Responsiveness to Change and Establishment of the Minimal Clinically Important Difference for the Cutaneous Sarcoidosis Activity and Morphology Instrument

The Cutaneous Sarcoidosis Activity and Morphology Instrument (CSAMI) is a reliable and valid instrument to objectively measure disease activity in cutaneous sarcoidosis.1 To our knowledge, its responsiveness to changes in disease activity over time has not been established. The objective of this study was to measure the responsiveness of the CSAMI to changes in disease activity over time and establish a minimal clinically important difference (MCID).

Methods | Patients 18 years and older were recruited from the cutaneous sarcoidosis clinic at the University of Pennsylvania between March 1, 2014, and December 31, 2016. Their demographic characteristics can be found in the eTable in the Supplement. This study was reported in accordance with the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guideline. A diagnosis of cutaneous sarcoidosis was based on clinical presentation and skin biopsy results consistent with the diagnosis. Treatments and follow-up visits were recommended as appropriate for routine clinical care. Written informed consent was obtained from all participants prior to participation, and this study was approved by the institutional review board at the University of Pennsylvania.

Standard physician- and patient-reported instruments were used to measure disease activity and health-related quality of life at each appointment. Physician-reported CSAMI was used to measure cutaneous sarcoidosis activity.1 Patients completed a visual analog scale as a self-assessment of disease, the Dermatology Life Quality Index2 to measure health-related quality of life, and the Sarcoidosis Assessment Tool—skin concerns module.3 Additionally, at follow-up appointments the physician change rating (PCR) was documented as improved, no change, or worsened (Table 1).

Descriptive statistics were used to characterize the demographic information, disease severity, and health-related quality of life at baseline. The median change in CSAMI score between baseline and follow-up was calculated for each PCR group (improved, no change, or worsened) and in those who met the MCID for the other standard instruments. An anchor-based approach was used to establish the MCID for the CSAMI, using PCR as the criterion standard for determining correct classification.4 A receiver operating characteristic curve analysis was performed to determine the sensitivity, specificity, and percentage of patients correctly classified as showing improvements in the CSAMI score. The final determination of MCID was based on the percentage of patients correctly classified and maximizing both the sensitivity and specificity (Table 2).

Results | The median (interquartile range [IQR]) age of the 41 patients included was 54 (46-52) years, and 29 patients (68%) were women. Most patients (n = 30; 73%) were African American. The median (IQR) baseline CSAMI score was 14.0 (9.0-23.0), and the median (IQR) baseline Dermatology Life Quality Index score was 3 (1-9). Patients categorized as improved had a median (range) improvement of 6.5 (−20 to 8) points in the CSAMI score, and those categorized as worsened had a median (range) worsening of 5 (0-10) points (Table 1). To examine the construct validity of the CSAMI to measure changes in disease severity, the median change between CSAMI score at follow-up visits and baseline was also calculated for patients who achieved the MCID for the other standard instruments (Table 1). A receiver operating characteristic curve analysis was performed to determine the MCID in CSAMI score using PCR as the criterion standard. A 5-point decrease in CSAMI score was 61.9% sensitive and 63.6% specific for improvement in skin disease, resulting in correct classification of 63% of the patients (Table 2).

Discussion | In this single-institution case series study, we found that the CSAMI was responsive to changes in cutaneous sarcoidosis disease activity over time. The analysis suggests that

Table 1. Assessing the Responsiveness of Cutaneous Sarcoidosis Activity and Morphology Instrument (CSAMI) Score Compared With Other Sarcoidosis Instruments

<table>
<thead>
<tr>
<th>Measure</th>
<th>No. of Patients (Range)</th>
<th>Difference in CSAMI Score, Median (Range)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physician change rating*</td>
<td>37</td>
<td>Improved 20 (−6.5 (−20.0 to 8.0) [−12.0 to −2.5])</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No change 17 (−4.0 (−27.0 to 10.0) [−8.0 to 0])</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Worsened 4 (5.0 (0 to 10.0) [2.0 to 8.0])</td>
</tr>
<tr>
<td>Patients who achieved the MCID for other sarcoidosis instruments</td>
<td>25</td>
<td>Patient self-assessment of skin*b</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Dermatology Life Quality Index*c</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sarcoidosis Assessment Tool—skin concernsd</td>
</tr>
</tbody>
</table>

Abbreviations: IQR, interquartile range; MCID, minimal clinically important difference.

* At the follow-up appointment, the physician was asked to rate the skin disease as improved, no change, or worse.

b For outcomes based on the visual analog scale, the MCID was established as a 10% change from baseline.

c The established MCID for the Dermatology Life Quality Index is a 4-point decrease in score.

d For the Sarcoidosis Assessment Tool—skin concerns, the MCID is a 3.5-point decrease in score.
Table 2. Determination of the Minimal Clinically Important Difference in Cutaneous Sarcoidosis Activity and Morphology Instrument Score

<table>
<thead>
<tr>
<th>Change in Score</th>
<th>Sensitivity, %</th>
<th>Specificity, %</th>
<th>Correctly Classified, No. (%)</th>
<th>ROC Curve Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Δ3</td>
<td>75.0</td>
<td>52.4</td>
<td>26 (63)</td>
<td>0.6369</td>
</tr>
<tr>
<td>Δ4</td>
<td>70.0</td>
<td>57.1</td>
<td>26 (63)</td>
<td>0.6357</td>
</tr>
<tr>
<td>Δ5</td>
<td>65.0</td>
<td>61.9</td>
<td>26 (63)</td>
<td>0.6345</td>
</tr>
<tr>
<td>Δ6</td>
<td>50.0</td>
<td>71.4</td>
<td>25 (61)</td>
<td>0.6071</td>
</tr>
<tr>
<td>Δ7</td>
<td>50.0</td>
<td>71.4</td>
<td>25 (61)</td>
<td>0.6071</td>
</tr>
<tr>
<td>Δ8</td>
<td>50.0</td>
<td>76.2</td>
<td>26 (63)</td>
<td>0.6310</td>
</tr>
<tr>
<td>Δ9</td>
<td>35.0</td>
<td>81.0</td>
<td>24 (58)</td>
<td>0.5798</td>
</tr>
<tr>
<td>Δ10</td>
<td>35.0</td>
<td>81.0</td>
<td>24 (58)</td>
<td>0.5798</td>
</tr>
<tr>
<td>Δ12</td>
<td>25.0</td>
<td>81.0</td>
<td>24 (54)</td>
<td>0.5298</td>
</tr>
<tr>
<td>Δ15</td>
<td>20.0</td>
<td>95.2</td>
<td>24 (58)</td>
<td>0.5762</td>
</tr>
</tbody>
</table>

Abbreviation: ROC, receiver operating characteristic.

Megan H. Noe, MD, MPH, MSCE
Joel M. Gelfand, MD, MSCE
Joshua S. Bryer, BA
Sarah N. Price, MA
Marc A. Judson, MD
Misha Rosenbach, MD

Author Affiliations: Department of Dermatology, Perelman School of Medicine, University of Pennsylvania, Philadelphia (Noe, Gelfand, Bryer, Price, Rosenbach); Department of Dermatology, Brigham and Women’s Hospital, Harvard Medical School, Boston, Massachusetts (Noe); Department of Psychology, University of Arizona, Tucson (Price); Division of Pulmonary and Critical Care Medicine, Department of Medicine, Albany Medical College, Albany, New York (Judson); Deputy Editor, JAMA Dermatology (Rosenbach).

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Corresponding Author: Megan H. Noe, MD, MPH, MSCE, Department of Dermatology, Brigham and Women’s Hospital, Harvard Medical School, 221 Longwood Ave, Boston, MA 02115 (mnoe2@bwh.harvard.edu).

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Concept and design: Noe, Rosenbach.

Acquisition, analysis, or interpretation of data: All authors.

Drafting of the manuscript: Noe, Judson.

Critical revision of the manuscript for important intellectual content: Gelfand, Bryer, Price, Judson, Rosenbach.

Statistical analysis: Noe.

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Additional Information: The CSAMI instrument was developed at the University of Pennsylvania, but the authors have never patented, copyrighted, or financially profited from it.


OBSERVATION

Diffuse Hyperpigmentation in Infants During Monsoon Season

Chikungunya fever (CF) is an arthropod-borne infection identified in nearly 40 countries, with endemcity in Indian subcontinent, Southeast Asia, and Africa.1 It is caused by the chikungunya virus and spread by Aedes aegypti and Aedes albopictus mosquitoes. In this series, we highlight diffuse hypermelanosisis as a rare presenting manifestation of CF among infants.

Report of Cases | Twelve infants (8 boys and 4 girls) aged 9 days to 11 months were seen during the monsoon season for sudden-onset, rapidly progressing, diffuse hyperpigmentation all over...