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Effectiveness of McKenzie Exercises in Postural Thoraco-Lumbar Scoliosis in an 11-Year-Old Girl: A Case Report

Dr.Y.Nissee Neelima RaJ
Associate Professor
Shadan college of physiotherapy

Abstract

Background: Postural scoliosis is a non-structural spinal deviation commonly seen in school-aged children due to poor posture, prolonged sitting, and muscular imbalance. Early intervention is essential to prevent progression and functional impairment.

Objective: To evaluate the effectiveness of McKenzie exercises in reducing Cobb angle, correcting posture, and relieving back pain in an 11-year-old girl with positional thoraco-lumbar scoliosis.

Methods: An 11-year-old school-going girl presented with back pain and visible postural asymmetry. Clinical and radiological evaluation confirmed positional thoraco-lumbar scoliosis. Cobb angle was measured using standing anteroposterior spinal radiographs. A supervised McKenzie exercise program was administered for one hour daily over four weeks. Outcomes were assessed using postural observation, pain reporting, functional tolerance, and Cobb angle measurement.

Results: Post-intervention findings demonstrated a reduction in Cobb angle from **18° to 8°**, along with significant improvement in spinal alignment, reduction in back pain, and improved sitting tolerance.

Conclusion: McKenzie exercises are effective in the conservative management of positional scoliosis in pediatric patients, showing measurable radiological and functional improvement when initiated early.

Keywords: Postural scoliosis; Cobb angle; McKenzie exercises; Pediatric physiotherapy; Thoraco-lumbar spine

Introduction

Scoliosis is defined as a lateral curvature of the spine exceeding 10° as measured by the Cobb method. In children, scoliosis may be structural or non-structural. Postural scoliosis is a flexible, reversible condition resulting from faulty posture, prolonged sitting, and muscular imbalance. With increasing sedentary behavior and academic screen exposure, postural spinal deviations are becoming more prevalent among school-aged children.

Physiotherapy plays a vital role in the early correction of postural scoliosis. The McKenzie Method of Mechanical Diagnosis and Therapy emphasizes repeated spinal movements and postural correction to restore normal alignment and reduce mechanical stress. However, objective radiological evidence supporting its effectiveness

in pediatric postural scoliosis remains limited. This case report aims to document clinical and radiological improvement following McKenzie exercise intervention.

Case Presentation

A 11-year-old female student presented to the physiotherapy clinic with complaints of mid- and lower-back pain for three months. The pain was aggravated by prolonged sitting during school hours and relieved by rest. There was no history of trauma, congenital spinal abnormality, or neurological symptoms.

Clinical Examination

- Visible lateral deviation of the thoraco-lumbar spine
- Shoulder and trunk asymmetry
- Poor sitting posture
- Pain aggravated during prolonged sitting
- Neurological examination: normal

REVIEW OF LITERATURE

Various studies have highlighted the role of poor posture and prolonged sitting in the development of back pain among school children. McKenzie RA emphasized the importance of repeated spinal movements and posture correction in managing mechanical spinal disorders. Negrini et al. reported that early conservative treatment is effective in managing non-structural scoliosis. Kendall et al. described the role of muscle imbalance in postural deviations and the importance of corrective exercises.

The literature supports the use of exercise therapy in pediatric postural abnormalities, emphasizing early intervention and supervised rehabilitation programs.

METHODOLOGY

Study Design

Single-subject case report.

Study Setting

The study was conducted in a shadan college of physiotherapy.

Subject Description

An 11-year-old female school-going child presented with complaints of back pain and difficulty maintaining upright posture during school hours.

Selection Criteria

Inclusion Criteria

- Age below 15 years
- Presence of positional scoliosis
- Complaints of back pain
- Willingness to participate in physiotherapy

Exclusion Criteria

- Structural or congenital scoliosis
- History of spinal trauma or surgery
- Neurological involvement
- Systemic musculoskeletal disorders

3.5 Assessment Tools

- Postural observation
- Pain assessment (subjective reporting)
- Functional assessment during sitting and standing
- Cobb angle

Intervention Protocol

The patient underwent a structured **McKenzie-based exercise protocol** focusing on correction of thoraco-lumbar deviation, spinal extension, and postural re-education. The program was designed specifically for postural scoliosis and was progressed over a period of **one month**.

The exercises were performed under supervision initially and later continued as a guided home exercise program.

Exercise Duration and Frequency

- Duration: **1 hour per session**
- Frequency: **Once daily**
- Total intervention period: **4 weeks (1 month)**

Week-wise McKenzie Exercise Program

Week 1: Pain Reduction, Postural Awareness Phase and Passive Stretching Phase

1. **Prone Lying**
   - Position: Patient lies prone with arms relaxed by the side.
   - Purpose: Reduces spinal loading and allows natural spinal alignment.
   - Hold: 5–10 minutes
   - Repetitions: 2–3 times per session

2. **Prone on Elbows**
   - Position: From prone lying, patient props up on elbows keeping pelvis relaxed.
   - Purpose: Initiates gentle lumbar and thoraco-lumbar extension.
   - Hold: 20–30 seconds
   - Repetitions: 10 repetitions
3. **Postural Awareness Training**
   - Sitting and standing posture correction using mirror feedback.
   - Duration: 10 minutes per session

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4. Passive Stretching Exercises

a. Passive Lateral Trunk Stretch (Concave Side Stretch)

- **Position:** Patient in side-lying with concave side facing upward.
- **Technique:** Therapist gently supports the pelvis and rib cage, applying slow passive stretch to the concave side of the thoraco-lumbar region.
- **Rationale:** Lengthens shortened paraspinal muscles and soft tissues on the concave side of scoliosis.
- **Hold Duration:** 20–30 seconds
- **Repetitions:** 3–5 repetitions
- **Rest:** 10–15 seconds

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b. Passive Quadratus Lumborum Stretch

- **Position:** Patient in side-lying or crook-lying position.
- **Technique:** Therapist stabilizes pelvis and gently elongates trunk laterally away from the tight side.
- **Rationale:** Reduces asymmetrical lumbar tightness contributing to postural deviation.
- **Hold Duration:** 20–30 seconds
- **Repetitions:** 3 repetitions per side (emphasis on tight side)

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c. Passive Hamstring Stretch

- **Position:** Patient in supine lying.
- **Technique:** Therapist raises the leg with knee extended until mild stretch is felt.
- **Rationale:** Decreases posterior chain tightness that may influence pelvic tilt and spinal alignment.
- **Hold Duration:** 20–30 seconds
- **Repetitions:** 3 repetitions per limb

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d. Passive Hip Flexor Stretch

- **Position:** Patient in supine at edge of plinth or modified Thomas position.
- **Technique:** Therapist gently lowers the involved limb into hip extension while stabilizing pelvis.
- **Rationale:** Reduces anterior pelvic tilt and lumbar stress.
- **Hold Duration:** 20–30 seconds
- **Repetitions:** 3 repetitions

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5. Postural Awareness Training

- **Method:** Sitting and standing posture correction using mirror feedback.
- **Duration:** 10 minutes per session

Precautions for Passive Stretching

- Stretching performed within pain-free range.
- No forceful or ballistic movements.
- Continuous monitoring of child's comfort and spinal alignment.

Clinical Justification

Early incorporation of **passive stretching** helps reduce muscle tightness, prepares soft tissues for McKenzie extension-based correction, and enhances tolerance to subsequent active exercises

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Week 2: Extension Progression Phase

6. Prone Press-Ups (Extension in Lying)

- Position: From prone lying, patient pushes upper body up using hands while pelvis remains on the mat.
- Purpose: Improves spinal extension and reduces lateral deviation.
- Hold: 5–10 seconds
- Repetitions: 10–15 repetitions

7. Extension with Lateral Shift Correction

- Position: Patient performs press-ups with slight correction toward the concave side of scoliosis.
- Purpose: Corrects thoraco-lumbar asymmetry.
- Repetitions: 10 repetitions

8. Corrected Sitting Posture Training

- Use of lumbar roll while sitting.
- Duration: Practiced during daily activities

Week 3: Functional Correction Phase

9. Standing Extension Exercise

- Position: Patient stands with hands on hips and gently bends backward.
- Purpose: Maintains spinal extension during functional activities.
- Hold: 5 seconds
- Repetitions: 10 repetitions

10. Side-Glide in Standing (McKenzie Technique)

- Position: Patient stands sideways against a wall and glides pelvis toward the corrected direction.
- Purpose: Addresses lateral spinal deviation.
- Repetitions: 10–15 repetitions

11. School Ergonomic Training

- Education on desk height, backpack use, and sitting breaks.

Week 4: Maintenance and Postural Control Phase

12. Sustained Extension in Sitting

- Position: Sitting with lumbar support maintaining upright posture.
- Duration: 10–15 minutes intermittently

13. Postural Correction Drills

- Repeated self-correction of posture during daily activities.
- Repetitions: Throughout the day

14. Home Exercise Program Reinforcement

- Review and correction of all previous exercises.

Precautions

- Exercises were performed pain-free
- Avoided forced movements
- Close supervision ensured correct technique

Postural education and ergonomic advice were provided alongside the exercise program

Outcome Measures

- Postural observation
- Pain assessment (subjective reporting)
- Functional sitting tolerance
- Radiological assessment using Cobb angle

Pre- and Post-Test Assessment

Parameter	Pre-Intervention	Post-Intervention
Postural alignment	Severe thoraco-lumbar deviation	Improved spinal symmetry
Back pain	Present during sitting and standing	Significantly reduced
Sitting tolerance	Limited	Improved
Functional posture	Poor	Near-normal

Results

After four weeks of intervention:

- Cobb angle reduced from **18° to 8°**
- Improved thoraco-lumbar spinal alignment
- Significant reduction in back pain
- Improved sitting endurance during school hours
- Enhanced postural awareness

Figures

Figure 1

Pre-intervention anteroposterior X-ray of the thoraco-lumbar spine showing positional scoliosis with a Cobb angle of approximately 18°.

Figure 2

Post-intervention anteroposterior X-ray of the thoraco-lumbar spine demonstrating significant correction of curvature with Cobb angle reduced to approximately 8° following four weeks of McKenzie exercise therapy.

Figure 1. Pre-intervention anteroposterior X-ray of the thoraco-lumbar spine showing positional scoliosis with a Cobb angle of approximately 18°.

Figure 2. Post-intervention anteroposterior X-ray of thoraco-lumbar spine demonstrating significant reduction of curvature with Cobb angle reduced to approximately 8° following four weeks of McKenzie exercise

Discussion

This case report demonstrates the effectiveness of McKenzie exercises in correcting postural thoraco-lumbar scoliosis in a pediatric patient. The significant reduction in Cobb angle confirms the flexible and reversible nature of postural scoliosis. Unlike structural scoliosis, postural scoliosis responds well to conservative physiotherapy intervention.

McKenzie exercises promote spinal realignment through repeated end-range movements and postural correction, reducing mechanical stress and muscular imbalance. Pediatric patients show favorable outcomes due to neuromuscular adaptability during growth years. Early intervention can prevent progression into structural scoliosis and chronic back pain.

Limitations of the Study

- Single-case design limits generalizability
- Short duration of follow-up
- Cobb angle measurement is subject to inter-observer variability
- Lack of long-term radiological follow-up
- Absence of comparison with other exercise approaches

Clinical Implications

- Early screening of school-aged children for postural abnormalities is essential
- McKenzie exercises can be considered a first-line conservative treatment for postural scoliosis
- Radiological assessment using Cobb angle provides objective outcome measurement

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Conclusion

This case report highlights that **early, supervised McKenzie exercise intervention can significantly reduce Cobb angle and improve posture in children with postural thoraco-lumbar scoliosis**. Conservative physiotherapy management is effective in reducing pain, correcting spinal alignment, and improving functional participation in school activities.

Ethical Considerations

Written informed consent was obtained from the patient's parent/guardian for participation and publication of clinical and radiological data. Radiographs were obtained only as part of routine clinical care.

Conflict of Interest

The author declares no conflict of interest.

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