Published in final edited form as:

Br J Dermatol. 2015 January ; 172(1): 169–174. doi:10.1111/bjd.13167.

Improvement in the cutaneous disease activity of patients with dermatomyositis is associated with a better quality of life

E.S. Robinson^{1,2}, R. Feng³, J. Okawa^{1,2}, and V.P. Werth^{1,2}

¹Veteran Affairs Medical Center, Philadelphia, PA

²Department of Dermatology, University of Pennsylvania, Philadelphia, PA

³Department of Biostatistics and Epidemiology, University of Pennsylvania, Philadelphia, PA

Abstract

Background—Cutaneous dermatomyositis (DM) disease activity is associated with a decreased quality of life.

Objectives—This prospective study assessed if an improvement in quality of life, as measured by the Skindex-29 and patient-reported itch and pain on a 10-point visual analog scale (VAS), correlated with an improvement in cutaneous DM disease activity.

Methods—Patients with a completed cutaneous DM disease area and severity index (CDASI) at two visits separated by at least two months were classified into responder (n=15) and non-responder (n=30) groups according to the point change in the CDASI activity scores between visits. Responders had at least a four-point improvement in CDASI activity, indicating clinically relevant improvement.

Results—The change from baseline to the follow-up visit of the Skindex-29 subscale scores for the responders versus the non-responders were significantly different: emotions P=0.0047, functioning P=0.0026, and symptoms P<0.0001. The change in VAS score between responders and non-responders was also significant for itch (P=0.0135) and pain (P=0.0367). There was no significant difference between the groups in terms of disease subtype, sex, race, age, treatment for DM, smoking history, or history of malignancy within five years of DM diagnosis.

Conclusions—This is the first study to demonstrate that the quality of life of patients with DM improved as their cutaneous disease activity decreased.

Introduction

Dermatomyositis (DM) is an inflammatory disease with distinctive cutaneous manifestations that can be accompanied by muscle disease and can cause significant morbidity. The disease may also include lung (classically interstitial lung disease), joint, esophageal, and cardiac

Corresponding Author: Dr. Victoria Werth, werth@mail.med.upenn.edu, Address: Department of Dermatology, 14 Penn Tower, Room 1430, 1 Convention Ave., Philadelphia, PA 19104.

Financial Disclosure: Dr. Werth serves as a consultant to: Xoma, RPS, Janssen/Centocor, Biogen-Idex, Sanofi-Aventis, UVC, Novartis, Idera, Pfizer, Lupus Foundation of America, Medimmune, Rigel, Merck, Genentech, GSK Stiefel, Celgene. Dr. Werth holds stock ownership/options in UV Therapeutics, grants from the NIH, Amgen, Celgene, Rigel, Novartis, and the VA, and the copyright for the CDASI is owned by the University of Pennsylvania.

findings. Patients with DM have an increased risk of malignancy, most commonly in older patients. Traditionally, improving myositis symptoms was the primary outcome of studies in DM.¹ More recently, physicians are recognizing the impact of DM skin symptoms, particularly pruritus, on disease morbidity and patient quality of life.² Goreschi *et al* observed that skin-specific quality of life measures in patients with dermatomyositis were comparable to those of patients with cutaneous lupus erythematosus (CLE) and vulvodynia, and much higher than those of many other dermatologic diseases.³ His study also found that the physical symptoms of DM were worse than those of CLE, type 2 diabetes, clinical depression, and hypertension, and that the social and emotional symptoms of DM were worse than those of congestive heart failure, recent myocardial infarction, type 2 diabetes, and hypertension. In total, Goreschi *et al* found that a higher DM skin disease activity score correlated with a poorer quality of life. To further our understanding of the impact of DM on quality of life this prospective study examined whether improvement in the cutaneous disease activity of patients with DM is associated with a better quality of life, as measured by the Skindex-29 and patient assessment of itch and pain on a ten-point visual analog scale (VAS).

Materials and Methods

The cutaneous DM disease area and severity index (CDASI), a validated outcome measure, systematically quantified each patient's cutaneous disease activity.^{4, 5} Using the CDASI each patient's skin disease activity was scored from 0 to 100 based on the physician's evaluation of erythema, scale, and erosion or ulceration at fifteen anatomic locations as well as alopecia, Gottron's sign or papules on the hands, and periungual changes. A four point or greater decrease in the CDASI activity score indicated clinically relevant improvement based on statistical analysis using a receiver operating characteristic curve to maximize sensitivity and specificity.⁶

The Skindex-29, itch VAS, and pain VAS measured patient-reported components of quality of life. The Skindex-29, a validated quality of life measure for cutaneous disease, contains 29 questions.^{7, 8} Every question is scored as 0, 25, 50, 75, or 100 for each available answer choice from "never" to "all the time." The points are averaged into three subscale scores from 0 to 100: emotions, functioning, and symptoms. The itch and pain VAS scores are components of the patient global assessment (PtGA). The PtGA measures skin disease, pain, and itch on a 10-cm horizontal line (VAS) from 0 to 10, as assessed by the patient. Although collected in this study, the patient's assessment of skin disease in the PtGA is not a quality of life measure. Higher numbers indicate a worse score for all three instruments, the CDASI, the Skindex-29, and the PtGA.

Data was collected as part of an ongoing University of Pennsylvania institutional review board-approved prospective database study on dermatomyositis. Consenting patients over 18 years old with a clinical, and/or histological diagnosis of dermatomyositis were enrolled in the study. At each visit the subjects completed questionnaires on their quality of life, including the Skindex-29 and the PtGA, and the physician completed the CDASI. The same physician evaluated all patients in this study. REDCap, a secure web application, was used for data collection and management.⁹

Patients with a completed CDASI at their first two database visits separated by at least two months were classified into responder (n=15) and non-responder (n=30) groups according to the point change in CDASI activity. Responders had at least a four-point improvement in CDASI activity, indicating clinical improvement.

The physician completed the CDASI for each patient at both visits. All patients in the responder group completed all sections of the Skindex-29 and PtGA at each visit. One non-responder did not complete the Skindex-29 emotions section and one did not complete the Skindex-29 functioning section. Five non-responders did not complete the pain and/or itch VAS assessment. Three non-responders did not complete the skin disease VAS assessment. Results were recalculated after removing the patients with missing data, and there was no difference in the outcomes.

Statistical Analysis

The Wilcoxon test was used to compare the Skindex-29 and the VAS scores at the baseline and the follow-up visits between responders and non-responders. Spearman correlation tests compared the change in CDASI to the change in each component of the Skindex-29 and VAS scores for all patients (the combined responders and non-responders). Linear regression models were used to compare the components of the Skindex-29 and the VAS scores at the follow-up visits between the responders and non-responders, accounting for the differences in baseline values. Smoking status was compared to CLE using Fisher's exact test. The analyses were performed using GraphPad Prism, version 5.0 (GraphPad Software Inc.) and R, version 3.0.2 for Windows (R core Team).

Results

The median CDASI activity score improved from 24 to 9 between visits for responders, and worsened from 14 to 15 for non-responders. For responders, the median Skindex-29 subscale scores decreased from 45 to 25 for emotions, 15 to 4 for functioning, 50 to 14 for symptoms; the median itch VAS score decreased from 2.4 to 0.4 and the pain VAS score from 2.4 to 0.8. Changes in the median scores of non-responders were: emotions from 33 to 31, functioning 13 to 17, symptoms 32 to 43, itch VAS 1.4 to 4.5, and pain VAS 0.5 to 0.5. For reference, Skindex-29 subscale scores for people without skin disease were (mean $\pm$ standard deviation): emotions 9 ± 13 , functioning 4 ± 8 , and symptoms 14 ± 12 (unpublished data obtained either by our group or by personal communication with Dr. Mary-Margaret Chren; median data was not available). To collect this Skindex-29 data for patients without skin disease, a booth was set up at a hospital cafeteria and people who denied having skin disease were invited to participate; the average age of respondents without skin disease was 33 years old.

The change in Skindex-29 subscale scores was significantly different between the responders and non-responders: emotions $P=0.0047$, functioning $P=0.0026$, and symptoms $P<0.0001$ (Fig. 1). The change in VAS scores was also significantly different between the groups for both itch ($P=0.0135$) and pain ($P=0.0367$) (Fig. 2). Change in the CDASI activity score of all subjects combined correlated with a change in Skindex-29 scores: emotions

$r_{sp}=0.6038$ ($P<0.0001$), functioning $r_{sp}=0.5924$ ($P<0.0001$), and symptoms $r_{sp}=0.6672$ ($P<0.0001$). Change in the CDASI activity score was less strongly correlated to the change in the itch and pain VAS scores than the Skindex-29 subscale scores: itch $r_{sp}=0.3951$ ($P=0.141$) and pain $r_{sp}=0.4551$ ($P=0.0036$).

The difference in baseline scores between responders and non-responders was significant. Using linear regression to adjust for these differences at visit 1, the mean Skindex-29 scores of responders at visit 2 remained significantly below those of non-responders: the emotions score 13.2 points lower ($P<0.01$), the functioning score 14.9 points lower ($P<0.001$), and the symptoms score 21.5 points lower ($P<0.0001$). Similarly, the responders' mean itch VAS score was 2.8 points lower ($P<0.0001$) and pain VAS score 1.2 points lower ($P<0.01$) at visit 2 compared to those of non-responders' after adjusting for baseline differences. While the CDASI activity, Skindex-29 subscales, itch VAS, and pain VAS scores were all higher at visit 1 for responders than non-responders, this linear regression model showed that the responders had improved quality of life in all parameters measured compared to the non-responders after adjusting for these baseline differences.

Despite improvement in the physician measured disease activity for the responder group, change in the patients' VAS self-assessment of their skin disease was not significant (decreased from 3.4 to 2.0, $P=0.0690$). There was also no significant change in the skin disease VAS score for non-responders. The non-responders' self-assessed skin disease worsened from 3.6 to 3.2 ($P=0.5011$).

The difference between responders and non-responders in demographics or disease history was not statistically significantly (Table 1). There was a higher percentage of women and patients with classic DM in the responder group, but this difference was not significant. 6.7% of the responders and 6.7% of the non-responders were current smokers. The majority of patients in both groups were white women in their 50s who had never smoked, were on immunosuppressant therapy for DM, and had no history of malignancy. Three of the 45 patients in this group were current smokers. Comparing our data with previously published lupus data that found that 50 of 149 patients with active CLE were current smokers,¹⁰ the number of current smokers is significantly less in DM than CLE ($P=0.0002$).

Discussion

Although two-thirds of DM patients in this study did not respond to treatment, those who had a clinically significant improvement in their skin activity following treatment also had a significant improvement in all quality of life measures. The Skindex-29 symptoms, functioning, and emotions subscale scores and patient-reported itch and pain VAS scores improved significantly for the responder group compared to the non-responder group. At visit 2 the median responders' Skindex-29 emotions score was 44% lower, functioning score 73% lower, and symptoms score 72% lower than at visit 1. For the non-responders, the emotions score was 9% lower, functioning score 31% higher, and symptoms score 34% higher at visit 2 compared to visit 1. Effective treatment enabled the Skindex-29 scores of the responders to trend towards those of people without skin disease, while the corresponding scores of the non-responders at visit 2 remained above that level.

Of the factors that impair the quality of life of DM patients, pruritus is known to significantly affect daily life.¹¹ Pruritus is one of the symptoms that DM patients often complain about during clinic visits, and correlates with a worse quality of life.² In this study a statistically significant decrease in pruritus accompanied improvement in the CDASI activity as well as in the pain VAS score and Skindex-29 emotions, functioning, and symptoms subscale scores. Of note, one of the seven questions contributing to the Skindex-29 symptoms subscale score is itch. Surprisingly, the correlation between change in CDASI activity and itch ($r_{sp}=0.3951$, $P=0.0141$) was not as strong as the correlation between change in CDASI activity and Skindex-29 emotions ($r_{sp}=0.6038$, $P<0.0001$), functioning ($r_{sp}=0.5924$, $P<0.0001$), and symptoms ($r_{sp}=0.6672$, $P<0.0001$) scores. Pain is thought to be a less significant symptom than itch in patients with DM, but this study found that pain significantly improved in the responders compared to the non-responders.³

It is interesting that improvement in many patient-reported skin-specific quality of life measures correlated with improvement in the cutaneous DM disease activity even when patients did not note statistically significant improvement in their skin disease. This result may be related to the outcome that the emotions scores changed the least for responders compared to their improvement in symptoms and functioning. Analogous study results could not be found for other skin diseases, including CLE, but studies in rheumatoid arthritis, an inflammatory condition like DM, also found greater improvement in physical functioning than emotions: physical functioning and disability improved by close to 40% following treatment compared to an increase in mental well-being of about 15%.^{12, 13} Similarly, our study found discordance between improvement in physical symptoms and measured disease activity versus improvement in patient-reported emotions. This finding may suggest that improvement in a patient's emotions and self-assessment of skin disease can lag behind recovery of other aspects of the disease that also impaired quality of life (functioning and symptoms), but a longer follow-up period would be needed to verify this concept.

Prior studies found that quality of life in DM is impaired to a level similar to that in CLE.³ One study found that, like DM, many quality of life measures in CLE improved as skin disease activity improved. Chang *et al* showed that treatment of CLE skin disease activity (as measured by the CLE Disease Area and Severity Index [CLASI]) correlated with an improvement in Skindex-29 emotions and symptoms subscale scores: emotions $r_{sp}=0.39$ ($P=0.01$) and, symptoms $r_{sp}=0.33$ ($P=0.04$).¹⁴ In Chang's study the correlation of the CLASI activity with the Skindex-29 functioning subscale score was not statistically significant, $r_{sp}=0.29$ ($P=0.07$). Our study found that the correlation of cutaneous DM disease activity with quality of life measures is stronger than that of CLE and correlates with more measures (emotions, symptoms, and functioning). These differences between CLE and DM may be because pruritus is often a significant and bothersome symptom for patients with DM, much less than for patients with CLE,³ and pruritus improved with DM disease activity.

Another difference between CLE and DM that may impact the correlation of disease activity and quality of life is smoking. Refractory disease and a worse quality of life in CLE are associated with active smoking.¹⁰ Additionally, recent studies suggest that active smoking alone is associated with an increased risk of depression and smoking cessation is associated with decreased depression, and improved mood and quality of life.^{15, 16} Only 7% of subjects

in this study were current smokers compared to 34% in previously published data of patients with CLE, suggesting that smoking is not a risk factor for DM ($P=0.0002$). Further study of this subject in DM is needed.

This is the first study to demonstrate that the quality of life of DM patients, as measured by skin specific instruments for emotions, functioning, symptoms, itch, and pain, improved with treatment of and subsequent improvement of their cutaneous disease activity. Even though subtypes of DM may only affect the skin, this disease affects a person's mood and ability to function in daily tasks. While some people with DM are responsive to existing treatments, there is a large group of patients who are not. The results of this study should encourage the development of more effective therapies to improve patients' disease activity and quality of life.

Acknowledgments

Funding Sources: This material is based upon work supported by the Department of Veterans Affairs (Veterans Health Administration, Office of Research and Development, Biomedical Laboratory Research and Development) and by the National Institutes of Health (NIH K24-AR 02207) to VPW.

Bibliography

1. Drouet B, Le Loet X, Vittecoq O, et al. A Study of Long-Term Survival, Functional Outcome and Quality of Life in Patients with Polymyositis or Dermatomyositis. *Rev Rhum Engl Ed*. 1996; 63:321–30. [PubMed: 8789877]
2. Hundley JL, Carroll CL, Lang W, et al. Cutaneous Symptoms of Dermatomyositis Significantly Impact Patients' Quality of Life. *J Am Acad Dermatol*. 2006; 54:217–20. [PubMed: 16443050]
3. Goreshi R, Chock M, Foering K, et al. Quality of Life in Dermatomyositis. *J Am Acad Dermatol*. 2011; 65:1107–16. [PubMed: 21722989]
4. Klein RQ, Bangert CA, Costner M, et al. Comparison of the Reliability and Validity of Outcome Instruments for Cutaneous Dermatomyositis. *Br J Dermatol*. 2008; 159:887–94. [PubMed: 18616782]
5. Yassae M, Fiorentino D, Okawa J, et al. Modification of the Cutaneous Dermatomyositis Disease Area and Severity Index, an Outcome Instrument. *Br J Dermatol*. 2010; 162:669–73. [PubMed: 19863510]
6. Anyanwu CO, Fiorentino D, Chung L, et al. Validation of the Cutaneous Dermatomyositis Disease Area and Severity Index: Characterizing Severity and Assessing Responsiveness to Clinical Change. *Arthritis Rheumatol (abstr)*. 2013; 65:1935.
7. Chren MM, Lasek RJ, Quinn LM, Mostow EN, Zyzanski SJ. Skindex, a Quality-of-Life Measure for Patients with Skin Disease: Reliability, Validity, and Responsiveness. *J Invest Dermatol*. 1996; 107:707–13. [PubMed: 8875954]
8. Chren MM, Lasek RJ, Quinn LM, Covinsky KE. Convergent and Discriminant Validity of a Generic and a Disease-Specific Instrument to Measure Quality of Life in Patients with Skin Disease. *J Invest Dermatol*. 1997; 108:103–7. [PubMed: 8980297]
9. Harris PA, Taylor R, Thielke R, Payne J, Gonzalez N, Conde JG. Research Electronic Data Capture (Redcap)--a Metadata-Driven Methodology and Workflow Process for Providing Translational Research Informatics Support. *J Biomed Inform*. 2009; 42:377–81. [PubMed: 18929686]
10. Piette EW, Foering KP, Chang AY, et al. Impact of Smoking in Cutaneous Lupus Erythematosus. *Arch Dermatol*. 2012; 148:317–22. [PubMed: 22105815]
11. Shirani Z, Kucenic MJ, Carroll CL, et al. Pruritus in Adult Dermatomyositis. *Clin Exp Dermatol*. 2004; 29:273–6. [PubMed: 15115510]

12. Lipsky PE, van der Heijde DM, St Clair EW, et al. Infliximab and Methotrexate in the Treatment of Rheumatoid Arthritis. Anti-Tumor Necrosis Factor Trial in Rheumatoid Arthritis with Concomitant Therapy Study Group. *N Engl J Med*. 2000; 343:1594–602. [PubMed: 11096166]
13. Moreland LW, Schiff MH, Baumgartner SW, et al. Etanercept Therapy in Rheumatoid Arthritis. A Randomized, Controlled Trial. *Ann Intern Med*. 1999; 130:478–86. [PubMed: 10075615]
14. Chang AY, Ghazi E, Okawa J, Werth VP. Quality of Life Differences between Responders and Nonresponders in the Treatment of Cutaneous Lupus Erythematosus. *JAMA Dermatol*. 2013; 149:104–6. [PubMed: 23324773]
15. Boden JM, Fergusson DM, Horwood LJ. Cigarette Smoking and Depression: Tests of Causal Linkages Using a Longitudinal Birth Cohort. *Br J Psychiatry*. 2010; 196:440–6. [PubMed: 20513853]
16. Taylor G, McNeill A, Girling A, Farley A, Lindson-Hawley N, Aveyard P. Change in Mental Health after Smoking Cessation: Systematic Review and Meta-Analysis. *BMJ*. 2014; 348:g1151. [PubMed: 24524926]

Bulleted Statements

- Dermatomyositis significantly impairs quality of life.
- Higher dermatomyositis skin disease activity correlates with a worse quality of life.
- This study shows that quality of life in dermatomyositis, as measured by the Skindex-29 emotions, functioning, and symptoms subscale scores and patient assessment of itch and pain on a ten-point visual analog scale, improves with a decrease in skin disease activity.

Figure 1.

Changes in the Skindex-29 subscale scores of emotions (a), functioning (b), and symptoms (c) from visit 1 to visit 2 for the 15 responders compared to the 30 non-responders. Red lines represent the median score.

Figure 2.

Changes in the itch (a) and pain (b) VAS scores from visit 1 to visit 2 for the 15 responders compared to the 30 non-responders. Red lines represent the median score.

Table 1

Demographic information and disease history of responders and non-responders

		Responders (n=15)	Non-Responders (n=30)
		Number (%)	Number (%)
Sex	Male	1 (6.7)	6 (20.0)
	Female	14(93.3)	24 (80.0)
Race	White (non-Hispanic)	11 (73.3)	24 (80.0)
	White (Hispanic)	2 (13.3)	2 (6.7)
	White (unknown)	2 (13.3)	3 (10.0)
	Asian	0 (0.0)	1 (3.3)
Disease Type	Classic	9 (60.0)	14 (46.7)
	Amyopathic	4 (26.7)	14 (46.7)
	Hypomyopathic	2 (13.3)	2 (6.7)
Medications for DM	Antimalarials only	3 (20.0)	9 (30.0)
	Immunosuppressants ± antimalarials	11 (73.3)	18 (60.0)
	Topicals only or none	1 (6.7)	3 (10.0)
Smoking History	Current	1 (6.7)	2 (6.7)
	Past	4 (26.7)	11 (36.7)
	Never	10 (66.7)	17 (56.7)
Malignancy within Five Years of DM Diagnosis	Yes	1 (6.7)	3 (10.0)
	No	14 (93.3)	27 (90.0)
		Average (SD)	Average (SD)
Age (years)		55.1 (13.1)	53.6 (14.2)