

INTER-RATER RELIABILITY OF THE VISUAL ESTIMATION OF SHOULDER ABDUCTION ANGLES AND THE AGREEMENT OF MEASUREMENTS WITH AN ACCELEROMETER

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1. INTRODUCTION

In clinical context, the evaluation of joint angular amplitudes is usually done by visual estimation (VE).

2. METHODS

In this study, six independent observers made, simultaneously, the VE of the shoulder position on the frontal plane for a set of 140 repetitions. The angles of the arm were monitored by a Biodex electro-goniometer.

At the same time, the arm acceleration measurements were recorded using a tridimensional xyzPlux accelerometer. The accelerometer was fixed with a Velcro tape to the anterior face of the subject's forearm. The 3D components of the acceleration signal were transmitted via Bluetooth to the processing unit which computed the abduction angle of the shoulder. The accelerometer data was taken as reference to validate the agreement analysis.

The VE error was determined by analysis of the variance of the six observers' VEs. The interclass correlation coefficient was determined with formula 2.1 from [1] after the verification of the statistic model's assumptions.

The correlation between VE from observers and xyzPlux measurements was established using Pearson's Coefficients (0.01 significance level; 2 tailed). The limits of agreement between both measurements was estimated using the standard error of the differences (SDdiff) [2].

3. RESULTS

The correlation obtained between the observers VE's is high (0.92), although the standard error of the method is 6.4°. The minimum detectable difference (MDD) (95% confidence level) is 17.6°. The correlation between the data from the observers and from xyzPlux is also high (0.986 to 0.996) and SDdiff is between 4.98° and 7.92°.

4. DISCUSSION

The high level of agreement between the VE of the six independent observers assures that the clinical evaluation of the shoulder joint angular amplitudes can be done by any of the six observers without a clinically significant increase of the measurement error.

We may accept that the VE method is appropriate if we assume that the identification of a difference of around 20° between the two measurements is acceptable and does not introduce problems in clinical interpretation. If a MDD of 20° (more precisely, 17.6°) is not adequate but we still want to use the VE method, we have to lower the confidence levels.

For a higher precision of the measurements the VE method is not adequate and it is necessary to the use more sophisticated instruments like the xyzPlux used in this study.

The data from xyzPlux and the electrogoniometer obtained in this study showed a very good level of agreement (0,757° Typical error ; SDdiff = 1,069 determined according to [3]; MDD of 2.10°).

REFERENCES

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