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Protocol used to examine the acute effect of inspiratory muscle warm-up on wrestling recovery performance

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Abstract

The following protocol has been used in the research title: Does the inspiratory muscle warm-up have an acute effect on wrestling recovery performance?
The aim of this research is to examine the acute effects of warm-up for inspiratory muscles on recovery, inspiratory muscle strength, along with some inspiratory function parameters in young wrestlers.

Attachments

ethics commitee.pdf
946KB

Materials

Measurement of inspiratory muscle strength: Micro Medical-Carefusion Micro RPM, United Kingdom,
Peak inspiratory flow and inspiration volume test: POWERbreathe K5, United Kingdom,
Heart rate monitoring: PO80, Beuer Germany,
Anthropometric measurements: SECA 213 (Made in Germany), Tanita BC 418 Tanita Corp., Tokyo, Japan

Testing Environment

1 Environmental conditions were standardised; In our study, three different warm-up protocols (Wrestling Warm-up, Wrestling Warm-up + Inspiratory Muscle Warm-up, Wrestling Warm-up + Placebo Warm-up) were administered on the same day and time of the week (Monday, 2–3:00 pm) with a one-week interval between each session. Environmental conditions were standardised; test sessions took place in a temperaturecontrolled laboratory (20 to 22 °C; humidity < 70%).

Participant

2 All participants train at the same sports club, under the guidance of the same coach, five days a week. The inclusion criteria for the study were as follows: being between 14-16 years of age, having participated in regular wrestling training for at least 4 years, being male, having no health problems that would prevent participation in the study, no history of chest diseases, being a non-smoker, and not having sustained any sports injuries in the past 12 months. Participants who volunteered to join the study and met the inclusion criteria completed the necessary paperwork (Informed Consent Form – Informed Parental/Guardian Consent Form). After receiving approval from the principal investigator, the warm-up protocols and tests to be conducted within the scope of the study were initiated. In our study, three different warm-up protocols were applied in the following order: wrestling warm-up, wrestling warm-up plus inspiratory warm-up, and wrestling warm-up plus placebo warm-up. Each protocol was separated by a one-week interval to minimize carryover effects, and their impacts on inspiratory muscle strength, peak inspiratory flow, inspiratory volume, and recovery were evaluated.

Anthropometric Measurements

3 Demographic information was collected before testing. Participants' height was measured using a SECA 213 (Made in Germany) with a measurement range of 20-205 cm and a measurement accuracy of 1 mm. Participants stepped barefoot on the disinfected area after each user and stood upright. The test result was recorded in cm. Body mass measurements of the participants were performed using a Tanita BC 418 segmental body composition analyzer (Tanita Corp., Tokyo, Japan). Measurements were performed in the morning, provided that participants had fasted for at least 12 hours, and refrained from heavy physical activity for at least 48 hours. During the measurement, participants were asked to remove all metal objects and step barefoot on the platform in light clothing

Warm-Up Protocols

4 Wrestling warm-up (WW): It was designed as a traditional specific wrestling warm-up that contained jogging (10-minute), followed by dynamic stretching exercises (10 minute) for the upper and lower body extremities. After the heart rate reached 95-100 beats/min with the traditional wrestling specific warm-up, then the wrestling bout was performed.
Wrestling warm-up plus inspiratory warm-up : It was designed so the WWIW protocol was coupled together with the traditional specific wrestling warm-up. All participants first performed the wrestling warm-up, then immediately carried out the respiratory warm-up by performing two sets of 30 breaths with inspiratory pressure-threshold equivalent 40% maximum inspiratory mouth pressure using the POWERbreathe® respiratory muscle device (POWERbreathe International Ltd., U.K.). After the heart rate reached 95-100 beats/min with the wrestling warm-up plus respiratory specific warm-up, then the wrestling bout was performed.
Wrestling warm-up plus placebo warm-up : The same method was followed as with the WWIW, but the POWERbreathe® respiratory muscle device was set by inspiratory pressure- threshold equivalent to 15% without notice for the participants. After the heart rate reached 95-100 beats/min with the wrestling warm-up plus placebo warm up specific warm-up, then the wrestling bout was performed.

Simulated Wrestling Bout

5 A simulated wrestling bout (two-min x 2 period, with a 30 s break between the periods) was performed after the warm-up protocol and measurements, according to the United World Wrestling rules, between wrestlers of the same weight class. The simulated wrestling bout lasted the full two-minute duration, regardless of any pin that might occur, ensuring consistency in match length. Additionally, subjects competed exclusively against the same opponent within their weight class throughout all protocol applications, with no changes in opponents.

Respiratory Muscle Function

6 Measurement of inspiratory muscle strength
Maximal inspiratory pressure which reveals the force generating capacity of inspiratory muscles during the Muller maneuver, is a valid method used to measure respiratory muscle strength. This measurement was determined with a portable device (Micro Medical-Carefusion Micro RPM, United Kingdom). The measurement score can be monitored instantly from the device. Participants were asked to hold the measuring instrument with both hands and close their lips tightly around the flanged mouthpiece during the measurement. The participants were asked to exhale as deeply as possible (residual volume) and then perform maximum inspiration for more than one second for the test. A nose clip was applied to prevent air escaping from the nose, and the test was

performed while the participants were standing. Participants completed three MIP trials at each timepoint, and the highest value was recorded and used for statistical analysis.

Peak inspiratory flow and inspiration volume test
Peak inspiratory flow evaluates the ability of inspiratory muscles to contract rapidly and overcome resistance inherent in the respiratory system Inspiratory volume is the volume and amount of air reaching the lungs with each inspiration. A portable device (POWERbreathe K5, United Kingdom) was used for both tests. The test was performed with the participant standing with his nose closed with a clothespin and was asked to exhale as deeply as possible (residual volume) and then perform maximum inspiration for more than one second for the test. PIF and inspiration volume were both taken simultaneously in the single breath test mode of the device.

Heart rate monitoring

7 Heart rate was measured just before and immediately after the performance bouts using a commercially available pulse oximeter (PO80, Beuer Germany) device that was placed tightly on the forefinger without moving and recorded the data.

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