

Accuracy of the new Elite Drivo ergometer

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Introduction

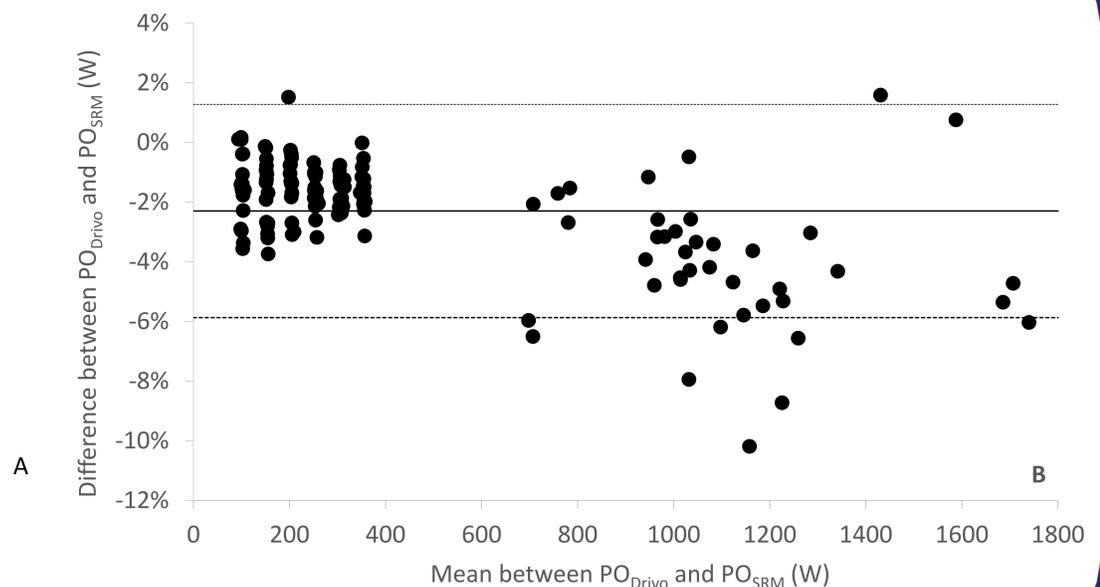
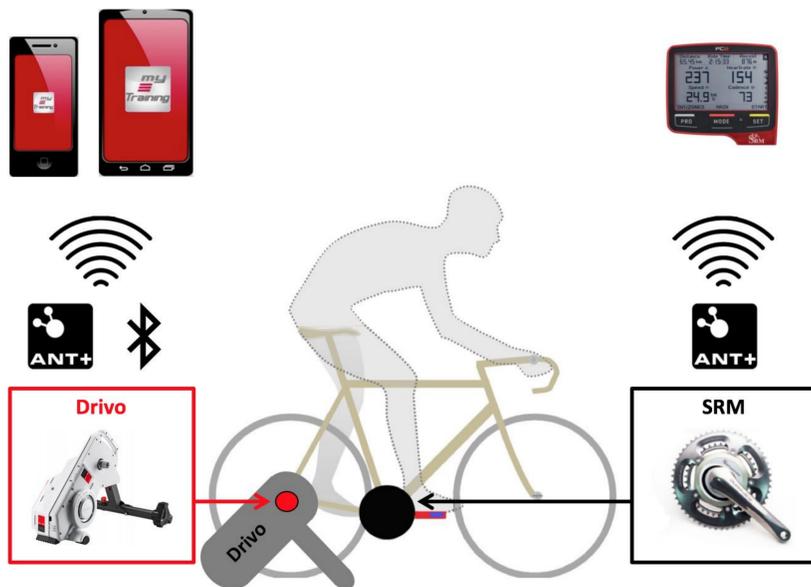
Recording power output (PO) of riders during training and competition is well accepted in modern cycling. To measure differences in performance, accuracy of PO measurement needs to be high [1,2]. Ergometers used for training and testing can be static or mobile. The Elite Drivo (Elite, Fontaniva, Italy) is a new static ergometer using two optical torque sensors, measuring the time delay between a set of teeth. PO is measured at the rear wheel, like most static ergometers on which a personal bike can be fitted. SRM (Trainingsystems, Schoberer Rad Messtechnik, Julich, Germany) is accepted as a valid power meter and considered as a gold standard [1,2,3]. SRM measures PO at the spider crank. The aim of this study was to assess the accuracy of the Elite Drivo ergometer in comparison with the SRM device.

Methods

Six cyclists (age: 24.1 ± 1.8 years, height: 1.79 ± 0.07 m, body mass: 71.7 ± 7.5 kg) performed a sprint test and a sub-maximal incremental test whereas a seventh cyclist performed only the sprint test. The tests were performed in a laboratory on a bicycle fitted with a professional SRM device and fixed on the Elite Drivo ergometer (Figure A). The sprint test consisted of three 7-sec sprints to determine maximal PO ($PO_{1\text{-sec}}$) and maximal 3-sec PO ($PO_{3\text{-sec}}$). The sub-maximal incremental test was performed with six 3-min duration PO levels (100, 150, 200, 250, 300 and 350 W) and three 1-min duration pedalling cadences for each PO level (60, 80 and 100 rpm). The last 30 sec of every interval were analysed. Before the study the SRM was calibrated and the zero-offset was reset before each test.

Results

There was a high correlation ($R^2 = 0.99$, $p < 0.001$) between PO_{SRM} and PO_{Drivo} . However, there was a significant difference between PO_{SRM} and PO_{Drivo} ($p < 0.001$). Bland and Altman analysis showed that PO_{Drivo} was significantly lower than PO_{SRM} (-16 W or -2.3%), with a 95% confidence interval between -66 W and 34 W (Figure B). Underestimation of PO increased with higher PO. Average underestimation for the incremental test was -1.6%, while in the sprint test, a higher underestimation was measured (-4.1%). The pedalling cadence did not significantly affect the PO measurements for both systems.



Discussion

The main finding of this study is that Elite Drivo ergometer underestimates PO compared to SRM with -2.3%. The underestimation increases with higher PO. This underestimation might be explained by the location of the two power meters on the bicycle. SRM records PO at the spider crank whereas Drivo at the rear wheel. It also explains the increased underestimation for sprints compared to sub-maximal incremental tests [2, 3]. Another reason could be the different measurement processes that explain the higher differences in PO during sprint test. The Elite Drivo uses an uncommon method with optical torque sensors, instead of strain gauges like SRM.

References

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