NOCTURNAL HEART RATE AND HEART RATE VARIABILITY BASED TRAINING LOAD MONITORING, A CASE STUDY OF AN ELITE JUNIOR XC SKIER DURING A GLACIER TRAINING CAMP

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INTRODUCTION

- Training camps on glacier are common among cross country (XC) skiers because camps allow to carry out ski training on snow year-round.
- Because exposure to high altitude is an environmental stressor itself [1], it is important to monitor training load and recovery in these high altitude camps.
- Recent studies [e.g. 2] suggested that nocturnal heart rate (HR) and HR variability (HRV) could be used as a tool for monitoring training load.

Purpose: To investigate the changes in nocturnal HRV of an elite junior XC skier during a glacier training camp.

METHODS

- 19-year old elite junior XC skier ("first timer" at high altitude) collected nocturnal RR-intervals with Suunto Memory belt before, during and after the 10-day glacier training camp.
- Living altitude: 1800 m
- Training altitude - Mornings skiing on glacier at 2700m
  - Afternoons dry land training mainly at 700 – 1100 m
- Nocturnal HRV was analyzed with frequency domain method (Firstbeat Technologies Ltd, Jyväskylä, Finland) for 4-hour time period starting 30 min after going to bed.

RESULTS

- Nocturnal HR increased by 16 %, while TP and RI decreased by 37 and 28 %, respectively, from the base level before the camp to the second night (after moderate training) during the camp (table 1, figure 1).
- Nocturnal HR, TP and RI values returned close to the base level after a resting day.
- Nocturnal HR increased again by 10 % and TP and RI decreased by 22 % and 20 %, respectively, during the last two nights of the camp (after moderate training).
- After returning home, all values returned to the base level.

DISCUSSION

- The changes in nocturnal HR and HRV data during the beginning of the high altitude training camp suggested increased sympathetic activity which may be related to acclimatization processes of the body.
- The findings at the end of the camp suggested cumulative fatigue.
- The skier seemed to recover quite rapidly after a resting day in the middle of the camp and after returning home although he has no earlier experience of altitude training.
- The HR and HRV based analysis seemed to be a practical tool to monitor training and acclimatization induced stress in endurance athlete during altitude training camp.
- However, the scale of RI and HR/HRV responses to training and altitude exposure are individual.

REFERENCES


Table 1. Nocturnal HR and HRV variables during the training camp.

<table>
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<th>Night</th>
<th>HR (bpm)</th>
<th>LF (ms²)</th>
<th>HF (ms²)</th>
<th>TP (ms²)</th>
<th>RI</th>
<th>Training</th>
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<td>Rest/travelling</td>
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</table>

Table 2. Individual recovery index history of the skier from previous 3 months.

- After recovery day/period 200 - 225
- After hard training day/period 150 - 160
- Lowest measured value (fever) 125

Figure 1. Changes in recovery index and training during the training camp.