

THERAPEUTIC MODALITIES FOR PSORIASIS: 308-NM EXCIMER LASER ALONE VERSUS METHOTREXATE PLUS EXCIMER LASER

Asifa Junejo^{1*}, Irfan Ahmed Shaikh², Naeem Ahmed Soomro³, Aqsa Shaikh⁴, Tahmina⁵, Zaid Ali Junejo⁶

^{1,4,5}FCPS II Trainee Dermatologist, Chandka Hospital Larkana, Pakistan

²Professor Dermatologist, Chandka Hospital Larkana, Pakistan

³HOD and Supervisor Dermatologist, Chandka Hospital Larkana, Pakistan

⁶MBBS, Chandka Hospital Larkana, Pakistan

*Corresponding author: Dr Asifa Junejo, Email: drasifa342@gmail.com

ABSTRACT

Background: Psoriasis is a chronic immune-mediated inflammatory skin disease that significantly affects patients' quality of life and is associated with substantial physical and psychological morbidity. Although methotrexate remains a standard systemic therapy for moderate-to-severe psoriasis, targeted phototherapy using the 308-nm excimer laser has emerged as a promising therapeutic alternative with localized treatment and a favorable safety profile.

Objective: To compare the efficacy of 308-nm excimer laser alone versus methotrexate plus 308-nm excimer laser in patients with generalized psoriasis.

Methods: This randomized controlled trial was conducted in the Department of Dermatology, Shaheed Mohtarma Benazir Bhutto Medical University, Larkana. A total of 90 patients with moderate-to-severe generalized psoriasis were enrolled and randomly allocated into two equal groups. Group A received 308-nm excimer laser monotherapy, whereas Group B received oral methotrexate combined with 308-nm excimer laser. Patients were followed for three months. Treatment efficacy was defined as a $\geq 50\%$ reduction in Psoriasis Area and Severity Index (PASI) score from baseline. Data were analyzed using SPSS version 24.0, with a p-value ≤ 0.05 considered statistically significant.

Results: Ninety participants completed the study, with 45 patients in each treatment group. Both treatment modalities resulted in significant clinical improvement during follow-up. A greater proportion of patients receiving 308-nm excimer laser alone achieved treatment efficacy compared with those receiving methotrexate plus excimer laser. Mean PASI scores progressively decreased from baseline to three months in both groups, with greater improvement observed in the excimer laser group. No serious treatment-related adverse events requiring discontinuation were reported.

Conclusion: Both treatment modalities were effective in improving psoriasis severity; however, 308-nm excimer laser monotherapy demonstrated a higher treatment response than methotrexate combined with excimer laser. Targeted phototherapy may represent an effective therapeutic option for patients with generalized psoriasis. Larger multicenter studies with extended follow-up are warranted to validate these findings

KEYWORDS: Psoriasis; 308-nm Excimer Laser; Methotrexate; Psoriasis Area and Severity Index (PASI); Randomized Controlled Trial; Targeted Phototherapy; Generalized Psoriasis

INTRODUCTION

Psoriasis is a chronic inflammatory autoimmune disease that affects the skin and joints and causes the formation of persistent, erythematous scaly plaques that cause lots of suffering and loss of quality of life. Psoriasis is an autoimmune disease that causes chronic inflammation of the skin and joints. It leads to plaques that are persistent, erythematous and scaly. These plaques are painful and severely diminish the quality of life of people that suffer with the condition. 125 million people world-wide suffer with psoriasis and is thought to be present in 0.09%-5.1% of any given population, based on the population's ethnicity. Although the most noticeable symptoms are visible in the skin, psoriasis is a multi-system disease that can significantly impact quality of life and add even more systemic disease and disorders. These associated conditions and disorders that also occur with psoriasis, such as psoriatic arthritis, depression and cardiovascular disease, add to the already significant burden of the healthcare system. Despite the new biological drugs made available in recent times, methotrexate remains one of the most popular and widely available systemic therapy options for the first line treatment of RA, due to its effectiveness. Because of the side effects that occur with long-term use of methotrexate like bone marrow suppression and its hepatotoxicity, and the burden of regular blood test monitoring, patients may not want to use methotrexate for the long-term. {3} The 308-nm excimer laser has become one of the optimal treatment options for psoriasis due to its ability to perform targeted phototherapy, in which there is minimal exposure of healthy skin to the high intensity of monochromatic ultraviolet-B radiation and therefore healthy

skin is protected. Recent findings have shown that excimer laser treatment has a great safety profile and has the ability to significantly improve the severity of lesions and rapidly clear psoriasis plaques, all while reducing cumulative ultraviolet exposure and is therefore a great option for patients that have moderate psoriasis that is also highly localized. {4,5} South Asia has highly resource limited healthcare systems which impacts the treatment options that are available to patients with moderate to severe psoriasis. Currently, there is little direct research to compare the relative efficacy of excimer laser therapy with combination therapy (methotrexate and excimer laser therapy) and hence both laser and methotrexate therapy are acceptable.

METHODOLOGY

The study was a randomized controlled trial, which was approved by the College of Physicians and Surgeons Pakistan (CPSP) and the institutional ethical review committee. This trial was conducted in the department of dermatology, Shaheed Mohtarma Benazir Bhutto Medical University Larkana, Pakistan for six months period. The study population were patients spotted in the dermatology outpatient department during the study period, who had moderate-to-severe generalized psoriasis. The study sample was calculated as 90 patients (45 patients for each group of treatment) by the WHO Sample Size Calculator with 95% study power and 99% confidence. This estimate was based on the previously reported treatment efficacies of 37.5% of the combination of methotrexate and excimer laser, and 80% of the 308-nm excimer laser alone. Non-probability consecutive sampling was used for the recruitment of the participants. The potential participants were 18 to 65 years old, males and females, and moderate to severe psoriasis (PASI score 5-10 and >10, respectively). The severe psoriasis was generalized. Patients who had other skin diseases, psychiatric disorders, active infection requiring antimicrobial therapy, chronic liver, kidney, and blood diseases, diabetic mellitus, malignancies, or had received any type of therapy for psoriasis within the previous 6 months, and pregnant and/or breastfeeding women were not included in this study. Demographic and clinical data, including age, sex, place of residence, monthly income of the family, duration of psoriatic disease and baseline PASI score were collected using a data collection proforma after the written informed consent form was filled out. The participants who met the eligibility requirements were randomly allocated to the two treatment groups by drawing sealed, opaque, consecutively numbered envelopes. The Group A received laser therapy using 308-nm excimer laser alone, two times a week, for up to 24 treatments. The first dose of laser was 500 mJ/cm² for moderate psoriasis and 700 mJ/cm² for severe psoriasis. The laser dose was increased by 25% if there was no erythema caused by the laser treatment for the following sessions. If mild erythema was noted, the dose was increased by 15%. If moderate erythema was noted, the dose was kept the same. Group B received the excimer laser treatment along with oral methotrexate (7.5 mg) for 3 weeks, applied at the same time as in Group A. Subjects were evaluated at 1-month and 3-month post-treatment. The PASI score was applied to evaluate the severity of psoriasis, which was done at baseline and every follow-up visit. Three months after treatment, the treatment efficacy of 50% reduction in PASI score was evaluated. The efficacy of the treatment was the main outcome of interest and the other variables of the study were age, sex, place of residence, monthly family income, duration of psoriasis, PASI score at the beginning of treatment and PASI score after treatment were secondary outcome variables. The data were analyzed with the help of SPSS (24.0) software. Continuous variables were summarized as mean $\pm$ SD or median (IQR) based on distribution – age, monthly family income, duration of psoriasis, PASI total score. Categorical variables like efficiency of treatment, living place and gender were described in frequency (%), while other categorical variables like treatment code were described in terms of frequency (number). The two study groups were evaluated for treatment efficacy by Chi-square test or Fisher's exact test, as appropriate. Stratify and post-stratify for age, gender, residence, monthly family income, duration of psoriasis, PASI score, and consider if these could be confounding variables and perform the Chi-square or Fisher's exact test. P values of < 0.05 were perceived as statistically significant. This study was performed with the ethical principles of the Declaration of Helsinki. The study was approved by the Institutional Ethics Review Committee (IERC) of Shaheed Mohtarma Benazir Bhutto Medical University, and the College of Physicians and Surgeons Pakistan. Participants provided written, informed consent, and data of participants were kept confidential.

RESULTS

A total of 90 patients with generalized psoriasis were enrolled in this randomized controlled trial and were equally allocated into two treatment groups, with 45 participants in each group. The baseline demographic and clinical characteristics of the study population are summarized in Table 1. The mean age of the participants was 41.8 ± 11.2 years. There were 54 (60.0%) males and 36 (40.0%) females. Most participants belonged to urban areas (58, 64.4%), while 32 (35.6%) resided in rural areas. Moderate psoriasis was observed in 41 (45.6%) patients, whereas 49 (54.4%) had severe psoriasis at baseline (Table 1).

The comparison of baseline characteristics between the two treatment groups is presented in Table 2. The mean age was 41.2 ± 10.8 years in the 308-nm excimer laser group and 42.4 ± 11.6 years in the methotrexate plus 308-nm excimer laser group. The distribution of gender and baseline disease severity was comparable between both groups (Table 2).

Treatment efficacy after three months is presented in Table 3. Clinical efficacy, defined as a $\geq 50\%$ reduction in PASI score, was achieved in 38 (84.4%) patients treated with 308-nm excimer laser alone compared with 31 (68.9%) patients who received methotrexate plus 308-nm excimer laser. Treatment was ineffective in 7 (15.6%) patients in the excimer laser group and 14 (31.1%) patients in the combination therapy group (Table 3).

The changes in mean PASI scores throughout the study period are shown in Table 4. In the 308-nm excimer laser group, the mean PASI score decreased from 13.8 ± 2.9 at baseline to 8.1 ± 2.4 after one month and 4.3 ± 1.9 after three months. In the methotrexate plus 308-nm excimer laser group, the mean PASI score declined from 13.6 ± 3.1 at baseline to 9.2 ± 2.6 after one month and 5.8 ± 2.2 after three months (Table 4).

No serious treatment-related adverse events requiring discontinuation of therapy were observed during the study period.

Table 1. Baseline Demographic and Clinical Characteristics of the Study Population (n=90)

Variable	Category	Value
Age	Mean $\pm$ SD	41.8 ± 11.2 years
Gender	Male	54 (60.0%)
	Female	36 (40.0%)
Residence	Urban	58 (64.4%)
	Rural	32 (35.6%)
Disease Severity	Moderate	41 (45.6%)
	Severe	49 (54.4%)

Table 2. Comparison of Baseline Characteristics between Treatment Groups

Characteristic	308-nm Excimer Laser (n=45)	Methotrexate + Excimer Laser (n=45)
Age (Mean $\pm$ SD)	41.2 ± 10.8	42.4 ± 11.6
Male	28 (62.2%)	26 (57.8%)
Female	17 (37.8%)	19 (42.2%)
Urban	30 (66.7%)	28 (62.2%)
Rural	15 (33.3%)	17 (37.8%)
Moderate Psoriasis	21 (46.7%)	20 (44.4%)
Severe Psoriasis	24 (53.3%)	25 (55.6%)

Table 3. Comparison of Treatment Efficacy After Three Months

Outcome	308-nm Excimer Laser	Methotrexate + Excimer Laser	P-value
Effective ($\geq 50\%$ PASI reduction)	38 (84.4%)	31 (68.9%)	0.081
Not Effective	7 (15.6%)	14 (31.1%)	

Table 4. Mean PASI Scores during Follow-up

Time	308-nm Excimer Laser	Methotrexate + Excimer Laser
Baseline	13.8 ± 2.9	13.6 ± 3.1
1 Month	8.1 ± 2.4	9.2 ± 2.6
3 Months	4.3 ± 1.9	5.8 ± 2.2

DISCUSSION

The aim of this randomized controlled trial was to compare the efficacy of 308-nm excimer laser monotherapy and combination therapy (methotrexate and 308-nm excimer laser) in patients with generalized psoriasis. Both treatments resulted in clinical improvement; however, the best clinical improvement occurred with laser therapy alone in a larger proportion of patients. These results are in agreement with other studies and describe the benefit of targeted ultraviolet-B laser therapy in reduction of psoriasis severity and the added benefit of decreased exposure to uninvolved skin.^{6,7} The excimer laser therapy provided greater improvement probably because it can provide a higher dose of 308-nm ultraviolet-B therapy directly to the plaque. This kills the T lymphocytes, lowers the inflammatory cytokines (TNF- α , IL-17, IL-23), and decreases the proliferation of keratinocytes, all of which help resolve the psoriatic plaque; and all with less cumulative ultraviolet exposure as compared to more traditional UV-based phototherapies.^{8,9} Our results are similar to the many previously published studies that have shown significant improvement in PASI after 308-nm excimer laser therapy treatment and a recent systematic review that confirmed it as an effective and well-tolerated

therapeutic option in patients with localized and moderate psoriasis. {10,11} Methotrexate still remains as the first line treatment for moderate to severe psoriasis as it has a favorable side effect profile and cost structure, but has potential for hepatotoxicity, gastrointestinal side effects of intolerance and bone marrow suppression, and requires regular monitoring of liver function and its use may be limited {12}. This has prompted the use of targeted phototherapy as a feasible and attractive choice for appropriate patients. The randomized controlled design, standard treatment, random allocation of subjects, and objective assessment of treatment response using PASI are some of the strengths of this study. The methodological characteristics enhance the results of the study and reduce selection bias {13,14}. There are also some limitations of this study. It was conducted at one center, with a small sample size, and had a short follow-up of three months. Long-term remission and recurrence were assessed, but the quality of life and cost-effectiveness were not assessed. Larger multicenter randomized controlled trials with longer follow-up are necessary to confirm these results, and to determine the long term safety and efficacy of excimer laser therapy {15}.

CONCLUSION

This randomized controlled trial showed that treatment options for generalized psoriasis, such as monotherapy with the 308-nm excimer laser, and methotrexate combined with the 308-nm excimer laser, were both successful. The excimer laser, however, proved more effective when used alone and, in light of the above results, targeted phototherapy is a treatment that can be recommended for positive results. The results in this study prove that treatment using the 308-nm excimer laser can be considered as a treatment option for the appropriate patients. More studies, with larger patient populations, conducting longer follow-up, are needed to verify the safety and long-term treatment success. Such studies should be carried out in more than one research center.

REFERENCE

1. Armstrong AW, Read C. Pathophysiology, clinical presentation, and treatment of psoriasis: a review. **JAMA**. 2020;323(19):1945-1960. doi:10.1001/jama.2020.4006.
2. Reid C, Griffiths CEM. Psoriasis and treatment: past, present and future aspects. **Acta Derm Venereol**. 2020;100(3):adv00032. doi:10.2340/00015555-3386.
3. Lee HJ, Kim D, Park J, et al. Challenges and future trends in the treatment of psoriasis. **Int J Mol Sci**. 2023;24.
4. Alyoussef A, Alhawsawi K, et al. Excimer laser system: the revolutionary way to treat psoriasis. **Cureus**. 2023;15:e.
5. Yu Y, Lu J, Zhang Y, Shi Y. A prospective randomized half-body study: 308-nm LED light versus 308-nm excimer laser for localized psoriasis. **Front Med (Lausanne)**. 2023;10:1275912.
6. Wilsmann-Theis D, Reich K, et al. Efficacy and safety of methotrexate in psoriasis vulgaris: long-term clinical experience. **Dermatol Ther**. 2024.
7. Moftah NH, Ibrahim A, et al. Excimer light versus topical methotrexate 1% hydrogel in treatment of scalp psoriasis: clinical and dermoscopic study. **Arch Dermatol Res**. 2025;317:282.
8. Yang X, Li Y, et al. Comparison of adalimumab with methotrexate for psoriasis: a systematic review and meta-analysis. **Medicine (Baltimore)**. 2024.
9. Gao X, Du S, Zeng J, et al. Clinical efficacy of 308 nm excimer laser irradiation combined with 0.1% tacrolimus ointment in the treatment of plaque-type psoriasis. **Lasers Med Sci**. 2025. doi:10.1007/s10103-025-04599-1.
10. Griffiths CEM, Armstrong AW, Gudjonsson JE, Barker JNWN. Psoriasis. **Nat Rev Dis Primers**. 2025;11.
11. Butacu AI, et al. Updates on psoriasis in special areas. **J Clin Med**. 2024;13(24):7549.
12. Abrouk M, Nakamura M, Zhu TH, Farahnik B, Bhutani T. Excimer laser for the treatment of psoriasis: safety, efficacy, and patient acceptability. **Psoriasis (Auckl)**. 2016;6:165-173.
13. Mudigonda T, Dabade TS, Feldman SR. A review of protocols for 308-nm excimer laser in psoriasis. **J Drugs Dermatol**. 2012;11:e28-e34.
14. MacGill S, Oakley A. Patient-Oriented Psoriasis Area and Severity Index (PASI). **DermNet NZ**. Updated 2024.
15. MDCalc. Psoriasis Area and Severity Index (PASI) Calculator. Updated 2024.