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

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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.
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, wrist 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 gement of tennis elbow
  - 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.

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

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REFERENCES

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