

Specific respiratory warm-up improves rowing performance and exertional dyspnea

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ABSTRACT

VOLIANITIS, S., A. K. MCCONNELL, Y. KOUTEDAKIS, and D. A. JONES. Specific respiratory warm-up improves rowing performance and exertional dyspnea. *Med. Sci. Sports Exerc.*, Vol. 33, No. 7, 2001, pp. 1189–1193. **Purpose:** The purpose of this study was a) to compare the effect of three different warm-up protocols upon rowing performance and perception of dyspnea, and b) to identify the functional significance of a respiratory warm-up. **Methods:** A group of well-trained club rowers ($N = 14$) performed a 6-min all-out rowing simulation (Concept II). We examined differences in mean power output and dyspnea measures (modified CR-Borg scale) under three different conditions: after a submaximal rowing warm-up (SWU), a specific rowing warm-up (RWU), and a specific rowing warm-up with the addition of a respiratory warm-up (RWUplus) protocol. **Results:** Mean power output during the 6-min all-out rowing effort increased by 1.2% after the RWUplus compared with that obtained after the RWU ($P < 0.05$) which, in turn, was by 3.2% higher than the performance after the SWU ($P < 0.01$). Similarly, after the RWUplus, dyspnea was 0.6 ± 0.1 ($P < 0.05$) units of the Borg scale lower compared with the dyspnea after the RWU and 0.8 ± 0.2 ($P < 0.05$) units lower than the dyspnea after the SWU. **Conclusion:** These data suggest that a combination of a respiratory warm-up protocol together with a specific rowing warm-up is more effective than a specific rowing warm-up or a submaximal warm-up alone as a preparation for rowing performance. **Key Words:** WARM-UP, PERFORMANCE ENHANCEMENT, RESPIRATORY SENSATION, INSPIRATORY MOUTH PRESSURE, RESPIRATORY FATIGUE

Warm-up may be defined as any preliminary activity that is used to enhance physical performance and to prevent sports-related injuries. There are various types of warm-up techniques that competitors use to prepare for their event. The most widely used methods are classified as passive, general, and specific warm-up (23).

Competitive rowing is considered to be one of the most physiologically demanding sports, as rowers work near their maximal physical capacities and recruit a very large muscle mass. Open class rowers generate among the highest values of any athletes in selected physical fitness parameters, including those related to cardiorespiratory and muscular function (14). Warm-up is an integral part of the preparation before the start of the race.

Most general warm-up protocols are of moderate intensity and characterized by a low ventilatory demand (12). In competitive rowing, however, a higher intensity specific warm-up usually follows the general warm-up in an attempt to practice the racing pace (7). The higher intensity of the specific warm-up, among other peripheral adaptations, elicits an elevated ventilatory response that may prepare the respiratory muscles for the demanding entrained breathing of rowing (17,24). However, a recent report has showed that a specific respiratory warm-up protocol is more effective in

enhancing inspiratory muscle strength than a whole body specific rowing warm-up protocol (26).

The purpose of this study was a) to compare the effect of three different warm-up protocols, and b) to identify the functional significance of the respiratory warm-up, in terms of rowing performance and perception of dyspnea.

METHODS

Subjects. Fourteen competitive club rowers (7 male) participated in the study after giving informed written consent approved by the local Ethics Committee. One of the subjects was removed from the study because he developed a respiratory tract infection within 2 wk of the data collection, a condition known to have potential effects on respiratory muscle strength (19). Subject characteristics are shown in Table 1.

Procedure. Before data collection, all subjects visited the lab on two occasions to be familiarized with mouth pressure, spirometry, and dyspnea measurements. The subjects performed three different warm-up protocols, on different occasions, followed by an assessment of rowing performance. The three protocols were a submaximal rowing warm-up (SWU), a specific rowing warm-up (RWU), and the same specific rowing warm-up with the addition of a respiratory warm-up (RWUplus). The respiratory warm-up was performed using a pressure threshold inspiratory muscle-training device (POWERbreathe®, IMT Technologies Ltd., Birmingham, UK). Rowing performance was assessed with a 6-min all-out effort, on a rowing ergometer (model c,