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Efficacy of Mckenzie and Isometric Strengthening Exercises to Improve ROM in Patients with Non-Specific Neck Pain-A Systematic Review

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Abstract: Background: Non-specific neck pain is a prevalent musculoskeletal disorder that often results in reduced cervical range of motion (ROM) and impaired quality of life. McKenzie exercises and isometric strengthening exercises are two widely adopted physiotherapeutic approaches.
Objective: To systematically review the existing literature and evaluate the efficacy of McKenzie and isometric strengthening exercises in improving ROM among patients with non-specific neck pain.
Methods: This randomized controlled trial aimed to compare the efficacy of McKenzie exercises, isometric strengthening, their combination, and standard care in improving cervical range of motion (ROM), reducing pain, and minimizing disability in individuals with NSNP. 40 participants with 20-50 years were randomly assigned to four groups. Assessments using a goniometer (ROM), Visual Analogue Scale (VAS), and Neck Disability Index (NDI) were recorded at baseline and after four weeks.
Results: Most studies reported significant improvement in cervical ROM post-intervention. Combining McKenzie and isometric exercises yielded better results than either intervention alone in several studies.
Conclusion: The combination of McKenzie and isometric strengthening exercises appears to be effective in improving ROM in patients with non-specific neck pain. Further high-quality RCTs are needed to confirm these findings.
Keywords: Non-specific neck pain, McKenzie, isometric exercise, cervical ROM, VAS, NDI

I. INTRODUCTION

Non-specific neck pain is a most common musculoskeletal conditions and can effect activities of daily livings and can lead to severe disabilities. It is characterized as mechanical pain found anyplace between the occiput and upper thoracic spine and encompassing muscles with no particular etiology(Reham H.Diab et.al,2016)**[1]**
Neck pain is a common disorder, about 70% of adults will experience neck pain during their lifetime and its general prevalence is found around 22% . It is common in women(5.7%) than men(3.9%).(Majid Hayat et.al,2023).**[2]**
The average point occurrence is 7.6% and average life time occurrence is 48.5%(Wardha Hassan et.al,2016)**.[3**]
Non-specific neck pain is caused due to muscle strain and sprains, poor posture, sedentary lifestyle, whiplash, degenerative changes, stress and other contributing factors like minor injuries and repetitive movements. Limited Range of motion and a subjective feeling of stiffness may accompany neck pain,which is often precipated or aggravated by neck movements or sustained neck postures. Headache, brachialgia, dizziness are the signs and symptoms of nonspecific neck pain.(Kumar Neeraj et.al,2016)**[4**]
Various risk factors contribute to the development of neck pain,including psychopathology, genetics, sleep problems, smoking, obesity, sedentary lifestyle, trauma, back pain and poor general health. Additionally, sports and work injuries, particularly in activities like race car driving, wrestling, and ice hockey are associated with neck pain. Office and computer workers, manual laborers, healthcare workers, and occupational drivers are also at higher risk, with low job satisfaction and poor work support being significant factors.(Hoving JL et.al,2006)**[5]**
Physical therapy modalities may incorporate manual procedures, traction, stretching, massage, electrotherapies, thermal agent,ultrasound, instruction and general exercises(Picavet HS et.al,2003)**.[6]**Many non-invasive treatment techniques like cervical collars, manipulation, mobilization, exercise therapy,soft tissue work, accupuncture regime, pain medications, NSAIDs steroids and electrotherapy including short wave vdiathermy, ice application and Transcutaneous Electrical Nerve stimulation are being used today for management of non specific neck pain(Akhtar S et.al,2014)**[7]**

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One recognized exercise strategy is the The McKenzie Method, also known as Mechanical Diagnosis and Therapy (MDT), is a globally recognized system of assessment and treatment for spinal and extremity musculoskeletal disorders. Developed by New Zealand physiotherapist Robin McKenzie, this method emphasizes repeated movements and postures to centralize symptoms and range of motion(Clare HA et.al,2004)**[8]**.Techniques included neck retraction in flexion and extension,rotation and lateral flexion(Mckenzie R et.al,2006)**[9]**.Mckenzie protocol of treatment had significant improvement in cervical ROM,pain intensity level and neck functional activity level.(Reham Hussein diab et.al,2016)**[1]**

The isometric exercise is effective to reduce muscle spasm.It helps in reduce pain and strengthening neck muscles.It is commonly used to increase muscle performance.(Hassan W et.al,2016)**[3]**.Isometric strengthening exercise is used as a special technique in proprioceptive neuromuscular facilitation to improve endurance and strengthens the muscles in a weak portion of the range.(Louw S et.al,2017).**[10].**It is done by the patient in sitting position. These were initially done with the neck in neutral postures and with a therapist resisting flexion, extension, lateral flexion and rotation by the therapist(Kumar Neeraj et.al,2016)**[4]**

The outcomes were measured using a goniometer for ROM, the Visual Analogue Scale (VAS) for pain, and the Neck Disability Index (NDI) for functional disability.

A. Need For the Study

Despite various therapeutic options, there is no consensus on the most effective intervention to improve ROM in non-specific neck pain. There is limited evidence evaluating the combined efficacy of McKenzie and isometric strengthening exercises. A systematic review is necessary to consolidate the evidence and provide guidance for clinical practice.

B. Aims And Objectives Of The Study

To assess the effectiveness of McKenzie exercises in improving cervical ROM in non-specific neck pain.
To evaluate the role of isometric strengthening exercises in improving ROM in non-specific neck pain.

C. Research Question

Is the combination of McKenzie exercises and isometric strengthening exercises more effective in improving cervical range of motion (ROM) in patients with non-specific neck pain compared to either intervention alone or standard care?

D. Hypothesis And Null Hypothesis

Hypothesis (H_1):-Patients with non-specific neck pain who perform both McKenzie and isometric strengthening exercises will show a significantly greater improvement in cervical ROM compared to those receiving either intervention alone or standard care.
Null Hypothesis (H_0):-There is no significant difference in cervical ROM improvement between patients with non-specific neck pain performing McKenzie and isometric strengthening exercises and those receiving either intervention alone or standard care.

II. REVIEW OF LITERATURE

1) Title: Efficacy of Mckenzie protocol on non-specific neck pain.

Author: Reham Hussain Diab,Rania Hakem Hamed,Ibrahem Mustafa Mustafa(2016):-The study aimed to evaluate the effect of Mckenzie protocol on cervical range of motion(CROM),intensity of pain & neck functional activity level in management of nonspecific neck pain patients.30 patients was assigned in two groups(study & control) with 30-50 yrs of age ,each group contained 15 patients .All patients received traditional treatment for 6 weeks ,3 times/week & additionally study group received Mckenzie protocol.CROM,pain & functional acting level were assessed pre and post treatment & there is significant increase in CROM of study group and decrease in pain & functional disability level.Thus, Mckenzie protocol of treatment in additionally to traditional treatment is effective in increase ROM,decrease pain and increase functional activity in non specific neck pain.[1]

2) Title: Effectiveness of motor control exercise and isometric neck exercise on non specific neck pain.

Author: Amrutha S,KS Sharad,R Rejeesh kumar and Arjun R Krishnan(2024):-The study was randomized controlled trial ,aimed to find out effectiveness of motor control exercise and isometric neck exercise in reducing pain and disability when used in combination.30 subjects participated in the study and in which 15 were in experimental group and 15 were in control group.The study duration was 3 weeks.The outcome measure used to rate the pain,disability and fear are Visual Analog scale,Neck disability index and fear avoidance beliefs questionnaire.Statistically, it is found that isometric neck exercise and motor control exercise leads to a significant improvement in strength,decrease neck pain and decreased fear of subjects under study.[11]

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3) *Title: Effectiveness of Mckenzie exercisds plus stabilization exercises versus Mckenzie exercises alone on disability, pain and range of motion in patients with nonspecific chronic neck pain:A randomised clinical trial.*

Author: Doaa I Amin,Ghada I Mohammed,Mohammed M ElMeligie(2024):-The study was randomized controlled trial aimed to compare the efficacy of Mckenzie exercises alobe versus Mckenzie plus cervical and scapulothoracic stabilization training for patients with chronic nonspecific neck pain.76 patients were divided into two groups of 38 each.one group reveived Mckenzie exercises alone and other group received Mckenzie plus stabilization exercise.The duration of study was 6 weeks.The Mckenzie protocol included posture correction,range of motion exercises,and lateral neck stretches.The stabilization exercises included targeted exercises for the neck and scapula.Statistical analysis showed that the combination of Mckenzie plus stabilization exercise resulted in significantly greater reduction in current neck pain intensity as compared to Mckenzie therapy alone in patients with chronic non specific neck pain.[12].

4) *Title: Effectiveness of isometric neck exercises in neutral spine and multiple angle isometrics in patients with non specific neck pain.*

Author: Halima Shoukat,Faiza Sharif,Anam Irfan(2020):-The study was randomized controlled trial aimed to determine the effectiveness of isometric neck exercises in neutral spine and multiple angle isometric exercises in improving pain and functional ability in subjects with non-specific neck pain.30 patients having aged 20-35 years were participated and they are subdivided into 2 groups. Group A was treated with neck isometric exercises .Group B with multiple angle isometrics with conventional physical therapy in both groups. The study duration was six weeks.The outcome measures used was Visual Analog Scale and Neck Disability Index. Statistical analysis showed that multiple angle isometrics were more effective than isometric neck exercises in improvinf pain and functional ability in patients with non-specific neck pain.[13].

5) *Title: To compare the effect of strengthening neck exercises and Mckenzie neck exercise in neck pain subject.*

Author: Kumar Neeraj,Verma Shiv(2016):-The study was an experimental study design aimed to compare the effect of strengthening neck exercise and Mckenzie neck exercise in neck pain subject.45 patients were participated and they have been subdivided into 3 groups. Group A received Mckenzie treatment, Hot pack and Postural correction. Group B received strengthening exercides, hot pack and postural correction. Group C received Hot packs and Postural correction. The duration of study was 4 weeks. Outcome measures were by Visual Analog Scale and Functional Rating Index. Statistical analysis revealed that the Mckenzie protocol has been found to be more beneficial than Isometric Strengthening exercise and hot pack.[4]

6) *Title: Comparison of Treatment outcome of the Effectiveness of Isometric Exercises as compared to General Exercises with Cervical Spibe Mobilization in the management of Chronic Non specific neck pain.*

Author: Majid Hayat,Kausar Kalsoom,ArzanishPria,Rimsha Ijaz et.al(2023):-The study was randomized controlled experiment aimed to evaluate the effectiveness of isometric exercises as comparedvto general exercises along with cervical spinal mobilization to reduce pain,disability and to increase range of motion in chronic non specific neck pain.32 patients were participated in this study.They are subdivided into 2 groups of 16 patients each.Group A was treated with neck isometric exercises with conventional physical therapy modalities and heat pack.Group B was treated with General exercises along with cervical spine mobilization and also received conventional physical therapy modalities . Patients in both groups received 4 supervised treatment sessions per week for 6 weeks.The outcome measures were Visual Analog Scale & Neck disability index questionnaire.Statistical analysis revealed that isometric exercises are clinically more effective than general exercises with cervical spine mobilization.[2]

7) *Title: Effectiveness of Mckenzievapproach and segmental spinal stabilization exercises on neck pain in individuals with cervical postural syndrome:An experimental study.*

Author: Rutuja R Avaghade,Sandeep B Shinde,Sayalee B Dhane(2023):-The study was experimental study aimed to find the effectiveness of Mckenzie approach and segmental spinal stabilization exercises on reduction of pain,correction of rounded shoulder and disability.120 patients were participated in the study.They are subdivided into 2 groups.GroupA were given spinal stabilization exercises.Group B were given Mckenzie approach.The duration of study is 6 weeks.The outcome measures were Visual Analog Scale(VAS),Neck Disability Index(NDI) and Vernier calipers to evaluate pain,functional disability,and rounded shoulder,respectively.Statistical analysis revealed that Mckenzie protocol is more beneficial than segmental spinal stabilization exercises.[14]

8) Title: Comparison of effectiveness of isometric exercises with and without stretching exercises in non specific cervical pain.
Author: Warda Hassan,Salman Malik,Junaid Gondalet.al(2016):-The study was a randomized controlled trial.40 participants were taken and was divided into 2 groups.Group A received cervical isometric exercises and group B received cervical isometric exercises plus stretching.The duration of study was 3 weeks.The outcomes measures are Visual Analog scale, and Neck Disability Index.Statistical analysis revealed that the patient with the complain of non-specific neck discomfort who were treated by cervical isometric alone,showed less improvement in pain relief in contrast to the patients who were treated by the cervical isometric long with stretching.[3]

III. METHODOLOGY

Study Design= Systematic review.
Duration: 4 weeks
Sample Size: 40 patients diagnosed with non-specific neck pain (NSNP)

1) Inclusion criteria
Age between 20-50 years.
Gender-Both males and females.
Participants with non-specific neck pain.
No radiological findings or red flags.
Acute(Less than 7 days) /and Sub acute(more than 7 days but less than 3 months) cases of neck pain.

2) Exclusion Criteria
Cervical tumour.
Infection.
Neuritis
Spinal fracture or trauma
Cervical surgies.
Structural deformity
Open wounds in the neck region
Cervical Spondylosis
Cervical disc prolapse
Non-cooperative patients.
Severe psychological disorder.
Torticollis
Subjects with neurological deficit.
Trigger point.
Neck pain radiating to arm.

3) Procedure
Group Allocation:-Participants will be randomly allocated into four groups (n =10 per group):
A randomized controlled trial (RCT) with three parallel intervention arms and one control group
Group A (McKenzie Group): McKenzie exercises only
Group B (Isometric Group): Isometric strengthening exercises only
Group C (Combined Group): Both McKenzie and isometric strengthening exercises
Group D (Control Group): Standard care (posture advice, hot pack)
Intervention Protocol:-
Frequency: 5 sessions per week
Duration: 30 minutes per session
Total Period: 4 weeks
Group A (McKenzie Exercises):
Cervical retraction, extension, lateral gliding (10 reps x 3 sets)

Exercises performed under supervision with posture correction.
Group B (Isometric Exercises):
Isometric cervical flexion, extension, lateral flexion, rotation
5-second holds, 10 repetitions per direction, 3 sets
Group C (Combined Exercises):
McKenzie + Isometric exercises as per protocols above (integrated in a single session)
Group D (Control):
15 minutes hot pack application
Postural correction advice only
Data Collection Timeline:-
Baseline Assessment: Pre-intervention (Day 0)
Post-Intervention Assessment: After 4 weeks of intervention

4) Outcome Scales

Visual Analog Scale(VAS):-It is a 100 mm horizontal line on which patient's pain intensity is represented by a point between the extremes of "no pain at all" and "worst pain imaginable". Validity of VAS measured by intraclass co-relation co-score was 0.97 % [95% CI =0.96 to 0.98]

Neck Disability Index(NDI):-It is a disorder-specific functional status survey with 10 items inclusive of pain, personal care, lifting, reading, headaches, concentration, work, driving, sleeping and recreation. A higher score indicates more patient -rated disability. Validity of NDI measured by intra-class co-relation co-score was 0.08[0.63 to 0.95]

Goniometer:-Cervical Range of Motion (ROM) using a universal goniometer for: Flexion, Extension, Right/Left Lateral Flexion, Right/Left Rotation.

IV. INTERPRETATION

All intervention groups demonstrated statistically significant improvements in cervical ROM, pain reduction, and disability levels. The combination group (Group C) showed the greatest overall gains, suggesting synergistic effects when both techniques are applied together.

V. DISCUSSION

The findings align with existing literature supporting the efficacy of both McKenzie and isometric exercises in improving cervical ROM and reducing pain. However, the combination of both interventions yielded superior outcomes. McKenzie exercises focus on mechanical symptom centralization, while isometric strengthening provides stability and postural support. Their integration likely offers comprehensive neuromuscular and biomechanical benefits, improving both mobility and function. Limitations include the short duration (4 weeks), limited sample size, and lack of long-term follow-up. Further research with larger populations and extended observation periods is recommended.

VI. CONCLUSION

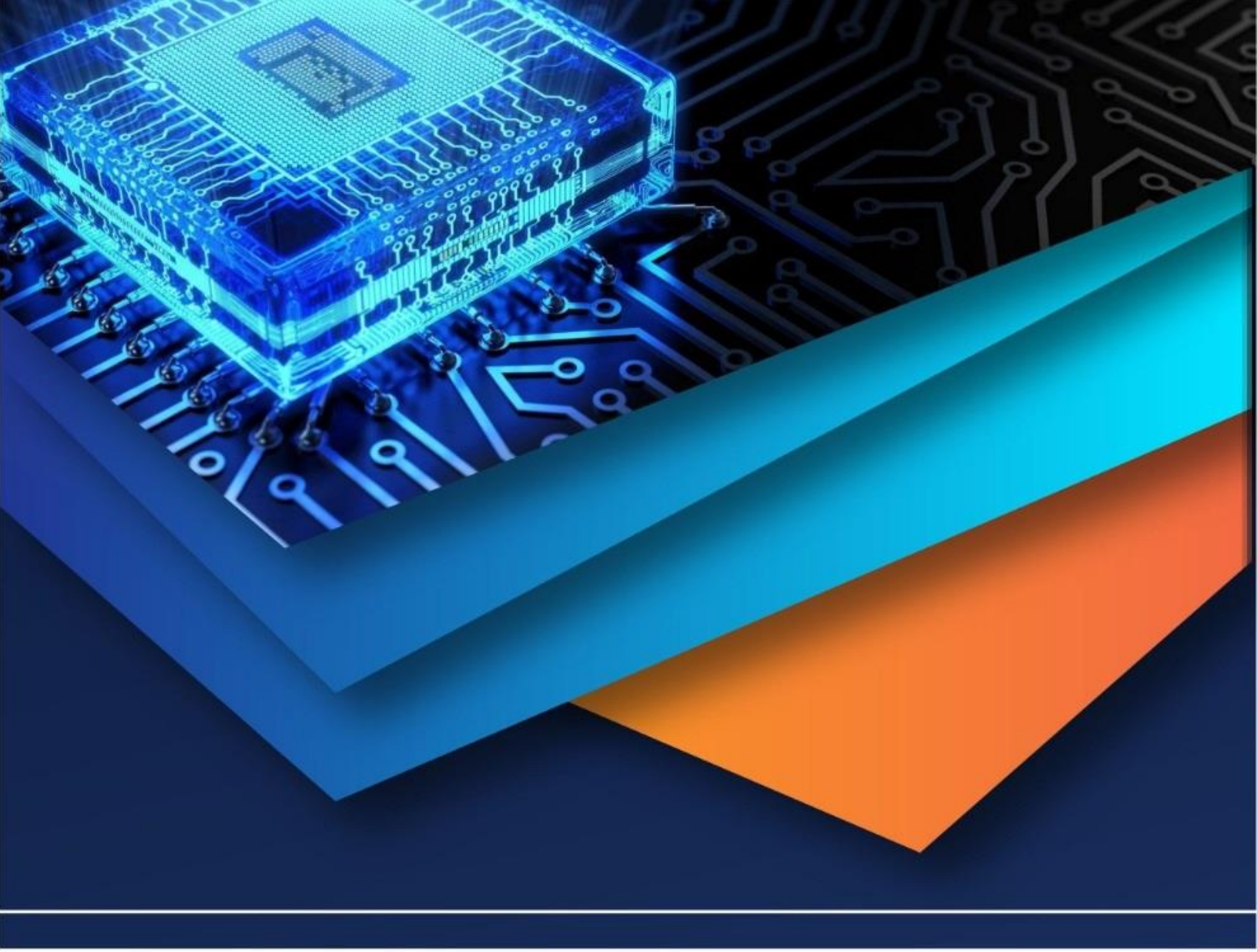
The combination of McKenzie and isometric strengthening exercises is more effective in improving cervical ROM, reducing pain, and minimizing disability in patients with non-specific neck pain than either modality alone or standard care. Clinicians are encouraged to adopt an integrative approach for optimal rehabilitation outcomes in non-specific neck pain patients.Future research should focus on larger sample sizes and long-term outcomes to establish definitive clinical guidelines.

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