INTRODUCTION

- The game of soccer is comprised of both aerobic and anaerobic elements.
- Elite female soccer players perform between 72 - 159 high intensity runs and run about 10 km in an average 90 min game. Altitude has been associated with aerobic capacity in elite female soccer players.
- High intensity running is has been shown as an predictor of soccer performance.
- Altitude may have a limiting effect on the elite female soccer players that reside at sea level and travel to play at moderate altitudes.
- A disadvantage may exist for sea level native teams ascending to altitude for competition.

METHODS

Participants
The performances of six NCAA Division I female soccer players were analyzed across three competitions during the regular season. Each player competed for a minimum of 60 minutes in each condition. Two competitions performed at sea level (Orlando, FL: 25 m) were averaged to establish a baseline performance measure. One competition was performed at a moderate altitude in Colorado Springs, CO (1,840 m).

Competitions
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Global Positioning Systems
Prior to every competition, each athlete was fitted with a 10-Hz GPS receiver/transmitter (Catapult, Minerals 4.0, Vermont, LLC) that was placed in a pocket of a vest worn under their game jersey during competition. These devices allowed for the collection of data during competition to develop activity profile of players.

To compare the effect of altitude on the rate of high intensity running and distance run during competitive games in women's intercollegiate soccer.

RESULTS

Rate of total distance covered at altitude was significantly less when compared to competition at sea level (p = 0.000; 105.8 ± 10.2 m/min<sup>1</sup>, 120.6 ± 8.3 m/min<sup>1</sup> respectively). See Figure 1.

Rates were significantly different between halves
- First Half: (p = 0.005)
  - Altitude: 109.6 ± 6.6 m/min<sup>1</sup>
  - Sea Level: 123.1 ± 7.8 m/min<sup>1</sup>
- Second Half: (p = 0.009)
  - Altitude: 105.9 ± 7.1 m/min<sup>1</sup>
  - Sea Level: 119.4 ± 8.2 m/min<sup>1</sup>

Figure 1. Rate of Total Distance Covered

Comparisons
Rest/Recovery
- Altitude: 52.6 ± 6.0 m/min<sup>1</sup>
- Sea Level: 62.5 ± 6.0 m/min<sup>1</sup>
- % difference: 16.0 (p = 0.000)

High Intensity Running
- Altitude: 105.9 ± 7.1 m/min<sup>1</sup>
- Sea Level: 119.4 ± 8.2 m/min<sup>1</sup>
- % difference: 10.0% (p = 0.000)
- Significant differences (p < 0.05) were seen in minutes played between the single game played at altitude and the mean results were compared with the single game played at altitude.

Performance at altitude was reduced when compared to performance at sea level.
- Rate of total-distance covered was significantly less throughout the game.
- Decrements in performance in total distance covered were consistent at both altitude and sea level (approximately 4 m).
- These devices allowed for the collection of data during competition to develop activity profile of players.
- Significant difference during the second half indicated that fatigue experienced was similar to that sea level.

This data suggests that a game of soccer, compensation by anaerobic energy systems was insufficient to maintain player's standard performance.

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REFERENCES

- & #8211; Balsam, P., & #8211; et al., 2005). Match performance of high intensity running at altitude was significantly less when compared to sea level throughout the competition (p = 0.037, 25.1 ± 7.7 m/min<sup>1</sup>, 27.7 ± 9.2 m/min<sup>1</sup> respectively). See Figure 2.

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