

DEVELOPING A SYSTEM FOR ANALYSING LEVEL OF STRESS AND RECOVERY IN VOLLEYBALL AND BASKETBALL

Häyrinen, M.¹, Hynynen, E.¹, Nummela, A.¹, Savikko, H.², Silander, J.², Hakala, L.², Berruto, M.¹, Tolonen, T.³ & Honkanen, P.²
¹KIHU – Research Institute for Olympic Sports, Jyväskylä, Finland,
²Finnish Basketball Association, ³Finnish Volleyball Association



INTRODUCTION

The goal of training in sports is to develop the different properties of the athlete so that the actual sport-specific performance is improved. The training disturbs the homeostasis of many processes of the body and positive adaptations are achieved only if the athlete implements enough time with either rest or low training loads. The regulation of the autonomic nervous system is affected by training and heart rate and heart rate variability can be used to detect these changes [1, 2].

The goal of this project was to use the latest know-how in heart rate based stress and recovery measurement in improving the quality of training of the Finnish national teams for men's volleyball and women's basketball.

METHODS

The subjects of this study were the athletes of the Finnish men's volleyball national team (n=11, 25.0±3.9 y, 197.0±6.2 cm, 91.0±6.5 kg) and Finnish women's basketball national team (n=8, 23.0±2.8 y, 181.5±8.0 cm, 73.5±11.4 kg).

The duration of the measurement period was two weeks. During the measurement period the subjects daily filled two questionnaires concerning their stress and recovery, executed a simple reaction test using Good Response –test equipment and collected heart rate during the nights using either Suunto t6 –wrist computers or Polar S810i –heart rate monitors. The heart rate variability was analyzed using Firstbeat Pro 2.0.0.9 –software.

RESULTS

In volleyball the use of the questionnaires unveiled the fact that different players feel to be strained in very different ways in the same training sessions. The different roles of the players affected the stressfulness of the training session and matches.

Both volleyball (18.5.) and basketball (11.8.) players felt that they were better recovered in the first match day of the season than the day before even if they had traveled and trained on the previous day (figures 1 and 2).

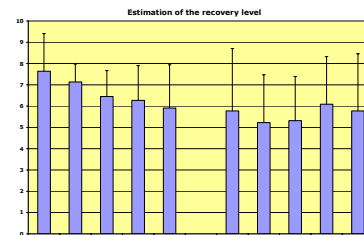


Figure 1. The means and SDs of the estimations of the recovery level in volleyball. Statistically significant changes: 8.5. vs. 10.5. ($p<0.05$), 8.5. vs. 16.5. ($p<0.05$), 8.5. vs. 17.5. ($p<0.05$), 9.5. vs. 10.5. ($p<0.05$), 9.5. vs. 16.5. ($p<0.05$), 9.5. vs. 17.5. ($p<0.05$) and 17.5. vs. 18.5. ($p<0.05$).

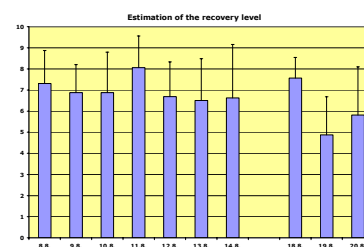


Figure 2. The means and SDs of the estimations of the recovery level in basketball. Statistically significant changes: 8.8. vs. 19.8. ($p<0.01$), 9.8. vs. 19.8. ($p<0.05$), 10.8. vs. 19.8. ($p<0.05$), 11.8. vs. 19.8. ($p<0.01$) and 18.8. vs. 19.8. ($p<0.01$).

The reaction times were quicker on the match days for both groups of athletes. The estimation of recovery level and the reaction times were not related to each other.

Great individual variation was observed in nocturnal heart rate variability and therefore inter-individual comparison was not performed. Figures 3 and 4 present examples from the results of two volleyball players concerning their stress indices, reaction times and estimations of recovery level.

From figure 3 it can be seen that this player had only small changes in the stress index although his own estimations of recovery level change a lot. From figure 4 it can be seen that this player had quite big changes in the stress index, but the change were not similar or parallel to his own estimations of recovery level change.

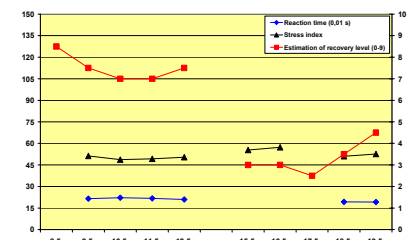


Figure 3. The reaction times, stress indices and estimations of recovery level of volleyball player X.

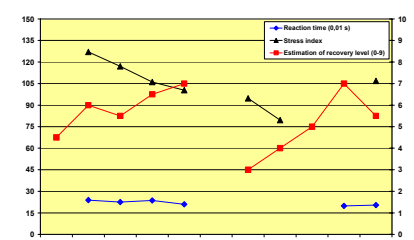


Figure 4. The reaction times, stress indices and estimations of recovery level of volleyball player Y.

CONCLUSIONS

To get more reliable information concerning the nocturnal heart rate variability measurements in volleyball and basketball the time period for the measurements should be longer so the information could be collected in different situations e.g. at rest and in extreme stress. The short follow-up period and the problems concerning the heart rate measurements weakened the reliability of the results in this project. Also the stressfulness of the training sessions could be evaluated with a more objective method (e.g. heart rate monitoring or counting the number of maximal jumps or sprints) than by a questionnaire. However, some of the methods like reaction tests and some questionnaires used in this project could be practical tools for monitoring stress and recovery in team sports like volleyball and basketball.

REFERENCES

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E-mail: mikko.hayrinen@kihu.fi