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## Correspondence

### Muscular static strength test performance and health: absolute or relative values?

### Desempenho do teste de força muscular estática e saúde: valores relativos ou absolutos?

Dear Editor,

We appreciate the article by Cavazzotto et al., "Muscular static strength test performance: comparison between normotensive and hypertensive workers", published in the Sept./Oct 2012 issue of the *Revista da Associação Médica Brasileira*.<sup>1</sup>

The purpose of this article was to compare static muscular strength test performance between hypertensive and normotensive workers. The results showed significant differences between hypertensive and normotensive individuals regarding age, body mass, body mass index (BMI), and waist circumference greater for hypertensive individuals. Regarding static muscle strength tests performance, hypertensive individuals ( $53.1 \pm 14.2$  left hand grip strength;  $49.7 \pm 14.0$  right hand grip strength) did not differ significantly from normotensive individuals ( $49.8 \pm 21.0$  left hand grip strength;  $45.9 \pm 20.0$  right hand grip strength); however, this difference was observed when groups divided by BMI were compared. The obesity group had higher strength values ( $49.9 \pm 15$  left hand grip strength;  $55.5 \pm 19$  right hand grip strength) than the normal weight/overweight group among normotensive individuals ( $45.3 \pm 20$  left hand grip strength;  $49.0 \pm 21$  right hand grip strength).

The conflicting results regarding the static muscle strength tests performance can be explained, at least in part, by the lack of adjustment of isometric muscle strength by body mass and/or fat-free mass. The only study used for comparison was by Artero et al., whose aim was to evaluate muscle strength and all causes of mortality in hypertensive men. The study by Artero et al. revealed that high levels of muscular strength appear to protect hypertensive men against all-cause mortality.<sup>2</sup> However, differently from Cavazzotto et al., the authors adjusted muscle strength by body mass and age, which may explain the contrasting results. Other studies also used the correction of muscle strength by body mass and/or fat-free mass.<sup>3-8</sup> Furthermore, Miyatake et al.<sup>9</sup> observed that when muscle strength is not corrected by body mass, women with obesity/hypertension/metabolic syndrome

presented higher levels of absolute muscle strength, similar to the findings of Cavazzotto et al.

Interestingly, the adjustment of the data from Cavazzotto et al., according to body mass, produces distinct results. Normotensive individuals presented a relative muscle strength of 0.69 (right hand) and 0.64 (left hand), while hypertensive individuals had a relative muscle strength of 0.60 (right hand) and 0.56 (left hand).

Moreover, a recent study from our research group revealed that obese women presented lower isometric relative muscle strength (measured by a handgrip strength dynamometer) and higher 24 h blood pressure values when compared with non-obese women.<sup>10</sup> This reinforces the importance of considering the use of relative muscle strength, rather than absolute values when comparing eutrophic, overweight, and obese individuals. It has been demonstrated that women with metabolic syndrome present lower relative handgrip muscle strength when compared with women without metabolic syndrome. To note, women with metabolic syndrome presented higher body mass, body mass index, waist circumference, and body adiposity index.<sup>11</sup> Similarly, Tibana et al. found that women with greater neck circumference (NC) presented more cardiovascular risk factors and less relative muscle strength when compared to women with lower NC values.<sup>12</sup> In this study, women with higher NC values presented lower relative muscle strength. Hence, non-drug treatments, such as resistance training (RT), have been used in patients with cardiovascular risk factors. Therefore, RT can be considered an essential component in a physical activity program designed to prevent and treat cardiovascular risk factors.

Additionally, dynamic muscle strength should also be evaluated with isokinetic and isoinertial devices, which is more associated with daily living activities than isometric muscle strength.<sup>13</sup> However, data from our research group revealed a good correlation between isometric handgrip with strength values obtained in one-maximal repetition tests in leg press, leg curl, leg extension, chest press, and lat pull-down in sedentary women.<sup>13</sup>

Finally, when comparing muscle strength from individuals with distinct body mass, we advise the use of relative values. This may also improve the understanding of the correlation between muscle strength and health parameters.

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