



TITLE: Transcutaneous Electrical Nerve Stimulator for Diabetic Neuropathy: Clinical Effectiveness and Cost Effectiveness

DATE: 18 July 2011

RESEARCH QUESTIONS

1. What is the clinical effectiveness of the transcutaneous electrical nerve stimulator machine for treating painful diabetic neuropathy?
2. What is the cost-effectiveness of the transcutaneous electrical nerve stimulator machine for treating painful diabetic neuropathy?

KEY MESSAGE

The findings of the identified studies were inconsistent; therefore, no conclusions regarding the effectiveness of the transcutaneous electrical nerve stimulator machine for treating painful diabetic neuropathy can be made. No literature was identified regarding the cost-effectiveness of the transcutaneous electrical nerve stimulator machine for treating painful diabetic neuropathy.

METHODS

A limited literature search was conducted on key resources including PubMed, The Cochrane Library (2011, Issue 7), University of York Centre for Reviews and Dissemination (CRD) databases, Canadian and major international health technology agencies, as well as a focused Internet search. No filters were applied to limit the retrieval by study type. Where possible, retrieval was limited to the human population. The search was also limited to English language documents published between January 1, 2006 and July 4, 2011. Internet links were provided, where available.

The summary of findings was prepared from the abstracts of the relevant information. Please note that data contained in abstracts may not always be an accurate reflection of the data contained within the full article.

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RESULTS

Rapid Response reports are organized so that the higher quality evidence is presented first. Therefore, health technology assessment reports, systematic reviews, and meta-analyses are presented first. These are followed by randomized controlled trials (RCTs), non-randomized studies, and economic evaluations.

The literature search identified one meta-analysis, two randomized controlled trials, and two non-randomized studies. No relevant health technology assessments, systematic reviews, or economic evaluations were identified. Additional literature that may be of interest is located in the appendix.

OVERALL SUMMARY OF FINDINGS

One meta-analysis¹ evaluating the effectiveness of transcutaneous electrical nerve stimulation (TENS) for diabetic peripheral neuropathy (DPN) included RCTs comparing TENS with routine care, pharmacological interventions, or placebo devices for patients with symptomatic DPN. Reduction in mean pain scores were significantly greater in the TENS group compared to placebo in all weekly margins except at 12 weeks. The authors could make no clear conclusion regarding the effectiveness of TENS.

One RCT² assessed the effect of TENS in reducing neuropathic pain in patients with DPN. The authors concluded there were no statistically significant differences between groups regarding pain intensity, pain disability, and quality of life; therefore, they concluded the effectiveness of TENS in reducing pain was not superior to a placebo treatment. The second RCT³ sought to determine the efficacy of electrical nerve stimulation machines (TENS and Diadynamic) on pain relief for patients with painful diabetic poly neuropathy. The authors concluded that TENS and Diadynamic may reduce pain in some patients; however, no significant differences in pain reduction were observed in the TENS, Diadynamic, or the placebo groups.

One non-randomized study⁴ investigated the effects of high rate frequency modulation with TENS treatment for patients with diabetic polyneuropathy. The authors concluded that TENS treatment had a positive effect on diabetic polyneuropathy based on a significant difference in glucose values before and after treatment. The second non-randomized study⁵ aimed to determine if TENS improved function of the A-delta or A-beta fibers of afferent nerves. The effect of TENS was evaluated with cold and heat pain thresholds, in addition to vibration perception and touch perception thresholds. The authors found no statistically significant changes in pain and perception thresholds in the stimulated areas.

REFERENCES SUMMARIZED

Health technology assessments

No literature identified.

Systematic reviews and meta-analyses

1. Jin DM, Xu Y, Geng DF, Yan TB. Effect of transcutaneous electrical nerve stimulation on symptomatic diabetic peripheral neuropathy: a meta-analysis of randomized controlled trials. *Diabetes Res Clin Pract.* 2010 Jul;89(1):10-5.
[PubMed: PM20510476](#)

Randomized controlled trials

2. Gossrau G, Wähler M, Kuschke M, Konrad B, Reichmann H, Wiedemann B, et al. Microcurrent transcutaneous electric nerve stimulation in painful diabetic neuropathy: a randomized placebo-controlled study. *Pain Med.* 2011 Jun;12(6):953-60.
[PubMed: PM21627767](#)
3. Pourmoumeni AA, Amini M, Safaei H, Hasanzadeh A. The effect of electroanalgesia on pain relief in patient with diabetic neuropathy type II. *Iranian J Endocrinol Metab.* 2009 Nov;11(4 SN 46):363-9. Available from:
<http://www.sid.ir/en/ViewPaper.asp?ID=166744&varStr=2;POURMOUMENI%20A.A.,AMINI%20MASOUD,SAFAEI%20HASAN,HASANZADEH%20AKBAR;IRANIAN%20JOURNAL%20OF%20ENDOCRINOLOGY%20AND%20METABOLISM%20%28IJEM%29%20%20%20%20%20;NOVEMBER%202009;11;4%20%28SN%2046%29;363;369>

Non-randomized studies

4. Kavak S, Tulgar M, Anlar Ö. Effects of transcutaneous electrical nerve stimulation on motor and sensorial nerves for diabetic polyneuropathy patients by use of electromyography. *Cell Membr Free Radic Res.* 2010;2(3). Available from:
<http://edergi.sdu.edu.tr/index.php/cmfr/article/view/2472>
5. Moharić M, Burger H. Effect of transcutaneous electrical nerve stimulation on sensation thresholds in patients with painful diabetic neuropathy: an observational study. *Int J Rehabil Res.* 2010 Sep;33(3):211-7.
[PubMed: PM20042866](#)

Economic evaluations

No literature identified.

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APPENDIX – FURTHER INFORMATION:

Review articles

6. Kaye V. Transcutaneous electrical nerve stimulation. Medscape Reference: Drugs, Diseases & Procedures. 2011 May 9 [cited 2011 Jul 15]. Available from: <http://emedicine.medscape.com/article/325107-overview> Subscription required.
7. Dubinsky RM, Miyasaki J. Assessment: efficacy of transcutaneous electric nerve stimulation in the treatment of pain in neurologic disorders (an evidence-based review): report of the Therapeutics and Technology Assessment Subcommittee of the American Academy of Neurology. *Neurology*. 2010 Jan 12;74(2):173-6.
[PubMed: PM20042705](#)
8. Pieber K, Herceg M, Paternostro-Sluga T. Electrotherapy for the treatment of painful diabetic peripheral neuropathy: a review. *J Rehabil Med*. 2010 Apr;42(4):289-95.
[PubMed: PM20461329](#)
9. Feldman EL, McCulloch DK. Treatment of diabetic neuropathy. 2010 Aug 5 [cited 2011 Jul 15]. In: UpToDate [Internet]. 14.3. Waltham (MA): UpToDate; c2005 - . Available from: www.uptodate.com Subscription required.