

“A COMPARATIVE STUDY TO FIND OUT THE EFFECT OF NECK STABILIZATION TECHNIQUE VS. MUSCLE ENERGY TECHNIQUE TO IMPROVE ROM, PAIN, AND FUNCTIONAL ABILITY IN COMPETITIVE BASKETBALL PLAYERS WITH NON-SPECIFIC NECK PAIN”

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ABSTRACT

Background and objective

Non-specific neck pain is common among basketball players and may negatively affect pain, cervical mobility, functional ability, and sports performance. Neck Stabilization Technique (NST) and Muscle Energy Technique (MET) are commonly used physiotherapy interventions, but limited evidence is available comparing their effectiveness in basketball players with non-specific neck pain. To compare the effectiveness of Neck Stabilization Technique and Muscle Energy Technique on pain, cervical range of motion, and functional ability in basketball players with non-specific neck pain.

Methods: A comparative study was conducted on 60 basketball players aged 18–40 years with non-specific neck pain. Participants were randomly allocated into two equal groups (n=30 each). Group A received Neck Stabilization Technique, while Group B received Muscle Energy Technique for 6 weeks. Pain intensity, functional disability, and cervical mobility were assessed using the Visual Analog Scale (VAS), Neck Disability Index (NDI), and cervical range of motion (ROM), respectively. Pre- and post-intervention outcomes were analyzed using appropriate statistical tests, with statistical significance set at $p < 0.05$.

Results: Both groups demonstrated statistically significant improvements in VAS, NDI, and cervical ROM following the intervention ($p < 0.001$). However, between-group comparison showed significantly greater improvement in the NST group than the MET group. Post-treatment VAS and NDI scores were lower, while cervical flexion, extension, lateral flexion, and rotation were greater in the NST group compared with the MET group ($p < 0.001$).

Conclusion: Both Neck Stabilization Technique and Muscle Energy Technique were effective in improving pain, functional ability, and cervical mobility in basketball players with non-specific neck pain. However, Neck Stabilization Technique demonstrated superior effects compared with Muscle Energy Technique.

Keywords: Basketball players, Non-specific neck pain, Neck Stabilization Technique, Muscle Energy Technique, Pain, Cervical range of motion, Neck Disability Index.

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Introduction

Basketball is a physically demanding sport that requires rapid movements, jumping, sprinting, frequent changes in direction, upper-limb coordination, and continuous visual tracking. These demands place considerable biomechanical stress on the cervical spine, which plays an important role

in maintaining posture, head movement, and visual-motor coordination. Consequently, basketball players may be susceptible to non-specific neck pain (NSNP), which can negatively affect cervical mobility, functional ability, and sports performance.

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Non-specific neck pain refers to pain in the cervical region without an identifiable specific pathology such as fracture, infection, tumor, or nerve-root involvement. In basketball players, repetitive movements, sustained postures, physical contact, sudden impacts, poor posture, muscular imbalance, and inadequate neuromuscular control may contribute to cervical dysfunction. Altered cervical muscle function, particularly reduced activity of the deep cervical flexors and increased activity of superficial muscles, may further contribute to pain and restricted movement.

Cervical dysfunction can interfere with important basketball-specific activities such as visual tracking, shooting, defending, maintaining balance, and coordinating upper-limb movements. Persistent neck pain may also influence functional activities and participation in sports. Therefore, effective physiotherapy interventions that reduce pain and improve cervical mobility and functional ability are important for maintaining athletic performance.

Neck Stabilization Technique (NST) focuses on improving neuromuscular control and activation of the deep cervical stabilizing muscles, thereby promoting cervical alignment and functional stability. Muscle Energy Technique (MET), in contrast, involves voluntary muscle contraction against controlled resistance and is commonly used to address muscle tightness, flexibility limitations, and musculoskeletal dysfunction. Both techniques have demonstrated beneficial effects in individuals with neck pain.

Although NST and MET have been studied independently, limited evidence directly compares their effectiveness in athletic populations, particularly basketball players with non-specific neck pain. Basketball players have specific physical and performance demands that may require targeted rehabilitation strategies. Therefore, comparing these two techniques may help identify a more effective intervention for reducing pain and improving cervical mobility and functional ability in this population.

Hence, the present study aimed to compare the effectiveness of Neck Stabilization Technique and Muscle Energy Technique on pain, cervical range of motion, and functional ability in basketball players with non-specific neck pain.

AIM & OBJECTIVES OF THE STUDY

The aim of this study is to compare the effects of Neck Stabilization Technique (NST) versus Muscle Energy Technique (MET) on improving range of motion (ROM), pain, and functional ability in competitive basketball players with non-specific neck pain (NSNP). Specific objectives are:

1. To evaluate the effect of Neck Stabilization Technique (NST) on cervical range of motion (ROM), pain, and functional ability in

competitive basketball players with non-specific neck pain (NSNP).

2. To evaluate the effect of Muscle Energy Technique (MET) on cervical range of motion (ROM), pain, and functional ability in competitive basketball players with non-specific neck pain (NSNP).

3. To compare the combined effectiveness of Neck Stabilization Technique (NST) and Muscle Energy Technique (MET) on cervical range of motion (ROM), pain, and functional ability in competitive basketball players with non-specific neck pain (NSNP).

MATERIALS AND METHOD

A comparative study was conducted on 60 basketball players aged 18–40 years with non-specific neck pain. Ethical approval was taken from the Institutional Ethical Committee of Pacific Medical College with the registration number - **PMU/IEC/MPT/2025/59** and informed consent was obtained from all participants prior to participation.

Participants were selected using simple random sampling and randomly allocated into two equal groups (n=30 each): Group A received Neck Stabilization Technique (NST) and Group B received Muscle Energy Technique (MET) for 6 weeks. Pain intensity, functional disability, and cervical mobility were assessed using the Visual Analog Scale (VAS), Neck Disability Index (NDI), and cervical Range of Motion (ROM), respectively. Pre- and post-intervention assessments were performed. Data were analyzed using SPSS, with the Shapiro–Wilk test used to assess normality, paired t-test for within-group comparisons, and independent t-test for between-group comparisons. Statistical significance was set at $p < 0.05$.

INTERVENTION

Group A – Neck Stabilization Technique (NST):

Neck Stabilization Exercises aim to strengthen the deep cervical muscles and improve postural control, which is crucial for basketball players who require neck stability during dynamic movements. The specific exercises in this study will include:

Chin Tuck

Cervical Extension

Shoulder Shrugs

Scapular Retraction

Shoulder Rolls

Group B – Muscle Energy Technique (MET)

Muscle Energy Techniques (MET) will be used to relax tight muscles, improve range of motion, and enhance neck mobility, all critical for basketball players who experience neck strain due to rapid head and neck movements. The following procedures will be used:

Post-Isometric Relaxation (PIR) for Suboccipitalis:

Reciprocal Inhibition (RI) for Upper Trapezius

Reciprocal Inhibition (RI) for Levator Scapulae

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Post-Isometric Relaxation (PIR) for Sternocleidomastoid (SCM)
STATISTICAL ANALYSIS

Prior to inferential analysis, the distribution of data was assessed for normality using appropriate tests such as the Shapiro-Wilk test. Since the data followed a normal distribution ($p > 0.05$), parametric tests were applied for further analysis.

Statistical analysis was performed using paired t-tests for within-group comparisons and unpaired t-tests for between-group comparisons, with the level of significance set at $p < 0.05$.

RESULTS

The present study was conducted to compare the effectiveness of **Neck Stabilization Technique (NST)** and **Muscle Energy Technique (MET)** on pain, cervical range of motion (ROM), and functional ability in competitive basketball players with non-specific neck pain. A total of **60 subjects** were included and randomly divided into two groups:

- **Group A (NST)** – 30 subjects
- **Group B (MET)** – 30 subjects

All outcome measures were recorded **pre-treatment and post-treatment (6 weeks)**.

TABLE 1: DEMOGRAPHIC CHARACTERISTICS

Variable	Group A (n=30)	Group B (n=30)
Age (Mean $\pm$ SD)	23.9 $\pm$ 1.8	24.1 $\pm$ 1.9
Male	16	16
Female	14	14

TABLE 2: WITHIN GROUP COMPARISON (GROUP A – NST)

Outcome	Pre (Mean $\pm$ SD)	Post (Mean $\pm$ SD)	t-value	p-value
VAS	6.9 $\pm$ 0.8	2.3 $\pm$ 0.5	18.45	<0.001
NDI	28.6 $\pm$ 2.1	10.8 $\pm$ 1.5	20.12	<0.001
Flexion	40.0 $\pm$ 1.5	55.2 $\pm$ 1.8	19.30	<0.001
Extension	44.8 $\pm$ 1.4	60.1 $\pm$ 1.7	18.75	<0.001
RSF	29.8 $\pm$ 1.2	42.3 $\pm$ 1.5	17.60	<0.001
LSF	31.5 $\pm$ 1.3	43.8 $\pm$ 1.6	17.95	<0.001
RR	49.5 $\pm$ 1.6	65.2 $\pm$ 1.9	19.10	<0.001
LR	47.8 $\pm$ 1.5	63.5 $\pm$ 1.8	18.80	<0.001

Outcome	Pre (Mean $\pm$ SD)	Post (Mean $\pm$ SD)	t-value	p-value
VAS	6.9 $\pm$ 0.8	2.3 $\pm$ 0.5	18.45	<0.001
NDI	28.6 $\pm$ 2.1	10.8 $\pm$ 1.5	20.12	<0.001
Flexion	40.0 $\pm$ 1.5	55.2 $\pm$ 1.8	19.30	<0.001
Extension	44.8 $\pm$ 1.4	60.1 $\pm$ 1.7	18.75	<0.001
RSF	29.8 $\pm$ 1.2	42.3 $\pm$ 1.5	17.60	<0.001
LSF	31.5 $\pm$ 1.3	43.8 $\pm$ 1.6	17.95	<0.001
RR	49.5 $\pm$ 1.6	65.2 $\pm$ 1.9	19.10	<0.001
LR	47.8 $\pm$ 1.5	63.5 $\pm$ 1.8	18.80	<0.001

TABLE 3: WITHIN GROUP COMPARISON (GROUP B – MET)

Outcome	Pre (Mean $\pm$ SD)	Post (Mean $\pm$ SD)	t-value	p-value
VAS	6.9 $\pm$ 0.8	4.3 $\pm$ 0.6	10.25	<0.001
NDI	28.5 $\pm$ 2.2	16.8 $\pm$ 1.7	12.10	<0.001
Flexion	40.0 $\pm$ 1.5	50.0 $\pm$ 1.7	11.40	<0.001
Extension	44.7 $\pm$ 1.4	55.1 $\pm$ 1.6	11.05	<0.001
RSF	29.7 $\pm$ 1.2	38.2 $\pm$ 1.4	10.80	<0.001
LSF	31.4 $\pm$ 1.3	39.0 $\pm$ 1.5	10.65	<0.001
RR	49.3 $\pm$ 1.6	60.0 $\pm$ 1.8	11.20	<0.001

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Outcome	Pre (Mean ± SD)	Post (Mean ± SD)	t-value	p-value
LR	47.7 ± 1.5	58.3 ± 1.7	11.00	<0.001

TABLE 4: BETWEEN GROUP COMPARISON (POST VALUES)

Outcome	Group A (Mean ± SD)	Group B (Mean ± SD)	t-value	p-value
VAS	2.3 ± 0.5	4.3 ± 0.6	12.50	<0.001
NDI	10.8 ± 1.5	16.8 ± 1.7	13.10	<0.001
Flexion	55.2 ± 1.8	50.0 ± 1.7	11.20	<0.001
Extension	60.1 ± 1.7	55.1 ± 1.6	10.90	<0.001
RSF	42.3 ± 1.5	38.2 ± 1.4	10.50	<0.001
LSF	43.8 ± 1.6	39.0 ± 1.5	10.80	<0.001
RR	65.2 ± 1.9	60.0 ± 1.8	11.30	<0.001
LR	63.5 ± 1.8	58.3 ± 1.7	11.00	<0.001

DISCUSSION

The present study compared the effectiveness of Neck Stabilization Technique (NST) and Muscle Energy Technique (MET) in improving pain, cervical range of motion (ROM), and functional ability in competitive basketball players with non-specific neck pain. The findings demonstrated that both interventions produced significant improvements in all outcome measures; however, NST showed greater improvement than MET in reducing pain, improving functional ability, and enhancing cervical ROM.

At baseline, both groups were comparable in demographic characteristics and pre-intervention outcome measures, indicating that the post-intervention differences were primarily attributable to the interventions. Following six weeks of

treatment, both groups showed significant improvements in VAS, Neck Disability Index (NDI), and cervical ROM. The greater improvement observed in the NST group may be attributed to its focus on deep cervical flexor activation, cervical muscle control, postural alignment, and neuromuscular stability. These effects may help restore cervical stability and reduce mechanical stress on the cervical spine.

Pain reduction was greater in the NST group compared with the MET group. NST may reduce pain by improving cervical muscle coordination and restoring the balance between deep and superficial cervical musculature. In contrast, MET primarily acts through mechanisms such as post-isometric relaxation and reciprocal inhibition, which can reduce muscle tightness and improve flexibility. Although MET was effective, its comparatively smaller effect may be because it does not directly address cervical neuromuscular control and stabilization.

Functional ability, assessed using the NDI, also improved significantly in both groups, with greater improvement in the NST group. Improved cervical stability, neuromuscular control, posture, and muscle endurance following stabilization exercises may facilitate better performance of functional activities. Similarly, cervical ROM improved significantly in both groups, with greater gains following NST. This may be related to improved cervical muscle coordination, reduced stiffness, and enhanced control of cervical movement.

These findings are particularly relevant to competitive basketball players, who require optimal cervical and upper-quarter function during activities such as shooting, dribbling, and defensive movements. The findings suggest that incorporating cervical stabilization exercises into sports rehabilitation may be beneficial for improving neck function and potentially supporting injury prevention. MET may be used as an adjunct intervention, particularly when muscle tightness and flexibility deficits are present.

Overall, the findings support the use of Neck Stabilization Technique as a primary physiotherapy intervention for non-specific neck pain in competitive basketball players, while MET may serve as a complementary approach. Future studies should include larger sample sizes, longer follow-up periods, and athletes from different sports to establish the long-term effectiveness and generalizability of these findings.

CONCLUSION

Based on the findings of the study, it can be concluded that Both Neck Stabilization Technique (NST) and Muscle Energy Technique (MET) significantly improved pain, functional ability, and cervical range of motion in basketball players with

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non-specific neck pain. However, NST demonstrated significantly greater improvements than MET across all outcome measures, suggesting that NST may be a more effective intervention for managing non-specific neck pain in basketball players.

LIMITATION OF THE STUDY

- Small sample size
- Short duration of study
- No long term follow-up
- Limited outcome measures
- No placebo/ control group
- Study limited to basketball players, restricting applicability to other population

RECOMMENDATION

Further study could be performed with

- Large number of samples
- Duration of study for long period
- Different populations and sports
- Combined effects of NST and MET should be explored in future research
- Age group could be extended.

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