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Effectiveness of Photobiomodulation Therapy on Human Bone Healing in Dentistry: A Systematic Review

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Abstract

Background: Despite the association, possible causality, and contradictory results, numerous studies evaluate photobiomodulation (PBM) therapy on the process of human bone healing. It is of paramount importance to review the available literature to elucidate the effect of laser on the bone healing process in dentistry.

Objective: This systematic review analyzes the effectiveness of PBM therapy to improve bone healing in dentistry.

Methods: A systematic search of studies published up to September 2021 and listed in PubMed, Cochrane Library, and Embase databases and registered on PROSPERO (CRD42020212790). Twenty-five studies were selected.

Results: The most used device was diode laser. PBM therapy parameters varied greatly. From the 25 selected studies, 17 had the primary outcome bone healing. Of these, 11 studies revealed improvement in bone healing with PBM therapy and six studies suggested no effect. The other eight studies evaluated secondary parameters. In seven studies, some of the clinical parameters were improved with the PBM therapy.

Conclusions: Within the limitations of this systematic review, bone healing in dentistry was improved with the use of PBM. PBM therapy can promote anti-inflammatory and analgesic effects, improve healing, as well as enhance quality of life related to oral health. Within the areas analyzed in dentistry, laser parameters varied greatly, becoming difficult to consider a definite protocol as a proper one.

Keywords: low-level laser therapy, bone and bones, bone regeneration, osseointegration, dentistry, photobiomodulation therapy

Introduction

THE FIRST SCIENTIFIC research about laser in dentistry dates back to the early 1960s. However, it was not until the 1990s that some federal regulatory agencies approved the

laser used for surgery of soft tissues in the oral cavity.¹ Numerous advances have occurred since then, and have led to the widespread of photobiomodulation (PBM) therapy use in the different fields of dentistry for treatment, such as post-surgical tooth extraction,^{2,3} rapid maxillary expansion,⁴⁻⁶

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