MEDWIN PUBLISHERS
Committed to Create Value for Researchers

Annals of Physiotherapy & Occupational Therapy
ISSN: 2640-2734

Challenges and Solutions in Evaluating Transcutaneous Electrical Nerve Stimulation (TENS) for Managing Lateral Elbow Tendinopathy

Stasinopoulos D[1]* and Johnson MI[2]

[1]Department of Physiotherapy, University of West Attica, Greece
[2]Centre for Pain Research, Leeds Beckett University, UK

***Corresponding author:** Stasinopoulos Dimitrios, Department of Physiotherapy, University of West Attica, Athens, Greece; Email: dstasinopoulos@uniwa.gr

Opinion
Volume 7 Issue 4
Received Date: October 23, 2024
Published Date: November 01, 2024
DOI: 10.23880/aphot-16000271

Keywords: TENS; Lateral Elbow Tendinopathy; Research

Abbreviations

TENS: Transcutaneous Electrical Nerve Stimulation; LET: Lateral Elbow Tendinopathy.

Introduction

The commonest tendinopathy in the elbow area is the Lateral Elbow Tendinopathy (LET). The diagnosis of LET is simple and quick. Most clinicians advocate a conservative approach. Typically, physiotherapy is provided, incorporating various techniques such as manual techniques, external support, soft tissue manipulation, physical agents, electrotherapy and heavy-slow resistance exercises.

The most common physical therapy approach for LET is a supervised progressive loading exercise program, often conducted in a clinical setting [1]. However, the progressive loading exercise program is usually combined with other physiotherapy approaches to optimize clinical outcome. Transcutaneous Electrical Nerve Stimulation (TENS) is used as a supplement to an exercise program to assist pain management and improve function.

Typically, TENS is a technique to stimulate low-threshold (cutaneous) peripheral nerves by using a portable battery-powered device to generate pulsed electrical currents that are delivered across the intact surface of the skin via conducting electrodes [2]. The primary purpose of TENS is for symptomatic relief of pain, irrespective of clinical condition, and physiological research provides evidence that TENS inhibits the activity and excitability of second-order central nociceptive neurons, thus reducing noxious input to the brain [3]. TENS treatment is available globally, and people can self-administered TENS treatment as often as is needed with minimal risk of adverse effects or toxicity. The cost of TENS equipment and clinical support is inexpensive, and health economic analyses suggest TENS lowers costs for the management of persistent pain [4], chronic low back pain [5,6], and knee osteoarthritis [7] when compared with long-term drug medication.

When used in LET management, TENS is administered by applying electrodes to the skin overlying, or close to, the site of pain. TENS is indicated as an adjunct to core treatment to alleviate pain and discomfort, and muscle tension and spasms. Thus, the direct beneficial effects of TENS are to soothe distressing symptoms, including sensitivity to innocuous stimuli such as touch that may arise from the impact of an 'overprotective brain' e.g., associated with central sensitization [8]. TENS is not used to 'stimulate tendons' or to act on muscle function. Nevertheless, the symptomatic effects of TENS may have indirect benefits such as improving movement-evoked pain enabling return to daily functions or improving sleep.

There appear to be remarkedly few efficacy/effectiveness studies of TENS as a sole treatment or as a supplement to physiotherapy in the management of LET. The clinical efficacy of TENS in the management of LET has been examined in three randomized controlled clinical trials [9-11]. In a study by Weng CS, et al. [9], TENS was applied as the sole treatment, and in the studies by Halle JS, et al. [10] and Chesterton LS, et al. [11] TENS was part of a physiotherapy approach. Halle JS,

et al. [10] reported greater benefits for the relief of pain and functional impairment when TENS was added as a supplement to physiotherapy. Weng CS, et al. [9] reported that TENS (modulated-frequency, acupuncture-like) provided benefits when given as the sole treatment choice for patients with LET. Chesterton LS, et al. [11] reported that the addition of TENS to a physiotherapy program provided no immediate or long-term clinical benefits in elbow disability, grip strength, and pain intensity compared with the physiotherapy program alone. The certainty of conclusions of these studies is compromised by methodological shortcomings common to clinical research on TENS, such as inadequate sample size, no validated outcome measures, lack of follow-ups, and insufficient reported details of TENS treatment protocols [3]. We advocate investigation into the ability of TENS to enhance the effectiveness of exercise programs to provide insights into a holistic approach for treating LET.

It is prudent to consider clinical experience, in the absence of high-certainty evidence to evaluate efficacy and effectiveness for the management of LET. A sub-group analysis within the largest meta-analysis on TENS published to date by Johnson [8] found that outcome for TENS was not dependent on medical diagnosis or pain characteristics. This supports the view that TENS should primarily be indicated according to symptoms (i.e., the presence of pain), rather than pathology. Decades of investigations searching for optimal electrical characteristics of TENS for specific conditions, (e.g., LET) has, in the main, been futile [3,8]. Thus, the quality (comfort) of sensations produced by TENS, rather than specific electrical characteristics of current, is the critical factor for success [3]. Physiologically, TENS should be considered similar to rubbing, cooling, or warming the skin, providing symptomatic relief of pain via physiological neuromodulation. Thus, in clinical practice, users are advised to self-administer strong non-painful TENS within or close to the site of pain and to adjust pulse frequency, duration, and pattern to what is most comfortable (see 3 for review). One advantage of TENS is that users can adjust electrical characteristics to produce a wide variety of TENS sensations such as pulsate and paresthesia to combat the dynamic nature of pain.

It seems surprising that there is a paucity of research on TENS for LET. Physiotherapists frequently treat LET and physiotherapists frequently indicate TENS for various painful conditions, including LET. There is a substantial amount of published clinical research on TENS, yet this literature has been criticized as being of low methodological quality [12]. Criteria have been developed to optimize the design and delivery of TENS studies by focusing on allocation methods (of participants to intervention groups), application methods (for delivery of TENS and control interventions), and assessment methods (of clinical outcomes) [13].

Generally, TENS research is poorly funded and this is likely to have contributed to studies with inadequate sample sizes. In 2022, Johnson MI, et al. [8] published a systematic review of 381 RCTs with a meta-analysis that found moderate certainty evidence of a clinically meaningful reduction in pain intensity during TENS, compared with placebo [8]. Their subgroup analysis found that the type of pain did not moderate this effect, found the generalizability of findings across pain conditions. Hopefully, this systematic review has helped to resolve the evidence-impasse. A large multi-centered RCTs using an enriched enrolment randomized withdrawal design, that incorporates a 'run-in phase' to screen for potential TENS responders and to optimize TENS treatment according to individual needs would be the next logical step to confirm or refute efficacy specifically for LET [3].

Finally, we may have to concede that specific evidence on the efficacy/effectiveness of TENS as a supplement to an exercise program to assist management of pain associated with LET may never arise because research funders consider TENS to be a low priority [3]. Practitioners and policymakers should be aware of evidence that symptomatic relief of pain during TENS is generalizable across different medical conditions. Furthermore, factors beyond 'efficacy/effectiveness' should be considered when making evidence-based decisions including clinical experience, cost, safety, utility, acceptability, etc. and this should be compared with other available treatment options. It is also important that due consideration is given to indirect benefits associated with TENS [14] and problems, solutions, and strategies reported by expert users of TENS [15]. Gladwell PW, et al. [16] has made a strong case for the need for foundational research to improve the quality of future evaluations of TENS.

Overall, we believe that the issues discussed in this article can help clinicians in their practice and provide avenues of further investigation for researchers.

References

1. Stasinopoulos D (2022) Is a Heavy-Slow Resistance Exercise Program an Appropriate Treatment Approach for All Patients with Lateral Elbow Tendinopathy? Editorial. J Clin Med 11(6): 1556.

2. Johnson MI, Paley CA, Wittkopf PG, Mulvey MR, Jones G (2022) Characterising the Features of 381 Clinical Studies Evaluating Transcutaneous Electrical Nerve Stimulation (TENS) for Pain Relief: A Secondary Analysis of the Meta-TENS Study to Improve Future Research. Medicina 58(6): 803.

3. Johnson MI (2021) Resolving Long-Standing Uncertainty

about the Clinical Efficacy of Transcutaneous Electrical Nerve Stimulation (TENS) to Relieve Pain: A Comprehensive Review of Factors Influencing Outcome. Medicina 57(4): 378.

4. Chabal C, Fishbain DA, Weaver M, Heine LW (1998) Long-term transcutaneous electrical nerve stimulation (TENS) use: Impact on medication utilization and physical therapy costs. Clin J Pain 14(1): 66-73.

5. Pivec R, Stokes M, Chitnis AS, Paulino CB, Harwin SF, et al. (2013) Clinical and economic impact of TENS in patients with chronic low back pain: Analysis of a nationwide database. Orthopedics 36(12): 922-928.

6. Pivec R, Minshall ME, Mistry JB, Chughtai M, Elmallah RK, et al. (2015) Decreased Opioid Utilization and Cost at One Year in Chronic Low Back Pain Patients Treated with Transcutaneous Electric Nerve Stimulation (TENS). Surg Technol Int 27: 268-274.

7. Woods B, Manca A, Weatherly H, Saramago P, Sideris E, et al. (2017) Cost-effectiveness of adjunct non-pharmacological interventions for osteoarthritis of the knee. PLoS ONE 12(3): e0172749.

8. Johnson MI, Paley CA, Jones G, Matthew RM, Priscilla GW (2022) Efficacy and safety of transcutaneous electrical nerve stimulation (TENS) for acute and chronic pain in adults: a systematic review and meta-analysis of 381 studies (the metaTENS study). BMJ Open 12(2): e051073.

9. Weng CS, Shu SH, Chen CC, Tsai YS, Hu WC, et al. (2005) The evaluation of two modulated frequency modes of acupuncture-like tens on the treatment of tennis elbow pain. Biomedical Engineering-Applications, Basis and Communications 17(5): 236-242.

10. Halle JS, Franklin RJ, Karalfa BA (1986) Comparison of four treatment approaches for lateral epicondylitis. J Orthop Sports Phys Ther 8(2): 62-69.

11. Chesterton LS, Lewis AM, Sim J, Mallen CD, Mason EE, et al. (2014) Transcutaneous electrical nerve stimulation as adjunct to primary care management for tennis elbow: pragmatic randomised controlled trial (TATE trial). Br J Sports Med 48(19): 1458.

12. Travers MJ, Connell NE, Tuegwell P, Eccleston C, Gibson W (2020) Transcutaneous electrical nerve stimulation (TENS) for chronic pain: the opportunity to begin again. Cochrane Database Syst Rev 4(4): ED000139.

13. Bennett MI, Hughes N, Johnson MI (2011) Methodological quality in randomised controlled trials of transcutaneous electric nerve stimulation for pain: low fidelity may explain negative findings. Pain 152(6): 1226-1232.

14. Gladwell PW, Badlan K, Cramp F, Palmer S (2015) Direct and Indirect Benefits Reported by Users of Transcutaneous Electrical Nerve Stimulation for Chronic Musculoskeletal Pain: Qualitative Exploration Using Patient Interviews. Phys Ther 95(11): 1518-1528.

15. Gladwell PW, Badlan K, Cramp F, Palmer S (2016) Problems, Solutions, and Strategies Reported by Users of Transcutaneous Electrical Nerve Stimulation for Chronic Musculoskeletal Pain: Qualitative Exploration Using Patient Interviews. Phys Ther 96(7): 1039-1048.

16. Gladwell PW, Cramp F, Palmer S (2022) Foundational Research Could Improve Future Transcutaneous Electrical Nerve Stimulation Evaluations. Medicina (Kaunas) 58(2): 149.