A study to explore the reliability of pain drawings using a novel method to define pain extent and pain location

Diego Leoni 1, Deborah Falla 2,3, Michele Egloff 1, Simone Faccendini 4, Marco Barbero 1

1 University of Applied Sciences and Arts of Southern Switzerland, Department of Health Sciences, Manno, Switzerland
2 Pain Clinic, Center for Anesthesiology, Emergency and Intensive Care Medicine, University Hospital Göttingen, Göttingen, Germany
3 Department of Neurorehabilitation Engineering, Bernstein Center for Computational Neuroscience, University Medical Center Göttingen, Georg-August University, Göttingen, Germany
4 Rehabilitation Department, San Raffaele Hospital, Milan, Italy

BACKGROUND AND AIM

Pain drawings (PDs) are a common method to investigate pain extent and pain location. Several methods for shading and scoring PDs have been proposed resulting in different estimations of pain extent and pain location. Despite the large use of PDs in clinical and research settings, the test-retest reliability of PDs has never been investigated. The aim of this study was to investigate the test-retest reliability of PDs using a novel method to define pain extent and pain location.

MATERIALS AND METHODS

Twenty-nine patients with chronic low back pain and twenty-three with chronic neck pain were enrolled. Each patient shaded two consecutive PDs (PD1 and PD2) with an interval of one minute. PDs were shaded with a stylus pen on an iPad® (Fig. 1). PDs’s pixels were counted and Bland-Altman plots were examined to provide a visual representation of size and range differences between two consecutive PDs from the same patient. The ICC and the Jaccard Similarity Coefficient were used to assess the reliability of documenting the pain extent and location respectively.

RESULTS

The mean extent was 5988±4564 pixels and 6261±5029 for PD1 and PD2 respectively. The ICC value was 0.96 (95% CI: 0.94-0.98). In the Bland-Altman plot the values for the mean difference was -372 pixel, and the 95% limits of agreement were -2710 to 1960 (Fig. 2). The mean Jaccard Similarity Coefficient between PD1 and PD2 was 0.62±0.18. Results for the whole sample and two subgroups (low back pain and neck pain patients) are reported in Table 1.

DISCUSSION

The test re-test reliability of pain extent between PD1 and PD2 was very high. Nevertheless the large pain variability between the subjects may determine an overestimation of the ICC. The Bland-Altman 95% interval of agreement was acceptable. Subjects shaded the pain extent approximately in the same location.

CONCLUSIONS

The results of this study suggest that PDs are a reliable tool to measure the pain extent and its location. However further research is needed to investigate the reliability of PDs in different patient populations with a larger sample size and an estimation of the potential confounding factors.

REFERENCES


ACKNOWLEDGEMENT: Thim van der Laan Foundation for funding the study.

e-mail: diego.leoni@supsi.ch

Table 1

<table>
<thead>
<tr>
<th>Whole sample</th>
<th>N</th>
<th>Mean (pixel)</th>
<th>Std. Deviation (pixel)</th>
<th>95% CI</th>
<th>ICC</th>
<th>Jaccard Similarity Coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>Descriptive statistics</td>
<td>PD1</td>
<td>5868.1</td>
<td>4584.1</td>
<td>(705.6, 460.6)</td>
<td>0.94 (95% CI: 0.94-0.98)</td>
<td>0.62 (SD=0.18)</td>
</tr>
<tr>
<td>PD1 - PD2</td>
<td>25</td>
<td>372.2</td>
<td>1180.3</td>
<td>- (370.6, 470.6)</td>
<td>0.84 (95% CI: 0.94-0.98)</td>
<td>0.62 (SD=0.18)</td>
</tr>
</tbody>
</table>

Whole sample: n=29; Mean: 5868.1 pixels; Std. Deviation: 4584.1 pixels; 95% CI: (705.6, 460.6); ICC: 0.94; Jaccard Similarity Coefficient: 0.62 (SD=0.18).

Chronic low back pain Group: n=25; Mean: 5868.1 pixels; Std. Deviation: 4584.1 pixels; 95% CI: (705.6, 460.6); ICC: 0.94; Jaccard Similarity Coefficient: 0.62 (SD=0.18).

Chronic neck pain Group: n=4; Mean: 5868.1 pixels; Std. Deviation: 4584.1 pixels; 95% CI: (705.6, 460.6); ICC: 0.94; Jaccard Similarity Coefficient: 0.62 (SD=0.18).

Figure 1

Examples of pain drawings: Low back pain (a,b) and neck pain patients (c,d).

Figure 2

The Bland-Altman plot showing the test-retest reliability of the pain drawings.