Agreement between visual estimation and video analysis in Nordic Hamstring Test assessment

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Background and Objective

The break-point angle (BPA) obtained during the Nordic Hamstring Test (NHT) can be used for preventive purposes to identify individuals with low eccentric hamstring strength and at risk of hamstring injury.[1] Video analysis is the preferred standard method for BPA assessment, but it lacks wide availability and ease-of-use for a field-based application, and is costly. Visual estimation is widespread as a method, but its reproducibility has never been studied. The goal of this study was to analyze the agreement between visual estimation and video analysis for measuring BPA.

Material and Methods

Five healthy adult volunteers were recruited. Ten NHT videos per subject were obtained by smartphone camera with a standardized method. Four raters (two physiotherapists and two physiotherapy students) independently measured the BPA first by visual estimation, then by standardized video analysis software on a PC (Figure 1), with a one-week interval between the two measurements. The agreement between the two methods was expressed as 95% limits of agreement (LoA) with the Bland-Altman method. Inter-rater agreements within 5° and 10° were also calculated.

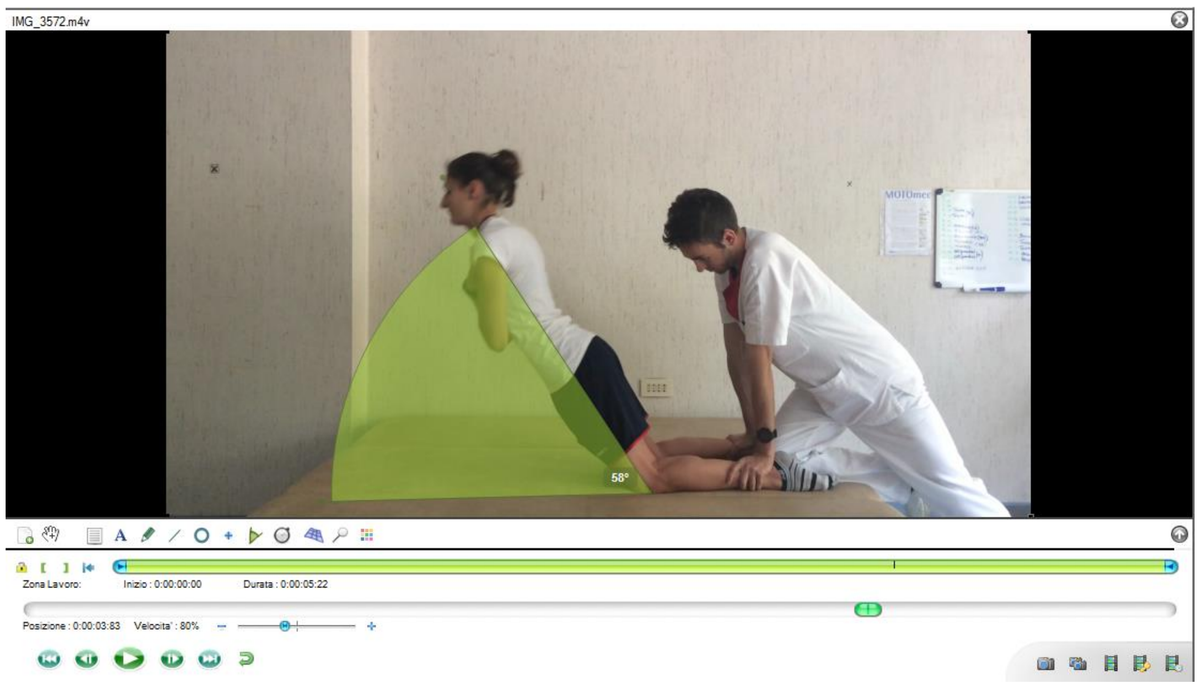

Figure 1. Break-Point Angle measurement procedure by standardized video analysis software.

Results

The agreement was poor, with 95% LoA equal to 19.9° (mean difference: -0.9±10°; N=200) (Figure 2). Inter-rater agreement within the limits of 5° and 10° was good (78% and 100%, respectively) for video analysis, and low (28% and 56%) for visual estimation.

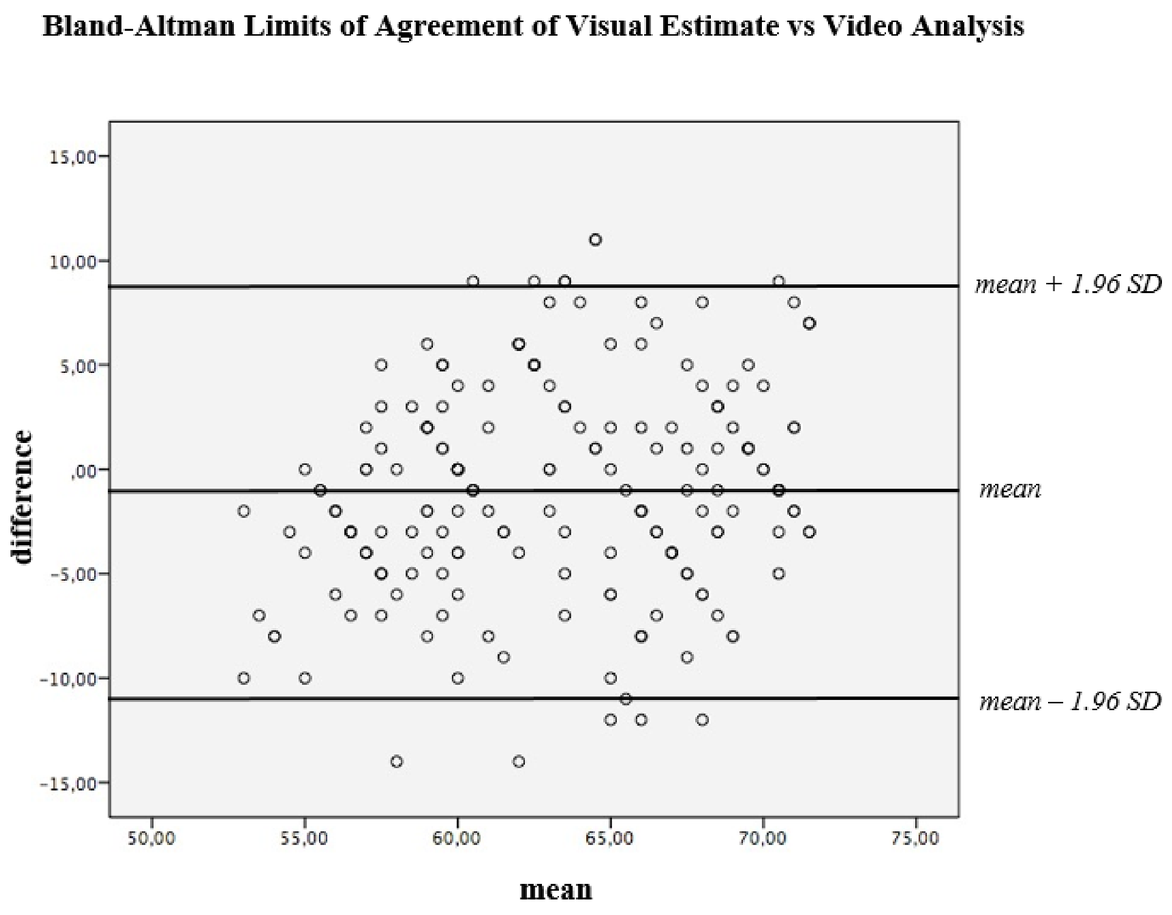

Figure 2. Bland–Altman plots with 95% limits of agreement (upper and lower lines), between visual estimation and video analysis. Wide distribution of measurements shows poor agreement between the two methods.

Discussion

Visual estimation showed poor agreement with video analysis to assess the BPA of NHT. Low inter-rater agreement was also observed, even among experienced physiotherapists. Visual estimation has been found as an accurate method - depending on the experience of the observer - for determining the angular positions in static[2,3] but not dynamic situations.[4,5] In line with previous results, we confirmed that visual estimation is not a reproducible method to assess angular degrees during dynamic performances.

Conclusions

Visual estimation is a poorly reproducible method for measuring the BPA in healthy subjects, and cannot be recommended for NHT measurement. More studies are necessary to identify a reproducible, low-cost, and field-based method for this purpose.

References

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