

Review

Photobiomodulation Therapy (PBMT) in Peripheral Nerve Regeneration: A Systematic Review

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Abstract: Photobiomodulation therapy (PBMT) has been investigated because of its intimate relationship with tissue recovery processes, such as on peripheral nerve damage. Based on the wide range of benefits that the PBMT has shown and its clinical relevance, the aim of this research was to carry out a systematic review of the last 10 years, ascertaining the influence of the PBMT in the regeneration of injured peripheral nerves. The search was performed in the PubMed/MEDLINE database with the combination of the keywords: low-level laser therapy AND nerve regeneration. Initially, 54 articles were obtained, 26 articles of which were chosen for the study according to the inclusion criteria. In the qualitative aspect, it was observed that PBMT was able to accelerate the process of nerve regeneration, presenting an increase in the number of myelinated fibers and a better lamellar organization of myelin sheath, besides improvement of electrophysiological function, immunoreactivity, high functionality rate, decrease of inflammation, pain, and the facilitation of neural regeneration, release of growth factors, increase of vascular network and collagen. It was concluded that PBMT has beneficial effects on the recovery of nerve lesions, especially when related to a faster regeneration and functional improvement, despite the variety of parameters.

Keywords: low-level laser therapy; nerve regeneration; peripheral nerve repair; photobiomodulation therapy; tissue regeneration

1. Introduction

Low-level laser therapy (LLLT), now commonly referred to as photobiomodulation therapy (PBMT), using low-level infrared light spectrum lasers is considered a therapeutic advance. Its effects are related to tissue biostimulation, presenting therapeutic responses from photoelectric, photoenergetic, and photochemical reactions [1]. Scientific research has shown the application of PBMT in bone tissue and peripheral nerves with good results whether or not it is associated with other supporting methods in tissue repair [2–7].

Laser photobiomodulation presents itself as an electromagnetic technology that is being inserted into clinical practice due to its characteristics that differ from other conventional thermal sources [8,9]. It was observed that there are several features of PBMT that are related to the reduction of tissue repair time and its capacity to increase cell proliferation [10].