LATERAL EPICONDYLITIS: A CASE STUDY OF CONSERVATIVE CARE USING ULTRASONIC THERAPY AND CONVENTIONAL THERAPY

Dr. Stuti Mehra
MPT (musculoskeletal) student
ISIC Institute of Rehabilitation Sciences, New Delhi, India.

Abstract*— *Introduction: **Lateral epicondylitis, commonly called tennis elbow, is a prevalent overuse injury that involves strain and irritation of the extensor tendons in the forearm. Though often linked to tennis and racquet sports, it can result from any repetitive hand or wrist activity, making it common among individuals whose daily tasks or occupations involve frequent arm movements. The condition involves pain, inflammation, and degeneration (tendinosis) of the wrist extensor tendon where it attaches to the lateral epicondyle, the outer part of the elbow. This leads to reduced joint mobility, impaired muscle performance, and limited range of motion, often causing significant discomfort and difficulty with routine tasks. Tennis elbow impacts approximately 40% of individuals, with the highest incidence seen in both men and women aged between 35 and 54. Physiotherapy is a key treatment approach, often involving ultrasound therapy to reduce pain and promote healing, along with active and strengthening exercises and ergonomic guidance to help prevent further strain and support functional recovery.**

Case Presentation: **A 42-year-old hypertensive woman, who works as a general secretary at a private company, has been experiencing persistent pain in her right elbow since December 2024. The pain has gradually worsened over time and is now interfering with her ability to carry out everyday activities. She reports discomfort during routine tasks such as brushing her hair, bathing, lifting and carrying household items, performing domestic chores, and especially while typing or using a computer at work.**

Management and Outcome: **The patient is undergoing two forms of physiotherapy treatments: ultrasonic therapy and conventional therapy. The assessment includes measuring pain using the Defense and Veterans Pain Rating Scale (DVPRS), evaluating muscle strength through Manual Muscle Testing (MMT), assessing the range of motion with a goniometer, and measuring functional ability using the Patient-Rated Tennis Elbow Evaluation (PRTEE).**

Conclusion: **The conservative treatment program, consisting of Ultrasonic Therapy and Conventional Therapy, for a patient diagnosed with lateral epicondylitis (tennis elbow) resulted in several notable improvements. These included a reduction in pain, as well as enhancements in range of motion, muscle strength, and overall functional ability.**

***Key words*—PCOS ,cardiovascular endurance, muscular endurance, balance, flexibility.**

I. INTRODUCTION

Lateral epicondylitis, commonly referred to as tennis elbow, is an injury marked by pain and sensitivity on the outer side of the elbow. It arises from overuse or repetitive strain of the forearm extensor tendons, especially the extensor carpi radialis brevis tendon, which attaches to the lateral epicondyle, the bony prominence on the outer side of the elbow. This condition typically develops due to repetitive motion that causes small tears in the tendons, resulting in inflammation, pain, and, in some cases, degeneration of the tendon tissue. Although it is often associated with tennis or racquet sports, lateral epicondylitis can affect individuals involved in any activity that demands repetitive arm, wrist, and hand movements, such as typing, lifting, using tools, or even frequent mouse usage at a desk job [1][2][3].

The hallmark symptom of lateral epicondylitis is pain on the outer side of the elbow, which may radiate down the forearm. The pain can worsen with activities involving gripping, lifting, or repetitive wrist motions, making simple tasks such as opening jars, carrying bags, or shaking hands difficult. Individuals may also experience weakness in the affected arm, reduced range of motion, and stiffness in the elbow joint. The condition most commonly affects individuals aged between 35 and 54, although it can occur at any age, and both men and women are equally susceptible. Lateral epicondylitis is thought to result from a combination of mechanical factors, poor ergonomics, improper technique in sports or work activities, and the cumulative effect of repetitive strain [3][4][5].

The diagnosis of lateral epicondylitis is generally based on a thorough physical examination and an assessment of the patient's activity history. Certain special tests are commonly used to help confirm the diagnosis. One of the most widely performed is Cozen's test, in which the examiner asks the patient to make a fist, extend their wrist, and resist pressure that is applied to the wrist. Pain or discomfort during this maneuver is typically indicative of lateral epicondylitis. This test helps evaluate the involvement of the extensor muscles, especially the extensor carpi radialis brevis tendon, which is most frequently affected in tennis elbow [6]. Another important test is Mill's test, where the examiner passively rotates the patient's forearm into pronation, bends the wrist downward, and straightens the elbow. A positive test, indicated by pain over lateral epicondyle, further supports the diagnosis [7]. The Maudsley's test is also useful, where the patient is asked to extend their third finger against resistance, provoking pain in the elbow if the condition is present [7]. Imaging techniques such as X-rays or MRIs are typically not necessary unless other conditions, such as fractures or joint degeneration, need to be ruled out. In most cases, the diagnosis is made through clinical examination and patient-reported symptoms [4].

Conservative treatment is the primary approach for managing lateral epicondylitis, focusing on pain relief, reducing inflammation, and promoting tendon healing. Standard treatments include rest, ice application, nonsteroidal anti-inflammatory drugs (NSAIDs), and physical therapy. Physical therapy often involves stretching, strengthening exercises for the forearm muscles, and techniques to improve flexibility and promote the healing of the tendons. In some cases, additional interventions such as ultrasound therapy, corticosteroid injections, or bracing may be used to reduce inflammation and alleviate symptoms. Surgery is rarely necessary and is typically considered only when conservative treatments fail after several months.[8][9]

Among the conservative physiotherapy program, ultrasound therapy and conventional therapy are commonly used in clinical practice [17]. Ultrasound therapy involves the use of high-frequency sound waves directed into the tissues to promote deep heating, increase blood circulation, reduce inflammation, and accelerate the healing process of the damaged tendons. The typical parameters used in ultrasound therapy for lateral epicondylitis include a frequency of 1 MHz for deeper tissue penetration, an intensity ranging from 0.8 to 1.5 W/cm², and a treatment duration of approximately 5 to 8 minutes, depending on the severity and chronicity of the condition. Both continuous and pulsed modes may be used, with pulsed mode often preferred in acute cases to minimize thermal effects [10][11][12].

Conventional therapy, on the other hand, includes a combination of therapeutic exercises and manual techniques designed to restore function. These exercises aim to strengthen the wrist extensor muscles, improve joint range of motion, and enhance overall arm function. Conventional therapy may also incorporate ergonomic education to help patients avoid movements or postures that contribute to tendon stress. Together, ultrasound and conventional therapies provide a comprehensive and effective approach to treating lateral epicondylitis, facilitating both symptom relief and functional recovery [13][14][15].

The prognosis for lateral epicondylitis is generally favourable, with most individuals experiencing significant pain relief and improvement in function with conservative treatment. However, recovery time varies, and some individuals may continue to experience symptoms for several months. To prevent recurrence, it is important to modify activities that involve repetitive arm movements, improve ergonomics, and engage in exercises to strengthen the forearm muscles [16].

II. CASE PRESENTATION

Subjective examination

A 42-year-old woman employed as a general assistant at a private company seeks medical attention for pain in her right elbow, which has been ongoing since December 2025. The pain began gradually and has worsened over the time of past 3 months , especially during daily activities that require repetitive arm, wrist, and hand movements. The patient reports that simple tasks such as personal hygiene, lifting objects, performing household chores, and typing at work aggravate the pain in her right elbow. These activities, which involve repetitive motions of the wrist and hand, exacerbate her discomfort, making her daily routine difficult. The patient then decided to consult the orthopedic department for further evaluation and began physiotherapy treatment shortly after her visit.

Physical Examination

Before beginning the intervention, a thorough physical examination was conducted by the physiotherapist. This comprehensive assessment included the evaluation of vital signs, inspection, palpation, basic movement testing, pain measurement, muscle strength, joint range of motion, edema, and a functional activity examination. Upon evaluating the patient's vital signs, her blood pressure was recorded at 120/80 mmHg, her height was 160 cm, her weight was 60 kg, her pulse rate was 79 beats per minute, and her respiratory rate was 18 breaths per minute, all of which were within normal limits.

When inspecting the patient's right elbow both statically and dynamically, it was noted that there was visible swelling on the lateral aspect of the elbow. The patient also reported experiencing pain when attempting to bend her right arm, particularly during activities that involved lifting or carrying objects. These actions triggered discomfort, making it difficult for her to perform tasks that require the use of her right hand. The patient expressed that she had been unable to engage in any strenuous activities with the right arm due to the persistent pain.

Upon palpation of the affected area, no pitting edema or muscle spasm was observed. However, tenderness was noted over the lateral epicondyle, which is consistent with lateral epicondylitis, commonly referred to as tennis elbow. There was no significant muscle wasting, and the surrounding tissues appeared to be in a normal state, aside from the localized tenderness.

Pain was assessed using the Visual Analogue Scale (VAS), which is a subjective measure of pain intensity. The patient reported mild pain (1/10) when at rest, which was not significantly bothersome. However, when pressure was applied during palpation, the pain increased to a value of 6/10, indicating moderate discomfort related to movement. The pain worsened to a moderately severe level (8/10) when the patient actively moved her elbow, indicating that the pain was more pronounced during motion, especially with activities involving repetitive wrist or elbow movements.

Further examination of edema revealed a 1 cm difference in circumference between the patient's right and left forearms, suggesting the presence of localized swelling around the elbow joint. This difference may contribute to the discomfort and functional impairment that the patient is experiencing.

Basic movement tests were performed to assess the patient's range of motion and muscle function. Both active and passive motion testing revealed that the patient experienced limitations in the range of motion of the elbow and wrist, accompanied by pain at the end of the motion range. The active movements, such as flexion and extension of the elbow, were restricted, likely due to the inflammation and irritation of the tendons at the lateral epicondyle. Passive range of motion testing also showed limitations with pain, confirming that movement was restricted in multiple directions.

During isometric testing, where the patient was asked to resist minimal pressure applied to the arm, the patient did not report pain. However, the patient was only able to resist minimal force, suggesting that there is a weakness in the forearm muscles associated with the condition.

Muscle strength was evaluated using Manual Muscle Testing (MMT), where a score of 4 out of 5 was observed for the strength of muscles involved in elbow and hand movements. This indicated a reduction in muscle strength of flexors and extensors of right elbow.

The range of motion of the patient's elbow were assessed in both flexion and extension, and in pronation and supination. The results showed reduced range of motions of right elbow.

Lastly, a functional activity assessment was conducted using the Patient-Rated Tennis Elbow Evaluation (PRTEE), which is a tool designed to assess both pain intensity and functional limitations associated with tennis elbow. The patient's score on the PRTEE was 78, which indicates a significant level of functional impairment and pain in the affected elbow. A higher score on this scale typically reflects greater pain and difficulty with activities that require the use of the affected arm.

The differential diagnosis included conditions such as radial tunnel syndrome, cervical radiculopathy, elbow osteoarthritis, biceps tendinopathy, fracture, posterior interosseous nerve palsy, forearm muscle strain, myofascial pain syndrome, and rheumatoid arthritis. However, the absence of diffuse or radiating pain, neurological symptoms, crepitus, anterior elbow pain, trauma history, systemic features, and widespread joint involvement helped rule out these conditions.

Based on the clinical history and physical examination, the provisional diagnosis was lateral epicondylitis (tennis elbow). The diagnosis was supported by localized tenderness over the lateral epicondyle, pain aggravated by wrist extension and gripping activities, and positive Cozen's, Mill's, and Maudsley's tests. The absence of signs suggestive of alternative pathologies further confirmed the diagnosis.

Management

The conservative treatment plan for the patient with lateral epicondylitis aims to reduce pain and inflammation, promote tendon healing, and improve functional ability and strength. The treatment includes a combination of Ultrasonic Physiotherapy, Conventional Physiotherapy, and prescribed medications.

Medical Management:

The patient has been prescribed a comprehensive medication regimen to assist in the management of her condition. The orthopedic department has prescribed Omeprazole 20 mg (1-0-0) for 10 days to prevent gastric discomfort or ulcers that may result from the use of nonsteroidal anti-inflammatory drugs (NSAIDs) like Indomethacin SR 75 mg (1-0-0) for 10 days. The Indomethacin is aimed at reducing the inflammation and pain associated with the condition. Additionally, the patient has been prescribed Calcium 500 mg and Vitamin D3 (1-0-0) for 10 days to support bone health and promote the healing of the affected tendon tissues. Alfacalcidol 0.25 mcg (1-0-0) for 10 days is prescribed to regulate calcium levels and support bone healing, which is beneficial in the case of tendinopathy. Furthermore, the patient will take a combination of L-arginine, Collagen Peptide Type 1, Sodium Hyaluronate, Chondroitin Sulphate, and Vitamin C (1-0-0) for 15 days, providing necessary nutrients to aid tendon repair, enhance collagen synthesis, and possess anti-inflammatory properties.

Physiotherapy Management:

The physiotherapy treatment plan for this patient is structured around both Ultrasonic Therapy and Conventional Physiotherapy techniques aimed at relieving symptoms and promoting healing of the tendons. The Ultrasonic Therapy was delivered for 5 minutes per session, typically 5 times per week for 2 weeks. The parameters for this therapy will include a frequency of 1 MHz for deeper tissue penetration, an intensity range of 0.8 - 1.2 W/cm² (depending on patient tolerance), and a 50% duty cycle for continuous treatment. The ultrasonic therapy will help reduce inflammation, improve blood circulation, and promote tissue healing in the affected area.(Fig.1)

Fig.1

The Conventional Physiotherapy component will focus on restoring the functional mobility of the elbow and forearm. Stretching exercises for the forearm muscles will be incorporated, particularly focusing on wrist extension and flexion to improve flexibility and reduce tension in the tendons. Strengthening exercises will be introduced once the pain is manageable, focusing on the extensor muscles of the forearm. These exercises will include isometric wrist extension, where the patient holds the wrist extension against resistance, and eccentric exercises, which involve slow lowering of the wrist against resistance to strengthen the muscle without aggravating the tendon. Each of these exercises should be done in the pattern of: 3 sets 10-12 repetitions/ day.(Fig.2)

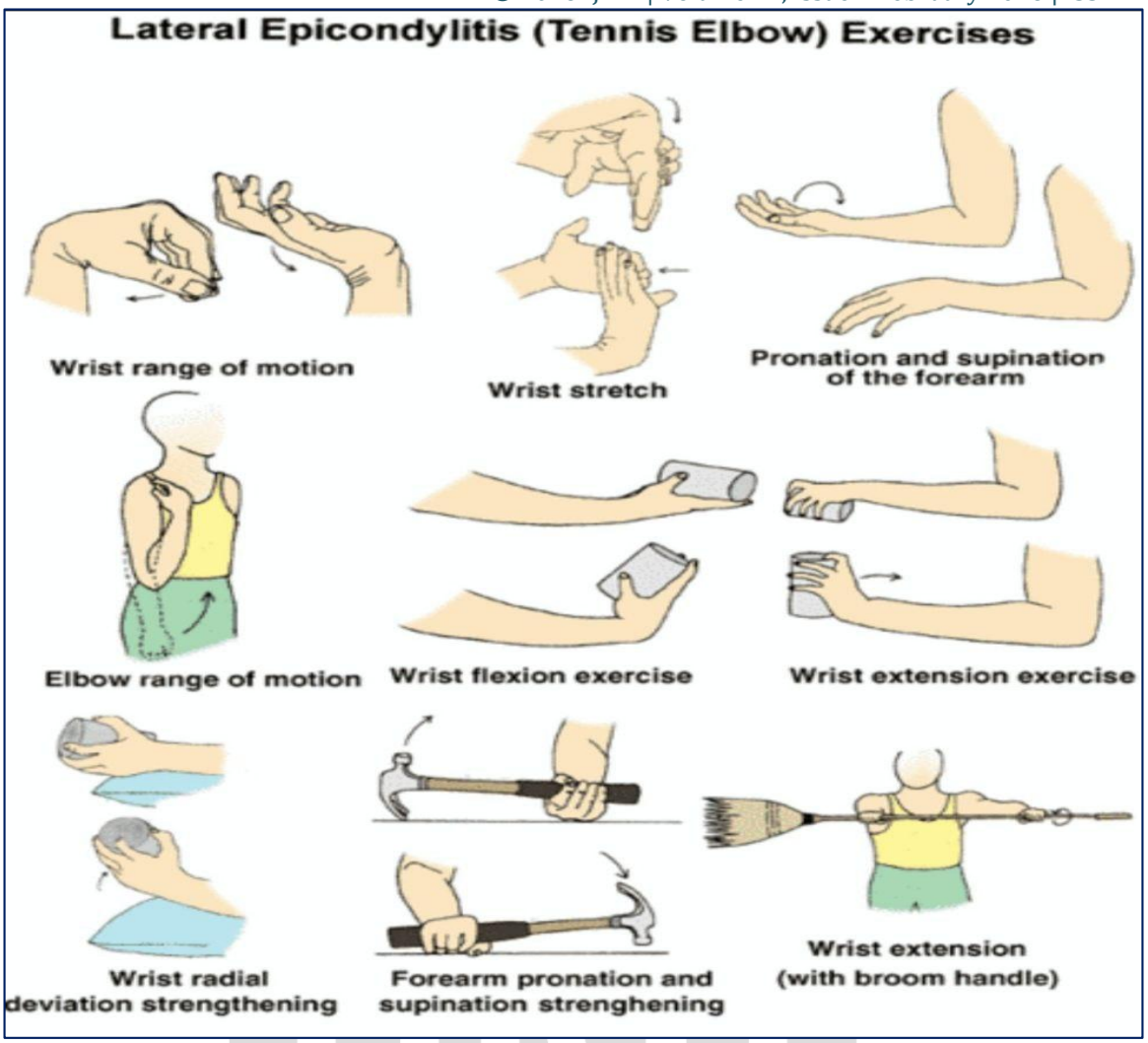
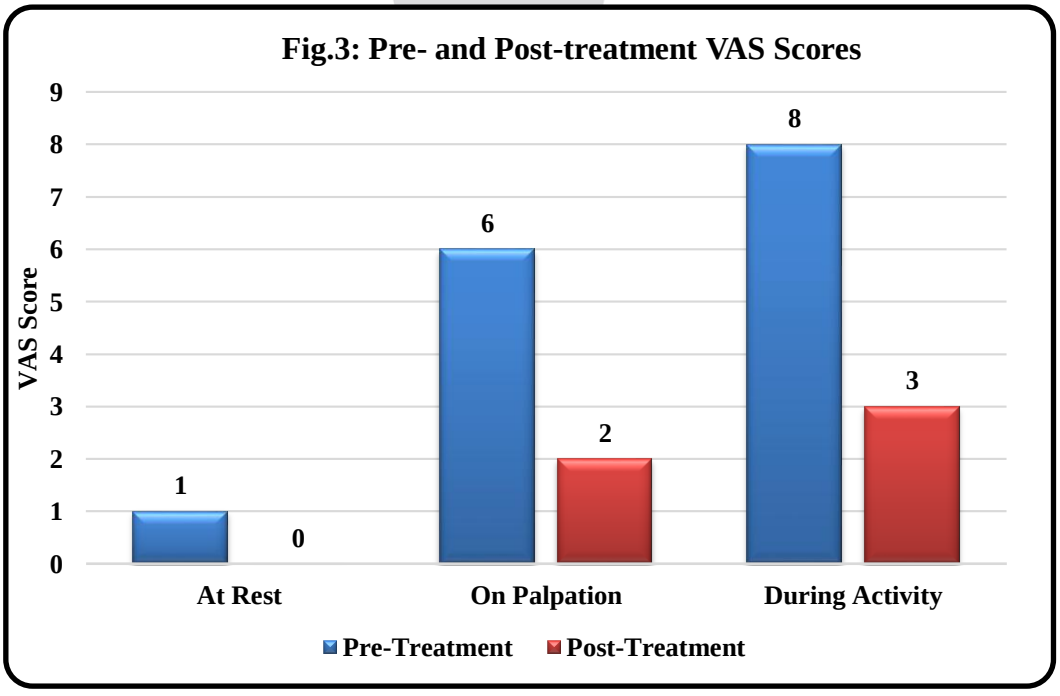


Fig.2

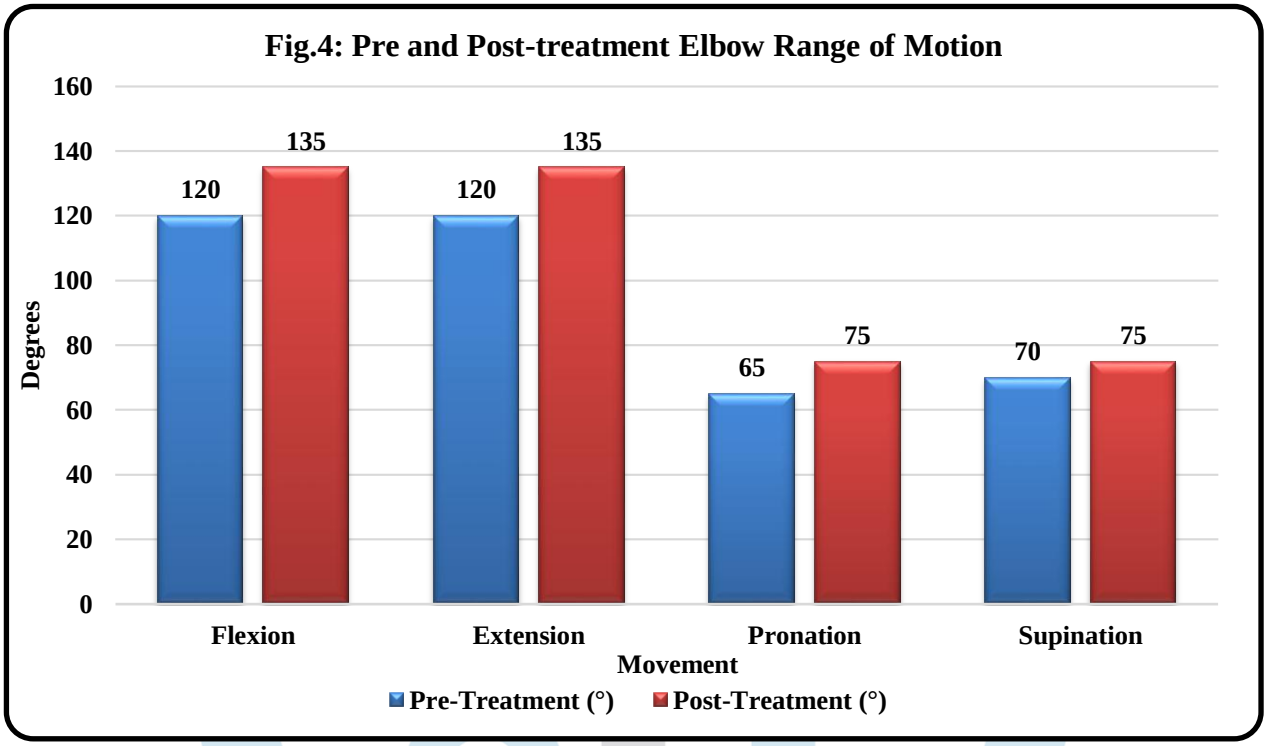
Ergonomic modifications will also be suggested to the patient, including adjustments to her workstation setup, such as desk height and keyboard positioning, to reduce strain on her elbow during typing and other repetitive tasks. She was also instructed in proper lifting and carrying techniques to prevent further strain on her elbow.

III. OUTCOMES

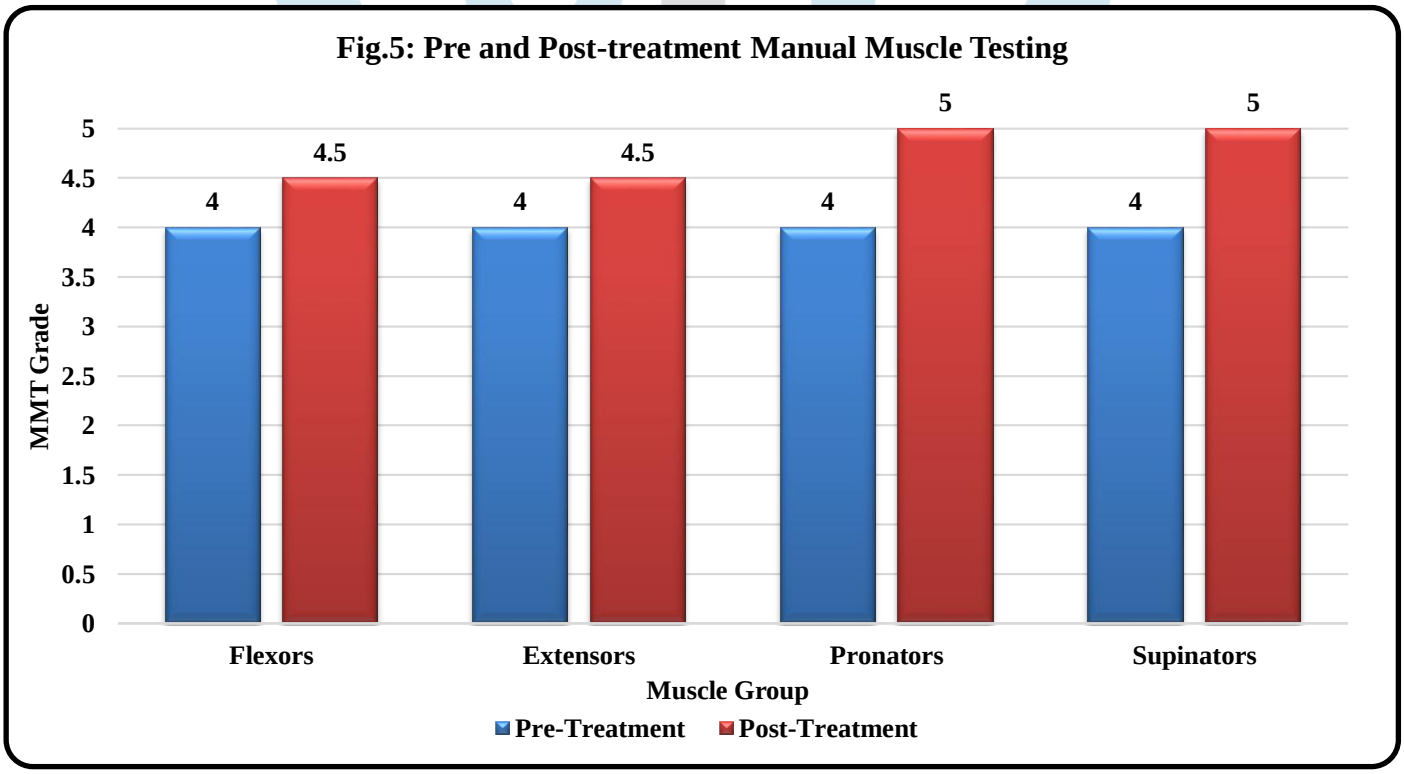
After two weeks of conservative management, the patient demonstrated significant improvement in pain, range of motion, muscle strength, and functional ability. Pain intensity decreased both at rest and during activity, as measured using the Visual Analogue Scale (Fig.3.), allowing improved tolerance to daily and occupational activities.



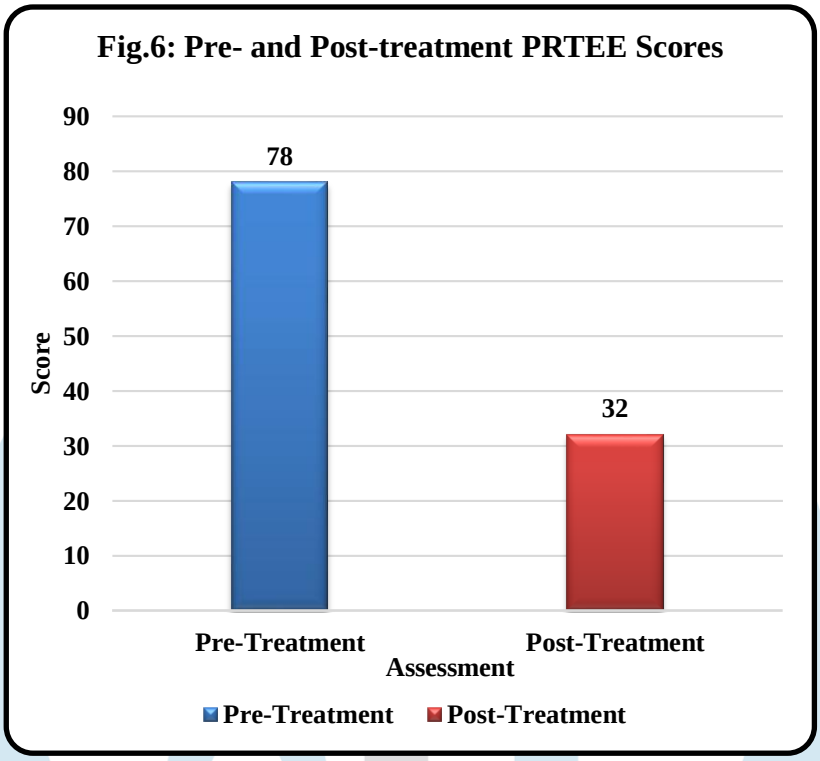
Goniometric assessment showed improved elbow flexion, extension, pronation, & supination with reduced end-range pain (Fig.4.).



Muscle strength of the right elbow flexors and extensors improved from Grade 4/5 to near-normal levels (Fig.5.).



Functional assessment using PRTEE revealed a marked reduction in score, indicating improved upper-limb function (Fig.6: Pre- and Post-treatment PRTEE Scores).



Overall, the combined ultrasonic and conventional physiotherapy program resulted in favorable clinical outcomes and improved functional independence.

IV. DISCUSSION

The management of lateral epicondylitis, commonly known as tennis elbow, involves a multifaceted approach that includes both medical and physiotherapeutic interventions. In this case, the patient underwent a conservative treatment regimen comprising pharmacological therapy and physiotherapy modalities, which collectively contributed to significant clinical improvement.

The physiotherapy management of lateral epicondylitis, or tennis elbow, is essential in addressing both the symptomatic and functional impairments associated with this common overuse injury. Lateral epicondylitis is characterized by pain and tenderness over the lateral epicondyle of the humerus, typically due to repetitive wrist extension and gripping activities that strain the common extensor tendon, particularly the extensor carpi radialis brevis (ECRB) muscle. In the present case, physiotherapy played a critical role in the patient's recovery by focusing on pain relief, tendon healing, muscle reconditioning, and prevention of symptom recurrence through ergonomic education and exercise [1][2].

Therapeutic ultrasound is a widely used modality in the management of tendinopathies, including lateral epicondylitis. Ultrasound therapy employs high-frequency sound waves to produce both thermal and non-thermal effects in soft tissues. Thermal effects result in deep tissue heating, which can increase blood flow, reduce muscle spasm, and enhance the extensibility of connective tissue. Non-thermal effects, including cavitation and acoustic streaming, are believed to stimulate cell membrane permeability and promote tissue repair by enhancing collagen synthesis and reducing inflammation [10].

In this case, the patient received ultrasound therapy using a frequency of 1 MHz for deep tissue penetration, with an intensity ranging between 0.8 and 1.2 W/cm² and a 50% duty cycle. The treatment was administered five times per week over a two-week period. These parameters align with recommendations from clinical studies suggesting that low-to-moderate intensity ultrasound, when administered consistently, may contribute to soft tissue healing in cases of tendinopathy [11]. Although a systematic review have found that ultrasound therapy alone may not offer substantial long-term benefits over placebo, it has been reported to provide temporary pain relief when combined with other interventions such as exercise and manual therapy [12].

Exercise therapy, particularly eccentric loading exercises, forms the cornerstone of evidence-based physiotherapy treatment for lateral epicondylitis. Eccentric exercises help in tendon remodeling by promoting fibroblast proliferation, enhancing collagen alignment, and improving tendon tensile strength. Numerous studies support the use of eccentric exercises as a first-line intervention for tendinopathies, with documented improvements in pain and function in both short-term and long-term follow-up [13].

In the current case, the patient followed a structured exercise regimen that included isometric wrist extension, dynamic eccentric loading of the wrist extensors, and stretching of the forearm muscles. These exercises were performed with gradual progression to avoid tendon overloading while still stimulating healing. A study was conducted that have demonstrated that patients performing eccentric wrist extensor exercises experienced greater reductions in pain and improvements in grip strength compared to those receiving only passive modalities [14].

The American Academy of Family Physicians emphasizes the importance of incorporating both eccentric strengthening and static stretching exercises as fundamental elements in the rehabilitation strategies for managing lateral epicondylitis by reducing muscle tension and promoting flexibility, which is often compromised due to chronic overuse injuries [15][19].

Moreover, addressing workplace ergonomics is essential, especially for individuals whose occupation involves repetitive hand and wrist movements, such as typing or lifting. Ergonomic modifications — such as adjusting the height of the workstation, optimizing hand positioning, and using assistive supports — help reduce mechanical stress on the lateral elbow. Literature supports

the inclusion of ergonomic education in treatment programs for lateral epicondylitis, as it helps prevent symptom recurrence and ensures sustained functional improvement [16].

The integration of ultrasound therapy, exercise interventions, manual techniques, and ergonomic counseling represents a multimodal approach, which is widely endorsed in current clinical guidelines. A multimodal treatment program offers a synergistic benefit by addressing pain, mechanical dysfunction, and the underlying tendon pathology simultaneously [18]. The present case demonstrated the effectiveness of such a comprehensive strategy. The patient's PRTEE score improved significantly over the course of two weeks, and clinical findings showed enhanced range of motion, muscle strength, and decreased tenderness over the lateral epicondyle [20].

V. CONCLUSION

The conservative treatment regimen, which incorporated both Ultrasonic Therapy and Conventional Physiotherapy techniques, led to significant clinical improvements in the patient diagnosed with lateral epicondylitis (commonly known as tennis elbow). The patient experienced a marked decrease in pain levels, accompanied by noticeable gains in joint range of motion and forearm muscle strength. In addition, the patient reported better functional performance in daily activities, indicating enhanced mobility and reduced discomfort during previously painful movements. This outcome highlights the effectiveness of a multimodal physiotherapeutic approach in managing the symptoms and functional limitations associated with this condition.

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