



ISSN Print: 2664-7281
ISSN Online: 2664-729X
Impact Factor: RJIF 8.15
IJSEPE 2025; 7(2): 630-633
<https://www.sportsjournals.net>
Received: 03-07-2025
Accepted: 06-08-2025

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Effect of Dynamic Neuromuscular Stabilization Exercise on Rounded Shoulder in Middle School Children

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DOI: <https://www.doi.org/10.33545/26647281.2025.v7.i2i.282>

Abstract

Rounded shoulder is a common postural disorder affecting 34-58% of middle school children, characterized by forward shoulder positioning that leads to muscle imbalance and pain. This study aimed to evaluate the effect of Dynamic Neuromuscular Stabilization (DNS) exercise on pain reduction and muscle strength improvement in children with rounded shoulder posture. Eight participants aged 11-14 years underwent a 30-minute DNS program three times per week for 3 weeks. Pain intensity and muscle strength were assessed using Visual Analog Scale (VAS) and Manual Muscle Testing (MMT) before and after intervention. Results demonstrated significant improvements in pain reduction and muscle strength. These findings suggest that DNS is an effective therapeutic approach for managing rounded shoulder posture and highlight the importance of targeted exercise interventions in improving postural alignment and functional outcomes.

Keywords: Rounded shoulder, postural disorder, Dynamic Neuromuscular Stabilization (DNS), pain reduction, muscle strength

Introduction

Rounded shoulder is a postural deviation affecting middle school children, characterized by forward positioning of the shoulders instead of alignment with the body's midline. This condition results from habitual poor posture, prolonged sitting, and activities such as carrying heavy bags and excessive use of digital devices. The prevalence rate for rounded shoulders affects 34% to 58% of middle school children aged 10-14 years, leading to muscle imbalance, discomfort, and pain in the neck and shoulder regions.

Dynamic Neuromuscular Stabilization (DNS)

Dynamic Neuromuscular Stabilization is a contemporary rehabilitation concept introduced by Dr. Pavel Kolar, based on developmental kinesiology principles. DNS aims to improve motor control, posture, and movement by retraining the central nervous system to restore natural movement patterns observed during infant development stages. DNS emphasizes the importance of training dynamic and stabilization functions of muscles within the kinetic chain, integrating breathing, posture, and movement through the central nervous system to achieve optimal neuromuscular control.

Postural Assessment

The acromion table length measurement is used to assess rounded shoulder posture, where distances greater than 2.5 cm indicate positive findings for rounded shoulder positioning.

Pain And Functional Impact

Children with rounded shoulder often experience both physical discomfort and functional limitations. In addition to managing symptoms like shoulder and neck pain, many experience reduced quality of life due to postural changes and associated muscle weakness affecting daily activities and school performance.

Visual Analog Scale (VAS)

The VAS is a reliable and valid tool used to measure pain intensity across different populations, including children with musculoskeletal conditions.

Materials and Methods

Materials Required

- Consent form
- Assessment form
- Measuring tape
- Goniometer
- Exercise mat
- Timer

Methodology

- **Study Design** This is a single group pilot study conducted using pre-test and post-test design.
- **Study Setting** Latha tuition centre, Coimbatore-641030
- **Sampling Method** Convenient sampling method

Selection Criteria

Inclusion criteria

- Age group of 11-14 years
- Both boys and girls
- Pain over the shoulder joint
- Positive acromion test (>2.5 cm)
- Positive wall test
- Positive pectoralis minor tightness test
- Children able to follow commands

Exclusion criteria

- Musculoskeletal disorders
- Fractures over shoulder joint
- Neurological disorders
- Systemic diseases
- Psychological conditions
- **Study Duration** 3 weeks
- **Sample Size** 8 children were included in the study
- **Duration of intervention** Participants underwent 3 weeks of Dynamic Neuromuscular Stabilization (DNS) program involving specific exercises, consisting of 30-minute sessions, three days per week.

Variable

Independent Variable

Dynamic Neuromuscular Stabilization Exercise

Dependent Variable

- Pain reduction
- Muscle strength improvement

Assessment Tool

- Visual Analog Scale (VAS) for pain
- Manual Muscle Testing (MMT) for rotator cuff muscles

Procedure

Patient preparation Middle school children aged 11-14 years with rounded shoulder posture were recruited based on inclusion criteria. Participants were assessed using acromion table length measurement, wall test, and pectoralis minor tightness test. Consent forms were obtained from parents/guardians. Children were instructed to wear

comfortable clothing suitable for exercise and avoid strenuous activities before assessment.

Pre-Test Pre-test measurements were taken using Visual Analog Scale (VAS) for pain assessment and Manual Muscle Testing (MMT) for rotator cuff muscle strength evaluation.

Procedure Each session began with pectoralis minor stretching (2 minutes, 30-second holds). DNS exercises were performed in sequence:

1. 3-Month Prone Position (2 mins): Prone lying with elbows forming triangle
2. Shoulder Stability Drill (5 mins): Side lying with shoulder external rotation
3. Shoulder Hinge (3 mins): Side lying on elbow with backward shoulder movement
4. Stability with Scapular Sliders (5 mins): Side sitting with scapular movements
5. Shoulder Stability Exercise (3 mins): Side lying with extended hand reaching
6. Isometric Chin Tension (2 mins): Standing with backward chin tuck
7. Shoulder Rolling (3 mins): Kneel sitting with shoulder internal rotation
8. Quadruped Rocking (5 mins): Prone kneeling with trunk movement
9. Wall-Assisted DNS Reach (2 mins): Standing wall reaches with scapular rotation
10. Low Bear Shoulder Taps (5 mins): Bear crawl position with shoulder taps

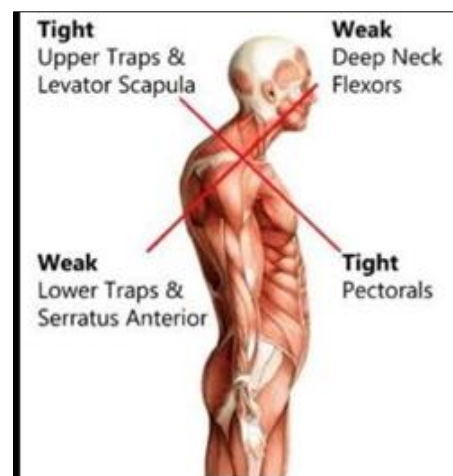


Diagram 1: Muscles involved in rounded shoulder

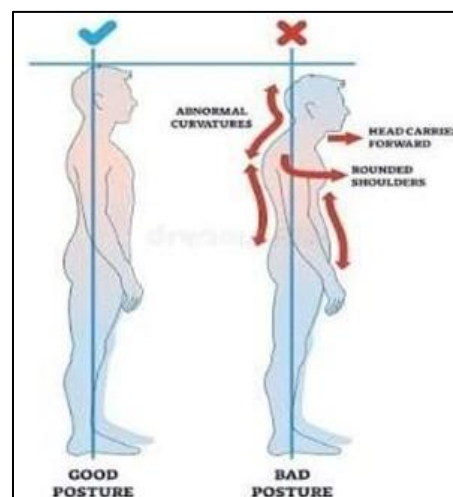


Diagram 2: Rounded shoulder posture

The DNS protocol emphasized proper breathing, postural alignment, and gradual progression. Heart rate monitoring and verbal encouragement were provided throughout sessions. Sessions concluded with cool-down exercises.

Post-Test Post-test measurements were recorded after the 3-week intervention period using Visual Analog Scale (VAS) for pain and Manual Muscle Testing (MMT) for muscle strength evaluation.

Results

The study evaluated pain reduction and muscle strength improvement in middle school children with rounded shoulder posture. Statistical analysis using paired t-test showed significant improvements in both outcome measures.

Pain Assessment (VAS)

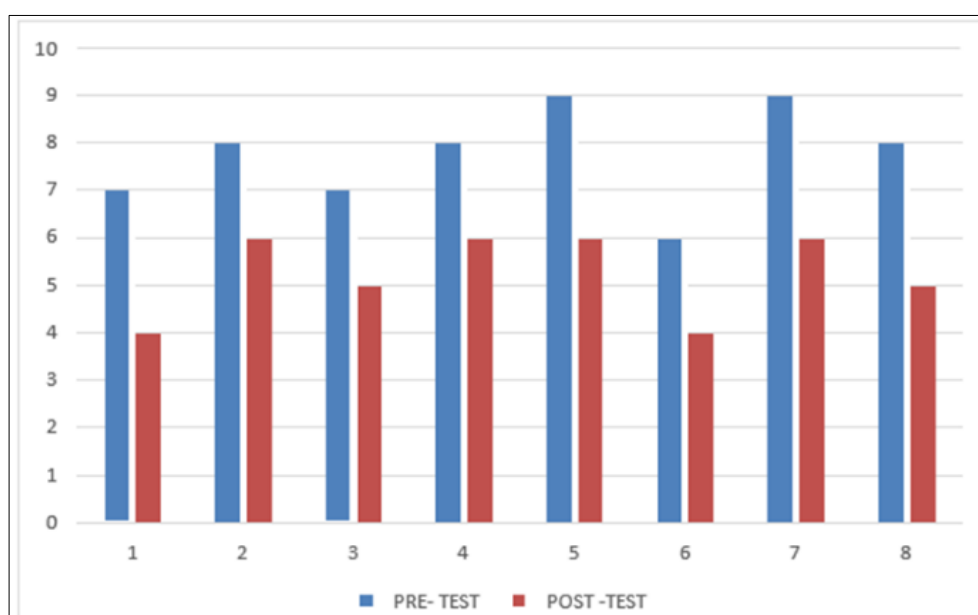
- Pre-test mean: 7.75

- Post-test mean: 5.25
- Mean difference: 2.50
- t-value: 13.25
- p-value: 0.0001 ($p < 0.05$)

Muscle Strength (MMT for Rotator Cuff):

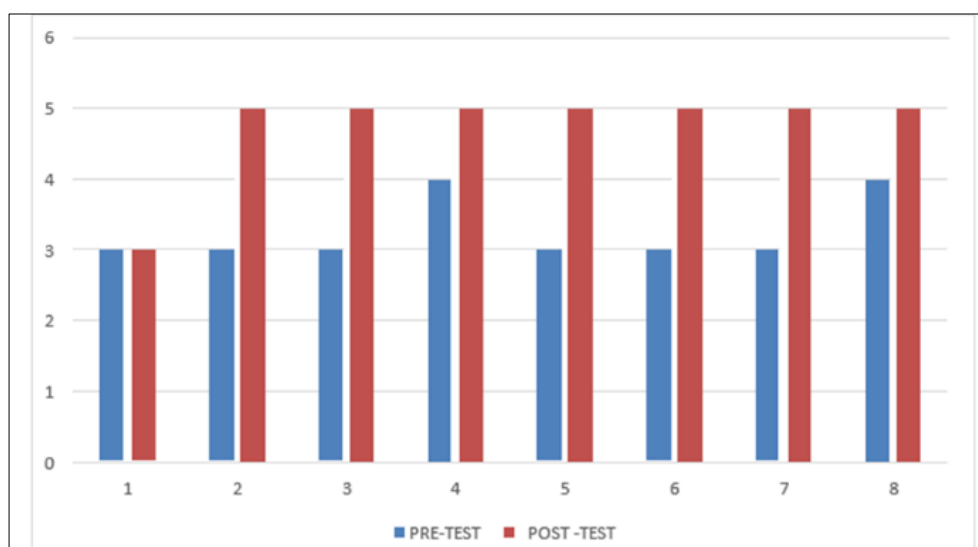
- Pre-test mean: 3.50
- Post-test mean: 4.88
- Mean difference: 1.375
- t-value: 7.68
- p-value: 0.000118 ($p < 0.05$)

These findings confirm that DNS intervention had a significant impact, demonstrating meaningful improvements in both pain reduction and muscle strength enhancement for middle school children with rounded shoulder posture.



Graph 1: Pre and Post-Test Values of Pain

Comparison of mean values of pain between pre and post test (VAS)



Graph 2: Pre and Post-Test Values for Muscle Strength:

Comparison Of Mean Values of Muscle Strength Between Pre and Post Test (MMT)

Discussion

Rounded shoulder posture is a chronic postural disorder affecting musculoskeletal alignment, pain levels, and functional capacity, with muscle imbalance contributing significantly to reduced quality of life in school children. In this study, Dynamic Neuromuscular Stabilization (DNS) was evaluated as a therapeutic intervention using VAS and MMT assessments in 8 children with rounded shoulder posture. The results demonstrated significant reductions in pain intensity and improvements in muscle strength, highlighting the effectiveness of DNS in addressing both symptoms and underlying dysfunction.

These findings emphasize the potential of DNS to enhance both physical function and postural alignment through neuromuscular re-education and movement pattern correction. The intervention's focus on developmental kinesiology principles appears particularly beneficial for this pediatric population, as it addresses the root causes of postural dysfunction rather than merely treating symptoms.

The evaluation of both pain and muscle strength during DNS sessions provided valuable insights into the neuromuscular adaptations occurring in children with rounded shoulder posture. The significant improvements observed suggest that DNS effectively retrains the central nervous system to restore optimal movement patterns and muscle activation sequences.

Conclusion

The results of this study concluded that following the pre-test and post-test comparison, pain intensity was significantly reduced on VAS, and muscle strength was notably improved following Dynamic Neuromuscular Stabilization (DNS) exercise intervention in middle school children with rounded shoulder posture. DNS proved to be an effective therapeutic approach for managing postural dysfunction in this population.

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