

Circuit Training

Is it Effective in Improving Anaerobic Lactacid Capacity?

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Abstract: The present study was aimed at discovering the effectiveness of circuit training in improving anaerobic lactacid capacity using 10 posts (movements) in 16 meetings. To this end, a one-group pretest and posttest experimental design was employed. The treatments were given to 20 futsal extracurricular participants at SMA Negeri 1 Haurgeulis. The measurement was conducted using running-based anaerobic sprint test (RAST). This test resulted in data on fatigue index. It was revealed that the average fatigue index improved. It can be concluded that circuit training significantly influenced the anaerobic lactacid capacity.

1 INTRODUCTION

Circuit training method is originally designed to improve physical fitness (Bompa and Buzzhicelli, 2015). It is a combination of anaerobic exercises and brief breaks between them (Taskin, 2009). Circuit training has the following advantages over other training methods: time efficiency, a combination of strength and aerobic exercise, short break time, minimal use of tools and facilities (Klika and Jordan, 2013). Circuit training is used for its tome efficiency and its ability to improve an individual health and fitness (Rodriguez, et al., 2011). This training is deemed efficient and effective in improving physical condition, especially cardiorespiratory skills and body composition (Romero-arenas, et al. 2013). Circuit training can improve physical performance, reduce fatigue, and minimize injury risk (Freaitas, et al., 2015). The question is “is it effective in improving main components of physical condition in futsal?” Futsal is a high intensity sport. Futsal is also a multiple-sprint sport (Makaje, and Yoopat, 2010) that demands its players to have aerobic and anaerobic ability skills as the main sources of metabolism (Alvarez, et al., 2009) because futsal is a high-intensity sport conducted in a relatively short duration, 2 x 20 minutes. A futsal player is required not to get tired easily or able to maintain his physical state during the game or has a good anaerobic lactacid capacity, which is the ability to withstand fatigue (Harsono, 2015). It requires training to

acquire a good anaerobic lactacid capacity. In this respect, a question is posed: is circuit training effective in improving anaerobic lactacid capacity of futsal players?

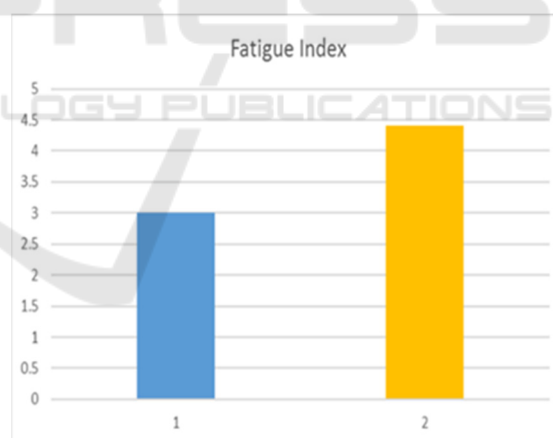


Figure 1: Circuit training effective in improving anaerobic lacatacid capacity.

2 METHODS

This study applied the one group pretest-posttest experimental design; i.e., by looking at the effect of a treatment (Freankel et al., 2011).

2.1 Treatment

The treatment in this study was a circuit training using 10 posts (movements) including, shuttle run, push-up, sit-up, zig-zag run, leg raises, side shuffle, squat thrust, lateral jump, mountain climber, and dash. Each exercise took 30 seconds, the break between exercises was 10 seconds, and the break between sets of exercises was 4 minutes.

2.2 Instrument

The data were collected through a running-based anaerobic sprint test (RAST), resulting in data on fatigue index. The lower the fatigue index is, the better the anaerobic lactacid capacity is (McKenzie, 2011).

2.3 Sample

The samples were 20 futsal extracurricular participants at SMA Negeri 1 Haurgeulis, consisting of 13 males and 7 females, selected using the total sampling technique.

3 RESULTS AND DISCUSSION

The fatigue index is the interpretation of anaerobic lactacid capacity. The difference between pretest and posttest gain scores was 1.4 watt/sec.

The paired sample t-test resulted in the Sig. (2-tailed) value of .003. Using the significance level of 0.05, it was concluded that H_0 was rejected. In other words, the circuit training significantly influenced the anaerobic lactacid capacity.

Table 1: Result of paired sample t-test.

	Sig. (2-Tailed)
Fatigue Index (Pretest) – Fatigue Index (Posttest)	.003

4 CONCLUSIONS

Based on statistical testing, it can be concluded that a 16-meeting circuit training can improve anaerobic lactacid capacity. Using circuit training, the research participants were able to improve several components of physical condition simultaneously. This is due to the fact that the circuit training comprises different exercise elements done

simultaneously. In addition, the training movements can be modified according to the needs.

Although the fatigue index was in a good category (<10), it was revealed that there was an increase in the fatigue index. This is not an ideal condition because the higher the fatigue index is, the easier it is to get tired. The increase in fatigue index was due to fact that the researchers ignored the requirements of anaerobic exercise, which is a good aerobic capacity (Giriwijoyo and Sidik, 2012) that is required to neutralize the lactic acid that allows a better recovery during the breaks between posts or between sets of exercises (Harsono, 2016). No sport is 100% aerobic or 100% anaerobic. A good anaerobic capacity is made possible by a good aerobic capacity. Aerobic endurance significantly supports speed endurance (Aliza, 2014). In anaerobic endurance, aerobic capacity serves as the lactic acid neutralizer during the break (Bompa and Careera, 2015). It was also revealed that the average improvement of anaerobic lactacid capacity was relatively small. This was due to the samples' gender differences. The samples were 13 males and seven females. Bompa and Haff (2009) state that:

Gender differences can play an important role in performance and individualized training adaptations. Prepubescent boys and girls are very similar in height, weight, girth, bone width, and skinfold thickness. After the onset of puberty, boys and girls begin to develop substantial differences in physical attributes. After puberty girls tend to have higher levels of body fat, lower amounts of fat-free mass, and lighter total body masses. The research participants were not really familiar with futsal training exercises. This affected the movement quality and understanding about the training movements per se.

Some external validity factors the researchers had no control over included: the small sample size, the samples' biorhythmic condition that might have allowed unexpected condition such as illness, samples' fatigue as a result of other activities or sleeping trouble that influenced their performance during treatment or posttest. It was concluded that circuit training was not effective in improving anaerobic lactacid capacity.

REFERENCES

- Aliza. 2014. *Peningkatan Kemampuan Aerobik Cabang Olahraga Futsal dan Dukungannya Terhadap Daya Tahan Kecepatan*. (Skripsi) Pendidikan Kepeleatihan Olahraga. Fakultas Pendidikan Olahraga dan Kesehatan. Universitas Pendidikan Indonesia. Bandung

- Alvarez, J. Dotavio, S. Granda, J. Castagna, C. 2009. Aerobic Fitness in Futsal Players of Different Competitive Level. *The Journal of strength and Conditioning Research*.
- Bompa, T, Buzzhicelli, C. 2015. *Periodization Training of Sport 3rd Edition*. USA: Human Kinetic
- Bompa, T, Carrera, M. 2015. *Conditioning Youth Athlete*. USA: Human Kinetic
- Bompa, T, Haff, G. 2009. *Theory and Methodology of Training 5th edition*. USA: Human Kinetic
- Freankel, J, Wallen, N. 2011. *How to Design and Evaluate Research in Education 8th Edition*. USA: McGraw-Hill Company
- Giriwijoyo., Sidik. 2012. *Ilmu Faal Olahraga (Fisiologi Olahraga) Fungsi Tubuh Manusia Pada Olahraga Untuk Kesehatan dan Prestasi*. Bandung: Rosda.
- Giriwijoyo., Sidik. 2012. *Ilmu Kesehatan Olahraga*. Bandung. Rosda
- Harsono. 2015. *Periodisasi Program Latihan*. Bandung. Rosda
- Harsono. 2016. *Latihan Kondisi Fisik (Untuk Kesehatan dan Atlet)*. Bandung. Rosda
- Klika, B., Jordan, C. 2013. High-Intensity Circuit Training Using Body Weight: Maximum Result with Minimum Investment. *ACM'S Fitness and Health Journal*. 17 (3)
- Makaje, N., Yoopat, P. 2010. *Physiological Demands During Futsal Match-Play of Thai Elite and Amateur Player*. Research gate
- Rodrigues, V. M., Ramos, G. P., Mendes, T. T., Cabido, C. E., Melo, E. S., Condessa, L. a, ... Garcia, E. S. 2011. Intensity of official futsal matches. *Journal of Strength and Conditioning Research / National Strength and Conditioning Association*, 25(12), 2482–2487.
- Romero-arenas, S., Alcaraz, P. E., Romero-arenas, S., Martí, M. 2013. Impact of Resistance Circuit Training on Neuromuscular , Cardiorespiratory and Body Composition Adaptations in the Elderly Impact of Resistance Circuit Training on Neuromuscular , Cardiorespiratory and Body Composition Adaptations in the Elderly, (October).
- Taşkin, H. 2009. Effect of circuit training on the sprint-agility and anaerobic endurance. *Journal of Strength and Conditioning Research / National Strength and Conditioning Association*, 23(6), 1803–1810.