Review Article

# The Effect of Using Magnetic Laser in the Treatment of Infraorbital Nerve Injuries: A Systematic Review

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## ABSTRACT

**Background:** We aimed to conduct a systematic review of studies investigating the effect of using magnetic laser on the treatment of infraorbital nerve injuries.
**Methods:** An electronic search was conducted of published literature in PubMed/MEDLINE, Cochrane, Web of Science, and SID databases over a fifteen-year period (September 2010 to September 2025). Two independent authors conducted the search process. Study eligibility criteria included randomized and non-randomized clinical trials, prospective or retrospective studies, case-control studies, and case series that evaluated the effect of magnetic laser therapy use on infraorbital nerve injuries.
**Results:** We selected 4 studies. One study in 2024, 1 in 2021, 1 in 2020 and 1 in 2013 investigated the issue.
**Conclusion:** The use of magnetic lasers could be used to repair facial nerve injuries, especially the infraorbital nerve, and is a promising alternative to current treatments.

**KEYWORDS**
Laser therapy; Facial nerve injury; Infraorbital nerve; Trauma

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## INTRODUCTION

Among all facial bone fractures, zygomatic bone fractures are prioritized, and various studies have estimated their prevalence at 35-43% of all facial injury cases[1]. The most common zygomatic fractures occur in the inferior orbital region, leading to injury to the infraorbital nerve[2, 3]. In the complex treatment of nerve fiber injuries, vasoactive drugs, antithrombotic and antifibrinolytic drugs, diuretics, psychotropic substances, and nootropic agents are traditionally used, which indirectly affect the infraorbital nerve through the trophic restoration of surrounding tissues. Low-level laser therapy (LLLT) has become very popular in the past decade due to its multifactorial effects, simplicity, non-traumatic nature, and lack of allergic reactions[4]. Magnetic laser therapy (MLT) involves a magnetic field and low-level laser therapy (also known as non-surgical lasers or LLLT) that have a therapeutic and preventive effect on the body. Using magnetic fields and laser therapy has trophic regenerative, anti-inflammatory, analgesic, anti-edema, and immunomodulatory effects[5, 6]. Due to these effects, magnetic therapy

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is widely used to treat injuries. Approaches based on devices that use waves (laser, magnetism, and electromagnetics) play an important role in the treatment and rehabilitation of the patient[7, 8], and the choice of each of these methods depends on the time elapsed since the injury[9]. The use of MLT is recommended 3 to 4 days after the injury if there are no inflammatory complications of infection resulting from a maxillofacial fracture.

In general, there is not enough information available on the use of MLT for infraorbital nerve injuries. Therefore, we aimed to investigate the effect of MLT on the recovery process of infraorbital nerve damage function.

## METHODS

### *Study design*

A systematic review of the literature was conducted in September 2025 on the effect of using magnetic laser in the treatment of infraorbital nerve injuries.

### *Search strategy*

This review searched for potentially relevant articles published between September 2010 to September 2025 (15-year period). It was conducted on PubMed, Scopus, web of science, and Google Scholar databases. The keywords facial nerve injuries AND infraorbital nerve AND magnetic laser were used.

### *Inclusion criteria*

Article's medium of language: English

All articles, except for systematic review and meta-analysis (to avoid double counting), on the abovementioned databases between September 2010 to September 2025.

### *Screening and selection of the literature*

PubMed, Scopus, web of science, and Google Scholar databases were initially searched for pertinent articles. The review's rigorous screening and selection phase started after identifying the first raw hits. From the initial raw hits, some literature was excluded as duplicates by Endnote and manual duplicate search strategies. Of these, a specific number of potentially relevant articles were selected based on title and/or abstract vicinity to the study subject.

## RESULTS

All studies within 15 years were selected based on the inclusion criteria, and 4 studies related to the effect of using MLT on infraorbital nerve injuries were selected and analyzed after evaluation (Figure 1).

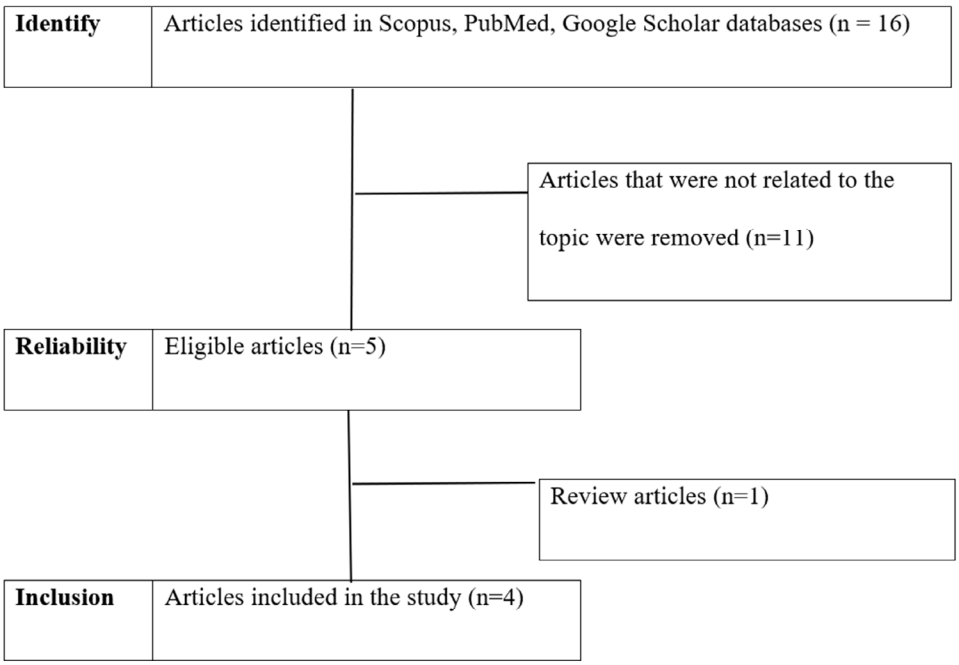


**Figure 1.** Scheme of the selection of articles in this review

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Table 1. Results obtained in previous studies

| Author (yr) | Type of study | Number of samples | Type of injury | Research period | Treatment outcome |
|---|---|---|---|---|---|
| Martins et al. (2024) [10] | Animal model | Rat | Infraorbital nerve injury | 2023 | ML and VBC can accelerate the repair of the injured infraorbital nerve in mice by reducing the expression of neurofilaments, increasing the expression of BDNF, laminin, and MBP, and overexpressing NGF. Considering the results obtained from this study, the researchers found that the use of ML and VBC may be effective in treating nerve damage, which has potential clinical applications. |
| G. Gadzhula et al. (2021) [11] | Clinical trial | 32 patients | Zygomatic fractures | 2020-2020 | Using magnetic laser therapy in the combined treatment of infraorbital nerve injury helps improve sensory changes of the infraorbital nerve following zygomatic fractures, reduce pain, increase treatment effectiveness, and speed up postoperative rehabilitation of patients. |
| Noma et al. (2020) [12] | Animal model | Rat | Neuropathic pain with partial ligation of the infraorbital nerve | 2019-2019 | The combined use of OXT and low-level magnetic laser can be effective in relieving neuropathic pain caused by trigeminal nerve damage. |
| K. Borsody et al. (2013)[13] | Animal model | Dog and sheep | Peripheral facial nerve injury and cerebral ischemia | - | This study supports the development of a non-invasive pulsed magnetic laser-based facial nerve stimulator that enhances the healing process of facial nerves, such as the infraorbital nerve, by improving CBF status. |

Among the 4 reviewed studies, 1 study in 2024, 1 study in 2021, 1 study in 2020, and 1 study in 2013 investigated the topic. Among these, 3 studies were laboratory studies and only one study was in the form of a clinical trial. The results indicated a potential beneficial effect of combining LLLT with magnetic fields in improving the condition of the damaged infraorbital nerve (Table 1).

## DISCUSSION

Infraorbital nerve injury causes symptoms ranging from mild to complete numbness in the sensory dermatome, which can lead to complete numbness to dysesthesia[14]. This condition leads to psycho-emotional disorders and significantly impairs the patient's quality of life[3]. Gradual improvement of neurological function is possible with conservative treatment and rehabilitation[6, 8, 15]. For this reason, MLT has been investigated in the rehabilitation period for patients with zygomatic bone fracture due to its close connection with tissue recovery processes, such as infraorbital nerve injury[15-18].

After analyzing the results of the reviewed studies, in zygomatic bone fractures with infraorbital nerve injury, using MLT with a red laser and a fixed magnetic field accelerated pain reduction during treatment[10-12]. This method significantly reduced

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pain intensity and leads to a moderate reduction in the types of neuropathies associated with damage to the infraorbital nerve[10-12,18,19].

The clinical efficacy of MLT for the treatment of infraorbital nerve injuries has been proven, as Gadzhula et al.[11] showed that magnetic laser treatment significantly reduced pain intensity and resulted in a moderate reduction in the types of neuropathies associated with infraorbital nerve injury. They found that the use of magnetic laser therapy in the combined treatment of infraorbital nerve injury helped improve the sensory changes of the infraorbital nerve following zygomatic fractures, reduce pain, increase the effectiveness of treatment, and speed up the patients' postoperative rehabilitation[11, 19]. In another study, Noma et al. demonstrated in an animal model that the combined use of OXT and low-level magnetic laser could be effective in relieving neuropathic pain caused by trigeminal nerve injury[12]. These results indicate that the therapeutic use of low-power laser and magnetic field provides effective and positive results in controlling pain caused by infraorbital nerve injury. This effectiveness of MLT on pain relief can be explained by the fact that laser light absorbed by pain receptors exerts an inhibitory effect on A and C pain fibers, which reduces conduction velocity and suppresses neurogenic inflammation[5]. The peripheral nervous system produces an analgesic effect by reducing the sensitivity of receptors and improving conduction function, which has a positive effect on restoring the function of damaged peripheral nerve endings by improving axon growth and myelination. Therefore, it reacts to the magnetic field and prevents the formation of connective tissue in them [5, 15, 19].

The analgesic effect of magnetotherapy is due to increased secretion of endogenous narcotics, which leads to muscle relaxation, anti-edema, and anti-inflammatory effects. Some studies have emphasized the regenerative potential of ML on the injured infraorbital nerve. Martins et al. acknowledged the above-mentioned result and stated that ML and VBC can accelerate the repair of the injured infraorbital nerve in mice by reducing the expression of neurofilaments, increasing the expression of BDNF, laminin, and MBP, and overexpressing NGF[10]. This type of ML effectiveness can be a confirmation of the ability to induce transcription and expression of targeted genes towards effective treatment based on inducing the function of subcellular units of magnetic fields and low-power lasers. Electron bias and consequently induction or control of gene expression based on electron excitation is among the presumed reasons for the aforementioned result[10]. This therapeutic method could also be effective in the use of stem cells in injuries such as the infraorbital facial nerve[10].

The development of a noninvasive pulsed magnetic laser stimulator for facial nerves has been supported by some studies. orsody et al. also showed that noninvasive pulsed magnetic laser stimulation of facial nerves enhances the healing process of facial nerves such as the infraorbital nerve by improving CBF status[13]. This type of effect has been previously shown for other nerves.

Overall, what is clear is the potential beneficial effect of the combined use of low-level laser therapy with magnetic fields on improving the condition of the injured infraorbital nerve. Based on a review, this type of effect has been determined in three areas: control of pain caused by infraorbital nerve injury[11, 12], repair and recovery of the injured infraorbital nerve[10], and increasing the efficiency of nerve repair[13].

One of the weaknesses of the present study is the limited number of available studies overall, while only 1 human study in the form of a clinical trial was observed.

## CONCLUSION

The use of MLT increases the effectiveness of complex treatment, optimizes the use of drugs by reducing the number of drugs and their doses, reduces postoperative rehabilitation periods for patients with infraorbital nerve injury, and can be recommended for widespread use in practical medicine and is a promising alternative to current treatments. This technique is easy to use and does not cause pain.

## FUNDING

The authors declare there is no funding support was included in the study.

## CONFLICT OF INTEREST

The authors declare there is no conflict of interest.

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## REFERENCES


1. Noor M, Ishaq Y, Anwar MA. Frequency of infra-orbital nerve injury after a zygomaticomaxillary complex fracture and its functional recovery after open reduction and internal fxation. *Int Surg J* 2017;**4**:685-689.
2. Das AK, Bandopadhyay M, Chattopadhyay A et al. Clinical Evaluation of Neurosensory Changes in the Infraorbital Nerve Following Surgical Management of Zygomatico-Maxillary Complex Fractures. *J Clin Diagn Res* 2015;**9**(12):ZC54-ZC58.
3. Kaukola L, Snäll J, Roine R et al. Health-related quality of life of patients with zygomatic fracture. *Med Oral Patol Oral Cir Bucal* 2017;**22**(5):e636- e642.
4. Gadzhula NG, Shinkaruk-Dykovytska MM, Cherepakha OL et al. Efciency of using the diode laser in the treatment of periodontal inflammatory diseases. *Wiad Lek* 2020;**73**(5):841-845.
5. Gagik H, Yesayan L, Seyranyan A, Matevosyan D. The use of magneticlaser therapy of patients with post-dental implant neuropathy. *JNPPR* 2020;**7**(1):009-112.
6. Rosso MPO, Buchaim DV, Kawano N et al. Photobiomodulation Therapy (PBMT) in PeripheralNerve Regeneration: A Systematic Review. *Bioengineering (Basel)* 2018;**5**(2):44.
7. Horlenko IM, Gadzhula NG, Cherepakha OL et al. Clinical and microbiological assessment of root canal decontamination in chronic apical periodontitis using the ultrasound. *Wiad Lek* 2020;**73**(6):1119-1123.
8. Nofel R, Yasser IS, Waleed TM. Rehabilitation of neurosensory changes in the infraorbital nerve following zygomatic fractures. *Curr Sci Int* 2014;**3**:51-64.
9. Tabrizi R, Neamati M, Rajabloo S, Latif F. Does the Lag Time Between Injury and Treatment Affect Recovery of Infraorbital Nerve Disturbances in Zygomaticomaxillary Complex Fractures? *Craniomaxillofac Trauma Reconstr* 2020;**13**(2):105-108.
10. Martins DO, Marques DP, Chacur M. Enhancing nerve regeneration in infraorbital nerve injury rat model: effects of vitamin B complex and Magnetic-laser. *Lasers in Medical Science* 2024;**39**(1):119.
11. Gadzhula NG, Barylo OS, Furman RL, Rekun TO. The use of magnetic-laser therapy in the rehabilitation period for patients with infraorbital nerve damage. *Acta Balneol, TOM LXIII, Nr* **3**(164);2021:165-169. doi 10.36740/ABAL202103106
12. Noma D, Fujita S, Zama M, Mayahara K, Motoyoshi M, Kobayashi M. Application of oxytocin with low-level laser magnetic stimulation suppresses the facilitation of cortical excitability by partial ligation of the infraorbital nerve in rats: An optical imaging study. *Brain Research* 2020;**1728**:146588.
13. Borsody MK, Yamada C, Bielawski D, Heaton T, Lyeth B, Garcia A, Prado FC, Azpiroz J, Sacristan E. Effect of pulsed magnetic stimulation of the facial nerve on cerebral blood flow. *Brain research* 2013 **28**;1528:58-67.
14. Hong WT, Choi J., Kim JH et al. Trigeminal somatosensory evoked potential test as an evaluation tool for infraorbital nerve damage. *Arch Craniofac Surg* 2019;**20**:223-227.
15. Lee SY, Kim SH, Hwang JH, Kim KS. Sensory recovery after infraorbital nerve avulsion injury. *Arch Craniofac Surg* 2020;**21**(4):244-248.
16. Kermani H, Dehghani N, Aghdashi F, Esmaeelinejad M. Nonsyndromic isolated temporal bone styloid process fracture. *Trauma Monthly* 2016;**21**(1):e24395.
17. Dehghani N, Mahmoudi X, Azarsina M, Sharifnia AR. Trauma and management in oral surgery. *InInnovative Perspectives in Oral and Maxillofacial Surgery* 2021:pp. 401-407. Cham: Springer International Publishing.
18. Dehghani N, Mahmoudi X, Azarsina M, Hassantash S. Ophthalmic Complications Following Sinus Lifting Surgery: Case Report and Review of Literature. *Clinical Case Reports* 2025;**13**(9):e70902.
19. Azarsina M, Arany P, Marques MM, Abrahamse H, Dehghani N, Azarsina S, Fekrazad R. Photobiomodulation for stem cell modulation and regenerative medicine-WALT position paper 2025. *J Dentistry* 2025:105832.


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