ATLANTIS PRESS
Advances in Health Sciences Research, volume 35
Proceedings of the 1st International Conference on Sport Sciences, Health and Tourism (ICSSHT 2019)

The Effect of Training Method and Ergogenic Implementation to Explosive Power Leg Muscle Basketball Athletes

Ronni Yenes[1], Erizal. N[2], and Roma Irawan[3]

[1,2,3]*Universitas Negeri Padang, West Sumatra, Indonesia*
[*]*Corresponding author. Email: ryenes@yahoo.co.id*

ABSTRACT
The use of appropriate training methods will make the exercises performed more effective and efficient. Moreover, the achievement of the training objectives will be acquired as the targets. This study aims to see the effect of the set system training method and the circuit training method with the implementation of resistance training on the explosive power of the leg muscle of the basketball athletes. In addition, both of the methods are also compared to obtain the more efficient training methods that can be used to increase the explosive power of the leg muscle of the basketball athletes. This type of study is quantitative with quasi-experimental research methods. The research design used in this study is two groups pre-test post-test. The population in this study are all men basketball athletes at the Faculty of Sport Science, Universitas Negeri Padang. The research instrument used in this study is the vertical jump test. The data were analyzed using a comparative analysis of two variables, namely the t test with $\alpha = 0.05$. The results show that: 1) There is a significant effect of the set system training method with the implementation of resistance training where t_h (7.00)> t_t (1.81). 2) There is a significant effect of the training circuit training method with the implementation of resistance training where t_h (19.91)> t_t (1.81). 3) Training circuit training methods with the implementation of resistance training have a more significant influence on the explosive power of the limbs of basketball athletes when compared to the set system training method with the implementation of resistance training where there are differences in average of 3.7 and t_h (1, 75)> t_t (1.72).

Keywords: *Training Method, Ergogenic, Explosive Power Leg Muscle*

1. INTRODUCTION

Basketball game is a sports game played by two opposing teams, in which each team consists of five players and seven substitute player. The aim of the game is to score as many points as possible to the opponent's ring and to defend his own ring from the opponent's attack. According Fardi (1999: 24) the basic techniques of the game of basketball include Passing, Catching, Dribbling, Shooting, running (Start) and Stop, body control, Pivoting, and Guarding. Furthermore, Ahmadi (2007: 13-22) in basketball states that there are five basic techniques that must be mastered by every player, namely: (1) passing the ball, (2) catching the ball, (3) footwork,(4) dribbling,(5) Shooting.From the experts' opinions above, one of the basic techniques that must be mastered by every basketball athlete is shooting.

Shooting in a basketball game consists of several types of shooting, and one of them is a jump shoot. Jump shoot is a shooting technique that is done by making a jump, and then the ball is released from the hand at the highest point of the jump. It is in line with Keynes (2012: 24) which states that a jump shoot is a shooting movement that is accompanied by a jump and then at the peak of the jump, the ball shot must have been released through the arms, wrists and fingers. A basketball athlete should master this *jump shoot*technique well since it has a special benefit when compared to ordinary shooting moves. By doing a *jump shoot* an athlete can avoid the opponent's obstacles when shooting, as*jump shoot is* performed by maximum jumping movements.

In improving the ability to jump shoot for a basketball athlete, there are a lot of factors that influence it. The involving factors that influence the ability to jump shoot a basketball athlete are physical condition factors such as leg muscle explosive power, arm muscle power, balance, and coordination, factors of the training methods used when jumping, and other factors which can affect the jump shoot ability. Physical condition is the most important factor in the process of doing a jump shoot, especially the leg muscle explosive

power. Leg muscle explosive power has a very big role in the process of implementing jump shoot. This is because the leg muscle explosive power will affect the high or low jump of an athlete when doing a jump shoot.

Beside the appropriate training methods, the implementation of sports technology such as ergogenic aid is important to achieve the objectives of the exercise being carried out. The application of ergogenic aid is the application of sports technology to facilitate the process of training and competition so that the activities done during training and competition becomes more efficient which can improve the performance of athletes (Riyadi, 2013)

One of ergogenic aid that can be used in increasing explosive power of Basketball athlete's leg muscles is *resistance bands.* Resistance bands are elastic bands that can be used to train power, explosive power, and flexibility (Wikipedia, 2019). Furthermore, Richard Weil (2019) revealed that "*Resistance training is any exercise that causes the muscles to contract against an external resistance with the expectation of increases in power, power, tone, flexibility, mass, and / or endurance*". It is meant that resistance training is an exercise that causes the contraction on muscles which against external resistance which expectedly increase explosive power, power, tone, flexibility, mass and muscular endurance.

Based on the description above, the researchers made a comparison of the two forms of training methods that have been stated previously namely the set system training method and the circuit training method with the application of ergogenic aid technology in the form of resistance bands to the explosive power of the legs of basketball athletes.

2. METHODOLOGY

This study uses a quantitative approach with quasi-experimental research methods. Sugiyono (2008: 8) states that the quantitative research approach can be interpreted as a research method based on the philosophy of *positivism* that is used to examine populations or specific samples, where data collection uses research instruments; data analysis uses statistics, with the aim to test hypotheses which have been set. Furthermore, this research method is a quasi-experiment which aims to find whether there is an influence of treatment between cause and effect between the variables studied. Sugiyono (2011: 48) says that experimental research aims to investigate the causal relationship (*Cause and Effect Relationship*), by exposing one or more experimental groups, and one or more of the control groups that are not subject to treatment.

The design in this study used a *two group pretest - posttest design*. The *two group pretest - posttest design* aims to compare two mean parameters (Kadir, 2015: 295). From this description, there are two research groups, namely: 1) the group of set system training methods using resistance bands. 2) the group of circuit training methods using resistance bands. For more details, the design of this study can be seen in the following figure.

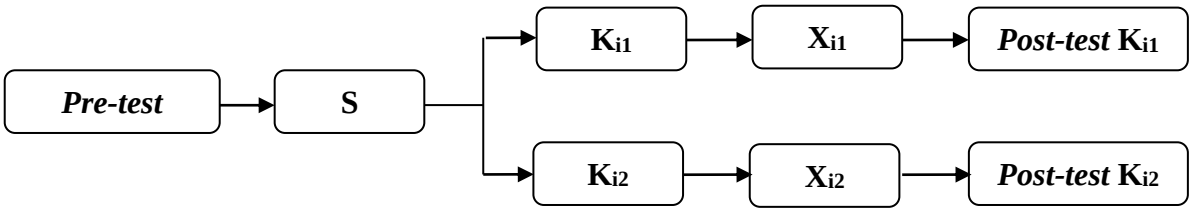

Figure 1. Design Research

Description:

Pre:	Preliminary Tests of Explosive Muscle Power Legs Treatment Before giving the treatment
S:	Sample
Ki1:	The group of set system training methods
Ki2:	The group of circuit training method
Xi1:	Treatment Against the Group of Set System Training Methods
Xi2:	Treatment Against the Group of circuit training method
Post Ki1:	Final test of Leg muscle explosive power with Set SystemTraining Methods
Post Ki2:	Final test of Leg muscle explosive power with Circuit Training Methods

3. RESULTS AND DISCUSSION

A. Description Of The Research Data

Based on the results research that has been done, the research data obtained as follows:

1. Data Pre-test and Post-test Leg Muscle Explosive Power withset system training method

Based on the leg muscle explosive power data obtained in the study group using the set system training method then obtained the total score of 650 (Pre-test) and 685 (Post- test), an average of 65 (Pre-test) and 68.5 (Post-test), while a standard deviation of 5.23 (Pre-test) and 5.10 (Post-test). Furthermore, the frequency distribution of leg muscle explosive power data in the research group using the set system training method can be in the table below.

Table 1. Frequency Distribution Data of Leg Muscle Explosive Power withset system training method

Class Interval	Pre-test		Post-test	
	Fa	Fr%	Fa	Fr%
> 75	0	0%	1	10%
69-75	2	20%	2	20%
64-68	4	40%	6	60%
59-63	3	30%	1	10%
<59	1	10%	0	0%
Amount	**10**	**100%**	**10**	**100%**

Based on the table above it can be seen that the number of samples that are in the interval class> 75 amount 0 people (0%) in the Pre-Test and 1 person (10%) in the Post-test, the number of samples in the 69-75 interval class were 2 people (20%) in the Pre-Test and 2 people (20%) in the Post-test, the number of samples in the 64-68 class interval were 4 (40%) in the Pre-Test and 6 people (60%) in the Post-test, the number of samples in the 59-63 interval class were 3 people (30%) in the Pre-Test and 2 people (10%) in the Post-test, and the number of samples in the interval class <59 were 1 person (10%) in the Pre-Test and 0 people (0%) in Post-test.

2. Pre-test and Post-test Data on Leg Muscle Explosive Power withcircuit training method

Based on data on the explosive power of leg muscles in the research group using the circuit training method, the total score of 649 (Pre-test) and 722 (722 (Post-test), an average of 64.90 (Pre-test) and 72.20 (Post-test), while the standard deviation of 4.43 (Pre-test) and 4.32 (Post-test). Furthermore, the frequency distribution of leg muscle explosive power data in the research group using the circuit training method can be in the following table.

Table 2. Frequency Distribution Data of Leg Muscle Explosive Power withcircuit training method

Interval Classes	Pre-test		Post Test	
	Fa	Fr%	Fa	Fr%
> 77	0	0%	2	20%
72-77	1	10%	3	30%
66-71	4	40%	5	50%
60-65	5	50%	0	0%
<60	0	0%	0	0%
Amount	**10**	**100%**	**10**	**100%**

Based on the table above it can be seen that the number of samples that are in the interval class> 77 amount 0 people (0%) in the Pre-Test and 2 people (20%) in the Post-test, the number of samples in the 72-77 interval class were 1 person (10%) in the Pre-Test and 3 people (30%) in the Post-test, the number of

samples in the interval class 66-71 were 4 (40%) people in the Pretest and 5 people (50%) in the Post-test, the number of samples in the 60-65 interval class were 5 people (50%) in the Pre-Test and 0 people (0%) in the Post-test, and the number of samples in the interval class <60 were 0 people (0%) in the Pre-Test and 0 people (0%) in Post-test.

B. Results of data Analysis and Discussion

Data obtained in this study were analyzed using comparative analysis of two sample dependent variables to compare pre-test and post-test data of each research group and comparative analysis of two sample independent variables to compare second post-test data research group. The results of the analysis of this research data can be seen in the summary table of the following research data analysis results.

Table 5. Summary of Analysis Results of Research Data

Variables Compared	t_h	t_t	Information
Pre-test post-test of leg muscle explosive power set system group training method	7.00	1.81	Significant
Pre-test post-test of leg muscle explosive power circuit training method group	19.91	1.81	Significant
Post-test leg muscle explosive power group set system training methods and circuit training	1.75	1.72	Significant

Based on the above table it can be seen that the set system training method has a significant effect to the explosive power of the legs of the men's basketball athletes, the Faculty of Sport Sciences, Universitas Negeri Padang where th (7.00)>t_t(1.81). This means that the set system training method with the implementation of resistance training has a significant effect on the explosive power of the legs of the men's basketball athletes at the Faculty of Sport Science, Universitas Negeri Padang. Leg muscle explosive power is one of the elements of special physical condition which consists of a combination of two elements of general physical condition namely speed and power. In training process, the leg muscle explosive power is more dominated by the anaerobic energy system. This is because every movement of the exercise, done quickly and as strong as possible. Harsono (2001: 196) set system training method is "a training method that uses several repetitions of a form of exercise then followed by a period of rest, then performs another repetition of the original (the same movement), some do 2 sets for a form of exercise and some who did 3 sets ". Along with this irianto (2002: 73) also argues that training using the set system training method is done by giving a weigh to a group of muscles in several sets in sequence and interspersed with rest (*recovery*). Resistance bands are training aids made of elastic rubber that can be used when increasing power, speed, and flexibility. Furthermore, Richard Weil (2019) reveals that "*Resistance training is any exercise that causes the muscles to contract against an external resistance with the expectation of increases in power, power, tone, flexibility, mass, and / or endurance*". The resistance training means an exercise that causes the muscles to contract against external resistance in the hope of increasing explosive power, power, tone, flexibility, mass and muscular endurance.

Based on the description above, it can be concluded that training using the set system training method with the implementation of resistance training can increase the explosive power of the legs of a basketball athlete. This is because the resistance band is able to make the muscles contract against the resistance that comes from the maximum resistance band. Besides, the dominated energy system factor on the training must be considered by the trainer, so the exercise can achieve the desired goals and objectives.

Furthermore, in this study also looked at the effect caused by the circuit training method on the basketball athlete's leg muscle power. The results revealed that the circuit training method with the implementation of resistance training had a significant influence on the explosive power of the legs of basketball athletes. This can be seen in the results of research data analysis where t_h (19.91)>t_t (1.81). Circuit training is a training method that consists of several training posts that are implemented in a circuit. In its implementation the circuit training method has 6 training posts where each training post has a different form of training. In each form of exercise carried out in each post using resistance bands as training aids. In addition, the form of exercise used has the characteristics of anaerobic energy systems so that the achievement of the training objectives can be done as fully as possible.

In its implementation, the training circuit has a short time to work with maximum movement. This is in accordance with Fox's opinion (1993) in which an exercise consisting of 6-15 training posts; one training

in one station is completed within 30 seconds; one circuit training is completed between 5-20 minutes; and the rest of each post is 5-20 seconds. Furthermore, the principle of resistance is the principle where an attitude of resistance to the opposition's efforts to create a situation. This principle is very suitable to be implemented in leg muscle explosive power training since one form of motion application that uses leg muscle explosive power is jumping. At the time of the leap, the body is required to put up a fight on Earth's gravity which brings the body back down. So we need an exercise to train the body's resistance in order to have maximum jump results.

Based on the description above, it can be concluded that the exercise of leg muscle explosive power through the circuit training method of training with the implementation of resistance training has a significant influence on the leg muscle explosiveness of basketball athletes. So the training method and form of the exercise is very efficient if applied to basketball athletes.

In the next discussion the researchers compared the two training methods to the explosive power of the basketball athlete's leg muscles. Based on the results of data analysis that has been done the circuit training method with the implementation of resistance bands gives a better effect on the explosive power of the legs of basketball athletes when compared to the set system training method. This can be seen from the difference in the average of the two study groups where the average leg muscle explosive power withthe group of circuit training method is higher than the average leg muscle explosive power with set system training method (72.2> 68.5). In addition the calculation results through comparative analysis of two independent variables samples comparing the results of post-test two groups also proved that this method of circuit training with the implementation of resistance training gives a better effect than the method of sets system training with the implementation of resistance training where t_h (1.75)>t_t (1.72).

Theoretically, the training circuit training method has the beneficial characteristic of the training method over the set system training method. In the circuit training method, the athlete is required to make the maximum possible exercise movement. This relates to the time the exercise is performed, whereas in the set system training method the implementation time is not valid, that the athletes are required to complete the form of training set by set. Based on these different characteristics, it shows that the circuit training method is better for increasing the explosive power of the basketball athlete's legs. Therefore, the implementation of circuit training methods with the implementation of resistance training is highly recommended for the training of basketball athlete's leg muscle power.

4. CONCLUSIONS AND SUGGESTIONS

A. Conclusions

Based on the results of research that has been done, the conclusions in this study are as follows:

1. The selection of appropriate training methods and implementation of sports technology is very important to support the training process.
2. The set system training method with the implementation of resistance training has a significant influence on the explosive power of the legs of a basketball athlete.
3. The circuit training method with the implementation of resistance training has a significant influence on the explosive power of the basketball athlete's legs.
4. The circuit training method with the implementation of resistance training has more significant influence on the explosive power of the basketball athlete's legs when compared to the set system training method with the resistance training implementation.

B. Suggestions

The suggestions that can be given based on the results of this study are as follows:

1. For the research institutes and dedicated program of UniversitasNegeri Padang, it is expectedto become a facilitator to socialize the research results that have been obtained in this study so that it can create the principle of the benefits of this research.
2. For the sports science faculty of UniversitasNegeri Padang, it is expected to utilize the results of this research as a reference and study in conducting a learning process with the aim to progress in the field of sports science, especially in the field of training.
3. For coaches, athletes, and the basketball community or players of basketball, it is hoped that this research can be a reference and a guide in the training process so that training objectives can be achieved effectively and efficiently.

REFERENCES

[1] Fardi, Adnan. (1999). *BolabasketDasar*.FakultasIlmuKeolahragaan: UniversitasNegeri Padang.
[2] Kadir.(2015). *StatistikaTerapan, Konsep, ContohdanAnalisis Data Dengan Program SPSS/LisrelDalamPenelitian*.Jakarta :RajawaliPers
[3] Richard Weil. 2019. *Resistance Training*. eMedicineHealth does not provide medical advice, diagnosis or treatment.

[4] Sugiyono. 2008. *MetodePenelitianKuantitatif, Kualitatifdan R & D*. Bandung: CV AlFABETA.
[5] _____. 2011. *MetodePenelitianKuantitatif, Kualitatifdan R & D*. Bandung: CV AlFABETA.
[6] YenesRonni. (2012). *KontribusiDayaLedakOtotTungkaidanKoordinasi Mata TanganTerhadapkemampuan Jump shoot. Tesis.*Program Pascasarjana UNP.
[7] https://hadiriyadi.blogspot.com/2013/01/ergogenic-aids-meningkatkan-performa.html.
[8] https://en.wikipedia.org/wiki/Resistance_band
[9] https://www.emedicinehealth.com/slideshow_9_least_effective_exercises/article_em.htm#what#39s_a_good_beginner_plan