Khalil NB, Edwards E, Lio P. Mindfulness-Based Techniques in the Treatment of Atopic Dermatitis: A Narrative Review. *Journal of Integrative Dermatology*. Published online 2025.

Review Article

Mindfulness-Based Techniques in the Treatment of Atopic Dermatitis: A Narrative Review

Nicole B. Khalil, B.S.[1], Elise Edwards, B.A.[1], Peter Lio, M.D.[2]

[1] Dr. Phillip Frost Department of Dermatology and Cutaneous Surgery, University of Miami, [2] Northwestern University Feinberg School of Medicine

Keywords: atopic dermatitis, eczema, mindfulness, Cognitive Behavioral Therapy (CBT), Habit Reversal Therapy (HRT), Mindfulness-Based Stress Reduction (MBSR)

Journal of Integrative Dermatology

Atopic dermatitis (AD) is known to have many negative effects on mental health and quality of life, with pruritus, pain, and sleep disturbance as major contributors. Mind-body therapies which address the emotional and behavioral impacts of stress in AD are of increasing interest including Cognitive Behavioral Therapy (CBT), Habit Reversal Therapy (HRT), and Mindfulness-Based Stress Reduction (MBSR). Mindfulness-based integrative therapies for AD show improvements in disease severity, QoL, and psychological outcomes. This review highlights evidence of MBSR, ACT, IBMS, CBT, and relaxation interventions. It is critical for providers to have an understanding of how they work and when to use them.

INTRODUCTION

Atopic dermatitis (AD) is a chronic, pruritic skin condition that is most prevalent in children but can also persist to and present in adulthood.[1] AD is known to have many negative effects on mental health and quality of life (QoL).[2] Pruritus, pain, and sleep disturbance are major contributors to reduced QoL, with the degree of impairment partially related to disease severity.[2] This results in strained social relationships, negative self-image, and increased rates of psychological disorders, such as depression and anxiety.[3]

Chronic stress, often in association with the mental health burden of AD, plays a significant role in the severity of this disease via the itch-scratch cycle.[4] The mechanisms by which stress worsens AD involve neuroendocrine, immune, and skin barrier pathways.[4] Stress-induced dysregulation of the hypothalamic-pituitary-adrenal (HPA) axis, the sympathetic and parasympathetic nervous systems, and the immune system contribute to a cascade of proinflammatory (and often pruritogenic) cytokines, chemokines, and prostaglandins.[4]

While supplements, probiotics, and acupuncture or acupressure are mentioned as adjunctive therapies in AD,[5] mind-body therapies which address the emotional and behavioral impacts of stress in AD are of increasing interest.[6] The more established treatments include Cognitive Behavioral Therapy (CBT), Habit Reversal Therapy (HRT), and Mindfulness-Based Stress Reduction (MBSR).[6] Other promising therapies are Acceptance and Commitment Therapy (ACT) and Biofeedback, while emerging or less-studied approaches include Integrative Body-Mind-Spirit (IBMS), Eye Movement Desensitization and Reprocessing (EMDR), Hypnotherapy, Autonomous Sensory Meridian Response (ASMR), Progressive Muscle Relaxation, Music Therapy, Massage and Touch Therapy, and other relaxation methods.[6]

Given a lack of rigorously designed trials, the link between AD and mental health, including ways to decrease the impact of AD on mental health, has not yet been thoroughly studied. Some integrative treatment modalities for AD, including mindfulness-based interventions, have been studied in select patient populations, but comprehensive evidence remains limited.[6] Our study aims to review and summarize clinical outcomes for mindfulness-based interventions in AD.

METHODS

We conducted a literature review using PubMed and Scopus with the key words “Mindfulness,” “atopic,” and “dermatitis.” After removing duplicates, a total of 50 articles were identified by these keywords and screened for relevance to our review. After screening, 9 studies were included (Table 1). No formal risk of bias or quality assessment was conducted, however limitations posed by the design of included studies will be discussed. Studies were eligible if they described implementation of a mindfulness-based intervention and reported clinical outcomes in human patients with atopic dermatitis. Studies were excluded if they were non-human, not published in English, lacked full-text availability, or did not describe treatment outcomes. Reference lists of included papers were also screened to identify additional relevant, supporting sources.

RESULTS

We identified a total of 9 studies meeting the inclusion criteria for this review. Mindfulness-based stress reduction was evaluated by 2 studies; Acceptance and commitment therapy was evaluated by one study; Integrative Body-Mind-Spirit was evaluated by one study; Cognitive Behavioral Therapy based interventions including aspects of

mindfulness were evaluated by 3 studies; and relaxation methods were evaluated by 2 studies.

MINDFULNESS-BASED STRESS REDUCTION

Mindfulness-based stress reduction (MBSR) is a structured mindfulness intervention that aims to help individuals manage stress levels, improve their psychological wellbeing, and increase their nonjudgmental awareness of present-moment situations.[7] Generally, MBSR programs include organized weekly sessions for 8 weeks and terminate with a one-day retreat for participants.[7] We identified 2 studies that assessed the effectiveness of MBSR interventions in patients with AD.

One study used the original MBSR program, which was developed by Jon Kabbat-Zin in the 1990s for patients with psoriasis, in AD patients.[8] 10 adult patients with AD participated in this instructor-led and self-directed program, which aimed to improve self-awareness, QoL, and resilience, and to increase the ability to cope with their illness. Prior to the program, participants completed individual interviews with the instructor to assess their willingness to implement mindfulness into their daily lives, which was a prerequisite for participation. This program involved independent daily practice of either body scans, yoga, or seated meditation, as well as the practice of being present during everyday activities. Additionally, participants attended weekly sessions with a MBSR instructor during which they practiced the three formal practices of mindfulness: body scan, yoga, and meditation. Weekly sessions lasted 2.5 hours, and there was a full day of silent mindfulness after the sixth session. At the end of the study, participants were found to have improvement in both POEM and DLQI scores, indicating improvement in disease severity and QoL, respectively. Furthermore, there was significant improvement in Freiburger Mindfulness Inventory (FMI) scores for both acceptance and presence after the intervention. Some participants commented on the intervention, noting its ability to decrease feelings of shame and annoyance towards oneself, even during frustrating moments of intense pruritus.[8]

Another study combined elements of MBSR and self-compassion training (MSC) in a randomized controlled trial where 107 patients participated in an integrated online training program for 8 weeks with an optional meditation retreat.[9] This program emphasized holistic wellbeing rather than focusing on AD-specific content, and it included meditation, psychoeducation, inquiry, and lectures. DLQI at 13 weeks was the primary endpoint of this study, with the MBSR/MSC intervention group showing significantly greater improvement (difference: −6.34; $P < 0.001$; Cohen's $d = -1.06$) than the control group. Secondary endpoints included eczema severity, itch- and scratching-related visual analog scales, self-compassion and all of its subscales, mindfulness, psychological symptoms, and participants' adherence to dermatologist-advised treatments, all of which showed greater improvements among the intervention group compared to the waitlisted control group.[9] The findings of both studies highlight the potential role of including MBSR programs in the treatment of patients with AD in addition to their usual medical treatment.

ACCEPTANCE AND COMMITMENT THERAPY

Acceptance and commitment therapy (ACT) is a subset of mindfulness-based behavioral interventions that aims to help people enhance and enjoy their lives while accepting the pain that is inevitably present. Rather than focusing on diminishing pain or discomfort like other forms of therapy, ACT encourages people to simply accept these symptoms and move past them to have a more fulfilling life.[10] A core theory of ACT states that psychological inflexibility, a behavioral pattern in which internal stimuli rather than value-based actions dominate, is the central process driving psychopathology.[11] In order to overcome this, ACT encourages people to evaluate whether their thoughts and beliefs align with their goals and values in life, and if not, to commit to taking action against these thoughts.[10] The six major principles of ACT are: defusion (detaching from thoughts and memories to let them pass without judgement), contact with the present moment (engaging in what is happening around oneself rather than in one's head), acceptance (allowing space for painful feelings to arise), self-as-context (identifying as the observer of one's thoughts and experiences, rather than allowing them to be one's entire identity), values (identifying guiding forces of one's actions), and committed action (engaging in behaviors that align with one's values).[10]

We identified one case study in which ACT was used in the treatment of an adolescent patient with AD.[10] Prior to the intervention, the patient was in a state of "fusion," which is defined in ACT as believing that one's thoughts are truth and that we must obey them. The patient had thoughts of uselessness and disgust toward himself because of his illness, which resulted in a depressed mood and self-isolation from family and friends. Furthermore, he believed he had no control over these thoughts. After completing 12 sessions of ACT with a CBT nurse therapist, the patient was able to shift from believing that AD ruined his life toward a more accepting mindset. Additionally, he was able to identify his values and goals in life, which allowed him to have a stronger sense of self and direction, rather than letting his condition dominate his life and thoughts.[10] Although ACT does not focus on improving disease severity like many other forms of mindfulness, this case report demonstrates its ability to help patients live more fulfilling and meaningful lives despite the presence of chronic disease.[10] ACT could therefore be beneficial for both young and aging patients with AD who are either struggling to find a sense of purpose in life or experiencing difficulty handling their condition as they age.

INTEGRATIVE BODY-MIND-SPIRIT

Integrative Body-Mind-Spirit (IBMS) is an intervention that incorporates elements of mindfulness and CBT to address the interconnectedness of mind, body, and spirit in a holistic manner.[12,13] It has proven to be successful in improving the physical and psychosocial wellbeing of patients with

numerous conditions, including psoriasis and atopic dermatitis.[13] IBMS is unique among mindfulness techniques as it focuses heavily on the importance of spirituality in overall health. However, compared to techniques like MBSR, IBMS is less formally structured and can be customized to contain elements of numerous interventions.[14]

We identified one randomized waitlist-controlled study that evaluated the effectiveness of a 6-week IBMS program on physical, psychological, and social outcomes for children diagnosed with AD.[15] Each week, children and their caregivers attended separate sessions with a different focus, followed by a joint activity for children and their caregivers to complete together. The goal of this program was to empower children and to help them build resilience to face their AD with a mindful attitude. The topics of the children's sessions by week are as follows: self-identity and self-appreciation; disease-identity; recognition, expression, and regulation of emotions; enhancing resilience capacity; identifying personal strengths and resources; support networks. The topics of the parents' sessions by week were: introducing fundamentals of IBMS in eczema; understanding relationship between health and emotion and helping the child through emotional expression; empowering coping flexibility; realizing discrepancies between parent and child experience of coping with AD; reconstructing the meaning of caregiver experiences; discovering reciprocity and appreciation in caregiver process. At the end of the intervention, AD severity measured by SCORAD was found to be significantly improved in the IBMS group compared to control (T0 vs. T1; $F = 4.827$, $P < 0.05$, $\eta 2 = 0.042$), however this effect was not maintained at the 5-week follow up visit. Furthermore, both generalized anxiety scores (T0 vs. T2; $F = 6.027$, $P < 0.05$, $\eta 2 = 0.051$) and social phobia scores (T0 vs. T2; $F = 5.692$, $P < 0.05$, $\eta 2 = 0.049$) were significantly reduced at the 5-week post-intervention follow up in the IBMS group compared to the control group. Children in the IBMS group were also found to have significantly improved ability to manage emotional arousal (measured by Lability/Negativity scores) both directly post-intervention (T0 vs. T1; $F = 4.370$, $P < 0.05$, $\eta 2 = 0.038$) and at the 5-week follow up (T0 vs. T2; $F = 4.975$, $P < 0.05$, $\eta 2 = 0.043$). Although QoL, which was measured by the Children's DLQI, did not differ significantly between groups after the intervention, children in both groups showed significant improvement in dermatologic QoL directly post-intervention and at the 5-week follow up.[15] This study provides valuable evidence suggesting that IBMS is beneficial in reducing both AD severity and the psychosocial impacts of the disease in children.

COGNITIVE BEHAVIORAL THERAPY

While Cognitive Behavioral Therapy (CBT) itself is not a subset of mindfulness, it can be combined with training in mindfulness to provide patients with a more comprehensive treatment plan. When used alone, CBT uses numerous different techniques which aim to decrease emotional distress by modifying maladaptive behaviors and thoughts.[16] While the use of CBT alone in dermatologic patients has strong supportive evidence, there also exists some evidence for the use of CBT combined with a mindfulness component.

One study enrolled 9 patients with AD in a 10-week program in which participants attended weekly CBT sessions focused on exposure therapy with an added element of mindfulness. Most patients found that the additional training in mindfulness allowed them to maximize their tolerance for unpleasant stimuli, such as itch and emotional distress.[17] Furthermore, there was a significant reduction in AD severity directly post-intervention as measured by PO-SCORAD ($t(8) = 2.9$, $P = .020$). General anxiety levels, measured by the BAI, were also significantly reduced post-intervention compared to baseline ($t(6) = 4.3$, $P = .005$).

Another study used an online platform to deliver an 8-week intervention to 21 participants with AD.[18] This online platform utilized two core tools: a mindfulness tool that allowed participants to observe sensations like itch without judgment, and an exposure tool that aimed to help participants confront and reduce avoidant behaviors in regard to their AD. The material provided to participants included psychological education, treatment instructions, and fictional patient examples. After each exercise, participants evaluated their experience using built-in tools. Although the usability of the website scored less than acceptable, at 3-month follow-up, preliminary effects were moderate to large for improvements in DLQI, peak pruritus NRS, PHQ-9, and the perceived stress scale. Another study used a similar online tool that was revised for improved usability and found that self-reported AD severity scores, measured by POEM scores, were significantly improved at the 3-month follow up.[19] These studies provide evidence that self-guided online modules that incorporate mindfulness techniques may be feasible and beneficial for patients with AD.

RELAXATION AND SELF-SOOTHING METHODS

Relaxation therapy refers to a collection of interventions that focus on reducing stress and improving overall wellbeing in patients with numerous medical conditions.[20,21] The link between stress and AD severity has been established, suggesting that there is indeed a potential role for relaxation therapy in the treatment of AD.[4] Unlike other forms of mindfulness, relaxation therapies are not structured programs, which may contribute to the lack of documented evidence for these therapies compared to other forms of mindfulness. However, the absence of a structured program may also be beneficial for patients whose schedules do not allow them to take part in such programs.

Two studies describing relaxation techniques in the treatment of AD have been reported. One study describes a 5-week program, coined the "Body Balance Relaxation Method," in which 9 adult participants were trained to increase their awareness of their body and emotions simultaneously.[22] This method involves dividing the body into 7 different levels (pelvic floor, legs, feet; pelvis; solar plexus; thoracic cage; neck; head, forehead; top of head) and training patients to focus on one level at a time before moving on to the next level. While focusing on a particular level, participants are taught to incorporate certain movements,

breathing patterns, color visualizations, and sounds. After each level, there is a period of relaxation and reflection that occurs before moving on. Participants in this study were found to have significantly decreased VAS itch scores ($P < 0.01$), stress scores ($P < 0.01$), and salivary cortisol levels ($P < 0.01$) after the treatment period. The average body surface area affected by AD also decreased from 46% to 29% after treatment, although this value was not significant ($P = 0.068$). Participants also provided positive verbal feedback, indicating that their stress and anxiety levels were reduced after each session, and for many of them, this effect lasted up to several days after each session.[22]

Another study describes a technique in which patients with AD are taught to squeeze their hands together with as much force as possible during moments of extreme itch rather than scratching.[23] They are instructed to do this for at least 15 seconds and to think of the technique as a way to discard "bad energy." This study was conducted by one provider who has taught the technique to 231 patients and followed up with each patient 6 months later. At the follow up visit, 92% of patients state that they consistently remember to practice this technique, with 60% of these patients stating that they have been able to reduce their topical corticosteroid use to "as needed" and 50% reducing their oral antihistamine use to "as needed." Patients also provided favorable verbal feedback, highlighting that this technique does not require them to take medication and that it can be practiced in public without drawing attention.[23]

Although high quality evidence on relaxation and self-soothing therapies is scarce in the current literature, these studies suggest a potential role for these techniques in AD treatment. The flexibility offered by these techniques, as well as their overall safety, should be highlighted. (Please see Table 1)

CONCLUSION

Mindfulness-based integrative therapies for AD show improvements in disease severity, QoL, and psychological outcomes. This review highlighted evidence of MBSR, ACT, IBMS, CBT, and relaxation interventions. Furthermore, mind-body therapies, including mindfulness, are of increasing interest to patients with AD, making it critical for providers to have an understanding of how they work and when to use them.[6,24]

The mechanism of action behind these techniques is believed to involve several intertwined pathways. First, stress is a major driver of AD exacerbations through its dysregulation of the HPA axis and promotion of a pro-inflammatory state.[4] AD patients are therefore believed to be in a state of sympathetic overdrive and autonomic imbalance.[25] Stress reduction is a core goal of mindfulness, which is hypothesized to help restore homeostasis of these pathways, thus decreasing AD exacerbations and improving disease severity.[4,25] The effect of mindfulness on stress has been linked specifically to the aspect of "acceptance" involved in mindfulness training.[26] Increased awareness of the present moment is also a core component of mindfulness training, which may play a role in disrupting the itch-scratch cycle, a central driver of AD.

In several forms of mindfulness, patients are encouraged to respond to itch sensation with acknowledgement of the sensation followed by self-compassion and self-soothing rather than unconsciously scratching. CBT highly emphasizes the importance of altering harmful behaviors (ie, scratching) in order to increase tolerance of discomfort (ie, itch sensation), and this effect is even greater when combined with mindfulness techniques.[17] Mindfulness techniques have also been found to increase patient adherence to medical treatment, resulting in better outcomes.[9] AD patients are known to have higher rates of psychological comorbidities, including anxiety and depression, that result in lower levels of compliance with medical treatment,[6] however due to the chronic nature of the condition, long-term compliance is critical for adequate treatment.

In addition to the indirect effect of mindfulness on AD via its modulation of stress pathways, it is also hypothesized that mindfulness works directly to deactivate areas of the brain that are overactive in itch perception and scratching behavior.[27] The cingulate cortex is involved in evaluation of itch stimuli, whereas the medial parietal cortex is involved in itch and pain sensation, and the motor cortex is activated in preparation for and during scratching. fMRI studies have shown that active meditation, a core component of MBSR, can decrease activity in these areas and thus prevent itch from becoming overwhelming during meditation.[27] Although it is not practical for patients to practice meditation at all times, this evidence suggests that other forms of relaxation that can be quickly implemented during moments of intense itch may have similar effects.

While mindfulness techniques are generally very safe, they should not necessarily be employed for all patients. For example, some patients, like those with comorbid psychiatric conditions, active psychosis, or high baseline levels of emotional instability, may not tolerate the increased awareness of discomfort that comes with the initial stages of mindfulness training.[25,28] Furthermore, the outcome of mindfulness training is dependent on the individual's ability to cultivate a sense of detachment toward a particular thought or feeling, as well as patients' willingness to incorporate a daily practice into their lives without continuous direct oversight[28] Time and motivation may consequently act as barriers to adherence.[29] Thus like all medical interventions, mindfulness may not work for every patient and will likely require customization based on many factors. It is therefore important to keep in mind that mindfulness is not a one-size-fits-all approach, so clinicians should be open to tailoring techniques to the patient's needs and abilities.

Barriers also exist on a system level, with many dermatologists reporting a low level of confidence in providing mindfulness-based treatments to patients due to a lack of formal training in the field.[30] Furthermore, the development of multidisciplinary care centers combining dermatology, psychiatry, and psychology is key in effectively delivering mindfulness-based treatments to patients. However, there is currently a lack of integrated care models, po-

Table 1. Overview of the included studies describing mindfulness interventions for AD.

Type of Mindfulness Therapy	Study Design	Number of Cases	Length of Intervention	Outcomes Measured	Reference Number
ACT	Case study	1	12 sessions, initially weekly then spaced out	Favorable patient feedback: improved mindset	10
MBSR	Prospective uncontrolled Pilot study	10	8 weeks	POEM: improved DLQI: improved FMI: significantly improved Favorable patient feedback	8
MBSR + MSC	Randomized Clinical Trial	107	8 weeks	DLQI: significantly improved Improved itch, eczema severity, and psychological symptoms	9
IBMS	Randomized-waitlisted controlled trial	113	6 weeks	SCORAD: significantly improved post-treatment Anxiety and emotional regulation: significantly improved	15
CBT + Mindfulness	Uncontrolled pretest-posttest open trial	9	10 weeks	PO-SCORAD: significantly improved post-treatment BAI: significantly improved post-treatment	17
CBT + Mindfulness	Single-arm feasibility study using a pre-post design	20	5 months, self-paced	POEM: moderate to large improvements	18
CBT + Mindfulness	Single-arm feasibility study using a pre-post design + secondary report on previous study	21	8 weeks	DLQI, Peak Pruritus NRS, PHQ-9, Perceived Stress Scale: moderate to large improvements	19
Relaxation/ Self-Soothing	Uncontrolled clinical trial	231	6 months	Decreased TCS and oral antihistamine use	23
Relaxation/ Self-Soothing	Open uncontrolled clinical trial	9	5 weeks	VAS Itch: significantly improved Mean BSA Affected: decreased	22

tentially due to limited personnel and financial resources.[30] While these integrated care models may not be widely accessible in the near future, some resources that may help bridge the gap are currently available and should be implemented. We suggest that dermatologists screen all patients for comorbid mental health disease and provide timely referrals to psychology or psychiatry. Furthermore, we encourage all clinicians to remain open-minded to integrative therapies that patients may already be using or may be interested in trying.

The generalizability of our findings may be limited by the paucity of large, blinded, placebo-controlled clinical trials. However, the evidence reported here does indeed highlight an important role for mindfulness in the treatment of AD. Although it is not currently recommended as part of first-line treatment, mindfulness could be a very beneficial tool in improving both disease severity and QoL in AD patients. Further studies are needed to confirm the mechanisms by which mindfulness exerts its effects and to establish guidelines for its use in practice, as validated guidelines do not currently exist. Additionally, despite the high prevalence of mental health disease in patients with AD and the role of stress in exacerbation of skin symptoms, guidelines for screening these patients do not exist.[3] Furthermore, experts believe the psychosocial burden of AD remains largely unaddressed by clinicians.[3] Identification of these patients, who would likely benefit significantly from mindfulness therapies, must therefore be done by implementing protocols for screening for stress and psychological comorbidities in dermatology clinics, along with plans for adequate follow-up.

CONFLICT OF INTEREST STATEMENT

PL 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, AbbVie, Almirall, Amyris, Apogee, Arcutis, ASLAN, Astria Therapeutics, Boston Skin Science, Bristol-Myers Squibb, Burt's Bees,

Castle Biosciences, Codex Labs, Concerto Biosci, Dermavant, Eli Lilly, Galderma, Kenvue, LEO Pharma, Lipidor, L'Oréal, Merck, Micreos, MyOR Diagnostics, Pelthos Therapeutics, Phyla, Regeneron/Sanofi Genzyme, Sibel Health, Skinfix, Song Lab Skincare, Soteri Skin, Stratum Biosciences, Sun Pharma, Theraplex, Thimble Health, UCB, Unilever, Verdant Scientific, Verrica, Yobee Care. Stock options with Akeyna, Inc., Alphyn Labs, Codex Labs, Concerto Biosci, Song Lab Skincare, Soteri Skin, Stratum Biosciences, Thimble, Yobee Care, Verdant Scientific. 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.

The other authors have no relevant conflicts to disclose.

Submitted: August 03, 2025 PDT.

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