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Excimer Laser for Plaque Psoriasis: A Systematic Review and Meta-analysis

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INTRODUCTION

Plaque psoriasis is a chronic inflammatory condition characterized by keratinocyte hyperproliferation and immune dysregulation that significantly impacts quality of life.[1] While conventional therapies, such as topical corticosteroids and biologics, are frequently capable of stabilizing disease progression, their limitations, like adherence challenges and adverse effects,[2,3] necessitate alternative treatments. The 308 nm excimer laser utilizes site-specific UVB to induce DNA damage and apoptosis in treated cells, decreasing the inflammation and hyperproliferation characteristic of psoriasis.[4] Although excimer is an established treatment, current literature lacks a comprehensive meta-analysis quantifying the laser's efficacy. This review and meta-analysis seek to address this gap by synthesizing data from studies evaluating excimer laser treatment for plaque psoriasis.

MATERIALS AND METHODS

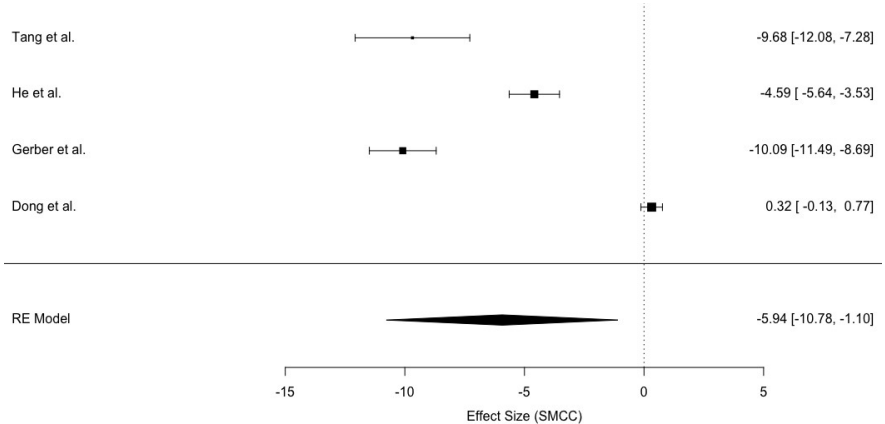
We searched MEDLINE, Embase, CENTRAL, and Web of Science using the search terms "psoriasis" and "laser". We included all clinical trials that utilized a 308 nm excimer laser for plaque psoriasis. Studies must have treated subjects twice weekly for at least 10 sessions. The Psoriasis Area and Severity Index (PASI) must have been the standardized measure used in included studies. A random-effects model was used to estimate standardized mean change with change score standardization (SMCC), which was used as the effect size to estimate the difference between baseline and follow-up PASI. A mixed-effects meta-regression was conducted to pool effect sizes across studies. All statistical analyses were performed in RStudio using the "metafor" package.

TABLE 1.

Characteristics of Included Studies

Study	Number of Subjects	Pulse Width (ns)	Initial Dose	Average Number of treatments	Frequency of treatments	Mean Pretreatment PASI (± SD)	Mean Posttreatment PASI (± SD)
Tang et al.	32	Not reported	3x MED	12	Twice weekly	11.47 (± 1.87)	5.08 (± 1.65)
He et al.	40	60	1-2x MED	13.7	Twice weekly	14.73 (± 4.37)	2.42 (± 2.91)
Gerber et al.	102	60	3x MED	10.8	Twice weekly	13.70 (± 2.1)	2.10 (± 1.2)
Dong et al.	20	60	1-2x MED	10	Twice weekly	12.02 (± 5.89)	4.09 (± 3.31)

FIGURE 1. Forest plot of SMCC of PASI scores.



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RESULTS

Our search identified 548 results, of which 4 met our inclusion criteria (Table 1). The heterogeneity analysis of the PASI dataset revealed significant variability among studies, with a high Cochran's Q (285.75, $P < 0.0001$) and I^2 of 98.95%, justifying the use of a random-effects model. The model produced an overall standardized mean change (SMCC) of -5.94 (95% CI: -10.78, -1.10), which indicates a significant reduction in PASI scores following excimer laser treatment ($z = -2.41$, $P = 0.0161$; Figure 1).

DISCUSSION

This review highlights the positive clinical response to the 308 nm excimer laser and quantifies the disease response. While previous reviews have aggregated data from studies on excimer's efficacy, to our knowledge, these findings have never been analyzed to quantify the disease response.[5] Our findings reinforce excimer's utility as an option for those unwilling or unable to treat large surface areas with topicals or biologic treatments. This study is limited by its small sample size. Further studies should evaluate a direct comparison to other treatments to elucidate which modality is most appropriate for this condition.

DISCLOSURES

The authors have no conflicts of interest to disclose.

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