Clinical Trial Protocol
Iranian Registry of Clinical Trials

22 Nov 2026

Evaluation and Comparison of the Effects of Low-Level Laser Therapy at 810 nm and 660 nm in Reducing Postoperative Pain Following Root Canal Treatment of Maxillary and Mandibular Premolars and Molars with Irreversible Pulpitis Accompanied by Apical Periodontitis

Protocol summary

Study aim

Evaluation and Comparison of the Effects of Low-Level Laser Therapy at 810 nm and 660 nm in Reducing Pain After Root Canal Treatment of Maxillary and Mandibular Premolar and Molar Teeth with Irreversible Pulpitis and Apical Periodontitis

Design

This double-blind, non-randomized clinical trial with two parallel groups was conducted on 28 patients requiring single-visit root canal treatment. Participants were divided into two groups balanced by gender, each receiving low-level laser therapy at wavelengths of 810 nm or 660 nm alongside standard root canal treatment. Treatments were performed by first-year residents. Analgesic consumption and occurrence of severe pain were recorded, and pain intensity was measured at 4, 8, 12, and 24 hours post-treatment using the Heft-Parker Scale (HPS).

Settings and conduct

Islamic Azad University of Isfahan (Khorasgan)

Participants/Inclusion and exclusion criteria

Inclusion Criteria:Patients with irreversible pulpitis and periapical lesion in single-visit root canal treatment of maxillary and mandibular premolars or molars. VAS pain score >54 on the Heft-Parker scale before treatment. Exclusion Criteria:Patients with systemic diseases Pregnant or lactating women Treatment of calcified teeth Patients presenting for secondary treatment or retreatment Patients currently taking anti-inflammatory medications

Intervention groups

F0irst Intervention group: Laser irradiation with a wavelength of 660 nm, power of 100 mW, and energy of 4 J applied for 40 seconds to an area of 1 cm² at the apex of the endodontically treated tooth on the buccal and lingual/palatal sides. Second Intervention group: Laser irradiation with a wavelength of 810 nm, power of 100 mW, and energy of 4 J applied for 40 seconds to an area of 1 cm² at the apex of the endodontically treated tooth on the buccal and lingual/palatal sides.

Main outcome variables

Postoperative Pain

General information

Reason for update

Acronym

IRCT registration information

IRCT registration number: **IRCT20250923067345N1**
Registration date: **2025-10-01, 1404/07/09**
Registration timing: **registered_while_recruiting**

Last update: **2025-10-01, 1404/07/09**
Update count: **0**

Registration date

2025-10-01, 1404/07/09

Registrant information

Name

Anahita Alikhani

Name of organization / entity

Country

Iran (Islamic Republic of)

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+98 31 3650 0251

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anahitaalkh@gmail.com

Recruitment status

Recruitment complete

Funding source

Expected recruitment start date

2025-09-27, 1404/07/05

Expected recruitment end date

2025-12-26, 1404/10/05

Actual recruitment start date

empty

Actual recruitment end date

empty

Trial completion date

empty

Scientific title

Evaluation and Comparison of the Effects of Low-Level Laser Therapy at 810 nm and 660 nm in Reducing Postoperative Pain Following Root Canal Treatment of Maxillary and Mandibular Premolars and Molars with Irreversible Pulpitis Accompanied by Apical Periodontitis

Public title

Evaluation of the Effect of Low-Level Laser Therapy on Reducing Pain After Root Canal Treatment

Purpose

Treatment

Inclusion/Exclusion criteria

Inclusion criteria:

Individuals with irreversible pulpitis accompanied by symptomatic apical periodontitis in mandibular and maxillary premolars and molars, eligible for single-visit root canal treatment. No use of analgesics within 48 hours prior to treatment. Based on the Heft-Parker (HPS) scale, patients with a pre-treatment VAS score above 54 are included in the study.

Exclusion criteria:

Patients with systemic diseases Pregnant or breastfeeding women Treatment of calcified teeth Patients seeking secondary or retreatment procedures Patients currently taking anti-inflammatory medications

Age

No age limit

Gender

Both

Phase

N/A

Groups that have been masked

- Participant
- Data analyser

Sample size

Target sample size: **28**

Randomization (investigator's opinion)

Not randomized

Randomization description

Blinding (investigator's opinion)

Double blinded

Blinding description

Patients: In our study, patients are unaware of which type of laser they receive (810 nm or 660 nm). Data Analyst: The statistician does not know which group received which wavelength and only evaluates the pain levels at different time intervals.

Placebo

Not used

Assignment

Parallel

Other design features

In our study, the effect of two different laser wavelengths on postoperative pain after root canal treatment are evaluated, and no control group is included.

Secondary Ids

empty

Ethics committees

1

Ethics committee

Name of ethics committee

Ethics Committee of Islamic Azad University, Isfahan (Khorasgan) Branch.

Street address

No. 21, Esfand Ave., Mehr Ave., Bahar Ave., Farabi 4th Blvd., Sepahan Shahr, Isfahan.

City

Esfahan

Province

Isfehan

Postal code

8137999594

Approval date

2025-07-20, 1404/04/29

Ethics committee reference number

IR.IAU.KHUISF.REC.1404.307

Health conditions studied

1

Description of health condition studied

Postoperative pain after root canal treatment in posterior teeth with irreversible pulpitis accompanied by symptomatic apical periodontitis in the maxilla and mandible.

ICD-10 code

ICD-10 code description

Primary outcomes

1

Description

Postoperative Pain

Timepoint

4, 8, 12, and 24 hours after laser irradiation

Method of measurement

Pain intensity will be measured using the Heft-Parker Visual Analog Scale (VAS, HPS).

Secondary outcomes

empty

Intervention groups

1

Description
Intervention Group 1: Laser irradiation at a wavelength of 660 nm with a power of 100 W and an energy of 4 J for 40 seconds over an area of 1 cm² at the apex of the treated tooth, applied to both the buccal and lingual/palatal surfaces.
Category
Treatment - Devices

2

Description
Intervention Group 2: Laser irradiation at a wavelength of 810 nm with a power of 100 W and an energy of 4 J for 40 seconds over an area of 1 cm² at the apex of the endodontically treated tooth, applied to both the buccal and lingual/palatal surfaces.
Category
Treatment - Devices

Recruitment centers

1

Recruitment center
Name of recruitment center
Islamic Azad University of Isfahan (Khorasgan)
Full name of responsible person
Dr. Amir Mansour Shirani
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Sponsors / Funding sources

1

Sponsor
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Grant name
Grant code / Reference number
Is the source of funding the same sponsor organization/entity?
No
Title of funding source
Islamic Azad University of Isfahan (Khorasgan)
Proportion provided by this source
100
Public or private sector
Public
Domestic or foreign origin
Domestic
Category of foreign source of funding
empty
Country of origin
Type of organization providing the funding
Academic

Person responsible for general inquiries

Contact
Name of organization / entity
Islamic Azad University
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Anahita Alikhani
Position
Student
Latest degree
A Level or less
Other areas of specialty/work
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Position
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Sharing plan

Deidentified Individual Participant Data Set (IPD)
Undecided - It is not yet known if there will be a plan to make this available

Study Protocol
Undecided - It is not yet known if there will be a plan to make this available

Statistical Analysis Plan
Undecided - It is not yet known if there will be a plan to make this available

Informed Consent Form
Undecided - It is not yet known if there will be a plan to make this available

Clinical Study Report
Undecided - It is not yet known if there will be a plan to make this available

Analytic Code
Undecided - It is not yet known if there will be a plan to make this available

Data Dictionary
Undecided - It is not yet known if there will be a plan to make this available