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Burden of adult atopic dermatitis and unmet needs with existing therapies

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ABSTRACT

Objective: Patients with atopic dermatitis (AD) have low treatment satisfaction. In this study, we evaluated the humanistic burden, treatment satisfaction, and treatment expectations in patients with AD in the United States.

Methods: Adults with AD recruited through the National Eczema Association and clinical sites completed a web-based survey comprising the Patient-Oriented SCORing Atopic Dermatitis (PO-SCORAD), Dermatology Life Quality Index; Work Productivity and Activity Impairment Questionnaire-Atopic Dermatitis; Treatment Satisfaction Questionnaire for Medication (TSQM); and answered questions on healthcare provider (HCP) visits, treatment history, and treatment goals. Descriptive analyses were performed to compare participants by severity.

Results: Among 186 participants (mean [standard deviation] age 39.7 [15.3] years, 79.6% female), 26.9%, 44.6%, and 26.3% of the participants had mild, moderate, or severe AD, respectively, based on PO-SCORAD. Greater disease severity was associated with a greater impact on work and daily life, decreased TSQM scores, and increased HCP visits. Corticosteroid topical cream or ointment (53.8%) and oral antihistamines (31.2%) were most commonly used for the treatment of AD. Participants reported declining/stopping/changing AD treatment due to the potential for side effects or lack of efficacy. 'Leading normal lives' (28.0%) and 'being itch-free' (33.9%) were important treatment goals.

Conclusions: Individuals with AD, especially severe disease, face a considerable humanistic burden even while using treatment.

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Atopic dermatitis; quality of life; work productivity; treatment satisfaction

Introduction

Atopic dermatitis (AD) is a chronic heterogeneous inflammatory skin disease (1). In the United States (US), the prevalence of AD in adults is approximately 2–7% (2–4), i.e., 6.6–23.2 million patients as calculated from 2020 US census data (5). Among these patients, the proportion of moderate-to-severe AD is approximately 30% (6). Moreover, among skin diseases, AD has the highest disease burden globally as measured by disability-adjusted life-years (7).

AD poses detrimental effects on patients' lives by impacting health and quality of life (QoL) as well as psychological, social, and occupational aspects (8). A recent US population-based survey reported that adults with AD (vs. those without AD) were more likely to rate their overall health as 'only fair'/'poor', and satisfaction with life as 'somewhat dissatisfied'/'very dissatisfied' (9). The prevalence of self-reported healthcare-diagnosed anxiety or depression is also higher in adults with AD vs. those without AD (40.0% vs. 17.5%) (10). Patients with AD in the US have also reported lower QoL and higher absenteeism, presenteeism, and overall work and activity impairment than matched non-AD controls (11). AD also imposes a substantial financial burden (8) as patients with AD incur significant out-of-pocket costs related to AD management (12), and have higher mean direct ($24,401 vs. $14,619) (13) and indirect costs ($8907 vs. $6517) (11) than those without AD.

Among AD treatments, topical agents such as moisturizers, corticosteroids, calcineurin inhibitors, and phosphodiesterase-4 inhibitors are often baseline therapeutic options (14), while phototherapy (15) and systemic immunomodulatory agents such as cyclosporine, azathioprine, mycophenolate mofetil, methotrexate or systemic corticosteroids may be considered if topical treatments inadequately control AD, or if the patient's QoL is substantially impacted (15,16). In the past five years, several treatments for AD have been approved by the Food and Drug Administration. These include biologics such as dupilumab and tralokinumab, oral small molecules such as upadacitinib and abrocitinib, and the topical small molecule ruxolitinib (17). Additionally, several agents administered via the injectable, oral, or topical route for AD treatment are being investigated (18).

Although treatment options are expanding, patients' satisfaction with traditional topical and systemic treatment options is low, and studies exploring or discussing newer treatment options are limited (19,20). Data on the humanistic burden and expectation of patients with AD in the US are limited. Thus, this study aimed to evaluate the humanistic burden of AD, treatment satisfaction, and

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treatment expectations for patients with AD, both overall and stratified by disease severity.

Methods

Study design and participant recruitment

This is a cross-sectional, non-interventional, US-based, web-based survey of adult participants with AD, conducted from September 2020 to February 2021. The study received institutional review board (IRB) approval from Advarra IRB (Columbia, MD; Advarra study number: Pro00041638). The recruitment methodology has been published previously (21). Participants were recruited through the National Eczema Association (NEA) advocacy group or via one of four clinical sites. Screening questions were used to determine participant eligibility. During the screening, participants were asked whether they had been offered or recommended systemic AD therapy in the past two years. Participants answering 'no' were approximated to have mild AD, and participants answering 'yes' were approximated to have moderate or severe AD. Enrollment was monitored to ensure that ≤25% of the study participants had mild AD (not offered a systemic AD therapy in the past two years). Systemic medications included oral or injectable corticosteroids, immunosuppressants, biologics (dupilumab), oral antihistamines, anti-microbial medications, and anti-viral medications. Once enrolled in the study, the severity of AD (mild, moderate, or severe) was clarified with use of Patient-Oriented SCORing Atopic Dermatitis (PO-SCORAD).

Eligible participants received a unique link to the web survey via e-mail and provided electronic consent. The survey comprised approximately 100–150 questions (depending on skip logic). Those who did not begin or complete the survey received at least one reminder e-mail. Respondents received $40 in the form of a gift card for completing the survey.

Inclusion and exclusion criteria

Participants were included if they were ≥18 years of age; lived in the US; had a diagnosis of AD for ≥12 months; could use a computer or smartphone and access the internet; provided consent; and could speak, read, and write English sufficiently to participate. Participants with a historic diagnosis of lupus erythematosus, psoriasis, and/or any form of skin cancer were excluded.

Measures

Data on demographics and clinical characteristics, employment status, and the impact of AD on employment were evaluated. Participants also completed the following patient-reported outcome measures: PO-SCORAD, Dermatology Life Quality Index (DLQI), Work Productivity and Activity Impairment Questionnaire-Atopic Dermatitis (WPAI-AD), and Treatment Satisfaction Questionnaire for Medication (TSQM).

PO-SCORAD considers the same items as the SCORAD (the extent and severity of AD lesions and the severity of itch and sleep disturbance; range, 0–103). Based on SCORAD index results, AD is classified into mild (≤27), moderate (≥28–≤56), and severe (≥57) (22). DLQI is a 10-item questionnaire scored on a scale of 0–30, with higher scores representing greater impairment of the patient's QoL (23). WPAI-AD is expressed as percentage of impairment, with higher numbers indicating greater impairment and lesser productivity (24). TSQM is a 14-item self-reported questionnaire divided into four domains: effectiveness, side effects, convenience, and global satisfaction. Using the provided scoring equation, total scores in each domain are calculated from 0 to 100. A higher score indicates better satisfaction in the domain (25). Participants also reported their healthcare provider (HCP) type, visit frequency, treatments used for AD, reasons for declining/discontinuing/changing AD treatment, and treatment goals, and expectations.

Statistical analysis

Descriptive analyses were performed on data for the overall sample and stratified by severity as per PO-SCORAD scores (≤27: mild AD, ≥28 to ≤56: moderate AD, and ≥57: severe AD) (22). Mean and standard deviation (SD) were presented for continuous variables. Frequency and percent distribution by category were presented for categorical variables. To evaluate differences across AD severity groups, Chi-square tests were used for categorical data and *t*-tests and general linear models were used for continuous data. Analysis of variance with Scheffe's test was used for multiple treatment comparisons. All statistical tests used a two-sided significance level of .05. Data were analyzed using SAS statistical software version 9.4 (SAS Institute Inc., Cary, NC).

Results

Participant disposition

Overall, 511 individuals were invited to participate in the survey, and 389 completed the screening questions. Among the 389 individuals, 183 were ineligible and 20 started the survey but did not complete it. The most common reasons for exclusion were 'did not endorse having a dermatologic condition' (n = 53; 10.4%), 'did not endorse having AD/eczema' (n = 25; 4.9%), and 'diagnosed with AD <12 months ago' (n = 25; 4.9%). In total, 186 participants (recruitment: NEA, n = 111; clinical sites, n = 75) were included in the analysis.

Demographic characteristics

The mean (SD) PO-SCORAD score was 42.1 (20.5). Out of 186 participants, most had moderate AD (n = 83; 44.6%), followed by mild AD (n = 50; 26.9%), and severe AD (n = 49; 26.3%). Demographic characteristics of the overall sample and stratified by PO-SCORAD AD severity are detailed in Table 1. Overall, the mean (SD) age was 39.7 (15.3) years, and the majority were female (n = 148; 79.6%). Approximately, half of the participants were White (n = 99; 53.2%) and were single/never married (n = 92; 49.5%). Participants with mild AD were older than those with moderate or severe AD (mean [SD] 42.8 [16.5] vs. 40.6 [14.9] vs. 35.1 [13.5]; p = .0311). The greatest proportion of participants among those with mild or moderate AD was White (n = 35; 70.0% and n = 47; 56.6%), respectively. Asian participants made up the greatest proportion of those with severe AD (n = 22; 44.9%). Based on the image selected in the PO-SCORAD, most participants reported a light skin tone (n = 79; 42.5%), followed by medium (n = 68; 36.6%), and dark (n = 38; 20.4%) (missing, n = 1 [0.5%]).

Quality of life, employment status, and impact of AD on employment

The mean (SD) DLQI score was 9.9 (7.4); scores increased as disease severity worsened (mild: 2.9 [3.6], moderate: 9.7 [5.7], severe:

Table 1. Participant demographic characteristics overall and by AD severity.

	Total (n = 186)[a]	Mild (n = 50)	Moderate (n = 83)	Severe (n = 49)	p Value
Age (years)					.0311
Mean (SD)	39.7 (15.3)	42.8 (16.5)	40.6 (14.9)	35.1 (13.5)	
Median	37.0	44.0	38.0	31.0	
Gender (n, %)					.4343
Female	148 (79.6%)	38 (76.0%)	70 (84.3%)	38 (77.6%)	
Male	38 (20.4%)	12 (24.0%)	13 (15.7%)	11 (22.4%)	
Race[b] (n, %)					
White	99 (53.2%)	35 (70.0%)	47 (56.6%)	16 (32.7%)	.0008
Asian	54 (29.0%)	5 (10.0%)	25 (30.1%)	22 (44.9%)	.0006
Black or African American	23 (12.4%)	8 (16.0%)	8 (9.6%)	7 (14.3%)	.5198
Mixed race	8 (4.3%)	2 (4.0%)	5 (6.0%)	1 (2.0%)	.5519
Other[c]	7 (3.8%)	1 (2.0%)	2 (2.4%)	4 (8.2%)	.1833
American Indian or Alaska Native	3 (1.6%)	2 (4.0%)	1 (1.2%)	0 (0.0%)	.2688
Native Hawaiian or Other Pacific Islander	3 (1.6%)	0 (0.0%)	1 (1.2%)	1 (2.0%)	.6175
Middle Eastern	2 (1.1%)	1 (2.0%)	1 (1.2%)	0 (0.0%)	.6292
Ethnicity (n, %)					.5449
Hispanic or Latino	18 (9.7%)	6 (12.0%)	6 (7.2%)	6 (12.2%)	
Not Hispanic or Latino	168 (90.3%)	44 (88.0%)	77 (92.8%)	43 (87.8%)	
Education (n, %)					.0883
Master's degree or higher	38 (20.4%)	8 (16.0%)	24 (28.9%)	5 (10.2%)	
Bachelor's degree	67 (36.0%)	22 (44.0%)	29 (34.9%)	15 (30.6%)	
Associate degree or professional certificate	20 (10.8%)	8 (16.0%)	6 (7.2%)	6 (12.2%)	
Trade/technical/vocational training	10 (5.4%)	3 (6.0%)	5 (6.0%)	2 (4.1%)	
Some college, but no degree	40 (21.5%)	7 (14.0%)	15 (18.1%)	16 (32.7%)	
High school graduate	11 (5.9%)	2 (4.0%)	4 (4.8%)	5 (10.2%)	
Less than high school	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	
Marital status (n, %)					.6667
Single, never married	92 (49.5%)	24 (48.0%)	38 (45.8%)	27 (55.1%)	
Married	69 (37.1%)	17 (34.0%)	32 (38.6%)	19 (38.8%)	
Divorced	22 (11.8%)	8 (16.0%)	11 (13.3%)	3 (6.1%)	
Separated	3 (1.6%)	1 (2.0%)	2 (2.4%)	0 (0.0%)	
Living situation (n, %)					.6610
Living with a partner or spouse	63 (33.9%)	16 (32.0%)	30 (36.1%)	15 (30.6%)	
Living with family members other than your spouse or partner	53 (28.5%)	15 (30.0%)	18 (21.7%)	18 (36.7%)	
Living alone	35 (18.8%)	9 (18.0%)	20 (24.1%)	6 (12.2%)	
Living with a partner or spouse and other family members	25 (13.4%)	7 (14.0%)	10 (12.0%)	8 (16.3%)	
Living with roommates (not family members)	10 (5.4%)	3 (6.0%)	5 (6.0%)	2 (4.1%)	
Household income (n, %)					.3080
$1–$5000	2 (1.1%)	0 (0.0%)	1 (1.2%)	1 (2.0%)	
$5001–$10,000	2 (1.1%)	1 (2.0%)	0 (0.0%)	1 (2.0%)	
$10,001–$15,000	1 (0.5%)	0 (0.0%)	1 (1.2%)	0 (0.0%)	
$15,001–$25,000	10 (5.4%)	2 (4.0%)	2 (2.4%)	5 (10.2%)	
$25,001–$50,000	31 (16.7%)	5 (10.0%)	14 (16.9%)	12 (24.5%)	
$50,001–$75,000	38 (20.4%)	7 (14.0%)	18 (21.7%)	12 (24.5%)	
$75,001–$100,000	23 (12.4%)	8 (16.0%)	10 (12.0%)	5 (10.2%)	
More than $100,000	43 (23.1%)	14 (28.0%)	22 (26.5%)	6 (12.2%)	
Prefer not to answer	36 (19.4%)	13 (26.0%)	15 (18.1%)	7 (14.3%)	

AD: atopic dermatitis; PO-SCORAD: Patient-Oriented SCORing Atopic Dermatitis; SD: standard deviation.
Scores from the PO-SCORAD rounded to the first integer were used to define severity; scores ≤27 indicate mild AD, scores ≥28 to ≤56 indicate moderate AD and scores ≥57 indicate severe AD.
[a]Four participants are missing severity level categorization due to at least one missing item on the PO-SCORAD.
[b]Participants were instructed to check all that apply so responses are not mutually exclusive.
[c]Other race reported as Hispanic (n = 4), Filipino (n = 1), and 'not applicable' (n = 2).

17.7 [5.2]; p < .0001). A very large or extremely large effect on their lives was reported by only 8.0% of the patients with mild AD (n = 4) and almost all patients with severe AD (n = 47; 95.9%) (Table 2).

More than half of the participants (n = 100; 53.8%) were employed full-time and 16.7% (n = 31) were employed part-time (Table 3). Of those not employed (n = 47), 10.6% (n = 5) were not employed due to moderate or severe AD. Overall, 48.4% (n = 90) of the participants reported no effect on their career or work life due to AD. A higher proportion of participants with mild AD (n = 39; 78.0%) than those with moderate AD (n = 34; 41.0%) or severe AD (n = 15; 30.6%) reported no effect on career or work life (p < .0001). Significant differences between AD severity groups were also observed for statements regarding increased distraction at work, taking on a job with less seniority or responsibility after AD diagnosis, and earning less money than possible if the participant did not have AD (p < .05 for all) (Table 3). For employed participants, the mean (SD) scores for absenteeism, presenteeism, and work productivity loss were 2.3 (9.3), 27.6 (27.7), and 28.7 (28.4), respectively. The mean (SD) activity impairment score for all participants was 34.7 (28.9). Participants with severe AD had higher scores (p < .05) for all four WPAI domains than those with mild and moderate AD (Figure 1).

Overall, 40.3% (n = 75) of the participants reported no effect of AD on any of their educational activities, relationships, family plans, or leisure activities. Here too, patients with mild AD (n = 31; 62.0%) fared better than those with moderate AD (n = 31; 37.3%) or severe AD (n = 11; 22.4%; p = .0002). Disease severity affected all other aspects of life significantly, except performing parenting duties (p < .05 for all) (Table 3).

Table 2. Quality of life in patients with AD[a].

	Total[b] (*N* = 186)	Mild (*N* = 50)	Moderate (*N* = 83)	Severe (*N* = 49)	*p* Value
DLQI total score					
Mean (SD)	9.9 (7.4)	2.9 (3.6)	9.7 (5.7)	17.7 (5.2)	<.0001
Effect on the patient's life (*n*, %)					
No effect at all (0–1)	29 (15.6%)	26 (52.0%)	2 (2.4%)	0 (0.0%)	<.0001
Small effect (2–5)	38 (20.4%)	15 (30.0%)	20 (24.1%)	2 (4.1%)	
Moderate effect (6–10)	34 (18.3%)	5 (10.0%)	28 (33.7%)	0 (0.0%)	
Very large effect (11–20)	67 (36.0%)	4 (8.0%)	29 (34.9%)	33 (67.3%)	
Extremely large effect (21–30)	18 (9.7%)	0 (0.0%)	4 (4.8%)	14 (28.6%)	

AD: atopic dermatitis; DLQI: Dermatology Life Quality Index; PO-SCORAD: Patient-Oriented SCORing Atopic Dermatitis; SD: standard deviation.
[a]Scores from the PO-SCORAD rounded to the first integer were used to define severity; scores ≤27 indicate mild AD, scores ≥28 to ≤56 indicate moderate AD, and scores ≥57 indicate severe AD.
[b]Four participants are missing severity level categorization due to at least one missing item on the PO-SCORAD.

Table 3. Work impact of AD[a].

	Total[b] (*N* = 186)	Mild (*N* = 50)	Moderate (*N* = 83)	Severe (*N* = 49)	*p* Value
Employment status (*n*, %)					
Employed full-time	100 (53.8%)	26 (52.0%)	46 (55.4%)	26 (53.1%)	.9214
Employed part-time	31 (16.7%)	8 (16.0%)	15 (18.1%)	8 (16.3%)	.9425
Full-time student	27 (14.5%)	5 (10.0%)	9 (10.8%)	13 (26.5%)	.0263
Full-time homemaker	12 (6.5%)	4 (8.0%)	3 (3.6%)	4 (8.2%)	.4522
Part-time student	8 (4.3%)	2 (4.0%)	4 (4.8%)	2 (4.1%)	.9677
Retired early	8 (4.3%)	3 (6.0%)	3 (3.6%)	1 (2.0%)	.5854
Retired at retirement age	8 (4.3%)	2 (4.0%)	6 (7.2%)	0 (0.0%)	.1454
Volunteer	5 (2.7%)	2 (4.0%)	3 (3.6%)	0 (0.0%)	.3845
On permanent disability (you do not expect to return to work)	3 (1.6%)	2 (4.0%)	0 (0.0%)	1 (2.0%)	.2077
On short-term disability	1 (0.5%)	0 (0.0%)	1 (1.2%)	0 (0.0%)	.5490
On long-term disability (you expect to return to work)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	
Working part-time due to atopic dermatitis (*n*, %)	7 (22.6%)	0 (0.0%)	4 (26.7%)	3 (37.5%)	.1742
Not employed due to atopic dermatitis (*n*, %)	5 (10.6%)	0 (0.0%)	2 (12.5%)	2 (13.3%)	.3698
Statement(s) that best describes how atopic dermatitis has affected career and work life (*n*, %)					
Atopic dermatitis has not affected my career or work life	90 (48.4%)	39 (78.0%)	34 (41.0%)	15 (30.6%)	<.0001
I work significantly fewer hours than I did before my atopic dermatitis diagnosis	10 (5.4%)	0 (0.0%)	6 (7.2%)	4 (8.2%)	.1313
I stopped working completely	8 (4.3%)	0 (0.0%)	4 (4.8%)	3 (6.1%)	.2347
The amount I work has not changed but I am more distracted at work	53 (28.5%)	6 (12.0%)	27 (32.5%)	20 (40.8%)	.0045
I took another job with less seniority or responsibility than the job I had before my atopic dermatitis diagnosis	7 (3.8%)	0 (0.0%)	2 (2.4%)	5 (10.2%)	.0201
I do not earn as much money as I could if I did not have atopic dermatitis	18 (9.7%)	0 (0.0%)	10 (12.0%)	7 (14.3%)	.0262
I did not receive an expected promotion	3 (1.6%)	0 (0.0%)	2 (2.4%)	1 (2.0%)	.5540
I have changed my career expectations	25 (13.4%)	2 (4.0%)	15 (18.1%)	7 (14.3%)	.0649
I am unable to take a certain type of job	35 (18.8%)	6 (12.0%)	16 (19.3%)	11 (22.4%)	.3762
Has atopic dermatitis affected any of the following aspects of your life?[c] (*n*, %)					
Atopic dermatitis has not affected any of my educational activities, relationships, family plans, or leisure activities	75 (40.3%)	31 (62.0%)	31 (37.3%)	11 (22.4%)	.0002
Pursue higher education (including delay in education, changed area of study, increased length of time to complete studies, etc.)	18 (9.7%)	2 (4.0%)	5 (6.0%)	11 (22.4%)	.0025
Do things that interest you (including personal hobbies, travel, join a special interest group, be active in a religious organization, etc.)	95 (51.1%)	18 (36.0%)	46 (55.4%)	30 (61.2%)	.0277
Marry or become involved in a long-term relationship	28 (15.1%)	2 (4.0%)	12 (14.5%)	13 (26.5%)	.0069
Have children	15 (8.1%)	0 (0.0%)	7 (8.4%)	8 (16.3%)	.0127
Perform parenting duties	11 (5.9%)	2 (4.0%)	3 (3.6%)	6 (12.2%)	.1029

AD: atopic dermatitis; PO-SCORAD: Patient-Oriented SCORing Atopic Dermatitis.
[a]Scores from the PO-SCORAD rounded to the first integer were used to define severity; scores ≤27 indicate mild AD, scores ≥28 to ≤56 indicate moderate AD, and scores ≥57 indicate severe AD.
[b]Four participants are missing severity level categorization due to at least one missing item on the PO-SCORAD.
[c]Responses are not mutually exclusive.

Treatment satisfaction of topical and systemic medications

Overall, in participants receiving topical medications, the mean (SD) TSQM global satisfaction, effectiveness, side effects, and convenience scores were 64.0 (20.5), 58.1 (20.3), 64.8 (31.7), and 67.3 (15.2), respectively (Figure 2(A)). Significant differences were observed in all four TSQM domains on stratification by disease severity (global satisfaction: $p = .0039$, effectiveness: $p < .0001$, side effects: $p = .0423$, and convenience: $p = .003$). Pairwise comparisons showed significantly higher scores for participants with mild AD for global satisfaction (vs. severe AD; $p < .01$), effectiveness (vs. severe AD; $p < .001$), and convenience (vs. moderate AD; $p < .01$ and vs. severe AD; $p < .05$). Significantly higher effectiveness scores were reported by participants with moderate AD vs. severe AD ($p < .01$).

In participants receiving systemic medications, the mean (SD) TSQM global satisfaction, effectiveness, side effects, and convenience scores were 67.8 (23.0), 65.6 (25.2), 67.3 (31.8), and 70.1 (16.4), respectively (Figure 2(B)). Significant differences were

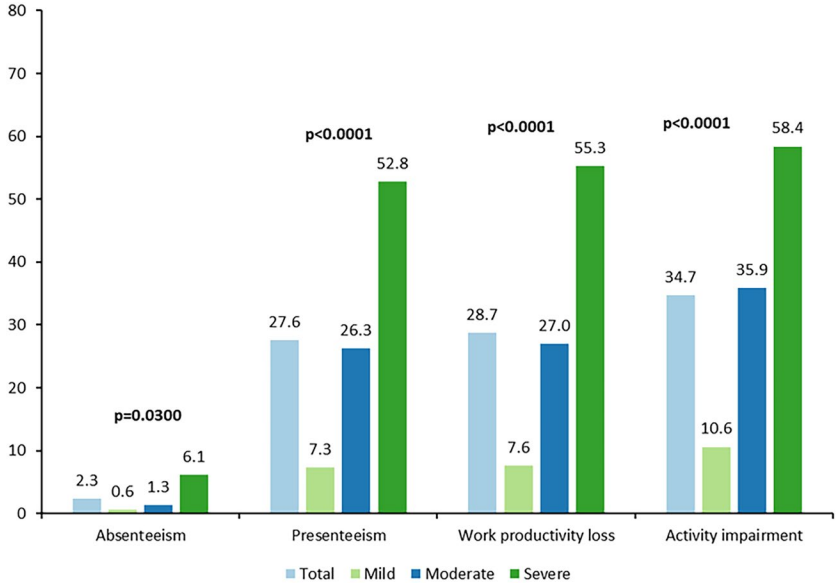

Figure 1. Work Productivity and Activity Impairment Questionnaire – Atopic Dermatitis[a]. Recall period: past seven days. [a]Scores from the PO-SCORAD rounded to the first integer were used to define severity; scores ≤27 indicate mild AD, scores ≥28 to ≤56 indicate moderate AD, and scores ≥57 indicate severe AD. Four participants were missing severity level categorization due to at least one missing item on the PO-SCORAD. Employed: n = 126. For absenteeism, presenteeism, and work productivity loss scores: total, n = 126; mild, n = 33; moderate, n = 59; severe, n = 32. For activity impairment score: total, n = 186; mild, n = 50; moderate, n = 83; severe, n = 49. AD: atopic dermatitis; PO-SCORAD: Patient-Oriented SCORing Atopic Dermatitis.

observed in stratification by disease severity for TSQM global satisfaction (p = .0033) and effectiveness (p < .0001) domains. Pairwise comparisons showed significantly higher scores for participants with mild AD for global satisfaction (vs. severe AD; p < .01), and effectiveness (vs. moderate AD; p < .01 and vs. severe AD; p < .001). TSQM side effects and convenience domain scores were not statistically different between the AD severity groups.

AD healthcare visits

Most of the participants visited a dermatologist (n = 133; 71.5%) for AD treatment. Participants most often visited any HCP for AD every three (n = 47; 26.9%) or six months (n = 43; 24.6%); visit frequency increased with disease severity (p = .0045). Most participants (n = 114; 65.1%) received an appointment within two weeks of contacting any HCP and traveled <30 min to reach the HCP's office (n = 131; 74.9%) (Table 4).

AD treatments and expectations

The most used current topical treatments were topical corticosteroid creams or ointments (n = 100; 53.8%) and emollients or moisturizers (n = 90; 48.4%), and the most used current systemic treatments were oral antihistamines (n = 58; 31.2%) and biologics (n = 54; 29.0%). Among topical and systemic treatments, disease severity only impacted the usage of oral antihistamines (p = .0048) and oral or injected corticosteroids (p = .0044) (Table 5). Overall, 47.3% of participants reported that they are taking all medications as prescribed.

In total, 38.7% (n = 72) of participants reported that they had declined AD treatment at least once. The most declined topical treatment was topical corticosteroid cream or ointment (n = 27; 37.5%), and the most declined systemic treatments were biologics (n = 25; 34.7%), immunosuppressants (n = 23; 31.9%), and oral or injected corticosteroids (n = 21; 29.2%). Among participants who declined a topical corticosteroid cream or ointment, the proportion of participants with mild AD (66.7%) was significantly higher than those with moderate (23.5%) or severe AD (40.0%; p = .0260). Significant differences were not observed between the AD severity groups for systemic treatments (Table 5). The most common reason for declining topical or systemic treatments was the potential for side effects (Appendix 1).

The most common reasons for stopping or changing AD treatment were 'the treatment did not work' (n = 126; 67.7%) and 'side effects of treatment' (n = 76; 40.9%) (Table 5). In terms of improving the current treatment's characteristics, participants most frequently reported 'a medication that helps me reduce my symptoms' and 'a medication that helps me reduce my flares' (data not shown).

The most important treatment goal associated with daily life/social activities for participants was to 'Lead a normal everyday life' (n = 52; 28.0%) (Figure 3(A)); significant differences were present between the AD severity groups (p = .0008). The most important treatment goals associated with treatment and symptom management for participants were 'be free of itching' (n = 63; 33.9%) and 'have clear skin' (n = 60; 32.3%) (Figure 3(B)).

Overall, 39.8% (n = 74) participants reported their treatment goals matched their HCP's treatment goals 'very closely', while 16.2% (n = 30) reported their treatment goals matched 'not very closely' or 'not at all' (Table 5). Participants with severe AD were more likely to report mismatched goals (p = .0005).

Discussion

In the current study, we evaluated the humanistic burden of AD, AD treatment satisfaction, and treatment expectations in patients with AD in the US, overall and stratified by disease severity. We observed that greater disease severity decreased QoL and work productivity, increased activity impairment, and decreased treatment satisfaction. The treatment goals of patients with higher disease severity and the perceived goals of HCPs were more likely to not match.

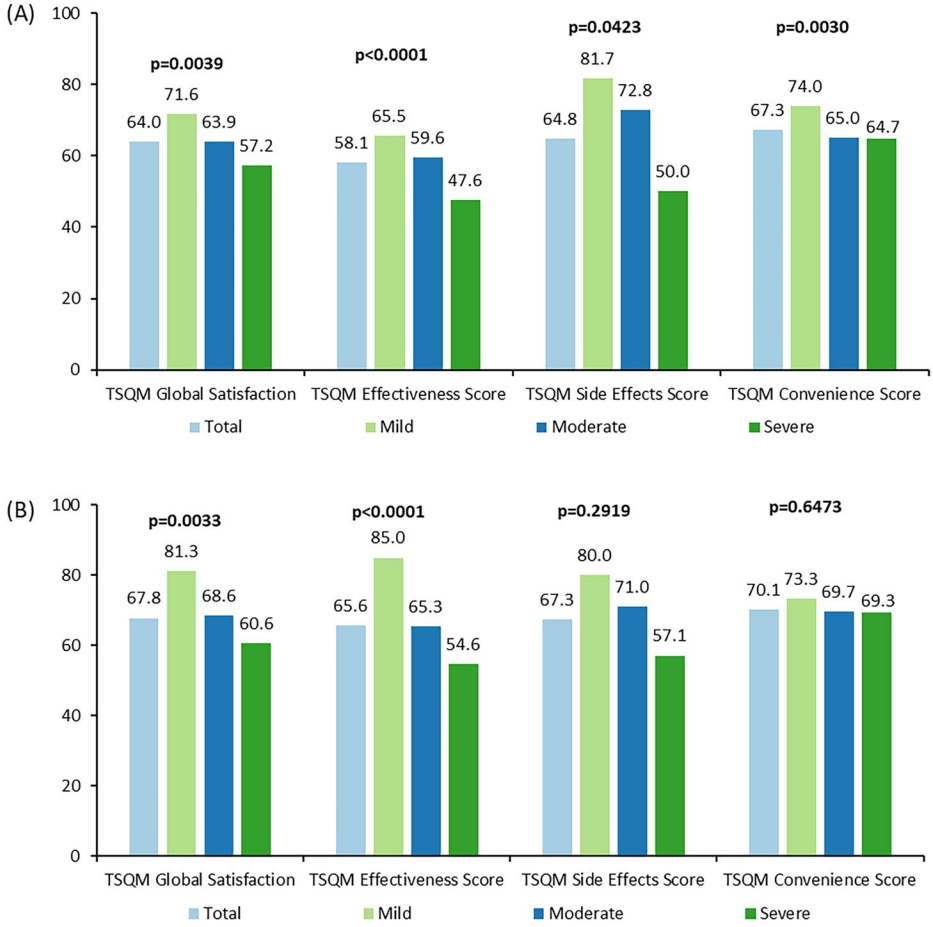

Figure 2. Treatment Satisfaction Questionnaire Medication (TSQM Version 2.0), topical and systemic medications, overall and by disease severity[a,b,c]. (A, B) TSQM scores for topical and systemic medications, respectively. (A) Pairwise comparisons: global satisfaction – mild vs. severe ($p < .01$), effectiveness – mild vs. severe ($p < .001$) and moderate vs. severe ($p < .01$), convenience – mild vs. moderate ($p < .01$), and mild vs. severe ($p < .05$). (B) Pairwise comparisons: global satisfaction – mild vs. severe ($p < .01$), effectiveness – mild vs. moderate ($p < .01$), and mild vs. severe ($p < .001$). [a]Topical medications included: corticosteroid topical cream or ointment, topical calcineurin inhibitor, topical phosphodiesterase 4 inhibitor, antihistamine by topical cream or ointment, emollient or moisturizer, itch cream, gel or ointment, and cleansers. [b]Systemic medications included: corticosteroid by mouth or injection, immunosuppressant, biologics (dupilumab), antihistamine by mouth, anti-microbial medication, and anti-viral medication. [c]Scores from the PO-SCORAD were used to define severity; scores ≤27 indicate mild AD, scores ≥28 to ≤56 indicate moderate AD, and scores ≥57 indicate severe AD.
Three and two participants for topical and systemic medications respectively are missing severity level categorization due to at least one missing item on the PO-SCORAD. Missing values were not included in %.In topical medications, for global satisfaction, effectiveness score, and convenience score: total, $n = 171$; mild, $n = 44$; moderate, $n = 79$; severe, $n = 45$. For side effects score: total, $n = 40$; mild, $n = 5$; moderate, $n = 19$; severe, $n = 16$. In systemic medications, for global satisfaction, effectiveness score, and convenience score: total, $n = 113$; mild, $n = 20$; moderate, $n = 55$; severe, $n = 36$. For side effects score: total, $n = 40$; mild, $n = 5$; moderate, $n = 21$; severe, $n = 14$. AD: atopic dermatitis; PO-SCORAD: Patient-Oriented SCORing Atopic Dermatitis; TSQM: Treatment Satisfaction Questionnaire Medication.

The mean DLQI score in the current study was higher than previous studies, most likely due to the greater proportion of participants with severe AD in this study (26.3%, defined by PO-SCORAD) compared with previous studies (11.0% and 8.1%, defined by the Patient-Oriented Eczema Measure Scale) (4,9). Enrollment was monitored in our study to ensure that ≤25% of the participants approximated mild AD. In addition to the sixfold greater mean DLQI score observed in participants with severe AD compared with mild AD in this study, the stark difference in the proportion of participants with mild and severe AD reporting a 'very large' or 'extremely large' effect of AD on their lives shows the high burden of severe AD on QoL.

Except for absenteeism, the WPAI scores in the current study were generally comparable to scores reported in two studies evaluating data from the 2013 National Health and Wellness Survey (11,26). Further, participants with moderate or severe AD had 2–4-fold and 5–10-fold higher scores across the WPAI questionnaire domains than those with mild AD, respectively. In the current study, 51.6% of the participants reported some sort of an impact of AD on career and work life; participants with severe AD reported an impact (69.4%) more than those with mild (22.0%) or moderate AD (59.0%). Many participants (59.7%) reported that AD affected their educational activities, relationships, family plans, or leisure activities. These results corroborate prior findings on the heavy lifestyle burden imposed by AD, especially in patients with moderate or severe disease (9).

In the current study, the most-used current systemic treatments were oral antihistamines. However, evidence on efficacy of antihistamines as a part of AD treatment is insufficient (15,27–30). In addition, blocking histamine receptors does not lead to significant improvement in itch or inflammation associated with AD (31). This could be a reason for lower treatment satisfaction among patients with AD. In a recent retrospective study of adult patients with AD, 21.1% of those receiving topical therapy and

Table 4. Healthcare provider visits for atopic dermatitis treatment[a].

	Total[b] (*N* = 186)	Mild (*N* = 50)	Moderate (*N* = 83)	Severe (*N* = 49)	*p* Value
Healthcare provider or medical specialist for AD (*n*, %)					
Dermatologist	133 (71.5%)	27 (54.0%)	65 (78.3%)	38 (77.6%)	.0760
My primary healthcare provider (internist or general practitioner)	34 (18.3%)	16 (32.0%)	9 (10.8%)	9 (18.4%)	
I do not see any healthcare providers to treat my dermatitis	11 (5.9%)	4 (8.0%)	5 (6.0%)	2 (4.1%)	
Allergist/Immunologist	5 (2.7%)	3 (6.0%)	2 (2.4%)	0 (0.0%)	
Naturopathic doctor	1 (0.5%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	
Other medical specialist	2 (1.1%)	0 (0.0%)	2 (2.4%)	0 (0.0%)	
On average, how often do you visit your provider for your AD? (*n*, %)					
No routine follow-up	24 (13.7%)	8 (17.4%)	9 (11.5%)	5 (10.6%)	.0045
More than once per month	5 (2.9%)	0 (0.0%)	2 (2.6%)	3 (6.4%)	
Monthly	16 (9.1%)	1 (2.2%)	8 (10.3%)	7 (14.9%)	
Every three months	47 (26.9%)	5 (10.9%)	22 (28.2%)	19 (40.4%)	
Every six months	43 (24.6%)	15 (32.6%)	21 (26.9%)	7 (14.9%)	
Once a year or less	40 (22.9%)	17 (37.0%)	16 (20.5%)	6 (12.8%)	
From time you contact office to schedule, how long does it take to get an appointment for your AD? (*n*, %)					
Less than two days	19 (10.9%)	5 (10.9%)	8 (10.3%)	4 (8.5%)	.2117
Two days to one week	48 (27.4%)	18 (39.1%)	18 (23.1%)	12 (25.5%)	
One to two weeks	47 (26.9%)	13 (28.3%)	22 (28.2%)	11 (23.4%)	
Two to four weeks	28 (16.0%)	5 (10.9%)	10 (12.8%)	13 (27.7%)	
One month	16 (9.1%)	3 (6.5%)	7 (9.0%)	5 (10.6%)	
Over one month	16 (9.1%)	2 (4.3%)	12 (15.4%)	2 (4.3%)	
Missing	1 (0.6%)	0 (0.0%)	1 (1.3%)	0 (0.0%)	
How long does it take to travel to your provider's office? (*n*, %)					
Less than 15 minutes	52 (29.7%)	17 (37.0%)	19 (24.4%)	15 (31.9%)	.4533
15–30 minutes	79 (45.1%)	22 (47.8%)	36 (46.2%)	18 (38.3%)	
30–60 minutes	40 (22.9%)	7 (15.2%)	21 (26.9%)	12 (25.5%)	
1–2 hours	3 (1.7%)	0 (0.0%)	2 (2.6%)	1 (2.1%)	
More than 2 hours	1 (0.6%)	0 (0.0%)	0 (0.0%)	1 (2.1%)	

AD: atopic dermatitis; PO-SCORAD: Patient-Oriented SCORing Atopic Dermatitis.
[a]Scores from the PO-SCORAD rounded to the first integer were used to define severity; scores ≤27 indicate mild AD, scores ≥28 to ≤56 indicate moderate AD and scores ≥57 indicate severe AD.
[b]Four participants are missing severity level categorization due to at least one missing item on the PO-SCORAD.

30.8% receiving topical + systemic therapy were 'less than satisfied' with their current AD treatments (20), suggesting an unmet need in patients using either topical or both topical and systemic treatments. Although this study did not compare TSQM scores of participants based on treatment category, participants on topical therapy scored numerically lower than those on systemic therapy. Moreover, in line with studies from Japan and the US (19,32), the lowest treatment satisfaction was observed in participants with severe AD. These findings emphasize the need for effective treatments in patients with more severe AD. Although new treatments have been recently approved for use (17), their effect in the real-world setting remains to be seen (33).

In the current study, participants commonly stopped or changed AD treatment due to 'ineffectiveness' (67.7%) or 'side effects' (40.9%). This is consistent with German patients with AD who reported 'adverse events' (43.8%) and 'ineffectiveness' (22.9%) as the major reasons for treatment discontinuation (34). It is important to note that 'ineffectiveness' and 'side effects' were the most common reasons for discontinuing or changing treatment across severity levels. Among participants who declined AD treatment (38.7%), 'fear of potential side effects' was also the most common reason. This commonality suggests that the patients' emphasis on disease control and safe medications is unmet by currently available treatments.

In line with a cross-sectional German study (35), the most important treatment goal associated with daily life/social activities for participants in the current study was to 'Lead a normal everyday life'. In terms of symptom management, 'be free of itching' and 'have clear skin' were the most important treatment goals in the current and Augustin et al.'s study (35) as itching is the most burdensome symptom (9,36). Although we did not evaluate treatment goals based on disease severity, research shows patients with greater severity have more needs, especially those related to handling adverse effects (35).

When asked about treatment goals, most participants (71.0%) in the current study felt that their treatment goals matched somewhat/very closely with their HCP's treatment goals; however, greater disease severity was associated with a greater mismatch. For shared decision-making in clinical practice, physicians must encourage and facilitate a discussion to enable patients to elucidate their needs and goals, as well as educate patients about available treatments, including their potential benefits and associated risks. This will help patients and HCPs determine, through shared decision-making, the appropriate individualized therapeutic strategy and consequently achieve the best possible outcomes in the management of AD.

Limitations

Anonymous web-based data collection prevented clinical verification of diagnosis and other clinical data. To overcome this limitation, participants were recruited from four clinical sites, allowing clinicians to confirm the diagnosis in 40% of the sample. Moreover, participants recruited in both modalities had similar characteristics. The study did not include some important confounders such as age, sex, household income, and region, which may also influence the results. The generalizability of the results may be limited due to convenience sampling via the NEA advocacy group and clinical sites. Replicating this research in countries with different healthcare systems, diagnoses, and treatment patterns may reveal similar or varying results. Finally, as participants self-reported the data it might be subject to recall bias (37).

Table 5. Atopic dermatitis treatment[a].

	Total[b] (*N* = 186)	Mild (*N* = 50)	Moderate (*N* = 83)	Severe (*N* = 49)	*p* Value
Which atopic dermatitis treatments are you currently using at the direction of a healthcare provider?[c](n, %)					
Topical					
Topical corticosteroid cream or ointment	100 (53.8%)	23 (46.0%)	48 (57.8%)	26 (53.1%)	.4156
Emollients or moisturizers	90 (48.4%)	18 (36.0%)	44 (53.0%)	26 (53.1%)	.1217
Itch creams, gels, or ointments	51 (27.4%)	10 (20.0%)	26 (31.3%)	15 (30.6%)	.3317
Cleansers	43 (23.1%)	7 (14.0%)	23 (27.7%)	12 (24.5%)	.1845
Topical calcineurin inhibitors	40 (21.5%)	6 (12.0%)	21 (25.3%)	12 (24.5%)	.1611
Topical phosphodiesterase 4 inhibitors	35 (18.8%)	5 (10.0%)	15 (18.1%)	14 (28.6%)	.0591
Topical antihistamine cream or ointment	15 (8.1%)	2 (4.0%)	6 (7.2%)	7 (14.3%)	.1597
Systemic					
Oral antihistamine	58 (31.2%)	7 (14.0%)	34 (41.0%)	17 (34.7%)	.0048
Biologics[d]	54 (29.0%)	14 (28.0%)	23 (27.7%)	15 (30.6%)	.9333
Oral or injected corticosteroid	20 (10.8%)	1 (2.0%)	8 (9.6%)	11 (22.4%)	.0044
Anti-viral medications	9 (4.8%)	2 (4.0%)	3 (3.6%)	4 (8.2%)	.4754
Anti-microbial medications	8 (4.3%)	0 (0.0%)	6 (7.2%)	2 (4.1%)	.1426
Immunosuppressant[e]	2 (1.1%)	0 (0.0%)	1 (1.2%)	1 (2.0%)	.6175
Other					
Sleep aids	21 (11.3%)	2 (4.0%)	10 (12.0%)	9 (18.4%)	.0803
Analgesics, anti-inflammatory agents, or NSAIDs	12 (6.5%)	4 (8.0%)	5 (6.0%)	3 (6.1%)	.8950
Phototherapy	8 (4.3%)	0 (0.0%)	3 (3.6%)	5 (10.2%)	.0417
Aspirin	3 (1.6%)	1 (2.0%)	2 (2.4%)	0 (0.0%)	.5610
Other	2 (1.1%)	0 (0.0%)	2 (2.4%)	0 (0.0%)	.2994
None of the above	17 (9.1%)	10 (20.0%)	6 (7.2%)	1 (2.0%)	.0060
Have you ever declined a treatment offered for your atopic dermatitis? (n, %)					
No	114 (61.3%)	38 (76.0%)	49 (59.0%)	24 (49.0%)	
Yes	72 (38.7%)	12 (24.0%)	34 (41.0%)	25 (51.0%)	.0199
Topical[f]	66 (38.4%)				
Systemic[f]	45 (39.8%)				
Topical[c]					
Topical corticosteroid cream or ointment	27 (37.5%)	8 (66.7%)	8 (23.5%)	10 (40.0%)	.0260
Topical calcineurin inhibitors	19 (26.4%)	3 (25.0%)	6 (17.6%)	10 (40.0%)	.1576
Topical phosphodiesterase 4 inhibitors	14 (19.4%)	3 (25.0%)	5 (14.7%)	6 (24.0%)	.5943
Itch creams, gels, or ointments	3 (4.2%)	0 (0.0%)	2 (5.9%)	1 (4.0%)	.6828
Emollients or moisturizers	2 (2.8%)	0 (0.0%)	1 (2.9%)	1 (4.0%)	.7876
Topical antihistamine cream or ointment	1 (1.4%)	0 (0.0%)	1 (2.9%)	0 (0.0%)	.5759
Cleansers	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	
Systemic[c]					
Biologics[d]	25 (34.7%)	1 (8.3%)	14 (41.2%)	9 (36.0%)	.1131
Immunosuppressant[e]	23 (31.9%)	2 (16.7%)	12 (35.3%)	9 (36.0%)	.4417
Oral or injected corticosteroid	21 (29.2%)	3 (25.0%)	8 (23.5%)	10 (40.0%)	.3639
Anti-microbial medications	3 (4.2%)	0 (0.0%)	1 (2.9%)	2 (8.0%)	.4611
Anti-viral medications	3 (4.2%)	0 (0.0%)	2 (5.9%)	1 (4.0%)	.6828
Oral antihistamines	2 (2.8%)	0 (0.0%)	1 (2.9%)	0 (0.0%)	.5759
Other[c]					
Phototherapy	13 (18.1%)	1 (8.3%)	7 (20.6%)	5 (20.0%)	.6175
Sleep aids	3 (4.2%)	0 (0.0%)	2 (5.9%)	1 (4.0%)	.6828
Other	2 (2.8%)	0 (0.0%)	1 (2.9%)	1 (4.0%)	.7876
Analgesics, anti-inflammatory agents, or NSAIDs	1 (1.4%)	0 (0.0%)	1 (2.9%)	0 (0.0%)	.5759
Aspirin	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	
Over your atopic dermatitis history, which of the following reasons have ever caused you to stop or change a treatment?[c](n, %)					
Treatment did not work	126 (67.7%)	29 (58.0%)	65 (78.3%)	30 (61.2%)	.0247
Side effects of treatment	76 (40.9%)	16 (32.0%)	36 (43.4%)	24 (49.0%)	.2125
Change in health insurance status	39 (21.0%)	8 (16.0%)	19 (22.9%)	12 (24.5%)	.5344
Change in healthcare provider	24 (12.9%)	6 (12.0%)	12 (14.5%)	6 (12.2%)	.8973
Time needed to apply/take medication	22 (11.8%)	4 (8.0%)	10 (12.0%)	7 (14.3%)	.6075
Scheduling difficulties (treatment did not fit with my lifestyle or schedule)	20 (10.8%)	2 (4.0%)	9 (10.8%)	9 (18.4%)	.0733
Time needed for medication to work	18 (9.7%)	3 (6.0%)	9 (10.8%)	5 (10.2%)	.6302
Method of delivery/administration	11 (5.9%)	2 (4.0%)	4 (4.8%)	4 (8.2%)	.6188
Method of administration	10 (5.4%)	3 (6.0%)	2 (2.4%)	3 (6.1%)	.4885
None of the above	28 (15.1%)	15 (30.0%)	8 (9.6%)	4 (8.2%)	.0018
How closely do you feel your treatment goals for atopic dermatitis match the goals of your health care provider treating your atopic dermatitis? (n, %)					
Very closely	74 (39.8%)	28 (56.0%)	33 (39.8%)	11 (22.4%)	.0005
Somewhat closely	58 (31.2%)	8 (16.0%)	27 (32.5%)	22 (44.9%)	
Not very closely	18 (9.7%)	3 (6.0%)	9 (10.8%)	6 (12.2%)	
Not at all	12 (6.5%)	2 (4.0%)	1 (1.2%)	8 (16.3%)	
Unsure	11 (5.9%)	4 (8.0%)	6 (7.2%)	1 (2.0%)	
Not applicable (not seeing a healthcare provider)	13 (7.0%)	5 (10.0%)	7 (8.4%)	1 (2.0%)	

NSAID: nonsteroidal anti-inflammatory drugs.

[a]Scores from the PO-SCORAD rounded to the first integer were used to define severity; scores ≤27 indicate mild AD, scores ≥28 to ≤56 indicate moderate AD, and scores ≥57 indicate severe AD.

[b]Four participants are missing severity level categorization due to at least one missing item on the PO-SCORAD.

[c]Responses are not mutually exclusive.

[d]Biologics included dupilumab.

[e]Immunosuppressants included methotrexate, azathioprine, cyclosporine, and mycophenolate mofetil.

[f]Sixty-six from 172 participants on topical medications declined treatment and 45 from 113 participants on systemic medications declined treatment.

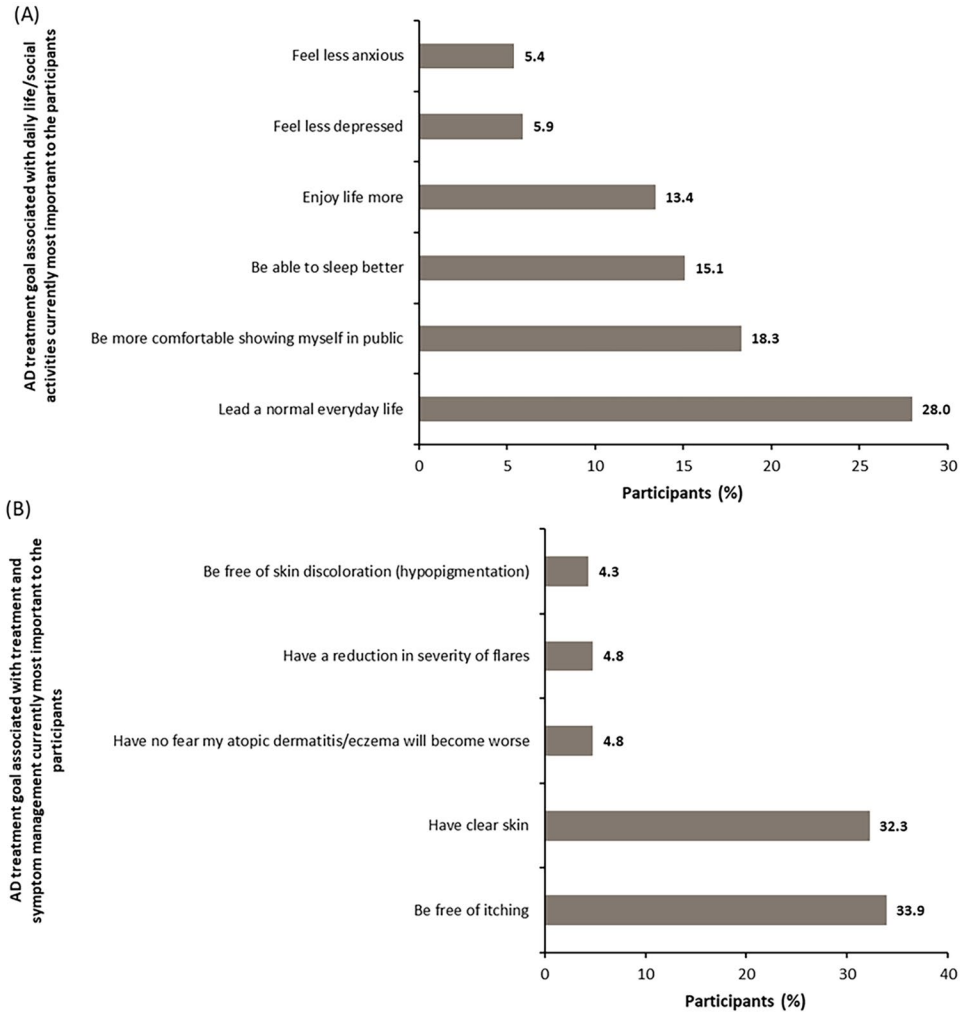

Figure 3. Atopic dermatitis treatment goal associated with daily life/social activities and treatment and symptom management currently most important to participants. (A) AD treatment goals associated with daily life/social activities currently most important to the participants. (B) AD treatment goals associated with treatment and symptom management currently most important to the participants. In figure 3A, n = 186. Other reasons accounting to <5% each were: be comfortable in my sex life (4.3%), be more productive in my everyday life (3.8%), be less of a burden on relatives/friends (1.1%), engage in normal leisure activities (1.1%), be less of a burden in my marriage or partnership (1.1%), be more productive in my working life (0.5%), and have more social contact with people (0.5%). In figure 3B, n = 186. Other reasons accounting to <4% each were: be free of skin pain (3.2%), have a reduction in frequency of flares (3.2%), have improved predictability of atopic flares from day to day (2.7%), find a clear diagnosis and treatment plan (2.7%), have a treatment that works quickly (2.2%), be less dependent on doctor and clinic visits (1.6%), have fewer of side effects of treatment (1.6%), be free of burning sensation on skin (0.5%), spend less time on treatment (0.5%), use fewer treatments (0.5%), have fewer out-of-pocket treatment expenses (0.5%), and have confidence that therapy will work (0.5%).AD: atopic dermatitis.

Conclusions

In this real-world cross-sectional study of participants with AD, negative humanistic findings were found across all AD severities but were higher in those with more severe AD. Treatment satisfaction with topical and systemic medications generally decreased with increasing disease severity. Our findings emphasize the need for effective treatments in AD, especially in those with more severe disease.

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Disclosure statement

EDB and JC are employed by Evidera, which provides consulting and other research services to pharmaceutical, device, government, and non-government organizations. In their salaried positions, they work with a variety of companies and organizations and are precluded from receiving any payment or honoraria directly from these organizations for services rendered. EJP, ARA, and ZD are employed by and own stock in Eli Lilly and Company. ARA has consulted for Henkel and received the Pfizer Independent Grant for Learning and Change. WSB has received grant funding from Pfizer and advisory board honoraria from Pfizer and Incyte. LB has received advisory board honoraria from Incyte. WSB and LB are salaried employees of the National Eczema Association, which has received grants and sponsorship awards from a variety of industry partners (full list at https://nationaleczema.org/about-nea/corporate-supporters).

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Data availability statement

YouGov provided Evidera with de-identified, fully documented datasets. Evidera may provide the datasets generated during and/or analyzed during the current study upon request; contact Elizabeth Bacci at Elizabeth.Bacci@evidera.com.

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Appendix 1. Reasons to decline atopic dermatitis treatment.[a,b]

	Total[c] (*N* = 186)	Mild (*N* = 50)	Moderate (*N* = 83)	Severe (*N* = 49)	*p* Value
Oral or injected corticosteroid					
Potential side effects	21 (100.0%)	3 (100.0%)	8 (100.0%)	10 (100.0%)	
Method of delivery/administration	2 (9.5%)	0 (0.0%)	2 (25.0%)	0 (0.0%)	.1660
Cost (my health insurance only partially covers the treatment)	1 (4.8%)	0 (0.0%)	0 (0.0%)	1 (10.0%)	.5613
Other	1 (4.8%)	1 (33.3%)	0 (0.0%)	0 (0.0%)	.0429
Topical corticosteroid cream or ointment					
Potential side effects	20 (74.1%)	7 (87.5%)	4 (50.0%)	8 (80.0%)	.1964
Cost (my health insurance only partially covers the treatment)	3 (11.1%)	1 (12.5%)	1 (12.5%)	1 (10.0%)	.9813
Cost (I do not have health insurance or health insurance does not cover the treatment)	2 (7.4%)	0 (0.0%)	2 (25.0%)	0 (0.0%)	.0874
Method of delivery/administration	2 (7.4%)	1 (12.5%)	1 (12.5%)	0 (0.0%)	.5081
Time needed to apply/take medication	1 (3.7%)	1 (12.5%)	0 (0.0%)	0 (0.0%)	.3104
Scheduling difficulties (treatment did not fit with my lifestyle or schedule)	1 (3.7%)	1 (12.5%)	0 (0.0%)	0 (0.0%)	.3104
Other	7 (25.9%)	2 (25.0%)	2 (25.0%)	2 (20.0%)	.9576
Topical calcineurin inhibitors					
Potential side effects	9 (47.4%)	2 (66.7%)	2 (33.3%)	5 (50.0%)	.6219
Cost (I do not have health insurance or health insurance does not cover the treatment)	4 (21.1%)	0 (0.0%)	0 (0.0%)	4 (40.0%)	.1023
Cost (my health insurance only partially covers the treatment)	3 (15.8%)	1 (33.3%)	1 (16.7%)	1 (10.0%)	.6219
Time needed for medication to work	1 (5.3%)	0 (0.0%)	1 (16.7%)	0 (0.0%)	.3187
Other	4 (21.1%)	1 (33.3%)	2 (33.3%)	1 (10.0%)	.4603
Topical phosphodiesterase 4 inhibitors					
Potential side effects	5 (35.7%)	2 (66.7%)	1 (20.0%)	2 (33.3%)	.4057
Cost (I do not have health insurance or health insurance does not cover the treatment)	2 (14.3%)	0 (0.0%)	1 (20.0%)	1 (16.7%)	.7185
Cost (my health insurance only partially covers the treatment)	2 (14.3%)	1 (33.3%)	0 (0.0%)	1 (16.7%)	.4169
Time needed to apply/take medication	2 (14.3%)	1 (33.3%)	0 (0.0%)	1 (16.7%)	.4169
Time needed for medication to work	1 (7.1%)	0 (0.0%)	1 (20.0%)	0 (0.0%)	.3794
Method of delivery/administration	1 (7.1%)	1 (33.3%)	0 (0.0%)	0 (0.0%)	.1389
Scheduling difficulties (treatment did not fit with my lifestyle or schedule)	1 (7.1%)	1 (33.3%)	0 (0.0%)	0 (0.0%)	.1389
Other	4 (28.6%)	1 (33.3%)	2 (40.0%)	1 (16.7%)	.6805
Immunosuppressant					
Potential side effects	20 (87.0%)	2 (100.0%)	12 (100.0%)	6 (66.7%)	.0683
Cost (I do not have health insurance or health insurance does not cover the treatment)	4 (17.4%)	0 (0.0%)	2 (16.7%)	2 (22.2%)	.7514
Cost (my health insurance only partially covers the treatment)	4 (17.4%)	0 (0.0%)	1 (8.3%)	3 (33.3%)	.2594
Method of delivery/administration	1 (4.3%)	0 (0.0%)	1 (8.3%)	0 (0.0%)	.6193
Time needed to apply/take medication	1 (4.3%)	0 (0.0%)	0 (0.0%)	1 (11.1%)	.4435
Scheduling difficulties (treatment did not fit with my lifestyle or schedule)	1 (4.3%)	0 (0.0%)	0 (0.0%)	1 (11.1%)	.4435
Biologics (dupilumab)					
Potential side effects	16 (64.0%)	1 (100.0%)	8 (57.1%)	6 (66.7%)	.6577
Method of delivery/administration	6 (24.0%)	1 (100.0%)	4 (28.6%)	0 (0.0%)	.0355
Cost (I do not have health insurance or health insurance does not cover the treatment)	5 (20.0%)	0 (0.0%)	4 (28.6%)	1 (11.1%)	.5254
Cost (my health insurance only partially covers the treatment)	5 (20.0%)	0 (0.0%)	1 (7.1%)	4 (44.4%)	.0865
Time needed to apply/take medication	1 (4.0%)	0 (0.0%)	0 (0.0%)	1 (11.1%)	.4191
Scheduling difficulties (treatment did not fit with my lifestyle or schedule)	1 (4.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	
Other	4 (16.0%)	0 (0.0%)	2 (14.3%)	1 (11.1%)	.9050
Analgesics, anti-inflammatory agents, or NSAIDs					
Potential side effects	1 (100.0%)	0 (0.0%)	1 (100.0%)	0 (0.0%)	
Oral antihistamines					
Potential side effects	1 (50.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	
Other	2 (100.0%)	0 (0.0%)	1 (100.0%)	0 (0.0%)	
Topical antihistamine cream or ointment					
Other	1 (100.0%)	0 (0.0%)	1 (100.0%)	0 (0.0%)	
Anti-microbial medications					
Potential side effects	3 (100.0%)	0 (0.0%)	1 (100.0%)	2 (100.0%)	
Anti-viral medications					
Cost (my health insurance only partially covers the treatment)	1 (33.3%)	0 (0.0%)	0 (0.0%)	1 (100.0%)	.0833
Potential side effects	1 (33.3%)	0 (0.0%)	1 (50.0%)	0 (0.0%)	.3865
Other	1 (33.3%)	0 (0.0%)	1 (50.0%)	0 (0.0%)	.3865

(*Continued*)

	Total[c] (*N* = 186)	Mild (*N* = 50)	Moderate (*N* = 83)	Severe (*N* = 49)	*p* Value
Phototherapy					
Time needed to apply/take medication	5 (38.5%)	1 (100.0%)	3 (42.9%)	1 (20.0%)	.3047
Scheduling difficulties (treatment did not fit with my lifestyle or schedule)	5 (38.5%)	1 (100.0%)	2 (28.6%)	2 (40.0%)	.3878
Cost (I do not have health insurance or health insurance does not cover the treatment)	3 (23.1%)	0 (0.0%)	2 (28.6%)	1 (20.0%)	.8002
Cost (my health insurance only partially covers the treatment)	3 (23.1%)	0 (0.0%)	2 (28.6%)	1 (20.0%)	.8002
Potential side effects	3 (23.1%)	0 (0.0%)	3 (42.9%)	0 (0.0%)	.1880
Time needed for medication to work	1 (7.7%)	0 (0.0%)	1 (14.3%)	0 (0.0%)	.6286
Method of delivery/administration	1 (7.7%)	0 (0.0%)	1 (14.3%)	0 (0.0%)	.6286
Other	1 (7.7%)	0 (0.0%)	1 (14.3%)	0 (0.0%)	.6286
Emollients or moisturizers					
Potential side effects	1 (50.0%)	0 (0.0%)	1 (100.0%)	0 (0.0%)	.1573
Other	1 (50.0%)	0 (0.0%)	0 (0.0%)	1 (100.0%)	.1573
Itch creams, gels, or ointments					
Potential side effects	1 (33.3%)	0 (0.0%)	1 (50.0%)	0 (0.0%)	.3865
Time needed for medication to work	1 (33.3%)	0 (0.0%)	0 (0.0%)	1 (100.0%)	.0833
Other	1 (33.3%)	0 (0.0%)	1 (50.0%)	0 (0.0%)	.3865
Sleep aids					
Potential side effects	2 (66.7%)	0 (0.0%)	1 (50.0%)	1 (100.0%)	.3865
Scheduling difficulties (treatment did not fit with my lifestyle or schedule)	1 (33.3%)	0 (0.0%)	1 (50.0%)	0 (0.0%)	.3865
Other	1 (33.3%)	0 (0.0%)	1 (50.0%)	0 (0.0%)	.3865
Other					
Potential side effects	1 (50.0%)	0 (0.0%)	0 (0.0%)	1 (100.0%)	.1573
Other	1 (50.0%)	0 (0.0%)	1 (100.0%)	0 (0.0%)	.1573

Aspirin and cleansers were not declined and are therefore excluded from the table. Reasons for declining treatment which were not reported by at least one participant in the medication class were excluded from the table.

[a]Scores from the PO-SCORAD rounded to the first integer were used to define severity; scores ≤27 indicate mild AD, scores ≥28 to ≤56 indicate moderate AD, and scores ≥57 indicate severe AD.

[b]Responses are not mutually exclusive.

[c]Four participants are missing severity level categorization due to at least one missing item on the PO-SCORAD.