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THE COMPARISON OF THE MCKENZIE EXERCISE AND STABILIZATION EXERCISE IN PATIENTS WITH NONSPECIFIC NECK PAIN: A RANDOMIZED CONTROLLED TRIAL

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Abstract: *Background: Non-specific mechanical neck pain is associated with pain, restricted cervical mobility, and functional disability. McKenzie exercises and cervical stabilization exercises are commonly used physiotherapy approaches, but their comparative short-term effects require further evaluation. Objective: To compare the effectiveness of McKenzie exercises and stabilization exercises in patients aged 40–50 years with non-specific mechanical neck pain. Methods: A randomized controlled trial was conducted among 42 participants, with 21 participants allocated to each group. Group A received McKenzie exercises and Group B received stabilization exercises for four weeks. Pain was assessed using the Visual Analogue Scale (VAS), disability using the Neck Disability Index (NDI), and cervical and shoulder mobility using a universal goniometer. Assessments were performed before and after the intervention. Results: The reported post-treatment VAS score was 2.67 ± 1.23 in Group A and 3.71 ± 0.96 in Group B ($p = 0.003$). NDI decreased from 33.38 ± 9.01 to 15.52 ± 7.79 in Group A and from 32.00 ± 9.99 to 29.29 ± 10.03 in Group B (reported $p < 0.0001$ for the post-treatment comparison). Group A also showed larger reported gains in cervical flexion, extension, rotation, and lateral flexion. Conclusion: Both exercise approaches were associated with improvement over four weeks; the reported results showed larger short-term changes with McKenzie exercises for pain, disability, and several cervical mobility measures. Larger randomized trials with longer follow-up are required to determine the durability and generalizability of these findings.*

Keywords: *non-specific neck pain; McKenzie exercises; stabilization exercises; physiotherapy; VAS; Neck Disability Index; cervical range of motion.*

1. INTRODUCTION

Non-specific neck pain is a common musculoskeletal problem characterized by pain in the posterior or lateral cervical region in the absence of a specific serious structural or neurological disorder. Symptoms may include pain, stiffness, restricted range of motion, reduced muscle performance, and limitations in daily activities. Mechanical neck pain is frequently associated with sustained postures and movement-related aggravation, and it can affect functional capacity and quality of life.[1–4] Exercise therapy is a central component of physiotherapy management for non-specific neck pain. The McKenzie approach uses repeated cervical movements, postural correction, and individualized mechanical loading according to the patient's response. Cervical stabilization exercise focuses on activation and coordinated control of deep and superficial cervical muscles, endurance, and neuromuscular control.[5–12] Previous investigations have reported beneficial effects of both approaches, but differences in participant characteristics, exercise dosage, duration, and outcome measures make direct comparison difficult. Studies have reported improvement with McKenzie exercises in pain and cervical mobility, while stabilization programmes have also demonstrated benefits for pain, disability, and cervical function.[13–29] The present study was therefore undertaken to compare McKenzie exercises with stabilization exercises in adults aged 40–50 years with non-specific mechanical neck pain.

2. AIM

To find out the effectiveness of the McKenzie exercise versus stabilization exercise in patients with non-specific neck pain.

3. OBJECTIVES:

- To determine the effectiveness of McKenzie exercises for non-specific mechanical neck pain.
- To determine the effectiveness of stabilization exercises for non-specific mechanical neck pain.
- To compare the effects of McKenzie exercises and stabilization exercises for non-specific mechanical neck pain.

4. RESEARCH QUESTION:

What is the comparative effectiveness of McKenzie exercises versus stabilization exercises in reducing pain and improving function in patients with non-specific neck pain?

5. METHODOLOGY:

Study design and setting: The study was conducted as a randomized controlled trial in Chhatrapati Sambhajinagar, Maharashtra, India. The intervention duration was four weeks. A total of 42 participants were included, with 21 participants in each group.

Participants: Participants were aged 40–50 years and had non-specific mechanical neck pain. Inclusion criteria were generalized neck pain for three months or more, pain perceived in the posterior cervical region from the superior nuchal line to the first thoracic spinous process, and a VAS score of 4–7. Participants with severe trauma or fracture, congenital cervical spine disorders, neurological deficits, previous spinal surgery, Pott's spine, rheumatoid arthritis, or ankylosing spondylosis were excluded.

Sampling and allocation: The thesis described simple random sampling and random allocation into two intervention groups. For this manuscript, the group allocation is standardized as Group A = McKenzie exercises and Group B = stabilization exercises.

Intervention: Group A received the McKenzie exercise approach. The programme included cervical movement and postural exercises such as cervical retraction, extension, flexion, lateral bending, and rotation, as described in the study protocol. Group B received cervical stabilization exercises aimed at improving cervical muscle activation, coordination, strength, and control. Both interventions were administered for four weeks.

Outcome measures: Pain intensity was assessed using the Visual Analogue Scale (VAS). Functional disability was assessed using the Neck Disability Index (NDI). Cervical and shoulder range of motion was measured using a universal goniometer. The NDI consisted of 10 neck-related activities scored from 0 to 5, with higher scores indicating greater disability.

Statistical analysis: Data were entered into Microsoft Excel and analysed using SPSS version 25.0. Mean and standard deviation were used for quantitative variables and proportions for categorical variables. The original analysis used unpaired t-tests for comparisons between the two groups and paired t-tests for pre- to post-treatment comparisons within groups. A p value <0.05 was considered statistically significant. The p-values in the Results are reported as presented in the source thesis tables.Ethical considerations: Participants were informed about the nature of the study and intervention, and informed consent was obtained before participation.

6. RESULTS:

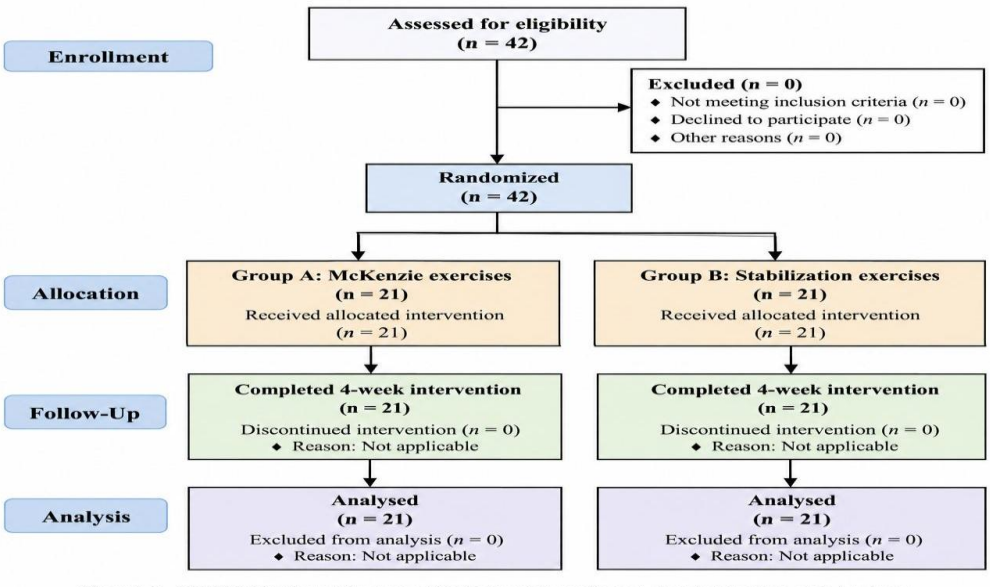


Figure 1. CONSORT Flow Diagram of Participant Recruitment, Randomization, and Analysis

Forty-two participants were included, with 21 participants in each group. Group A represented the McKenzie exercise group and Group B represented the stabilization exercise group. The mean age was 44.48 ± 3.97 years in Group A and 44.46 ± 3.91 years in Group B, with no reported significant difference (p = 0.989).

Table 1. Distribution of participants according to age group

Age group	Group A: McKenzie n (%)	Group B: Stabilization n (%)
40–45 years	14 (66.7)	13 (61.9)
46–50 years	7 (33.3)	8 (38.1)
Total	21 (100)	21 (100)

Table 2. Distribution of participants according to sex

Sex	Group A: McKenzie n (%)	Group B: Stabilization n (%)
Male	4 (19.0)	3 (14.3)
Female	17 (81.0)	18 (85.7)
Total	21 (100)	21 (100)

The sex distribution was similar between groups. Group A included 4 males (19.0%) and 17 females (81.0%), whereas Group B included 3 males (14.3%) and 18 females (85.7%). The reported between-group comparison was not statistically significant (p = 0.679).

Table 3. Principal outcome measures before and after intervention

Outcome	Group	Pre-treatment Mean ± SD	Post-treatment Mean ± SD	Reported between-group p value	Mean change	Reported within-group p value
Cervical flexion (°)	A – McKenzie	33.48 ± 3.03	38.62 ± 2.54	<0.0001	+5.14°	<0.0001
Cervical flexion (°)	B – Stabilization	31.14 ± 4.51	33.05 ± 4.37	<0.0001	+1.91°	0.012
Cervical extension (°)	A – McKenzie	32.76 ± 3.45	38.33 ± 2.65	0.001	+5.57°	<0.0001
Cervical extension (°)	B – Stabilization	30.81 ± 4.83	32.71 ± 4.83	0.001	+1.90°	0.067
Right rotation (°)	A – McKenzie	43.81 ± 4.68	49.00 ± 3.79	0.001	+5.19°	0.003
Right rotation (°)	B – Stabilization	41.62 ± 5.98	43.43 ± 5.78	0.001	+1.81°	0.032
Left rotation (°)	A – McKenzie	44.00 ± 4.45	49.14 ± 3.54	0.001	+5.14°	0.001
Left rotation (°)	B – Stabilization	42.62 ± 5.93	43.62 ± 5.77	0.001	+1.00°	0.310
Right lateral flexion (°)	A – McKenzie	31.95 ± 3.81	36.76 ± 3.19	0.001	+4.81°	<0.0001
Right lateral flexion (°)	B – Stabilization	29.52 ± 4.56	32.00 ± 4.39	0.001	+2.48°	0.022
Left lateral flexion (°)	A – McKenzie	31.86 ± 3.96	36.80 ± 3.44	0.001	+4.94°	<0.0001
Left lateral flexion (°)	B – Stabilization	29.38 ± 4.57	31.00 ± 4.40	0.001	+1.62°	0.472
VAS	A – McKenzie	4.86 ± 1.15	2.67 ± 1.23	0.003	−2.19	0.001
VAS	B – Stabilization	4.54 ± 0.98	3.71 ± 0.96	0.003	−0.83	0.034
NDI	A – McKenzie	33.38 ± 9.01	15.52 ± 7.79	<0.0001	−17.86	<0.0001
NDI	B – Stabilization	32.00 ± 9.99	29.29 ± 10.03	<0.0001	−2.71	0.036

Cervical mobility improved in both groups, but the reported magnitude of improvement was greater in the McKenzie group. Cervical flexion increased by 5.14° in Group A compared with 1.91° in Group B.

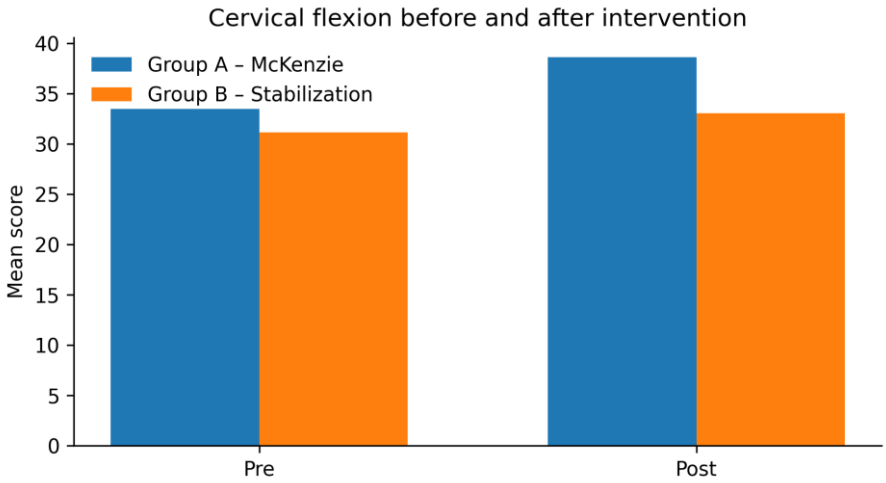


Figure 1. Cervical flexion before and after intervention

Cervical extension increased by 5.57° in Group A and 1.90° in Group B.

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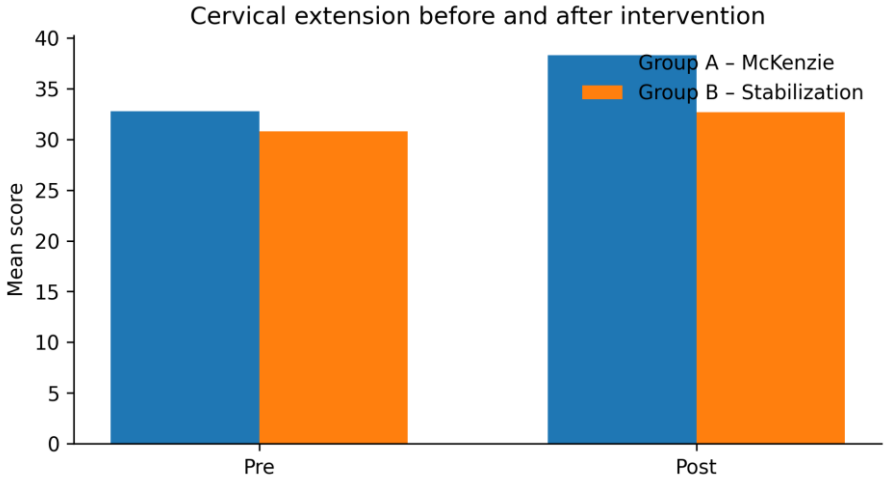


Figure 2. Cervical extension before and after intervention

Right and left cervical rotation increased by 5.19° and 5.14°, respectively, in Group A, compared with 1.81° and 1.00° in Group B.

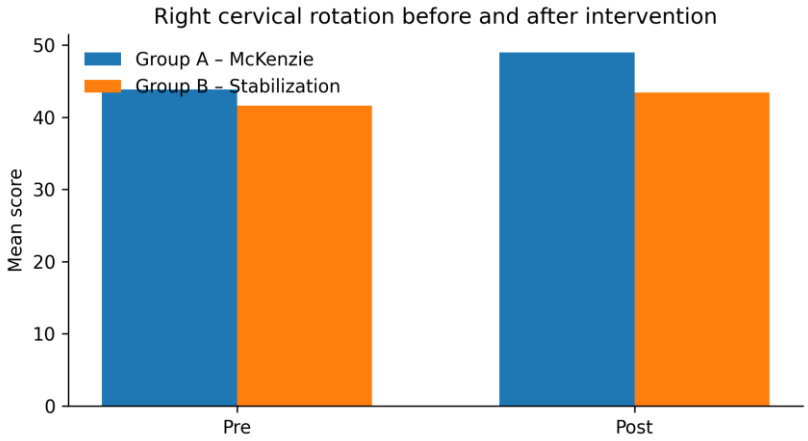


Figure 3. Cervical rotation before and after intervention

Right and left lateral flexion increased by 4.81° and 4.94° in Group A, compared with 2.48° and 1.62° in Group B.

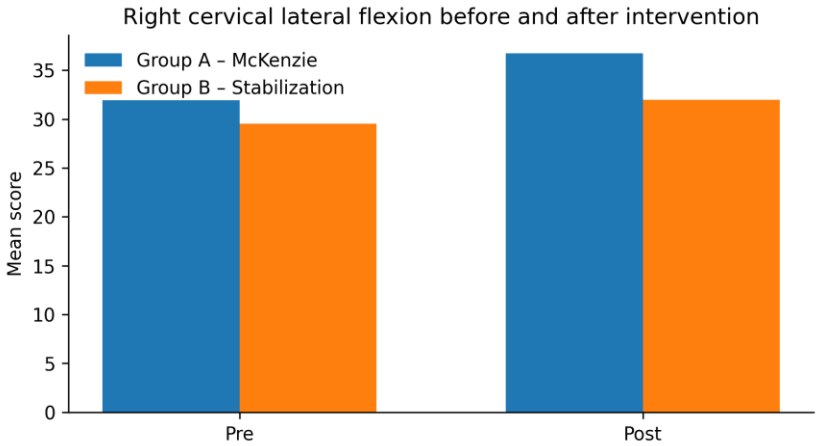


Figure 4. Cervical lateral flexion before and after intervention

Pain intensity decreased from 4.86 ± 1.15 to 2.67 ± 1.23 in Group A and from 4.54 ± 0.98 to 3.71 ± 0.96 in Group B. The reported post-treatment between-group p value was 0.003.

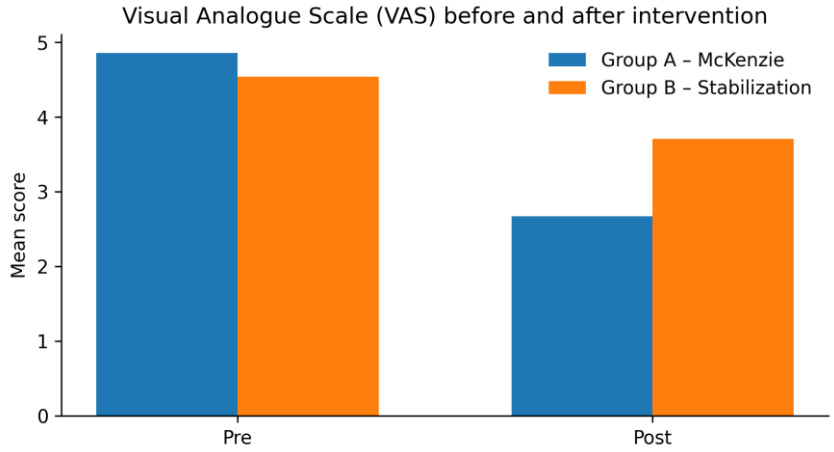


Figure 5. VAS scores before and after intervention

NDI decreased from 33.38 ± 9.01 to 15.52 ± 7.79 in Group A and from 32.00 ± 9.99 to 29.29 ± 10.03 in Group B, with a reported post-treatment p value <0.0001.

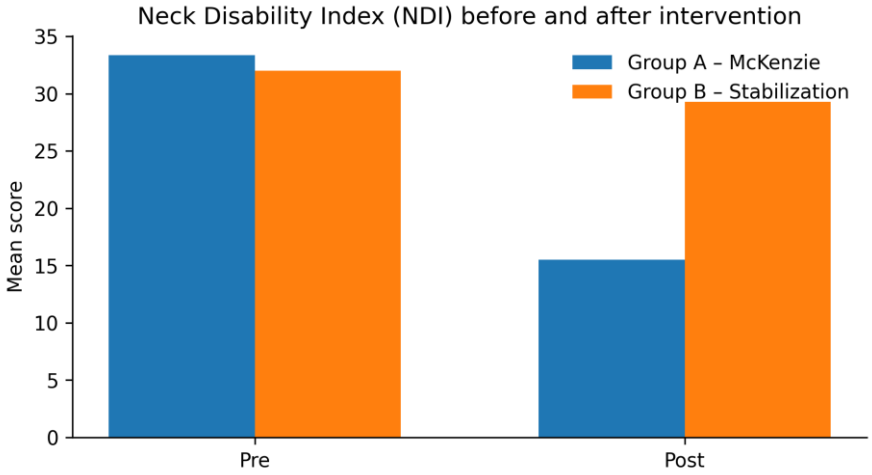


Figure 6. Neck Disability Index scores before and after intervention

Shoulder range of motion was also assessed. The reported values showed improvement in several shoulder movements within Group A, while between-group post-treatment differences were not consistently statistically significant across all shoulder movements. The source thesis contains multiple shoulder ROM tables; these secondary results were not used to alter the principal comparative interpretation presented above.

7. DISCUSSION:

The present randomized controlled trial compared McKenzie exercises with cervical stabilization exercises in adults aged 40–50 years with non-specific mechanical neck pain. The reported findings showed improvement in both groups after four weeks, with larger changes in the McKenzie group across the principal outcomes. The baseline age, sex distribution, VAS, and NDI values were reported as comparable between the two groups.

The reduction in pain was greater in the McKenzie group. VAS decreased by 2.19 points in Group A compared with 0.83 points in Group B. The findings are consistent with previous research describing beneficial effects of McKenzie-based exercise for pain reduction and restoration of cervical movement. Studies comparing McKenzie exercises with other exercise approaches have similarly reported improvement in pain and cervical mobility.[5],[13],[14],[25],[26] Functional disability also showed a larger reported improvement in the McKenzie group. NDI decreased by 17.86 points in Group A compared with 2.71 points in Group B. The NDI assesses the effect of neck symptoms on daily activities; therefore, the larger reduction indicates greater short-term functional improvement in the McKenzie group within the present sample.

Cervical range of motion demonstrated a similar pattern. McKenzie exercise produced larger reported improvements in flexion, extension, rotation, and lateral flexion. The McKenzie approach emphasizes repeated and controlled cervical movements and individualized mechanical loading, which may help restore movement and reduce

movement-related symptoms. Previous studies have also reported improvement in cervical ROM following McKenzie-based interventions.[5],[14],[25] The stabilization group also demonstrated improvement in several outcomes. Cervical stabilization programmes are intended to improve deep cervical muscle activation, coordination, endurance, and neuromuscular control. Previous studies have reported beneficial effects of stabilization exercises for pain and disability.[3],[9],[15],[28] The comparatively smaller changes observed in the present study should be interpreted in the context of the four-week intervention period; the present study did not include long-term assessment and therefore cannot establish whether stabilization exercises would produce greater effects with longer training. The findings should be interpreted in relation to the study design and analysis. The original thesis used unpaired t-tests for between-group comparisons and paired t-tests for within-group comparisons. For a two-group randomized trial, the most direct comparative estimate is the difference in change between groups, preferably analysed using an appropriate repeated-measures or ANCOVA approach. Accordingly, the p values in this manuscript are retained as reported in the source thesis and should be verified against the original master chart and SPSS output before final submission. The study contributes to the clinical literature by directly comparing two commonly used exercise approaches within a defined age range. Nevertheless, the sample was small, recruitment was from a single setting, intervention duration was four weeks, and long-term outcomes were not assessed. Consequently, the results describe short-term changes in this sample and should not be generalized beyond the study population without further evidence.

8. CONCLUSION:

Both McKenzie exercises and stabilization exercises were associated with improvement in patients with non-specific mechanical neck pain after four weeks. Based on the reported numerical results, the McKenzie exercise group demonstrated greater short-term improvement in pain, neck disability, and several cervical range-of-motion measures than the stabilization exercise group. The findings support the use of exercise-based physiotherapy for non-specific mechanical neck pain, while larger randomized studies with longer intervention periods and follow-up are required to determine the durability of the comparative effects.

9. LIMITATIONS:

- The sample size was relatively small, limiting generalizability.
- The study was conducted at a single centre.
- The intervention duration was limited to four weeks.
- Long-term follow-up was not performed, so maintenance of treatment effects and recurrence could not be assessed.
- Only participants aged 40–50 years were included.
- Psychosocial, occupational, ergonomic, and lifestyle factors were not evaluated.

10. FUTURE SCOPE:

- Larger multicentre randomized controlled trials should be conducted.
- Longer intervention periods and follow-up assessments should be included.
- Future studies should use an appropriate between-group change analysis or repeated-measures/ANCOVA framework.
- The effects of exercise adherence, cervical muscle endurance, proprioception, and quality of life should be evaluated.
- Different age groups and occupational populations should be investigated.
- Studies comparing combined McKenzie and stabilization programmes may be undertaken.

11. CLINICAL IMPLICATIONS:

The reported findings indicate that McKenzie exercises may be useful for short-term reduction of pain and disability and for improving cervical mobility in patients with non-specific mechanical neck pain. The approach requires relatively little equipment and can be incorporated into supervised physiotherapy and home-exercise programmes. Stabilization exercises remain relevant for cervical neuromuscular control and should also be considered within individualized rehabilitation programmes. Selection of exercise should be based on the patient's clinical presentation, treatment goals, tolerance, and progression.

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