RELIABILITY AND CONCURRENT VALIDITY OF THE PAINMAP FOR AUTOMATED QUANTIFICATION OF PAIN DRAWINGS IN BODY CHARTS IN PATIENTS WITH LOW BACK PAIN

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Introduction

Low back pain (LBP) is the primary cause of years lived with disability in the world[1,2]. Widespread pain was observed in 24% of patients with LBP[3] and patients with widespread pain that includes low back area have more comorbidities, psychosocial factors, pain duration, and functional limitations than patients with local LBP[4]. The assessment of painful areas through printed body charts is a simple way to clinicians identifies patients with widespread pain in primary care[5]. However, there is a lack in the literature about a simple and automated method designed to analyze pain drawings in body charts in clinical practice.

Objective

To test the inter- and intra-rater reliability and concurrent validity of a software (PainMAP) for quantification of pain drawings in patients with low back pain.

Methods

A reliability and concurrent validity study was conducted and approved by the Research Ethics Committee of Federal Institute of Rio de Janeiro (CAAE: 80405017.0.0000.5268).

Adult participants with a current episode of self-reported acute or chronic LBP were included. Participants with neurological involvement, trauma, presence of specific vertebral pathology, pregnancy, inability to understand Portuguese, and with history of abdominal surgery in the last year were excluded.

Thirty-eight participants [16(42.10%) female; mean age 50.24(11.54) years; mean body mass index 27.90(5.42) kg/m2; duration of pain of 94.35(96.11) months] with a current episode of LBP were recruited at physiotherapy outpatients.

Participants were instructed to shade all their painful area in a body chart using a red pen (Figure 1). The body charts were digitized by separate raters using smartphone cameras and twice for one rater to analyze the intra-rater reliability. Both the number of pain sites and the pain area were calculated using ImageJ (reference method). The PainMAP software used image processing methods to automatically quantify the data from the same digitized body charts.

The inter-examiner reliability of measurements was calculated using a 2-way random-effects model of the intraclass correlation coefficients (ICC2,1), with the consistency type. The inter-examiner reliability was calculated using the first measurement of each examiner (Examiner A and B). The standard error of the measurement (SEM = SDpooled* √1–ICC) was estimated. All significant tests were two-sided, with an alpha of 0.05. The concurrent validation of the PainMAP (index method) was compared with ImageJ software (reference method) in patients with non-specific LBP and was evaluated by the regression and Bland-Altman method. Statistical analysis was conducted in R version 3.6.0.

Results

The reliability analyses revealed that the PainMAP has excellent inter- and intra-rater reliability to quantify the number of pain sites [ICC2,1: 0.998 (95%CI 0.996-0.999); ICC2,1: 0.995 (95%CI 0.991-0.998)] and pain area [ICC2,1: 0.998 (95%CI 0.995-0.999); ICC2,1: 0.975 (95%CI 0.951-0.987)], respectively. The standard error of the measurement was 0.22 (4%) for the number of pain sites and 0.03 (4%) cm^2 for the pain area. The Bland-Altman analyses revealed no substantive differences between the two methods for pain area [mean difference = 0.007 (95%CI 0.067-0.053)].

FIGURA

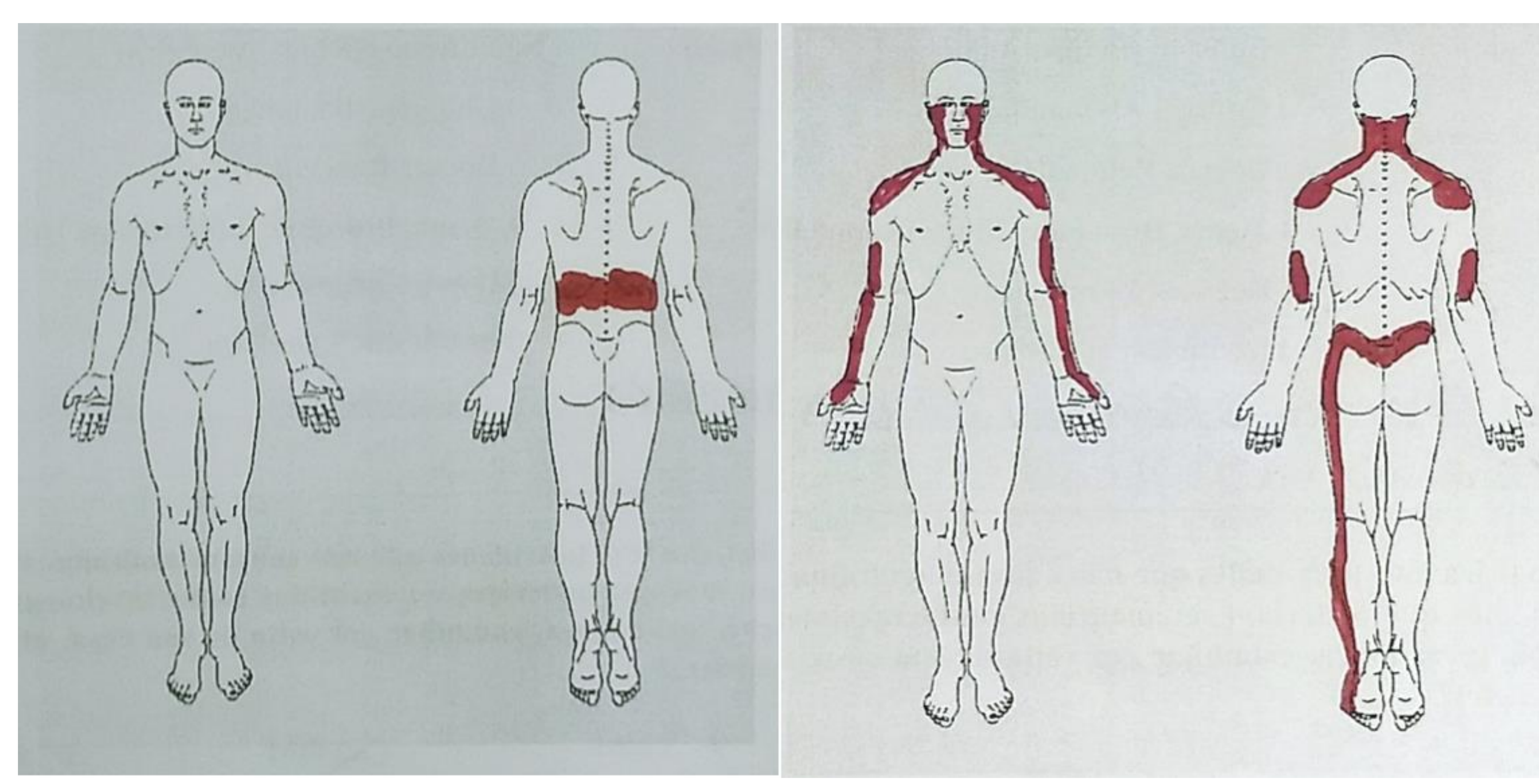

Figure 1. Examples of body map photo by patients with low back pain.

Conclusion

The PainMAP software is reliable and valid to be used for quantification of the number of pain sites and pain area in patients with low back pain.

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