

Lateral elbow tendinopathy: Evidence of physiotherapy management

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Abstract

Lateral elbow tendinopathy (LET) is a common musculo-skeletal/sports injury. A plethora of physiotherapy techniques has been proposed in the management of LET. The exercise programme is the most common treatment in the management of LET. The optimal

protocol of exercise programme is still unknown. The effectiveness of the exercise programme is low when it is applied as monotherapy. Therefore, exercise programme is combined with other physiotherapy modalities such as soft tissue techniques, external support, acupuncture, manual therapy and electrotherapy, in the treatment of LET. Future research is needed to determine which treatment strategy combined with exercise programme will provide the best results in LET rehabilitation.

Key words: Tennis elbow; Isometric exercises; Physical therapy; Electrotherapeutic modalities; Eccentric training; Stretching; Physical modalities; Manipulation; Lateral epicondylitis; Lateral elbow tendinopathy

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Core tip: An effective treatment approach in the management of lateral elbow tendinopathy (LET) is an exercise programme. Exercise programme improves patients' symptoms but the ideal exercise protocol for the management of LET is still under investigation. Exercise programme as a sole treatment approach does not respond positively in many patients with LET. Thus, physiotherapists combine exercise programme with other physiotherapy techniques like **electrotherapy**, manual therapy, taping/bracing and acupuncture. Research to determine which treatment approach combined with exercise programme will provide the best results in the management of LET is needed.

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Lateral epicondylalgia, lateral epicondylosis, tennis elbow and/or lateral epicondylitis are inappropriate

clinical diagnostic terms due to pathophysiological, anatomical aetiological and factors^[1]. Therefore, lateral elbow tendinopathy (LET) is the most appropriate clinical diagnostic term. LET is related to sport or arm work pain disorder. It is defined as a cause of pain in the lateral epicondyle^[2] that failed healing tendon response rather than inflammatory or may be degenerative^[3]. LET is characterized by the absence of inflammatory cells, glycosaminoglycans and proteoglycans, disorganized and immature collagen vascular hyperplasia, the increased presence of fibroblasts^[4]. The most commonly affected structure is the origin of the extensor carpi radialis brevis^[4]. LET is common between 30 and 60 years of age, the disorder appears to be more severe and of longer duration in females^[3,5] and the most commonly affected arm is the dominant arm^[2,6].

The main complaints of LET patients are decreased function and pain^[2,3]. Both symptoms affect daily activities. Pain can be reproduced with one of the following ways: (1) palpation on the facet of the lateral epicondyle; (2) **with the elbow in extension, resisted wrist extension and/or resisted middle-finger extension;** and (3) gripping activities^[2,3,7]. The Patient-Rated Tennis Elbow Evaluation questionnaire has been translated and culturally adapted into German^[8], Italian^[9], Swedish^[10] and Greek^[11] and provides a quick, standardized, and easy quantitative description of functional disability and pain in LET patients^[8].

Although the diagnosis of LET is not difficult, the proper management is unknown. Physiotherapy is usually recommended for the management of LET^[7,12]. A plethora of physiotherapy techniques, electrotherapeutic and non-electrotherapeutic modalities, has been recommended for the management of LET^[2,3,7,12-15]. The aim of these treatments is the same, improving function and reducing pain, but the theoretical mechanism of action of these treatments is different. Therefore, more research is needed to find out the most effective treatment approach in LET patients since this variety of treatment techniques suggests that the most proper treatment technique is not known^[2,3].

One of the most common physiotherapy treatments for LET is a supervised or in clinic exercise programme^[2,3,7,12,14]. Malliaras *et al*^[16] concluded that instead of eccentric loading in lower limb tendinopathy, clinicians should consider eccentric-concentric loading alongside. A Heavy Slow Resistance (HSR) program is recommended in the management of lower limb tendinopathy for young active people^[17,18]. There are not similar studies for the upper limb. A similar loading program may be beneficial for the management of LET^[2,3,7,12,14].

Alfredson *et al*^[19] were first proposed the eccentric training of the injured tendon, the most commonly used conservative technique in the management of tendinopathy. Systematic review^[20,21] and RCT^[22] favor eccentric over other types of contractions in the management of LET, but using only eccentric training of the injured tendon is not effective treatment

approach for some patients with upper and lower limb tendinopathies^[23]. Thus, eccentric contractions of the injured tendon is combined with stretching exercises, especially static, of the injured tendon in the rehabilitation of tendinopathies as it was proposed by Stanish *et al*^[24]. The patients in the Stanish exercise program, perform a five-steps program. A general, whole-body warm-up exercise is the first step. Static stretching exercises for the injured tendon are carried out in the second step. Next, the eccentric training is carried out once daily (3 sets of 10 repetitions) for six weeks and after six weeks, the patients are carried out three times per week for six more weeks 3 sets of 10 repetitions. Discomfort, or pain, is experienced in the last set of 10 repetitions. The eccentric training is described in detailed in the Stanish *et al*^[24] article. Every treatment ends with the same stretching exercise as described in the second step. Ice on the «injured» tendon for about 5-10 min after the program is used by the patients. There are not studies to support the efficacy of the Stanish exercise protocol in LET patients.

It was stated by Martinez-Silvestrini *et al*^[25] that isometric contraction, which would be more beneficial than eccentric contraction in LET because it is often related to forceful grip activities. Recently, isometric training has been recommended to decrease and manage the pain of tendon increasing the strength at the angle of contraction without producing inflammatory signs^[26]. **Forty five second isometric mid-range quadriceps exercise** reduced the pain of patellar tendon for 45 min post exercise^[26]. The dosage of isometric contractions in the present is based on clinical experience^[26-28] and their effect on LET pain requires further research. Therefore, it was hypothesized that the simultaneous use of these two kinds of contractions (isotonic and isometric) and static stretching exercises will further enhance the analgesic effect of contractions in the treatment of LET, increasing the arm function^[29]. However, the optimal protocol of exercise training needs to be investigated although the supervised exercise program is more effective than the home exercise program^[30].

Exercise program is rarely delivered as a treatment in isolation in the management of LET^[2]. An exercise program is usually combined with a range of physical therapy modalities. Furthermore, many manual therapies for the management of LET have been advocated, but the evidence to support the effectiveness of manual therapy in the management of tendinopathy is minimal^[31]. The most common manipulative techniques for the treatment of LET are Cyriax manual technique, Mulligan manipulation, mobilization of the neck, manipulation of the wrist and radial neural mobilization are^[32]. Manual therapy may increase grip strength and reduce pain immediately following treatment, but the evidence of any long-term clinical effects for manual therapy alone is insufficient^[2,3,7,12,14].

Treatment focusing on trigger points reduces pain and improves function in LET patients^[33]. A solid

conclusion will be formulated when high and large quality RCTs are carried out^[2]. Myofascial pain management methods such as deep transverse friction, low level laser, dry needling, etc., should also be evaluated^[2]. The additional effect of myofascial methods, it would be interesting to determine on exercise program or other treatment methods used in management of LET^[2,12,14].

Electrotherapeutic modalities such as low level laser, transcutaneous electrical nerve stimulation, extracorporeal shockwave therapy, pulsed electromagnetic field therapy therapeutic, ultrasound and iontophoresis are commonly used to manage LET^[7,12,14,15,29,34]. Well-conducted trials are needed to determine the effectiveness of the above reported modalities in the management of LET. It is believed that the exercise training alone in the rehabilitation of LET is less effective therapeutic approach than the combination of exercise training with electrotherapeutic modality/ies^[2,3,7,12,14,15].

External support such as bracing/taping is recommended for the management of LET^[2]. The evidence for the effectiveness of bracing/taping in the improvement of function and reduction of pain is conflicted^[35]. There was no compelling evidence that any one kind of bracing/any type of taping is superior to another in the short term, or that adding an external support to another treatment provides any additional benefit^[7,12].

At the end of the treatment and/or at the short-term follow up acupuncture is an effective LET treatment^[2,7,12]. **The pathology of tendinopathy does not reverse using acupuncture, but it improves the signs of LET, reducing pain and increasing the function, but it**^[36]. To draw definite conclusions about the effectiveness of acupuncture, more research with well - designed clinical trials are needed.

Finally, the most promising treatment approach in the management of LET is the exercise training but more research is needed to investigate the optimal protocol of exercise training. When the exercise program is applied as part of the rehabilitation process its effectiveness is higher than it is applied as monotherapy^[2,7,12,37]. More research to find out which treatment approach combined with exercises is needed to provide the best results in the management of LET.

REFERENCES

- 1 **Stasinopoulos D**, Johnson MI. 'Lateral elbow tendinopathy' is the most appropriate diagnostic term for the condition commonly referred-to as lateral epicondylitis. *Med Hypotheses* 2006; **67**: 1400-1402 [PMID: 16843614]
- 2 **Bisset LM**, Vicenzino B. Physiotherapy management of lateral epicondylalgia. *J Physiother* 2015; **61**: 174-181 [PMID: 26361816 DOI: 10.1016/j.jphys.2015.07.015]
- 3 **Coombes BK**, Bisset L, Vicenzino B. Management of Lateral Elbow Tendinopathy: One Size Does Not Fit All. *J Orthop Sports Phys Ther* 2015; **45**: 938-949 [PMID: 26381484 DOI: 10.2519/jospt.2015.5841]
- 4 **Kraushaar BS**, Nirschl RP. Tendinosis of the elbow (tennis elbow). Clinical features and findings of histological, immunohistochemical, and electron microscopy studies. *J Bone Joint Surg Am* 1999; **81**: 259-278 [PMID: 10073590]
- 5 **Waugh EJ**, Jaglal SB, Davis AM, Tomlinson G, Verrier MC. Factors associated with prognosis of lateral epicondylitis after 8 weeks of physical therapy. *Arch Phys Med Rehabil* 2004; **85**: 308-318 [PMID: 14966719 DOI: 10.1016/S0003-9993(03)00480-5]
- 6 **Vicenzino B**, Collins D, Wright A. The initial effects of a cervical spine manipulative physiotherapy treatment on the pain and dysfunction of lateral epicondylalgia. *Pain* 1996; **68**: 69-74 [PMID: 9252000]
- 7 **Sims SE**, Miller K, Elfar JC, Hammert WC. Non-surgical treatment of lateral epicondylitis: a systematic review of randomized controlled trials. *Hand (N Y)* 2014; **9**: 419-446 [PMID: 25414603 DOI: 10.1007/s11552-014-9642-x]
- 8 **Rompe JD**, Overend TJ, MacDermid JC. Validation of the Patient-Rated Tennis Elbow Evaluation questionnaire. *J Hand Ther* 2007; **20**: 3-10 [DOI: 10.1197/j.jht.2006.10.003]
- 9 **Cacchio A**, Necozone S, MacDermid JC. Cross-cultural adaptation and measurement properties of the Italian Version of the Patient-Rated Tennis Elbow Evaluation (PRTEE) questionnaire. *Phys Ther* 2012; **2**: 1036-1045 [DOI: 10.2522/ptj.20110398]
- 10 **Nilsson P**, Baigi A, Marklund B, Månsson J. Cross-cultural adaptation and determination of the reliability and validity of PRTEE-S (Patientskattad Utvärdering av Tennisarmbåge), a questionnaire for patients with lateral epicondylalgia, in a Swedish population. *BMC Musculoskelet Disord* 2008; **9**: 79 [PMID: 18534009 DOI: 10.1186/1471-2474-9-79]
- 11 **Stasinopoulos D**, Papadopoulos C, Antoniadou M, Nardi L. Greek adaptation and validation of the Patient-Rated Tennis Elbow Evaluation (PRTEE). *J Hand Ther* 2015; **28**: 286-290; quiz 291 [PMID: 26003013 DOI: 10.1016/j.jht.2014.12.005]
- 12 **Weber C**, Thai V, Neuheuser K, Groover K, Christ O. Efficacy of physical therapy for the treatment of lateral epicondylitis: a meta-analysis. *BMC Musculoskelet Disord* 2015; **16**: 223 [PMID: 26303397 DOI: 10.1186/s12891-015-0665-4]
- 13 **Bisset L**, Paungmali A, Vicenzino B, Beller E. A systematic review and meta-analysis of clinical trials on physical interventions for lateral epicondylalgia. *Br J Sports Med* 2005; **39**: 411-422; discussion 411-422 [PMID: 15976161 DOI: 10.1136/bjism.2004.016170]
- 14 **Menta R**, Randhawa K, Côté P, Wong JJ, Yu H, Sutton D, Varatharajan S, Southerst D, D'Angelo K, Cox J, Brown C, Dion S, Mior S, Stupar M, Shearer HM, Lindsay GM, Jacobs C, Taylor-Vaisey A. The effectiveness of exercise for the management of musculoskeletal disorders and injuries of the elbow, forearm, wrist, and hand: a systematic review by the Ontario Protocol for Traffic Injury Management (OPTIMA) collaboration. *J Manipulative Physiol Ther* 2015; **38**: 507-520 [PMID: 26130104 DOI: 10.1016/j.jmpt.2015.06.002]
- 15 **Dingemans R**, Randsdorp M, Koes BW, Huisstede BM. Evidence for the effectiveness of electrophysical modalities for treatment of medial and lateral epicondylitis: a systematic review. *Br J Sports Med* 2014; **48**: 957-965 [PMID: 23335238 DOI: 10.1136/bjsports-2012-091513]
- 16 **Malliaras P**, Barton CJ, Reeves ND, Langberg H. Achilles and patellar tendinopathy loading programmes : a systematic review comparing clinical outcomes and identifying potential mechanisms for effectiveness. *Sports Med* 2013; **43**: 267-286 [PMID: 23494258 DOI: 10.1007/s40279-013-0019-z]
- 17 **Beyer R**, Kongsgaard M, Hougs Kjær B, Øhlenschläger T, Kjær M, Magnusson SP. Heavy Slow Resistance Versus Eccentric Training as Treatment for Achilles Tendinopathy: A Randomized Controlled Trial. *Am J Sports Med* 2015; **43**: 1704-1711 [PMID: 26018970 DOI: 10.1177/0363546515584760]
- 18 **Kongsgaard M**, Kovanen V, Aagaard P, Doessing S, Hansen P, Laursen AH, Kaldau NC, Kjær M, Magnusson SP. Corticosteroid injections, eccentric decline squat training and heavy slow resistance training in patellar tendinopathy. *Scand J Med Sci Sports* 2009; **19**: 790-802 [PMID: 19793213 DOI: 10.1111/j.1600-0838.2009.00949.x]
- 19 **Alfredson H**, Pietilä T, Jonsson P, Lorentzon R. Heavy-load eccentric calf muscle training for the treatment of chronic Achilles tendinosis. *Am J Sports Med* 1998; **26**: 360-366 [PMID: 9617396]

- 20 **Raman J**, MacDermid JC, Grewal R. Effectiveness of different methods of resistance exercises in lateral epicondylitis--a systematic review. *J Hand Ther* 2012; **25**: 5-25; quiz 26 [PMID: 22075055 DOI: 10.1016/j.jht.2011.09.001]
- 21 **Cullinane FL**, Boocock MG, Trevelyan FC. Is eccentric exercise an effective treatment for lateral epicondylitis? A systematic review. *Clin Rehabil* 2014; **28**: 3-19 [PMID: 23881334 DOI: 10.1177/0269215513491974]
- 22 **Peterson M**, Butler S, Eriksson M, Svärdsudd K. A randomized controlled trial of eccentric vs. concentric graded exercise in chronic tennis elbow (lateral elbow tendinopathy). *Clin Rehabil* 2014; **28**: 862-872 [PMID: 24634444 DOI: 10.1177/0269215514527595]
- 23 **Cannell LJ**, Taunton JE, Clement DB, Smith C, Khan KM. A randomised clinical trial of the efficacy of drop squats or leg extension/leg curl exercises to treat clinically diagnosed jumper's knee in athletes: pilot study. *Br J Sports Med* 2001; **35**: 60-64 [PMID: 11157465 DOI: 10.1136/bjism.35.1.60]
- 24 **Stanish WD**, Rubinovich RM, Curwin S. Eccentric exercise in chronic tendinitis. *Clin Orthop Relat Res* 1986; **(208)**: 65-68 [PMID: 3720143]
- 25 **Martinez-Silvestrini JA**, Newcomer KL, Gay RE, Schaefer MP, Kortebein P, Arendt KW. Chronic lateral epicondylitis: comparative effectiveness of a home exercise program including stretching alone versus stretching supplemented with eccentric or concentric strengthening. *J Hand Ther* 2005; **18**: 411-419, quiz 420 [PMID: 16271688 DOI: 10.1197/j.jht.2005.07.007]
- 26 **Rio E**, Kidgell D, Purdam C, Gaida J, Moseley GL, Pearce AJ, Cook J. Isometric exercise induces analgesia and reduces inhibition in patellar tendinopathy. *Br J Sports Med* 2015; **49**: 1277-1283 [PMID: 25979840 DOI: 10.1136/bjsports-2014-094386]
- 27 **Stasinopoulos D**. The Effectiveness of Isometric Contractions Combined with Eccentric Contractions and Stretching Exercises on Pain and Disability in Lateral Elbow Tendinopathy. A Case Report. *J Nov Physiother* 2015; **5**: 238 [DOI: 10.4172/2165-7025.1000238]
- 28 **Malliaras P**, Cook J, Purdam C, Rio E. Patellar Tendinopathy: Clinical Diagnosis, Load Management, and Advice for Challenging Case Presentations. *J Orthop Sports Phys Ther* 2015; **45**: 887-898 [PMID: 26390269 DOI: 10.2519/jospt.2015.5987]
- 29 **Dimitrios S**. Exercise for tendinopathy. *World J Methodol* 2015; **5**: 51-54 [PMID: 26140271 DOI: 10.5662/wjm.v5.i2.51]
- 30 **Stasinopoulos D**, Stasinopoulos I, Pantelis M, Stasinopoulou K. Comparison of effects of a home exercise programme and a supervised exercise programme for the management of lateral elbow tendinopathy. *Br J Sports Med* 2010; **44**: 579-583 [PMID: 19887440 DOI: 10.1136/bjism.2008.049759]
- 31 **Bennett A**, Watson T, Simmonds J. The Efficacy of The Use Of Manual Therapy In The Management Of Tendinopathy: A Systematic Review. *BJSM* 2014; **48**: A11-A12 [DOI: 10.1136/bjsports-2014-094114.17]
- 32 **Hoogvliet P**, Randsdorp MS, Dingemans R, Koes BW, Huisstede BM. Does effectiveness of exercise therapy and mobilisation techniques offer guidance for the treatment of lateral and medial epicondylitis? A systematic review. *Br J Sports Med* 2013; **47**: 1112-1119 [PMID: 23709519 DOI: 10.1136/bjsports-2012-091990]
- 33 **Shmushkevich Y**, Kalichman L. Myofascial pain in lateral epicondylalgia: a review. *J Bodyw Mov Ther* 2013; **17**: 434-439 [PMID: 24139000 DOI: 10.1016/j.jbmt.2013.02.003]
- 34 **Thiele S**, Thiele R, Gerdsmeyer L. Lateral epicondylitis: This is still a main indication for extracorporeal shockwave therapy. *Int J Surg* 2015; **24**: 165-170 [PMID: 26455532 DOI: 10.1016/j.ijsu.2015.09.034]
- 35 **Shamsoddini A**, Hollisaz MT. Effects of taping on pain, grip strength and wrist extension force in patients with tennis elbow. *Trauma Mon* 2013; **18**: 71-74 [PMID: 24350156 DOI: 10.5812/traumamon.12450]
- 36 **Speed C**. Acupuncture's role in tendinopathy: new possibilities. *Acupunct Med* 2015; **33**: 7-8 [PMID: 25576594 DOI: 10.1136/acupmed-2014-010746]
- 37 **Stasinopoulos D**, Stasinopoulou K, Johnson MI. An exercise programme for the management of lateral elbow tendinopathy. *Br J Sports Med* 2005; **39**: 944-947 [PMID: 16306504 DOI: 10.1136/bjism.2005.019836]

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