REVIEW

OPEN

Impact of Atopic Dermatitis and Chronic Hand Eczema on Quality of Life Compared With Other Chronic Diseases

Silvia Capucci, BSc, MSc,* Julie Hahn-Pedersen, MSc,† Andreas Vilsbøll, MSc,† and Nana Kragh, MSc†

The aim of this study was to conduct 3 literature reviews to examine the impact of atopic dermatitis (AD) and chronic hand eczema (CHE) on health-related quality of life (HRQoL) compared with other chronic conditions by comparing reported utility scores of 4 commonly used generic HRQoL instruments. A systematic search was performed using PubMed, ScienceDirect, MEDLINE, EMBASE, Health Technology Assessment database, and ScHARRHUD. Inclusion criteria included, but were not limited to, patients of any age, studies from any location, publications reporting utility data based on EuroQoL 5 dimensions, the EuroQoL 5-dimension Visual Analog Scale, the Short-Form Health Survey, and the Short-Form 6 Dimensions in the English language. Inclusion criteria were met by 16 articles for AD, 25 articles for chronic conditions, and 9 articles for CHE. The findings of this review highlight that the disutility and loss in HRQoL of patients with AD and CHE are similar to or higher than other chronic conditions, such as cancer or hepatitis.

What is currently known

- Atopic dermatitis (AD) is one of the most common dermatological conditions in developed countries, and it is becoming more prevalent worldwide.
- Hand eczema is the most frequent dermatosis related to the hands and often becomes chronic. Chronic hand eczema (CHE) can be mild, moderate, or severe.
- Both AD and CHE have a negative impact on health-related quality of life (HRQoL), and inflict a socioeconomic burden on patients and the health care system.

What is not known

- How the disease burden and disutility of AD and CHE on HRQoL compare with those of other well-recognized chronic conditions.

*From the *SDA Bocconi School of Management, Bocconi University, Milan, Italy; and †Leo Pharma, Ballerup, Denmark.*

Address reprint requests to Silvia Capucci, BSc, MSc, LEO Pharma Industriparken 55, 2750 Ballerup, Denmark. E-mail: silviacapucci.sc@gmail.com.

N.K., A.V., and J.H.-P. are employees of Leo Pharma. No other conflicts of interest or sources of funding were declared.

Supplemental digital content is available for this article. Direct URL citations appear in the printed text and are provided in the HTML and PDF versions of this article on the journal's Web site (www.dermatitisjournal.com).

DOI: 10.1097/DER.0000000000000598

What this study adds

- Using generic HRQoL instruments (EuroQoL 5 dimensions, the EuroQoL 5-dimension Visual Analog Scale, the Short-Form Health Survey, and the Short-Form 6 Dimensions) to quantitatively measure the burden/disutility of chronic conditions on HRQoL, this review found that AD and CHE have a burden on HRQoL similar to or higher than other chronic conditions such as vision disorders, hepatitis, and some types of cancer.

Among inflammatory dermatological conditions, the most common is dermatitis (also referred to as eczema).[1] Dermatitis consists of a group of conditions, including atopic dermatitis (AD) and hand eczema.[1] Atopic dermatitis is a common, chronic, inflammatory, and relapsing condition.[2] Young children are most frequently affected, with the condition developing in approximately 60% of patients before they are 1 year old, although approximately 25% of adults with AD experience disease onset in adulthood.[2–5] The prevalence of AD varies between countries,[6] but it is becoming more prevalent worldwide, and in developed countries, approximately a fifth of the population is now affected.[4] Prevalence estimates also differ because of diverse and nonstandardized case definitions of AD[7] and range from 2.1% to 8.1% in adults[8] and from 15% to 30% in children.[2,4] Atopic dermatitis is characterized by a fluctuating course of xerosis, intense pruritus, blisters, papules, and erosions.[9–11] Patients and caregivers suffer a great burden because the disease is unpredictable, and the symptoms can cause sleeplessness, impair everyday activities, and affect physical and psychological well-being.[3,10–15] Because of the visibility of the condition, half of adult patients avoid social interactions,[11] and patients are more inclined to suffer from anxiety, depression, and suicidal ideation than patients without AD.[14,16,17] Atopic dermatitis is associated with high morbidity and

several comorbidities and is the primary contributor to skin-related disability.[3,11,18] Apart from having a negative impact on health-related quality of life (HRQoL),[3] AD also puts a socioeconomic burden on both patients and the health care system. Atopic dermatitis has been shown to affect concentration and mental health, with resultant absenteeism and presenteeism effects,[10,11,13–15] as well as increased health care consumption and out-of-pocket payments.[10,14,19]

Hand eczema is a type of dermatitis that develops on the hands and is commonly related to certain occupations.[20] Hand eczema is a heterogeneous disease and is linked to several different morphologies and etiologies.[1] It may be acute or chronic and ranges from mild to severe.[1] Symptoms include inflammation, edema, scaling, fissures, and hyperkeratosis.[1] Chronic hand eczema (CHE) can be defined as a hand eczema lasting for longer than 3 months or relapsing 2 or more times per year.[1] Although hand eczema is one of the most frequently occurring skin diseases,[21] and its prevalence is increasing,[22] CHE prevalence is difficult to estimate because not all patients seek treatment.[23] It is estimated that hand eczema affects 2% to 10% of the general population.[24] There is a high risk of hand eczema becoming chronic, with up to two-thirds or more developing CHE.[25] Fifty-two percent of hand eczema cases are associated with occupational exposure according to a European multicenter study,[25] whereas CHE represents 9% to 35% of all occupational diseases.[26] Fifteen percent of CHE patients are excluded from the labor market,[21] and 8% of patients have to change occupations.[1] Symptoms of CHE can persist for 10 to 15 years after onset and result in long-term sick leave.[27] Chronic hand eczema has a significant negative impact on the physical, social, and psychological HRQoL of patients and presents a great burden not only to patients but also to society and the health care system.[1,24]

The impact or burden of a specific condition is closely associated with the condition's effect on HRQoL, among other factors.[28] Utility-based instruments are often used to measure HRQoL and assign a weight or value to each health state to quantify the impact or burden of a disease.[28] This information is needed to allocate resources appropriately to improve health outcomes.[29] The impact of serious chronic conditions, such as cancer, is fairly well understood and reported, but less is known about how the impact of AD and CHE compares with other chronic conditions. Therefore, the objective of this study was to understand the disease burden of AD and CHE on HRQoL in relation to other well-recognized chronic conditions by comparing disutilities derived from different generic HRQoL index instruments. The HRQoL instruments vary widely, and there is no consensus about the best measure of HRQoL.[29] Therefore, 4 different instruments were included in this review because these instruments have different characteristics and can highlight the multidimensional aspects of the burden of these conditions.

METHODS

Three separate systematic literature reviews were conducted according to the principles of systematic reviewing embodied in the Cochrane handbook[30] and guidance published by the Centre for Reviews and Dissemination.[31] The first review was conducted to determine the impact of AD on HRQoL; the second to determine the impact of CHE on HRQoL; and the third to determine the impact of other chronic conditions on HRQoL for comparison to AD and CHE. The review was limited to 4 frequently used generic health HRQoL instruments to make comparisons across different chronic conditions: the EuroQoL 5-dimension scale (EQ-5D), the EQ-5D Visual Analog Scale (EQ-5D VAS), the Short-Form 36 Health Survey (SF-36), and the Short-Form 6 Dimensions (SF-6D). The EQ-5D and SF-6D, in particular, are widely used in health technology assessments (HTAs) to calculate utility scores.[32,33] Because a key aim of the review was to compare several conditions, disease-specific instruments were not considered. For the chronic disease search, results were limited to review articles to limit the broad scope and prohibitively large number of articles describing individual studies across all chronic diseases. Different search, assessment, and extraction strategies were used for the CHE review because it was a larger review that explored a variety of outcomes in addition to HRQoL—only relevant details of this review are included in this article.

Search Strategy

Several databases were searched using various terms. For the AD and chronic conditions reviews, PubMed and ScienceDirect were searched from 2000 to June 2019 for full publications, and 2016 to June 2019 for conference abstracts. For the CHE review, MEDLINE, EMBASE, ScHARRHUD, HTA database, and HTA agency websites were searched. MEDLINE was searched from database inception until July 2017, whereas the other databases were searched from inception until July 2018. Only conference abstracts and presentations for the last 3 years were included.

The design and implementation were guided by population, interventions, comparators, outcomes, and study types with full details provided in the Supplemental Table 1 of the Appendix (http://links.lww.com/DER/A37). The populations of interest were patients of all ages with mild to severe AD, CHE (*International Classification of Diseases, 10th Revision* codes L20, 23, 24, 35, and L30) or chronic conditions. Outcomes of interest were quality of life and utility data based on EQ-5D, EQ-5D VAS, SF-36, and SF-6D for mild to severe AD, CHE, and chronic conditions. Study types considered for inclusion were published economic evaluations; clinical trials and reports of HRQoL and utility data based on EQ-5D, EQ-5D VAS, SF-36, and SF-6D from original research for AD; costing studies, reviews, and HTAs; reports of disease-specific and generic patient-reported outcome measures (PROMs), including utility studies for CHE; and published literature reviews for chronic conditions reporting utility values derived from EQ-5D, EQ-5D VAS, SF-36, and SF-6D for chronic diseases. The search strategies are presented in more detail in the Supplemental Tables 2 and 3 of the Appendix (http://links.lww.com/DER/A37). To avoid bias in

disease selection, the search terms for the chronic conditions review were generic and not specific for defined chronic conditions.

Articles in English and publications from all countries, except Asia and Africa for the CHE review, were included. Other inclusion criteria were a requirement for studies about AD to report EQ-5D–, EQ-5D VAS–, SF36–, and/or SF-6D–derived utility index scores at baseline; CHE studies were required to report data on utilities elicitation exercises or HRQoL, including PROMs; and for chronic conditions, only systematic reviews that report EQ-5D, EQ5D VAS, SF-36, and SF-6D utility index scores were included. For AD, studies that included patients with comorbidities or focusing on disease treatment or not reporting utility values at baseline were excluded, as well as studies not reporting mean mental and physical SF-36 component scores. Studies from Asia and Africa and studies involving patients with any disease other than CHE were excluded from the CHE search. The following publications were excluded from the chronic conditions search: studies including patients with any comorbidity, studies not reporting EQ-5D–, EQ-5D VAS–, SF-36–, and SF-6D–derived utility index scores at baseline, reviews not reporting a range of scores for EQ-5D and SF-36 or not reporting mean mental and physical SF-36 component scores, publications focusing on disease treatment, reviews not reporting directly on primary publications, publications about the validity of PROMs, and discussion articles on HRQoL in various disease areas. No gray literature or reference lists were searched.

Article Assessment and Data Extraction

For all 3 reviews, searches were conducted, and results were assessed by a single researcher according to publication relevance in providing information on each of the review questions, and irrelevant records were removed. Titles, abstracts, and full texts of remaining publications were assessed for relevance against protocol criteria by 1 reviewer for AD and chronic conditions publications and independently by 2 reviewers for CHE publications. For the AD and CHE reviews, quality assessment and risk of bias were assessed using the Adapted Newcastle Ottawa Scale[34] and the Cochrane Risk of Bias tool.[30] AMSTAR[35] was used to assess the quality of systematic reviews included in the CHE literature review. The number of records excluded and included at each stage for all 3 reviews were recorded in the Preferred Reporting Items for Systematic Reviews and Meta-Analyses[36] flow diagram (Supplemental Figs. 1A–C in the Appendix, http://links.lww.com/DER/A35).

For all reviews, data were extracted by 1 reviewer. Extracted data included study design, country, population, disease severity, HRQoL instrument(s) used, HRQoL outcomes reported, and strengths and limitations. A second reviewer was involved in the data extraction of the CHE review. For all reviews, queries at any step of study assessment and data extraction were resolved by an independent reviewer.

Instrument Description

The EQ-5D is a generic and standardized instrument to measure health outcomes and HRQoL. It defines health states by using utility scores covering 5 dimensions of responder's status: mobility, self-care, usual activities, pain/discomfort, and anxiety/depression.[37] By using preference-based valuation, the health states can be calculated to a utility score ranging from less than 0 to 1 (negative values, states worse than death; 0, death; 1, perfect health).[38] The EQ-5D VAS is a vertical scale where responders evaluate their health on a visual scale numbered from 0 to 100, where 0 is the worst health imaginable and 100 is the best health imaginable.[38] Whereas EQ-5D and EQ-5D VAS focus on general HRQoL questions, SF-36 assesses physical and mental QoL in more detail and provides a better overview of the burden of disease. The SF-36 is a patient-reported survey of health consisting of 8 health concepts that are grouped in a physical component score (PCS) and mental component score (MCS). The health concepts are role limitations due to physical as well as emotional/personal problems, bodily pain, energy/fatigue (vitality), physical functioning, emotional well-being, social functioning, and general health perception.[39] The SF-36 also has 1 question that enquires about change in health state.[39] The range of the scale is between 0 and 100, where 0 represents the least favorable health state, and 100, the best health state.[39] The SF-6D is a short-form version of the SF-36, and it includes 7 of the 8 dimensions of the SF-36—general health perception is excluded, and physical and emotional role participation/limitation is combined.[40] The aim of this tool is to show the value that responders place on different health limitations. Scores range from 0 to 1, where 0 is the worst health state, and 1, the best health state.[40]

Analysis and Synthesis

For all health conditions, the ranges of reported results were compared descriptively. Because of a lack of standardized reporting of variability, formal statistical comparisons or meta-analysis was not feasible.

RESULTS

The initial search strategies identified 1604 publications for AD, 8020 for CHE, and 10,310 for chronic diseases. After deduplication and exclusion based on title, abstract, and full-text review, quality, and bias assessment, 16 publications were included in the AD review, 9 publications were included in the final review for CHE, and 25 publications were included in the other chronic conditions review (Supplemental Figs. 1A–C in the Appendix, http://links.lww.com/DER/A35).

Of the 16 studies included in the AD review, the majority reported EQ-5D, 5 studies reported EQ-5D VAS, 5 reported SF-36, and 4 studies reported SF-6D. Nine of these studies were cross-sectional, 3 were randomized control studies, 1 study was longitudinal, 1 case-control, 1 validation, and 1 was a retrospective cost-of-illness study (see Supplemental Table 4 in the Appendix [http://links.lww.com/DER/A37] and Supplemental Figs. 1A–C in the Appendix [http://links.lww.com/DER/A35]). Of the 9 studies included in the CHE review, EQ-5D scores were reported by 7 studies, whereas EQ-5D VAS

scores were reported by 4 studies, and no data for SF-36 or SF-6D were found. Identified study types included economic evaluations, cost of illness, surveys and cross-sectional studies, observational cohort studies, and validation studies (see Supplemental Table 5 in the Appendix, http://links.lww.com/DER/A37). Of the 25 studies included in the chronic conditions review, data on EQ-5D were reported in 16 reviews, EQ-5D VAS in 5 reviews, SF-36 in 7 reviews, and SF-6D in 3 reviews. Six reviews described cancer; 4 reviews described liver diseases; 3 reviews described cardiovascular diseases; 2 reviews each described kidney diseases, type 2 diabetes, vision conditions, and rheumatoid arthritis; and 1 review each described psoriasis, systemic lupus erythematosus, systemic sclerosis, and ankylosing spondylitis (see Supplemental Table 6 in the Appendix, http://links.lww.com/DER/A37).

HRQoL Results for AD

Where possible, data were grouped based on disease severity and used for comparison, rather than using data of the general AD population. Data stratified by disease severity were available for the EQ-5D and SF-6D, whereas for the EQ-5D VAS and SF-36, only general AD population results were reported. For mild AD, the EQ-5D index was reported in 1 study, with a reported score of 0.85.[41] For moderate AD, the EQ-5D range was 0.77[42] to 0.80,[41] and for severe AD, the range was 0.61[43] to 0.76.[41] The EQ-5D values range from 0.61[43] to 0.94[44] in the general AD population. The EQ-5D VAS values for the general AD population ranged between a lower limit of 63.6[45] and an upper limit of 76.8.[46] The lower limit for the SF-36 PCS was 46.5 (general AD population),[47] and the upper limit was 52.6 (mild AD).[48] For the SF-36 MCS, the lower limit was 38.5 (severe AD),[48] and the upper limit was 51.1 (mild AD).[48] In chronic diseases, differences of 2.5 and 5 points are considered clinically meaningful,[49] and the difference of 8 points between the lower limit of PCS (46.5) and MCS (38.5) indicates that AD causes a high psychological and social burden on patients. For mild AD, the range of SF-6D values was 0.73.[50,51] to 0.80.[41] Moderate and mild AD had the same upper limit of 0.80,[41] but moderate AD had a decreased lower limit of 0.64.[50,51] Severe AD had the worst SF-6D scores, with a lower limit of 0.59[50,51] and an upper limit of 0.75.[41]

HRQoL Results for CHE

Data were available for all disease severities for the EQ-5D, but only for moderate and severe CHE for the EQ-5D VAS. The EQ-5D scores for mild CHE ranged from 0.81[52] to 0.97[53] and for moderate to severe CHE from 0.50[54] to 0.80.[55] The EQ-5D VAS scores for moderate to severe CHE ranged from 36.4[56] to 74.2.[55] No data were available for SF-36 or SF-6D.

HRQoL Results for Chronic Diseases

Data for chronic diseases were grouped based on disease area, and mean upper and lower limits are reported for each HRQoL instrument. Overall EQ-5D lower and upper limits for chronic disease were −0.18[57] to 0.98.[57,58] Both the lower and upper ends of the overall range are associated with cancer, reflecting the wide range of variability in HRQoL across cancers. Given variability and overlapping ranges across diseases, there was a lack of clear trends across diseases. For EQ-5D VAS, general lower and upper estimates were 18.7[59] to 89.[60] As for the EQ-5D utility index, cancer displayed the greatest range for the VAS, and vision conditions were associated with relatively higher values than other chronic conditions. The SF-36 PCS values ranged from 22[61] to 68.2,[62] and SF-36 MCS values ranged from 30.3[61] to 76.4,[62] with lowest HRQoL observed for rheumatoid arthritis and the highest for kidney disease. The SF-6D values ranged from 0.55 for rheumatoid arthritis[63] to 0.88 for cardiovascular disease.[64]

Overall Analyses Comparing AD, CHE, and Chronic Diseases

When comparing AD and CHE to other chronic diseases, the EQ-5D estimates for the dermatological conditions tended to fall within the range observed for other chronic conditions (see Supplemental Figure 2 in the Appendix [http://links.lww.com/DER/A38]). The upper estimates of moderate and severe AD (0.80 and 0.76, respectively) are lower than most chronic conditions, suggesting that AD can potentially have a substantial impact on HRQoL, equivalent to or greater than a number of other chronic conditions. However, the lower limits of moderate and severe AD (0.77 and 0.61, respectively) are higher than the lower limits of most other chronic conditions. The EQ-5D estimates for CHE differ greatly based on disease severity (mild, 0.97[53]; moderate, 0.80[55]; severe, 0.50[54]). According to these values, mild CHE has one of the lowest impacts on HRQoL in both the upper and lower limits. However, moderate to severe CHE has one of the lowest HRQoL values, indicating a greater burden compared with other chronic conditions.

In general, AD and CHE have a narrower EQ-5D range compared with other conditions, such as cancer (−0.18 to 0.98) and type 2 diabetes (0.20–0.94).

Similar to EQ-5D values, EQ-5D VAS scores for AD and CHE fall within the range of other chronic conditions. Chronic hand eczema has lower EQ-5D VAS scores in the lower limit (36.4) and upper limit (74.2) than most other chronic diseases, such as hepatitis, type 2 diabetes, and vision conditions. On the lower limit, the EQ-5D VAS score for AD was 63.6, which is slightly higher than CHE and most other chronic conditions, with the exception of vision conditions. In the upper limit, AD had an EQ-5D VAS score of 76.8, which was lower than for type 2 diabetes (80.0), cancer (84.0), and heart diseases (89.0).

The SF-36 values for AD, both PCS and MCS, fall within the range of values of other chronic conditions. Atopic dermatitis has a higher PCS score in the lower limit (46.5) compared with all other chronic conditions, but has a lower score (52.6) than most of the chronic conditions in the upper limit. When considering SF-36 results for MCS, dermatological conditions perform worse than other chronic diseases, with the HRQoL scores for AD lower than many

other chronic conditions. For example, the upper limit of MCS for AD was 51.1 compared with 76.4 for kidney diseases, whereas the lower limit for AD was 38.5 compared with 43.6 for hepatitis. There was a very slight increase in the upper limit for MCS compared with PCS, but a significant decrease in its lower limit (from 46.5 for PCS to 38.5 for MCS). These results suggest a greater negative impact of AD on the mental and social aspects of HRQoL compared with other conditions, perhaps due to the more visible impairment of AD and the relative social stigma, as well as the inability of patients to perform everyday activities. In contrast, all nondermatological chronic conditions reviewed here had lower PCS than MCS scores in both the upper and lower limits, highlighting the physical burden as the main impairment of these diseases.

SF-6D data were available only for 2 chronic conditions. Overall, HRQoL values for AD fall within the range of other chronic conditions. The impact of AD on HRQoL appears to vary greatly based on disease severity, particularly in the lower limit scores where there is a large difference between mild and severe AD (0.73 vs 0.59, respectively).

DISCUSSION

Atopic dermatitis and CHE are among the most common skin conditions and have a high burden in terms of health and sociopsychological HRQoL. In this review, commonly used, generic HRQoL instruments were used to compare the impact and burden of dermatological conditions on HRQoL to other chronic conditions. Among all HRQoL instruments explored, SF-36 appears to be the best at communicating the impairment of AD on patients' lives. Key findings from this review are that AD and CHE have a burden on HRQoL similar to or higher than other chronic conditions such as vision disorders, hepatitis, and some types of cancer. A systematic review on psoriasis by Møller et al[65] found that the lower and upper limits for moderate to severe psoriasis were 0.52 and 0.9, respectively, for EQ-5D and 50.7 and 75.1, respectively, for EQ-5D VAS. The EQ-5D scores for psoriasis were similar to other chronic conditions, but psoriasis had a lower impact on HRQoL than CHE and AD in the upper limit.[65] Psoriasis had EQ-5D VAS scores similar to other chronic conditions and between AD and CHE in both lower and upper limits.[65] Short-Form 36 Health Survey values were available from another review, in which psoriasis was found to have a higher SF-36 PCS score (56.2) than AD and other chronic conditions in the upper limit, but one of the lowest PCS scores in the lower limit (32.7).[66] The SF-36 MCS score for psoriasis was lower than those of many other chronic conditions and ranged from 35.7 to 52.4.[66] The EQ-5D scores for psoriasis reported in this study ranged from 0.48 to 0.74, and the EQ-5D VAS scores ranged from 55.3 to 76.4.[66] The latter values were similar to those reported by Møller et al.[65] Among dermatological conditions, moderate to severe CHE had a greater impact on HRQoL than both AD and psoriasis. A survey of approximately 33,000 adults found that people with hand eczema reported significantly more problems in all 5 dimensions of the EQ-5D than people without hand eczema, and the EQ-5D index was similar for psoriasis and hand eczema.[67]

The results of this review are important to explore and quantitatively measure how dermatological conditions, despite not being life-threatening diseases, impact patients' lives as much or even more than life-threatening chronic diseases, especially with regard to psychosocial aspects. This review helps to emphasize the disutility and loss in HRQoL of patients with AD and CHE, which if well understood can help to optimize resource utilization for patients and health systems and ensure that perhaps under-recognized diseases, such as AD and CHE, will have sufficient resources allocated for patients to be controlled. These results could also be used to characterize the baseline and lower and upper limits of EQ-5D, EQ-5D VAS, SF-36, and SF-6D utility estimates and HRQoL impact among patients with AD and CHE, which can serve as benchmarks for future comparisons.

Strengths and Limitations

A strength of this review is the breadth of the review that included a range of geographic locations, diseases, and widely used generic HRQoL instruments. However, there are several limitations that should be acknowledged. The HRQoL results may vary by country given differences in perception of HRQoL aspects, especially in relation to psychological aspects and social life, as well as the preference valuation of the health states used when deriving EQ-5D based utility scores. This can lead to disparities when trying to compare the studies from different countries. No statistical analysis or meta-analysis was feasible, because many studies lacked standard deviation and confidence intervals, such that comparisons are descriptive in nature. Some dermatological studies included standard care (topical emollients), whereas other studies did not specify any treatment. Standard care was considered a baseline value, but it may be different than no therapy at all. Studies also varied with respect to age of the included population, and the difference in HRQoL in specific areas, such as social and working life, can be very different for children compared with adults. A methodological limitation was that studies were reviewed and included by a single reviewer for both the AD and chronic conditions reviews. Additionally, no search for gray literature was performed, and only articles in English were included. Finally, the definitions of AD, CHE, and their various disease severities are not standardized in the literature,[68–70] potentially influencing patients' impressions and descriptions of symptoms and limiting the comparability of findings between studies.

Future Work

Standardization of disease and severity definitions for AD and CHE and the criteria used to identify and characterize individuals with AD and CHE is needed and will increase the comparability of outcomes across future studies. It may also be beneficial for future work if the causes of CHE are better understood and to compare the utilities of those who have a high risk of developing CHE (eg, high-risk professions) to health utilities of the general population. Validated preference-based health utilities associated with standardized disease scenarios are needed. This review highlighted the psychological

burden of AD compared with other diseases, possibly due to the social stigma of having a visible impairment, as well as the inability to perform everyday activities. This impact could be explored further by using the SF-36 and SF-6D to survey patients with CHE. Future studies should also consider how to represent patients with mild and moderate disease severity, as patients with severe disease are often overrepresented.

CONCLUSIONS

Overall, this review helps to emphasize the disutility and loss in HRQoL of patients with AD and CHE, whose lives can be as strenuous as those of patients living with other diseases, such as cancer or type 2 diabetes. In particular, compared with most other chronic conditions, moderate to severe AD and CHE have a bigger impact on HRQoL—in terms of the upper limits of EQ-5D and SF-36 for AD and the lower limit of EQ-5D VAS for CHE (SF-36 and SF-6D values not available from identified studies). The results of this review can assist in anticipating future resource needs for AD and CHE, especially as AD and hand eczema prevalence rates are increasing.

REFERENCES

1. Diepgen TL, Andersen KE, Chosidow O, et al. Guidelines for diagnosis, prevention and treatment of hand eczema. *J German Soc Dermatol* 2014;e1–e22.
2. Boguniewicz M, Fonacier L, Guttman-Yassky E, et al. Atopic dermatitis yardstick: practical recommendations for an evolving therapeutic landscape. *Ann Allergy Asthma Immunol* 2018;120:10–22.
3. Howell MD, Parker ML, Mustelin T, et al. Past, present, and future for biologic intervention in atopic dermatitis. *Allergy* 2015;70:887–896.
4. Silvestre Salvador JF, Romero-Perez D, Encabo-Duran B. Atopic dermatitis in adults: a diagnostic challenge. *J Investig Allergol Clin Immunol* 2017;27(7):78–88.
5. Lee HH, Patel KR, Singam V, et al. A systematic review and meta-analysis of the prevalence and phenotype of adult-onset atopic dermatitis. *J Am Acad Dermatol* 2019;80(6):1526–1532.
6. Deckers IA, McLean S, Linssen S, et al. Investigating international time trends in the incidence and prevalence of atopic eczema 1990–2010: a systematic review of epidemiological studies. *PLoS One* 2012;7(7):e39803.
7. Chiesa Fuxench ZC, Block JK, Boguniewicz M, et al. Atopic dermatitis in America study: a cross-sectional study examining the prevalence and disease burden of atopic dermatitis in the US adult population. *J Invest Dermatol* 2019;139:583–590.
8. Barbarot S, Auziere S, Gadkari A, et al. Epidemiology of atopic dermatitis in adults: results from an international survey. *Allergy* 2018;73(6):1284–1293.
9. Weidinger S, Beck L, Bieber T, et al. Atopic dermatitis. *Nat Rev Dis Primers* 2018;4(1):1.
10. Eckert L, Gupta S, Amand C, et al. The burden of atopic dermatitis in US adults: health care resource utilization data from the 2013 National Health and Wellness Survey. *J Am Acad Dermatol* 2017;78(1):54–61.e51.
11. Silverberg JI, Gelfand JM, Margolis DJ, et al. Patient burden and quality of life in atopic dermatitis in US adults. *Ann Allergy Asthma Immunol* 2018;121:340–347.
12. Simon D, Wollenberg A, Renz H, et al. Atopic dermatitis: Collegium Internationale Allergologicum (CIA) update 2019. *Int Arch Allergy Immunol* 2019;178:207–218.
13. Anderson RT, Rajagopalan R. Effects of allergic dermatosis on health-related quality of life. *Curr Allergy Asthma Rep* 2001;1(4):309–315.
14. Whitley J, Emir B, Seitzman R, et al. The burden of atopic dermatitis in US adults: results from the 2013 National Health and Wellness Survey. *Curr Med Res Opin* 2016;32(10):1645–1651.
15. Yu SH, Attarian H, Zee P, et al. Burden of sleep and fatigue in US adults with atopic dermatitis. *Dermatitis* 2016;27(2):50–58.
16. Andersen YMF, Egeberg A, Skov L, et al. Comorbidities of atopic dermatitis: beyond rhinitis and asthma. *Curr Dermatol Rep* 2017;6(1):35–41.
17. Dalgard FJ, Gieler U, Tomas-Aragones L, et al. The psychological burden of skin diseases: a cross-sectional multicenter study among dermatological out-patients in 13 European countries. *J Investig Dermatol* 2015;135(4):984–991.
18. Abuabara K, Ye M, McCulloch CE, et al. Clinical onset of atopic eczema: results from 2 nationally representative British birth cohorts followed through midlife. *J Allergy Clin Immunol* 2019;144:710–719.
19. Silverberg JI. Health care utilization, patient costs, and access to care in US adults with eczema: a population-based study. *JAMA Dermatol* 2015;151(7):743–752.
20. The Eczema Society of Canada. About hand eczema. Available at: https://eczemahelp.ca/hand-eczema/. Published 2019. Accessed September 26, 2019.
21. Diepgen TL, Agner T, Aberer W, et al. Management of chronic hand eczema. *Contact Dermatitis* 2007;57(4):203–210.
22. Nielsen NH, Linneberg A, Menne T, et al. The association between contact allergy and hand eczema in 2 cross-sectional surveys 8 years apart: the Copenhagen allergy study. *Contact Dermatitis* 2002;47(2):71–77.
23. Barrett A, Hahn-Pedersen J, Kragh N, et al. Patient-reported outcome measures in atopic dermatitis and chronic hand eczema in adults. *Patient* 2019;12:445–459.
24. Fowler JF, Ghosh A, Sung J, et al. Impact of chronic hand dermatitis on quality of life, work productivity, activity impairment, and medical costs. *JAAD* 2006;54(3):448–457.
25. Cazzaniga S, Apfelbacher C, Diepgen T, et al. Patterns of chronic hand eczema: a semantic map analysis of the CARPE registry data. *Br J Dermatol* 2018;178(1):229–237.
26. Elston D, Ahmed D, Watsky K, et al. Hand dermatitis. *J Am Acad Dermatol* 2002;47(2):291–299.
27. Mollerup A, Veien NK, Johansen JD. Chronic hand eczema—self-management and prognosis: a study protocol for a randomised clinical trial. *BMC Dermatol* 2012;12:6.
28. Manuel DG, Schultz SE, Kopec JA. Measuring the health burden of chronic disease and injury using health adjusted life expectancy and the Health Utilities Index. *J Epidemiol Community Health* 2002;56:843–850.
29. US Department of Health and Human Services. *An Assessment of the State of the Art for Measuring Burden of Illness*. Washington, DC: US Department of Health and Human Services; 2011.
30. Higgins J, Altman D, Sterne J, The Cochrane Collaboration. In: *Chapter 8: Assessing Risk of Bias in Included Studies* 2011.
31. Centre for Reviews and Dissemination. *Systematic Reviews: CRD's Guidance for Undertaking Reviews in Health Care*. York: Centre for Reviews and Dissemination, University of York; 2009.
32. Canadian Agency for Drugs and Technologies in Health. Guidelines for the Economic Evaluation of Health Technologies. Available at: https://www.cadth.ca/sites/default/files/pdf/guidelines_for_the_economic_evaluation_of_health_technologies_canada_4th_ed.pdf. Published 2017 March. Accessed November 20, 2018.
33. NICE. Guide to the methods of technology appraisal 2013. Available at: https://www.nice.org.uk/process/pmg9/resources/guide-to-the-methods-of-technology-appraisal-2013-pdf-2007975843781. Published 2013. Accessed November 20, 2018.

34. Hillen M, Medendorp N, Daams J, et al. Appendix C—Adapted Newcastle-Ottawa Scale for Evaluating Cross-sectional/Survey Studies. In patient-driven second opinions in oncology: a systematic review. *Oncologist* 2017; 22:1197–1211.
35. Shea BJ, Reeves BC, Wells G, et al. AMSTAR 2: a critical appraisal tool for systematic reviews that include randomised or non-randomised studies of healthcare interventions, or both. *BMJ* 2017;358:j4008.
36. Liberati A, Altman DG, Tetzlaff J, et al. The PRISMA statement for reporting systematic reviews and meta-analyses of studies that evaluate health care interventions: explanation and elaboration. *J Clin Epidemiol* 2009;62:e1–e34.
37. EuroQoL. EuroQoL Instruments. Available at: https://euroqol.org/eq-5d-instruments/. Published 2018. Accessed November 20, 2018.
38. EuroQoL. EQ-5D-3L User Guide. Available at: https://euroqol.org/publications/user-guides/. Published 2018. Accessed October 24, 2019.
39. RAND Corporation. 36-Item Short Form Survey (SF-36) scoring instructions. Available at: https://www.rand.org/health-care/surveys_tools/mos/36-item-short-form/scoring.html. Published 1992. Accessed October 24, 2019.
40. Optum. The SF-6D. Available at: http://www.optum.in/content/dam/optum/resources/Manual%20Excerpts/SF-6D.pdf. Accessed October 24, 2019.
41. Poole CD, Chambers C, Sidhu MK, et al. Health-related utility among adults with atopic dermatitis treated with 0.1% tacrolimus ointment as maintenance therapy over the long term: findings from the Protopic CONTROL study. *Br J Dermatol* 2009;161(6):1335–1340.
42. Poole CD, Chambers C, Allsopp R, et al. Quality of life and health-related utility analysis of adults with moderate and severe atopic dermatitis treated with tacrolimus ointment vs topical corticosteroids. *J Eur Acad Dermatol Venereol* 2010;24(6):674–678.
43. Vietri J, Nyberg F, Varol N. The impact of severity of atopic dermatitis on patient-reported outcomes of adults with moderate-to-severe atopic dermatitis. *J Am Acad Dermatol* 2017;76(6):AB254.
44. Lee SH, Lee SH, Lee SY, et al. Psychological health status and health-related quality of life in adults with atopic dermatitis: a nationwide cross-sectional study in South Korea. *Acta Derm Venereol* 2018;98(1):89–97.
45. Langenbruch A, Radtke M, Franzke N, et al. Quality of health care of atopic eczema in Germany: results of the national health care study AtopicHealth. *J Eur Acad Dermatol Venereol* 2014;28(6):719–726.
46. Vinding GR, Knudsen KM, Ellervik C, et al. Self-reported skin morbidities and health-related quality of life: a population-based nested case-control study. *Dermatology* 2014;228(3):261–268.
47. Lundberg L, Johannesson M, Silverdahl M, et al. Health-related quality of life in patients with psoriasis and atopic dermatitis measured with SF-36, DLQI and a subjective measure of disease activity. *Acta Derm Venereol* 2000;80(6):430–434.
48. Kiebert G, Sorensen SV, Revicki D, et al. Atopic dermatitis is associated with a decrement in health-related quality of life. *Int J Dermatol* 2002;41(3): 151–158.
49. Eckert L, Gupta S, Amand C, et al. Impact of atopic dermatitis on health-related quality of life and productivity in adults in the United States: an analysis using the National Health and Wellness Survey. *J Am Acad Dermatol* 2017;77(2):274–279.e273.
50. Silverberg JI, Gelfand JM, Margolis DJ. Health utility scores of atopic dermatitis in US adults. *J Allergy Clin Immunol Pract* 2019;7(4):1246–1252.e1241.
51. Silverberg JI, Gelfand JM, Margolis DJ, et al. Validation and interpretation of Short Form 12 and comparison with Dermatology Life Quality Index in atopic dermatitis in adults. *J Invest Dermatol* 2019;139(10):2090–2097.e2093.
52. National Institute for Health and Care Excellence. Single technology appraisal (STA): specification for manufacturer/sponsor submission of evidence. NICE. Available at: https://www.nice.org.uk/media/default/about/what-we-do/nice-guidance/nice-technology-appraisals/specification-for-manufacturer-sponsor-submission-of-evidence-june-2012.doc. Published 2012. Accessed January 20, 2020.
53. Küster D, Haufe E, Rethberg C, et al. Health utilities for controlled and uncontrolled chronic hand eczema in healthcare employees. *Contact Dermatitis* 2018;78(1):18–27.
54. Coretsi PA, Scalone L, Belisari A, et al. Cost and quality of life in patients with severe chronic hand eczema refractory to standard therapy with topical potent corticosteroids. *Contact Dermatitis* 2014;70(3):158–168.
55. Dibenedetti D, Baranowski E, Zelt S, et al. Assessing United States patient and dermatologist experiences with severe chronic hand eczema. *J Clin Aesthet Dermatol* 2015;8(11):19–27.
56. van Gils RF, Bosmans JE, Boot CR, et al. Economic evaluation of an integrated care programme for patients with hand dermatitis. *Contact Dermatitis* 2013;69(3):144–152.
57. Wójcik A, Młyńczak K, Dobrowolska I, et al. PSY99 systematic review of EQ-5D based utility scores in leukemias. *Value Health* 2016;19(7):A592.
58. Mlynczak K, Wojcik A, Dobrowolska I, et al. Systematic review of health state utilities based on the EQ-5D in studies of lymphomas. *Value Health* 2016;19(7):A593.
59. Golicki D, Wójcik A, Młyńczak K, et al. PSY103 systematic review of EQ-5D based health state utility values in multiple myeloma. *Value Health* 2016;19(7):A593.
60. Dyer MT, Goldsmith KA, Sharples LS, et al. A review of health utilities using the EQ-5D in studies of cardiovascular disease. *Health Qual Life Outcomes* 2010;8:13.
61. Matcham F, Scott IC, Rayner L, et al. The impact of rheumatoid arthritis on quality-of-life assessed using the SF-36: a systematic review and meta-analysis. *Semin Arthritis Rheum* 2014;44(2):123–130.
62. Alhaji MM, Tan J, Hamid MR, et al. Determinants of quality of life as measured with variants of SF-36 in patients with predialysis chronic kidney disease. *Saudi Med J* 2018;39(7):653–661.
63. Harrison MJ, Davies LM, Bansback NJ, et al. The validity and responsiveness of generic utility measures in rheumatoid arthritis: a review. *J Rheumatol* 2008;35(4):592–602.
64. Smith DW, Davies EW, Wissinger E, et al. A systematic literature review of cardiovascular event utilities. *Expert Rev Pharmacoecon Outcomes Res* 2013;13(6):767–790.
65. Møller AH, Erntoft S, Vinding GR, et al. A systematic literature review to compare quality of life in psoriasis with other chronic diseases using EQ-5D–derived utility values. *Patient Relat Outcome Meas* 2015;7(6):167–177.
66. Ali FM, Cueva AC, Vyas J, et al. A systematic review of the use of quality-of-life instruments in randomized controlled trials for psoriasis. *Br J Dermatol* 2017;176(3):577–593.
67. Moberg C, Alderling M, Meding B. Hand eczema and quality of life: a population-based study. *Br J Dermatol* 2009;161(2):397–403.
68. Vakharia PP, Chopra R, Silverberg JI. Systematic review of diagnostic criteria used in atopic dermatitis randomized controlled trials. *Am J Clin Dermatol* 2018;19(1):15–22.
69. Simpson EL, Keck LE, Chalmers JR, et al. How should an incident case of atopic dermatitis be defined? A systematic review of primary prevention studies. *J Allergy Clin Immunol* 2012;130(1):137–144.
70. Silverberg JI, Thyssen JP, Paller AS, et al. University of Zurich. Zurich Open Repository and Archive Website. What's in a name? Atopic dermatitis or atopic eczema, but not eczema alone. Available at: https://www.zora.uzh.ch/id/eprint/140844/8/lone.pdf. Published 2017. Accessed January 20, 2020.