INTRODUCTION

Studies on muscle fatigue have shown that females exhibit greater fatigue resistance than males, most likely related to differences in muscle morphology, neuromuscular activation or substrate utilization [1,2]. The few studies available on submaximal neck muscle fatigue sustained this assumption but they did not explore neural activation patterns during fatigue or morphometric variations across gender [3,4]. Therefore, the aim of this study was to examine the sex-differences in MVC/CSA ratio and EMG activity of neck muscles during a sustained maximal isometric contraction.

METHODS

18 young healthy subjects, 8 females (F) and 10 males (M), performed a 15-s sustained maximal isometric neck flexion on a specific ergometer. Force and surface EMG activity of sternocleidomastoid (SCM) and cervical paraspinal (PARA) muscles were recorded. The initial values and change of the average EMG (AEMG) and mean power frequency (MPF) were estimated over 0.5 s epoch. AEMG was normalized with values recorded during MVC before the test. Force and MPF shift was normalized with respect to initial value of the test. Linear regression was used to estimate the changes in variables with fatigue. Cross-sectional area (CSA) of muscles was estimated with MRI for a better estimation of the specific tension.

RESULTS AND DISCUSSION

Males were stronger than females in terms of absolute MVC (%init) (right) in males and females during 15-s sustained maximal contraction on a specific ergometer. Force and surface EMG activity of sternocleidomastoid (SCM) and cervical paraspinal (PARA) muscles were recorded. The initial values and change of the average EMG (AEMG) and mean power frequency (MPF) were estimated over 0.5 s epoch. AEMG was normalized with values recorded during MVC before the test. Force and MPF shift was normalized with respect to initial value of the test. Linear regression was used to estimate the changes in variables with fatigue. Cross-sectional area (CSA) of muscles was estimated with MRI from C2 to C7 for MVC/CSA ratio calculation (figure 1).

Collectively, these findings may indicate that F were unable to maximally recruit their neck flexors during a sustained maximal contraction. Future studies should examine other muscle activities during fatigue and calculate their lever arm for a better estimation of the specific tension.

REFERENCES