



Effectiveness of integrated neuromuscular inhibition technique along with postural correction exercises in the management of postural thoracic kyphosis with chronic upper back pain: A case report

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Abstract

Background: Postural thoracic kyphosis is frequently accompanied by upper back pain, muscle imbalance, and restricted spinal mobility. Myofascial trigger points and altered neuromuscular control may contribute to persistent symptoms. Integrated Neuromuscular Inhibition Technique (INIT) is a manual therapy approach designed to reduce muscle hypertonicity and pain through combined neuromuscular inhibition strategies.

Case Presentation: A 39-year-old female homemaker presented with chronic bilateral upper back pain of 6 months duration, associated with thoracic hump, postural dysfunction, and sleep disturbance. Clinical examination revealed increased thoracic kyphosis, forward head posture, rounded shoulders, reduced thoracic mobility, scapular muscle weakness, and myofascial trigger points in the upper trapezius, levator scapulae, and pectoral muscles. Pain intensity was rated 8/10 on the NRS.

Results: The physiotherapy program emphasized INIT followed by postural correction, mobility, and strengthening exercises. Following intervention, the patient demonstrated reduced pain intensity and improved postural control after 6 weeks.

Conclusion: INIT and posture correction exercises serve as a beneficial adjunct to physiotherapy in the management of thoracic kyphosis-related upper back pain.

Keywords: Thoracic kyphosis, Integrated neuromuscular inhibition technique, Upper back pain, trigger points, Postural dysfunction.

Introduction

Thoracic kyphosis is defined as an excessive anterior curvature of the thoracic spine beyond normal sagittal alignment. It is commonly associated with prolonged faulty posture, muscular imbalance, reduced thoracic mobility, and impaired postural control. Alterations in thoracic curvature can modify spinal biomechanics and load distribution, potentially contributing to musculoskeletal discomfort and functional limitations during daily activities ^[1].

Postural thoracic kyphosis is frequently accompanied by forward head posture and rounded shoulders, which disrupt normal muscle length-tension relationships. Shortening of anterior chest musculature and overactivity of cervical and scapular elevator muscles may lead to upper back pain, stiffness, and reduced spinal extension. Previous studies have demonstrated that thoracic posture and mobility are closely related to neck and upper thoracic musculoskeletal symptoms. ^[2, 3]

Myofascial trigger points are commonly identified in muscles affected by postural deviations, including the upper trapezius, levator scapulae, and pectoralis major and minor. These trigger points can contribute to persistent pain, muscle guarding, and altered neuromuscular control, thereby limiting the effectiveness of postural correction and strengthening exercises when pain is not adequately managed. ^[4]

Integrated Neuromuscular Inhibition Technique (INIT) is a multimodal manual therapy approach that combines ischemic compression, muscle energy technique, and strain-

counterstrain to address myofascial trigger points and neuromuscular dysfunction. Previous studies have reported significant reductions in pain intensity, improvement in range of motion, and decreased disability following INIT application in individuals with myofascial pain syndromes. ^[5, 6]

Although evidence supports the effectiveness of INIT in managing trigger point-related pain, its role in individuals with postural thoracic kyphosis remains limited in the literature. Therefore, this case report aims to describe the clinical effects of incorporating Integrated Neuromuscular Inhibition Technique within a comprehensive physiotherapy program for the management of chronic upper back pain associated with thoracic kyphosis.

Case Presentation

A 39-year-old right-hand-dominant female homemaker presented to the physiotherapy outpatient department with complaints of persistent upper back pain and progressive postural deformity. She had previously worked as a tailor for several years, an occupation that required prolonged sitting in a flexed posture, but had discontinued this work approximately 3-4 years prior to presentation.

The patient reported an initial episode of upper back pain in 2013, following which she gradually noticed an increase in the curvature of her upper back along with a perceived reduction in height but ignored it. Over the past 6 months, the pain had progressively increased in intensity and frequency. She visited to an orthopaedic who advised her to

do investigations. Plain radiographs (X-Ray) of the thoracic spine (anteroposterior and lateral views) demonstrated an increased thoracic kyphotic curvature with exaggerated anterior convexity in the mid-thoracic region. Mild anterior vertebral body wedging was noted at the T6–T8 levels, along with subtle reduction in intervertebral disc space height, suggestive of chronic postural and degenerative adaptation. MRI of the thoracic spine revealed mild degenerative changes in the intervertebral discs without significant disc herniation or spinal canal compromise. The spinal cord signal intensity was normal, with no features suggestive of myelopathy or nerve root compression. Paraspinal musculature demonstrated changes consistent with chronic mechanical loading. Overall, imaging findings supported a diagnosis of postural thoracic kyphosis and excluded serious structural or neurological pathology.

Clinical findings

Patient had pain which was localized to the upper thoracic region, described as dull and aching in nature, with an insidious onset and intermittent pattern. Pain was aggravated by prolonged sitting, standing, and postural transitions, particularly during activities requiring sustained upright posture. The patient also reported difficulty sleeping in the supine position due to upper back discomfort. Rest provided partial symptomatic relief. Previous conservative treatment resulted in minimal improvement, estimated by the patient as approximately 10%. At presentation, pain intensity was rated as 8/10 on the Numerical Rating Scale (NRS) during aggravating activities. There was no history of radiating pain, numbness, tingling, or limb weakness. The patient's medical history was significant for rheumatoid arthritis diagnosed in 2010, pulmonary tuberculosis treated in 2017 and again in 2021, and hypothyroidism diagnosed in 2013, all of which were under medical management. There was no history of spinal trauma, surgery, or known neurological disorders.

On observation

Patient had marked increase in thoracic kyphotic curvature (52°) with a visible thoracic hump, more prominent in relaxed standing posture, forward head posture with rounded shoulders with increased shoulder protraction and internal rotation.

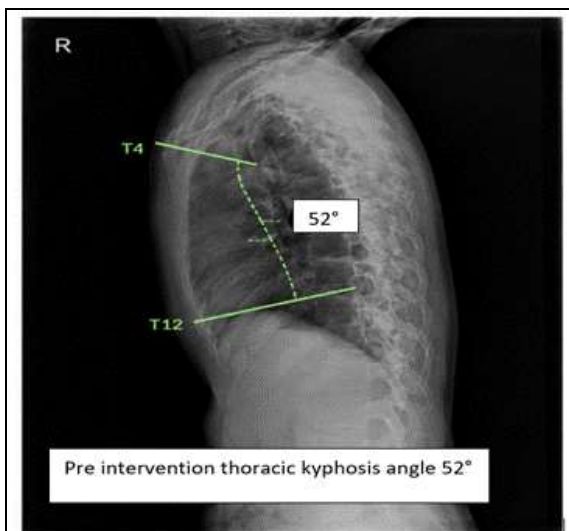


Fig 1: Pre- Intervention X-Ray showing Thoracic Kyphosis Angle

On palpation

Grade 2 tenderness over thoracic spinous processes, predominantly at T6–T8 levels. Grade 1 tenderness noted over paraspinal muscles of the upper thoracic region. Trigger points- Presence of active and latent myofascial trigger points in upper trapezius, levator scapulae, and rhomboid muscles.

On examination

Active Range of motion- Thoracic range of motion was restricted, particularly extension (10°). (Table 1)

Table 1: Range of Motion

Region	Movement	Right ($^\circ$)	Left ($^\circ$)
Cervical Spine	Flexion	40°	—
	Extension	45°	—
	Rotation	65°	60°
	Side flexion	30°	28°
Thoracic Spine	Flexion	35°	—
	Extension	10°	—
	Rotation	25°	23°
Shoulder Complex	Flexion	170°	170°
	Abduction	170°	168°
	External rotation	85°	83°
	Internal rotation	85°	88°

Manual muscle strength- (Table 2)

Table 2: Manual Muscle Strength Test Table 2: Manual Muscle Strength Test

Middle trapezius	3+/5 bilaterally
Lower trapezius	3+/5 bilaterally
Rhomboids	3+/5 bilaterally
Serratus anterior	4–/5 bilaterally
Lumbar and thoracic extensors	2/5
Deep cervical flexors endurance	24 seconds

Muscle length and flexibility assessment- Upper trapezius, levator scapulae, pectoralis major and minor tightness present bilaterally. Thoracolumbar fascia had reduced extensibility.

Neurological examination- Sensory examination intact for all dermatomes. Myotomes C5–T1 not affected. Deep tendon reflexes normal and symmetrical.

Functional Assessment- Difficulty maintaining upright sitting posture for prolonged periods, Increased pain during sustained standing and transitional movements, Reduced tolerance to static postures requiring thoracic extension, Sleep disturbance in supine position due to upper thoracic discomfort.

Clinical impression

The clinical findings were consistent with chronic mechanical upper back pain associated with postural thoracic kyphosis, characterized by thoracic extension restriction, scapular muscle weakness, anterior shoulder girdle tightness, and myofascial trigger point involvement, without neurological compromise.

Outcome Measures: Neck Disability Index- 56% indicating severe disability

Physiotherapy Intervention ^[7, 8]

The patient underwent a structured, individualized physiotherapy program designed to address pain, postural dysfunction, thoracic hypomobility, muscle imbalance, and functional limitations associated with postural thoracic

kyphosis. The intervention emphasized symptom modulation, neuromuscular re-education, and long-term postural correction. Treatment was delivered in supervised sessions with progressive loading and was supported by a structured home exercise program.

The physiotherapy protocol was carried out for six weeks with five sessions per week. (Table 3)

Table 3: Physiotherapy Intervention Protocol

Intervention	Treatment / Technique	Dosage / Details	Purpose
1. Pain modulation and soft tissue manipulation	Integrated Neuromuscular Inhibition Technique (INIT)	Applied to identified myofascial trigger points	Reduce pain, muscle hypertonicity, and neuromuscular imbalance
	Ischemic compression	Sustained pressure on trigger points of upper trapezius, levator scapulae, pectoralis major/minor, and upper thoracic paraspinals for 30–60 sec	Reduce tenderness and tissue resistance
	Strain–counterstrain	Muscle positioned in a shortened, comfortable position and maintained for approximately 90 sec	Reduce muscle spindle activity and nociceptive input
	Muscle Energy Technique (post-isometric relaxation)	Gentle isometric contraction at 20–30% effort for 7–10 sec, followed by relaxation and passive stretching	Improve muscle relaxation and extensibility
2. Postural education and ergonomic advice	Neutral spine training	Education regarding optimal sitting and standing alignment	Improve postural awareness
	Postural self-correction	Mirror and tactile feedback	Facilitate independent postural correction
	Ergonomic modification	Back support, appropriate seat height, and regular posture breaks during prolonged sitting	Reduce mechanical stress and sustained faulty posture
3. Mobility and flexibility training	Thoracic extension	Towel roll/foam roller: 10 repetitions, 10-sec hold	Improve thoracic extension mobility
	Cat–camel exercise	10 repetitions	Improve spinal mobility
	Segmental thoracic mobility	Controlled thoracic extension: 10 repetitions	Improve segmental mobility and movement control
	Pectoral stretching	Pectoralis major and minor: 30-sec hold × 3 repetitions	Reduce anterior shoulder girdle tightness
	Cervicospinal stretching	Upper trapezius and levator scapulae: 30-sec hold × 3 repetitions	Improve muscle flexibility
	Scapular stabilization	Prone retraction, prone Y and T exercises	Strengthen middle/lower trapezius and rhomboids
4. Strengthening and neuromuscular control	Serratus anterior activation	Wall slides and dynamic hug exercises	Improve scapular control
	Thoracic and lumbar extensor strengthening	Progressive resistance and endurance exercises	Improve postural endurance
	Deep cervical flexor training	Activation and endurance exercises	Improve cervicothoracic postural control
	Core stabilization	Progressive stabilization exercises	Support spinal alignment during functional activities
	Postural integration	Incorporation of corrected posture into activities of daily living	Transfer postural correction to functional activities
5. Functional training and progression	Exercise progression	Gradual increase in intensity, repetitions, and hold duration according to symptom response	Promote progressive adaptation
	Postural muscle endurance	Sustained functional postural activities	Improve ability to maintain alignment during prolonged activities
	Thoracic mobility	Daily thoracic mobility exercises	Maintain mobility gains
	Muscle stretching	Daily stretching of tight musculature	Maintain flexibility
6. Home exercise programme	Scapular stabilization	Regular scapular strengthening exercises	Improve postural control and endurance
	Home programme monitoring	Periodic review of technique and progression	Ensure adherence and correct exercise performance

Table 4: Pre- and Post-Intervention Outcomes

Outcome Measure	Pre-Intervention	Post-Intervention
Pain intensity (NRS)	8/10	2/10
Neck Disability Index (NDI)	56%	32%
Thoracic kyphosis angle	52°	48°

Results (Table 4)

The treatment protocol was followed for 6 weeks and there was improvement quantitatively in the NRS 2/10, NDI 32% and thoracic kyphosis angle 48° (Figure 2). The strength of the muscles improved when compared with the pre assessment.

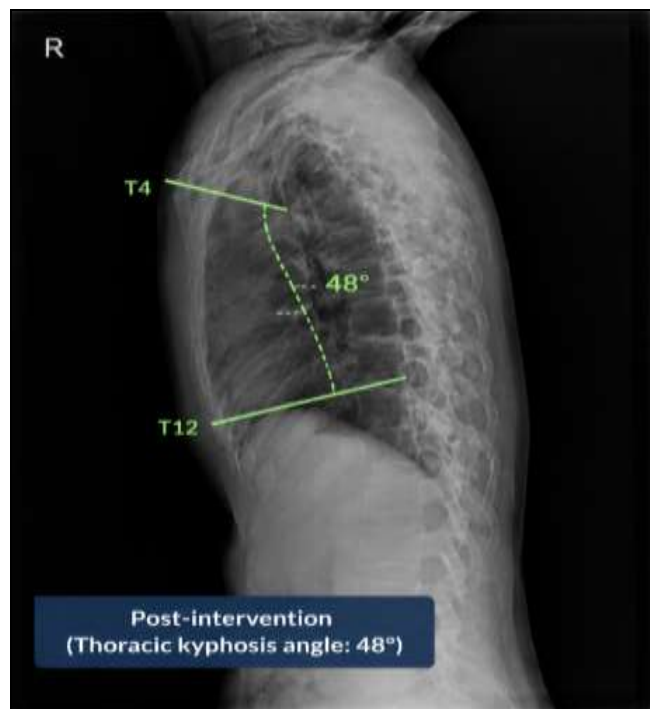


Fig 2: Post Intervention X-Ray showing Thoracic Kyphosis Angle

Discussion

In this case of chronic upper back pain associated with postural thoracic kyphosis, the integration of Integrated Neuromuscular Inhibition Technique (INIT) within a comprehensive physiotherapy program was associated with meaningful clinical improvements. INIT is a multimodal manual therapy approach combining ischemic compression, muscle energy technique (MET), and strain-counterstrain (SCS) to target myofascial trigger points and neuromuscular imbalance. Its sequential application is designed to reduce muscle hypertonicity, interrupt pain-spasm cycles, and normalize neuromuscular function prior to active corrective exercise.

The rationale for using INIT in this patient stems from the presence of myofascial trigger points and heightened muscle guard in the upper trapezius, levator scapulae, and pectoral muscles — common contributors to persistent pain and altered movement patterns in postural dysfunction. Several clinical trials support the potential benefit of INIT in deactivating trigger points and reducing pain intensity. For example, a randomized controlled trial comparing INIT with MET alone in individuals with upper trapezius trigger points demonstrated that the INIT group had significantly greater improvements in pain, disability, and range of motion.^[4, 5] Additionally, another study found that a single session of INIT produced significant reductions in pain intensity immediately and 24 hours post-treatment in individuals with upper trapezius trigger points, supporting its short-term hypoalgesic effect.^[4]

Beyond specific technique effects, comprehensive manual therapy has been shown to influence postural variables relevant to thoracic kyphosis. Systematic evidence indicates

that manual therapy, when compared to no intervention, can reduce forward head posture and thoracic kyphosis in the short to medium term, suggesting a role for hands-on techniques in improving postural alignment.^[1, 2] This is congruent with the improvements observed in this case, where INIT likely contributed to pain modulation and improved tissue extensibility, facilitating subsequent corrective exercises targeting posture and mobility.

Mechanistically, INIT may act through multiple pathways: reduction of localized nociceptive input, improvement of muscle length and extensibility, and enhancement of neuromuscular control through reflex inhibition effects. The combined application of ischemic compression, MET, and SCS leverages both peripheral and central mechanisms of pain modulation, which can be particularly valuable in chronic pain states where muscle guarding and altered motor patterns are prominent.

While research directly examining INIT in thoracic kyphosis is limited, the positive outcomes seen in related musculoskeletal conditions and trigger point-driven pain syndromes provide a reasonable evidence base for its use. However, future controlled studies are needed to specifically evaluate INIT in postural kyphosis populations and to delineate long-term effects. These findings underscore the value of integrating evidence-informed manual therapy with exercise-based rehabilitation to address the multifactorial nature of chronic postural pain syndromes.

Conclusion

This case report highlights the clinical relevance of Integrated Neuromuscular Inhibition Technique as part of a comprehensive physiotherapy approach for managing chronic upper back pain associated with postural thoracic kyphosis. The use of INIT contributed to effective pain reduction, improved thoracic mobility, and enhanced postural control by addressing underlying myofascial trigger points and neuromuscular imbalance. When combined with postural education and targeted strengthening exercises, INIT facilitated functional improvement without the need for invasive interventions. Although findings from a single case cannot be generalized, this report supports the potential role of INIT as an adjunctive manual therapy technique in the conservative management of postural thoracic kyphosis. Further controlled studies are warranted to establish applicability in larger populations.

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Conflict of Interest

There is no conflict of interest related to the preparation, conduct, or publication of this case report.

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