

Effect of Circuit and Interval Training Method on the Improvement of Physical Fitness

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ABSTRACT

This study aimed to improve the student physical fitness of the Department of Sport Education, Faculty of Sports Science, State Universitas Negeri Padang, and to compare impact given by the circuit training method and the interval training method. This type of research was quasi-experiment given to student in sport education major who took part in the formation of physical condition course. The population in this study consisted of 41 persons. Sampling was done by purposive sampling technique so that the sample in this study amounted to 36 persons that consisted of 18 persons for circuit method and 18 persons for interval method. This exercise was given 15 times. The instrument used in this study was Indonesian Physical Fitness Test with an age range between 16-19 years. The physical fitness elements measured in this study were speed, arm muscle strength, strength and endurance of the abdominal muscles, explosive strength of leg muscles and weakness. Based on statistical analysis, it was obtained that t_{count} was 0.68 and t_{table} was 1.69, so that $t_{count} < t_{table}$ 1.69 so it can be concluded that the increase in physical fitness given by the two training methods was not significantly different.

Keywords: *Circuit, interval training method, physical fitness*

1. INTRODUCTION

Education is one of human efforts to improve the quality of human life in terms of behavioral quality, knowledge and skills. Sports education is one of numerous majors at Universitas Negeri Padang which aims to shape the student attitude to be intelligent, competent and have decent morals. According to Law No. 3 of 2005 on National Sport System Article 1 Verse 11, it states that sports education is a sport carried out as part of an orderly and sustainable education process to gain knowledge, personality, skills, health and physical fitness.

The sports education as mentioned above has various purposes. One of them is for education, health and physical fitness; considering the importance for students to have good physical fitness to support all student activities both on- and off-campus. Therefore, the Sports Education Department, through several courses, provides guidance to the physical fitness of students. One of the subjects aimed at improving the physical fitness of the students is the course of Formation of Physical Conditions. Through this course, students will gain knowledge and understanding of the importance of physical fitness as well as procedures to improve physical fitness. As a student who has been

tempered by physical fitness, students of sports education should have a good level of physical fitness, because students of Sports Education Department are students selected through written selection, skilled or physical tests and sports education students who already understand the importance of physical fitness. However, from the writer's observation as a lecturer of Physical Condition Formation, it is frequently found students who have low levels of physical fitness. This was proved by the measurement that found out the average students have physical fitness in the moderate category and still many of them who have the level of physical fitness on low category. This thing becomes a problem for students majoring in sports education because many activities that the students have to participate in, ranging from lecturings, organization activities, and sports practices. Given the importance of physical freshness for the students, the writer is interested to do a research with the goal of improving the physical fitness possessed by them through the methods of circuit training and interval training. Upon the completion of this research, it is expected there will be an increase in the level of physical fitness of students and to get the idea of what method of exercise is more effective to increase the level of physical fitness.

Training

According to Hardiansyah (2017) training is an activity carried out with a purpose. Suharno (1993) states training is a process of training with physical, technical and tactical burden regularly to achieve achievement. From some of these opinions it can be understood that training is a process that is carried out repeatedly and regularly to improve achievement.

Circuit Training Method

Hardiansyah (2017) states that circuit training is a training that makes some forms of physical training into posts. PBSI (2007) states that circuit method combines several exercises into one implementation. This is one form of efficient training because someone can do more practice in a shorter period of time in accordance with Jill's opinion (2017) "circuit training is an effective and efficient exercise". According to Edwarsyah (2017), he states that the circuit training method is a training that combines many forms of exercises. From some of the statements above, it can be said that circuit training is a combined exercise of several forms of exercises that are carried out continuously in one period.

Interval Training Method

Hardiansyah (2017) states that interval method is a training method used to increase physical fitness. Interval method is a form of training in the form of series of exercises that are surrounded by periods of time for other lighter activities (Junusal Hairy, 2003). The training interval based on the principle of interval is characterized by variations in the length of loading (length of distance / large series of exercises), variation in load intensity, variation in load interval (length of rest), in order to have a purpose that is directed. So interval training must be considered by the length of rest needed to return in doing the exercise. Then Fox (1994) revealed a range of rest period in training, namely:

1. Long training interval, interval comparison between work and rest 1 : 1
2. Medium training interval, interval comparison between work and rest 1: 2.
3. Short training interval, Interval comparison between work and rest 1: 3

In addition, load intensity of each load must be measured, if the load intensity is high (85% VO₂max), then the duration of training is short or may be 15-12 minutes, whereas if the intensity is low, the training time must be long. Because the adaptation of the organism to the performance required in the break (interval), the measurement has meaning in the training interval. Based on the description above, it can be seen that interval training method is one form of method that can be used for exercises aimed at increasing physical fitness.

Physical Fitness

Hardiansyah (2017) stated that physical fitness is the body's ability to be able to do a routine without experiencing fatigue. According to Arsil (2009) "physical fitness is an aspect, namely the physical aspect that gives a person the ability to live a productive life and can adjust to each physical burden". From some of the opinion above, it can be said that physical fitness is the physical condition needed to carry out daily routine.

Physical Fitness Components

Speed

According to Ihsan (2017) "fast means the ability to travel long distances with short period of time" and speed is the ability of individual to do the same movements repeatedly in the shortest possible time. The success of sprint cannot be achieved without muscle strength to move the foot quickly.

Strength

Strength is "the ability of a group of muscles to generate power during contractions. Muscle strength must be possessed by the child. If the child does not have muscle strength, he is not able to perform physical play activities such as: walking, running, jumping, throwing, climbing, hanging and pushing". (Gusril, 2008).

Explosive Power

Ordinary muscle power is also called explosive power or explosive power is the ability of a muscle or a group of muscles to overcome the load resistance at high speed in a complete movement. Explosive power is a power blend with speed. Explosive power is usually used for jumping, start on short running, swimming, throwing, kicking and all movements in the sport are done suddenly with maximum strength with high speed (Neldi, 2008).

Endurance

Endurance "is defined as the time to survive the length of time a person can do the intensity of work or away from fatigue. Durability consists of two parts: general endurance and local muscle endurance. Common endurance is related to the ability of the cardiovascular system, whereas local muscular endurance is associated with local muscle abilities. Thus, the outline of endurance is the body's ability to perform activities without experiencing fatigue.

2. METHOD

In accordance with the type of research developed that is quasi experiment research, using circuit method and interval training as independent variable and physical fitness as dependent variable. Here's the design of research implementation:

Table 1: Research Design.

O ₁	X ₁	O ₂
O ₃	X ₂	O ₄

Information:

- O₁ : Pre test circuit training method
- O₂ : Post test circuit training method
- O₃ : Pre test Interval training method
- O₄ : Post test Interval training method
- X₁ : Circuit training method
- X₂ : Interval training method

The population was student of the Department of Sport Education, Faculty of Sport Sciences, State Universitas Negeri Padang who participated in the formation of 40 Physical Conditions. Sampling with a purposive technique only took students who performed training regularly so that the sample in this study amounted to 36 persons consisting of 18 persons for the circuit training group and 18 persons for interval training. The instrument used in this study was the Indonesian physical fitness level test that consisted of tests: (1) 60-meter run, (2) 60-second pull up for men and elbow hanging for women, (3) 60-second sit up, (4) vertical jump, (5) 1200- meter run for men and 1000-meter run for women. The data analysis technique used an independent sample using different test (t test).

3. RESULT AND DISCUSSION

Result

Pre Test Circuit Training Method

From the results of measurements taken on the sample, it was obtained the highest score 21, the lowest score 10, and average count 16.22, median score 16, and standard deviation of 2.84. The distribution of this pre-test data can be seen in figure 1.

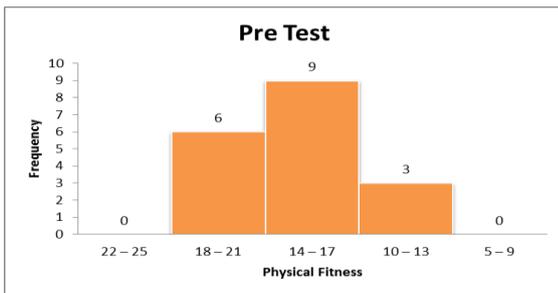


Figure 1. Physical Fitness Pre test Circuit Training Method.

From figure 1, it is clear that no student has physical fitness in the Well Class category with intervals of 22-25, and 6 students (33.33%) have physical fitness at 18-21 Good category, next 9 students (50%) have physical fitness at intervals 14-17 with Medium category and at intervals 10-13 with the less category there are 3 students (16.67%), while for interval 5-9 with poor category there are no students who have physical fitness in that category.

Post Test Data Circuit Training Method

From the results of measurements taken on the sample, it was obtained the highest score of 22, the lowest score of 14, and the average count (mean) 17.50, median 17.5, and standard deviation of 2.12. The distribution of post test data can be seen in figure 2:

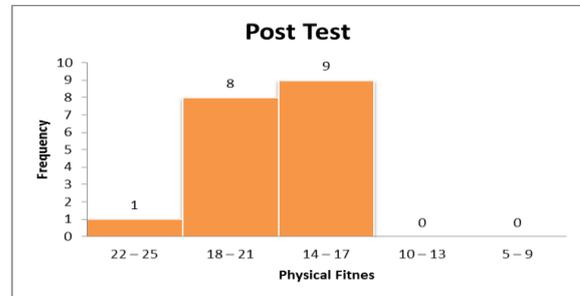


Figure 2: Physical Fitness Post test Circuit Training Method.

From figure 2 it can be seen that there are 1 students (5.56%) who have physical fitness at 22-25 intervals with the Good One category, and 8 students (44.44%) have physical fitness at 18-21 intervals with Good category, next 9 students (50%) have physical fitness at intervals 14-17 with Medium category and for Less category and Category category Less Once there are no students who have physical fitness in that category.

Pre Test Data Interval Training Method

From the results of measurements taken on the sample obtained the highest score 20, the lowest score 11, and average count (mean) 16.17, median value 16, and standard deviation (standard deviation) of 2.85. The distribution of pre test data can be seen in figure 3.

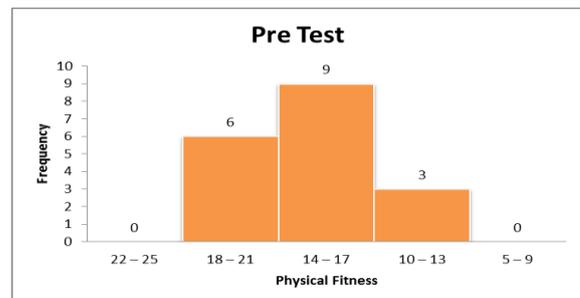


Figure 3. Physical Fitness Pre test Interval Training Method.

From figure 3 it can be seen that there are no students who have physical fitness in the Good One category with intervals of 22-25, and 6 students (33.33%) have physical fitness at 18-21 Good, 9 students (50%) have physical fitness at intervals 14-17 with Medium category and for at interval 10-13 with category There are at least 3 students (16.67%) while for interval 5-9 with category Poor Once there are no students who have physical fitness in that category

Post Test Data Interval Training Method

From the results of measurements taken on the sample obtained the highest score of 22, the lowest score 14, and the average count (mean) 17.72, median 17.5, and standard deviation 2.52. This post-test data distribution can be seen in figure 4.

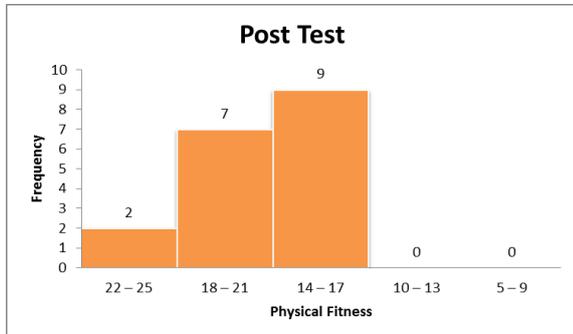


Figure 4. Physical Fitness Post test Interval Training Method.

From figure 4, it can be seen that there are 2 students (11.11%) who have physical fitness at 22-25 intervals with Excellent category, and 7 students (38.89%) have physical fitness at 18-21 intervals with Good category, next 9 students (50%) have physical fitness at intervals 14-17 with Medium category and for Less category as well as lowest category there are no students who have physical fitness in that category.

Hypothesis testing

The hypothesis in this research is there is a significant difference between the influence given by the circuit method with the interval method to increase the physical freshness of students of Sport Education Department Faculty of Sports Science Universitas Negeri Padang. The hypothesis was tested by using t-test at a significant level of α 0.05%.

From the results of data analysis, it was obtained t_{count} (0.68) < t_{table} (1.69), thus H_0 accepted and H_a rejected means hypothesis stating there is a significant difference between the influence given by circuit method with interval method to increase physical fitness of students of Sports Education Department of Faculty of Sports Science Universitas Negeri Padang, its truth is empirically denied, the influence given by both methods is not significantly different.

Discussion

Based on data analysis which had been done, the result of research indicates that circuit method can improve physical freshness of students of Department of Sport Education Faculty of Sport Science Universitas Negeri Padang and similarly, interval method can improve physical freshness of students of Department of Sport Education of Faculty of Sports Science Universitas Negeri Padang. However, after conducting further tests using t-test, it can be seen that the results given by both groups are not significantly different.

This took place because of several things including: (1) Both methods have their own advantages, circuit method has strengths because of the more varied physical composition so that the boredom of the sample can be minimized, while the interval method has the strengths because the physical exercise is more focused on one aspect so it is easier to be controlled and the improvement tends to be more visible. (2) Weakness, Circuit method will be more difficult to control each movement because the number of motions performed at the same time by the sample, while the interval method will tend to be more boring because the exercise consists only of one physical exercise alone so it tends to be more boring. (3) It is difficult to strictly control the nutritional settings consumed by the sample during the exercise process. Khumadi (1994) suggested that nutrition has several functions such as to obtain energy to support daily physical activities, so if the sample nutrition is not fulfilled, it will certainly cause disruption of the exercise process due to lack of energy supply. (4) Resting setting out of research that cannot be controlled maximally. Rest is important to note because rest is the process of recovery of physical conditions due to loading during the exercise process. Recovery is a key point of the exercise process. Optimization of recovery techniques is important to do in accordance with the quality of recovery is good to reduce fatigue, so the exercise provided with regular recovery will provide the maximum impact. (5) The difficulty of knowing and controlling the psychological factors of the sample during the exercise, especially the motivation factor of the sample during the training process. Soemanto (1990) argues that "motivation is the conditions or circumstances that activate or encourage someone to behave in achieving the goals generated by the motivation. Amti (1992) explains that "motivation is a conscious effort to move, direct and maintain a person's behavior so that he is motivated to act to do something, so as to achieve certain goals. Students who have high motivation in following the training process will certainly follow the exercise seriously although no strict supervision. Meanwhile, students who follow the training process with low motivation will cause the exercise not maximal so that the results provided by the training process are also not maximal.

Circuit method and interval method are two methods that can improve physical fitness, as proved by the increase of post-test data compared with pre-test data, but when compared to the improvement given by both methods, the result is not significantly different. Some of the above factors are the possible causes of the absence of significant differences provided by the two methods of exercise namely circuit method and interval method to the improvement of physical condition. In other words, to improve the ability of physical condition, it can be used both circuit training and interval training method.

4. CONCLUSION

Based on the findings of the research and discussion of the research results, it can be concluded that: there is no significant difference between the influence given by circuit method and the method of interval to increase physical fitness of the students of the Department of Sport Education, Faculty of Sport Sciences, Universitas Negeri Padang.

REFERENCES

- [1] Amti, Erman, dkk. 1992. *Bimbingan dan Konseling*. Jakarta: Depdikbud.
- [2] Arsil. 2009. *Tes Pengukuran Dan Evaluasi Pendidikan Jasmani Dan Olahraga*. Padang: FIK UNP
- [3] Edwarsyah, Hardiansyah Sefri, Syampurma Hilmainur. (2017). *Pengaruh Latihan Sirkuit Training Terhadap Kondisi Fisik Atlet Pencak Silat Unit Kegiatan Olahraga Universitas Negeri Padang*. Jurnal: Penjakora. Vol. 4 No 1: 51-63.
- [4] Fox, El. Bower RW. Fose ML. (1994). *Theory Physydogyca Basic Of Physical Education And Athletics*. Philadelphia: Saunders Collage Publishing
- [5] Gusril. (2008). *Model Pengembangan Motorik Pada Siswa Sekolah Dasar*. Padang. UNP Press.
- [6] Hairy, Junusul. (2003). *Daya Tahan Aerobik*. Jakarta: Direktorat Jendral Olahraga Departemen Pendidikan Nasional.
- [7] Hardiansyah Sefri. 2017. *The Influence Of Circuit Training Method On The Enhancement Of Physical Fitness Of Sports Education Department Students*. *Proceedings The 1st Yogyakarta international seminar on health, physical education, and sports science:Yogyakarta*
- [8] Hardiansyah Sefri. 2017. *Pengaruh Metode Interval Training Terhadap Peningkatan Kesegaran Jasmani Mahasiswa Jurusan Pendidikan Olahraga*. Jurnal: Penjakora. Vol. 4 No 1: 83-92.
- [9] Ihsan Nurul, Yulkifli, Yohandri. 2017. *Development of Speed Measurement System for Pencak Silat Kick Based on Sensor Technology*. *InternationalConferenceonRecentTrendsInPhysi cs2016(ICRTP2016)* IOPPublishing. *JournalofPhysics: ConferenceSeries755(2016)011001* doi:10.1088/1742-6596/755/1/011001
- [10] Jill Maples. 2017. *A Comparison of High Intensity Functional Training and Circuit Training on Health and Performance Variables in Women: A Pilot Study*. *Journal Women in Sport and Physical Activity*, Volume 25 2017, 1-10.
- [11] Khumadi. 1994. *Bahan Pangan dan Olahan*, Jakarta: Balai Pustaka
- [12] Neldi, Hendri (2008). *Pembelajaran Pendidikann Jasmani dan Olahraga*. Padang: FIK UNP.
- [13] PBSI. (2007). *Penataran Pelatih Bulutangkis Tingkat Nasional*. Jakarta: PB PBSI.
- [14] Soemanto, Wasty. 1990. *Psikologi Pendidikan*. Jakarta: PT Rineka Cipta.
- [15] Suharno. 1993. *Metodologi Penelitian Olahraga*. Seri Bahan Penataran Pelatih Tingkat Muda/Madya. Jakarta: Koni Pusat. Pusat Pendidikan Dan Penataran
- [16] Undang-undang RI No 03. 2005. *Sistem Keolahragaan Nasional*. Yogyakarta: Pustaka Yudisti.