

## **A Systematic Review of Low-Level Light Therapy For Treatment of Diabetic Foot Ulcer.**

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#### **Abstract**

Diabetes mellitus (DM) is a significant international health concern affecting more than 387 million individuals. A diabetic person has a 25% lifetime risk of developing a diabetic foot ulcer (DFU), leading to limb amputation in up to one in six DFU patients. Low-level light therapy (LLLT) uses low-power lasers or light-emitting diodes to alter cellular function and molecular pathways, and may be a promising treatment for DFU. The goal of this systematic review is to examine whether the clinical use of LLLT is effective in the healing of DFU at 12 weeks and 20 weeks in comparison with the standard of care, and to provide evidence-based recommendation and future clinical guidelines for the treatment of DFU using LLLT. On September 30<sup>th</sup> 2015, we searched PubMed, EMBASE, CINAHL, and Web of Science databases using the following terms: "diabetic foot" AND "low level lighttherapy," OR "light emitting diode," OR "phototherapy," OR "laser." The relevant articles that met the following criteria were selected for inclusion: randomized control trials (RCTs) that investigated the use of LLLT for treatment of DFU. Four RCTs involving 131 participants were suitable for inclusion based upon our criteria. The clinical trials used sham irradiation, low dose, or non-therapeutic LLLT as placebo or control in comparison to LLLT. The endpoints included ulcer size and time to complete healing with follow-up ranging from 2 weeks to 16 weeks. Each article was assigned a level of evidence (LOE) and graded according to the Oxford Center for Evidence-based Medicine Levels of Evidence Grades of Recommendation criteria. Limitations of reviewed RCTs include a small sample size (N<100), unclear allocation concealment, lack of screening phase to exclude rapid healers, unclear inclusion/exclusion criteria, short (<30 days) follow-up period, and unclear treatment settings (wavelength and treatment time). However, all reviewed RCTs demonstrated therapeutic outcomes with no adverse events using LLLT for treatment of DFU. This systematic review reports that LLLT has significant potential to become a portable, minimally invasive, easy-to-use, and cost effective modality for treatment of DFU. To enthusiastically recommend LLLT for treatment of DFU, additional studies with comparable laser parameters, screening period to exclude rapid healers, larger sample sizes and longer follow-up periods are required. We envision future stringent RCTs may validate LLLT for treatment of DFU. Systematic review registration number: PROSPERO CRD42015029825. This article is protected by copyright. All rights reserved.

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#### **KEYWORDS:**

diabetic foot ulcer; laser; light emitting diode; low-level light therapy; phototherapy