

THE EFFECT OF POWER ENDURANCE EXERCISES USING CIRCUIT TRAINING METHODS ON VO2MAX KARATE KATA ATHLETES

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Abstract

This research aims to the effect of endurance training using the circuit training method on the athlete vo2max karate kata. The researchers did strength training that required physical components of physical endurance to support the athlete's ability to do repetitive motion exercises using circuit training methods that were expected to improve physical components made specifically for pre-match games. The method used in this study is the type of pre-experimental design of one group pretest-posttest. The study population was the karate kata athlete in UKM Karate UPI. Sampling is done by purposive sampling, where the sample is based on an assessment of the quality provided by a sample of 5 people. The results of this study indicate that endurance training using the circuit training method can increase the vo2max of karate athletes by obtaining t-test and post-cardiovascular values = -3,901 with degrees $\alpha = 0.05$ and obtained Sig (2-tailed) = 0.018 < 0.05. Thus, there is a significant increase in vo2max athletes in karate kata between the pretest and posttest scores using the circuit training training method.

Keyword:

Power Endurance, Circuit Training, Vo2max.

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Introduction

In this modern era, karate is developing very rapidly both in Indonesia and in other countries. This rapid development is shown by the number of matches and competition which is quite tight both at the national and international levels. The class that are competed in karate are *kata* and *kumite*. In this study, the author will examine which is relating to *kata*. The meaning of *kata* (stance) it self according to Sagitarius (2008, p. 29) said that: *Kata* is a series of forms consisting of attacks and parries. *Kata* in our terms is a stance, in standard karate, that is the movement and flow of the movement (*embumsen*) have been determined so that it cannot be changed or modified according to our wishes. Meanwhile, according to Sujoto (1996, hlm. 137) is: "*kata* is a combination of series basic motion of punches, parries, and kicks into one tangible form". In *kata* there are stored forms of attitude in karate that must be possessed, such as control (self), power (power), speed, and forms of appreciation of karate in actual reality (Phang Victorianus, 2012 p. 45).

In the *kata* class match there are two components that are seen as the basic reference for the referee's assessment, namely the technical component and the physical component, in the latest 2019 regulations, the assessment uses a point allocation where what is assessed is the technical component and the athletic/physical from *kata* it self. The value is 70% for technical and 30% for athletic. (World Karate Federation, 2019).

To support the maximum performance of *kata* athletes, it is important to undergo a physical training program. Every athlete is required to have good physical condition. Therefore, the ability of physical condition is the foundation in developing and improving the technical, tactical/strategy and mental abilities of athletes. As stated by Harsono (1998, p. 153) that: If the physical condition is good then, 1). There will be an increase in the ability of the circulatory system and the work of the heart; 2). There will be improvements in strength, flexibility, stamina, and speed; 3). There will be a better movement economy when competing; 4). There will be faster recovery in the organs after the match; 5). There will be a fast response from our body's organism if at any time such a response is needed.

The elements of physical condition that must be considered include is endurance. The meaning of endurance in here is circulatory-respiratory endurance (circulatory-respiratory endurance) or called as cardiovascular endurance; circulatory is things related to blood circulation; respiratory with breathing and cardio is the heart. This endurance is often called aerobic endurance. According to Harsono (2016), the definition of aerobic endurance (aerobic endurance) is a state or condition of the body that is able to work or train for a long time, without experiencing excessive fatigue after completing the work or exercise.

Good cardiovascular endurance is very important for karate athletes in class *kata* because athletes will be more stable in overcoming fatigue during competition. Cardiovascular endurance is described by the VO_2MAX value. Thus, it can be concluded that an athlete who has a good VO_2MAX value will have good cardiovascular endurance. Sports experts suggest to build the athlete's VO_2MAX as large as possible or in other words the athlete's body has to be made as aerobic as possible. The reason is, in a body that has a large VO_2MAX there is an energy-creating engine that works amazingly without stopping.

Karate sports in class *kata* dominant requires explosive power (power) in every stroke, parry or kick. The existing power is not only done for one repetition but consists of many repetitions. So it takes power endurance to support the ability of a *kata* athlete in doing strong and fast *kata* movements. In developing and improving good physical condition, proper periodization of exercise is necessary. According to Harsono (2017, p. 19) Periodization is the process of dividing the annual training program into shorter training stages and covering time segments that are more manageable. Similarly, so that the peak of achievement (peaking) in that year can



be on time that has been planned. Periodization of exercise requires a long period of time in order to develop optimally.

However, the karate matches schedule in Indonesia is uncertain/sudden. This makes the athletes lack of preparation in the face of a match. Based on the periodization of training that requires a long period of time because it goes through several stages of training. Therefore, there is not enough time to develop each element of the physical condition optimally. Often, the time available to prepare the athlete's physical condition before a match or at the pre-match stage is only 1-2 months. Therefore we need the right training method to improve the athlete's physical condition in a short time, which is using the circuit training method. As stated by Harsono (2016, p. 147), circuit training is an exercise system that can simultaneously develop the overall fitness of the body, which is the elements of endurance, strength, flexibility, power, muscle endurance, agility, speed and others.

Methods

This study uses a pre-experimental research design with a one-group pretest-posttest type of design.

Participant

Participants in this study are people who are involved in study. The participants in this study included: (1) Researchers, are participants as writers and observers. (2) Active members of UKM Karate UPI who were re-elected 5 individual kata athletes.

Population & Sample

The population in this study are active members of UKM Karate, Universitas Pendidikan Indonesia in individual kata class. With a total of 10 people (5 male and 5 female). While the sample in this study amounted to 5 people who were taken using purposive sampling technique. As explained by Sugiono (2018, p. 85) that "Purposive sampling is a sampling technique with certain considerations." Based on the opinions described regarding the sampling technique, the determination of the sample is based on the following considerations:

- 1) UKM Karate UPI U21 athlete (18-20 years old)
- 2) Athletes who already have good kata skills and have experience in participating in competitions (Black Belt, DAN I)
- 3) Athletes who compete in the individual kata class.
- 4) Athletes who are prepared to take part in student competitions. (UNS and POMNAS 2019)

Instrument

In accordance with the problem under study, the measuring instrument used to measure collecting data is a bleep test to match the characteristics of the branch karate sports and according to the karate test parameter protocol (Anglos, 2017). With the aim of knowing the VO₂MAX value of karate athletes.

Procedure

Research on this went through several stages. First, do a pre-test where the test is in the form of a bleep test to determine the initial physical condition before being given treatment. After getting the results from the pre-test, the researchers treated the sample. Treatment is in the form of power endurance training using the circuit training method. After giving treatment, the researcher finally will do a post test in the form of a bleep test to find out whether power endurance training using the circuit training method could increase the VO₂MAX of the kata athletes or not.

Below here are some brief steps regarding the research procedure that the researcher carried out.

- 1) Administrative Requirements

Prepare a permit/statement of readiness to participate in this research.

- 2) Briefing

Provide direction to the tester regarding the bleep test. So that the tester knows and understands the procedure for carrying out the test so that when it is carried out it can run smoothly.

- 3) Tool Preparation

In carrying out the test, require a meter, cones, and speakers are needed.

- 4) The Power Endurance Exercise Program uses the Circuit Training method.

Each set of Power Endurance Exercises using the Circuit Training method has 7 posts. In each post the athlete performs explosive movements for 20 seconds. While the rest time for the change of sets for 2-3 minutes.

Data Analysis

In this study, researchers conducted statistical tests with using SPSS series 16 software. Statistical test steps are: what the researcher did was describe the data, conduct a normality test, test homogeneity and perform a significance test.

Result

The data obtained after the implementation of this study were the scores on the pre-test and post-test of VO₂MAX karate athletes with *kata* class. In this study, the pre-test data score was the score obtained before the power endurance treatment was given using the circuit training method to the UKM Karate UPI *kata* athletes, who were the samples in this study. While the post-test data scores are data obtained after being given power endurance treatment using the circuit training method.

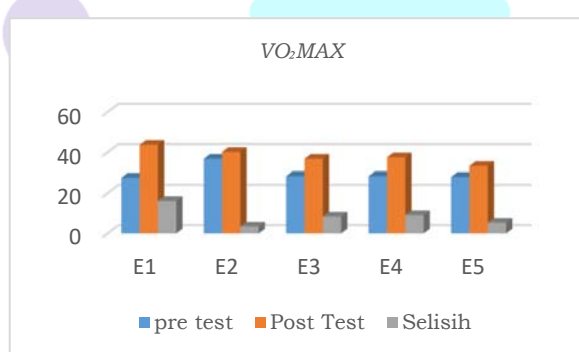
Tables & Figures

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From Table 1 and Graph 1, it can be explained that there are various increases in VO_2MAX . Some athletes have improved significantly. The athlete with the highest improvement was E1 with a difference of 16.1 increase. Where in each exercise, the athlete made a lot of positive progress because it was seen from the training that it went very well and always followed by the given training program. This athlete seems has a lot of improvement every time the training held. But there are also athletes who has low improvement, which is E2 with a difference of increase of 3.4

Table 1. Skor *pretest-posttest* VO_2MAX atlet karate nomor *kata*.

No		Pre-test	Post Test	Selisih
1	E1	27,6	43,7	16,1
2	E2	36,8	40,2	3,4
3	E3	28,4	36,8	8,4
4	E4	28,4	37,5	9,1
5	E5	28	33,3	5,3



Graph 1. Skor *pretest-posttest* VO_2MAX atlet karate nomor *kata*.

Discussion

From the results of research data processing, there is an effect of giving power endurance training using the circuit training method on the VO_2MAX of karate athletes with *kata* class. According to the informant, Yuditya Perdana as the physical trainer of the Indonesian karate national team in 2019. That the 2019 Indonesian Seagames team karate VO_2MAX for women's *kata* is 45.2 and men's is 55.7. In this case, the magnitude of the VO_2MAX value will affect the athlete's performance when competing. It can be proven that by obtaining a good VO_2MAX score, the Indonesian karate national *kata* team athlete can win a gold medal at the 2019 seagames event in Manila, Philippines.

According to the results of a study entitled Effects of Aerobic Exercise on Strength Performance After Various Recovery Periods by (Enger, 2003). The results of this study indicate that increasing the VO_2MAX value will shorten the strength training time, so that those with higher VO_2MAX can complete target exercises faster than those with low VO_2MAX . According to a study entitled Effects Of High Intensity



Circuit Training Using Body Weight On Aerobic Fitness And Muscular Endurance In College Students by (Solanki, Bhise, Shukla, & Prabhakar, 2015). Shows that aerobic exercise using the High Intensity Circuit Training method can help expand physical energy, prevent fatigue and maintain engagement in what is being done. In other studies also showed relatively the same results. According to a study entitled The Effect of a Short-Term High-Intensity Circuit Training Program on Work Capacity, Body Composition, and Blood Profiles in Sedentary Obese Men: A Pilot Study by (Miller et al., 2014). The results of this study show that the HICT (High Intensity Circuit Training) program brings changes in key health markers. One of the relevant findings of this study is that HITC can improve cardiovascular performance and accelerate recovery during exercise.

If we look from the analysis of the training process, data processing and the formulation of problems that have been proposed previously, the use of the circuit training exercise method has a significant effect on increasing VO_2MAX to the body, especially blood pressure, hormones, blood glucose, lactate levels, and the autonomic nervous system. In the cardiovascular system, this circuit training method can cause a physiological thickening of the left ventricular myocardium of the heart so that the strength and ability of the heart to pump blood with each contraction increases, decreasing the number of pulses per minute. In line with the results of research conducted by Andika Ridwan Nugraha (2017, p.1) "states that one type of physical exercise that can improve cardiorespiratory fitness so that the heart works more optimally is circuit training".

Conclusion

Based on the results of research, calculations, and data analysis of research that has been carried out, regarding the effect of power endurance training using the circuit training method, it has a significant effect on the VO_2MAX of UPI Karate UKM athletes with *kata* class.

Based on the results of this study, the suggestions that can be put forward are, for karate coaches and trainers to apply circuit training training methods in order to increase VO_2MAX . For karate athletes, the results of this study can be used as a reference in circuit training research on VO_2MAX .

For further researchers, the writer hopes to be able to complete the research with broad insight and coverage, because the author still feels that this has many shortcomings in this research due to limited power, time and material. Related with what the author did, further research should be carried out with a different method from this research. For further research, it is recommended to conduct research from the psychological side of athletes while practicing.



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Please describe all acknowledgments (if any) at the very end of the paper before the references and may include supporting grants, presentations, and so forth.

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