



## REVIEW ARTICLE

# A Review of the Current Literature Evaluating If There is a Positive Correlation Between Dental Implant Success When Combined with Photobiomodulation Therapy (PBMT) in Human Clinical Studies

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## Introduction

Low level light therapy (LLLT), or photobiomodulation therapy (PBMT) uses focused light to stimulate cellular metabolism, which can decrease pain as well as accelerate the healing process [1]. Photobiomodulation therapy is defined as a form of light therapy that utilizes non-iodizing light sources, including lasers, light emitting diodes, and/or broadband light, in the visible (400-700 nm) and near infrared (700-1100 nm) electromagnetic spectrum [1]. This low-level light therapy (LLLT) is a form of light therapy that is non-invasive and non-thermal therapy [1,2]. The process results in beneficial therapeutic outcomes including pain relief, promotion of wound healing and tissue regeneration [2]. The correlation between the positive effects of PBMT and dental implants has primarily been documented or reported based upon animal studies [1-4].

In the field of oral and maxillofacial surgery, implant reconstruction plays a major role in our goal of patient rehabilitation. Implant placement has many variables to the pathway of successful implant stability and osseointegration [3]. A recent variable that has been looked at to enhance implant osseointegration is the use of PBMT to help with tissue repair and regeneration, as well as pain relief at the implant site [1,2]. The goal of this article is to review the current literature and to determine if there is a positive correlation between

implant placement and combined PBMT in human clinical studies.

## Methods

A search in PubMed was conducted regarding the “use of PBMT and dental implants (excluding mini-implants or orthodontic implants) in human (non-animal) clinical trials” revealed only six articles.

An article by Zayed and Hakim [5] reviewed articles up to January 2020. Seven trials were evaluated with the primary location being the posterior mandible, using resonance frequency analysis. Four of the seven studies found that PBMT may cause a positive outcome on implant stability, while the remaining studies showed no effect upon implant stability. Additional studies were recommended [5].

Mohajerani, Salehi, Tabeie, and Tabrizi looked at the effects of low-level light therapy (LLL) and light-emitting diode (LED) therapy upon the implant stability quotient (ISQ) [6]. When compared to a control group that did not receive LLD or LED therapy, simultaneous use of LLL and LED therapy resulted in increased implant stability at the 9 week follow up appointment. They recommended further studies for confirmation of the positive implant effects of PBMT [6].

Reza, et.al. looked at the effects of PBMT upon wound healing and pain following implant surgery. (9)



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A total of 42 implants were placed in 21 patients with the results of this study showing that PBMT enhanced wound healing and decreased pain following dental implant surgery [7].

Matys, et al. [4] Inserted 40 implants in the posterior mandible of 24 patients. Each implant underwent PBMT the day prior to implant placement, immediate after placement, 2, 4, 7, and 14 days after implant placement. Periosteal Values (PTV) and bone density analysis were completed. The results showed that PBMT enhanced secondary implant stability and bone density. The authors commented that further well controlled, long termed trials and larger sample sizes are needed [8].

One study by Kinalski, Agostini, Bergoli, and dos Santos looked at the application of PBMT at the healed bone site prior to implant placement and after suturing of the surgical wound. The therapy had no positive effect upon implant stability [9].

## Conclusion

A review of the literature regarding the use of photobiomodulation therapy (PBMT) or low-level light therapy (LLL) in human clinical trials and its enhancement of dental implant success is limited in terms of the volume of studies and the long-term follow up. However, even with the limited number of studies, the positive results are worthy of further detailed research to definitively connect a correlation between PBMT and enhancing the success of dental implants.

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