

## The Efficacy of Preoperative Thermal Pulsation Treatment in Reducing Post Cataract Surgery Dry Eye Disease: A Systematic Review and Meta-analysis

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**Abstract :** Background: The thermal pulsation system is a therapy that uses heat and massage to treat dry eye disease; thus, some trials have been published to compare it with the conventional treatment. The aim of this study is to conduct a systematic review and meta-analysis comparing the efficacy of thermal pulsation systems with conventional treatment in patients undergoing cataract surgery. Methods: Medline, Embase, and Cochrane Central Register of Controlled Trials (CENTRAL) databases were searched for eligible trials. We included three randomized controlled trials (RCTs) that compared the thermal pulsation system with the conventional treatment in patients undergoing cataract surgery. A table of characteristics was plotted, and the Quality of the studies was assessed using the Cochrane risk-of-bias tool for randomized trials (RoB 2). Forest plots were plotted using the Random-effect Inverse Variance method.  $\chi^2$  test and the Higgins-I-squared (I<sup>2</sup>) model were used to assess heterogeneity. A total of 201 cataract surgery patients were included, with 105 undergoing preoperative pulsation therapy and 96 receiving conventional treatment. Demographic analysis revealed comparable distributions across groups. Results: All the studies in our analysis are of good quality with a low risk of bias. A total of 201 patients were included in the analysis, out of which 105 underwent pulsation therapy, and 95 were in the control group. Tear Break-up Time (TBUT) analysis revealed no significant baseline differences, except pulsation therapy being better at 1 month. (SMD 0.42 [95%CI 0.14 - 0.70] p=0.004). This positive trend continued at three months (SMD 0.52 [95% CI (0.20 - 0.84)] p=0.002). Corneal fluorescein staining scores and Meibomian gland-yielding secretion scores showed no significant differences at baseline. However, at one month, pulsation therapy significantly improved Meibomian gland function (SMD -0.86 [95% CI (-1.20 - -0.53)] p<0.00001), indicating a reduced risk of dry eye syndrome. Conclusion: Preoperative pulsation therapy appears to enhance post-cataract surgery outcomes, particularly in terms of tear film stability and Meibomian gland secretory function. The sustained positive effects observed at one and three months post-surgery suggest the potential for long-term benefits.

**Keywords :** lipiflow, cataract, thermal pulsation, dry eye

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