



RESEARCH REPORT

# Efficacy of low-energy extracorporeal shockwave therapy and a supervised clinical exercise protocol for the treatment of chronic lateral epicondylitis: A randomised controlled study

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## KEYWORDS

extracorporeal shockwave therapy;  
lateral epicondylitis;  
supervised exercise protocol

**Abstract** This randomised controlled trial was designed to evaluate the efficacy of low-energy extracorporeal shockwave therapy with a supervised exercise protocol for the treatment of chronic lateral epicondylitis. Thirty patients of lateral epicondylitis were randomly placed into two groups: an experimental group ( $n = 15$ ) and a control group ( $n = 15$ ). The experimental group received low-energy extracorporeal shockwave therapy and supervised exercise once a week for 3 weeks, whereas the control group received a supervised exercise protocol three times a week. Both the groups were instructed to carry out a home exercise programme twice daily for 4 weeks.

Outcome parameters included in this study were pain intensity, pain-free grip strength, and the Disability of Arm, Shoulder, and Hand questionnaire. Data were collected at baseline and after the end of treatment (at 4th week). There was a decline in pain, and improvements in pain-free grip strength and limb function in both groups compared with the baseline values. At the end of the treatment period, the experimental group had greater reduction in pain intensity and better improvement in limb function ( $p < 0.01$ ). It can be concluded that low-energy extracorporeal shockwave therapy, when combined with regular exercise, is an effective method for reducing pain and improving upper limb function in patients with chronic lateral epicondylitis. Copyright © 2012, Hong Kong Physiotherapy Association Ltd. Published by Elsevier (Singapore) Pte Ltd. All rights reserved.

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## Introduction

Lateral epicondylitis is defined as a pathologic condition of the wrist extensor muscle at their origin at the lateral epicondyle of the humerus. It includes pain and local tenderness over the common extensor origin, which is exacerbated by continual use [1]. Lateral epicondylitis, often called tennis elbow, is one of the most common lesions of the arm [2]. It is a work-or sports-related pain disorder usually caused by excessive, quick, monotonous, repetitive eccentric contractions and gripping activities of the wrist [3–5].

The basic anatomical cause is sudden and, often repeated, use of the forearm extensor muscles leading to pathological changes mainly in the extensor carpi radialis brevis [4–6]. The extensor carpi radialis brevis tendon has a unique anatomic location that makes its undersurface vulnerable to contact and abrasion against the lateral edge of the capitellum during elbow motion [7].

A wide array of physiotherapy treatments have been recommended for the management of lateral epicondylitis, which have different theoretical mechanisms of action but the same aim of pain relief, control of inflammation, promotion of healing, rehabilitation, and prevention of recurrence [6,8–12].

One of the most common physiotherapy treatments for lateral epicondylitis is the exercise programme [13–15]. Home exercise programmes as well as supervised exercise programmes have been investigated and found to be effective in the treatment of lateral epicondylitis [16]. Strengthening and stretching exercises are the main components of an exercise programme because both strength and flexibility of the muscle/tendon should be addressed [12,15,16]. Stasinopoulos et al [16,17] suggested that exercise programmes should be administered for at least 4 weeks.

Low-energy extracorporeal shockwave therapy is an upcoming modality of treatment for chronic lateral epicondylitis [18–21]. Its use in the treatment of lateral epicondylitis has shown some encouraging results [21,22], but the optimal treatment dose of shockwave therapy has not yet been discovered [8] and inconsistent results have been reported [8,19,20]. The latest *Cochrane Database of Systematic Reviews* suggested that low-energy extracorporeal shockwave therapy provides minimal or no benefit in terms of improving pain and limb function among patients with lateral epicondylitis, when compared with placebo [20]. So far, no study has investigated the effects of combining low-energy extracorporeal shockwave therapy along with a structured exercise protocol for the treatment of chronic lateral epicondylitis.

The objective of this study was to examine whether adding low-energy extracorporeal shockwave therapy to an exercise protocol had any additional effect in the treatment of chronic lateral epicondylitis.

## Methods

### Study design

This was a randomised controlled trial designed to investigate the effect of low-energy extracorporeal shockwave

therapy combined with a supervised clinical exercise protocol for the treatment of chronic lateral epicondylitis.

### Participants

The criteria for inclusion were as follows: all referred and prediagnosed cases of lateral epicondylitis, presence of symptoms for  $\geq 6$  months, presence of pain on palpation at lateral epicondyle; positive Thomsen test, and positive Maudsley's test. Ethics approval of the study was granted by the Institutional Ethical Committee. Prior to participation in the study, informed consent was obtained from the participants. They were screened according to the inclusion criteria. Maudsley's test was performed with the participants sitting in a chair with the shoulder joint flexed to around  $60^\circ$ , elbow extended, and forearm pronated. The patient was then asked to extend the middle finger against resistance. Positive test was indicated by the presence of pain at the lateral epicondyle area [23]. Thomsen test or resisted wrist extension was performed with the shoulder flexed to  $60^\circ$ , elbow extended, forearm pronated, and wrist extended to about  $30^\circ$ ; pressure was applied to the dorsum of the second and third metacarpal bones in the direction of flexion and ulnar deviation to stress the extensor carpi radialis brevis and longus. Positive test was indicated by pain at the lateral epicondyle [21,23].

### Randomisation

After baseline data collection, the participants were then allocated to either the experimental group (Group A) or the control group (Group B) using computer-generated random numbers. Group A consisted of 15 patients (8 women and 7 men) with a mean age of 41.9 years. Group B comprised 15 patients (10 women and 5 men) with a mean age of 42.9 years. All patients in both the groups were treated in isolation so that no patient could know the treatment allocation of other participants. The patients were reassessed at the end of the 4th week (Fig. 1).

### Interventions

The experimental group received low-energy extracorporeal shockwave therapy and supervised exercise once a week for 3 weeks, whereas the control group received same type of supervised exercise programme as that of the experimental group three times a week. All participants in both the groups were instructed to carry out a home exercise programme twice daily for 4 weeks.

For the low-energy extracorporeal shockwave therapy, three sessions of treatment, consisting of 2000 impulses of  $0.06 \text{ mJ/mm}^2$ , were administered to the anterior aspect of the lateral epicondyle and around this site at a radius of 1.5–2 cm at intervals of 1 week [21,22,24]. The low-energy extracorporeal shockwave therapy was applied by an experimental device, the MP-100 model (Storz Medical, Tägerwil, Switzerland). The treatment head of the device was directed perpendicularly to the point of maximal tenderness on the lateral epicondyle, as identified by the therapist's palpation and patient report. During the

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