e-ISSN: 0976-822X, p-ISSN:2961-6042

Available online on http://www.ijcpr.com/

International Journal of Current Pharmaceutical Review and Research 2025; 17(8); 1061-1064

Original Research Article

Methotrexate versus Methotrexate with Narrow-Band Ultra Violet B in Treatment of Moderate to Severe Psoriasis – A Comparative Study

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Received: 20-06-2025 / Revised: 19-07-2025 / Accepted: 20-08-2025
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Conflict of interest: Nil

Abstract:

Introduction: Psoriasis is a chronic inflammatory skin disorder affecting 2%–3% globally. This study compares methotrexate (MTX) monotherapy with its combination with narrowband ultraviolet B (NBUVB), aiming to evaluate efficacy in moderate to severe psoriasis, especially in resource-limited settings where optimizing affordable, conventional treatments is essential for improving outcomes and achieving sustained remission.

Methods: This comparative study, conducted at Malla Reddy Institute from Sept 2022 to Dec 2023, evaluated MTX monotherapy versus MTX with NBUVB in psoriasis patients. Eligible adults were randomized into two groups, treated for 12 weeks, and assessed using PASI scores to determine therapeutic efficacy between the modalities.

Results: Among 60 patients, majority were aged 31–40 years and male. Group B (MTX+NBUVB) showed significantly greater PASI reduction (83.3%) than Group A (77.03%) at 12 weeks (P = 0.013). Common adverse effects included nausea and abnormal LFTs (MTX), and erythema and itching (NBUVB).

Conclusion: This study confirms that combination therapy is more effective than methotrexate alone in reducing PASI scores. It highlights the importance of patient-specific factors like BMI and comorbidities in psoriasis management. These findings support personalized treatment strategies, offering clinicians valuable guidance to improve outcomes and quality of life for patients.

Keywords: Psoriasis, Methotrexate, PASI Score, Combination.

Introduction

Psoriasis is a chronic, immune-mediated inflammatory skin disorder affecting 2%–3% of the global population, presenting with erythematous, scaly plaques primarily on the extensor surfaces, scalp, and trunk [1]. The disease significantly impairs quality of life and may involve joints (psoriatic arthritis) and nails. Its pathogenesis is multifactorial, involving genetic predisposition, immune dysregulation, environmental triggers, infections, psychological stress, and lifestyle factors such as smoking and alcohol consumption. Treatment strategies vary depending on disease severity, ranging from topical agents and phototherapy to systemic immunosuppressants and biologics [2].

Methotrexate (MTX), a folate antagonist approved by the FDA in 1972, remains a mainstay in treating moderate to severe psoriasis due to its immunosuppressive and anti-inflammatory effects [3]. Narrowband ultraviolet B (NBUVB) therapy,

utilizing wavelengths of 311–313 nm, is a widely accepted phototherapy modality for psoriasis with fewer side effects and better patient tolerance compared to broad-spectrum UV or PUVA therapy [4]. Emerging evidence suggests that combining NBUVB with MTX can enhance therapeutic outcomes, reduce cumulative drug doses, and improve long-term disease control.

However, data on this combination approach remain limited, especially in cost-conscious settings where access to biologics is restricted. This study aims to compare the efficacy of MTX monotherapy with the combination of MTX and NBUVB in patients with moderate to severe psoriasis, highlighting the importance of optimizing conventional, affordable treatments to improve disease outcomes and sustain remissions.

Methods

It was a comparative study, conducted in the department of Dermatology Venereology and Leprosy, Mallareddy Institute of Medical Sciences, Hyderabad. Study was conducted from September 2022 to December 2023. Study protocol was approved by the institutional ethics committee. An informed written consent was taken from the study members.

The study included patients with Fitzpatrick skin phototypes III and IV, aged between 18 and 65 years. Only those without any contraindications to NBUVB therapy and MTX were enrolled. Additionally, female participants were included only if they had completed their families. Extreme age groups and noncooperative individuals were excluded.

A detailed history was obtained from all patients, including name, age, sex, nature and duration of illness, previous treatments, family history, and any predisposing factors. Diagnosis was established based on clinical history, physical examination, and relevant investigations, with confirmation by skin biopsy where necessary. Eligible patients were randomly allocated into two groups using computer-generated random numbers; group A received MTX monotherapy, MTX, NBUVB combination therapy to group B. Baseline Psoriasis Area and Severity Index (PASI) scores were calculated for all before initiating treatment [5]. Female participants were advised to avoid conception during and for one month after the treatment course.

Baseline investigations including complete blood picture (CBP), liver function tests (LFT), renal function tests (RFT), urine examination, and chest X-ray were performed to rule out systemic contraindications. Punch biopsies were conducted under local anesthesia in selected patients to confirm diagnosis. Group A were administered with 0.4 mg/kg/week oral MTX, maximum dose of 25 mg/week for 12 weeks. Group B participants were provided with protective UV goggles and genital shields during phototherapy sessions. Minimal erythema dose (MED) was determined prior to treatment initiation. NBUVB therapy was administered three times weekly, with dose adjustments based on erythema response during follow-up. Treatment was continued until there was either 90% reduction in PASI score or completion of 12 weeks, whichever occurred first. At the end of 12 weeks, therapeutic efficacy in both groups was assessed by recalculating PASI scores, enabling a comparative evaluation of the outcomes between the two treatment modalities.

Statistical Analysis: The collected data were entered into a Microsoft Excel spreadsheet and analyzed using both MS Excel and SPSS software. Frequencies and ratios were calculated for all qualitative variables. Descriptive and inferential statistics were computed to evaluate the study variables. Comparative analysis was conducted using the Mann-Whitney U test; $P < 0.05$ was considered statistically significant.

Results

A total of 60 patients were included in the study. The majority were aged 31–40 years (43.3%), and 68.3% were male. Itching was the most common complaint (63.3%). Most participants (63.3%) had no comorbidities, with diabetes (16.6%) being the most frequent, followed by hypertension (10%) and hypothyroidism (5%). About 65% had no addictions; alcohol use was seen in 20%, and 8.3% were both alcoholic and smokers. Commonly affected sites were the lower limbs (60%), trunk (58.3%), and upper limbs (56.6%). Nail changes were present in 48.1%, mainly pitting (23.3%). A significant positive correlation was found between BMI and PASI score ($r = 0.334$, $p < 0.001$).

The PASI score showed a significant reduction from 12.639 at baseline to 2.632 at week 12. Group B demonstrated superior improvement, with a mean rank of 24.88 versus 36.12 in group A ($P = 0.013$). Baseline PASI scores were comparable between the groups (13.332 vs. 13.499). At 12 weeks, Group B achieved greater PASI reduction (83.30%) compared to group A (77.03%). Similarly, at 4 and 8 weeks, PASI reduction was higher in group B (39.03%, 64.00%) than in group A (31.2%, 56.24%). MTX caused nausea, fatigue, and abnormal LFTs, while NBUVB led to itching, erythema, and burning.

Discussion

In the present study comprising 60 patients with moderate to severe psoriasis, the majority were between 31–40 years (43.3%), with a male predominance (68.3%). This demographic distribution aligns with previous epidemiological

findings suggesting a higher prevalence of psoriasis among males and peak onset in early adulthood and middle age [6]. The predominant symptom reported was itching (63.3%), reflecting the distressing pruritic nature of the disease, which significantly impacts patients' quality of life. Most patients (63.3%) had no associated comorbidities, yet among those with comorbidities, diabetes mellitus (16.6%) and hypertension (10%) were prominent, highlighting the metabolic implications of psoriasis. This is consistent with findings that psoriasis is often associated with components of metabolic syndrome [7].

Regarding lifestyle factors, 65% of patients reported no addictions, while alcohol consumption (20%) and combined alcohol and smoking use (8.3%) were notable. These observations underscore the potential aggravating role of addictive behaviors in psoriasis pathogenesis and flare-ups. Prior studies have documented a link between alcohol, smoking, and psoriasis severity, attributing it to immune dysregulation and oxidative stress induced by this substance [8]. The most frequently involved body sites were the lower limbs (60%), trunk (58.3%), and upper limbs (56.6%), aligning with the classic distribution of plaque psoriasis, which tends to favor extensor surfaces and the scalp [9]. Nail involvement was found in 48.1% of cases, with pitting (23.3%) being the most common feature. Nail psoriasis is often considered a marker for more severe disease and is frequently associated with psoriatic arthritis [10].

A notable finding in this study was the significant positive correlation between BMI and PASI score ($r = 0.334$, $P < 0.001$), suggesting that higher BMI is associated with increased psoriasis severity. This is supported by existing literature indicating that obesity contributes to systemic inflammation, leading to worsening psoriatic manifestations [11]. Adipose tissue secretes pro-inflammatory cytokines like TNF-α and IL-6, which are involved in the pathogenesis of psoriasis. These findings highlight the importance of addressing weight management in patients with psoriasis, both to improve skin symptoms and reduce systemic inflammatory burden. Thus, this study reinforces the multifactorial nature of psoriasis, its association with comorbidities and lifestyle, and the relevance of holistic patient evaluation and management strategies.

The current study demonstrated a significant reduction in PASI scores over 12 weeks in both treatment groups, with more pronounced improvement in the combination therapy group (Group B). Group B, which received MTX along with NBUVB, achieved a PASI reduction from 13.499 at baseline to 2.25 at week 12 (83.30%), compared to Group A, which received methotrexate alone and showed a reduction from 13.332 to 3.06 (77.03%). These findings are consistent with earlier studies demonstrating enhanced therapeutic outcomes with combination therapy. Dogra and Mahajan found that combining NBUVB with MTX accelerated lesion clearance and reduced cumulative MTX dose, thereby minimizing systemic toxicity [12]. Similarly, it was reported that NBUVB enhances the efficacy of systemic agents, likely due to its additive immunomodulatory effects [13].

The statistical comparison of PASI score improvements between the two groups revealed a significant difference, with group B having a lower mean rank (24.88) compared to group A (36.12), and a p-value of 0.013, indicating the superiority of the combination therapy. This supports the results of Racz et al., who concluded that NBUVB and MTX have complementary mechanisms, MTX inhibits DNA synthesis and T-cell activation, while NBUVB reduces cytokine production and promotes apoptosis in T-lymphocytes [14]. The higher PASI reductions observed at week 4 (39.03% vs. 31.2%) and week 8 (64.00% vs. 56.24%) in group B further emphasize the quicker response and sustained improvement offered by combination therapy; same was documented and also noted that such regimens lead to more rapid skin clearance and prolonged remission periods [15].

Adverse effects were observed in both groups, though with differing profiles. In Group A, methotrexate monotherapy was associated with nausea (10%), fatigue (3.3%), and abnormal liver function tests (6.7%), which aligns with known MTX toxicity reported in previous trials [16]. Conversely, group B experienced adverse effects related to phototherapy such as itching (10%), erythema (6.7%), and burning (3.3%). While these side effects were milder and limited to the skin, they were manageable with appropriate dosing adjustments and photoprotection. According to Yones et al., phototherapy is generally well tolerated and adverse reactions are usually reversible with dose modifications [17]. The tolerability of NBUVB enhances its value in combination regimens, especially in patients who may be at risk for systemic toxicity from higher doses of methotrexate alone.

Overall, the combination of methotrexate with NBUVB proved to be more effective than monotherapy in reducing psoriasis severity as assessed by PASI scores, with acceptable safety and tolerability. These findings support the growing preference for multi-modal treatment strategies in moderate to severe psoriasis, particularly in resource-limited settings where biologics may not be affordable. The study reinforces the importance of combining therapies with different mechanisms to achieve synergistic effects and minimize long-term side effects, thereby optimizing patient outcomes.

Conclusion: Our study demonstrates the superior efficacy of combination therapy over MTX alone in reducing PASI scores among patients with moderate to severe psoriasis. It emphasizes the importance of incorporating patient-specific factors such as BMI, comorbidities, demographics, and clinical presentation when tailoring treatment strategies. These findings contribute significantly to the current understanding of psoriasis management and highlight the need for personalized treatment approaches. By integrating these insights into clinical practice, healthcare professionals can optimize therapeutic outcomes, improve quality of life, and enhance patient satisfaction. This study thus serves as a valuable addition to the growing literature on psoriasis treatment.

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