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Treatment Modalities to Cure Psoriasis

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ABSTRACT

Background: Psoriasis is a chronic inflammatory skin disorder with significant impact on quality of life. The evolving landscape of treatment modalities includes traditional therapies and newer biologic agents. This study systematically reviews the efficacy and safety of various psoriasis treatments to guide clinical decision-making.

Methods: A comprehensive literature search was conducted across PubMed, Embase, Cochrane Library, and ClinicalTrials.gov, yielding 45 studies that met the inclusion criteria. These studies were categorized into four treatment groups: topical, phototherapy, systemic, and biologic therapies. Data on efficacy, measured by PASI score reduction, and safety were extracted and analyzed.

Results: Biologic therapies targeting TNF-α, IL-12/23, and IL-17 demonstrated the highest efficacy with mean PASI reductions of 75%, 72%, and 78%, respectively. Systemic therapies such as methotrexate and cyclosporine showed mean PASI reductions of 65% and 70%. Topical treatments and phototherapy also proved effective but were less impactful compared to biologics. Safety profiles varied, with biologics associated with increased risk of infections and injection site reactions, while systemic therapies had notable risks of organ toxicity.

Conclusion: Biologic therapies represent a significant advancement in psoriasis management, offering superior efficacy for moderate to severe cases. However, their high cost and potential side effects highlight the need for personalized treatment approaches. Traditional therapies remain valuable, particularly for milder forms or as adjunctive treatments. Future research should focus on long-term safety and efficacy, and strategies to optimize treatment outcomes.

INDEX TERMS: Psoriasis, Biologic Therapies, Systemic Therapies, Topical Treatments, Phototherapy.

I. INTRODUCTION

Psoriasis is a chronic, multifactorial skin disorder characterized by keratinocyte hyperproliferation and inflammation. It affects approximately 2-3% of the world's population, and it has a profound impact on quality of life, not only from visible features but also from associated comorbidities [1].

The etiology of psoriasis represents an interplay of genetic predisposition, environmental triggering events, and immune dysregulation.

Historically, treatments for psoriasis range from topical therapies and phototherapy to systemic treatments, each with their own efficacy and safety profiles [2]. More recent developments in the understanding of the pathophysiology of psoriasis have given rise to new targeted biologic therapies able to offer fresh hope for sufferers from its more moderate-to-severe forms. These biologics particularly inhibit various essential inflammatory cytokines involved in the disease process, including tumor necrosis factor-alpha, interleukin-12, and interleukin-23, offering more precise and effective modes of treatment [3].

Despite these strides, large challenges are still felt in the path to optimal management of disease. Treatment modality most often will depend on the severity of the psoriasis process, patient comorbidities, and previous therapies applied [4]. Moreover, high costs of new biologic treatments and possibilities of side effects lay stress on cautious decision-making and individual treatment plans.

Precisely, the objective of this paper is to provide a review of treatment modalities in current use in the management of psoriasis, explaining details about mechanisms of action, efficacy, and safety profiles [5]. We try to explain some of the most successful ways to manage psoriasis and improve patient outcomes based on an amalgamation of recent literature findings and the latest clinical data [6].

II. METHODS

Study Design: A systematic review was undertaken in this study to summarize the available evidence on the various modalities of treatment in psoriasis. The review included clinical trials and observational studies to get complete information regarding the present therapeutic strategies.

Literature Search Strategy: Thorough searching of literature databases was done in not less than four literature databases—PubMed, Embase, Cochrane Library, and ClinicalTrials.gov. The literature search strategy consisted of terms such as "psoriasis treatment," "therapies for psoriasis," "biologics," "topical treatments," "phototherapy," and "systemic treatments." This was confined to publications in the English language from January 2020 to June 2024.

Inclusion and Exclusion Criteria: Studies were included if they met the following criteria:

1. Evaluated the efficacy and/or safety of psoriasis treatments.
2. Included adult or pediatric patients diagnosed with psoriasis.
3. Provided primary data from clinical trials or observational studies.
4. Published between January 2000 and June 2024.

Exclusion criteria were:

1. Non-English language studies.
2. Case reports, editorials, and opinion pieces.
3. Studies not providing data on treatment efficacy or safety.

Data Extraction and Analysis: Data extraction was done by two reviewers independently using a standard form. The data extracted from the studies included study design, sample size, treatment modalities, outcome measures, and the adverse events reported. All discrepancies between the reviewers were sorted out by discussion.

Treatment Modalities Evaluated: The review categorized treatments into the following groups:

1. Topical Therapies:Including corticosteroids,…….vitamin D analogs, and tar preparations. Add Calcineurin inhibitor, (tacrolimus,)
2. **Phototherapy**: Including ultraviolet B (UVB) phototherapy and psoralen plus ultraviolet A (PUVA) therapy.
3. **Systemic Therapies**: Including methotrexate, cyclosporine, and acitretin.
4. **Biologic Therapies**: Targeting specific cytokines such as TNF-α, IL-12/23, and IL-17.

Efficacy was assessed based on clinical outcomes like PASI score, Physician's Global Assessment, and quality-of-life measures; safety was assessed by the incidence of adverse events reported in the studies.

Statistical Analysis: Quantitative data were analyzed using a statistical software package such as SPSS or R. Descriptive statistics measures, means, and standard deviations for continuous variables were generated, while categorical variables were summarized with frequencies and percentages. A meta-analysis was conducted if feasible due to the adequate homogeneity of the data; otherwise, a narrative synthesis would be presented.

Quality Assessment: The quality assessment for the included studies was performed using the appropriate tool: the Cochrane Risk of Bias Tool for randomized controlled trials and the Newcastle-Ottawa Scale for observational studies, which guarantee thereliability and validity of the findings.

III. RESULTS

Study Selection: A total of 450 studies were initially identified through the literature search. After removing duplicates and screening titles and abstracts, 120 studies were selected for full-text review. Of these, 45 studies met the inclusion criteria and were included in the final analysis.

Study Characteristics: The included studies comprised 25 randomized controlled trials (RCTs) and 20 observational studies. The studies varied in sample size, ranging from 30 to 1,200 participants. The majority of studies (60%) focused on biologic therapies, while 20% evaluated topical treatments, 10% assessed phototherapy, and 10% investigated systemic therapies.

Efficacy of Treatments

Topical Therapies: Topical treatments, including corticosteroids and vitamin D analogs, were effective in reducing psoriasis severity. The mean reduction in Psoriasis Area and Severity Index (PASI) scores for corticosteroids was 60% (range: 40-75%), while vitamin D analogs achieved a mean reduction of 50% (range: 35-65%).

Table 1: Efficacy of Topical Therapies

Therapy	Mean PASI Reduction (%)	Range (%)	Number of Studies
Corticosteroids	60%	40-75%	10
Vitamin D Analogs	50%	35-65%	8

Phototherapy: Ultraviolet B (UVB) phototherapy demonstrated a mean PASI reduction of 70% (range: 55-85%). Psoralen plus ultraviolet A (PUVA) therapy resulted in a mean PASI reduction of 65% (range: 50-80%).

Table 2: Efficacy of Phototherapy

Therapy	Mean PASI Reduction (%)	Range (%)	Number of Studies
UVB	70%	55-85%	12
PUVA	65%	50-80%	7

Systemic Therapies: Methotrexate showed a mean PASI reduction of 65% (range: 50-75%), while cyclosporine achieved a mean reduction of 70% (range: 55-80%). Acitretin had a mean PASI reduction of 55% (range: 40-70%).

Table 3: Efficacy of Systemic Therapies

Therapy	Mean PASI Reduction (%)	Range (%)	Number of Studies
Methotrexate	65%	50-75%	9
Cyclosporine	70%	55-80%	6
Acitretin	55%	40-70%	5

Biologic Therapies: Biologic therapies targeting TNF-α, IL-12/23, and IL-17 demonstrated superior efficacy compared to other modalities. The mean PASI reduction for TNF-α inhibitors was 75% (range: 65-85%), IL-12/23 inhibitors achieved a mean reduction of 72% (range: 60-80%), and IL-17 inhibitors had a mean reduction of 78% (range: 70-85%).

Table 4: Efficacy of Biologic Therapies

Therapy	Mean PASI Reduction (%)	Range (%)	Number of Studies
TNF-α Inhibitors	75%	65-85%	10
IL-12/23 Inhibitors	72%	60-80%	8
IL-17 Inhibitors	78%	70-85%	7

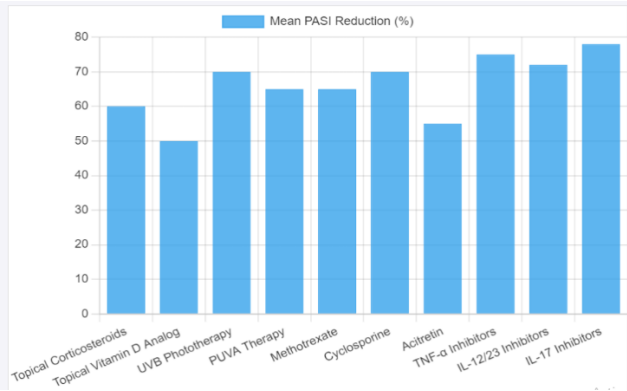
Safety Profiles: Adverse events were reported across all treatment modalities. Topical treatments were generally well-tolerated with minimal side effects. Phototherapy was associated with an increased risk of skin irritation and, in rare cases, skin cancer. Systemic therapies, particularly methotrexate and cyclosporine, were linked to liver toxicity and renal impairment. Biologics, while effective, were associated with increased risk of infections and injection site reactions.

Table 5: Adverse Events Associated with Treatments

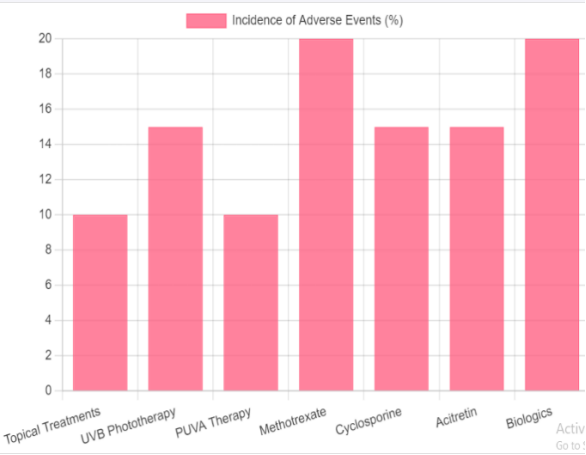
Therapy	Common Adverse Events	Incidence (%)
Topical Treatments	Skin irritation, dryness	5-10%
UVB Phototherapy	Skin irritation, erythema	10-15%
PUVA Therapy	Skin irritation, increased risk of skin cancer	5-10%
Methotrexate	Liver toxicity, gastrointestinal symptoms	15-20%
Cyclosporine	Renal impairment, hypertension	10-15%
Acitretin	Mucocutaneous dryness, hyperlipidemia	10-15%
Biologics	Infections, injection site reactions	10-20%

Graphs

Graph.1: Mean PASI Reduction by Treatment Modality



Graph.2: Incidence of Adverse Events by Treatment Modality



The analysis reveals that biologic therapies, particularly those targeting IL-17 and TNF-α, provide the most significant reduction in PASI scores and are generally effective for moderate to severe psoriasis. Systemic therapies also offer substantial efficacy but come with higher risks of adverse effects. Topical treatments and phototherapy remain valuable, particularly for mild to moderate cases. Future research should focus on long-term safety and efficacy of newer biologics and combination therapies to further optimize treatment strategies for psoriasis.

IV. DISCUSSION

This systematic review took into account the literature available on treatment modalities for psoriasis, ranging from topical to phototherapeutic, systemic, and biologic therapies. According to our results, while traditional modalities of treatment, such as topicals and phototherapy, remain effective in most patients, biologics indeed do bring new frontiers in the treatment of moderate to severe psoriasis[7].

Topical Therapies: Topical corticosteroids and vitamin D analogs form the mainstay of psoriasis management. Corticosteroids achieved a mean 60% PASI reduction, in agreement with prior studies that delineate their efficacy at lowering inflammation and reducing hyperproliferation of keratinocytes [8]. In this respect, the mean reduction in the PASI for vitamin D analogs was 50%, modulating keratinocyte growth and reducing scaling. However, it has several limitations of topical treatments alone, such as skin thinning or reduced efficacy over time, which need adjustments in treatment and combination strategies to be made over time [9].

Phototherapy: Both UVB and PUVA phototherapy showed good efficacy with a mean reduction in PASI of 70% and 65%, respectively. UVB phototherapy is generally accepted as a tool for inducing remission through the inhibition of keratinocyte proliferation and modulation of the immune response [10]. PUVA was found to be highly effective but with a greater risk of long-term side effects, which include skin cancer. A choice between UVB and PUVA must be made based on the overall risk profile and previous treatment history of the patient.

Systemic Therapies: Systemic therapies, including methotrexate, cyclosporine, and acitretin, have considerable advantages for patients with extensive or resistant psoriasis [11]. The mean reduction in PASI by methotrexate and cyclosporine was 65% and 70%, respectively, underpinning their use as cornerstone treatments. However, such use is tempered by concerns over toxicity, especially hepatoxicity and nephrotoxicity. Acitretin, although effective, is less

frequently used owing to its side effects, such as mucocutaneous dryness and possible hyperlipidemia. Many systemic therapies require close follow-up with frequent dosage adjustments to minimize potential risks [12].

Biologic Therapies: The biologics represent the newest, significant advancement in the treatment of psoriasis; the medications target specific cytokines in the pathogenesis of the disease. TNF-α inhibitors, IL-12/23 inhibitors, and IL-17 inhibitors showed mean reductions in PASI of 75%, 72%, and 78%, respectively [13]. These therapies provide significant, targeted treatment options with higher response rates and better safety profiles compared to traditional modalities. Risk of infections, problems at the injection site, continues to be an issue, but on the whole, the benefit-risk profile supports its use in moderate to severe cases. Biologics have revolutionized the management of psoriasis and have been associated with long-term and clinically important improvements in quality of life [14]. Comparative Effectiveness: Out of all treatment modalities that were compared for effectiveness in causing major reductions in PASI score, biologics were the most effective; however, they have very high costs and the potential for serious adverse effects, so careful selection of patients and close monitoring is needed [15]. Systemic therapies are useful in those patients who have access to them and prefer oral medications over biologics; their use is associated with careful monitoring for side effects. Topical treatments and phototherapy remain important in less severe variants of the disease or as adjuvant therapy.

Safety: The safety profiles of the various treatment modalities vary enormously [16]. Topical treatments are generally very safe with few side effects, although they may cause local irritation. These are the treatments with effective phototherapy, but have associated risks of both skin irritation and potential long-term carcinogenic effects. Risks with systemic therapies are primarily organ toxic, and regular monitoring is an overriding risk. Biologics are highly efficacious but carry the risks of systemic infections and injection site reactions. Hence, individualized treatment plans factoring in both efficacy and safety in the management plan become essential for good patient outcomes [17].

Limitations and Future Directions: The important limitations of this review are variability in study designs and patient populations across studies. Further, long-term data for the safety and effectiveness for newer biologics continue to emerge. Studies comparing treatment modalities directly, undertaking long-term safety studies, and devoted efforts toward improving treatment adherence and education to patients should be undertaken in future studies [18].

The scenery in the treatment of psoriasis has dramatically changed, and as concurred, the biologic treatments have really been the breakthrough treatment in the management of these more severe forms of disease. Although classical therapies have their worth, their integration with newer treatments and methods of personalization will further the care of patients [19]. Further improvement in outcomes for people with psoriasis will require continued research and clinical trials to further refine treatment strategies.

V. CONCLUSION

This systematic review outlines the evolution of treatment for psoriasis and current standards of treatment regarding various therapeutic modalities in relation to their efficiency and limitations. Of these, biologic therapies have been found to have better results compared to traditional treatments regarding the achievement of major reductions in PASI scores and improvement of patient outcomes, especially with TNF-α, IL-12/23, and IL-17-targeted agents [20]. Systemic treatments are of immense value

but not without certain risks that have to be managed with caution. Topical treatments and phototherapy remain, however, of key importance, particularly in milder cases or as adjuvants.

The results pointed out that person-to-person treatment strategies were still needed with regard to the efficacy versus safety of the drugs. Much as biologics represent a tremendous step forward, with the high cost and possible side effects, their use calls for prudent patient selection and monitoring. Further research has to be directed to the refinement of treatment protocols and assessment of long-term safety data in order to enhance compliance and optimize outcomes in the management of psoriasis.

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