

GRIP STRENGTH: ARE DINAMOMETERS EQUIVALENT? JAMAR vs E-Link

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Introduction

Levels of risk for future disability can be assessed with grip strength. This assessment is of fundamental importance for establishing prevention strategies. It also allows verifying relationships with functional capacity of individuals. Most studies on grip strength use the JAMAR Hydraulic dynamometer that provides the value of isometric force obtained during the performance of grip movement and is considered the “gold standard” for measurement of grip strength. Yet other dynamometers are available, such as portable computerized dynamometer E-Link (Biometrics), which provides the value of maximum force (peak force) in addition to other variables as the rate of fatigue for hand strength and other dynamometers which are available commercially. Of our knowledge, there are no studies that allow us to accept or not and compare values obtained with both devices and perhaps use them interchangeably.

Objectives

To evaluate the absolute agreement between the measurements of grip strength (peak force or maximum force in kg) obtained from two different devices (portable dynamometers): a computerized (E-Link, Biometrics) and a hydraulic (JAMAR).

Materials & Methods

41 subjects (15M, 26F, 20 ± 2 years, 23.8 ± 4.5 kg/m²) were assessed at the same time of day on two consecutive days. Test position chosen was recommended by the American Association of Occupational Therapists and was considered the best result from three attempts for the dominant hand. A correlation was studied between values obtained in the variable analyzed in each equipment (Spearman coefficient); a Bland-Altman analysis to assess the agreement between the two measurements and the intraclass correlation coefficient (ICC) to assess the absolute agreement.

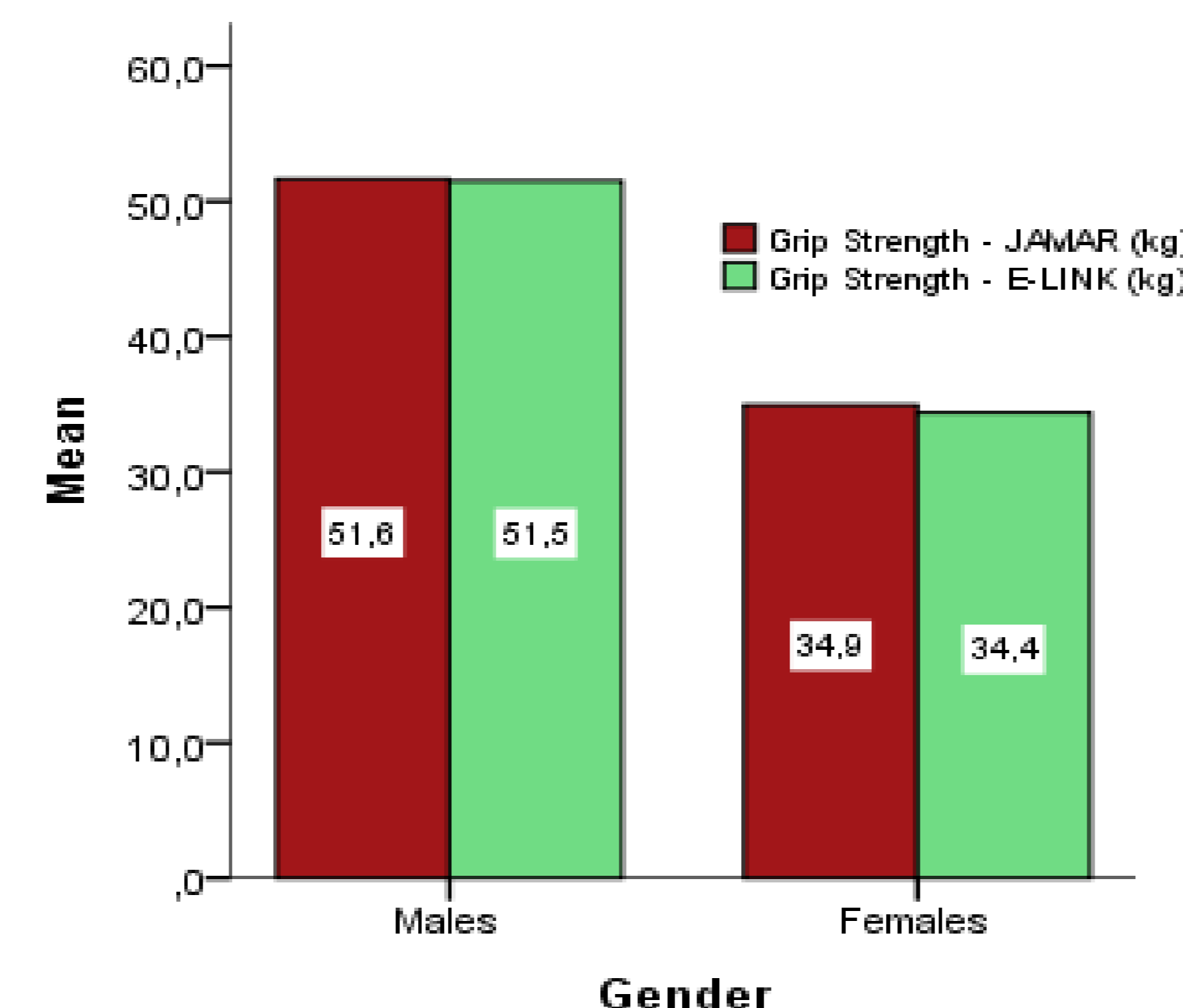
Results & Discussion

Values for grip strength were 41.0 ± 9.9 kg on JAMAR and 40.6 ± 10.5 kg on E-Link showing that differences between both dynamometers ranging between -9.1kg and 4.1kg (-0.4 ± 2.9, mean ± sd).

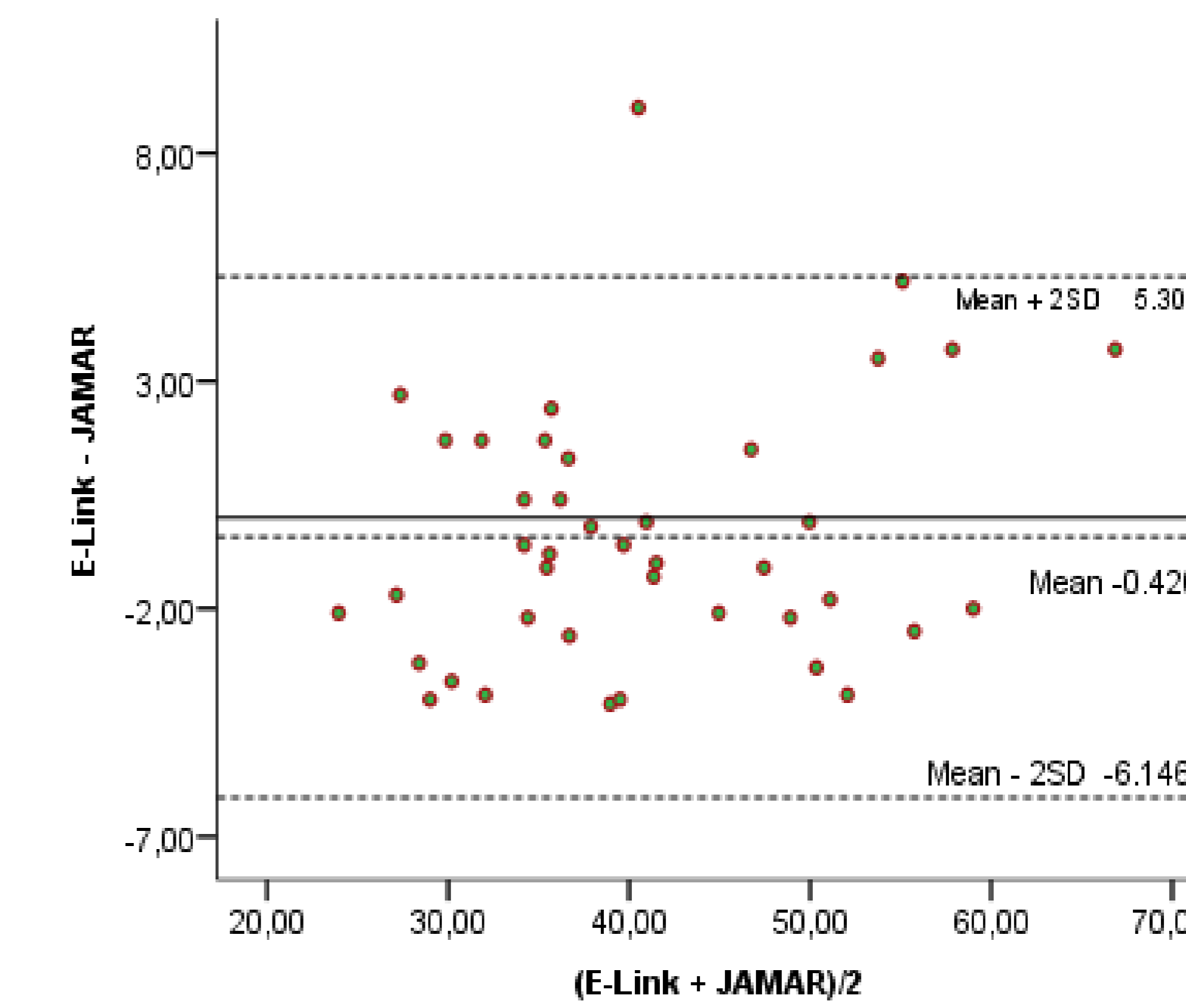
E-Link slightly underestimate grip strength, without statistical significance.

The correlation coefficient between the two measurements was high ($r_s = 0.962$, $p < 0.001$) and Bland & Altman analysis of the values obtained are all except one within the range of mean ± 2SD.

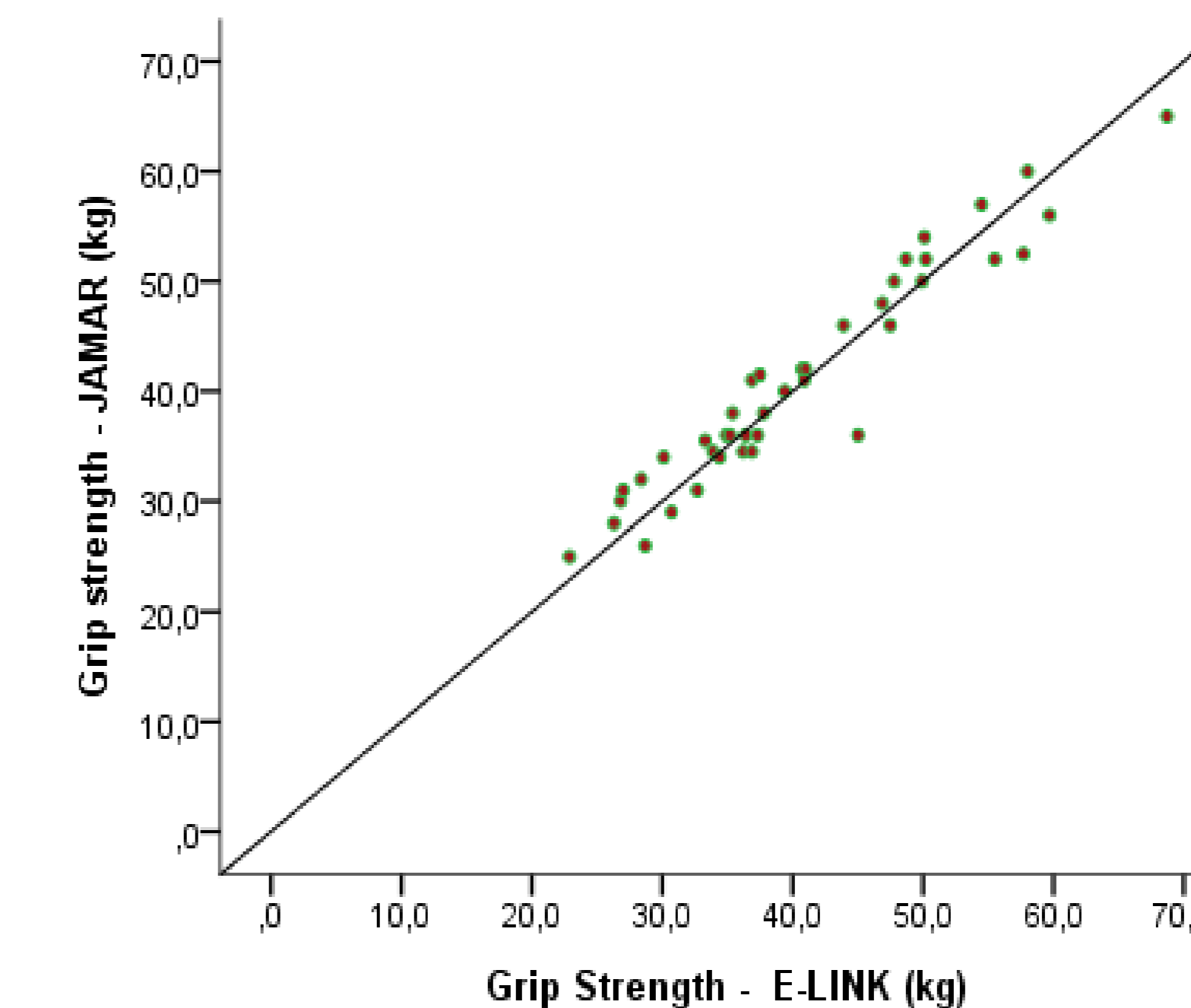
ICC was excellent (0.961; $p < 0.001$).



Graph 1. Grip strength by gender on both dynamometers



Graph 2. Bland –Altman plot between JAMAR and E-Link dynamometers



Graph 3. Correlation between values collected on both dynamometers.

These two dynamometers seem to be interchangeable; however, one must not forget that the same dynamometer should be used in the same study or clinical settings with the same therapist and in pre- and post-testings or validity could be compromised.

Conclusions

Data indicate that the two measurements were equivalent, revealing that the tested dynamometers can be comparable or used interchangeably in different studies with young adults or clinical settings.