Carbohydrate and protein gel increases finishing success during slalom ski race training

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Introduction

Skeletal muscle contraction forces have been shown to reach maximal levels during alpine ski racing. When the repeated contractions of multiple skiing runs are compounded, the result is metabolic stress. Past research, using recreational skiers skiing for three hours, shows significantly elevated myoglobin and creatine kinase levels in the skiers drinking water only, compared to a matched group ingesting water with carbohydrate and protein; this indicates metabolically-induced muscle damage. This study builds on that research and investigates ski racers ingesting a carbohydrate and protein gel that has been shown to minimize muscle stress. The goal is to determine if a carbohydrate and protein supplement translates into the real world currency of the ski racer by measuring finish success, time difference, number of gates skied, and Rate of Perceived Exertion (RPE) during slalom training.

Methods

Thirty ski racers, 14 to 19 yrs old, were matched by gender, age, and USSA (United States Ski & Snowboard Association) slalom points. During a 2-hr slalom training session, after each run (mean: 41 gates), one of the pair ingested a commercially available energy gel (Accel Gel®, PacificHealth Labs; 20g CHO + 5g protein) with about 150mL water, while the matched skier ingested 150mL flavoured water (WO). Six runs were completed consisting of 2 timed runs, 2 training runs, followed by 2 timed runs on the original course. Data were collected over two successive training days.

Results

Significant chi square difference ($p<.015$) was found for total "Did Not Finish" (DNF) with the GEL group having 14 DNF's out of 104 total runs (13%), and 38 DNF's out of 112 runs (34%) for WO (see Fig. 1). DNF's represented any time an athlete skied out of either the timed courses or the training course. A significant difference ($p<.01$) was also found for DNF's in the two post training runs. The GEL group had 9 DNF's out of 52 runs (17%) while the WO group had 23 DNF's out of 56 runs (41%). The GEL group completed a significantly ($p=.04$) greater number of gates on Day 2 (260.3 ±20.1 vs. 246.3 gates ±17.5) (see Table 1). The GEL group reported a significantly ($p=.007$) lower RPE (4.3 ±1.5) than WO (5.3 ±1.4) using the 10 point Borg RPE. No difference was observed for the fastest timed run (GEL: 45.1 ±2.7 vs. WO: 45.2 ±2.8 sec).

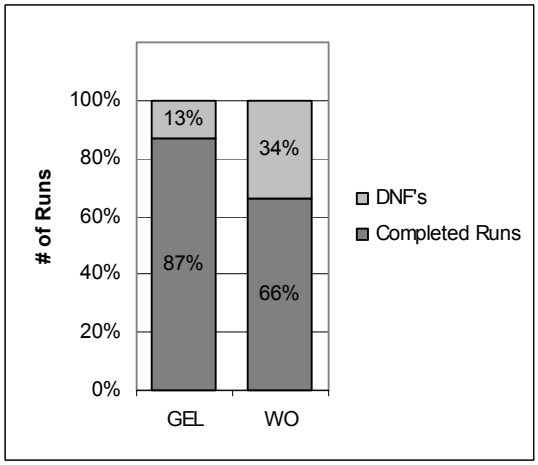

Fig. 1: Percent of DNF's*significant ($p=.04$)

# of gates completed / athlete	Day 1	Day 2
GEL	232.6	260.3*
Water Only	231.8	246.3

Table 1: Number of gates completed per athlete by day
*significant ($p=.04$)

Discussion/Conclusion

When analyzing the data with the fastest runs, WO finishing times were not significantly different from the GEL skiers. However, an important training/racing variable was noted: WO skiers had 2.6 times more DNF's than the GEL skiers ($p<.015$). This trend was mirrored in the two post training runs where the WO group had 41% DNF compared to the GEL skier's 17% DNF rate ($p<.01$). The consequence of these greater DNF's is a decrease in training volume that was shown by a significantly ($p=.04$) lower number of gates skied by the WO group on Day 2 (see Table 1). The two most important training variables are volume and intensity. The WO skier's training volume was sacrificed since they were unable to finish as many training runs. Added to this they were less able to keep their intensity high demonstrated by the high RPE. Thus the WO group's volume and intensity was negatively effected. In conclusion: consuming a carbohydrate + protein GEL and water increased training run finish success, increased the number of gates trained per session, and resulted in a lower Rating of Perceived Exertion compared to a group that drank only water.

References

Hintermeister RA et al (1997) Med Sci Sports Exerc 29: 548-553

Seifert JG et al (2005) in press