



Review Article

Exploring the Impact of Psychotherapeutic Interventions on Inflammatory Skin Conditions

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Inflammatory skin disorders such as psoriasis, atopic dermatitis (AD), and acne vulgaris significantly impact patients' quality of life. These conditions often have a bidirectional relationship with psychological factors, where stress and psychological distress can exacerbate symptoms, and the symptoms themselves can lead to increased psychological distress. This narrative review explores the benefits of various adjunctive psychotherapeutic interventions, including meditation, psychotherapy biofeedback, and relaxation therapy on psoriasis, AD, and acne vulgaris.

INTRODUCTION

There is a well-established link between inflammatory skin disorders and psychological factors, though the mechanisms remain unclear. The relationship seems bidirectional: Inflammatory skin conditions can lead to psychological distress and psychological stress can exacerbate inflammatory skin diseases. One explanation for the mind-skin connection is the influence of peripheral inflammatory cytokines.¹ A second factor may be the ectodermal origin of both the central nervous system and the skin.² Numerous studies have investigated the value of psychological interventions for both the physical and psychological aspects of dermatological conditions. A literature review by Schut et al concluded that techniques such as habit reversal training, relaxation training, and cognitive behavioral therapy (CBT) effectively reduced chronic itch.³ Montgomery et al assessed 120 dermatology patients, evaluating factors including subjective serenity, shame related to skin appearance, fear of negative evaluation, anxiety, depression, quality of life, and mindfulness levels.⁴ They found an inverse relationship between mindfulness and overall distress. Other literature reviews have suggested the beneficial effects of mindfulness-based therapies for inflammatory skin disorders.⁵⁻¹⁰ The present review provides a perspective on mind-body therapies for three prevalent inflammatory dermatoses: psoriasis, atopic dermatitis, and acne vulgaris.

Psoriasis is a chronic inflammatory skin disorder of multifactorial pathogenesis, including genetic, environmental, and lifestyle factors. There is evidence that psychological stress can trigger psoriasis flare-ups.^{11,12} Atopic Dermatitis (AD) is a chronic inflammatory skin condition characterized by recurrent, pruritic eczema, which is frequently associated with other allergic conditions such as asthma and rhinitis. The ability of stress to exacerbate AD symptoms, particularly pruritus, has been well-documented.¹³ Acne vulgaris is a complex and multifactorial condition that af-

fects approximately 9.4% of the population.¹⁴ Stress has been identified as a potential aggravating factor.

This narrative review will explore the effects of meditation, psychotherapeutic interventions, biofeedback, and relaxation therapy as adjunct treatments for psoriasis, AD, and acne vulgaris.

MEDITATION

In psychology, meditation usually describes certain practices intended to affect one's mental or emotional state. Meditation can involve activities such as repeating a word or phrase, focusing on a point outside oneself or within oneself, or clearing one's mind of thoughts and feelings. There are many different types of meditation including body centered meditation, contemplation, mindfulness meditation, imagery-based meditation, and movement meditation.¹⁵ There are many ways to learn to meditate, including formal classes and workshops, books, internet channels, and applications for cell phones. We included a variety of types of meditation and mindfulness practices. Mindfulness practices are exercises intended to make one more aware of their inner state or their mental or physical experiences. The variability of the types and duration of meditation and mindfulness training complicates the generalizability of any single approach or study. (Table 1)

PSORIASIS AND MEDITATION

One of the earliest investigations into the effects of meditation and guided imagery on psoriasis was conducted by Gaston et al in 1988.¹⁶ This 18-person study spanned 12 weeks and employed a three-arm design, comprising a meditation group, a meditation with imagery group, and a waitlist control group. Participants in the meditation groups were instructed in an "opening-up" meditation technique, which involved broadening attentional focus towards bodily sensations. Participants assigned to the meditation with imagery condition were additionally guided to

Table 1. Meditation

Meditation						
Study	Intervention	Comparison	Study Design	Sample size	Physical Results	Psychological Results
Psoriasis and Meditation						
Gaston et al. (1988) ¹⁶	Meditation, Meditation + guided imagery	TAU	RCT	n= 18 (meditation= 5, meditation + imagery = 4, waiting list = 5, TAU = 4) subjects with moderate to severe psoriasis	Meditation and Meditation + Imagery showed significant symptomatic improvement. (4/9 participants in the intervention groups showed improvement in disease severity, $p < 0.01$) There was no additional benefit in the imagery group.	Positive correlation between severity of psoriasis and psychological distress was found.
Kabat-Zinn et al. (1998) ¹⁷	Guided meditation + UVB phototherapy	TAU (UVB phototherapy)	RCT	n= 37 (intervention = 19, control = 18); subjects with moderate to severe psoriasis	Intervention group improved more rapidly than those in the control group ($p=0.01$).	No change in state trait anxiety was found in either group.

TAU – Treatment as Usual, RCT – Randomized Controlled Trial, UVB – Ultraviolet B Light

visualize an image representing their psoriatic lesions and then generate a transformative image to heal the lesions. The results indicated a significant improvement in psoriasis severity in both meditation groups compared to the control group ($p < 0.01$). No significant additive benefit was observed in the guided imagery group compared to the meditation-alone group. Despite the study's limited sample size, these findings provided initial evidence for the therapeutic potential of meditation in alleviating psoriasis severity.

Kabat-Zinn et al conducted a randomized, controlled trial to investigate the impact of mindfulness meditation-based stress reduction on skin clearance rates in 37 patients with moderate to severe psoriasis undergoing phototherapy and photochemotherapy treatments.¹⁷ The patients were randomly assigned to either an experimental group, which received mindfulness meditation instruction via audiotape during light treatment sessions, or a control group which only received light treatments. The mindfulness meditation recordings focused on cultivating present moment awareness and a non-judgmental attentional stance, guiding participants through mindful awareness of bodily sensations, emotions, thoughts, and ambient sounds. As the meditation time was increased during the study, participants were asked to visualize ultraviolet light decelerating the growth and division of their skin cells. The results demonstrated that patients in the meditation group achieved statistically significant faster rates of skin clearing compared to those in the control group ($p=0.01$).

PSYCHOTHERAPY

Psychotherapy is a broad term describing activities intended to relieve emotional distress or enhance emotional well-being. There are numerous techniques and schools of psychotherapy. Some methods involve interaction with a therapist, although self-help techniques such as workbooks or computer applications are also widely available. There are psychotherapeutic approaches that focus on emotions, some on relationships, and some on maladaptive cognitive or behavioral patterns, although in clinical practice the techniques and goals are usually a mix of some or all of these. Some techniques have a degree of standardization, such as CBT, whereas other techniques are unstructured, such as forms of talk therapy. Psychotherapy frequently includes, or is combined with, other activities, including patient education, medications, hypnosis, biofeedback, journaling, meditation, or mindfulness training.¹⁸

In the context of dermatology and other medical conditions, psychotherapy can be useful to help a patient cope with the emotionally distressing effects of their illness and has also been shown to alter the symptomatology and clinical course of certain diseases that are not considered to be primarily of psychological origin. (Table 2)

PSORIASIS AND PSYCHOTHERAPY

To explore the efficacy of mindfulness-based cognitive therapy (MBCT) as an adjunctive treatment for psoriasis, Maddock et al conducted a randomized controlled trial of its effectiveness on the psychological well-being, including

Table 2. Psychotherapy

Psychotherapy						
Study	Intervention	Comparison	Study Design	Sample size	Physical Results	Psychological Results
Psoriasis and Psychotherapy						
Bundy et al. (2013) ¹⁹	Online CBT + psoriasis education	TAU	RCT	n = 135 (intervention = 67, control = 68)	Mean SAPASI was not significantly different between groups.	Online CBT significantly reduced anxiety and improved QOL in intervention group compared to control ($p < 0.05$).
D'Alton et al. (2019) ²⁰	Mindfulness based cognitive therapy (MBCT), mindfulness based self-compassion therapy (MBSCT), self-help mindfulness based self-compassion theory (MBSCT-SH)	TAU	RCT	n = 94 (MBCT = 25, MBSCT = 25, MBSCT-SH = 22, TAU = 22)	No statistically significant differences in PASI between groups.	No statistically significant differences on anxiety or QOL between groups.
Larsen et al. (2014) ²¹	Motivational Interviewing + climate therapy/heliotherapy	Climate therapy/heliotherapy alone	RCT	n = 169 (experimental = 86, control = 83)	Intervention group showed a significant improvement in SAPASI at 3-month and 6-month follow up. ($p < 0.05$)	Intervention group showed significantly lower illness perception score at 3 months ($p = 0.01$) but this difference was not significant at 6 months.
Maddock et al. (2019) ²²	Mindfulness based CBT	TAU	RCT	n = 101 (intervention = 51, control = 50); with mild to severe psoriasis	MBCT group had a large significant reduction in SAPASI ($p = .01$) at the end of the program, but not at 3 month follow up. The TAU group showed no statistically significant change.	MBCT group reported a significant reduction in anxiety scores post-treatment vs TAU.
Nguyen et al. (2021) ²³	MBSR and mindfulness	TAU	RCT	n = 34 (intervention = 17 (psoriasis = 10, rheumatoid arthritis = 7), control = 17 (psoriasis = 9, rheumatoid arthritis = 7))	No significant change in psoriasis severity between groups.	A significantly higher proportion of patients in the intervention group showed a clinically relevant change in WHO5, compared to the control group.
Ramos et al. (2023) ²⁴	Compassionate emotional accompaniment (CEAT), single session with therapist	Emotional disclosure (ED)	RCT	n = 44 (intervention = 30, control = 14)	PASI scores were significantly lower in the CEAT group compared with the ED group ($p = .04$).	CEAT group showed significantly improved emotional coping significantly higher mindfulness, and a significant reduction in HR. PSO-Life was higher in the ED

Psychotherapy						
						group compared to the CEAT group indicating a higher quality of life in the ED group ($p = .03$).
Van Beugen et al. (2016) ²⁵	Online CBT	TAU	RCT	$n = 86$ (intervention = 33, control = 53)	No significant differences on PASI between groups. There was a statistically significant improvement in physical functioning for the CBT group, driven by improvements in fatigue.	No statistically significant differences were found between groups regarding psychological functioning.
Zachariae et al. (1996) ²⁶	Individual psychotherapy sessions focused on cognitive behavioral stress management, imagery training, and relaxation training	No treatment	RCT	$n = 51$ (intervention = 25, control = 26)	No significant difference in PASI score.	A significant difference was found between the two groups in perceived stress between baseline and post intervention.
Atopic Dermatitis (AD) and Psychotherapy						
Brown & Bettley (1971) ²⁷	Unique psychiatric treatment plan	TAU	RCT	$n = 72$ (intervention = 38, control = 34)	No significant difference in overall outcome between control and experimental group.	N/A
Ehlers et al. (1995) ²⁸	1) Relaxation therapy, 2) dermatologic education, 3) CBT, 4) dermatologic education + CBT	TAU	RCT	$n = 137$ (intervention = 113, control = 24)	All groups showed decreased severity of AD after treatment compared to standard medical care. At one-year, autogenic training, CBT, and dermatologic education + CBT showed significantly greater improvement in skin condition than standard medical care and dermatological education.	No significant differences between groups in distress and global disability rating.
Habib et al. (1999) ²⁹	Stress management, communication skills, problem solving, relaxation, habit reversal, guided imagery, self-monitoring	TAU	RCT	$n = 17$ (intervention group = 9, control group = 8)	Significantly decreased pruritus in the intervention group. Global severity of AD was lower in the intervention group but not statistically significant on intragroup analysis. Pruritus and global severity continued to be	Significantly decreased social anxiety and self-consciousness in the intervention group.

Psychotherapy						
					significantly reduced at 8 weeks follow up.	
Hedman-Lagerlöf et al. (2021) ³⁰	Internet delivered CBT	TAU	RCT	n = 102 (intervention = 51, control = 51)	Intervention group showed greater reduction in AD symptoms than the control group.	Intervention group showed significantly larger reductions in stress, sleep problems, and depressive symptoms from baseline to post-treatment compared to controls.
Kishimoto et al. (2023) ³¹	Online mindfulness and self-compassion training	TAU	RCT	n = 107 (intervention = 56, control = 51)	Intervention group showed significantly fewer patient-reported AD symptoms.	Intervention group showed significantly better disease-specific QOL ratings.
Linnet et al. (2001) ³²	Psychotherapy	TAU	RCT	n = 32 (intervention = 16, control = 16)	AD patients with higher levels of trait anxiety showed greater lesion severity improvement after psychotherapy.	AD patients with a higher level of intake trait anxiety showed greater improvement after psychotherapy.
Melin et al. (1986) ³³	Habit reversal therapy + hydrocortisone cream	Hydrocortisone cream alone	RCT	n = 16 (intervention = 9, control = 7)	Significant reductions in skin irritation and scratching for both groups, the intervention group showed reductions significantly higher than the control group.	Significant reduction in "annoyance" for both groups, the intervention group showed a significantly greater reduction than the control group.
Norén et al. (2018) ³⁴	Habit reversal therapy	TAU	RCT	n = 39 (intervention = 18, control = 21). Participants were ages 5-13	Intervention group showed a significant improvement in SCORAD compared to the control group.	Both groups showed a significant improvement in CDLQI.
Schut et al. (2013) ³⁵	Cognitive behavioral stress management	TAU	RCT	n = 28 (intervention = 14, control = 14)	No group differences were seen with respect to SCORAD.	The intervention group showed a statistically significant improvement in "calmness" compared to controls.
Xie et al. (2020) ³⁶	Pediatric participants attended group sessions about mind-body integration (exploring self identity, understanding disease identity, improving recognition and regulation of emotion, enhancing resilience etc.) Parents also attended classes	TAU	RCT	n = 113 (intervention = 58, control = 55)	Significant decrease in severity of AD in intervention group.	Both groups showed a significant reduction of anxiety. The control group showed improvement in emotional regulation.

Psychotherapy						
	to learn about coping strategies.					
Bae et al. (2012) ³⁷	Progressive muscle relaxation group	TAU	RCT	n = 25, intervention = 15, control= 10	Intervention group showed a decrease in pruritus. Significant improvement in eczema area and severity in both groups	Intervention group showed statistically improved depression and anxiety symptoms.
Acne and Psychotherapy						
Chatzikonstantinou et al. (2019) ³⁸	Pythagorean Self-Awareness Intervention in subjects with acne vulgaris included self-reflective questions What have I done wrong? What have I done right? What have I omitted that I ought to have done?	TAU	RCT	n = 30 (intervention group = 15, control group = 15)	Intervention group showed significant improvement in acne stage compared to the control group.	Intervention group experienced significant reduction in perceived stress and negative affect compared to the control group.
Kelly et al. (2009) ³⁹	Self-soothing group or attack resisting group – both based on daily imagery self-talk in patients with acne vulgaris	TAU	RCT	n = 73 (self-soothing condition = 23, attach resisting condition = 26, control condition = 24)	NA	The attack resisting group showed significantly lower depression. Both attack resisting and self-soothing interventions showed reduced shame. Both groups also showed reduced the frequency with which acne bothered the participants emotionally, functionally, and physically.
Mashayekhi et al. (2020) ⁴⁰	CBT in patients with acne exorée.	TAU	RCT	n = 32 (intervention = 16, control = 16).	Intervention group showed significant reductions in photograph evaluation of acne severity score and the clinical severity score.	Only the control group showed significant improvements in depression and anxiety.

CBT – Cognitive Behavioral Therapy, TAU – Treatment as Usual, RCT – Randomized Controlled Trial, SAPASI – Self-Administered Psoriasis Area and Severity Index, QOL – Quality of Life, PASI – Psoriasis Area and Severity Index, MBSR – Mindfulness Based Stress Reduction, SCORAD – Scoring Atopic Dermatitis, CDLQI – Children’s Dermatology Life Quality Index

anxiety and depression, of 101 patients with psoriasis.²² The study also explored the influence of MBCT on several psychological domains suggested by a Buddhist-influenced model, such as acceptance, mindfulness, and self-compassion. Results indicated that MBCT significantly improved self-reported symptoms of psoriasis (p=0.01) as well as psychological well-being, reducing anxiety (p=0.02) and depression (p=0.02) compared to the control group. These improvements were present immediately after the course of

treatment and for some measures (depression, rumination, worry, mindfulness, non-attachment, and self-compassion) at the three-month follow up.

The effectiveness of an internet facilitated, electronic cognitive-behavioral (eCBT) program for psoriasis has also been evaluated by Bundy et al and Van Beugen et al.^{19,25} The two studies, when combined, randomized 268 participants to receive either an eCBT treatment or treatment as usual. Those in the eCBT group benefited from statistically

significant reduced anxiety levels ($p=0.03$) and improved quality of life ($p=0.03$),¹⁹ and improved physical functioning ($p=0.03$) and impact on daily activities ($p=0.04$).²⁵ There were no statistically significant differences in psoriasis severity in either group. Of note, Bundy's study had a 43% drop out rate.

Motivational interviewing (MI) is a patient-centered counseling method that aims to enhance intrinsic motivation and commitment to behavior change. Larsen et al explored the impact of a telephone-based MI on 169 patients with psoriasis following climate therapy.²¹ Psoriasis patients who received MI showed significant improvements across multiple outcomes, including a significant reduction in disease severity, with significant improvements persisting at both three and six months post-intervention compared to the control group. Additionally, the intervention positively influenced various self-management capacities, with enhancements noted in several domains in the Health Education Impact Questionnaire (heiQ), particularly in self-efficacy scores at similar intervals ($p^* < 0.05$). *The study also found that psoriasis knowledge was significantly better in the intervention group at 6 months ($p^* = 0.01$), suggesting that MI can effectively augment patient education.*

Not all mindfulness-based therapies have shown a beneficial effect in patients with psoriasis. D'Alton compared three different mindfulness interventions—MBCT, mindfulness-based self-compassion therapy, and a self-help version of mindfulness-based self-compassion therapy—against treatment as usual for psoriasis ($n=94$).²⁰ The intervention group showed no statistically significant improvement in psychological well-being, symptom burden, or quality of life compared to the control group, although some participants reported personal benefits. Nguyen et al explored the efficacy of Mindfulness-Based Stress Reduction (MBSR) in patients with either psoriasis ($n=20$) or rheumatoid arthritis ($n=15$).²³ The results showed no statistically significant improvement in wellness or quality of life.

ATOPIC DERMATITIS AND PSYCHOTHERAPY

Psychotherapy focused on stress management has been studied in AD. Habib et al evaluated the effectiveness of a psychoeducational stress management program as an adjunct treatment for AD ($n=17$).²⁹ The intervention group experienced significant reductions in itchiness and overall severity of dermatitis ($p=0.03$), with improvements sustained at the 8-week follow-up. Participants also reported decreased levels of social anxiety and self-consciousness about their appearance ($p < 0.01$). Similarly, Schut et al conducted a randomized controlled trial to investigate the effects of cognitive behavioral stress management (CBS) on patients with AD ($n=28$).³⁵ The results showed reduced morning cortisol levels and a reduced cortisol response to acute stress in the intervention group ($p=0.04$). No significant difference in skin status was noted on the Scoring Atopic Dermatitis scale (SCORAD).

The efficacy of eCBT has also been explored for AD. Hedman-Lagerlöf et al used eCBT-based exposure therapy to reduce the effect of triggers on AD exacerbation ($n=102$).³⁰

The intervention group showed statistically significant improvements eczema severity ($p < 0.01$), itch intensity ($p < 0.01$), perceived stress ($p < 0.01$), sleep problems ($p < 0.01$), and depression ($p < 0.01$). These improvements were maintained at 12 month follow-up. Kishimoto et al used eCBT to increase mindfulness and self-compassion ($n=107$), resulting in significant improvement in DLQI scores ($p < 0.01$), indicating enhanced quality of life and better management of their condition. Secondary outcomes also improved, such as itch and scratching measured by visual analog scales, and psychological symptoms.³¹

Ehlers et al investigated the effectiveness of relaxation training combined with psychotherapy in AD.²⁸ The subjects ($n=113$) were divided into four group groups: dermatological education (DE), autogenic relaxation training (AT), cognitive-behavioral treatment (BT), and a combined DE and BT approach (DEBT). The psychological treatments (AT, BT, DEBT) led to significantly greater improvements in skin condition compared to DE or only standard medical care ($p < 0.05$). Notably, these improvements were sustained at a 1-year follow-up. Significant reduction in the use of topical steroids was also observed among patients who underwent psychological treatments (AT, BT, DEBT), with the DEBT group reporting the largest decrease.

Bae et al studied the efficacy of Progressive Muscle Relaxation (PMR) in reducing symptoms of AD ($n=25$). Serological parameters associated with anxiety were also examined. The findings revealed statistically significant improvements in the PMR group compared to the control group, with reduction of pruritus ($p < 0.05$) and improved sleep ($p < 0.05$). Anxiety levels, measured by State Anxiety scores, also improved in the PMR group. No significant changes were observed in serological parameters such as nerve growth factor, neuropeptide Y, or Th2 cytokines (IL-4, IL-5, and IL-13) in either group.³⁷

ACNE VULGARIS AND PSYCHOTHERAPY

Chatzikonstantinou et al explored the effectiveness of the Pythagorean Self-Awareness Intervention (PSAI) for managing acne vulgaris.³⁸ The PSAI involved a daily practice of self-reflection, asking participants to consider three questions: What have I done wrong? What have I done right? What have I omitted that I ought to have done? The study included 30 female participants, randomly assigned to either the control group or the PSAI group. Over an 8-week period, 93.3% of participants in the intervention group experienced improvement in acne stages compared to 26.7% in the control group ($p < 0.01$). The study also reported large to moderate statistically significant effects on reducing perceived stress and negative affect among participants in the intervention group, with no reported dropout or side effects, and a 100% compliance rate.

Kelly et al evaluated two self-help interventions designed to reduce depression in self-critical individuals with acne vulgaris by improving their ability to soothe themselves and resist self-attacks.³⁹ The study ($n=75$) recruited participants who reported psychological distress related to their acne vulgaris. The participants were randomly assigned to receive self-soothing training, attack-resisting

training, or to the control group. Both interventions involved daily imagery-based self-talk exercises over a two-week period. The attack-resisting training significantly reduced symptoms of depression, shame, and skin complaints, particularly in individuals who initially scored high in self-criticism. The self-soothing training significantly reduced feelings of shame and skin complaints but did not significantly impact depression levels. Both of the interventions significantly lowered the frequency with which participants were bothered emotionally, functionally, and physically by their acne as assessed with SKINDEX-16. The intervention group reported that their acne had improved, but these results were based on self-report only. The study found that the interventions were particularly beneficial for those with high levels of self-criticism, suggesting that individualized approaches may be beneficial in treating patients with acne vulgaris and psychological distress.

In a randomized controlled trial, Mashayekhi et al examined the efficacy of CBT as an adjuvant treatment for acne excoriée, a condition characterized by the compulsive picking or scratching of acne lesions, leading to the formation of crusts and scars.⁴⁰ The participants (n=32) were divided into a control group or an intervention group. Both groups received standard treatment. The CBT group also participated in eight CBT sessions over two months. The CBT group showed significantly greater improvements in clinical severity ($p=0.01$) and self-reported Skin Picking Scale scores ($p=0.02$) compared to the control group, along with notable reductions in both depression and anxiety.

Overall, these studies provide evidence that incorporating psychological interventions into the management of acne vulgaris can lead to significant improvements in both physical symptoms and associated psychological distress. The effectiveness of these interventions may vary depending on the specific type of acne, the individual's psychological characteristics (eg, tendency to self-criticism), and their adherence to the treatment plan. Further research is needed to establish the long-term effectiveness of these interventions and to determine the optimal combination of psychological and medical treatments for each patient.

BIOFEEDBACK

Biofeedback is a term that describes techniques to teach people to alter bodily processes that are normally regulated unconsciously, such as heart rate, blood pressure, muscle tension, and skin temperature. Biofeedback often involves using devices to monitor and display information about one's physiological state. With this feedback, individuals can learn to make changes in the measured variable.⁴¹ Although biofeedback focuses on physiological variables, changing those variables is often an indirect means of affecting a person's mental state. For example, training a person to increase the temperature of their finger surface increases parasympathetic tone, which may alleviate stress, anxiety, and fear. (Table 3)

PSORIASIS AND BIOFEEDBACK

Piascero et al examined the benefits of combining biofeedback and CBT compared to standard ultraviolet B (UVB) therapy in treating psoriasis.⁴³ Forty participants were randomized to receive UVB light either alone or in combination with CBT and biofeedback. The biofeedback targeted muscle tension, skin conductance level (SCL), skin temperature, respiratory patterns, and heart rate. Participants who received UVB therapy in combination with biofeedback and CBT showed a greater reduction in both the area and severity index of their psoriasis compared to those who only received only UVB therapy. In the combined treatment group 65% of participants achieved 75% or greater reduction in PASI scores from baseline (PASI75) after eight weeks, compared to only 15% of participants of the control group ($p<0.01$). Additionally, the group who received CBT and biofeedback showed significant improvements in the emotional domain of the Skindex-29, a measure of skin disease-related quality of life ($p=0.04$).

Of note, Piascero's results differ from an earlier study by Keinan et al who compared 1) phototherapy alone to 2) phototherapy plus relaxation therapy, to 3) phototherapy plus relaxation therapy and electromyography biofeedback (EMG), which is designed to reduce muscle tension.⁴² The study enrolled 32 psoriasis patients. The relaxation group was taught an abbreviated version of progressive muscle relaxation in which they were trained to gently flex then relax muscle groups. The study showed no significant differences between any of the groups in psoriasis symptom improvement; however, the biofeedback and relaxation groups reported statistically significant improvement of their psoriasis symptoms relative to the previous year during the same season, while improvement in the phototherapy group relative to the previous year did not reach statistical significance.

ACNE VULGARIS AND BIOFEEDBACK

To assess the efficacy of biofeedback-assisted relaxation and cognitive imagery in treating acne vulgaris, Hughes et al conducted a study (n=30) of patients who were receiving dermatological treatment.⁴⁴ Participants were matched by age, sex, and pre-treatment acne severity and then randomly assigned to one of three groups. All participants continued medical treatment. The treatment group received instructions on the use of imagery to control acne, and was trained in EMG biofeedback, using patterned breathing and thoughts of relaxation to reduce muscle tension. The second group received group therapy and education for the same amount of time as the biofeedback group and were assigned the same daily home practice assignments. The third group received no treatment beyond their usual medical care. The treatment consisted of 12 sessions over six weeks. The biofeedback group showed significant improvements, with a notable reduction in acne severity, compared to the other two groups ($p<0.01$). However, this improvement was maintained at follow-up only by those who continued home practice; the improvement diminished for those who discontinued home practice.

Table 3. Biofeedback

Biofeedback						
Study	Intervention	Comparison	Study Design	Sample size	Physical Results	Psychological Results
Psoriasis and Biofeedback						
Keinan et al. (1995) ⁴²	Biofeedback and relaxation techniques; relaxation techniques only	No treatment	RCT	n = 32 (biofeedback + relaxation = 11, relaxation = 10, control = 11)	No significant differences in improvement between groups.	N/A
Piascero et al. (2016) ⁴³	CBT+ biofeedback +UVB phototherapy	UVB phototherapy	RCT	n = 40 (intervention = 20, control = 20)	Intervention group showed a significant reduction in PASI (-1.46 points (95% CI -2.65 to 0.29); p= 0.016). Clinical improvement maintained at 1 month after treatment.	Intervention group had significant improvements in the emotional domain (from the Skindex-2) compared to control patients (-2.8 points, (p=0.04).
Acne Vulgaris and Biofeedback						
Hughes et al. (1983) ⁴⁴	Biofeedback, relaxation and cognitive imagery in patients with acne vulgaris	TAU	RCT	n = 30 (10 in each group biofeedback + cognitive imagery group, group therapy attention-comparison group, control group)	Intervention group showed significant improvements in their acne compared to control.	NA

RCT – Randomized Controlled Trial, CBT – Cognitive Behavioral Therapy, UVB – Ultraviolet B, PASI – psoriasis area and severity index, TAU – Treatment as Usual,

BODY RELAXATION

Body relaxation is a technique that is used for anxiety related disorders. It commonly involves tensing and relaxing specific muscle groups. It is thought that learning to reduce tension in the muscular system will reduce the generalized stress activation of the body.⁴⁵ (Table 4)

BODY RELAXATION AND PSORIASIS

Body relaxation training in addition to other psychotherapeutic interventions may benefit psoriasis patients. Fortune et al added a body relaxation component to a cognitive-behavioral psoriasis symptom management program.⁴⁶ The study included progressive muscle relaxation training with didactic education about psoriasis and its treatments, stress reduction techniques including autogenic training, and cognitive techniques to help participants (n=93*) manage maladaptive thought processes. Participants who participated in the intervention program demonstrated significantly better outcomes compared to those who received standard treatment alone, including reductions in the clinical severity of psoriasis (p=0.04), as well as reductions in anxiety (p=0.04), depression (p<0.01), psoriasis-related stress (p<0.01), and disability (p<0.01). These improvements were maintained at both the six-week and six-month follow-up assessments.

These improvements were maintained at both the six-week and six-month follow-up assessments.

Treatments focusing on body relaxation without a psychological component were studied by Price et al and Neerackal et al. In the study performed by Price et al (n=31) the intervention group learned relaxation techniques and participated in group discussions for eight weekly sessions.⁴⁸ The results showed a statistically significant (p<0.05) reduction in anxiety scores from the initial assessment to the 6-month endpoint in the treatment group compared to the control group. There was a trend towards clinical improvement in psoriasis scores, but it did not reach statistical significance. Neerackal et al examined the efficacy of relaxation therapy alone, without cognitive therapy (n=60).⁴⁷ The results showed that after two months of practice, one week with a psychodermatologist, practicing the release-only relaxation technique on days one, three, and seven, followed by seven weeks using a voice recording, 70% of participants in the intervention group achieved a 50% improvement in the PASI score compared to 13% in the control group (p<0.03). Moreover, the intervention group showed significant improvements in the Dermatology Life Quality Index (DLQI) (p<0.01) and the Hospital Anxiety and

Table 4. Body Relaxation

Body Relaxation						
Study	Intervention	Comparison	Study Design	Sample size	Physical Results	Psychological Results
Psoriasis and Body Relaxation						
Fortune et al. 2002 ⁴⁶	CBT (including muscle relaxation)	TAU	Case-Control Study	n = 93 (intervention = 40, control = 53) all with chronic plaque psoriasis	The intervention group showed significantly reduced PASI scores maintained at 6-month follow up, compared with the control.	The intervention significantly reduced anxiety scores compared with the control.
Neerackal et al (2020) ⁴⁷	Relaxation therapy	TAU	Case-Control study	n = 60 (intervention = 30, control = 30)	The intervention group showed a statistically significant reduction in PASI.	The intervention group showed a statistically significant reduction in anxiety levels.
Price et al. (1991) ⁴⁸	Relaxation therapy	TAU	RCT	n = 31 (intervention = 15, control = 16)	Improvement in psoriatic symptoms but no statistically significant change in either group.	Intervention group showed significant reduction anxiety levels after 8 weeks and at 6 month follow up.

RCT – Randomized Controlled Trial, CBT – Cognitive Behavioral Therapy, TAU – Treatment as Usual

Depression Scale (HADS) scores ($p < 0.01$) compared to the control group.

DISCUSSION

Although there is substantial evidence for the efficacy of psychotherapeutic interventions in the management of psoriasis, atopic dermatitis, acne vulgaris, and acne excoriée, it is important to acknowledge the limitations and variations in the literature. Some studies, such as those by D'Alton et al²⁰ and Nguyen et al,²³ did not find significant improvements in the psychological well-being or symptom burden following mindfulness-based interventions.

The research suggests that certain patient characteristics may contribute to the role of psychological interventions and could be considered when recommending treatment options. Linnet et al found that patients with higher trait anxiety levels experienced greater dermatologic benefit from psychotherapy than those with lower trait anxiety levels.³² Similarly, Brown and Bettley found that patients with clear psychological distress and high motivation benefited more from psychiatric treatment.²⁷ Kelly et al showed that patients with high levels of self-criticism responded better to psychological interventions.³⁹ Stadtmüller et al investigated the characteristics of psoriasis patients who showed interest in a short psychological intervention.⁴⁹ The study assessed interest in the intervention in a group of 127 participants who completed questionnaires encompassing the severity of psoriasis, stress, illness perceptions, mindfulness, anxiety, and depression. The researchers found that patients expressing interest in the intervention

were typically younger patients who experienced more severe skin-related symptoms. They exhibited higher levels of anxiety and depression, but lower levels of stress and mindfulness. Interested participants were more likely to attribute their condition to external factors like nutrition and viruses. The severity of psoriasis did not differ between the two groups.

Van Beugen et al found that a better therapeutic relationship with the therapist in eCBT was associated with greater improvements in both physical and psychological outcomes for psoriasis. This suggests the need for additional research into the relational dynamics of therapy when considering efficacy and usefulness as a treatment modality.

Psychotherapeutic approaches face several barriers, including inadequate insurance coverage, stigma, lack of well-defined and supported techniques, and the potential to increase the treatment burden by adding more time or effort to what may be an already demanding treatment plan. These obstacles can be particularly challenging for young patients or patients facing other social or medical challenges. However, the possibility of artificial intelligence and internet-based treatments may create new possibilities for affordable psychological approaches that can be implemented at home. Researchers have already begun to explore online CBT. In a study performed by Hedman-Lagerlöf et al, statistically and clinically significant results were seen from eCBT treatment for patients with AD, with therapists spending a mean of only 39.7 minutes per treated patient.³⁰

Some interventions can be accomplished without ongoing contact with formally trained psychotherapists, such as motivational interviewing. Motivational interviewing is a patient centered counseling method that aims to enhance intrinsic motivation and commitment to behavior change.⁵⁰ As little as one telephone-based motivational interview has been shown to lead to significant improvements across multiple outcomes for psoriasis patients, including a significant reduction in disease severity, with significant improvements persisting at both three and six months post-intervention.²¹

The studies reviewed in this paper employed a wide range of methodologies, sample sizes, and intervention durations, which diminishes the comparability and generalizability of the findings. Further research is needed to establish the optimal combination of psychotherapeutic and medical treatments for each dermatologic condition and each patient. Longer follow-up is also needed to determine the long-term effectiveness and sustainability of these interventions. Increasing the amount of research on psychotherapeutic approaches to dermatologic conditions may improve the quality of care for patients and increase access to a wider array of treatment options.

CONCLUSION

The evidence reviewed in this paper supports the integration of psychotherapeutic interventions into the management of psoriasis, atopic dermatitis, and acne vulgaris/excoriée. Mindfulness-based therapies, CBT, psychotherapy, biofeedback, and relaxation techniques have demonstrated significant reductions in disease severity and enhanced psychological well-being and quality of life for some patients. While not all the studies showed significant improvement in the physical manifestations of the diseases,

treating the associated distress of dermatologic skin disorders is itself a worthy goal.

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DISCLOSURES

Dr. Lio reports being on the speaker's bureau for AbbVie, Arcutis, Eli Lilly, Galderma, Hyphens Pharma, Incyte, La Roche-Posay/L'Oréal, Pfizer, Pierre-Fabre Dermatologie, Regeneron/Sanofi Genzyme, Verrica; reports consulting/advisory boards for Alphyn Biologics (stock options), AbbVie, Almirall, Amyris, Arcutis, ASLAN, Bristol-Myers Squibb, Burt's Bees, Castle Biosciences, Codex Labs (stock options), Concerto Biosci (stock options), Dermavant, Eli Lilly, Galderma, Janssen, LEO Pharma, Lipidor, L'Oréal, Merck, Mircroos, MyOR Diagnostics, Regeneron/Sanofi Genzyme, Sibel Health, Skinfix, Suneco Technologies (stock options), Theraplex, UCB, Unilever, Verdant Scientific (stock options), Verrica, Yobee Care (stock options). In addition, Dr. Lio has a patent pending for a Theraplex product with royalties paid and is a Board member and Scientific Advisory Committee Member emeritus of the National Eczema Association.

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