

# Laser and Regenerative Therapies for Striae Distensae and Striae Alba: A Systematic Review of Comparative Efficacy

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## ABSTRACT

**Introduction:** Striae distensae and striae alba are common dermatological conditions with significant cosmetic and psychosocial impact. Despite multiple treatment approaches including lasers, light therapies, microneedling, and regenerative techniques, a consensus on the most effective modality remains unclear. Advances in laser technology and adjunctive regenerative treatments such as platelet-rich plasma and stem cell-derived products have prompted numerous clinical trials to evaluate comparative efficacy.

**Aim:** This review aimed to synthesise evidence from randomised controlled studies evaluating various therapeutic modalities for striae management and to identify the most promising interventions.

**Materials and Methods:** A systematic review of randomised controlled trials and comparative clinical studies published between 2012 and 2025 were performed. Databases including PubMed, Google Scholar and NCBI were searched using keywords related to striae treatment and lasers, light therapy, or regenerative approaches. Eight eligible studies with PEDro scores ranging from 5 to 8 were included, assessing modalities such as Poly-L-Lactic Acid (PLLA), Er: YAG, diode and Nd: YAG lasers, fractional CO<sub>2</sub>, Intense Pulsed Light (IPL), microneedling, and regenerative adjuncts, including

Stromal Vascular Fraction (SVF), Platelet Rich Plasma (PRP) and Mesenchymal Stem Cell (MSC)-conditioned medium.

**Results:** PLLA and its combination with NAFL demonstrated superior outcomes compared to laser monotherapy. Er: YAG combined with SVF yielded the best improvement compared to PRP or saline. Diode LLLT showed comparable results to fractional CO<sub>2</sub> with mixed outcomes when combined. Long-pulsed Nd: YAG was slightly superior to fractional CO<sub>2</sub>. Nd: YAP and fractional CO<sub>2</sub> lasers consistently produced significant improvement and safety. Fractional CO<sub>2</sub> was superior to topical tretinoin. Microneedling with MSC-conditioned medium significantly outperformed the control.

**Conclusion:** Evidence suggests that laser-based therapies, particularly fractional CO<sub>2</sub>, Nd:YAG, and Nd:YAP, provide significant clinical improvement in striae, with enhanced outcomes when combined with regenerative adjuncts such as PLLA, SVF, or MSC-conditioned medium. While these interventions are generally safe and effective, further standardised, large-scale trials are warranted to establish optimal protocols and long-term outcomes.

**Keywords:** Fractional CO<sub>2</sub> laser, Nd:YAG, Poly-L-Lactic acid, Regenerative therapy

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