Comparison of VAS and verbal rating scale in Japanese patients using VAS with 10-point end of “worst imaginable itch”

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Pruritus is a subjective symptom with multiple factors that cannot be measured objectively to date.

There have been no established methods to estimate the intensity of pruritus quantitatively.

Common tools for self-report of pruritus intensity in adult patients:

- Visual analogue scale (VAS)
- Numerical rating scale (NRS)
- Verbal rating scale (VRS)

0: No pruritus
1: Mild pruritus
2: Moderate pruritus
3: Severe pruritus
4: Very severe pruritus
The patients (n=310) assessed pruritus using VAS, NRS, and VRS. VRS showed the highest correlation with NRS (R=0.82, p<0.0001), followed by VAS (R=0.75, p<0.0001). Each category of VRS differs significantly from the others regarding VAS. They defined the bands of VAS based on detailed analysis: 0 = no pruritus, >0 - <4 points = mild pruritus, ≥4 - <7 points = moderate pruritus, ≥7 - <9 points = severe pruritus, and ≥9 points = very severe pruritus. They found some differences in VAS scoring between Caucasian and Japanese subjects.
Aim of this study

• To assess the relationship between VAS and VRS in randomly selected Japanese patients with itchy skin diseases.

• To define the set of VAS bands referring to mild, moderate, severe, and very severe pruritus according to the report by Dr. Reich et al.

• To assess the reproducibility regarding ethnic differences in itch score.
Subjects: Patients, aged over 10 years and visited the dermatological departments of 4 university hospitals between April 2012 and January 2013, were interviewed about their pruritus using VAS and VRS.

Subjects and interview sheet

- Visual Analogue Scale (VAS)
  - 0: No pruritus
  - 10: Very severe pruritus

- Verbal Rating Scale (VRS)
  - 0: No pruritus
  - 1: Mild pruritus
  - 2: Moderate pruritus
  - 3: Severe pruritus
  - 4: Very severe pruritus
## Patients

<table>
<thead>
<tr>
<th></th>
<th>total</th>
<th>KPUM</th>
<th>Mie U.</th>
<th>Jikei U.</th>
<th>Kyushu U.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient’s number</td>
<td>949</td>
<td>238</td>
<td>108</td>
<td>277</td>
<td>316</td>
</tr>
<tr>
<td>age</td>
<td>52.6± 19.3</td>
<td>57.8± 22.2</td>
<td>57.9± 18.1</td>
<td>49.1± 16.8</td>
<td>49.8± 18.0</td>
</tr>
</tbody>
</table>

***: p<0.0001 vs. Kyoto prefectural U. or Mie U.
The diagnoses had a wide variety
Distribution of disease in each facility

- Kyoto Prefectural University:
  - Atopic dermatitis
  - Other eczema and dermatitis
  - Urticaria
  - Prurigo and pruritus cutaneus
  - Erythema and erythroderma
  - Vascular diseases
  - Connective tissue diseases
  - Bullous and pustular diseases
  - Granulomas and diseases of fat
  - Disorders by physical agents
  - Keratosis
  - Diseases of glands
  - Diseases of hair and nail
  - Congenital diseases
  - Metabolic diseases
  - Pigmentary disorders
  - Phacomatosis
  - Tumor
  - Bacterial and viral infections
  - Dermatomycosis
  - Drug eruptions
  - Others

- Mie University:
  - Atopic dermatitis
  - Other eczema and dermatitis
  - Urticaria
  - Prurigo and pruritus cutaneus
  - Erythema and erythroderma
  - Vascular diseases
  - Connective tissue diseases
  - Bullous and pustular diseases
  - Granulomas and diseases of fat
  - Disorders by physical agents
  - Keratosis
  - Diseases of glands
  - Diseases of hair and nail
  - Congenital diseases
  - Metabolic diseases
  - Pigmentary disorders
  - Phacomatosis
  - Tumor
  - Bacterial and viral infections
  - Dermatomycosis
  - Drug eruptions
  - Others

- Jikei University:
  - Atopic dermatitis
  - Other eczema and dermatitis
  - Urticaria
  - Prurigo and pruritus cutaneus
  - Erythema and erythroderma
  - Vascular diseases
  - Connective tissue diseases
  - Bullous and pustular diseases
  - Granulomas and diseases of fat
  - Disorders by physical agents
  - Keratosis
  - Diseases of glands
  - Diseases of hair and nail
  - Congenital diseases
  - Metabolic diseases
  - Pigmentary disorders
  - Phacomatosis
  - Tumor
  - Bacterial and viral infections
  - Dermatomycosis
  - Drug eruptions
  - Others

- Kyushu University:
  - Atopic dermatitis
  - Other eczema and dermatitis
  - Urticaria
  - Prurigo and pruritus cutaneus
  - Erythema and erythroderma
  - Vascular diseases
  - Connective tissue diseases
  - Bullous and pustular diseases
  - Granulomas and diseases of fat
  - Disorders by physical agents
  - Keratosis
  - Diseases of glands
  - Diseases of hair and nail
  - Congenital diseases
  - Metabolic diseases
  - Pigmentary disorders
  - Phacomatosis
  - Tumor
  - Bacterial and viral infections
  - Dermatomycosis
  - Drug eruptions
  - Others
Gender of patients did not influence the pruritus intensity scoring assessed with VAS or VRS.

![Graphs showing VAS and VRS comparisons between male and female patients](image)
Age of patients did not correlate with the pruritus intensity scoring assessed with VAS or VRS

Spearman’s rank correlation test $R = -0.07$  
$R = -0.09$
* : p < 0.05 vs. atopic dermatitis
VAS significantly correlated with VRS

Spearman's rank correlation test $R = 0.94$
$p < 0.0001$
Each category of VRS differed significantly from the others regarding the VAS scoring

Estimate of the cut-off levels for categorization of VAS

<table>
<thead>
<tr>
<th>VAS scoring</th>
<th>VRS scoring</th>
<th>Mean</th>
<th>Mode</th>
<th>Median</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 (0-5 mm)</td>
<td>0</td>
<td>0.1 ± 0.3</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1 (6-15 mm)</td>
<td>1</td>
<td>0.9 ± 0.4</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>2 (16-25 mm)</td>
<td>2</td>
<td>1.1 ± 0.3</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>3 (26-35 mm)</td>
<td>3</td>
<td>1.4 ± 0.6</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>4 (36-45 mm)</td>
<td>4</td>
<td>1.8 ± 0.5</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>5 (46-55 mm)</td>
<td>5</td>
<td>2.0 ± 0.4</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>6 (56-65 mm)</td>
<td>6</td>
<td>2.3 ± 0.5</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>7 (66-75 mm)</td>
<td>7</td>
<td>2.8 ± 0.6</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>8 (76-85 mm)</td>
<td>8</td>
<td>3.1 ± 0.5</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>9 (86-95 mm)</td>
<td>9</td>
<td>3.5 ± 0.5</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>10 (96-100 mm)</td>
<td>10</td>
<td>4.0 ± 0.0</td>
<td>4</td>
<td>4</td>
</tr>
</tbody>
</table>

<Limits>

- Mild and moderate: 3 or 4 points in VAS
- Moderate and severe: 6 or 7 points in VAS
- Severe and very severe: 8 or 9 points in VAS

Verbal Rating Scale (VRS)

0: No pruritus
1: Mild pruritus
2: Moderate pruritus
3: Severe pruritus
4: Very severe pruritus
### Defining the bands of the VAS

<table>
<thead>
<tr>
<th>Cut-offs of VAS</th>
<th>3-6-8</th>
<th>3-6-9</th>
<th>3-6-8</th>
<th>3-7-9</th>
<th>4-6-8</th>
<th>4-6-9</th>
<th>4-7-8</th>
<th>4-7-9</th>
</tr>
</thead>
<tbody>
<tr>
<td>All subjects</td>
<td>( \kappa (95%) ) 0.56 (0.53-0.59)</td>
<td>0.57 (0.59-0.65)</td>
<td>0.57 (0.54-0.80)</td>
<td>\textbf{0.64 (0.61-0.67)}</td>
<td>0.55 (0.51-0.58)</td>
<td>0.61 (0.58-0.64)</td>
<td>0.56 (0.53-0.59)</td>
<td>0.63 (0.60-0.66)</td>
</tr>
<tr>
<td>( n=949 )</td>
<td>( r ) 0.92</td>
<td>0.92</td>
<td>0.92</td>
<td>0.92</td>
<td>0.91</td>
<td>0.91</td>
<td>0.9</td>
<td>0.9</td>
</tr>
<tr>
<td>Male</td>
<td>( \kappa (95%) ) 0.54 (0.50-0.59)</td>
<td>0.59 (0.54-0.63)</td>
<td>0.55 (0.51-0.60)</td>
<td>\textbf{0.60 (0.56-0.65)}</td>
<td>0.53 (0.49-0.58)</td>
<td>0.58 (0.53-0.63)</td>
<td>0.54 (0.50-0.59)</td>
<td>\textbf{0.60 (0.55-0.64)}</td>
</tr>
<tr>
<td>( n=446 )</td>
<td>( r ) 0.91</td>
<td>0.91</td>
<td>0.9</td>
<td>0.9</td>
<td>0.89</td>
<td>0.89</td>
<td>0.89</td>
<td>0.89</td>
</tr>
<tr>
<td>Female</td>
<td>( \kappa (95%) ) 0.56 (0.52-0.61)</td>
<td>0.65 (0.61-0.69)</td>
<td>0.58 (0.53-0.62)</td>
<td>\textbf{0.66 (0.62-0.70)}</td>
<td>0.56 (0.51-0.90)</td>
<td>0.64 (0.60-0.68)</td>
<td>0.57 (0.52-0.61)</td>
<td>\textbf{0.66 (0.61-0.70)}</td>
</tr>
<tr>
<td>( n=503 )</td>
<td>( r ) 0.93</td>
<td>0.93</td>
<td>0.93</td>
<td>0.93</td>
<td>0.92</td>
<td>0.92</td>
<td>0.92</td>
<td>0.92</td>
</tr>
</tbody>
</table>

Ex: Cut off value (3-6-8) means 0 < mild <3, 3 ≤ moderate <6, 6 ≤ severe < 8, and 8 ≤ very severe.

- The most suitable set of bands were estimated as (3-7-9) or (4-7-9).
  - The specialist of statistics in our group suggests that (3-7-9) was the most suitable.
- Our results are consistent with the conclusion about the cut-off values (3-7-9) in Caucasian by Dr. Reich et al.
## Factor influencing VAS or VRS scores

<table>
<thead>
<tr>
<th>explanatory variable</th>
<th>VAS</th>
<th></th>
<th>VRS</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>partial regression coefficient</td>
<td>P-value</td>
<td>partial regression coefficient</td>
</tr>
<tr>
<td>Age</td>
<td>0.016</td>
<td>0.7699</td>
<td>-0.0005</td>
<td>0.8232</td>
</tr>
<tr>
<td>Gender</td>
<td>-3.273</td>
<td>0.0791</td>
<td>0.0942</td>
<td>0.1998</td>
</tr>
<tr>
<td>Disease</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Atopic dermatitis</td>
<td>20.6163</td>
<td>0.0000</td>
<td>***</td>
<td>0.8413</td>
</tr>
<tr>
<td>Eczema and dermatitis</td>
<td>24.7175</td>
<td>0.0000</td>
<td>***</td>
<td>0.9708</td>
</tr>
<tr>
<td>Urticaria</td>
<td>16.4673</td>
<td>0.0000</td>
<td>***</td>
<td>0.6559</td>
</tr>
<tr>
<td>Others</td>
<td>-3.7539</td>
<td>0.2253</td>
<td>-0.1856</td>
<td>0.1285</td>
</tr>
<tr>
<td>Facility</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kyoto prefectural U.</td>
<td>0.1573</td>
<td>0.9499</td>
<td>-0.0666</td>
<td>0.4996</td>
</tr>
<tr>
<td>Miel U.</td>
<td>5.2916</td>
<td>0.0970</td>
<td>0.1624</td>
<td>0.1962</td>
</tr>
<tr>
<td>Jikei U.</td>
<td>5.7776</td>
<td>0.0188</td>
<td>*</td>
<td>0.2589</td>
</tr>
</tbody>
</table>

Multiple-regression analysis

**Adjusted R^2** = 0.1638

**Adjusted R^2** = 0.1764
Summary

✓ We assessed the relationship between VAS and VRS in 949 Japanese patients with itchy skin diseases in 4 University Hospitals.
✓ VAS significantly correlated with VRS.
✓ Each category of VRS differed significantly from the others regarding VAS scoring.
✓ Cut-off value (3-7-9), 0 < mild <3, 3 ≤ moderate <7, 7 ≤ severe < 9, and 9 ≤ very severe, was the most suitable set of bands for VAS.
✓ The scores of VAS in each category of VRS and the cut-off value were consistent with previous report by Dr. Reich et al.
✓ There were some differences in itch intensity according to skin diseases.
✓ There was some regional difference in the expression of itch intensity in Japanese patients.
Conclusion

- VAS and VRS are valuable methods for pruritus measurement.
- The scoring values of these scales may be influenced by some factors including type of skin diseases and living areas of the patients.