POWER PRODUCTION DURING THE INITIAL PHASES IN LUGING: A PRELIMINARY STUDY

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Introduction

In sliding sports a fast start is a prerequisite for the successful outcome of the run. The start in luging is divided into five phases: sliding forward (1), sliding backwards (2), the start spurt (or start jerk) phase (3), several paddling arm-strokes (4), and assumption of riding position (5). The first phases (2 and 3) are known as the most important for an outstanding start performance (Lembert et al., 2011; Platzer et al., 2009).

Information on kinetic measurements in the sport of luge is rare in scientific literature. The aim of this study was to assess power output of lugers during the Phases 2 and 3 of the start (Figure 1) and to evaluate these variables as possible performance predictors.

Materials & Methods

Eight experienced sliders – 4 female and 4 male athletes – gave an informed consent for their routine training start attempts on the iced start ramp to be videotaped and analysed. The records of start phases 2 and 3 were processed. For each athlete the best start attempt out of 3 was analysed. The start time was used as a selection criterion.

Average power output during Phase 3, the start spurt phase, (Ps), average power to reach maximal horizontal velocity in Phase 3 (Pmax) and average power to reach maximal horizontal backward velocity in Phase 2 (Pback) were calculated as in (Bezodis et al., 2008). Sled horizontal velocity was estimated from 100 fps video records using Simi Motion analysis software. Two start interval times – time to clear the first 3 m (t1) and 15 m (t2) distance on the slope – were used as performance criteria.

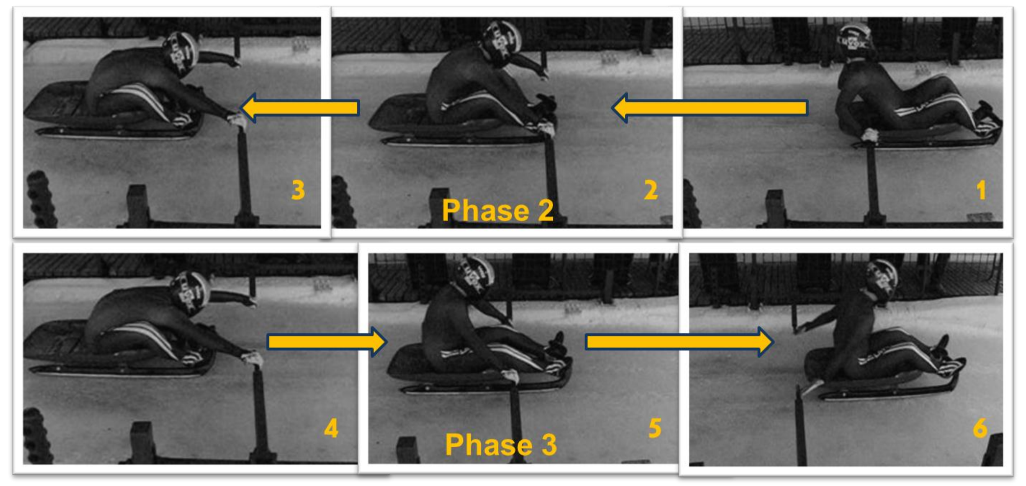

Figure 1. Phases 2 (top) and 3 (bottom) of start in the sport of luge.

Results & Discussion

For all athletes Pmax had the largest values among all power parameters; it ranged from 3104 to 3875 W in male group, and from 1584 to 2458 W in female group. Other power parameters showed larger relative differences within the groups: Ps ranged from 334 to 867 in male, and from 187 to 394 W in female group; Pback 505 to 1293 for male, and 295 to 600 W in female group. From all measured variables only maximal velocity during the start spurt (Vmax) correlated with performance criteria (in male group only).

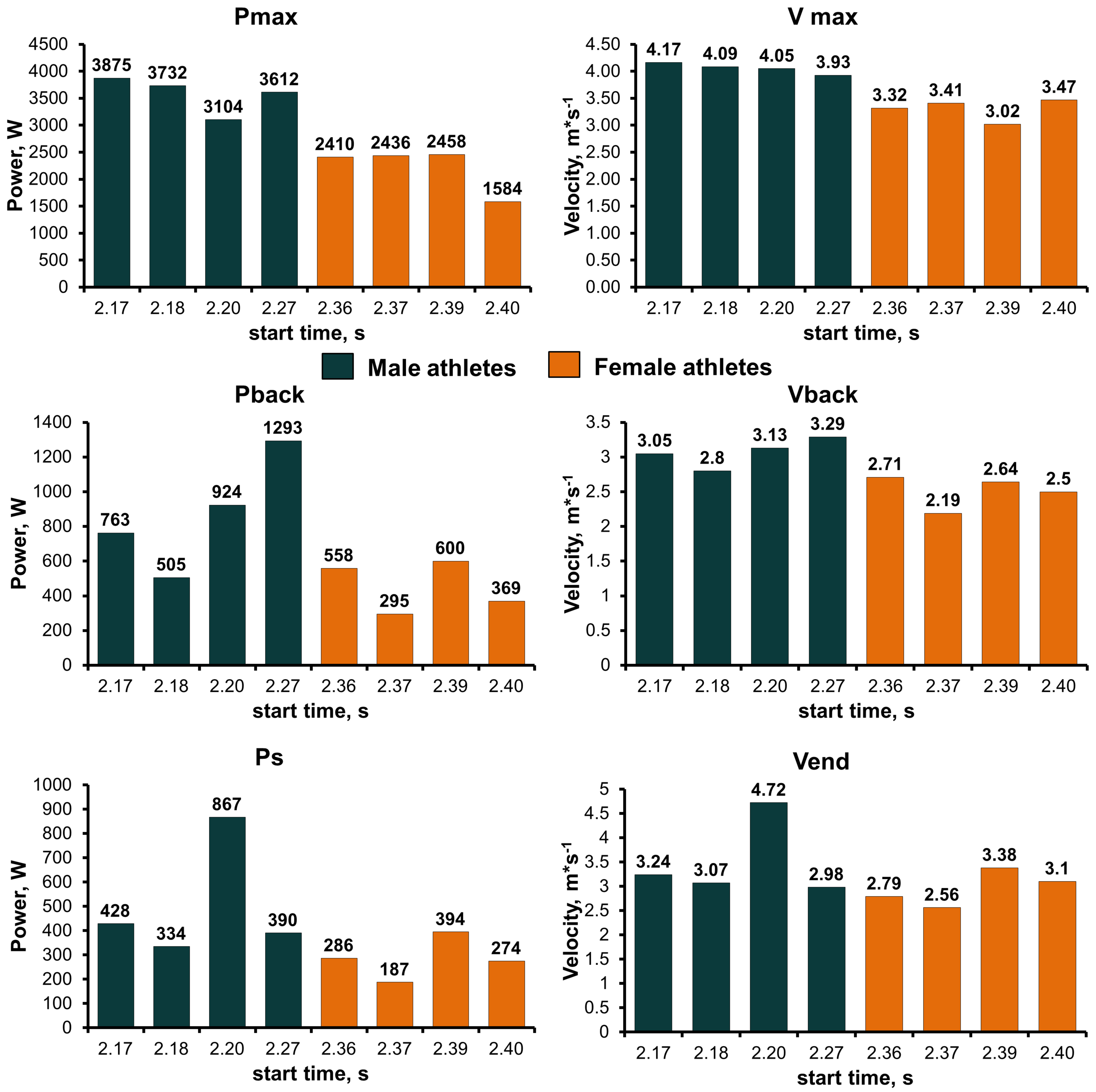

Figure 2. Power and velocity measurement results.

Vback – Phase 2 maximal velocity, Vend – velocity at handles release instance (end of Phase 3)

From the preliminary study all calculated power parameters appeared to be poor performance predictors. This was also true for values normalized to body mass. Vmax correlation with start time in male group was in accordance with Platzer et al. (2009) data; however, in female group correlation was not statistically significant.

Average Pmax values normalized to body mass for both groups were comparable to values in snatch pull in weightlifting according to previously published data. For male group the normalized Pmax values were in average 32 W*kg^{-1}, for female athletes this variable was lower – 27 W*kg^{-1}. Absolute values of Pmax tended to exceed the results reported for weightlifters (Garhanner, 1991; Zebas et al., 2000).

Given an emphasis put on strength training in luging, power output measurements might provide additional information for coaches and athletes. Applicability of power variables for performance prediction, on the other hand, requires further research.

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Conclusions

The preliminary study did not reveal a statistically significant correlation between average power variables calculated for Phases 2 and 3 of the start and start interval times, therefore using power outputs as performance predictors is not justified so far. Nevertheless, importance of power assessment in force-dependant athletic activities, as the sport of luge, shall not be underestimated.

References

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