



Študentská vedecká aktivita

THE EFFECT OF HIGH INTENSITY INTERVAL TRAINING TO THE CROSS-COUNTRY SKIING DOUBLE POLING PERFORMANCE

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ABSTRACT

The reason, we chose this theme was the fact, that in the highest level of sport performance is progress already very limited.

The aim of our research was to find out, how big will be the effect of high-intensity interval training, to the cross-country skiing double poling performance. We were specifically aiming to cross-country skiing sprint format.

Our research sample was composed by 8 probands, national level cross-country skiers. We realized our experiment in 6 weeks. Experimental group had done training load of 30 seconds of maximal intensity and 90 seconds of rest, for 12 times. Control group realized 30 second on 90% of maximal heart rate level and 30 second of rest, for 24 times. All in double poling cross-country skiing technique.

Experimental group achieved performance progress of 3,35% (in total distance), in contrast with control group, where the progress was only 1,54%. From statistical significance 0,715 we state, that we did not registered significant improvement of athletes performance. It is also confirmed by the value of Cohens d (0,21), what is evaluated as low effect size.

Despite the fact our results were not statistical significant, in real races, the gap between winner and loser, is many times just few meters, or even centimeters. That is why our results are significant in real world.

Klíčové slová: Cross-country skiing double poling, high-intensity interval training, HIIT

INTRODUCTION

In the highest level of athletes sport performance, is progress already very limited. Therefore athletes and coaches have to look for other, new, or alternative training methods to increase their performance (Billat, 2001). Previous researches are pointing out, that in this specific case, we are able to increase our athletes performance by high-intensity interval training (Laursen, 2002). This type of training is also called HIIT.

In our research we wanted to confirm this hypothesis, respectively to find out, how big can be the increment of our probands performance in cross-country skiing double poling technique.

Cross-country skiing is very hard sport in terms of technique and coordination demands (Ilavský, Suk, 2005). Ilavský (2000) is adding, that in terms of organism response, total body

engagement to the motion, makes this sport one of the hardest on earth.

Cross-country skiing classic technique includes few technique variations, which we use accordingly specific track profile, or track sections (Bolek et al., 2008). In today's cross-country skiing, we are dealing with very specific cases. Double poling skiing technique is now not only for flat terrain and athletes are choosing this technique to compete also on very demanding courses (Brünn, 2015).

We chose this theme because we have not found any research, dealing with our problem in cross-country skiing. On the other side, many HIIT experiments on cyclist, swimmers and runners showed big VO_{2max} improvements (Gullstrand, 1996), peak-power improvements during performance (Patron, 2005), lactate threshold rise (Hamilton, 2006) and improvements on time trials (Lindsay, 1996). In most of these researches, were emphasized to use maximal power, maximal speed and maximal speed on VO_{2max} threshold (Driller, 2009).

In this type of training, athletes are able to train with higher intensity for a longer period of time, as it would be in non-interval training method and create less lactate. Then, this training speed is more similar to the race speed, or is even higher, what we can use in key phases of competition. On top of this fact, cross-country skiing has interval character of work, so we are adapting organism to the specific race load.

The main benefit from our research, will be the direct transfer of our findings, to the cross-country skiing training.

RESEARCH AIMS AND HYPOTHESES

Aim

The aim of our research was to find out, how big will be the effect of high-intensity interval training to the cross-country skiing double poling performance. Specifically in cross-country skiing sprint format.

Hypotheses

H0: We assume, that there will be a rise of performance in both groups, but at the same time, that improvement do not has to be statistical significant.

H1: We assume, that at least rise of performance in experimental group, will be statistical significant.

METHODOLOGY

We realized our research from 9. 10, till 20.11. 2016, which was in total 6 weeks. Specific tests took place in Kremnica (556 m altitude). For the training process, we also used our training center in Skalka pri Kremnici (1220 m altitude).

Our research sample was consisted of 8 probands, cross-country skiers, from the club MKL Kremnica. These athletes are all on national level and international level.

Despite the fact, that our research sample was not homogeneous in terms of age, after first test, we divided this sample into two groups, which were homogeneous in terms of performance level. Then, we monitor improvements of each group in average and intraindividual changes.

In the experiment we used high-intensity interval training method. Specifically it was 30 second of maximal effort (97% from maximal heart rate) and 90 second of rest, for 12 times. Control group did the load under anaerobic threshold (90% from maximal heart rate) for 30 seconds and 30 second of rest, for 24 times.

Both groups did two double poling interval trainings every week.

For testing we had trainer Concept 2, which was specifically created and modified for cross-country skiers. So as the training stimulus, also the tests we did in double poling technique. This trainer evaluate power in Watts, total distance and speed (m/s).

RESULTS

Experimental group increased their average distance about 22,25 m. Control group made improvemet only by 12,5 m in average. So the difference between these groups was 9,75 m.

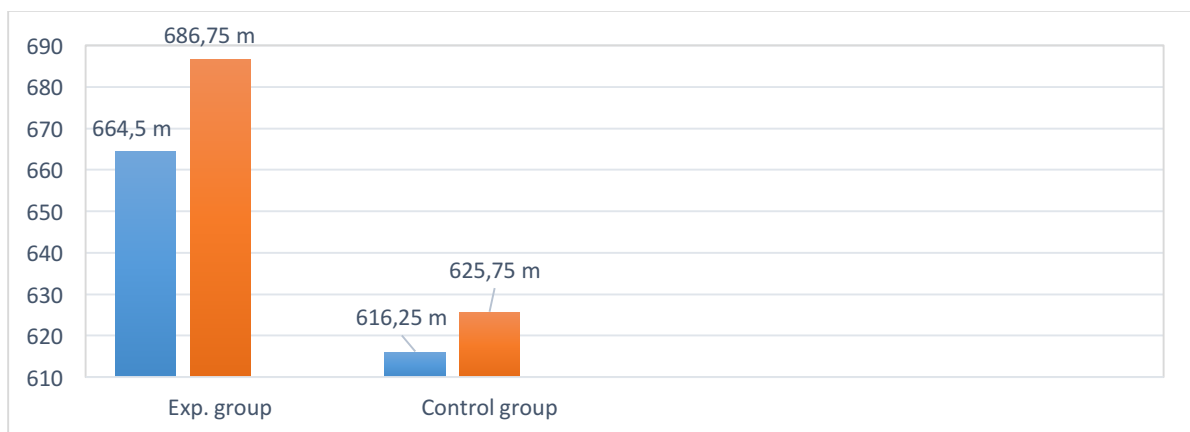


Figure 1 Average completed distance in both groups

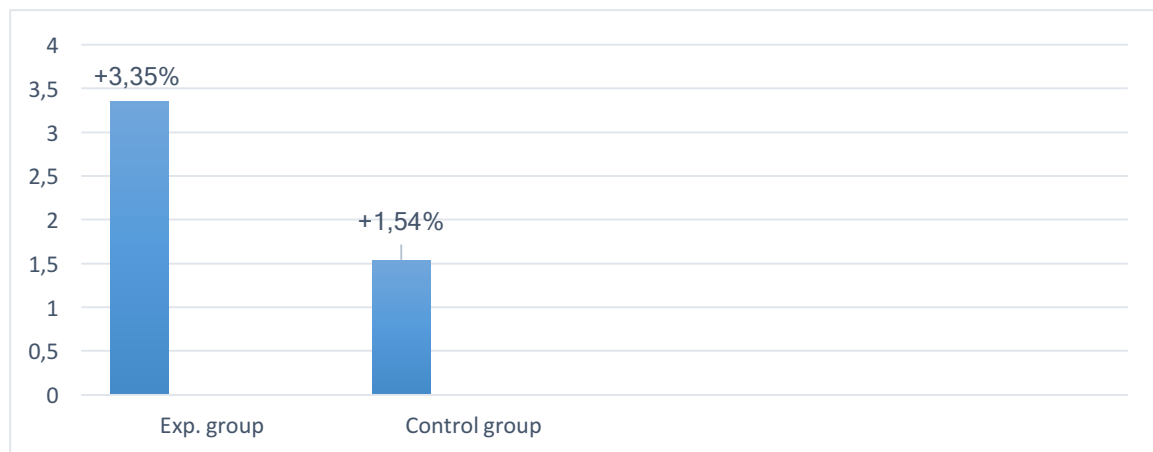


Figure 2 Improvement in total distance in both groups

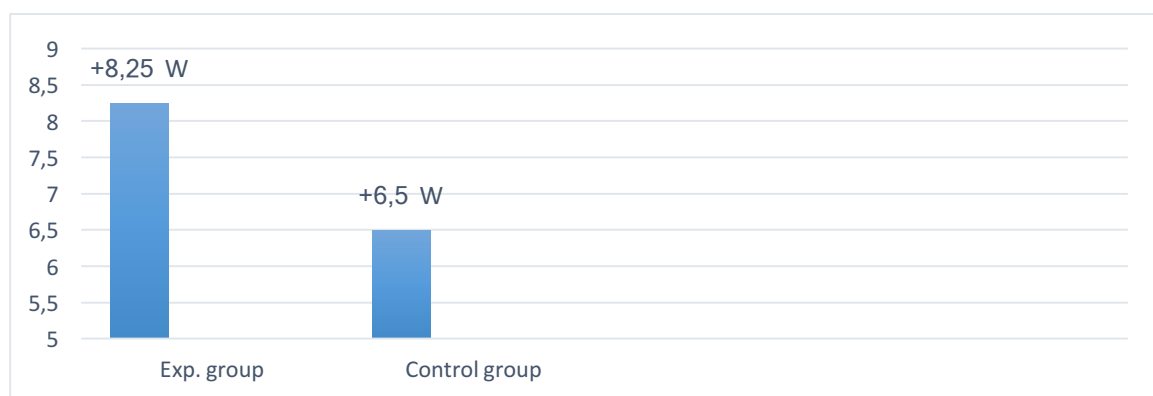


Figure 3 Improvement of average group power

The value of statistical significance (p) was 0,715 for both groups. Because it is more than 0,05, we state, that we did not registered significant changes in the athletes performance level.

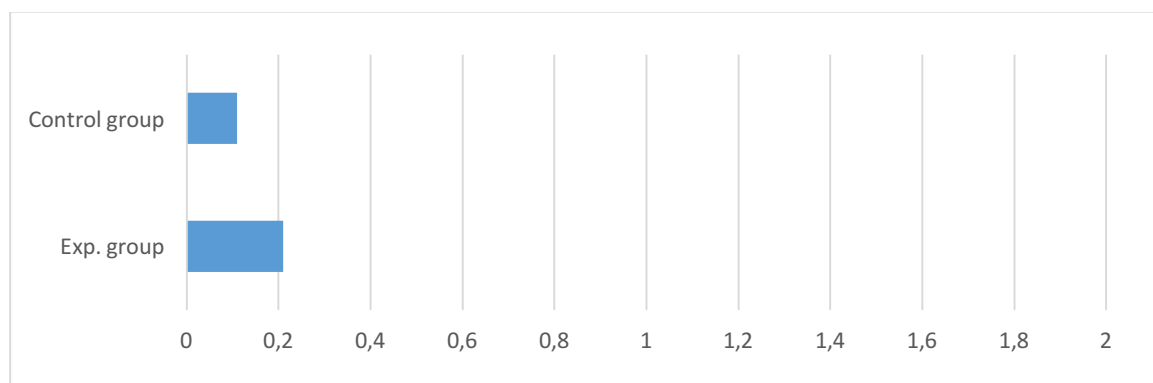


Figure 4 Effect size (Cohen d)

The same as small statistical significance, so the effect size (experimental group: 0,21 and control group: 0,11) showed small effect. Therefore we are confirming hypothesis 0.

CONCLUSION AND DISCUSSION

By our research we found out, that high-intensity interval training has bigger effect on performance enhancement in our specific purpose, as it is in training right under anaerobic threshold. Despite the fact, that our results did not show statistical significance, we registered big improvements in both groups, what is definitely significant in real world.

The difference between experimental and control group was about 9,75 meters in average. But in real race it means, that the athlete is winner, or loser.

We have to remind, that also control group did training loads of quite big effort (90% from maximal heart rate), so the inclination to the total differences was here little bit smaller. Despite this fact we found out big difference in real meters. But we also have to take in mind possible deviations, which could be caused by our testing device. We can not be sure, if the transfer from power, to the real meters, is on our trainer the same thing, as it is on snow.

What we can confirm and prove, are power improvements in average and maximal Watts on the same trainer, at the beginning and at the end of our experiment.

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