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Relationship between Handgrip Strength and Cardiopulmonary Fitness in Myocardial Infarction

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Purpose

The purpose of this study was to investigate the relationship between hand grip strength and cardiopulmonary fitness in patients with myocardial infarction. We hypothesized that patients with low grip strength would present an unfavorable cardiopulmonary function.

Methods

This study was designed as a cross-sectional, case controlled study. A total of 67 participants who experienced myocardial infarction were recruited for 1 consecutive years from February 2017. The hand grip strength were measured by handheld dynamometer. The patients squeezed the dynamometer three times with both hands using maximum effort. The mean of three trials was recorded respectively. Dynapenia was diagnosed on the basis of dominant hand grip strength less than 26 kg for male and 20kg for female. Cardiopulmonary exercise test was performed using a treadmill and a 12-channel electrocardiogram according to modified Bruce protocol. During the entire test, exhalation gases were analyzed in real time using a respiratory gas analyzer. The test was terminated immediately when participants requested termination

Results

Of the 67 subjects, 60 were males and 7 were females and the mean age of the patients was 56 ± 9 years (Table 1). The mean dominant and non-dominant handgrip strength was 34.2 ± 8.6 kg and 32.2 ± 8.8 kg, respectively. Dynapenia was diagnosed in 14.9% (n=10) of the participants and cardiorespiratory fitness parameters including maximal oxygen consumption (VO₂max), ventilatory threshold (VT), maximal O₂pulse (O₂pulsemax), minute ventilation (VEmax) and exercise time were significantly decreased in dynapenia group compared with non-dynapenia group (Table 2). Correlation analysis revealed that dominant handgrip strength was significantly related with VO₂max ($r=0.377$, $p<0.01$), VT ($r=0.450$, $p<0.01$), O₂pulsemax ($r=0.485$, $p<0.01$), VEmax ($r=0.453$, $p<0.01$), and exercise time ($r=0.464$, $p<0.01$) (Table 3).

Conclusion

Handgrip strength could potentially be used as a marker of cardiorespiratory functions. Therefore, proper management for the muscle strength should be considered to improve cardiopulmonary fitness in patients with myocardial infarction