PROCEEDING
THE 6TH INTERNATIONAL CONFERENCE OF SPORT FOR DEVELOPMENT AND PEACE 2023
Vol 6 Number 1 • ISSN 2830-3342

THE AIR ALERT TRAINING PROGRAM USING THE INTERVAL METHOD CAN INCREASE LEG MUSCLE POWER AND ENDURANCE IN BASKETBALL ATHLETES

Lalu Hulfian[a] *, Nurlan Kusmaedi2, Suryansyah[3], Lalu Sapta Wijaya Kusuma[4]

[1]Doctoral student in Postgraduate Sports Education, Indonesian Education University
[2]Lecture in Postgraduate Sports Education, Indonesian Education University
[3]Lecturer in Physical Education and Health, FIP Hamzanwadi University
[4]Lecture in Physical Education and Health FIKKM, Mandalika Education University

*laluhulfian@upi.edu
*Universitas Pendidikan Indonesia

Abstract

Physical condition is needed in basketball, especially the ability of leg muscle power and endurance. Leg muscle power is needed when performing basic technical movements such as rebounding, lay up shoot and jump shoot while endurance is needed because the game of basketball uses 4 x 10 minutes. One of the training methods that can be used to improve both physical conditions simultaneously is the interval training method which is applied in the air alert training program. However, the extent of the resulting increase we do not know. Therefore, researchers wanted to know the effect of the Air Alert training program using the interval training method on increasing leg muscle power and endurance. This study used a quasi-experimental method because the sample selection used a purposive sampling technique, namely Undikma Mataram basketball students. This study used a population of 30 people with a total sample of 15 people in the treatment group who were given Air Alert training using the interval training method and a control group of 15 people without treatment but practicing basketball as usual. The test used is the vertical jump test using the DF jump to measure leg muscle power and the MFT test to measure endurance. From the calculation of data analysis with the SPSS program, the results obtained in the treatment group for leg muscle power ability are sig. (0.000) < α (0.05), which means there is an increase in leg muscle power and for endurance it has a sig value. (0.000) < α (0.05), which means there is an increase in endurance

Keywords:

Interval Training, Air Alert Training, Leg Muscle Power, Endurance

Introduction

Basketball is one of the most popular team sports in the world besides football, especially in the United States and is a sport that is fun, competitive, educational, entertaining and healthy (Oliver, 2004). The sport of basketball requires athletes to perform a variety of physical and technical tasks during the game (Castagna, 2010; Cochrane, 2013; Boddington et al., 2019). The aim of the basketball game is to score points by putting the ball into the opponent's basket which is 3.05 meters high from the floor and preventing the other team from doing the same thing (Perbasi. 2018). A basketball game consists of four quarters (rounds) where each half takes ten minutes, so the energy

requirements from the anaerobic system cannot meet the needs. Muscle performance will decrease due to fatigue during the game. Therefore, although the emphasis of training in basketball should be on developing the anaerobic energy system, it is also necessary to train to develop aerobic abilities. For this reason, a training program is needed that can improve both. Looking at the characteristics of the basketball game, skills and excellent physical condition are required in the form of leg muscle strength to jump to put the ball in and endurance to play for ten minutes in each quarter

Basic techniques in playing basketball include footwork, shooting, passing, dribbling, rebounding, moving with the ball, moving without the ball, and defending (Wissel, 1996). One of the physical conditions that supports improvement in performing the basic techniques above is leg muscle power. Several previous studies found that there was a significant relationship between leg muscle power and lay up ability in basketball games (Nurafni, R & Riyanto, P. 2018; Sutisna, E. 2018; Prabowo, R. A., Sudarsono, S., & Yulianto, R. 2019; Qolbin, L.R. 2021). Athletes who have good leg muscle power will find it easier to put the ball into the basket through jump shoots and lay up shots and will more easily defend against opponents through blocks and rebounds.

One program that can increase power is the Air Alert training program. This training program is one of the training programs where the movements resemble plyometric training which consists of several movements. The movements of this Air Alert exercise include: 1) leaps up, 2) calf raises, 3) step ups, 4) thrust ups, 5) squat jumps, 6) burnouts. This training program significantly increases the leg muscle power of basketball athletes (Tukel, 2004). However, it is not yet known how to increase the endurance components of basketball athletes which are also needed in the game of basketball to achieve performance.

The physical condition component of endurance can be improved using training methods. One method that can significantly increase endurance is the interval training method (Busyairi and Ray. 2018; Sepriadi, Arsil, Mulia, A.D. 2018; Tanzila, Ayu, R & Bustan, Fadliya, M. 2017). The interval training method is a training method that uses intervals (distance) for each training movement performed. Interval training consists of periods of high intensity exercise alternated with periods of rest (Tanzila & Bustan. 2017).

From the opinion above, researchers are interested in trying to create a combination of Air Alert training with interval training methods so that the training can increase leg muscle power and endurance simultaneously. Empirically, the movements from Air Alert training cause an increase in power, while the interval training method causes an increase on endurance. This needs to be proven through research so that the training program can be used by trainers as an option in training.

Based on the background above, the problem in this research can be formulated as (1) is there an effect of Air Alert Training using the interval method on the leg muscle power of basketball athletes? (2) Is there an effect of Air Alert Training using the interval method on the endurance of basketball athletes?

This study aims to determine the effect of Air Alert Training using the interval method on leg muscle power and endurance in basketball athletes.

PROCEEDING
THE 6TH INTERNATIONAL CONFERENCE OF SPORT FOR DEVELOPMENT AND PEACE 2023
Vol 6 Number 1 • ISSN 2830-3342

Methods

This research is a quasi-experimental research (quasi experiment) and the research design used is the experimental design "Non-Randomized Control Groups Pre test-Post test Design" (Hulfian, L. 2014).

Participants

Men's basketball players who take part in the Basketball Sports UKM for at least 1 semester and are aged between 19-23 years.

Population & Sample

The sample used in this research was male students who took part in the basketball sports UKM at Undikma Mataram, totaling 30 students. The sampling technique used was purposive sampling.

Instruments

The results of leg muscle power were obtained using the vertical jump test using jump df and endurance using the MFT test (Kemenegpora. 2005).

Procedure

A test was carried out to determine 1 RM after carrying out the pre-test to determine the percentage of initial training load regarding repetitions of each movement so that a training program could be prepared according to what was planned. The training was carried out in the afternoon at 16.00 WIT, three times a week for two months, totaling 24 meetings.

After analysis, the pre-test results of leg muscle power and endurance were normal and homogeneous. After testing these prerequisites, research data analysis was carried out which could answer the hypothesis in this research, namely; The effect of Air Alert training using the interval method on leg muscle power and endurance.

Data Analysis

Data analysis in this study used the paired sample t-test with a significance level of 5% using SPSS (Everitt, Sabine Landau, B. S. 2004). The data normality test was carried out using Kolmogorov-Smirnov, while for the data homogeneity test the Levene's statistical test was used (Kurniawan. 2011).

Result

The results of the calculation of the data normality test using the Kolmogorov-Smirnov test obtained a sig value. > α (p>0.05), then the pre-test results of leg muscle power and endurance in the experimental group and control group are normally distributed. Meanwhile, the results of the calculation of the homogeneity test of pre-test data for leg muscle power and endurance obtained a sig. > α (p>0.05), then the data is homogeneous.

Treatment Group (Exercise)

1. Components of Leg Muscle Power

   To see the extent of the increase in leg muscle power as a result of the interval training program treatment in Air Alert, a t-test (paired sample test) calculation was used because it tested the results of the pre-test and post-test with the same sample in the comparison of leg muscle power. The steps for carrying out the analysis are as follows:

PROCEEDING
THE 6TH INTERNATIONAL CONFERENCE OF SPORT FOR DEVELOPMENT AND PEACE 2023
Vol 6 Number 1 • ISSN 2830-3342

a. Proposed hypothesis:
   1) H0 : μ1 = μ2 (no increase)
   2) H1: μ2 > μ1 (there is an increase)
b. b. Basic decision making in hypothesis testing:
   1) If the value (sig.) > α (0.05), then H0 is accepted, H1 is rejected meaning there is no increase.
   2) If the value (sig.) < α (0.05), then H0 is rejected, H1 is accepted, meaning there is an increase.
c. The results of calculations using SPSS can briefly be seen in table 1, below

Table 1: Results of analysis of increase in leg muscle power in the treatment group

Paired Samples Test

		Paired Differences					T	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	POSTTEST - PRETEST	3.60000	1.59463	.41173	2.71692	4.48308	8.744	14	.000

d. Interpretation and Conclusion

From the table above, the value (sig.) < α (0.05), namely (0.000 < 0.05), then H0 is rejected, H1 is accepted, meaning there is an increase in leg muscle power with the Air Alert training program using the interval training method.

2. Components of Endurance

To see the extent of the increase in endurance due to the interval training program treatment in Air Alert, a t-test (paired sample test) was used because it tested the results of the pre-test and post-test with the same sample

a. Proposed hypothesis:
   1) H0 : μ1 = μ2 (no increase)
   2) H1: μ2 > μ1 (there is an increase)
b. Basic decision making in hypothesis testing:
   1) If the value (sig.) > α (0.05), then H0 is accepted, H1 is rejected meaning there is no increase.
   2) If the value (sig.) < α (0.05), then H0 is rejected, H1 is accepted, meaning there is an increase.
c. The results of calculations using SPSS can briefly be seen in table 2, below

Table 2: Results of analysis of increased endurance in the treatment group

PROCEEDING
THE 6TH INTERNATIONAL CONFERENCE OF SPORT FOR DEVELOPMENT AND PEACE 2023
Vol 6 Number 1 • ISSN 2830-3342

Paired Samples Test

		Paired Differences					T	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	POSTTEST - PRETEST	2.50000	1.85434	.47879	1.47310	3.52690	5.222	14	.000

d. Interpretation and Conclusion
From the table above, the value (sig.) < α (0.05), namely (0.000 < 0.05), then H0 is rejected, H1 is accepted, meaning there is an increase in endurance with the Air Alert training program using the interval training method..

Control Group

Testing the hypothesis of leg muscle power and endurance in this study used SPSS with a paired sample test. Before testing the hypothesis, first analyze the results from the control group to see whether the increase was really due to the treatment or other factors. The results of the analysis can be seen in tables 3 below.

Table 3: Results of analysis of increase in leg muscle power in the control group

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	POSTTEST - PRETEST	1.00000	1.30931	.33806	.27493	1.72507	2.958	14	.010

From the table above, the leg muscle power table has a value (sig.) > α (0.05), namely (0.10 > 0.05), meaning there is no significant increase in leg muscle power in the control group because the sample did technical training and tactics as usual without doing air alert training using the interval method.

Table 4: Results of analysis of increased endurance in the control group

PROCEEDING
THE 6TH INTERNATIONAL CONFERENCE OF SPORT FOR DEVELOPMENT AND PEACE 2023
Vol 6 Number 1 • ISSN 2830-3342

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	POSTTEST - PRETEST	.78000	1.17181	.30256	.13107	1.42893	2.578	14	.022

From the table above, the endurance table value (sig.) > α (0.05), namely (0.22 > 0.05), means that there was no significant increase in endurance in the control group because the sample carried out technical and tactical exercises such as usually without doing air alert exercises using the interval method.

Discussion

When preparing training programs related to sets and repetitions, this research pays attention to the maximum repetitions of each individual. Researchers conducted a test to determine 1 repetition maximum (RM) after carrying out the pre-test to determine the percentage of initial training load related to repetitions of each movement to be able to develop an exercise program. In this study, the initial repetition used was 60% of the Maximum Repetition. This is based on the capabilities of the sample used.

The sample carried out training with a frequency of three times a week, namely Monday, Wednesday and Friday, with a continuous training duration of eight weeks. This is to prevent the principle of reversibility which states that there will be a decline in physical condition if you do not carry out exercise activities for more than 2x24 hours, so exercise should be carried out continuously and sustainably. In this study too, the sample carried out the Air Alert exercise program where the characteristics of this exercise movement focused on the leg muscles and used interval training methods because the aim was to increase leg muscle power and endurance.

1. **The effect of Air Alert Training using the interval method on leg muscle power**

   The findings of this research are the value (sig.) < α (0.05), namely (0.000 < 0.05), so H0 is rejected, H1 is accepted, meaning there is an increase in leg muscle power with the Air Alert training program using the interval training method. Air Alert training using the interval method has a significant effect on increasing leg muscle power and this increase is believed to be the influence of treatment results because the control group who did not do this exercise did not experience a similar increase. This increase in leg muscle power is due to the adaptation of the muscle working system to training that combines strength and speed and the movements carried out are specific to what you want to improve. Harsono (2001) states that power is the product of speed and strength. Therefore, to increase power, use combination exercises between the two and have movement characteristics that are specific or similar to the movement you want to improve.

These findings are consistent with the findings of previous research. Tukel, (2004) created the Air Alert training program using the interval training method which was carried out for 15 weeks. This training program can significantly increase the power capacity of the leg muscles. The Air Alert training program significantly increases leg muscle power because the training movements are movements that use your own body weight in a series of dynamic muscle contractions, emphasizing leg muscles such as jumping which can increase the strength and speed of the muscles being trained. Hulfian, L. (2014) conducted research with the air alert training program using the circuit training method with 7 movements and compared the rest periods used. A total of 45 students aged 16-20 years were the samples in this study. The explosive power of the leg muscles of the sample was significantly increased and the 30 second rest period was better.

2. Effect of Air Alert Training with the Interval Method on Endurance

The findings from the results of this research are the value (sig.) < α (0.05), namely (0.000 < 0.05), then H0 is rejected, H1 is accepted, meaning there is an increase in endurance with the Air Alert training program using this interval training method. Air Alert training using the interval method has a significant influence on increasing the endurance of basketball athletes. This is in line with previous research from Hulfian, L. (2016) which found that there was an improvement in the physical condition of athletes through interval training. The physical conditions referred to here are anaerobic and aerobic in the form of endurance. Another relevant research also conducted by Rustiawan, H. (2020) found the effect of interval training on increasing Vo2max. Furthermore, Wibowo, S. P. K. (2020) conducted another research and found that there was a significant influence of High Intensity Interval Training on Cardiovascular Endurance at the Age of 13-15 Years.

Conclusion

Based on the results of the research and discussion that have been described, the conclusions in this research can be stated as follows:

1. There is an effect of Air Alert Training using the Interval Method on increasing leg muscle power in Undikma basketball UKM athletes
2. There is an influence of Air Alert Training using the Interval Method on the endurance of Undikma basketball UKM athletes.

Acknowledgment

Based on the results of research on interval training at Air Alert Training which provides a significant increase in leg muscle power above, there are several suggestions, including the following:

1. To improve anaerobic and aerobic abilities simultaneously, you can use the Air Alert training program with the interval training method.
2. When training for leg muscle power, it is recommended to use the Air Alert training program.

3. It is recommended to carry out further research on overall physical condition, not just power and endurance, but other components of physical condition.
4. It is recommended to carry out further research on the Air Alert training program using other methods and compare which method is best for improving physical condition.
5. It is recommended to carry out further research with a larger sample, stricter control and grouping so that the conclusions obtained can be broader.
6. If a coach provides a training program, of course he must pay attention to and treat the athlete according to the athlete's characteristics and level of ability, especially in determining sets and repetitions in order to achieve maximum results without experiencing overtraining.

References

Boddington, et al. (2019). *The validity and reliability of the Basketball Jump Shooting Accuracy Test*. Journal of Sports Sciences, 37(14), 1648–1654. https://doi.org/10.1080/02640414.2019.1582138

Busyairi, et al. (2018). *Perbandingan Metode Interval Training dan Continuous Run terhadap Peningkatan Vo2max*. Jurnal Terapan Ilmu Keolahragaan Vol 3 No 1 Tahun 2018: 76-81. www.ejournal.upi.edu

Castagna. (2010). *The Effect of Players' Standard and Tactical Strategy on Game Demands in Men's Basketball*. October. https://doi.org/10.1519/JSC.0b013e3181e2e0a3Cochrane,

Cochrane. (2013). *Tests Examining Skill Outcomes in Sport: A Systematic Review of Measurement Properties and Feasibility.* February 2015. https://doi.org/10.1007/s40279-013-0131-0

Everitt, Landau. (2004). *A Handbook of Statistical Analyses using SPSS*. New York: Chapman & Hall/CRC Press LLC No.

Harsono. (2001). *Latihan Kondisi Fisik.* KONI Pusat. Pusat pendidikan dan Penataran. Jakarta.

Hulfian. (2014). *Penelitian Dikjas*. Garuda Ilmu. Mataram.

Hulfian. (2014). *Pengaruh Periode Istirahat pada Pelatihan Air Alert terhadap Peningkatan Kondisi Fisik*. Jurnal Pendidikan Olahraga dan Kesehatan. Vol 1 No 1 Tahun 2014. pISSN: 2355-4355. eISSN: 2807-2227

Hulfian. (2016) *Peningkatan Kondisi Fisik Atlet melalui interval training dan circuit training*. Jurnal Gelora: Jurnal Pendidikan Olahraga dan Kesehatan. Vol 3 No 2 Tahun 2016. https://dx.doi.org/10.33394/gjpok.v3i2.440

Kemenegpora. (2005). *Panduan Penetapan Parameter Tes pada Pusat Pendidikan dan Pelatihan Pelajar dan Sekolah Khusus Olahragawan*. Kemenegpora. Jakarta.

Kurniawan. (2011). *SPSS: Serba-Serbi Analisis Statistic dengan Cepat dan Mudah*. Jasakom. Jakarta.

Oliver. (2004). *Dasar-Dasar Bola Basket*. Pakar Raya. Bandung.

Perbasi. (2018). *Peraturan Resmi Bolabasket 2018.* Perbasi. Jakarta.

Rustiawan. (2020). *Pengaruh Latihan Interval Training Dengan Running Circuit Terhadap Peningkatan Vo2max. Jurnal Wahana Pendidikan*. Vol 7 No 1 Tahun 2020. DOI: http://dx.doi.org/10.25157/wa.v7i1.3108

Sepriadi, et al. (2018). *Pengaruh Interval Training Terhadap Kemampuan Daya Tahan Aerobik Pemain Futsal*. Jurnal Penjakora Fakultas Olahraga Dan Kesehatan. Vol 5 No 2 Tahun 2018. Https://Doi.Org/10.23887/Penjakora.V5i2.17288

Stølen, et al. (2005). *Physiology of Soccer*. Sports Medicine, 35(6), 501–536. https://doi.org/10.2165/00007256-200535060-00004

Tanzila, et al. (2017). *Pengaruh Latihan Interval Intensitas Tinggi terhadap Denyut Nadi Mahasiswa Kedokteran*. Global Medical and Health Communication, Vol. 5 No. 1 Tahun 2017. www.ejournal.unisba.ac.id

Tukel, (2004). *Air Alert: How to Jump Increase.* http://www.Airalert.com (diunduh tanggal 12 Januari 2011).

Wibowo. (2020). *Pengaruh High Intensity Interval Training terhadap Daya Tahan Kardiovaskuler, Kecepatan dan Kelincahan pada Usia 13-15 Tahun*. *JOSSAE (Journal of Sport Science and Education)*, *4*(2), 79–84. https://doi.org/10.26740/jossae.v4n2.p79-84