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Changes in lung volumes and respiratory muscle strength in different phases of the rowing stroke in Sri Lankan rowers: a preliminary study

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Breathing is a muscular process brought on by a group of muscles that are capable of demanding as much as 16% of available oxygen during maximal exercise. The rowing stroke consisting of four major phases; catch, drive, finish and recovery are engaged with the breathing cycle. A cross sectional descriptive study was conducted to assess respiratory functions and ergometer performance in 20 male national level rowers in the Sri Lanka Army in the age range 20-35 years in the competition season. Lung volumes and capacities were measured using a portable spirometer (Spiro analyzer ST-75). Respiratory muscle strength (RMS) was measured using a portable hand held mouth pressure meter (Micro MPM, Micro Medical Ltd., Kent, United Kingdom; Precision Medical MPM, UK). Both Lung volumes and RMS were assessed in standing, upright seated, catch and finish positions on the rowing ergometre machine in the morning before training session. Data was analyzed in SPSS software using descriptive statistics and relationship of variables were assessed with Pearson correlation. Probability values < 0.05 were considered significant. Ethical clearance was obtained from Ethics Review Committee, Faculty of Medicine, University of Peradeniya. The lung volumes of peak inspiratory flows (PIF) (2.40 ± 0.61), vital capacity (VC) (8.37 ± 1.66), forced expiratory volume per second (FEV1) (5.80 ± 1.18) and forced vital capacity (FVC)/FEV1 (1.63 ± 2.54) are higher in standing position while peak expiratory flows (PEF) (13.64 ± 1.48) and FVC (6.57 ± 3.17) are higher in finish and catch position on the ergometre machine respectively. Inspiratory muscle strength (IMS) (111.60 ± 29.79) and expiratory muscle strength (EMS) (155.30 ± 33.94) are higher in standing position. EMS and IMS significantly correlated with FVC/FEV1 in finish ($r=-0.64$; $p<0.01$) and upright seated ($r=-0.56$; $p<0.01$) position in ergometre machine respectively. This study shows that there is a significant association between lung volumes and RMS in phases of rowing stroke rather than in standing position.

Keywords: Ergometre machine, expiratory muscle strength, inspiratory muscle strength, lung volumes