

# Effect of Extracorporeal Shock Wave Therapy on Pain and Function in Patient with Tennis Elbow: An Evidence Based Study

Dr Mukul Chauhan<sup>1</sup>, Dr Ankita Patel<sup>2</sup>, Dr Asha Dabhi<sup>3</sup>, Dr Himanginiben Patel<sup>4</sup>

<sup>1</sup>Assistant Professor at SSCP College Bhandu, Mehsana, Gujarat, India

<sup>2</sup>Assistant Professor at SSCP College Bhandu, Mehsana, Gujarat, India

<sup>3</sup>Assistant Professor at SSCP College Bhandu, Mehsana, Gujarat, India

<sup>4</sup>Student At Northumbria University, Newcastle Upon Tyne, England, United Kingdom

Corresponding Author: Chauhan Mukulkumar Rajendrabhai

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## ABSTRACT

**OBJECTIVE:** The aim of the study is to review the available literature on the use of Extracorporeal Shock Wave Therapy (ESWT) for the treatment of Tennis elbow to understand its therapeutic potential.

**MATERIALS AND METHODS:** A systematic review was performed on the PubMed, Scopus, Science Direct, and Research Gate databases with the following inclusion criteria: Studies published in last 08 years. (2015 to 2022) Studies that includes subjects with Tennis Elbow.

**RESULTS:** 20 studies were reviewed from which 10 studies concluded that ESWT is effective in Tennis Elbow patients.

**CONCLUSIONS:** Based on the analysis of these 10 articles, it can be concluded that ESWT is an effective treatment regimen in individual with Tennis Elbow patients.

**KEY WORDS:** Extracorporeal Shock Wave Therapy (ESWT), Tennis Elbow, Pain, Grip Strength.

## INTRODUCTION

Lateral epicondylitis is one of the widely seen lesions of the arm characterized by pain localized over lateral epicondyle which is the insertion site of the wrist extensors, and extensor muscles of the forearm. Despite the name “tennis elbow,” tennis is a direct cause in only 5% of those with lateral epicondylitis, although sports, such as tennis, requiring overhead or repetitive arm actions increase risk, with up to 40% of tennis players affected at some stage. Its prevalence in general population ranges between 1-3% which peaks between 40-50 years of age. It is seen more frequently in females, and more often affects the dominant hand. Lateral epicondylitis is frequently seen in individuals performing

activities which repetitively strain extensor muscles of the wrist. It is characterized by pain, and decrease in grip strength which might manifest with resisted wrist extension, and extension of the middle finger accompanied with restriction of daily living activities. [1-2]

It is generally a work related or sport related disorder of the common extensor origin of the arm, usually caused by excessive, quick, monotonous, repetitive movements of the wrist, especially in eccentric contractions and gripping activities causing macroscopic and microscopic tears in the extensor carpi radialis brevis tendon, the most commonly affected structure. It is a degenerative or failed healing tendon response characterised by the increased presence of fibroblasts,

increased amounts of proteoglycans and glycosaminoglycans, vascular hyperplasia, and disorganised collagen in the origin of the extensor carpi radialis brevis tendon. The diagnosis is simple and confirmed by tests that can be used in daily clinical practice such as palpation on the facet of the lateral epicondyle, the Thomsen test, handgrip dynamometer testing, Mill's test, chair test, and the coffee cup test.[3]

Some activities with long-term repetitive use of the extensor muscles of the forearm (for example tennis, lifting weights, holding the pot, wring clothes, manual work) may increase the risk of the tendinitis. Neck Shoulder pain is the most common symptoms in the population of lateral humerus epicondylitis, but it can be associated with changes of biomechanics in upper-limb.[4]

Basic principles of the treatment include pain relief, acceleration of the healing process, refraining from activities overloading arms, and patient's return to daily living activities. Conservative treatment alternatives include medical treatment, resting, use of splint, and orthosis, application of ice, electrotherapy, massage, manipulation-mobilization, exercise, and extracorporeal shock wave therapy (ESWT) [3]. Operative treatment is optional for those patients with severe or persistent symptoms that cannot be alleviated by a well performed conservative treatment, which include open, percutaneous and arthroscopic approaches. It is estimated that about 4% to 11% of patients ultimately undergo surgery.[4]

Extracorporeal shock wave therapy (ESWT) is a noninvasive procedure that uses single pulsed acoustic or sonic waves generated outside the body and focused at a specific site within the body. The shock waves dissipate energy at the interface of 2 substances with different acoustic impedance, such as the bone-tendon interface, resulting in the release of kinetic energy at the junctions that can cause tissue alterations. It has been hypothesized that ESWT works by stimulating nerve fibers to

produce analgesia and that disruption of the tendon tissue may induce a healing process.[2]

A systematic review conducted by Schmitz C suggested that ECSW has been proven as an effective and safe noninvasive treatment option for tendon and other pathologies of the musculoskeletal system.[5]

The purpose of this study the scientific evidence regarding the effect of the ESWT in tennis elbow patients

## METHODOLOGY

### CRITERIA FOR CONSIDERING STUDIES

- **Inclusion criteria for this study were:**

- Studies published in last 08 years. (2015 to 2022)
- Studies that include subjects with Tennis elbow
- Studies that include physiotherapy interventions for same outcome measures.

- **Exclusion criteria for this study were:**

- Studies based on animal data.
- Studies published in languages other than English
- Studies with Pain (VAS) and grip strength hand held dynamometer (HHD).
- Used the other treatment for tennis elbow

Outcome measures: Any outcome such as Pain level measurement (VAS), grip strength by HHD was present in the literature, was consider eligible for study.

- A total of 60 articles were found in the database search. After full article review, eight studies that met the inclusion criteria were considered for inclusion.
- Several studies were rejected after applying the inclusion and exclusion criteria. The primary reasons for the exclusion from the study were: (1) studies not published in the English language, (3) the absence of pain and grip strength as outcome, (4) use the

other treatment than ESWT, (5) use of animal data, (6) unavailability of the full text of the article.

A summary of the sample and design characteristics, intervention, outcome measures and results from each study were presented on table.

Author	Sample design/ no of article & subject	Intervention	Outcome Measure	RESULT	LEVEL OF EVIDENCE
Christoph Schmitz at el 2015 <sup>[5]</sup>	Efficacy and safety of extracorporeal shock wave therapy for orthopedic conditions: a systematic review on studies listed in the PEDro database	106 studies included. randomly divided into radial AND focus ECSWT	-	ESWT has been proven as effective and safe treatment option for tendon and other pathologies of the musculoskeletal system in a multitude of high-quality RCTs	1A
Pawel Lizis, PhD at el 2015 <sup>[6]</sup>	Analgesic effect of extracorporeal shock wave therapy versus ultrasound therapy in chronic tennis elbow-25 Subjects Allocated RCT	RECEIVED 5 SESSION OF 1000,1500, 2000impluses each session at weekly ,	VAS	pain decreased to a significantly greater extent in the ESWT group than in the US group	1b
Clara Wing-Yee Wong at el 2016 <sup>[7]</sup>	Comparison of treatment effects on lateral epicondylitis between acupuncture and extracorporeal shockwave therapy-36 patients.-RCT	Seventeen patients were treated by 3-week ESWT, one session per week. Another 17 were treated by 3-week acupuncture therapy, two sessions per week	VAS GRIP STRENGTH DASH	The treatment effects of acupuncture and ESWT on lateral epicondylitis were similar. The pain relief persisted for at least two weeks after treatment	1b
Mehran Razavipour at el. 2018 <sup>[8]</sup>	The Short Term Effects of Shock-Wave Therapy for Tennis Elbow: a Clinical Trial Study	2000 pulses-daily for one week	VAS DASH	patients with tennis elbow, extracorporeal shock wave therapy can reduce the severity of pain and improve daily activity	4
Chenchen Yan at el 2019 <sup>[9]</sup>	A comparative study of the efficacy of ultrasonics and extracorporeal shock wave in the treatment of tennis elbow: a meta-analysis of randomized controlled trials	5 studies included for meta-analysis	VAS GRIP STRENGTH	ESWT offers more effective therapy for lateral epicondylitis than US therapy	1A
Gaowen Yao et al2020 <sup>[10]</sup>	Efficacy of Extracorporeal Shock Wave Therapy for Lateral Epicondylitis: A Systematic Review and Meta-Analysis	13 articles 1035 patients 501 patients for ECSWT & 534 OTHER	VAS GRIP STRENGTH	Based on the existing clinical evidence, ECSWTcan effectively relieve the pain and functional impairment	1A
Chenxiao Zheng, MDet al 2020 <sup>[4]</sup>	Effectiveness of extracorporeal shock wave therapy in patients with tennis elbow A meta-analysis of randomized controlled trials	9 RCTs was evaluated for eligibility and was included in the present meta-analysis	VAS GRIP STRENGTH	ECSW cannot effectively reduce the mean overall pain, but it showed more people acquire 50% pain reduction and might be a better option for the treatment of L	1A
Noha Hosni Ibrahim et al2021 <sup>[11]</sup>	Extracorporeal shock wave therapy (ESWT) versus local corticosteroid injection in treatment of lateral epicondylitis (tennis elbow) in athletes: clinical and ultrasonographic evaluation	Time: 02:05 min:s Pressure: 1.2 Bar Frequency: 4.0 Hz Shock number: 500 N Energy density: 0.144 mj/mm2	VAS PRTEE	shock wave therapy revealed better improvement on long-term clinical and ultrasonographic follow-up than corticosteroid injection	1b
Stefanos Karanasios et al 2021 <sup>[12]</sup>	Clinical effectiveness of shockwave therapy in lateral elbow tendinopathy: systematic review and meta-analysis	not mention	VAS GRIP STRENGTH	Based on very-low and moderate certainty of evidence, extracorporeal shockwave therapy outperforms against Laser and ultrasound, respectively	1A
Salameh Aldajah et al 2022 <sup>[13]</sup>	Analgesic Effect of Extracorporeal Shock-Wave Therapy in Individuals with Lateral Epicondylitis: A Randomized Controlled Trial 40 patients	ESWT was set at 2000 shock waves with 1.6 bar intensity and 16 Hz frequency	VAS DASH	five sessions of ESWT intervention showed a significant reduction of pain and determined significant improvement in upper-extremity function and grip strength	1 b

## CONCLUSION

There is different level of evidence found of ESWT in patients with Tennis elbow. it can be concluded that there is strong evidence supporting the improving functional capacity, decrease pain and improve ADL Activity.

## Abbreviations

VAS: visual analogue score, DASH: Disability in Arm, Shoulder and Hand  
PRTEE: Patient Rated Tennis Elbow Evaluation Questionaries  
ESWT: extracorporeal shock wave therapy,  
ROM: Range of Motion

## Declaration by Authors

**Ethical Approval:** Not Applicable

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**Conflict of Interest:** The authors declare no conflict of interest.

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