

## HIGH INTENSITY INTERVAL TRAINING

(Professional paper)

**Katarina Herodek<sup>1</sup>, Cvetko Simonović<sup>2</sup>, Vesma Pavlović<sup>3</sup> and Ratko Stanković<sup>1</sup>**

<sup>1</sup>University of Niš, Faculty of Sport and Physical Education, Niš, Serbia

<sup>2</sup>Teacher Training College, Gnjilane - Bujanovac, Serbia

<sup>3</sup>„Dositej Obradović”, Primary school, Vranje, Serbia

<sup>1</sup>Stanković, R., Faculty of Sport and Physical Education, Niš, Serbia

### Abstract

*Interval training can be adapted to match the needs of a sport when it is aimed at the development of specific speed endurance. Shows the description and application of cardio and interval training (HIT-high intensity training, HIIT-high intensity interval training and Tabata method) in order to increase the efficiency of high intensity interval training. A cardio training should be based on individual goals. If the goal of a cardio training is burning fat, then one should focus on nutrition and weight training. Interval trainings (HIT-high intensity training, HIIT-high intensity interval training and Tabata method) are a much better option for the loss of fat deposits than traditional jogging. Aforementioned examples of HIIT have shown that with fitness enthusiasts and sports people it is possible to carry out a systematic training in a safe and efficient way without disturbing the development of motor abilities and sports techniques.*

**Keywords:** effectiveness of interval training, cardio training, HIT-high intensity training, HIIT-high intensity interval training, Tabata training method

### INTRODUCTION

The preparation of a body for an exercise should be comprised of movement patterns which according to anatomical and physiological characteristics resemble normal human walking in most naturally way. Those movement patterns could be either brisk walking or interval running and their combination with light hops and stretching exercises. These stretching exercises will not only increase capacity of muscles for what is going to follow, but they will also prevent the body from injuries since the muscles after stretching become more prepared for the movements to come. Therefore, the preparation of a body for an exercise, which is known to all of us as “warm up”, is absolutely necessary.

#### Effectiveness of Interval Training

A cardio training should be based on individual goals. If the goal of a cardio training is burning fat, then one should focus on nutrition and weight training. A cardio training highly affects the level of cortisol- stress hormone. Chronically elevated cortisol levels affect the loss of muscular structure and slow down the metabolic processes.

Interval trainings (**HIT**-high intensity training, **HIIT**- high intensity interval training and **Tabata**

**method**) represents much better option for the loss of fat deposits than traditional jogging. Alternating sprints with recoveries for 15 minutes has greater effect on metabolism than 60 minute jogging. In HIT the level of metabolic rate remains elevated up to 48 hours after the training, whereas in jogging it stays increased as long as the activity lasts.

#### Previous researches

The research conducted at the National Institute of Fitness and Sport in Tokyo, points to the effectiveness of interval training. The protocol consisted of 20 seconds of maximum intensity exercise followed by 10 seconds of rest, repeated continuously 8 times (cycles). After 8 weeks of such an interval training, the anaerobic capacity was increased by 28%, while the VO<sub>2</sub> max was increased by 14% (Tabata et al., 1996).

The research conducted at University of Montreal has shown that a 15 second interval of intensive workout is optimal for the increase of maximum oxygen capacity in patients with coronary artery disease (Guiraud et al., 2010).

Interval training can be adapted to match the needs of a sport when it is aimed at the development of specific speed endurance. Only such a type of training

will effectively lead to the development of specific endurance. A Football game has mostly anaerobic and aerobic requirements towards energetic processes in ATP/CP 60-80%, LA 20% i 0-10% of oxygen. (Bompa, 1994).

### High Intensity Training

HIT stands for High Intensity Training. An intensity can be defined as a percentage of instant ability to do an exercise. It is neither the percentage of maximum weight that can be lifted, nor the weight that is lifted that matters, but a personal feeling of effort while doing an exercise. High Intensity Training is a type of strength training which became popular in the 1970s of the last century. The main idea of HIT was totally opposite to the ideas of majority of traditional bodybuilding trainings which were very popular at that time. Instead of total volume, variety of exercises and various schemes of repetition and sets, HIT advocates an intensity as a basis of achieving new high quality growth. The main principles of HIT are: strenuous exercise (as intensive as possible, without disturbing the form of an exercise), short exercise (1-3 sets of basic exercises per one hour training or shorter), infrequent workouts (no more than 3 times a week, often twice or even only once) and safe training (in such hard workouts safety is in the first place).

In order for the muscles to be exposed to constant tension, a repetition should be well controlled. Some believe that the concentric phase of a movement should last 2 seconds, whereas others think it should last up to 20 seconds. The emphasis should not be on the duration of the exercise but on the quality of an exercise to the point of momentary muscular failure. Only one set per exercise is usually performed since the authors of this concept think that it is enough for the stimulation of muscle growth. If the set is done well, another set will be impossible to be done.

### Summary of HIT training methods

- Keep training till the muscle failure (sometimes even longer) in order to stimulate the new muscle growth
- Design a short and concise training programme (45 mins or less)
- Train each group of muscles for no more than once a week, and allow rest periods for the muscles to grow.
- Recovery period differs from person to person, if you don't see the results, it is possible that you are overtrained.
- Each repetition should be of high quality and controlled. (no rejection, momentum and the so-called "cheating").
- Slow down the pace as you come near extreme muscle contractions, so that a greater number of muscle fibers could be recruited.
- High quality nutrition regime is as important as high quality training programme.

### High Intensity Interval Training

It is often difficult to find any information about

HIIT. HIIT is much better than the traditional aerobic exercise without rhythmic changes, because when done properly HIIT workout brings about the process known as EPOC (Excess Post Exercise Oxygen Consumption), which means an increased oxygen consumption after the training. HIIT training should last between 18 and 30 minutes. During HIIT session the intervals of hard effort alternate with intervals of recovery from the hard effort. For optimal training results change interval should be in the ratio of 1:3 (high / low). Naturally, one should always bear in mind that the first two letters of HIIT training mean HIGH INTENSITY, and in relation to that the effort at a training should be planned and progressively increased in order to make an advancement. Since recovery periods are 3 times longer than hard effort periods, they should be adapted properly to ensure a complete rest. Also, it is advisable, either by sensors at cardio machines or pulse meters, to monitor the frequency of the heart rate in order to see how the periods of effort and rest affect it.

HIIT is a type of training in which intervals of maximum intensity interchange repeatedly with intervals of medium or lower intensity. It can be carried out on cardio machine of one's own choice: the treadmill, static bike, eclipter. EPOC (Excess Post-exercise Oxygen Consumption) is the term that refers to the effects of HIIT. It means an increased amount of oxygen consumption which the body necessitates in the recovery period after the training and burning fat up to 9 times faster even during the rest period.

Such an advanced type of exercise increases VO2 max, maximal oxygen uptake, improves cardiovascular and ATP and CP system, increases stamina, strength and explosiveness.

### Principles of High Intensity Interval Training

This training is not meant for the novices, patients with cardiovascular problems and other risk factors. In case of problems with breathing or chest pain, it is necessary to start with cooling down as soon as possible before the total cessation of training. Warm up and cool down intervals are necessary before and after HIIT. HIIT should be practised no more than 2- 3 times a week and never on consecutive days. High intensity intervals should not last longer than 2-4 minutes, the entire HIIT session should not last longer than 10-20 minutes.

### Tabata training method

None of the reviews will be complete without mentioning Tabata training method. Due to its high intensity Tabata is also called supra aerobic cardio. Those who had a chance to try Tabata consider the name - high insanity cardio- to be more appropriate for it than high - intensity cardio. Tabata is the most effective HIIT method. Also it is the most intensive and the shortest ( lasts 4 mins). The founder of this method is Dr. Izumi Tabata from the National Institute of Fitness and Sports in Tokyo.

The original Tabata protocol consisted of 5 minute

warm up, 20 seconds of ultra high intensity exercise followed by 10 seconds of rest, repeated continuously for 4 minutes, 8 intervals, and ending with 2 minute cool down period. Originally Tabata worked with highly trained sports people in excellent condition who did 8 intervals or more on bikes at speed higher than 85 revolutions per minute, until they could no longer maintain that high level of intensity.

The main part of the training should be preceded by at least 5 minute warm up. Tabata can be practiced in several ways. One of the ways is to do the same exercise in all sets. In that case it is advisable for the exercise to be complex so that various groups of muscles are recruited. Burpees is an example of such an exercise. Another way of practising Tabata is to choose two or more different exercises to be combined in those 8 sets. If that is the case, one should make sure that the exercises chosen in next set do not activate the muscle groups that have been activated in previous sets.

In practice this method has proved to be very effective and adaptable. It can be carried out at running track, in nature, in water, in the gym (treadmill, stationary bike, ecliper, jumping rope, punching bag, weights, and many other training aids). Before proceeding to Tabata protocol it is essential to do at least 5 minute warm up ( skipping the rope for 5 minutes at 40% of maximum capacity). Also, at the end of the training at least 5 minute cool down and stretching period is required. Tabata protocol is short but extremely tiring. It is important to proceed from one exercise to another gradually in order to avoid injuries. In order to adapt gradually, at first, only 3-4 intervals at 70-80% of maximum capacity should be performed.

Correspondence:  
Katarina herodek  
University of Niš  
Faculty of Sport and Physical Education  
Čarnojevićeva 10a, 18000 Niš, Serbia  
E-mail:rominaherodek@gmail.com

## CONCLUSION

Aforementioned examples of HIIT have shown that with fitness enthusiasts and sports people it is possible to carry out a systematic training in a safe and efficient way without disturbing the development of motor abilities and sports techniques. While the exercises can be changed and modified, it is important that they are done technically right. Also, one must be very careful when programming the load. HIIT planned in this way may be a positive component of physical preparation of fitness enthusiasts and sports people no matter whether a general or a specific physical preparation is in question.

## REFERENCES

- Bangsbo, J. (1994). *Fitness training in football - a scientific approach*. Copenhagen: August Krogh Institute - Copenhagen University.
- Bompa, T. O. (1994). *Theory and Methodology of Training. The Key to Athletic Performance*. Dubuque, IA: Kendall/Hunt Publishing Company.
- Galbo, H. (1986). The hormonal response to exercise, *Diabetes Metabolism Reviews*, 1(4), 385-408.
- Guiraud T., Juneau M., Nigam A., Gayda M., Meyer P., Mekary, & S., Bosquet, L. (2010). Optimization of high intensity interval exercise in coronary heart disease, *Eur J Appl Physiol*, 108(4),733-44.
- Tabata, I., Nishimura, K., Kouzaki, M., Hirai, Y., Oqita, F., Miyachi, M., & Yamamoto, K. (1996). Effects of moderate-intensity endurance and high-intensity intermittent training on anaerobic capacity and VO<sub>2</sub>max. *Med Sci Sports Exerc*, 28(10):1327-1330.
- Tremblay, A., Simoneau, J.A., & Bouchard, C. (1994). Impact of exercise intensity on body fatness and skeletal muscle metabolism. *Metab. Clin. Exp.*, 43,7 814-818.