**INTRA AND INTER-SESSION RELIABILITY**

**OF THE ANGLE BETWEEN PAIN ONSET AND SUBMAXIMAL PAIN DURING**

**UPPER LIMB NEURODYNAMICS TEST 1: A STUDY IN HEALTHY INDIVIDUALS**

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**Background and objective.** The Upper Limb Neurodynamics Test 1 (ULTN1) is a common procedure used to assess nerves’ mechanosensitivity of the upper limb nerve trunks. Besides the clinical criteria to establish the positivity of the test, the measurement of pain onset (PO) and submaximal pain (SP) angles of occurrence during ULNT1 has been proposed to quantify the mechanosensitivity. The intra-session reliability of such measurement is considered high, while the inter-session reliability has not yet been extensively explored. Moreover a slight difference in patient positioning or in the ULNT1 execution during different sessions could affect the occurrence of PO and SP. We thought that the angle between PO and SP (∆) could be a more reliable measurement between different sessions. Our aim was to investigate the intra- and inter-session reliability of ∆ and test if it was higher compared to the reliability of PO and SP angles of occurrence.

**Materials and methods.** Twenty-nine healthy volunteers (10 female, 19 male) participated. Each participant underwent three ULNT1 till PO and SP, twice in the first session and once in the second (Figure 1). A splint, a positioning device and an electromagnetic goniometer were used to standardize the procedure and record the angles of PO and SP occurrence. The intra- and inter-session reliability of ∆ was examined using Intraclass Correlation Coefficient (ICC 3,1) and Bland-Altman plots. Similarly the intra- and inter-session reliability of PO and SP angles of occurrence was explored.

**Results.** The intra- and inter-session ICC values for ∆ were 0.71 (95% CI: 0.47;0.85), and 0.79 (95% CI: 0.60;0.89), respectively. The intra- and inter-session mean difference and 95% limits of agreement (± 1.96 SD) in the Bland-Altman plots were 2.3° (-18.3°;23.1°), and 2.8° (-14.7°;20.4°), respectively. ICC and Bland-Altman plots values are reported in Table 1.

**Discussion and conclusions.** The intra- and inter-session reliability of ∆ during the ULNT1 in healthy individuals is high, and higher than the reliability of PO and SP angles of occurrence. Thus ∆ could be a preferable variable in the assessment of neural mechanosensitivity. Further research should test the ∆ reliability in the clinical setting.

**Keywords:** reliability, neurodynamics, ULNT1, pain onset, submaximal pain

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**Figure 1.** Representation of the experimental procedure.The angles of occurrence in range of pain onset (PO) and submaximal pain (SP) during elbow extension in ULNT1 were recorded; then the angle between PO and SP was calculated for each ULNT1 execution.

**Table 1.** Intraclass Correlation Coefficients (ICC) and Bland-Altman Plots (B-A plots) values for the angle between PO and SP (∆), and the angle of occurrence in range of PO and SP.

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