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The Impact of Physical Therapy on Functional Disability in Patient with Cervical Spondylosis: A Single Case Study

Sakshi Gupta[1], Rita Sharma[2](PT)

[1]Physiotherapy Intern, Department of Physiotherapy, Sharda University, Greater Noida, India
[2]Assistant Professor, Department of Physiotherapy, Sharda University, Greater Noida, India

Corresponding Author: Rita Sharma

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ABSTRACT

Background: Cervical spondylosis is a common degenerative condition affecting the cervical spine, often leading to chronic pain, stiffness, and functional impairment. Physical therapy plays a crucial role in managing symptoms and improving functional ability. However, limited research compares the combined effects of these modalities such as transcutaneous electrical nerve stimulation (TENS) and Ultrasound Therapy (UST) along with structured exercise on outcomes such as pain reduction, reduce stiffness and improve ADL.

Objective: This case study evaluates the impact of a structured physiotherapy program on the functional ability of a 53-year-old female patient with cervical spondylosis, experiencing right shoulder and neck pain, stiffness, and tingling sensations in the right arm.

Methodology: The patient presented with progressive neck and right shoulder pain radiating to the right arm, aggravated by neck movements and daily activities. She also reported difficulty in self-care tasks such as eating and bathing. A comprehensive physiotherapy assessment was conducted, including pain evaluation using the Visual Analogue Scale (VAS), Range of motion (ROM) testing, and functional assessment. The intervention program included cervical mobilization, therapeutic exercises, electrotherapy, and ergonomic education.

Results: After a structured physiotherapy regime, the patient demonstrated significant improvement in pain reduction (VAS score reduction), increased cervical ROM, and enhanced functional independence. Strengthening and mobility exercises contributed to improved upper limb function, reducing the impact of symptoms on daily activities.

Conclusion: This case study highlights the effectiveness of physiotherapy in managing cervical spondylosis related pain and functional limitations. A tailored rehabilitation approach incorporating manual therapy, exercise therapy, and patient education can significantly enhance mobility and quality of life in individuals with cervical spondylosis.

Keywords: Cervical spondylosis, neck pain, physiotherapy, ROM, functional disability.

INTRODUCTION

Cervical spondylosis is a long-term degenerative condition of the cervical spine that impacts the vertebral bodies and intervertebral discs, leading to disc herniation, bone spur formation (osteophytes), and thickening of the ligaments.[1] Cervical spondylosis is the leading cause of mechanical neck pain.[2]

The prevalence of cervical spondylosis exceeds 85% in individuals aged 60 and above.[3] Cervical spondylosis most frequently involves the C5 -C6 and C6-C7 segments of the cervical spine.[4] WHO data indicates that cervical spondylosis is the world's second most prevalent chronic disease, with its highest occurrence between ages 40 and 60, especially during the fifth decade of life.[5] A patient present with neck pain and stiffness while neck flexion, extension and difficulty in turning head in initial stages of the disease. As the disease progresses, symptoms related to radiculopathy increased. The symptoms can be provoked by neck extension. If neural structures are compressed, patients may also develop radicular symptoms, including pain, numbness, or weakness that spreads into the arm. [6] Several studies have shown that performing repetitive movements beyond a joint's normal range of motion can lead to mechanical compression of the cervical spine, potentially raising the risk of secondary injury. [4]

Cervical spondylosis is a degenerative disorder of the cervical spine resulting from age-related degeneration of the intervertebral discs, vertebrae, and surrounding structures. Disc dehydration and loss of elasticity lead to disc thinning, annular tears, and reduced shock absorption. This increases mechanical stress, triggering osteophyte (bone spur) formation, facet joint degeneration, and ligament thickening, particularly of the ligamentum flavum and posterior longitudinal ligament these changes contribute to spinal canal narrowing (stenosis), nerve root compression (radiculopathy), and spinal cord compression (myelopathy), resulting in neck pain, stiffness, radiating arm pain, numbness, weakness, and in severe cases gait disturbances and bladder, the management of cervical spondylosis often requires a multimodal approach, incorporating medication, lifestyle adjustments, and physiotherapy.

Physiotherapy treatment for such cases primarily focuses on correcting cervical spine alignment and using manual therapy techniques for pain relief. [7] It plays a crucial role in the conservative treatment of this condition by focusing on pain relief, enhancing joint mobility, and improving overall well-being and daily functional activities. Various therapeutic techniques and. exercises are commonly used, including TENS, UST, hot packs, and targeted exercises such as chin tucks, neck rotations, side bends, and shoulder retractions. Additionally, emphasis is placed on maintaining proper posture and strengthening the neck and shoulder muscles to provide better spinal support.

This research aims to provide insights into optimising physiotherapy protocols for managing this pervasive condition.

CASE PRESENTATION

A 53 years old right handed female patient, a housewife, was reported with a complaint of right shoulder and neck pain with stiffness, difficulty in turning and tilting the head, tingling sensation in arms since 8 months. The pain was started aggravating with as mild stiffness in neck and the right shoulder which was radiating till right arm but become worst over time. Pain was constant which was aggravated while doing neck flexion. Quality of pain is dull aching radiating down till right arm. The patient reported aggravation of pain during neck flexion, neck rotation, lifting heavy objects, straining the neck with a pain intensity of 7/10 on the VAS. The patient reported difficulty with (ADLs) such as cooking (difficulty in lifting utensils, stirring food), bathing (difficulty reaching the back and bending the neck to wash hair), dressing (tying the hair due to neck stiffness and pain). Pain gets relieved on rest, hot pack, medication. The Pain was associated with past history of type 2 Diabetes Mellitus, surgical history of Cholecystectomy in 2002. She had been managing her symptoms with topical and oral analgesics painkillers

(Zerodol-SP) but reported no or minimal relief.

On inspection, forward head was observed. Mild swelling was present around right upper trapezius muscle but there was no discoloration of skin. On palpation grade 2 tenderness was present on ipsilateral levator scapulae and right upper trapezius muscle. Spasm was present at cervical paraspinal muscle. Muscle strength assessed by manual muscle testing during clinical examination was grade 4+ for the sternocleidomastoid muscle and grade 3+ for the rhomboids and right side neck flexors, respectively. Range of motion was measured by goniometer, was found to be Neck Flexion: 25°; Neck Extension: 30°; Neck Rotation: 65°. The cervical spondylosis diagnosis was confirmed by the results of the Spurling and Distraction tests. Cervical lordosis loss, disc space narrowing, and osteophyte growth on the anterior aspect were all noted in the investigation report of the cervical spine X-ray.

Before the physiotherapy session were started, the procedure was completely explained to the patient and informed written consent was taken from her. Then the following outcome measures were recorded: Neck Disability Scale (NDI) is a questionnaire was used to assess disability due to neck pain, Visual Analogue Scale (VAS) was used to measure the pain intensity and a goniometer was used to measure the range of motion (ROM).

The patient was instructed to attend the physiotherapy treatment twice a week for a total of four weeks, with two weeks of daily visits and two weeks of alternate days. Traditional physical therapy involved ten minutes of TENS. Electrode placement: two electrodes were placed on the cervical spine (C5-C7) and another electrode placed on the right upper trapezius muscle; another two electrodes placed on the right arm (one on the lateral upper arm near deltoid muscle) for optimal pain relief. Ultrasound Therapy was also used for healing effects with 1MHz frequency for a period of 5 minutes. A hot pack was applied to the affected area for 10 minutes to help reduce muscle tension and enhance local blood circulation. Following this, the physiotherapy treatment was progressed by initiating stretching exercises. The stretches targeted the right upper trapezius, levator scapulae, and scalene muscles. Each muscle group was stretched for 10 repetitions, with the total duration of the stretching session lasting approximately 15 minutes. Additionally, gentle range-of-motion exercises were prescribed, with 10 repetitions aimed at preserving flexibility. Strengthening exercises focused on the sternocleidomastoid, levator scapulae, and upper fibers of the trapezius muscles, with each movement performed for 10 repetitions and held for 10 seconds. To support overall health, posture re-education was recommended to the patient.

TABLE 1: Physiotherapy plan

Modality /Exercises	**Frequency**	**Intensity**	**Time**	**Type**
TENS	5 days per week	100 Hz, Adjusted to the patient tolerance level	10 minutes	electrotherapy
Ultrasound Therapy	5 days per week	0.8 W/cm, 1MHz, continuous mode	5 minutes	electrotherapy
Hot Pack	5 days per week	40-45 °C	10 minutes	electrotherapy
Stretching exercises	daily	Hold for 10-15 sec, 3 reps each	10 sec hold, 10 reps	Upper trapezius, levator scapulae, scalene stretches
ROM exercises	daily	Slow, pain free	10 reps	flexion and extension, side bending, rotation,

		movements, 5-10 reps each		chin tucks (fig 1)
Strengthening exercises	Consecutive 3 days per week	Moderate resistance, 2-3 sets	10 sec hold, 10 reps	Isometric neck strengthening: press forehead back of head and side of head against resistance, shoulder blade squeeze (fig 2) , shoulder retraction, scapular stabilization

EXERCISES

Fig1: Chin Tucks

Fig2: Scapular blade squeeze

ELECTROTHERAPY

Fig3: TENS

Fig4: UST

RESULTS

TABLE 2: Measures of Results following Four Weeks of Traditional Physiotherapy

Measures	***Before***	***After***
VAS	7	2
NDI	32% (severe disability)	8% (mild disability)
MMT		
Neck flexors	Grade 3 (right)	Grade 4+ (right)
Rhomboids	Grade 3 (right)	Grade 4+ (right)
ROM		
Cervical flexion	25°	40°
Cervical extension	30°	38
Cervical rotation	65°	74°
Shoulder flexion	110°	175°
Shoulder extension	30°	50°
Shoulder abduction	170°	180°
Shoulder adduction	25°	50°
Shoulder internal rotation	50°	85°
Shoulder external rotation	60°	90°

DISCUSSION

This case study highlights the effectiveness of a structured physiotherapy program in managing cervical spondylosis-related pain, stiffness, and functional impairment. The patient of 53-year-old right-handed female patient diagnosed with cervical spondylosis. She had previously undergone medical treatment, including a methylprednisolone injection and Tab Zerodol-SP (twice daily) for pain relief. While she initially experienced immediate symptom relief, the pain returned after a few hours. However, after three weeks of conventional physiotherapy, the patient showed significant improvement. Her pain score on the VAS decreased from 7 to 2 with the use of TENS and UST.

Ultrasound therapy that increases collagen's flexibility and enhances circulation in deeper tissues. Evidence indicates that exercise therapy contributes to reducing neck pain and disability in patients with cervical spondylosis. [2] It also plays a crucial role in restoring neck mobility and strength. ROM exercises helped in maintaining cervical flexibility and reducing stiffness. Stretching exercises targeting the upper trapezius, levator scapulae, and scalene muscles alleviated muscular tightness, while strengthening exercises, including isometric neck exercises and scapular stabilization, contributed to better postural support and reduced strain on the cervical spine. The application of a hot pack facilitated muscle relaxation and increased blood flow to the affected area, further aiding in pain management and tissue healing.

The reduction in pain intensity, as reflected in outcome measures such as the NDI and VAS, suggests that an individualized rehabilitation program can provide substantial benefits in symptom management. The NDI was utilized to assess the functional status of patients experiencing neck pain. It includes 20 questions that evaluate how neck pain impacts emotional well-being, cognitive abilities, and daily activities. Each item is rated on a scale from 0 to 5, where 0 represents normal function and 5 indicates the most severe level of impairment due to neck pain. The total score is obtained by summing the responses, resulting in an overall score ranging from 0 to 100. [8] The need for a comprehensive and patient-specific approach in physiotherapy management of

This case study emphasizes cervical spondylosis. The combination of electrotherapy, exercise therapy, and patient education proved to be effective in alleviating pain, improving cervical

function, and enhancing overall well-being. Future research comparing different physiotherapy protocols and long-term follow-up studies will be beneficial in optimizing treatment strategies for cervical spondylosis management.

CONCLUSION

This case study demonstrates the effectiveness of a structured physiotherapy program in managing cervical spondylosis-related pain, stiffness, and functional impairment. A comprehensive approach incorporating manual therapy, exercise therapy, and patient education resulted in significant improvements in pain reduction, cervical range of motion, and functional independence. The combination of TENS, UST and therapeutic exercises proved to be effective in alleviating symptoms and enhancing overall well-being. These findings highlight the importance of a patient-specific approach in physiotherapy management of cervical spondylosis. In future the more number of researches are required to provide customized tailored management programme for obtaining long term result in patient with cervical spondylosis.

Declaration by Authors

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