

## Effect of Electrical Stimulation with Surface Electrodes on Pain Due to Diabetes Induced Peripheral Neuropathy: A Systematic Review

Michal Elboim-Gabyzon, BPT, Ph.D and Yocheved Laufer, D.Sc

Physical Therapy Department, Faculty of Social Welfare and Health Sciences, The University of Haifa

### Abstract

**Background:** Diabetes is a common chronic disease, with a worldwide prevalence. Diabetes induced peripheral neuropathy (DPN) is one of the most common complications of diabetes, causing severe pain in the extremities with significant implications on the quality of life of those affected by it. The conservative treatment of DPN is usually pharmacological and is accompanied by various side effects. Electrical stimulation using surface electrodes is an accepted evidence based treatment technique in physical therapy used to treat pain.

**Objective:** To perform a systematic review of studies that examined the effect of transcutaneous electrical stimulation on pain resulting from DPN.

**Research method:** A systematic search of the following databases was carried out: Pubmed, CINAHL, Web of Science, Cochrane. The search keywords were diabetes, peripheral neuropathy, and electrical stimulation. Articles meeting the following criteria were included: Treatment of individuals with DPN; measures of pain; noninvasive electrical stimulation; Pedro's Score of 4/10 or higher; English language.

**Results:** Fourteen articles were found that met the inclusion criteria. In three of the eight studies comparing electrical stimulation and a placebo treatment, extremely low-current currents (micro-current) were used that did not produce action potentials. In these studies the effect of electrical stimulation was no higher than that of placebo treatments. In contrast, in four of the remaining five studies, electrical stimulation had a significantly greater effect on analgesia compared to the placebo treatment. Support for this finding was found in studies that compared electrical stimulation and alternative therapies. Common to the studies that indicated treatment effectiveness was the use of electrical stimulation leading to a strong sensory response or muscle contractions.

**Summary:** This systematic review suggests that electrical stimulation, especially at an intensity leading to a strong sensory response and even to a motor response, have the potential to serve as an effective therapeutic tool for pain caused by DPN. However, the wide variety of the studies in terms of intervention characteristics (duration and frequency of pulses, type and position of electrodes, duration and frequency of treatment, etc.), as well as the methodological level of most, do not allow conclusive recommendations as to the preferred treatment protocol.

**Keywords:** electrical stimulation, pain, peripheral neuropathy, diabetes