NARROW BAND ULTRAVIOLET B ON PSORIASIS VULGARIS: A SYSTEMATIC REVIEW

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Abstract

Background: Psoriasis is a chronic inflammatory skin disease affecting a significant proportion of the global population. Narrowband ultraviolet B (NB- UVB) phototherapy is a widely used treatment modality. This study was carried out to systematically review the evidence on the efficacy and safety of NB-UVB phototherapy in adults with psoriasis vulgaris. **Methods:** A systematic literature search was conducted in five data bases (PEDro , PubMed , Scopus , Web of Science, and the Cochrane Library) from January 2005 to April 2024. Randomized controlled trials (RCTs) comparing NB-UVB with control interventions were included. Methodological quality was assessed using the PEDro scale. **Results:** Five RCTs met the inclusion criteria. Due to heterogeneity in study designs and intervention protocols, a meta-analysis was not performed; instead, a narrative synthesis was conducted. The review found that NB-UVB consistently reduced Psoriasis Area and Severity Index (PASI) scores. Three weekly sessions appeared sufficient for achieving clinically significant reductions. Both percentage-based andfixed-doseregimensyieldedcomparableoutcomes.Seleniumsupplementation did not enhance NB-UVB efficacy. **Conclusion:** This systematic review supports NBUVB as an effective therapy for reducing PASI in psoriasis vulgaris, but we can't say assertively that NBUVB can be a reliable monotherapy in treatment of psoriasis vulgaris because of the heterogeneous data which didn't help to proceed and make a meta-analysis and the small number of included studies as we included randomized control trials only.

Key words: Narrow band Ultraviolet B , Phototherapy , Psoriasis Vulgaris.

Introduction

Psoriasis is a chronic inflammatory skin disease affecting 3% of the global population [1,2]. Characterized by erythematous plaques with silvery-white scales, psoriasis varies in severity from localized lesions to extensive body surface involvement [3,4]. While the precise etiology remain sun clear, genetic predisposition and immune system involvement are strongly implicated [5]. External triggers, including trauma, sunburn, infections, certain medications, and stress, can exacerbate condition [6].

Psoriasis significantly impacts patients' physical , emotional and social well-being, leading to impaired quality of life [7,8,9,10].The disfigurement , potential disability, and reduced productivity associated with psoriasis contribute to a substantial burden for individuals and society, including increased rates of depression and social stigmatization [11,12,13].

Psoriasis vulgaris, the most common clinical form, accounts for approximately 90%of cases and presents with well - demarcated, erythematous plaques covered by characteristic silvery scales. Lesions typically appear symmetrically on the scalp, elbows, knees, and gluteal cleft [14,15] .This immune – mediated diseaseis associated with complex genetic susceptibility [16].

Ultraviolet (UV) phototherapy, introduced in the early 20th century, utilizes specific wavelengths of UV light to treat skin diseases. Narrowband UVB (NB- UVB) phototherapy (311–313nm)has emerged as a preferred treatment modality due to its superior clinical tolerability and reduced side effects compared with broadband UVB (BB-UVB) and other UV therapies [17].

Despite the established use of NB-UVB, a comprehensive and up-to-date systematic

review is warranted to synthesize the available evidence on its efficacy and safety in treating psoriasis vulgaris. This systematic review aims to evaluate the effectiveness of NB-UVB phototherapy in reducing disease severity in adults with psoriasis vulga

Methods

This systematic review evaluated the effectiveness of narrowband ultraviolet B (NB-UVB) phototherapy in patients with psoriasis vulgaris. The study protocol was registered with PROSPERO (CRD42024535657). This review was conducted in accordance with the PRISMA (Preferred Reporting Items for Systematic reviews and Meta-Analyses) guidelines.Search Strategy and Study Selection A systematic literatures each was conducted in PEDro , PubMed (MEDLINE) , Scopus , Web of Science , and the Cochrane Library from January2005toApril 2024. The following search strings were used:

PubMed :(“ultraviolet”OR“ultravioletB”) AND (psoriasis)

Scopus :(“ultraviolet”OR“ultraviolet B” OR “narrow band ultraviolet B”) AND (“psoriasis” OR “psoriasis vulgaris” OR “plaque psoriasis”)

Cochrane Library :(“ultraviolet” OR “ultraviolet B”) AND (“psoriasis”)

PEDro : (ultraviolet) AND (psoriasis)

Web of Science :(“ultraviolet” OR “ultraviolet B”) AND (“psoriasis”)

Duplicate records were removed using Mendeley reference management software. Titles and abstracts of remaining articles were screened for relevance. Full texts of potentially eligible studies were retrieved and assessed for inclusion based on pre-defined criteria.

Eligibility Criteria

Studies were included if they:

- Were published in English as full – text original articles in peer-reviewed journals.
- Included adult participants (age>16years) with mild to moderate psoriasis vulgaris.
- Were randomized controlled trials (RCTs) that evaluated NB-UVB phototherapy.
- Compared NB-UVB with traditional treatment or no intervention.
- Reported outcomes related to improvement in psoriatic plaques , primarily assessed using the Psoriasis Area and Severity Index (PASI) score.

Studies were excluded if they:

- Used non – experimental designs (e.g., cohort studies , cross-sectional studies, case reports).
- Were conducted on animals.
- Combined or compared NB-UVB with pharmacological drugs.
- Combined or compared NB-UVB with other modalities such as laser, balneotherapy, or ultraviolet A (UVA) phototherapy.

Data Extraction

Data were extracted using a standardized data extraction form and included: author, year of publication , study population characteristics (sample size , age range , sex) , intervention details (frequency , duration , dose of NB-UVB) , and outcome measures (PASI score and other reported outcomes such as CRP and selenium concentration).

Quality Assessment

The methodological quality of included RCTs was assessed using the Physiotherapy Evidence Database (PEDro) scale. The PEDro scale is an 11-item check list that assesses internal validity , with scores ranging from 0 to 10.Scores were interpreted as follows: 0–3 (poor), 4–5 (fair), 6–8 (good), and 9–10 (excellent)[18].

Data Synthesis and Analysis

Due to heterogeneity in study designs and intervention protocols (e.g., frequency of sessions, initial dose adjustments), a meta-analysis was not performed. A narrative synthesis was conducted to summarize and compare findings across studies. This involved examining trends in PASI score reduction and comparing intervention groups with control groups. Where reported, p-values were recorded to assess statistical significance.

Results

The systematic search identified 1131 articles, of which 706 unique records remained after duplicate removal. Following the title and abstract screening, 107 articles underwent full-text review, resulting in the inclusion of 5 studies in this systematic review (Figure 1).

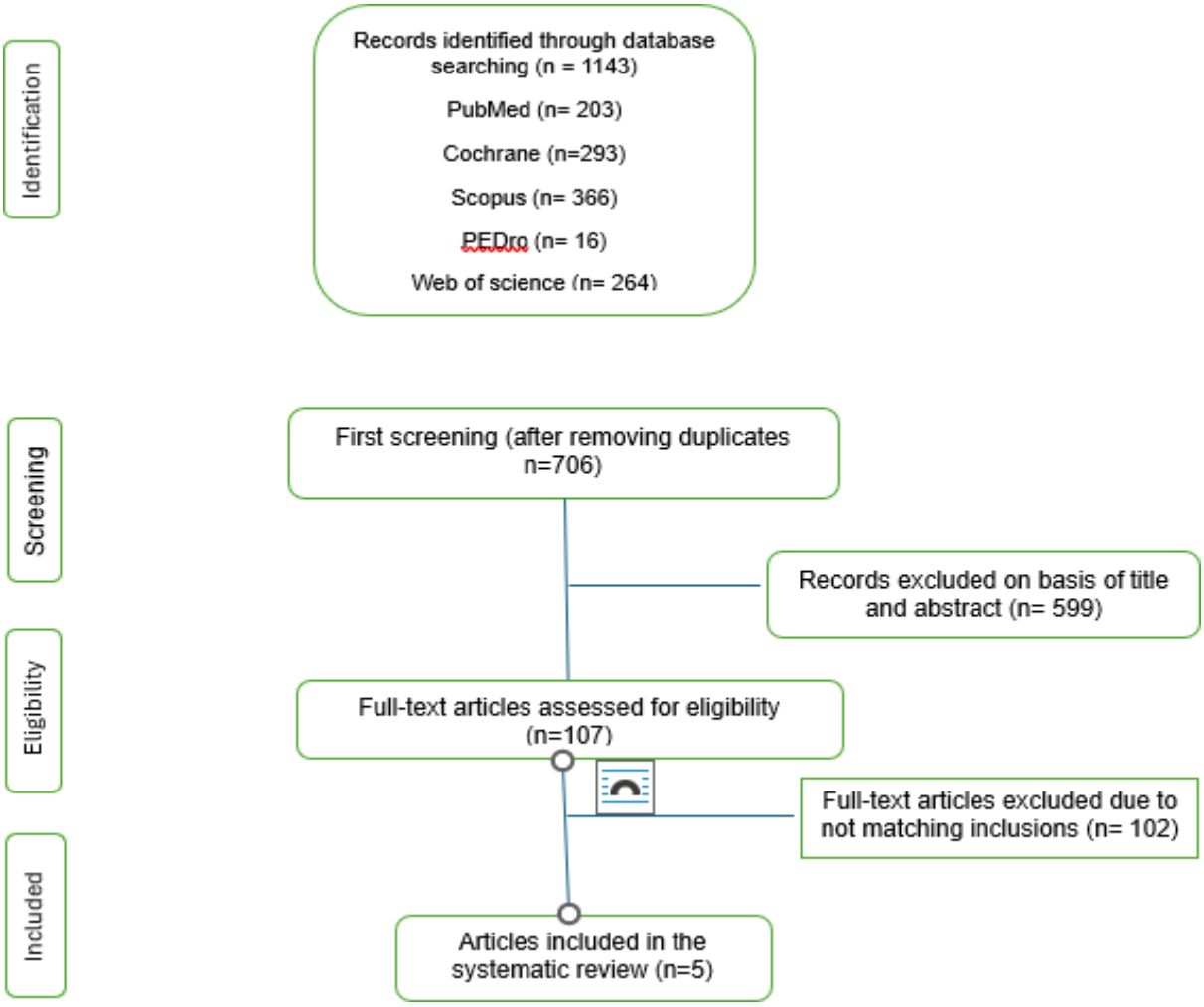

Figure 1: PRISMA Flow Diagram

Study Characteristics

The 5 included studies, published between 2005 and 2015, enrolled a total of 461 patients (330 female [71.6%] and 131 males [28.4%]). The mean age of participants was 45.5 years (range, 16-75 years).A summary of study characteristics is presented in Table 1.

Author	Population		Intervention		Outcome Measurement	Main Results
	Number	Age (Years)	Content	Parameters		
Serwin et al, 2006	37 patients 23 M 14 F G1:19 G2:18	18–50	G1 received NBUVB with+ selenium supplementation. G2 received NBUVB only	Initial NBUVB dose was70% of the minimal erythema dose and increasing the dose by 20% every second day. Both groups5 times/week for 4 weeks.	PASI sTNF-R1 CRP Selenium	The difference between the two groups was not statistically significant(P= 0.05) regarding PASI. The difference between the two groups was not statistically significant

					concentration	regarding CRP. The concentration ofsTNF-R1 decreased significantly in both groups but T2 was markedly higher in group2. Supplementation with SeMet resulted in more than a double increase in serum Se concentration in group1

Kleinpenning et al., 2009	109 patients 54 M 55 F G1:55 patients G2:54 patients	30.2:62.4	G1:Initial dose was 70% of MED for the high dose regimen. G:35% of MED for the low dose regimen.	The dose was increased at each irradiation session by 40% for the high dose regimen and by 20%for the low dose regimen. Both groups 3 sessions / week up to 30 sessions.	PASI	No significant difference between the two regimens was found in the number of patients achieving clearance.
Hallaji et al, 2010	45 patients. 26 M 19 F Group1:23 patients Group2:22 patients	13:75	Group1:3times/ week NBUVB regime treatment. Group2:5times/ week NBUVB regime treatment	G1:3timesa week till plaques clear G2:5timesa week till plaques clear	PASI	The difference between the two groups was not statistically significant (P = 0.44) regarding PASI.

Dawe et al., 2011	210 patients divided into 3 groups equally All female	16:75	G1:fixed stating dose. G2:70%of Individual MED. G3:50%of Individual MED.	3sessions/week for up to 60 sessions.	PASI	The difference between the two groups was not statistically significant regarding PASI.
Parlaketal, 2015	60 patients 28 M 32 F Divided into 2 groups (N.B does not mention number of each group)	18:70	G1:percentage dose protocol. G2:fixed dose protocol.	3sessions/week for up to 28 weeks MED for skin type 1 and 2 from 200: 1200 mJ/cm2 For skin type 3 and 4 start from 600: 1600 mJ/cm2	PASI	No statistical difference was found between the groups (P = 0.83) regarding PASI.

Table1.Data Extraction Sheet

Quality Assessment

Methodological quality, assessed using the PEDro scale, ranged from 5 to 9.Two studies scored between 7 and 9 , indicating good to excellent methodological rigor. Three studies scored between 5 and 6, indicating fair quality. Detailed PEDro scores for each study are presented in Table 2.

Author	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Total
Serwin et al, 2006	yes	yes	no	yes	yes	yes	yes	yes	no	yes	yes	8
Kleinpenning et al.,2009	yes	yes	no	yes	yes	yes	yes	no	no	yes	yes	7
Hallaji et al, 2010	yes	yes	yes	yes	no	no	yes	no	yes	yes	yes	7
Dawe et al, 2011	yes	yes	yes	yes	yes	yes	yes	no	yes	yes	yes	9
Parlak et al, 2015	yes	yes	no	yes	no	no	no	no	yes	yes	yes	5

Table2. Quality assessment of included studies according to the PEDro scale

Synthesis of Findings

Due to heterogeneity in intervention protocols , a meta – analysis was not performed. A narrative synthesis of the findings is presented below, focusing on the impact of treatment frequency, dose regimens, and adjunct interventions on PASI outcomes.

Frequency of NB-UVB administration

Three studies examined the effect of varying NB-UVB administration frequencies. Hallaji et al (2010) [19], found no statistically significant difference in PASI reduction between patients receiving NB-UVB 3 times per week and those receiving it 5timesper week (P= .44). Dawe et al (2011) [20], reported comparable PASI outcomes across three groups receiving NB-UVB 3 times per week with different initial doses. Similarly, Kleinpenning et al (2009) [21], found no significant difference in PASI outcomes between high-dose (70% minimal erythema dose [MED]) and low-dose (35% MED) regimens administered 3 times per week.

Dose Regimen Variations

Two studies evaluated different NB-UVB dose protocols. Parlak et al (2015) [21], found no significant difference in PASI improvement between percentage-based and fixed – dose protocols (P=.83) , both administered 3 times per week. Dawe et al (2011) [20], also observed no significant difference in PASI reduction across groups receiving different initial doses. Kleinpenning et al (2009) 21, reported the same findings.

Adjunct Interventions

One study investigated the effect of selenium supplementation on NB-UVB efficacy. Serwin et al (2006) [23] ,found no significant difference in PASI reduction between patients receiving NB-UVB with and without selenium supplementation, although a significant increase in serum selenium concentration was observed in the supplemented group.

Summary of Findings

The findings of this review suggest that NB-UVB phototherapy is effective in reducing PASI scores in patients with psoriasis vulgaris. However, variations in treatment frequency, dose regimens and the addition of selenium supplementation did not significantly impact treatment outcomes.

Discussion

This systematic review evaluated the effectiveness of narrowband ultraviolet B (NB-UVB) phototherapy in patients with psoriasis vulgaris. Although heterogeneity in study designs and intervention protocols precluded quantitative meta-analysis, a narrative synthesis of 5 randomized controlled trials (RCTs) provided insights into optimal treatment frequency, dosage regimens and the role of adjunct therapies.

Effectiveness of NB-UVB Monotherapy

NB-UVB phototherapy demonstrated a consistent ability to reduce Psoriasis Area and Severity Index (PASI) scores, supporting its efficacy in managing psoriasis vulgaris. Improvements in PASI scores were observed across various treatment frequencies (3 or 5 times per week) [19,24]. and dose regimens [20,21,22]. Some studies reported long-lasting remission periods following NB-UVB monotherapy, suggesting durable treatment effects [24].

This review identified several key patterns: (1) administering NB-UVB 3 times per week appears sufficient for achieving clinically significant PASI reductions, with no added benefit from higher frequencies; (2) both percentage-based and fixed- dose protocols resulted in comparable PASI improvement; and (3) selenium supplementation did not enhance the therapeutic effects of NB-UVB. These findings support the use of NB-UVB as an effective and adaptable treatment for psoriasis vulgaris, consistent with existing evidence.

Detailed Analysis of Key Findings

Treatment Frequency & PASI Reduction

This review suggests that 3 weekly NB-UVB sessions are sufficient for achieving significant PASI reductions. Increasing the frequency to 5 times per week did not result in superior outcomes. This finding has important clinical implications, as a 3-times-per-week schedule balances treatment efficacy with patient convenience and adherence.

Dose Regimen: Percentage – Based versus Fixed – Dose Protocols

No substantial difference in PASI outcomes was observed between percentage- based (relative to minimal erythema dose [MED]) and fixed-dose NB-UVB protocols.This finding suggests flexibility in dosing, allowing clinicians to tailor treatment based on individual patient characteristics, including skin type [22], photo type, and prior phototherapy experience. This is supported by Parlak et al, who found no major advantage of MED-guided dosing over fixed protocols, especially in patients with darker skin types.

Adjunct Therapy: Selenium Supplementation

Selenium supplementation did not enhance PASI improvement when combined with NB-UVB therapy, suggesting that NB-UVB monotherapy is generally sufficient. While anti oxidants like selenium have been hypothesized to benefit skin health and reduce oxidative stress in psoriatic lesions [23], the evidence remains inconclusive.

Combination Therapies

While this review focused on NB-UVB monotherapy, it is important to acknowledge the evidence supporting the use of NB-UVB in combination with systemicagents (e.g., fumaricacidesters, methotrexate, etanercept, adalimumab) and topical treatments (e.g., calcipotriol, tazarotene) [25,26,27,28,29]. These combinations have been shown to enhance therapeutic outcomes in some cases, although further research is needed to determine the optimal combinations and patient populations that benefit most. It's important to consider the potential side effects of systemic agents, including immune suppression [30,31,32].

Cost-Effectiveness

NB-UVB therapy is a cost-effective treatment option compared with biologic therapies, which can be considerably more expensive [33,34] .This makes NB-UVB a valuable option for both individual patients and health care systems, especially in resource-limited settings.

Protocol Variability and Its Impact

The heterogeneity in NB-UVB treatment protocols across studies, including variations in dose escalation, frequency, and duration, highlights the need for standardized treatment guidelines. However, the finding that variations in these parameters did not significantly affect PASI outcomes suggests that clinicians can individualize treatment based on patient needs and preferences. Patient adherence, facilitated by treatment satisfaction, is a critical factor influencing outcomes [35].

Limitations

This review has several limitations. The small number of included studies and heterogeneity in study designs and intervention protocols precluded a meta- analysis. Variations in patient demographics and baseline disease severity may limit generalizability. While the PEDro scale was used to assess methodological quality, the potential for bias in some studies cannot be entirely excluded.

Furthermore, this review focused solely on RCTs, excluding other study designs that may provide valuable clinical insights.

Conclusion

This systematic review supports NBUVB as an effective therapy for reducing PASI in psoriasis vulgaris, but we can’t say assertively that NBUVB can be a reliable monotherapy in treatment of psoriasis vulgaris because of the heterogeneous data which didn’t help to proceed and make a meta-analysis and the small number of included studies as we included randomized control trials only, so we recommend further randomized control trials researches and research should expand on these findings by focusing on long-term efficacy, patient experience, and the potential role of adjunct therapies to enhance treatment outcomes.

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