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ORIGINAL ARTICLE

# Validity and reliability of the Rosacea Area and Severity Index: A novel scoring system for clinical assessment of rosacea severity

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## Abstract

**Background:** Rosacea is a common chronic inflammatory facial skin disorder. Standardized evaluation of the severity and extent of rosacea is important for baseline assessment and treatment effect. The currently used Investigator's Global Assessment (IGA) is unspecific and fails to consider subtypes/phenotypes of rosacea and area involvement. The Rosacea Area and Severity Index (RASI) was developed to give a more nuanced evaluation of rosacea features in four facial skin areas adjusted to the relative importance of each area of the face to obtain an overall severity score.

**Objectives:** To validate RASI against the IGA and to assess the inter- and intraobserver reliability for RASI.

**Methods:** Sixteen dermatologists evaluated photographs of 60 adult patients with rosacea (3 photographs per patient, one from the front and one from each side). IGA and RASI scores were performed for interobserver reliability assessment. To determine intraobserver reliability, 14 dermatologists evaluated 10 other patients twice with at least 1 week interval.

**Results:** The IGA and RASI correlated well (Spearman correlation coefficient (SCC) = 0.75, 95% confidence interval (CI) = 0.72–0.78). Interobserver reliability was moderate for RASI and poor to moderate for IGA. Reliability was strongest for rhinophyma, followed by papules/pustules and erythema, and rather weak for telangiectasia. For area scores, interobserver reliability was strongest for cheeks, followed by nose, chin and forehead. We found a moderate-to-strong intraobserver agreement both for IGA and RASI.

**Conclusions:** We have designed a new practical tool to examine clinical severity of rosacea. RASI proved simple and reliable in scoring clinical severity of rosacea with an agreement comparable to the currently used IGA although RASI will provide a more nuanced view of the current rosacea extent and severity. We suggest that RASI is used in the daily clinical setting as well as in clinical studies assessing the efficacy of rosacea therapies.

# INTRODUCTION

Rosacea is a common chronic inflammatory skin disorder primarily affecting the face with a global prevalence of 5.5%.[1] Onset of rosacea is usually around ages 30–50 years of age,[1] and the disease can have a major negative impact on quality of life in patients who may experience anxiety and depression due to the visible features as well as the invisible stinging/burning sensation.[2–4] Standardized evaluation of severity and extent of the disease is important for baseline assessment and for monitoring disease course and treatment effects, especially in clinical trials. Currently, there are no specific guides for evaluating rosacea severity. One of the most commonly used guides for assessing treatment effects of rosacea is the Investigator's Global Assessment (IGA). The IGA combines the different elementary lesions in a rather rigid way with only 5 overall grade levels across features and thereby fails to address patients with different severities of features (e.g. intense erythema but no papules/pustules), and area involvement.[5–7]

Adequate assessment of the severity and extent of rosacea is needed for evidence-based practice. A scoring system should be objective and easy to use, be reliable both within and between observers, as well as being validated against currently applied scoring systems for rosacea.

The Rosacea Area and Severity Index (RASI) was developed to provide a reliable and sensitive tool to assess major clinical aspects of rosacea across a wide range of patients to obtain an overall severity score. The index was developed through inspiration of the validated Psoriasis Area and Severity Index (PASI),[8] Eczema Area and Severity Index (EASI),[9] and Hand Eczema Severity Index (HECSI).[10] These scoring systems are based on the principle that the intensity of key signs combined with the extent of these signs in affected areas is an important factor in determining severity of chronic inflammatory skin diseases.

The aim of this study was to develop a more flexible system allowing for accurate evaluation of the different rosacea phenotypes and to validate RASI against the IGA. We also tested whether observers agreed on their overall RASI ratings on a given day (interobserver reliability), and whether they were consistent in their ratings on a day-to-day basis (intraobserver reliability).

# MATERIALS AND METHODS

## Observers

A total of 16 observers were selected as a representative sample of the population of clinicians who may ultimately use the RASI in clinical practice. Observers were dermatologists with experience in assessing signs and symptoms in patients with rosacea. Observers came from academic hospital departments (Department of Dermato-Venereology, Bispebjerg Hospital; Department of Dermatology and Allergy, Gentofte Hospital; Department of Dermatology, Zealand University Hospital; Department of Dermato-venereology, Aarhus University Hospital; Department of Dermatology, Aalborg University Hospital) or from private practice dermatology clinics distributed throughout Denmark, respectively. Observers were instructed to be consistent in their evaluations. The RASI was developed by authors NKFW, JPT, CZ and AE. The remaining co-authors commented on the index and provided clinical input, and alterations were subsequently made based on this. No pilot study was performed before testing the scale in the present study. Patients with rosacea were not involved in the concept generation. The first and senior author (authors NKFW and AE, who were responsible for study conduct and analyses) did not participate in the objective RASI evaluations.

## Patients

Ratings were collected digitally via the online platform RedCap (Research Electronic Data Capture, Vanderbilt University). Ratings were based on standardized high-resolution digital photographs (Canon PowerShot G12, 10.0 Megapixel) of the facial skin, collected during an interview study of patients with rosacea in Copenhagen, Denmark.[11] At Day 1, photographs of 3 + 60 (see below) patients were assessed *one* time for interobserver reliability (Day 1). For each patient, 3 photographs were presented: one from the front (of the entire face) and one from each side. Initially, pictures of 3 patients were presented, allowing observers to practice the use of RASI before being presented to the 60 patients included in the final analyses. At Day 2, 10 other patients (again, 3 photographs per patient) were selected to represent all features and severities of rosacea to test intraobserver reliability of RASI. These 10 patients were rated twice (Days 2 and 8) with at least a 1 week gap.

## Assessments

Observers evaluated each photograph on both RASI and IGA. RASI and IGA are evaluations of the severity of rosacea at a given time. Both are essentially five-point scales although whereas IGA only considers an overall severity of rosacea, the RASI provides a combination of severity of each feature and the affected area. Erythema (E), papules and pustules (P), and telangiectasia (T) are separately rated in each facial area on a scale from 0 to 4, while rhinophyma (R) and other features located to the nose are rated from 0 to 3. The different rating for the nose was decided because features are often not as intense on the nose as the rest of the face, and because milder symptoms on the nose are more visible than in other facial areas (Table 1, part A).

For each facial area (cheeks, forehead, nose and chin), the extent of rosacea features was rated on a proportional factor from 0 to 6 based on the percentage of the facial area involved (from 0 to 100%): 0 = no affection; 1 = <10%; 2 = 10%–29%; 3 = 30%–49%; 4 = 50%–69%; 5 = 70%–89%; and 6 = >90% affected (Table 1, part B). The algorithm for calculating RASI uses, for each facial area, the sum of clinical sign scores (E + P + T + R),

**TABLE 1** Scoring template for Rosacea Area and Severity Index (RASI)

| (a) Elementary lesion severity score: per area (A) and entire face (E) | | | | | | |
|---|---|---|---|---|---|---|
| **Symptom** | **Lesion score** | **Cheeks** | **Forehead** | **Nose*** | **Chin** | **Entire Face Sum (E)**** |
| Erythema | 0 = None<br>1 = Slight<br>2 = Moderate<br>3 = Severe<br>4 = Very Severe | | | | | |
| Papules/pustules | | | | | | |
| Telangiectasia | | | | | | |
| Phyma | | - | - | | - | |
| | Lesion Score Sum (A) | | | | | |

| (b) Area score (B): Degree of involvement as a percentage for each body region affected (score each region between 0-6) | | | | | |
|---|---|---|---|---|---|
| **Area Score** | **Cheeks** | **Forehead** | **Nose** | **Chin** | |
| 0 = 0%<br>1 = 1 - 9%<br>2 = 10 - 29%<br>3 = 30 - 49%<br>4 = 50 - 69%<br>5 = 70 - 89%<br>6 = 90 - 100% | | | | | |
| **(c) Individual subtotals (C) per area = Lesion Score Sum (A) x Area Score (B)** | | | | | |
| **Subtotals (C)** | | | | | |
| **(d) Adjusted subtotals (D) according to the relative surfaces of the areas on the entire face** | | | | | |
| **Corrector factor according to the area** | **x 0.4** | **x 0.3** | **x 0.2** | **x 0.1** | **RASI Score (sum)***** |
| **Adjusted subtotals (D)** | | | | | |

*Note*: RASI consists of four parts (a–d); *a* is the evaluation of each feature in each facial area. The entire face sum (E) and lesion score sum (a) can be used as a measure of severity of each feature (E)/facial area affected (a), respectively; *b* is the degree of involvement for each facial area (area score); *c* is the individual subtotals per area; *d* is the adjusted subtotals according to each area resulting in the total RASI score sum. Two guides were given to the observer: A guide with different pictures as models to evaluate the severity of each elementary lesion (Figure S1) and a schema of the face where 100% of each area was represented, to evaluate percentage of involved area (Figure S2).

[a]The nose is graded from 0–3.

[b]The maximum value of the entire face sum (E) of elementary lesion severity scores varies according to the elementary lesion: (15 (4 + 4 + 3 + 4)) for erythema, papules/pustules, telangiectasia, and 3 for Phyma.

[c]The maximum value of RASI score is 72: maximum value for each location (A [=3–15]) × maximum area sore (B [=6]) = max (C); and with the adjusting for respective factors: ([12 × 6] × 0.4) + ([12 × 6] × 0.3) + ([12 × 6] × 0.2) + ([12 × 6] × 0.1) = 28.8 + 21.6 + 14.4 + 7.2 = 72.

multiplied by the proportional factor attributed to the percentage of involved area (Table 1, part D), multiplied by the proportional factor resulting in a total RASI score which is the sum of the scores from each of the four facial areas. The RASI has a minimum score of 0 and a maximum of 72 (Table 1).

IGA is a global evaluation of rosacea severity consisting of a five-point scale ranging from 0 to 4 (0 = clear; 1 = very mild; 2 = mild; 3 = moderate; and 4 = severe). It allows for rapid evaluation without considering each type of elementary lesion separately nor area affected. In our study, in addition to the usual IGA (overall) index, we adapted the IGA for erythema, papules and pustules, telangiectasia, and rhinophyma, respectively (Table S1). Each patient was evaluated on both IGA and RASI in one sitting.

## Approvals

The project was approved by the Danish data protection agency (P-2020-765), and all patients who provided pictures for the RASI guide provided written informed consent.

## Statistics

First, we tested the agreement between RASI ratings against IGA ratings based on Day 1 (convergent validity). This was done by calculating two measures: Kendall's tau and Spearman correlation coefficient. The Kendall's tau is used to test the strength of a relationship between two variables by using catergories.[12] We tested Kendall's tau for IGA against the corresponding RASI value. The Spearman correlation coefficient (SCC) is, like Kendall's tau, a non-parametric test which can be used to determine the degree of association between two variables.[12] We calculated the SCC with IGA as the explanatory variable and RASI as the response variable, adjusting for patient and observer. Calculating the SCC results in a value between −1 to +1, where −1 is a strong negative correlation and + 1 is a strong positive correlation. Values between 0–0.19 are regarded as weak, 0.2–0.39 as weak, 0.40–0.59 as moderate, 0.6–0.79 as strong, and 0.8–1.0 as very strong.[13,14] There are no universal standards for effect size of Kendall's tau, but values above 0.5 seem to be considered moderate-to-strong agreement.[12]

Secondly, we wanted to test the reliability of both IGA and RASI *between* observers (interobserver reliability). To test this, we calculated intraclass correlation coefficients (ICC) for IGA values (overall, erythema, papules/pustules, telangiectasia and rhinophyma) and for overall RASI as well as for each key sign (erythema, papules/pustules telangiectasia, rhinophyma) based on ratings on Days 2 and 8. The ICC results in a value between 0 and 1 with higher values indicating better agreement; values <0.5 indicate poor agreement, values between 0.50 and 0.74 indicate moderate agreement, values between 0.75 and 0.89 indicate good agreement, and values between 0.90 and 1.00 indicate excellent agreement.[15] To determine the values of

RASI corresponding to different severity levels of rosacea ('very mild', 'mild', 'moderate', 'severe' and 'very severe'), we compared RASI values to the corresponding IGA levels based on evaluations on Day 1.

Thirdly, we wanted to test agreement *within* observers from day to day (intraoberserver reliability). To test this, we performed linear regressions between Days 2 and 8 for both RASI and IGA overall. Regressions were adjusted for observer and rating day.

## RESULTS

A total of 16 observers performed ratings on Day 1, and 14 observers performed ratings on Days 2 and 8. Total RASI score sum ranged between 0.0 and 57.0 on Day 1, between 3.0 and 39.2 on Day 2, and between 1.6 and 41.2 on Day 8. For a trained clinician (author NKFW), each picture took an average of 1 min and 5 s (range, 39 s–1 min 37 s) to rate on both the IGA and RASI. For other raters, it took between 1 min and 4 min per rating with an average of 1 min 30 s.

RASI categories ('no rosacea', 'very mild', 'mild', 'moderate', 'severe' and 'very severe') were based on evaluations of the 60 patients on Day 1. The basis for the categories was the depiction of mean IGA and RASI scores (Figure 1a). RASI = 0 was considered 'no rosacea'; RASI between >0 and <3 was considered 'very mild'; RASI between ≥3 and <6 was considered 'mild'; RASI between ≥6 and <11.1 was considered 'moderate'; RASI between ≥11 and <20 was considered 'severe'; RASI ≥20 was considered 'very severe' based on the corresponding IGA values.

### Convergent validity

Based on Day 1, there was a moderate-to-strong correlation between overall IGA and overall RASI score (Kendall's tau = 0.64, 95% CI = 0.61–0.67, $p < 0.001$; Spearman correlation coefficient = 0.75, 95% CI = 0.72–0.78, $p < 0.001$) (Figure 1, Table 2).

When looking at the performance of RASI at different severities of rosacea, there was a moderate-to-strong agreement for all categories. The agreement between RASI and IGA was slightly stronger for clear to moderate rosacea (Spearman correlation coefficient = 0.88, 95% CI = 0.86–0.90) compared with moderate to severe rosacea (Spearman correlation coefficient = 0.68, 95% CI = 0.58–0.76). The agreement was strongest for clear to mild rosacea (Spearman correlation coefficient = 0.96, 95% CI = 0.95–0.97) and weakest for severe rosacea (Spearman correlation coefficient = 0.53, 95% CI = 0.29–0.71).

### Interobserver reliability

For RASI, the interobserver agreement assessed by ICC was moderate on all study days (Day 1: 0.66 (95% CI = 0.56–0.75); Day 2: 0.59 (95% CI = 0.37–0.84); and Day 8: 0.53 (95% CI = 0.31–0.80)). Lesion score and key signs all had moderate-to-strong agreement; however, for area score, the ICC was weak for forehead and chin. For IGA scores, the overall IGA was in poor agreement between observers on both Day 2 and Day 8, although IGA for erythema, papules and pustules, telangiectasia and rhinophyma were all in moderate agreement. There was no statistical difference between IGA and RASI on Day 2 and 8 (Figure 2, Tables 3 and 4).

### Intraobserver reliability

Intraobserver reliability was moderate for both IGA overall (0.72 [95% CI = 0.64–0.79]) and for RASI (0.85 [95% CI = 0.80–0.89]). Data were adjusted for 'observer' (dermatologist) and 'rating day' (Days 1–8) as these parameters were expected to affect correlations. The adjusted correlation for IGA overall was 0.99 (95% CI = 0.99–1.00) and 0.87 (95% CI 0.82–0.91) for RASI. We found ratings to be 2.12 points lower overall on RASI when comparing between Days 2 and 8. When testing correlation between Days 2 and 8 for severity of rosacea (no rosacea, very mild, mild, moderate, severe), we found a correlation of 0.993 (95% CI = 0.99–1.00) for both RASI and IGA.

## DISCUSSION

We have designed and constructed a new practical tool to examine the severity of rosacea. Agreement was strong overall between RASI and the currently used IGA. We found a slightly stronger interrater relability for IGA compared with RASI when adjusting for observer and patient, probably due to the simplicity of IGA with fewer levels in comparison with RASI. However, a simple index is generally unsuited for patients with rosacea who often present with several different features at once.

For RASI, we found an overall moderate-to-strong interobserver reliability on the three study days, both in overall RASI and for each item in the scoring system (extent, location and key clinical signs), except for area score for *chin* and *forehead, which were in poor agreement*. The interobserver reliability for each item was similar on Days 2 and 8. Intraobserver reliability was highest for rhinophyma, followed by papules/pustules, and erythema. The reliability was rather poor for telangiectasia, probably because ratings were performed using pictures instead of in-person ratings, and picture quality may in some instances have made it difficult to correctly evaluate telangiectasia.

Previous rosacea studies have focused on inflammatory lesion count and/or the severity of papules/pustules. We found a moderate-to-strong agreement between IGA papules/pustules and the corresponding RASI evaluation, suggesting that RASI accurately reflects severity of papules/pustules. For area scores, interobserver reliability was strongest for cheeks, followed by the nose; however, it was weak for chin and forehead. A reason for this could be that these areas were difficult to evaluate in pictures, and that rosacea rarely involves the whole face, but

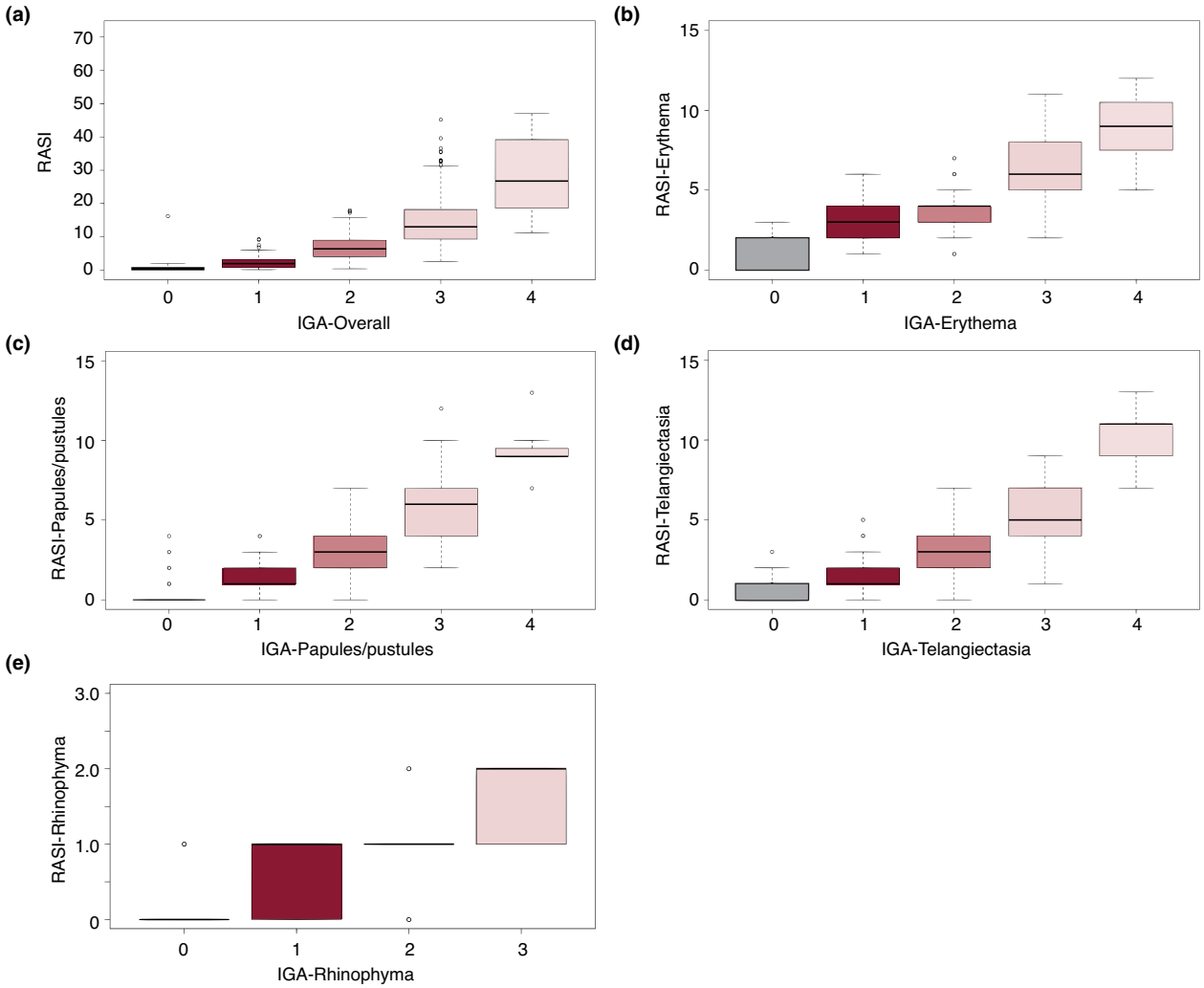


**FIGURE 1** Box plots depicting median rating for rosacea features on RASI against IGA. The *x*-axis represents severity of IGA; the *y*-axis represents severity of the corresponding RASI value. The thick line depicts median values, the boxplot shows the interquartile range, and the lines at the end show highest and lowest values without outliers. A = RASI versus IGA overall. The *x*-axis, IGA overall, has a scale from '0 to 4' where higher scores represent more severe rosacea. RASI has a scale from '0 to 72' with higher scores representing more severe rosacea; B = RASI erythema versus IGA erythema. The *x*-axis, IGA erythema, has a scale from '0 to 4' where higher scores represent more severe erythema. RASI erythema has a scale from '0 to 15' with higher scores representing more severe erythema; C = RASI papules and pustules versus IGA papules and pustules. The *x*-axis, IGA papules and pustules, has a scale from '0 to 4' with higher scores representing more severe papules and pustules. RASI papules and pustules have a scale from '0 to 15' with higher scores representing more severe papules and pustules; D = RASI telangiectasia versus IGA telangiectasia. The *x*-axis, IGA telangiectasia, has a scale from '0 to 4' with higher score representing severe telangiectasia. RASI telangiectasia has a scale from '0 to 15' with higher scores representing more severe telangiectasia; E = RASI rhinophyma versus IGA rhinophyma. The *x*-axis, IGA rhinophyma, has a scale from '0 to 4' with higher scores representing severe rhinophyma. RASI rhinophyma has a scale from '0 to 15' with higher scores representing more severe rhinophyma. IGA, Investigator Global Assessment; RASI, Rosacea Area and Severity Index.

spares the perioral skin and the temples. This could have led to uncertainty regarding how to rate percentage area affected in these areas, which has been clarified in the guide (Figure S2). We also found a stronger agreement between observers in patients with clear to mild rosacea compared with severe rosacea. A reason for this could be that patients with more severe rosacea represents with a wider variety of features and severities of rosacea, leading to more diverse ratings. However, additional training prior to using the index could also be useful in ensuring equal evaluations across all severities of rosacea.

We found that observers generally rated patients slightly lower the second time they saw the pictures. We speculate that this could be due to the repeated exposure which meant that observers got 'used' to the pictures, rating them lower than on the first encounter; however, this should not be a problem in the daily clinical setting, as patients will often present with different severities/features at each visit.

RASI is an objective tool for clinical and nuanced evaluation of all rosacea features at once, resulting in a total rosacea severity score. RASI is based on clinical signs only and does not entail questions on impact of the disease which should still be addressed by the currently available patient reported outcome scoring tools (Dermatology Life Quality Index [DLQI] and/or Rosacea Quality of Life [RosaQOL]).[16,17]

**TABLE 2** Agreement between RASI and IGA (convergent validity) (established by 16 dermatologists on Day 1) for both overall and for each rosacea feature, determined by Kendall's tau and Spearman correlation coefficient

| IGA vs. RASI | Kendall's tau (95% CI), *p*-value* | Spearman correlation coefficient (95% CI), *p*-value* |
|---|---|---|
| Feature | | |
| Overall | 0.64 (0.61–0.67), $p < 0.001$ | 0.75 (0.72–0.78), $p < 0.001$ |
| Erythema | 0.66 (0.63–0.69), $p < 0.001$ | 0.78 (0.75–0.80), $p < 0.001$ |
| Papules/pustules | 0.70 (0.67–0.73), $p < 0.001$ | 0.82 (0.80–0.85), $p < 0.001$ |
| Telangiectasia | 0.72 (0.69–0.74), $p < 0.001$ | 0.81 (0.78–0.83), $p < 0.001$ |
| Rhinophyma | 0.79 (0.37–0.46), $p < 0.001$ | 0.85 (0.82–0.89), $p < 0.001$ |

Abbreviations: IGA, Investigator Global Assessment; RASI, Rosacea Area and Severity Index.

*The null hypothesis is that variables are uncorrelated at 0.05 significance level. A *p*-value below 0.05 means that the null hypothesis can be rejected = values are correlated.

**TABLE 3** Interobserver reliability on RASI between 16 dermatologists on Day 1 and between 14 dermatologists on Days 2 and 8, determined by the intraclass correlation coefficients

| | Day 1 | Day 2 | Day 8 |
|---|---|---|---|
| RASI, ICC (95% CI) | 0.66 (0.56–0.75) | 0.59 (0.37–0.84) | 0.53 (0.31–0.80) |
| **(a) Lesion score sum** | | | |
| Erythema | 0.59 (0.46–0.72) | 0.68 (0.48–0.88) | 0.56 (0.34–0.82) |
| Papules/Pustules | 0.76 (0.67–0.84) | 0.75 (0.57–0.91) | 0.85 (0.71–0.95) |
| Telangiectasia | 0.56 (0.43–0.70) | 0.43 (0.23–0.73) | 0.68 (0.47–0.88) |
| Rhinophyma | 0.43 (0.33–0.56) | 0.86 (0.72–0.95) | 0.81 (0.65–0.94) |
| **(b) Area score** | | | |
| Cheeks | 0.62 (0.50–0.74) | 0.65 (0.44–0.88) | 0.63 (0.42–0.86) |
| Forehead | 0.69 (0.59–0.79) | 0.71 (0.51–0.90) | 0.67 (0.46–0.88) |
| Nose | 0.74 (0.64–0.83) | 0.675 (0.47–0.88) | 0.61 (0.39–0.85) |
| Chin | 0.54 (0.42–0.67) | 0.685 (0.48–0.88) | 0.631 (0.42–0.86) |

Abbreviations: ICC, intraclass correlation coefficient; RASI, Rosacea Area and Severity Index.

**TABLE 4** Interobserver reliability rating on IGA between 14 dermatologists on Days 2 and 8, determined by the intraclass correlation coefficients

| | Day 2 | Day 8 |
|---|---|---|
| IGA, ICC (95% CI) | | |
| Overall | 0.45 (0.25–0.75) | 0.41 (0.22–0.71) |
| Erythema | 0.60 (0.39–0.84) | 0.65 (0.45–0.87) |
| Papules/Pustules | 0.74 (0.55–0.91) | 0.798 (0.64–0.93) |
| Telangiectasia | 0.60 (0.38–0.84) | 0.67 (0.47–0.88) |
| Rhinophyma | 0.76 (0.57–0.92) | 0.83 (0.67–0.94) |

Abbreviations: ICC, intraclass correlation coefficient; IGA, Investigator Global Assessment.

Severity ratings using RASI on Days 1, 2 and 8 remained below 40 for all but two ratings, with no evaluations reaching the maximum score of 72. From the scoring for atopic dermatitis, EASI, experience has shown that the score should remain low compared with the worst possible score, even for severe disease, in order to obtain accuracy in the scoring.[9] Variations in interobserver reliability could indicate that the scale has greater accuracy if the same observer evaluates the same patient throughout the course of treatment, although overall agreement between observers and between study days may be improved by more thorough training of observers prior to ratings.

## Strengths and limitations

Strengths of this study include the high number of observers (up to 16 specialists) from different clinical settings (private practice as well as multiple hospital departments), resembling the population that will be using RASI in the future; a high number of patients (pictures), and the possibility to score the exact same pictures twice, making it easier to evaluate intraobserver reliability. Limitations include the lack of formal in-person training in how to use RASI due to the inclusion of doctors from across Denmark during a global pandemic (COVID-19); the use of pictures rather than in-person assessment, which only allowed for 2-dimensional ratings of patients and the risk of problems in rating, for example telangiectasia and papules/pustules, which could be difficult to tell apart even on high-resolution pictures. While RASI has 5 levels for most rosacea features (erythema, papules/pustules, telangiectasia), rhinophyma was only comprised of 4 levels. This is reflected in a high interobserver reliability for rhinophyma; however, the less nuanced assessment of rhinophyma could have affected evaluation of the less visibly

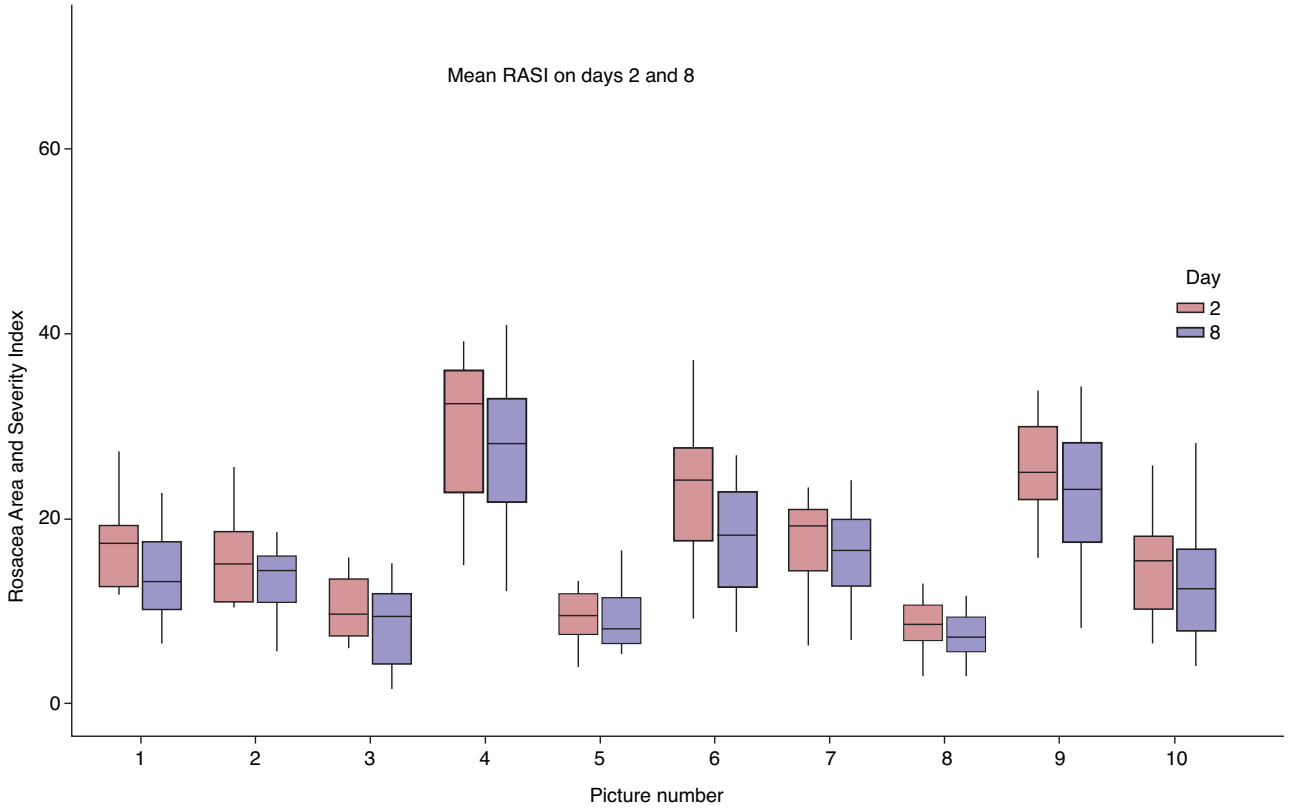


**FIGURE 2** Summary of trends in intraobserver reliability following RASI evaluation of the 10 pictures that were evaluated on each study day. The *x*-axis represents the picture number from 1 to 10, and the y-axis represents severity on the RASI scale. For each picture, there are two study days: 'Day 2' and 'Day 8'. The boxes represent the mean average RASI ± SD. RASI, Rosacea Area and Severity Index; SD, standard deviation.

rhinophyma features like granularity. This is counterbalanced with a supplementary criterion for the nose (rhinophyma). Furthermore, it was not possible to evaluate ocular symptoms in RASI. While there may be a considerable discord between perceived importance of clinical symptoms by patients and physicians[18] RASI is meant as a uniquely clinical severity measure as patient-reported outcome measures (PROMs) are already available for evaluating patient experience in rosacea.

## CONCLUSION

RASI is a simple and reliable tool for scoring rosacea severity with an agreement comparable to the currently used IGA. In contrast to IGA, RASI is a composite index, nuanced and adaptable, to match as closely possible the reality of the different phenotypes: it comprehensively evaluates the severity of the different elementary lesions and the extent of rosacea across different facial areas. We suggest that RASI may be valuable for detailed objective assessment of common rosacea signs.

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### CONFLICT OF INTEREST

N.K.F. Wienholtz has received travel grants from Kgl. Hofbundtmager Aage Bang Foundation, UCB and Eli Lilly. J.P. Thyssen is an advisor/investigator or speaker for AbbVie, Almirall, Eli Lilly Leo Pharma, Pfizer, Regeneron and Sanofi-Genzyme. C.E. Christensen is a consultant/speaker for Teva Pharmaceuticals. S.F. Thomsen is an advisor/investigator or speaker for Leo Pharma, Janssen, Novartis, UCB, Union Therapeutics and Sanofi. G.E.B. Jemec is an advisor/investigator or speaker for AbbVie, Afyx, CSL Behring, Chemocentryx, Coloplast, Incyte, InflaRx, Janssen-Cilag, Kymera, Leo Foundation, Novartis and VielaBio. C. Vestergaard is an advisor/investigator or speaker for AbbVie, Astra Zeneca, Almirall, Eli Lilly Leo Pharma, Novartis and Sanofi Genzyme. L. Skov is an advisor/investigator or speaker for AbbVie, Boehringer Ingelheim, Bristol-Myers Squibb, Janssen Pharmaceuticals, Leo Foundation, Leo Pharma, Novartis,

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## DATA AVAILABILITY STATEMENT

Data are available from the corresponding author upon reasonable request.

## ETHICAL APPROVAL

The study was part of a larger study which was approved by the Ethical Committee of the Capital Region of Denmark (H-17023750). The study was conducted in accordance with the declaration of Helsinki anno 1964 with adjustments until 64th WMA General Assembly, Fortaleza, Brazil, October 2013. All pictures in the guide were used either after permission from www.dermnetnz.org, or after informed oral and written consent from each patient to publish their pictures in the guide. All participants provided written informed consent.

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## SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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