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A Pilot Study of a Mindfulness-Based Stress Reduction Programme in Patients Suffering from Atopic Dermatitis

Martin Offenbächer ^{1,*}, Michael Seitlinger ², Daniela Münch ^{3,4}, Christina Schnopp ⁵, Ulf Darsow ⁵, Julia Harfensteller ⁶, Peter Schmid-Grendelmeier ⁷, Johannes Ring ⁵ and Niko Kohls ⁸ 

¹ Institute of General Medicine, University Clinic, 80333 Munich, Germany

² Forum for Mindfulness and Stress Management, KEB Munich and Freising, 80333 Munich, Germany; mail@michael-seitlinger.de

³ CK-CARE AG, Education, 7265 Davos, Switzerland; daniela.muench@phlu.ch

⁴ Department of Adult Education, University of Teacher Education, 6000 Lucerne, Switzerland

⁵ Department of Dermatology and Allergy, Technical University Munich, 80802 Munich, Germany; nina.schnopp@tum.de (C.S.); ulf.darsow@tum.de (U.D.); johannes.ring@tum.de (J.R.)

⁶ SAGE Institute for Mindfulness and Health, 10115 Berlin, Germany; harfensteller@sage-institut.de

⁷ Department of Dermatology, University Hospital of Zürich, 8091 Zürich, Switzerland; Peter.Schmid@usz.ch

⁸ Division of Health Promotion, University of Applied Sciences and Arts, 96450 Coburg, Germany; niko.kohls@hs-coburg.de

* Correspondence: m.offenbaecher@gmx.de; Tel.: +49-89-4400-53779



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Abstract: Introduction: Patients with atopic dermatitis (AD) have several potential stressors including the symptoms of the disease itself, the stigmatization due to their appearance, and emotional and psychological strain. Psychological factors and stress can trigger and exacerbate the symptoms of skin diseases and there is evidence that stress has a relevant clinical effect on the function of skin cells in vivo. Our objective was to evaluate in a pilot study the feasibility, acceptance, and effectiveness of a Mindfulness-Based Stress Reduction (MBSR) programme in AD patients in a clinical setting. Methods: 10 patients took part in an 8-week MBSR programme, which included, e.g., mindful and conscious awareness of the body and bodywork, and seated meditation. We assessed sociodemographics and disease related variables with standardized measures at predefined time points including Score of Atopic Dermatitis, Patient Oriented Eczema Measure, Dermatology Life Quality Index, Perceived Stress Questionnaire, Freiburg Mindfulness Inventory (FMI), and others. Participants also gave qualitative feedback regarding the effects of the intervention. Results: The mean age was 53.10 years (SD = 15.04), seven patients were female, and disease duration was 36.6 years (SD = 25.5). Calculating pre-post effect sizes (Cohen's *d*), the FMI indicated significant improvement in the "presence" and "acceptance" subscales. There was also tendency for less stress. This was confirmed by the qualitative statements of the participants. Conclusions: The MBSR programme is feasible and acceptable for AD patients. Considering the long disease history and the severity of disease burden, the effects of this intervention seem promising as an adjunct to conventional treatments for patients with AD.

Keywords: atopic dermatitis; stress; mindfulness stress reduction; psychosomatic interactions; eczema

1. Introduction

Atopic dermatitis (AD) is a chronic non-contagious itchy inflammatory skin disorder leading in many cases to a vicious cycle of scratching and further inflammation [1,2].

In Western countries, 10–20% of children and 1–3% of adults are affected by this skin disease [3,4]. The direct costs for the health care system are high. In the US, between 900 million and 3.8 billion dollars per year are spent for the treatment of AD [5]. AD has a significant effect on quality of life [6]. In a study by Kiebert et al. [7], AD patients exhibited significantly lower scores in several subscales of the SF-36, including vitality, social role, and mental health compared to healthy people as well as patients with diabetes and hypertension. AD patients were also significantly more restricted in physical and

emotional role, vitality, as well as social functioning and mental health in comparison to patients suffering from psoriasis.

Patients with other itchy skin diseases, e.g., chronic urticaria, have higher depression and anxiety scores than healthy controls [8]. Konuk et al. [9] evaluated patients with a chronic lichen simplex in respect to their psychological distress. Patients exhibited significantly higher scores in all subscales of the SCL-90-R and in another instrument measuring depression. These patients had also personality characteristics associated with emotional stress, i.e., pain avoidance and a higher dependency in respect to demands from peers. In addition, the patients appeared to be more “adapted” and “dutiful” than healthy controls.

Two studies evaluating patients with AD identified further potential stressors. Male and female AD patients report significantly more problems in their sexual life than patients with psoriasis or controls and the AD patients exhibit higher depression scores [10,11]. There is a high degree of individual burden of disease also affecting socioeconomic aspects in society [12]. Summing up, patients suffering from AD are potentially exposed to increased stress because of the disease itself, the stigmatization due to their appearance, and because of their emotional and psychological strain, which in turn has a negative impact on quality of life [6].

There is evidence that psychological factors and stress trigger and exacerbate the symptoms of skin diseases, such as itch [13,14], and that stress has a relevant clinical effect on the function of skin cells in vivo [15]. The endocrine and the immune system as well as the central and peripheral nervous system interact in response to acute and chronic stress [16]. In their review article, Paus et al. [17] denote the skin as an ideal model to study neuroimmunological consequences of stress because coping with stress plays an important role in the management of AD, hyperhidrosis, flush reactions, pruritus, and several other skin symptoms, provoked and modulated by stress [18].

More than 30 years ago, Jon Kabat-Zinn developed a structured Mindfulness-Based Stress Reduction programme (MBSR) to treat and prevent stress and its aftermath. During the last decades, the effectiveness of this MBSR programme has been documented in several studies for a variety of disorders such as anxiety, depression, or sleep problems [19–21]. In a small study, Kabat-Zinn et al. [22] showed, in 1998, that an adjuvant MBSR programme resulted in a higher improvement rate in patients with psoriasis undergoing an ultraviolet light therapy. By now, MBSR programmes are important and accepted components in many clinical and non-clinical institutions in the USA. Surprisingly enough, until Kabat-Zinn’s early study their clinical effectiveness as well as compliance had not been evaluated in AD patients and there is a paucity of studies. Therefore, we decided to perform a pilot study to evaluate the feasibility, acceptance, and effectiveness of a Mindfulness-Based Stress Reduction programme in patients suffering from AD.

2. Materials and Methods

2.1. Study Design and Patients

After IRB approval was obtained from the ethical committee of the Technical University Munich (TUM), patients were recruited at the Department for Dermatology at TUM. The diagnosis of all AD patients was made by experienced dermatologists of the department using standard criteria [23]. Patients were informed about the possibility to enrol in an MBSR programme as a complementary health promotion training nested within a clinical context, not interfering with their standard medical treatment. The training was offered to the patients on a voluntary basis at no additional costs. Patients were also informed that they could withdraw from the programme at any time without having to explain themselves. Since our study was planned as a pilot study aiming to evaluate mainly the feasibility of a structured MBSR programme, we did not define rigorous inclusion and exclusion criteria. We included adults (age 18 to 80) with a diagnosis of AD, independent of the severity of the AD. Patients with a history of psychiatric conditions as determined by the treating dermatologist were not included. Patients were asked by the dermatologists

about willingness to participate and then in case they gave written informed consent to the programme and scientific evaluation.

2.2. Content, Goals and Background of Mindfulness Training and the MBSR Course

The mindfulness training for patients with AD or chronic itch follows the MBSR eight-week course developed by Jon Kabat-Zinn (curriculum see [24]). The eight-week Mindfulness-Based Stress Reduction (MBSR) programme was developed by Jon Kabat-Zinn, in order to make the wisdom of meditative traditions accessible and beneficial to people in their daily lives in modern society. Mindful and conscious awareness of the body (body scan) and bodywork (yoga), seated meditation, and the practice of mindfulness and presence during everyday activities are essential parts of the eight-week MBSR programme. This also includes the willingness for independent daily practice.

Mindfulness is a stance and practice in which attention is consciously directed towards the present moment. Being aware of the present is accompanied by a non-judgmental, open attitude towards all physical sensations as well as psychological and mental processes (e.g., also towards the phenomena of itch and all the thoughts and feelings connected with it). In this way, unhealthy and stress producing patterns and mechanisms can be recognized and interrupted in their self-perpetuating dynamics.

Mindfulness as a culture of inner presence and consciousness fosters the anchoring of experience in the here and now, and, thus, creates a counterbalance to the experience of agitation and limitation in stressful situations. Furthermore, mindfulness in the form of pausing to observe without immediately acting can weaken automatic, harmful reactions to experiencing stress. Freedom and manoeuvring room in the form of old patterns of behaviour arise through consciousness. The stance of goodwill and friendliness in dealing with oneself plays a central role in the practice of mindfulness. Discernibly viewing the immediate present experience is, thus, accompanied by an attitude of kind-heartedness and forgiveness towards oneself. With this in mind, the MBSR eight-week course aims to improve self-awareness, coping with illness, quality of life, and resilience of patients with eczema or other forms of chronic itch. In a supplemental file, we provide a more detailed description of the programme.

2.3. Outcome Assessment

Prior to inception to the MBSR programme, several assessment and outcome variables and instruments were utilised. To assess treatment success instruments were administered one week and three months after completion of the programme. Quantitative data was assessed prior to (t1) and after the intervention (t2) as well as an additional post measurement three months after the intervention (t3). Additionally, written qualitative data of patients' feedback was collected after the programme.

2.4. Sociodemographics

Sociodemographic data including age, gender, education and job as well as disease specific variables (e.g., onset, disease duration, allergies) were assessed. Not all of those variables were analysed or depicted in the manuscript. In the following, the patient reported outcome measure administered in this study are described. All measures have good psychometric properties and were used in their German versions.

2.5. Score of Atopic Dermatitis (SCORAD)

The SCORAD is an instrument to assess the severity of AD by evaluating both signs and symptoms. It was developed by the European Task Force for Atopic Dermatitis [25,26] and, subsequently, administered in several studies. We used a version the patient filled out by him/herself, which has been shown to be valid and reliable [27]. First of all, the percentage of the affected skin is assessed. Then the intensity of various skin lesions (erythema, oedema/papules, effect of scratching, oozing/crust formation, lichenification and dryness) is rated on a Likert scale from 0 to 3. In addition, symptoms such as pruritus and

sleeplessness are judged on a visual analogue scale (absence of pruritus, no sleeplessness = 0; extreme pruritus, extreme sleeplessness = 10). A severity index is calculated by adding percentage of affected skin surfaces (max. 65 points, giving a maximum of 103), intensity of skin disease (max. 18 points), and symptoms (max. 20 points).

2.6. Patient Oriented Eczema Measure (POEM)

The POEM is a questionnaire to monitor patients with AD [28]. It consists of seven items measuring the frequency of symptoms during the last seven days on a 5-point Likert scale. The higher the score, the more frequent the symptoms occurred.

2.7. Dermatology Life Quality Index (DLQI)

The DLQI was developed by Finlay et al. [29] in order to measure quality of life in different skin diseases. This measure has been used in many studies (see review by Basra et al. [30]) and the respective validity and reliability has been reported as good. The DLQI consists of 10 items covering symptoms and feelings, daily activities, leisure, work or school, personal relationships, and response to treatment. Each question is rated on a 4-point Likert scale (not at all, a little, a lot, and very much). The total score is calculated by summing the score of each question and total scores range from 0 to a maximum of 30, with higher scores representing greater impairment of QOL.

2.8. Hospital Anxiety and Depression Scale (HADS)

The Hospital Anxiety and Depression Scale (HADS) is a brief (14 item) self-report questionnaire measuring anxiety and depression [31] on a 4-point Likert scale. It was developed for use in general medical out-patient clinics but is now widely used in clinical practice and research. Scores between 8 and 11 points are considered as borderline, scores above 11 as abnormal cases.

2.9. Perceived Stress Questionnaire (PSQ)

The PSQ [32] is one of the most widely used psychological instruments gauging the subjective perception of stress. It assesses with 10 items the degree to which situations in one's life are appraised as being stressful. Items were designed to tap how unpredictable, uncontrollable, and overloaded individuals assess their life circumstances on a 5-point Likert scale. The higher the score, the more stressed is the person in life.

2.10. Freiburger Mindfulness Inventory (FMI)

The FMI [33,34] assesses awareness and nonjudgment of present moment experiences. The 14-item short form with the two subscales "presence" and "acceptance" was employed in this study, which is a consistent and reliable short version of the scale. Higher scores denote higher mindfulness.

2.11. Mindful Attention Awareness Scale (MAAS)

The MAAS measures with 15 items on a 6-point Likert scale a core characteristic of dispositional mindfulness (DM), namely, open or receptive awareness of and attention to what is taking place in the present [35]. Higher scores reflect higher levels of DM.

2.12. Global Transition Items

Three months after the end of the programme, patients were asked to rate their subjective impression regarding change in different areas such as general well-being, stress management, psychological well-being, quality of life, and others on a 5-point Likert scale (much worse–unchanged–much better).

Participants were also asked to provide qualitative feedback after the programme in a written format.

3. Analyses

As this was a pilot study, aiming at testing the feasibility of nesting an MBSR intervention in a clinical setting as well as gauging patient compliance, only a small sample could be recruited due to a several constraints, among them space and time restrictions as well as patient traveling distance to the clinic. A first inspection of the data set revealed—technically as a consequence of sample attrition—that the data set differs slightly in number with regard to single scale responses. This is attributable to three patients having not provided data for every scale of the questionnaire battery at every point in time, although they have not fully dropped out of the programme. For example, with regard to the FMI, 10 patients have provided baseline data, while seven participants have also answered the questionnaire at post measurement and six participants have provided data three months after the intervention.

In order to adapt our statistical analysis strategy to this situation, we decided to conduct an intention-to-treat analysis for descriptive statistics to be able to use all available data points. However, with regard to exploratory intrasample t-test and corresponding pre-post treatment effect size calculation (Dz see [36]) we decided to not interpolate missing data and opt for a per-protocol analysis (PPA). We thought that a straightforward per-protocol analysis would give us realistic effect size estimates for a larger study, and the qualitative data would probably tell us about reasons for dropping out or not returning (full sets of) data. Statistical analysis was performed using SPSS for Windows (version 20.0. SPSS, Chicago, IL, USA).

4. Results

4.1. Sociodemographics

The sociodemographic and disease variables are displayed in Table 1:

Table 1. Sociodemographics are reported.

Variable	Number of Participants (N = 10)
Mean Age	53.10 (SD = 15.04)
Gender Distribution	7 female, 3 male
German Citizenship	10
Level of Education	7 High School, 3 Secondary School
Experience with Mindfulness Meditation	1
Experience with Mind-Body Interventions (autogenic training)	1
Mean Dermatological Symptoms in Years	36.6 (SD = 25.5)
Mean Amount of Inpatient Treatments in the Past Five Years	2.0 (SD = 2.44)

4.2. Quantitative Results

Table 2 depicts pre-post differences in outcome scores. Comparison between pre-(baseline) and post-intervention only indicated significant differences in mindfulness scores both for the FMI presence and acceptance factor, meaning an improvement.

Table 2. Mean Scores at t1 (pre), t2 (post) and t (three months post).

Measure (n)	T1		T2		T3		Dz (t1–t2)
	M	SD	M	SD	M	SD	
PSQ Stress (8)	48.33	19.95	34.37	10.57	34.52	11.81	0.47
FMI-Presence (8)	2.37	0.42	2.80	0.21	2.64	0.55	1.85
FMI-Acceptance (8)	2.25	0.33	2.73	0.27	2.78	0.18	2.07
MAAS (8)	2.26	0.60	2.36	0.45	2.54	0.53	0.13
POEM (6)	13.25	4.77	12.5	4.81	13.85	6.51	0.09
DLQI (5)	5.57	3.40	4.20	1.92	4.60	2.70	0.08
SCORAD (5)	27.89	8.99	31.03	8.03	26.57	8.83	0.29
HADS-Anxiety (8)	8.80	2.35	8.87	2.10	8.5	2.16	0.17
HADS-Depression (8)	10.30	1.42	11.38	1.30	11.14	1.95	0.76

Notes: Descriptive statistics (Means and SD) are based on an intention to treat analysis. Pre- and post-treatment differences (dependent t test and effect sizes (Cohens Dz)) are based on per protocol analyses (respective n in brackets after measurement variable). Bold letters indicate significance between t1–t2 at $p < 0.01$. Abbreviations: PSQ = Perceived Stress Questionnaire; FMI = Freiburger Mindfulness Inventory; MAAS = Mindful Attention Awareness Scale; POEM = Patient Oriented Eczema Measure; DLQI = Dermatology Life Quality Index; SCORAD = Score of Atopic Dermatitis; HADS = Hospital Anxiety and Depression Score.

4.3. Global Transition Items

Due to 40% missing (only six patients provided feedback), we are not reporting these results in detail. However, in many variables, 50% or more of the remaining six patients reported an improvement in the respective areas, e.g., in general well-being, stress management, psychological well-being, and quality of life.

4.4. Qualitative Written Feedback of Participants

These are the written feedback of some patients concerning the experience with and the effects of the MBSR programme:

- “The mindfulness exercise is not a fast technique for eliminating symptoms.”
- “The practice of mindfulness needs to be practiced again and again and the decision made to pick it up in everyday life.”
- “Practicing mindfulness brings a healing quality to one’s life; it opens up the possibility of jumping off the hamster wheel of being busy and agitated again and again and being more present, and thus content to just being in the moment.”
- “Remembering and implementing this stance in the midst of daily life makes it possible to experience a more intense feeling of living and thus a better quality of life.”
- “In the case of pruritus, sometimes the spiral of itch and scratch can be interrupted at the beginning. When the initial itch is simply noticed (along with a kind attitude towards oneself) without reacting right away by scratching, it can also subside again.”
- “Sometimes the practice of mindfulness is useless in the face of acute symptoms of itching.”
- “Even when itch leads to scratching, a different attitude in dealing with the symptoms of itch arises through turning towards oneself in a kindhearted, friendly way; the annoyance and shame towards oneself are reduced.”

5. Discussion

In this pilot study, AD patients participated in an 8-week MBSR course with the aim to increase mindfulness and decrease symptoms of their skin disease. At the end of the programme patients scored significantly higher on the subscales ‘presence’ and ‘acceptance’ of the FMI indicating a higher degree of mindfulness. This effect, however, faded away after three months. There was also a trend towards less stress.

Our AD patients were within the moderate severity strata determined with the SCORAD, the POEM, and the DLQI in a large study conducted by Silverberg et al. [37]. Our patients had a very long history of skin symptoms caused by AD and borderline scores

of clinically relevant anxiety and depression. The latter slightly increased by 10% after the MBSR programme as well as the SCORAD score indicating more self-reported symptoms. This is not unexpected since greater mindfulness can lead in short term to greater awareness of physical and depressive symptoms [38].

It has been suggested by Day et al. [39] that, mindfulness meditation in the beginning of practising accelerates the shift toward relating to thoughts (as objects of awareness, e.g., my skin is itching and I do not know what to do) rather than from thoughts (as necessarily reflecting reality), although the presence of the thought or emotion itself may or may not change. Mindfulness meditation practice facilitates this “reperceiving” and may also implicitly engender eventually a shift in cognitive content. Repetitive negative thoughts or rumination are common features in depression and anxiety [40]. Both disorders have a high prevalence in patients with AD. In a study by Simpson et al. [41], up to 50% with moderate or severe disease exhibited anxious or depressive symptoms measured with the HADS. However, to date, there is no study evaluating rumination in AD, but it is very likely and conceivable that repetitive negative thoughts play an important role in this patient group, especially considering that these patients suffer from chronic itch (a constant trigger drawing permanent attention of the person), a symptom which bothers 50% of moderately to severely affected AD patients a lot or very much and only 47% a little [41]. However, not only depression and anxiety or physical symptoms are a source of rumination, but also stigmatization and loneliness, both common topics in AD patients [42,43].

Another central mechanism in mindfulness meditation that has been described is regulation of attention via decoupling from emotion [44]; hence, emotional regulation may also be a critical process across mindfulness-based interventions.

From a clinical perspective, emotions and suffering play an important role in patients with AD. As mentioned above, there are several sources of negative emotions for patients with AD. Adults with AD are also angry more readily and have difficulties expressing anger [45], which is associated with itch intensity in patients with chronic urticaria. Emotions in general are able to increase itch intensity [46]. So, a mindfulness programme has the potential to regulate and decrease intense emotional experiences [47] and in turn positively affect physical symptoms in patients with AD. As one patient described it in the qualitative part of our pilot study: “. . . the annoyance and shame towards oneself are reduced”. This patient also mentioned that she/he was more able to react in a kind-hearted way towards the self. Being self-compassionate is a treatment aim in mindfulness interventions and has by itself been shown to have positive effects on health [48].

Further comments of the patients related to the spiral of itch and scratching that can be interrupted at the beginning when the initial itchiness is simply noticed without reacting right away. Focusing attention on bodily sensation such as itch can result in a heightened sensitivity of hypervigilance in patients with such symptoms leading to a vicious circle. Obviously, some patients in our programme learned to interrupt this circle at least occasionally.

As two further comments noted, “practising mindfulness brings a healing quality to one’s life” and mindfulness “makes it possible to experience a more intense feeling of living and thus a better quality of life”. Mindfulness does not only have a positive effect on symptoms associated with the patient’s skin disease but also on the quality of life in general [37].

Some limitations must be mentioned. Since this was a pilot study with a small sample size, no definite conclusion can be drawn regarding effectiveness of a MBSR programme in AD. Sample bias is likely to have occurred as a consequence of patients self-enrolling in the program. However, the sociodemographic distribution observed in our study is not uncommon for health-promotion programmes, where higher age, educational levels, and female participants are frequently more prone to participate. Certainly, the small amount of only three male patients participating, along with more than 35 years presence of clinical symptoms do not allow us to generalize our results. However, we opine that our results suggest that a partial remedy of clinical symptoms even after a long disease history of AD

by means of MBSR is not only possible, but also accepted by some patients. Nevertheless, we consider them as promising but preliminary findings, as the follow-up period was short, and we did not assess potentially confounding factors such as the patients' mindfulness training or other health promotion related activities outside the programme structure.

Mindfulness programmes are intended to increase mindfulness guiding the participant to the very moment of his or her being and, thus, to help the individuals to cope with their stressful clinical problems [19]. Chronic diseases, such as painful conditions or itch diseases, however, cause stress from multifactorial origins and in turn distract the sufferer from his or her self-leading to more catastrophizing and more symptoms especially in case of low mindfulness [49]. Therefore, MBSR could be a valuable treatment option for AD patients. In our pilot study, we were able to show that there is a short-term benefit in an increased mindfulness and stress reduction. However, symptoms remained unchanged, but this was not unexpected since the patients had a long-term history of AD, were in the moderately affected disease strata, and had no prior experience with MI.

To conclude, the practice of mindfulness for patients with atopic dermatitis or other forms of chronic itch is not a substitute for well-trying coping strategies or medical therapy used so far, but can be integrated as an additional, valuable treatment option. However, further controlled studies with larger sample sizes and longer duration are necessary in order to assess to effectiveness of mindfulness interventions.

Supplementary Materials: The following are available online at <https://www.mdpi.com/article/10.3390/psych3040042/s1>, Implementation and description of the MBSR programme.

Author Contributions: All authors made substantial contributions to the conception of the work. M.S., D.M. and J.H. were responsible for the acquisition of the data. M.O. and N.K. analysed of the data. M.O., N.K., D.M., C.S., U.D., P.S.-G., J.H. and J.R. made substantial contributions to the interpretation of the data. M.O. and N.K. drafted the work and all other authors critically revised the work for important intellectual content. All authors have read and agreed to the published version of the manuscript.

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References

1. Ring, J.; Ruzicka, T.; Przybilla, B. (Eds.) *Handbook of Atopic Eczema*, 2nd ed.; Springer: Berlin, Germany; New York, NY, USA, 2006.
2. Ring, J. *Neurodermitis—Atopisches Ekzem*; Thieme: Stuttgart, Germany, 2012.
3. Stensen, L.; Thomsen, S.F.; Backer, V. Change in prevalence of atopic dermatitis between 1986 and 2001 among children. In *Allergy and Asthma Proceedings*; Oceanside Publications Inc.: Providence, RI, USA, 2008; Volume 29, pp. 392–396.
4. Muto, T.; Hsieh, S.; Sakurai, Y.; Yoshinaga, H.; Suto, H.; Okumura, K.; Ogawa, H. Prevalence of atopic dermatitis in Japanese adults. *Br. J. Dermatol.* **2003**, *148*, 117–121. [[CrossRef](#)]
5. Ellis, C.N.; Drake, L.A.; Prendergast, M.M.; Abramovits, W.; Boguniewicz, M.; Daniel, C.R.; Lebwohl, M.; Stevens, S.R.; Whitaker-Worth, D.L.; Cheng, J.W.; et al. Cost of atopic dermatitis and eczema in the United States. *J. Am. Acad. Dermatol.* **2002**, *46*, 361–370. [[CrossRef](#)]
6. Finlay, A.Y. Quality of life in atopic dermatitis. *J. Am. Acad. Dermatol.* **2001**, *45* (Suppl. 1), S64–S66. [[CrossRef](#)]
7. Kiebert, G.; Sorensen, S.V.; Revicki, D.; Fagan, S.C.; Doyle, J.J.; Cohen, J.; Fivenson, D. Atopic dermatitis is associated with a decrement in health-related quality of life. *Int. J. Dermatol.* **2002**, *41*, 151–158. [[CrossRef](#)]
8. Engin, B.; Uguz, F.; Yilmaz, E.; Özdemir, M.; Mevlitoglu, I. The levels of depression, anxiety and quality of life in patients with chronic idiopathic urticaria. *J. Eur. Acad. Dermatol. Venereol.* **2007**, *22*, 36–40. [[CrossRef](#)]
9. Konuk, N.; Koca, R.; Atik, L.; Muhtar, S.; Atasoy, N.; Bostanci, B. Psychopathology, depression and dissociative experiences in patients with lichen simplex chronicus. *Gen. Hosp. Psychiatry* **2007**, *29*, 232–235. [[CrossRef](#)]
10. Mercan, S.; Altunay, I.K.; Demir, B.; Akpınar, A.; Kayaoglu, S. Sexual Dysfunctions in Patients with Neurodermatitis and Psoriasis. *J. Sex. Marital. Ther.* **2008**, *34*, 160–168. [[CrossRef](#)]
11. Ermertcan, A.T.; Gencoglan, G.; Temeltas, G.; Horasan, G.D.; Deveci, A.; Ozturk, F. Sexual dysfunction in female patients with neurodermatitis. *J. Androl.* **2011**, *32*, 165–169. [[CrossRef](#)]
12. Ring, J.; Zink, A.; Arents, B.W.M.; Seitz, I.A.; Mensing, U.; Schielein, M.C.; Wettemann, N.; de Carlo, G.; Fink-Wagner, A. Atopic eczema: Burden of disease and individual suffering—results from a large EU study in adults. *J. Eur. Acad. Derm. Venereol.* **2019**, *33*, 1331–1340. [[CrossRef](#)]

13. Kimyai-Asadi, A.; Usman, A. The role of psychological stress in skin disease. *J. Cutan. Med. Surg.* **2001**, *5*, 140–145. [CrossRef]
14. Conrad, R.; Geiser, F.; Haidl, G.; Hutmacher, M.; Liedtke, R.; Wermter, F. Relationship between anger and pruritus perception in patients with chronic idiopathic urticaria and psoriasis. *J. Eur. Acad. Dermatol. Venereol.* **2008**, *22*, 1062–1069. [CrossRef]
15. Saint-Mezard, P.; Chavagnac, C.; Bosset, S.; Ionescu, M.; Peyron, E.; Kaiserlian, D.; Nicolas, J.-F.; Bérard, F. Psychological stress exerts an adjuvant effect on skin dendritic cell functions in vivo. *J. Immunol.* **2003**, *171*, 4073–4080. [CrossRef] [PubMed]
16. Fleshner, M.; Laudenslager, M.L. Psychoneuroimmunology: Then and Now. *Behav. Cogn. Neurosci. Rev.* **2004**, *3*, 114–130. [CrossRef]
17. Paus, R.; Theoharides, T.C.; Arck, P.C. Neuroimmunoendocrine circuitry of the 'brain-skin connection'. *Trends Immunol.* **2006**, *27*, 32–39. [CrossRef]
18. Biro, T.; Ko, M.C.; Bromm, B.; Wei, E.T.; Bigliardi, P.; Siebenhaar, F.; Hashizume, H.; Misery, L.; Bergasa, N.; Kamei, C.; et al. How best to fight that nasty itch - from new insights into the neuroimmunological, neuroendocrine, and neurophysiological bases of pruritus to novel therapeutic approaches. *Exp. Dermatol.* **2005**, *14*, 225. [CrossRef]
19. Grossman, P.; Niemann, L.; Schmidt, S.; Walach, H. Mindfulness-based stress reduction and health benefits: A meta-analysis. *Focus Altern. Complement. Ther.* **2010**, *8*, 500. [CrossRef]
20. Sedlmeier, P.; Eberth, J.; Schwarz, M.; Zimmermann, D.; Haarig, F.; Jaeger, S.; Kunze, S. The psychological effects of meditation: A meta-analysis. *Psychol. Bull.* **2012**, *138*, 1139–1171. [CrossRef] [PubMed]
21. Bohlmeijer, E.; Prenger, R.; Taal, E.; Cuijpers, P. The effects of mindfulness-based stress reduction therapy on mental health of adults with a chronic medical disease: A meta-analysis. *J. Psychosom. Res.* **2010**, *68*, 539–544. [CrossRef] [PubMed]
22. Kabat-Zinn, J.; Wheeler, E.; Light, T.; Skillings, A.; Scharf, M.J.; Cropley, T.G.; Hosmer, D.; Bernhard, J.D. Influence of a Mindfulness Meditation-Based Stress Reduction Intervention on Rates of Skin Clearing in Patients With Moderate to Severe Psoriasis Undergoing Photo Therapy (UVB) and Photochemotherapy (PUVA). *Psychosom. Med.* **1998**, *60*, 625–632. [CrossRef]
23. Hanifin, J.M.; Rajka, G. Diagnostic features of atopic dermatitis. *Acta Derm. Venereol. Suppl.* **1980**, *92*, 44–47.
24. Mindfulness-Based Stress Reduction (MBSR) Authorized Curriculum Guide 2017. Available online: <https://mindfulness.nhs.gov.uk/media/2105/mbsr-curriculum-guide-2017.pdf> (accessed on 26 August 2021).
25. Kunz, B.; Oranje, A.P.; Labreze, L.; Stalder, J.F.; Ring, J.; Taieb, A. Clinical validation and guidelines for the SCORAD index: Consensus report of the European Task Force on Atopic Dermatitis. *Dermatology* **1997**, *195*, 10–19. [CrossRef]
26. Stalder, J.F.; Atherton, D.J.; Bieber, T. Consensus Report of the European Task Force on Atopic Dermatitis. Severity scoring of atopic dermatitis: The SCORAD index. *Dermatology* **1993**, *186*, 23–31.
27. Stalder, J.-F.; Barbarot, S.; Wollenberg, P.-D.D.A.; Holm, E.A.; De Raeve, L.; Seidenari, S.; Oranje, A.; Deleuran, M.; Cambazard, F.; Svensson, A.; et al. Patient-Oriented SCORAD (PO-SCORAD): A new self-assessment scale in atopic dermatitis validated in Europe: PO-SCORAD self-assessment scale validation. *Allergy* **2011**, *66*, 1114–1121. [CrossRef]
28. Charman, C.R.; Venn, A.J.; Williams, H.C. The patient-oriented eczema measure: Development and initial validation of a new tool for measuring atopic eczema severity from the patients' perspective. *Arch. Dermatol.* **2004**, *140*, 1513–1519. [CrossRef] [PubMed]
29. Finlay, A.; Khan, G. Dermatology Life Quality Index (DLQI)-a simple practical measure for routine clinical use. *Clin. Exp. Dermatol.* **1994**, *19*, 210–216. [CrossRef] [PubMed]
30. Basra, M.K.; Fenech, R.; Gatt, R.M.; Salek, M.S.; Finlay, A.Y. The Dermatology Life Quality Index 1994–2007: A comprehensive review of validation data and clinical results. *Br. J. Dermatol.* **2008**, *159*, 997–1035. [CrossRef]
31. Zigmond, A.S.; Snaith, R.P. The hospital anxiety and depression scale. *Acta Psychiatr. Scand.* **1983**, *67*, 361–370. [CrossRef]
32. Fliege, H.; Rose, M.; Arck, P.; Walter, O.B.; Kocalevent, R.D.; Weber, C.; Klapp, B.F. The Perceived Stress Questionnaire (PSQ) reconsidered: Validation and reference values from different clinical and healthy adult samples. *Psychosom. Med.* **2005**, *67*, 78–88. [CrossRef]
33. Kohls, N.; Sauer, S.; Walach, H. Facets of mindfulness—Results of an online study investigating the Freiburg mindfulness inventory. *Personal. Individ. Differ.* **2009**, *46*, 224–230. [CrossRef]
34. Walach, H.; Buchheld, N.; Buttenmüller, V.; Kleinknecht, N.; Schmidt, S. Measuring mindfulness—The Freiburg mindfulness inventory (FMI). *Personal. Individ. Differ.* **2006**, *40*, 1543–1555. [CrossRef]
35. Brown, K.W.; Ryan, R.M. The benefits of being present: Mindfulness and its role in psychological well-being. *J. Pers. Soc. Psychol.* **2003**, *84*, 822–848. [CrossRef] [PubMed]
36. Cohen, J. *Statistical Power Analysis for the Behavioral Sciences*, 2nd ed.; Routledge Academic: New York, NY, USA, 1988.
37. Silverberg, J.I.; Gelfand, J.; Margolis, D.J.; Fonacier, L.; Boguniewicz, M.; Schwartz, L.B.; Simpson, E.; Grayson, M.H.; Ong, P.Y.; Fuxench, Z.C.C. Severity strata for POEM, PO-SCORAD, and DLQI in US adults with atopic dermatitis. *Ann. Allergy Asthma Immunol.* **2018**, *121*, 464–468.e3. [CrossRef] [PubMed]
38. Dobkin, P.L.; Zhao, Q.; Monshat, K. Who experiences depressive symptoms following mindfulness-based stress reduction and why? *Int. J. Whole Pers. Care* **2017**, *4*, 13–31. [CrossRef]
39. Day, M.A.; Jensen, M.P.; Ehde, D.M.; Thorn, B.E. Toward a Theoretical Model for Mindfulness-Based Pain Management. *J. Pain* **2014**, *15*, 691–703. [CrossRef]
40. McEvoy, P.M.; Watson, H.; Watkins, E.; Nathan, P. The relationship between worry, rumination, and comorbidity: Evidence for repetitive negative thinking as a transdiagnostic construct. *J. Affect. Disord.* **2013**, *151*, 313–320. [CrossRef] [PubMed]

41. Simpson, E.L.; Guttman-Yassky, E.; Margolis, D.J.; Feldman, S.R.; Qureshi, A.; Hata, T.; Mastey, V.; Wei, W.; Eckert, L.; Chao, J.; et al. Association of Inadequately Controlled Disease and Disease Severity With Patient-Reported Disease Burden in Adults With Atopic Dermatitis. *JAMA Dermatol.* **2018**, *154*, 903–912. [[CrossRef](#)]
42. Hatzenbuehler, M.L.; Nolen-Hoeksema, S.; Dovidio, J. How does stigma “get under the skin”? The mediating role of emotion regulation. *Psychol. Sci.* **2009**, *20*, 1282–1289. [[CrossRef](#)]
43. Carroll, C.L.; Balkrishnan, R.; Feldman, S.R.; Fleischer, A.B., Jr.; Manuel, J.C. The burden of atopic dermatitis: Impact on the patient, family, and society. *Pediatr. Dermatol.* **2005**, *22*, 192–199. [[CrossRef](#)]
44. Davidson, R.J.; Goleman, D.J. The role of attention in meditation and hypnosis: A psychobiological perspective on transformations of consciousness. *Int. J. Clin. Exp. Hypn.* **1977**, *25*, 291–308. [[CrossRef](#)]
45. Ginsburg, I.H.; Prystowsky, J.H.; Kornfeld, D.S.; Wolland, H. Role of emotional factors in adults with atopic dermatitis. *Int. J. Dermatol.* **1993**, *32*, 656–660. [[CrossRef](#)]
46. van Laarhoven, A.I.; Walker, A.L.; Wilder-Smith, O.H.; Kroeze, S.; van Riel, P.L.; van de Kerkhof, P.C.; Kraaimaat, F.W.; Evers, A.W.M. Role of induced negative and positive emotions in sensitivity to itch and pain in women. *Br. J. Dermatol.* **2012**, *167*, 262–269. [[CrossRef](#)] [[PubMed](#)]
47. Goldin, P.R.; Gross, J.J. Effects of mindfulness-based stress reduction (MBSR) on emotion regulation in social anxiety disorder. *Emotion* **2010**, *10*, 83–91. [[CrossRef](#)] [[PubMed](#)]
48. Birnie, K.; Speca, M.; Carlson, L.E. Exploring Self-compassion and Empathy in the Context of Mindfulness-based Stress Reduction (MBSR). *Stress Health* **2010**, *26*, 359–371. [[CrossRef](#)]
49. Schutze, R.; Rees, C.; Preece, M.; Schutze, M. Low mindfulness predicts pain catastrophizing in a fear-avoidance model of chronic pain. *Pain* **2010**, *148*, 120–127. [[CrossRef](#)]