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Efficacy of Low-Level Laser Therapy in the Management of Dry Eye Disease: A Pilot Study

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Dry eye disease (DED) is a prevalent ocular condition characterized by tear film instability, ocular surface inflammation, and discomfort, significantly affecting patients' quality of life. Traditional treatments often include artificial tears and anti-inflammatory medications, but many patients experience persistent symptoms. Low-level laser therapy (LLLT) has emerged as a novel, non-invasive approach that may reduce inflammation and promote cellular repair. This pilot study evaluated the efficacy and safety of LLLT in 50 patients diagnosed with moderate DED. Participants underwent four weekly sessions of LLLT applied around the periocular area using a 630 nm wavelength device. Primary outcome measures included tear break-up time (TBUT), Ocular Surface Disease Index (OSDI) scores, and Schirmer's test results, assessed at baseline and four weeks post-treatment.

Results demonstrated a statistically significant improvement in TBUT, increasing from a mean of 5.2 seconds at baseline to 9.1 seconds post-treatment ($p < 0.001$). OSDI scores improved by 40%, indicating symptomatic relief, while Schirmer's test values showed modest but not significant changes. No adverse effects or complications were reported during or after therapy. These findings suggest that LLLT may improve tear film stability and reduce ocular surface inflammation in DED patients. Although promising, this pilot study's limitations include the small sample size and lack of a control group. Further randomized controlled trials with longer follow-up are necessary to confirm LLLT's therapeutic role, optimal treatment parameters, and long-term safety. If validated, LLLT could become an effective adjunct or alternative for patients with refractory DED, offering a non-pharmacologic option that addresses the underlying inflammatory pathology.

Biography

Dr. Sofia Ramirez is an Assistant Professor of Ophthalmology at the University of São Paulo. Her research focuses on innovative treatments for ocular surface diseases, with a special interest in laser therapies and inflammation modulation. Dr. Ramirez is committed to advancing therapeutic approaches that enhance patient outcomes in complex ocular surface disorders.