# THE COEFFICIENT OF VARIATION AND THE SIMILARITY OF FORCE-TIME CURVES (HANDGRIP TEST)

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## INTRODUCTION

There are many methods to analyse experimental data, such as graphical methods, autocorrelation function, smoothing techniques and mathematical models [1,2,3]. However, these methods are not sufficient for identification of the "similarity" among force-time curves, which have a temporal structure (stochastic process). The aim of this study was identify some characteristics of the Coefficient of Variation (CV) applied to the force-time curves from handgrip test.

## METHODS

The data of this study was generated by the handgrip test on a computerized dynamometer, performed by one subject (24 years) as a maximum effort in six trials with 5s of duration. The force-time curves of each trial were recorded and submitted to the definition of the CV, corresponding to the ratio of the standard error $s$ for the force to the mean value $\bar{x}$ of the force. For each curve were used the mean and the standard deviation of the force and their respective CV for each time $t$, which were arranged as a time series. The analyses were performed for the 0-1s interval of the test because of the CV values remained constant until the end. These procedures were made by two steps: 1) with all curves and 2) without an anomalous curve, identified by graphical criteria [1]. The CV´s were graphically exhibited and their lowest values were considered for identifying "similarities" of the curves.

## RESULTS AND DISCUSSION

The Figure 1 shows the mean values for the force-time curves. It is important to note an anomalous curve that was not executed by the subject as the required protocol. The Figure 2 exhibits the mean values with the exclusion of that curve.

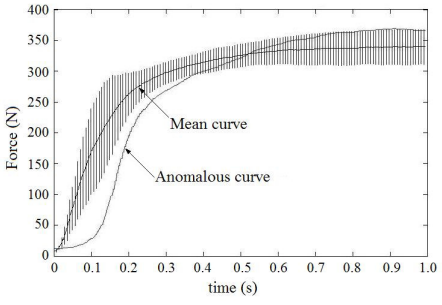


**Figure 1**: The mean and standard deviations for the 0-1s interval considering the six curves (including the anomalous one).

From the CV's curves for both situations (Figure 3) and considering the definition of CV, can be said that low CV values indicates low standard deviations values and lower data dispersion. As a consequence, there is a "similarity" or an equivalence relation among the curves, as showed by graphical display.

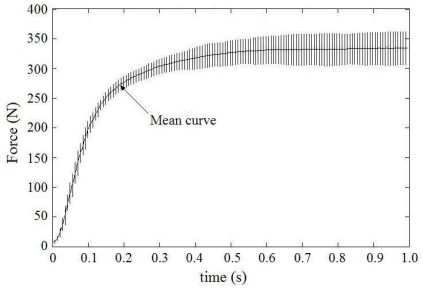


**Figure 2**: The mean and standard deviations for the 0-1s interval without the anomalous curve.

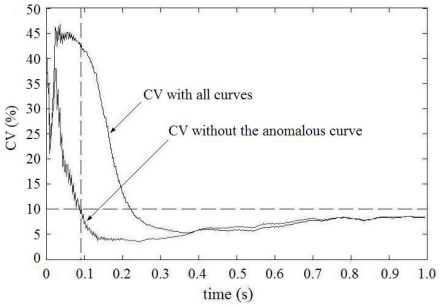


**Figure 3**: The CV's values obtained before and after the anomalous curve exclusion.

## CONCLUSIONS

Thus, those graphical procedures indicate that the mean curve is the best parameter for representing the performance of the subject in the handgrip test. The exclusion of discrepant values from the group contributes to decreasing the CV values which can be considered as a parameter of "similarity" identification of the handgrip force-time curves. Biomechanical research has being conducted in our laboratory with the proposed method for curve differentiation on dysfunctions of the musculoskeletal system, such as fibromyalgia and chronic kidney disease.

## ACKNOWLEDGEMENTS

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## REFERENCES

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