scales (NPNPQ and VAS) and a range (Inclinometer). Patients in Group A received Mulligan Mobility with Upper Lateral Movement to Rest the Cervical Cord for 45 minutes for 4 days for 1 week in 4 weeks. Patients in Group B received McKenzie Mobility with Neurological Mobilization for 45 minutes, 4 days for 1 Week in 4 weeks with the patient in supine position (foot uncrossed) and results of the study showed that the McKenzie exercise was more effective in reducing pain and improving cervical spine function than mulligan mobilization in improving pain and disability for a patient with cervical radiculopathy. The results of the current study showed reduced pain and improved cervical spine function.

Seo et al. (2012) reported that the Twenty individuals with chronic neck pain were randomly assigned to the sling exercise group (n = 10) or the McKenzie exercise group (n = 10) in order to study the effects of these exercise programs on neck pain, according to Seo et al. (2012). Over the course of four weeks, the sling exercise group (n = 10) underwent 30 minutes of slinging exercise twice a week. Over the course of four weeks, the other group engaged in McKenzie exercise (n=8) for thirty minutes each day, twice a week. To determine the impact of sling exercise and McKenzie exercise, several key metrics are measured, including cervical muscle strength, cervical range of motion (ROM), visual analog scale (VAS), algometer, manual digital muscle tester (MMT), and neck disability index (NDI). The results showed that both rotation and the NDI, VAS, and algometer on the trapezius, following intervention in the sling exercise group, there was a significant increase in cervical muscle strength in both rotation and lateral flexion, as well as in cervical extension and lateral flexion. In the McKenzie exercise group, there was a significant increase in VAS, algometer on both trapeziuses, left (Lt.) rotation of cervical muscle strength, Lt. lateral flexion of cervical muscle strength, cervical flexion and extension of ROM, and Lt. lateral flexion of ROM after the intervention compared to before. The findings corroborate the idea that McKenzie exercise and a sling helped patients with persistent neck pain with their pain, muscle strength, and range of motion. These findings imply that a sling and McKenzie exercise regimen is appropriate for treating persistent neck pain. According to the current study, applying the McKenzie technique had no effect on neck rotation or flexion-extension range of motion. Additionally, results showed that Rt and Lt side flexion range of motion is positively significant. The McKenzie technique reduced pain and improved neck function, according to the results.

Abdel-Aziem (2022) is experimental study compares the McKenzie protocol with deep neck flexor and scapulothoracic exercises for treating chronic neck pain. A total of fifty-five individuals with persistent cervical pain took part in this controlled, randomized study. Participants were divided into three groups at random: the DNF group received traditional physical therapy (physical therapy agents, stretching, and isometric exercises) along with DNF and scapulothoracic exercises; the McKenzie group received traditional physical therapy along with McKenzie exercises; and lastly, a control group received traditional physical therapy. They underwent assessments using a visual analog scale (VAS), a gravity-reference goniometer, and the Copenhagen neck functional disability scale (CNFDS) before and after 6 weeks of treatment to determine the degree of neck pain, cervical range of motion (ROM), and functional disability. All groups demonstrated a

significant reduction in the degree of neck pain and disability relative to baseline, and a significant increase in the range of motion for the neck's flexion and extension, lateral right and left flexion, and right and left rotation. Compared to the DNF group and the control group, the McKenzie group's improvement was noticeably greater. Furthermore, compared to the control group, the DNF group's improvement was noticeably greater. According to the results of this study, McKenzie exercises are useful for increasing range of motion and reducing pain.

Manzoor et al. (2021) showed a comparison of Mulligan mobilization and muscle energy technique's efficacy in treating patients with non-specific neck pain. Patients with non-specific neck pain of any gender were divided into two groups for this quasi-experimental study, which took place from March to September 2017 at the Mayo Hospital's Physiotherapy Department in Lahore, Pakistan. Patients in group 1 underwent Mulligan mobilization, whereas patients in group 2 underwent muscle energy technique. Measurements were taken of cervical range of motion, pain intensity, and neck functional status both before and after treatment. 28 (or 50%) of the 56 patients were split between the two groups. There were 36.89±9.28 years in the total mean age. Group 2 saw noticeably greater improvements in pain intensity, functional status, and neck extension range of motion. It was discovered that Mulligan mobilization was a superior choice for treating patients with non-specific neck pain. The current study's findings indicated that the Mulligan technique had no effect on range of motion (ROM) in neck flexion-extension, but that ROM for Rt and Lt rotation was positively significant. As a result, the results of Rt and Lt side flexion showed a decrease in pain intensity and the development of neck function.

The study limitations. the time for sample collection is very short and this study is limited to comparing just two techniques of treatment for non-specific neck pain. There may be some possible limitation in this study, like limited of difference diagnosis of non-specific neck pain clear, and that require from the researcher to do additional tests to ensure the diagnosis.

Finally, McKenzie and Mulligan technique they are therapeutic methods for neck pain, probably more study needs to compare a mulligan with a McKenzie program will be needed.

5. Conclusion

This study was designed to investigate which technique is a better technique to treat patients with non-specific neck pain, both two group McKenzie and Mulligan techniques are effective in decrease pain and increase ROM according the study.

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