

Materials and methods.— Each subject performed two types of muscular exercise test on VPHandisport ergometer. This is a test with increasing speed and constant load test and an increasing load and constant speed. The measurement of gas exchange during muscular exercise has identified the peak oxygen consumption (VO₂ peak) and peak aerobic power (PMA) corresponding. The propulsion parameters were also measured during each test.

Results.— The peak VO₂ was significantly higher during the test at increasing load (2529 mL/min versus 2226 ± 628 mL/min ± 396, $P < 0.05$). The cycle time and push time decreased significantly during the test with increasing speed, the return time decreases significantly during the test at increasing load.

Conclusion.— In this population, the increasing load test seems the most relevant for the assessment of aerobic capacity. The test with increasing speed underestimates this capacity: the characteristics of the propulsion seem to be a limiting factor in this type of test.

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Aerobic capacity in wheelchair rugby players: Laboratory assessment and field-test comparison

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Keywords: Wheelchair rugby; Peak oxygen consumption; Field test

Objective.—The objective of this study is to compare the peak oxygen consumption (VO₂pic) measured in the laboratory with the one evaluated in a field test, in subjects practicing the quad rugby competition.

Population.— Fifteen subjects (14 men, 1 woman, average age 29.5 ± 6.73 years) practicing the quad rugby competition, participated in the study. In this sample, 9 were subjects with spinal cord injury, 1 is a bilateral amputee, 3 have cerebral palsy and 3 patients develop the Charcot-Marie-Tooth disease. According to their skill level, 4 subjects are classified 3.5 points, 1 about 3 points, 3 subjects 2 points, 2 subjects 1.5 points, 2 subjects 1 point and 3 subjects are classified 0.5 for practice in competition.

Materials and methods.— Each subject received VO₂pic laboratory evaluation during a maximal muscle exercise test on an ergometer for wheelchair and an estimate of VO₂pic at a field test (Modified Leger and Boucher Test). Statistical analysis allowed for the existence of a correlation between laboratory test (VO₂pic laboratory) and field test (VO₂pic field).

Results.— The average VO₂pic is 25.03 ± 11.98 mL/kg/min in laboratory and 26.9 ± 5.4 mL/kg/min in the field test. There is a significant correlation between the laboratory and VO₂pic field ($r = 0.58$, $P = 0.048$) between the VO₂pic laboratory and classification ($r = 0.609$, $P = 0.016$) and between the VO₂pic field and classification ($r = 0.823$, $P = 0.001$). In the subgroup of subjects with tetraplegia ($n = 9$), there is also a significant correlation between the VO₂pic laboratory and VO₂pic field ($r = 0.76$, $P = 0.044$) between the VO₂pic laboratory and classification ($r = 0.851$, $P = 0.004$) and between the VO₂pic field and classification ($r = 0.804$, $P = 0.029$).

Conclusion.— The field test is predictive of aerobic capacity of subjects practicing wheelchair rugby.

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Exercise intensity during wheelchair rugby competition

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Keywords: Wheelchair rugby; Cardiorespiratory; Exercise intensity; Prescription

Purpose.— The purpose of this study is to assess the exercise intensity in competition for subject practicing wheelchair rugby.

Method.— Six men (26,1 ± 4,5 years, two quadriplegics, an amputee, a cerebral palsy, two subjects with Charcot-Marie-Tooth disease) performed an assessment of their maximal oxygen consumption (VO₂max in ml/kg/min) in laboratory (continuous peak exercise test on cycle ergometer for wheelchair). During exercise testing, the heart rate at ventilatory threshold 2 (HRvt2) and the maximal heart rate (HRmax) were recorded for every subject. During a tournament of French first division, records of heart rate (HR) were collected (every five seconds) in these six players. The data of the seven records could be analyzed to determine the time spent in percentage of the playing time at or above HRvt2 and at or above 90% HRmax.

Results.— The average VO₂max measured in laboratory was 32 ± 9 ml/kg/min. The mean HRmax recorded in laboratory was 145 ± 29 bpm (beats per minute). Analysis of ventilatory parameters was used to determine for each subject HRvt2 resulting in an average of 148 ± 26 bpm. The mean heart rate obtained during the game time was 145 ± 28 bpm. The mean percentage of time spent HRvt2 or above and 90% HRmax or above is respectively 53% ± 22% and 34% ± 19% regardless of classification level.

Discussion and conclusion.— Results of this study indicate that wheelchair rugby enables some players to reach an exercise intensity associated with improvements in cardiorespiratory parameters and that the training type should be oriented to the efforts of high intensity.

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Shoulder injuries in wheelchair athletes

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Keywords: Shoulder injuries; Wheelchair athletes; Overuse injuries; Muscular imbalance

Sports participation in the wheelchair-user population is growing. This growth has been an increase in sports-related and overuse injuries especially about the shoulder.

The shoulder joint gleno-humeral of the wheelchair user is the primary joint for transfer and propulsion.

Even a minor injury to the shoulder can impair a person's ability to achieve independence particularly with the spinal cord injuries. Frequent overuse injuries include rotator cuff tears and impingement syndrome. Most rotator cuff injuries are due to muscle imbalances of the shoulder. There is weakness of the shoulder adductors in people with paraplegia. This weakness could be a cause for the development or rotator cuff impingement syndrome. People with paraplegia also demonstrated a significant weakness of external and internal rotation.

The relationship of sports involvement to medical complications in wheelchair athletes and non-athletes concluded that sports participation was not associated with increased risk of medical complications but strengthening of shoulder internal and external rotators as well as the adductors is recommended.

Prevention is key for the treatment of overuse injuries because wheelchair users cannot lose their independence.

Most rotator cuff injuries are due to an imbalance in muscle groups and, in particular, weak adductors and internal and external rotators. Muscle imbalances could be prevented by a muscular well-planned training. For sports with the acquisition of propulsion, the priority is a quality, lightweight and well-suited material to the level of injury and morphology. Similarly complete recovery from injury is required before the resumption of sporting activity.

Further reading

Pailler D, Druvert JC. Paraplégie et sport : quelle pratique ? Devenir à moyen et long terme ? Journée de Traumatologie du sport 2011, Rachis et sport : quels risques ? Quels effets bénéfiques ? Coordonné par Rodineau J, Besch S et Furgolles E.

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