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A comparative clinical evaluation of LED- versus laser-activated in-office tooth whitening

Submission date	Recruitment status	[_] Prospectively registered
24/01/2026	No longer recruiting	[_] Protocol
Registration date	**Overall study status**	[_] Statistical analysis plan
27/01/2026	Completed	[_] Results
Last Edited	**Condition category**	[_] Individual participant data
27/01/2026	Oral Health	[X] Record updated in last year

Plain English summary of protocol
Background and study aims
This study compares two commonly used professional tooth whitening methods—one activated by LED light and one activated by a diode laser.

Who can participate?
Adult patients with tooth discoloration.

What does the study involve?
Participants were randomly assigned to one of the two treatments. Tooth color changes were measured objectively using a digital device before and after treatment to evaluate and compare the effectiveness of the two systems.

What are the possible benefits and risks of participating?
Benefits and risks not provided at time of registration

Where is the study run from?
Grigore T. Popa University of Medicine and Pharmacy, Romania.

When is the study starting and how long is it expected to run for?
October 2025 to December 2025

Who is funding the study?
Investigator initiated and funded

Who is the main contact?
Dr Amititeloaie Carmen, carmen.amititeloaie@umfiasi.ro

Contact information

Type(s)
Principal investigator, Public, Scientific

Contact name
Dr Amititeloaie Carmen

Contact details
Str. Universitatii Nr. 16
Iasi
Romania
700115
+40744357867
carmen.amititeloaie@umfiasi.ro

Additional identifiers

Study information

Scientific Title
Comparative clinical evaluation of LED- versus laser-activated in-office tooth whitening using digital spectrophotometry: a pilot randomized clinical trial

Study objectives
The objective of this study is to compare the clinical effectiveness of LED-activated and diode laser–activated in-office tooth whitening systems using objective digital spectrophotometric assessment of tooth color changes.

Ethics approval required
Ethics approval required

Ethics approval(s)
approved 28/09/2025, Scientific Research Ethics Committee of the UMF "Grigore T. Popa" Iaşi (Str. Universitatii Nr.16, Iasi, 700115, Romania; +40.232.211.818; eticacercetarii@umfiasi.ro), ref: 643

Primary study design
Interventional

Allocation
Randomized controlled trial

Masking
Blinded (masking used)

Control
Active

Assignment
Parallel

Purpose
Treatment

Study type(s)

Health condition(s) or problem(s) studied
Tooth discoloration; dental aesthetics

Interventions
Participants were randomly allocated to one of two intervention groups: laser-activated tooth whitening using a diode laser system and LED-activated tooth whitening using an LED light system. Both interventions were performed in a single clinical session under standardized conditions.

The expected total duration of the study visit for each participant was approximately 60–90 minutes, including baseline assessment, intervention, and immediate post-treatment evaluation. There was no additional follow-up period, as all outcomes were assessed immediately after completion of the whitening procedure.

Method of randomisation:
Participants were randomly allocated in a 1:1 ratio using a computer-generated random allocation sequence (Microsoft Excel). Allocation concealment was ensured using sealed, opaque envelopes, which were opened on the day of treatment.

Intervention Type
Device

Phase
Not Applicable

Drug/device/biological/vaccine name(s)
Biolase Epic diode laser (940nm), Philips Zoom WhiteSpeed LED whitening system

Primary outcome(s)
1. Tooth color (ΔE) (color difference (ΔE) is calculated from CIE L*a*b* coordinates) measured using a digital spectrophotometer (VITA Easyshade) at baseline (pre-treatment) and immediately after completion of the whitening procedure (post-treatment)

Key secondary outcome(s))
1. Adverse events measured using clinical observation and patient self-reporting of any adverse events at occurring during or immediately after the whitening procedure

2. Clinical perceptibility of whitening: The proportion of participants achieving a clinically perceptible color change, defined as ΔE > 3.3, measured using a digital spectrophotometric measurements. at immediately after completion of the whitening procedure, compared with baseline.

Completion date
19/12/2025

Eligibility

Key inclusion criteria

1. Healthy adults aged 18–45 years
2. Extrinsic or mixed-type tooth discoloration (Vita shade A3 or darker)
3. Good oral hygiene

Healthy volunteers allowed
Yes

Age group
Adult

Lower age limit
18 years

Upper age limit
45 years

Sex
All

Total final enrolment
12

Key exclusion criteria
1. Pregnancy or breastfeeding
2. Severe dental hypersensitivity
3. Active carious, periodontal, or oral mucosal lesions
4. Systemic diseases or known allergies to bleaching agents

Date of first enrolment
01/10/2025

Date of final enrolment
19/12/2025

Locations

Countries of recruitment
Romania

Sponsor information

Organisation
Grigore T. Popa University of Medicine and Pharmacy

ROR
https://ror.org/03hd30t45

Funder(s)

Funder type

Funder Name
Investigator initiated and funded

Results and Publications

Individual participant data (IPD) sharing plan

IPD sharing plan summary
Not expected to be made available