

Table S1. Data extraction

N o	Author (year)	Title	Objective	Study design	Sample size	Intervention	LLT Wavelength	Result
1	An et al., 2021 ⁸	Effect of humic acid as a photosensitizer combined with low-energy laser on orthodontic tooth movement in rats	To investigate the effect of HA, as a photosensitizer, combined with a low energy laser on orthodontic tooth movement in rats.	Randomized clinical trial	an orthodontic tooth movement model	HA was injected into the rats' abdominal cavity (80 mg/kg once daily). The periodontal tissue of the upper left upper first molar on the pressure side was irradiated (50 s once every 2 days) using a semiconductor laser (wavelength, 650 nm; power, 50 mV). HA was injected into the rats' abdominal cavity (80 mg/kg once	650 nm	HA alone did not significantly affect orthodontic tooth movement, alveolar structure density, or periodontal tissue remodeling ($P > 0.05$). HA combined with a low-energy laser accelerated orthodontic tooth movement. The number of bone absorption lacunae and osteoclasts on the alveolar bone's pressure side increased significantly ($P < 0.05$), while the density decreased

						daily). The periodontal tissue of the maxillary left first molar on the pressure side was irradiated (50 s once every 2 days) using a semiconductor laser (wavelength, 650 nm; power, 50 mV).		significantly (P < 0.05); however, no root absorption was observed.
2	Andrad e et al., 2021 ³	Comparative Study about the Efficacy of Low Level Laser Therapy and Curcumin Antimicrobial Photodynamic Therapy as a Coadjuvant Treatment of Oral Mucositis in Oncologic Patients: Antimicrobial, Analgesic and Degree Alteration Effect.	To evaluate the effect of Low Level Laser Therapy and Antimicrobial Photodynamic Therapy mediated by curcumin and blue LED as an adjunct treatment of oral mucositis for oncology patients chemotherapy and or radiothera	Randomiz ed clinical trial	30 patients	LLLT was performed with a Therapy EC equipment wavelength of 660 nm red in a punctual and continuous manner, beam diameter of 0.25 cm2, power of 100 mW, irradiation time of 03 seconds per point, generating a fluency of 1.2 J/cm2 over the entire length of the	660 nm	A reduction in the degree of mucositis and pain score was observed in the LLLT and aPDT groups, with the aPDT group standing out when presenting early clinical improvement in relation to the LLLT group and the control group, thus emphasizing its effectiveness within the desired aspects. Regarding the antimicrobial effect,

			py.			lesion with an equidistance of 1 cm between the points.		aPDT showed a greater reduction of yeasts of the genus Candida in the tested parameters.
			To evaluate the effect of Low Level Laser Therapy and Antimicrobial Photodynamic Therapy mediated by curcumin and blue LED as an adjunct treatment of Oral mucositis among oncology patients undergoing chemotherapy and/or radiotherapy					
3	Guimaraes et al., 2021 ⁵	Effect of photobiomodulation on post-operative symptoms in teeth with asymptomatic apical	To assess the efficacy of photobiomodulation in reducing post-operative symptoms and use of analgesics in teeth with	Randomized clinical trial	70 patients with one single-rooted tooth with asymptomatic apical	0.01% methylene blue solution was inserted into the root canal for 5 min. Irradiation was performed inside the root canal with a 55-	660±10 nm and 808±10 nm	Photobiomodulation had no significant effect on post-operative pain, tenderness, oedema and the use of analgesics after root canal treatment

periodontitis
treated with
foraminal
enlargement: A
randomized
clinical trial

asymptomatic
apical
periodontitis
treated and use
of analgesics in
teeth with
asymptomatic
apical
periodontitis
treated with
foraminal
enlargement in a
single visit.

To assess the
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tion in reducing
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single visit..

periodontiti
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mm optical fibre
coupled to the red
laser source of
Indium Gallium
Aluminium
Phosphide
(InGaAlP) with a
wavelength of
 660 ± 10 nm. The
optical fibre was
chemically
sterilized by total
immersion in 1%
peracetic acid for
10 hrs. In addition,
after the root canal
filling, LLLT was
performed with an
infrared laser
source of Gallium
Aluminium
Arsenide (GaAlAs)
with a wavelength
of 808 ± 10 nm

with foraminal
enlargement in
single-rooted teeth
treated in a single
visit.

4	Andrade et al., 2022 ⁴	Comparative randomized trial study about the efficacy of photobiomodulation and curcumin antimicrobial photodynamic therapy as a coadjuvant treatment of oral mucositis in oncologic patients: antimicrobial, analgesic, and degree alteration effect Comparative randomized trial study about the efficacy of photobiomodulation and curcumin antimicrobial photodynamic therapy as a coadjuvant treatment of oral mucositis in oncologic	To evaluate the effect of photobiomodulation (PBM) and antimicrobial photodynamic therapy (aPDT) mediated by curcumin	Randomized clinical trial	30 patients with OM in the process of chemotherapy and/or radiotherapy	The patients were divided into 3 groups: control group (treated with nystatin), PBM group (treated with low-level laser therapy), and the aPDT group (treated with 450-nm blue LED and curcumin photosensitizer).	660 nm	A reduction in the degree of mucositis and pain score was observed in the PBM and aPDT groups, with the aPDT group standing out when presenting early clinical improvement in relation to the PBM group and the control group, thus emphasizing its effectiveness within the desired aspects. Regarding the antimicrobial effect, aPDT showed a greater reduction of yeasts of the genus <i>Candida</i> in the tested parameters.
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patients:
antimicrobial,
analgesic, and
extent of
alteration.

5	Hamed et al., 2023 ⁹	The Synergistic Cytotoxic Effect of Low-Level Laser Therapy and 5-Aminolevulinic Acid-Mediated Photodynamic Therapy on Tongue Squamous Cell Carcinoma Cell Line	To investigate the cytotoxic effect of 5-aminolevulinic acid-mediated photodynamic therapy (5-ALA-PDT) on human tongue squamous cell carcinoma (HNO-97) cells, to assess the possible enhancement of therapy (5-ALA-PDT) on human tongue squamous cell carcinoma (HNO-97) cells, and to assess the possible enhancement of	Randomized clinical trial	human tongue squamous cell line (HNO-97)	The current study was divided into five groups: control group, 5-ALA only group, LLLT only group, 5-ALA-PDT group, and a combination of LLLT and 5-ALA-PDT group. For the ALA-PDT group and the combination group, cells were exposed to a 650 nm laser beam of 10 J/cm ² .	650 nm	MTT assay results showed a significant decrease in the mean viability percentages of all studied groups and subgroups in comparison to the untreated negative control subgroup and a non-significant decline of that of the combination treatment subgroups when compared to 5-ALA-PDT subgroups. DNA fragmentation, cytological examination, and Ann-V/PI results revealed an increase in the apoptosis rate
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its efficacy by combining it with low-level laser therapy (LLLT).

across all treatment groups. Conclusion: 5-ALA-PDT had an obvious cytotoxic effect on HNO-97 cells that can be further reinforced by combining it with LLLT.

MTT assay results showed a significant decrease in the mean viability percentages of all studied groups and subgroups compared with the untreated negative control subgroup, and a non-significant decline in the combination treatment subgroups compared with the 5-ALA-PDT subgroups. DNA fragmentation, cytological examination, and Annexin V/PI results

							revealed an increased apoptosis rate across all treatment groups. Conclusion: 5-ALA-PDT exerted a marked cytotoxic effect on HNO-97 cells, which can be further enhanced when combined with LLLT.
6	Fouad et al., 2024 ⁷	Regenerative endodontic therapy in immature teeth using photobiomodulation and photodynamic therapy; a histomorphological study in a canine model	To evaluate the regenerative potential of photobiomodulation (PBM) on RET in immature roots when photodynamic therapy (PDT) protocol is implemented for root canal disinfection in canine	A histomorphological study (experimental study)	72 root canals of 3 healthy beagle dogs	Seventy-two root canals were recruited, with sixty assigned to experimental groups and twelve to positive and negative controls. Following the induction of pulp necrosis and apical periodontitis, the roots were divided into two experimental groups: Group I received RET	808 nm The newly formed hard tissue highly resembled true dentine, where the dentinal tubules looked well organized lined by poly layers palisading pattern of rounded odontoblast-like cells with cytoplasmic processes extending through the predentine layer. GI exhibited

followed by PBM (seven sessions with an 808 nm diode laser at 300 mW for 90 s), and Group II received RET without PBM. Follow-ups were conducted at 1, 2, and 3 months (subgroups A, B, and C respectively). Qualitative and quantitative assessments were carried out histologically. All data were statistically analyzed with the Mann-Whitney U test and Bonferroni's adjustment, as well as the Chi square test.

statistically significantly higher scores of vital tissue infiltration and hard tissue deposition in subgroups A and B ($P \leq 0.05$). The inflammatory cell scores were significantly lower in GI than in GII at all time intervals. However, no significance could be detected regarding apical closure.

The newly formed hard tissue closely resembled true dentin, with well-organized dentinal tubules lined by multiple layers of rounded odontoblast-like cells arranged in a palisading pattern, and with cytoplasmic processes extending

								through the predentin layer. Group I exhibited statistically significantly higher scores for vital tissue infiltration and hard tissue deposition in subgroups A and B ($P \leq 0.05$). Inflammatory cell scores were significantly lower in Group I than in Group II at all time intervals. However, no significant difference was detected regarding apical closure.
7	Moraes et al., 2024 ⁶	Impact of Photobiomodulation during Root Canal Treatment on Oral Health-Related Quality of Life: A	To evaluate the impact of endodontic treatment with photobiomodulation on oral health-related	Randomized clinical trial	79 patients with single-rooted teeth and a diagnosis of asymptomatic apical	Participants with single-rooted teeth and a diagnosis of asymptomatic apical periodontitis were selected and randomized into two groups: control	808 + 10nm	No statistically significant differences were found between groups regarding sociodemographic and clinical characteristics

		Randomized Clinical Trial	quality of life (HRQoL).		periodontitis	group (CG, n = 35), root canal treatment without additional treatment, and experimental group (EG, n = 35), root canal treatment associated with antimicrobial photodynamic therapy and low-level laser therapy. OHRQoL was assessed using the Oral Health Impact Profile Questionnaire (OHIP-14) at baseline and 7 and 30 days after treatment.		(p>0.05). There was also no difference in the OHRQoL between the CG and EG (p>0.05). However, there was a statistical difference in OHIP-14 scores between baseline and the 7- and 30-day follow-up intervals in both groups for all domains (p<0.05). Conclusion: Root canal treatment, with or without photobiomodulation, significantly improved the OHRQoL of participants after 7 and 30 days of treatment.
8	Rezaei et al., 2025 ¹⁰	Comparative evaluation of photobiomodulation and photodynamic therapy for	To compare the efficacy of photobiomodulation therapy (PBM) and photodynamic	Single-blinded clinical trial study	10 patients with OLL	For one side of mouth, PBM with diode 660 nm was irradiated, and for the other side, PDT with diode 660 nm	660 nm	Both PBM and PDT demonstrated significant reductions in lesion size, pain intensity, and clinical

management of
erythematous
and ulcerative
oral lichenoid
lesions

therapy (PDT) in
treating
erythematous
and ulcerative
oral lichenoid
lesions that
were not
evaluated
before.

and methylene
blue with the same
dose was
irradiated. Each
patient underwent
four treatment
sessions over two
weeks, followed by
a 48-day follow-up.
Pain intensity,
change in lesion
size, clinical
improvement by
using the
Thongprasom
scoring system, and
recurrence of
ulcers were
evaluated.
Statistical analyses
were conducted
using Friedman,
Mann-Whitney,
and Chi-square
tests.

improvement ($p < 0.05$). However,
there was no
significant
difference for pain
reduction, size of
lesions,
Thongprason scale
and recurrence
between the two
methods.
Conclusion: PBM
and PDT are both
effective in
managing OLL, with
neither showing
superiority.
