A comparison of two Wingate Anaerobic Test software packages

C. Talbot[1],T. Kay[1] and M.J. Price[2]
[1]Sport, Exercise and Life Sciences, The University of Northampton, [2]Biomolecular and Sport Sciences, Coventry University

Introduction

A common data collection system for Wingate anaerobic testing (WAnT) is provided by Cranlea. More recently Monark have provided Wingate software for use with their ergometers. The aim of this study was to compare upper body WAnT performance measures provided by the two systems.

Methods

Participants: Following institutional ethical approval, eighteen participants volunteered for the study (Male, *n* = 11, Age *mean* 26.1, *s* = 9.2, body mass *mean* 87.0, *s* = 18.3). Female, *n* = 8, Age *mean* 22.6, *s* = 3.7, body mass *mean* 67.9, *s* = 16.8).

Methods: Each participant undertook three WAnT using a table mounted cycle ergometer (Monark 894E, Sweden) as part of familiarisation for a larger study. All tests involved a 4% body mass resistive load with a minimum of 24-h between tests. Prior to each test participants undertook a 5-min warm-up (60 rev·min^{-1}) including three 3-4 s practise sprints. Corrected peak power (PP; over 1 s duration for Cranlea; over one pedal revolution and 1 s for Monark), mean power (MP; over 24 s), time to PP, peak and mean cadence were recorded using Cranlea Wingate v4.0 and Monark v2.2 software.

Statistical analysis: Data were analysed by paired t-tests (SPSS 17.0), Pearsons correlation coefficient and Bland Altman plot. Significance was accepted with $P < 0.05$.

Results

There were significant differences between Monark and Cranlea outputs for PP ($P < 0.01$), MP ($P < 0.01$) mean cadence ($P < 0.01$). There was no significant difference for peak cadence ($P = .678$) or time to peak power ($P = 0.25$). The range of PP values (Monark; 137 – 946 W and Cranlea; 179 – 1000 W) reflected the range of values reported in the literature. Mean differences between software for PP and MP were 33 (*s* = 46) and 22 W (*s* = 14).

Figure 2 shows a strong correlation between measures of peak power ($R^2 = 0.976$). Figure 3 shows the Bland Altman plot indicates that as peak power increase the disparity between the measurement devices also increases.

Table 1. Results for Monark Vs Cranlea (mean ± *s*)

	Monark	Cranlea	R^2
Peak power (W) Monark 1 pedal revolution, Cranlea 1 s	546 ± 264	517 ± 239	0.976
Mean power (W) 24 s	317 ± 134	339 ± 141	0.992
Peak cadence (rev·min-1)1 s	114 ± 35	114 ± 35	0.999
Mean cadence (W) 24 s	98 ± 28	100 ± 29	0.999
Time to peak power (s)	4 ± 2	4 ± 3	0.677

Figure 1. Monark 894E ergometer adapted for arm crank ergometry.

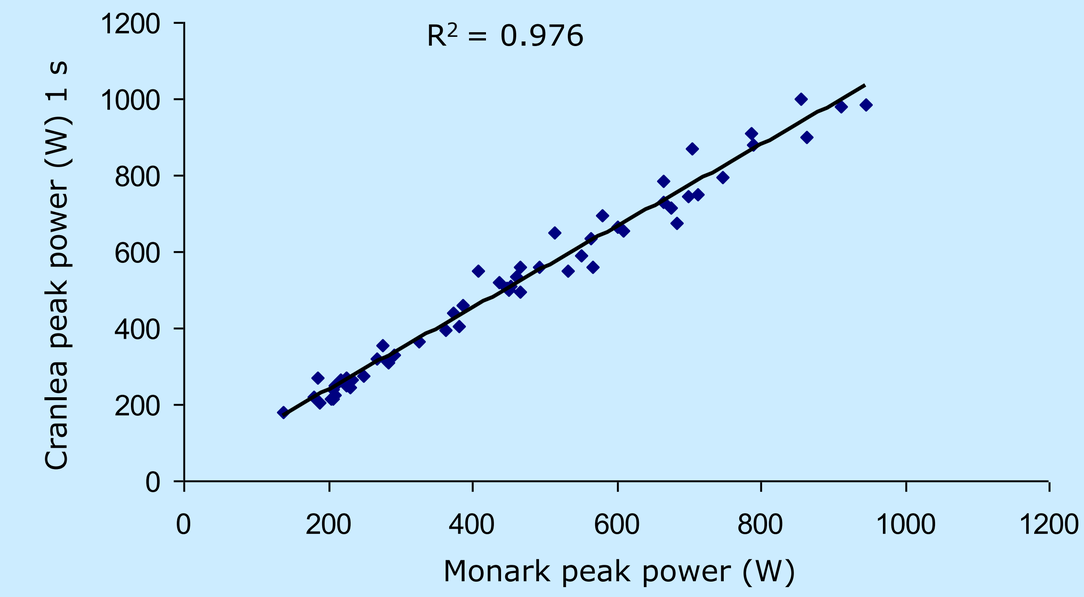

Figure 2. Change in corrected and uncorrected peak power output with changes in resistive load as a percentage of body mass.

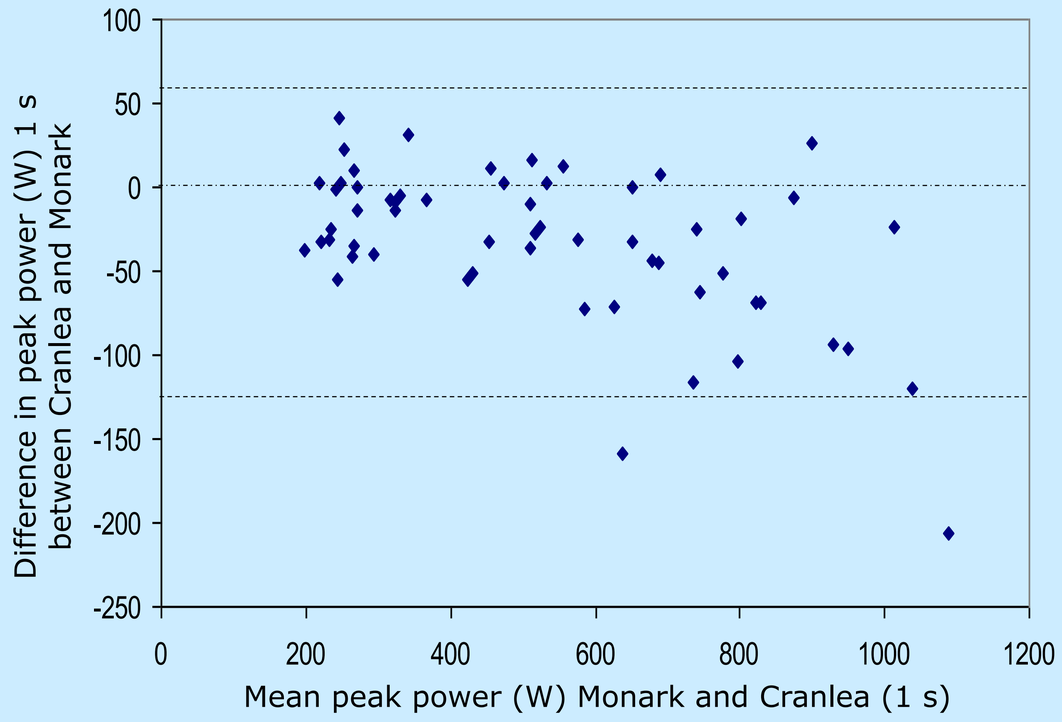

Figure 3. Bland Altman plot with 95% limits of agreement (dashed lines) and mean bias for peak power between the two measurement devices.

Summary and conclusions

The results of this study suggest that at lower power values either method of measuring upper body WAnT variables can be used. However, increased disparity in peak power at higher values indicates that results may not be comparable.

chris.talbot@northampton.ac.uk