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Indra Adi Budiman
Physical Education Faculty of Teacher Education, University of Majalengka, West Java Indonesia

Corresponding Author:
Indra Adi Budiman
Physical Education Faculty of Teacher Education, University of Majalengka, West Java Indonesia

The effect of anaerobic endurance training on the intensity of motion in basketball games

Indra Adi Budiman

Abstract
A player is expected to be able to play his best in a match, not only good for himself personally but good for the benefit of his team, so every player must have good physical abilities. The physical condition of students who get tired easily and the intensity of motion in dribbling the ball is still stiff, so students need anaerobic endurance training, because anaerobic endurance is a physical condition that is needed by every basketball player. The aim of this research is to find out how much influence anaerobic endurance training has on the intensity of motion in basketball games. While the method used in this research is the experimental method. The results of data analysis show that the value of t count is greater than t table, namely 13,359 > 2.093 so that Ho is rejected and Hi is accepted. In other words that there is a significant difference between the initial test and the final test. Based on the t-count value, the anaerobic endurance training group obtained 13,358. So it can be concluded that anaerobic endurance training has a significant effect on increasing the intensity of motion in basketball games.

Keywords: Anaerobic endurance, increasing the intensity of motion, based on the t-count value

Introduction
Basketball is a game between two teams who try to score as many points as possible to achieve team victory. Basketball games require fairly complete equipment such as: basketball court, basketball, hoop to enter basketball. Basketball is a team game and can be played by boys and girls of all ages. In the game of basketball, each team must try to get as much ball as possible into the opponent's basket and prevent the opponent from putting the ball into his own basket. Sucipto in Aji Zaenal Mutaqin, Sufyar Mudjianto, Lukmanul Hakim Lubay, (2010). "The game of basketball has complex movements and many collisions occur. For this reason, every basketball player is required to have excellent quality abilities. These relatively complex movements in basketball, for example; jump, twist, turn, short sprint, run while dribbling, pass the ball, block, dodge and many others. All of these movements can be done well if a basketball player has good physical abilities" [1].
The same thing was conveyed by: Mc. Innes in T. Brijwasi and P Borkar (2022:25), "Basketball is a sport which is characterized complicated movements such as: running, changes of direction, lateral movements, jumps, and uncontrolled landings" [2]. However, the rate of injuries in game situations were 2 times higher than in practices and this is due to the fact that movements during the game are unpredictable. Meanwhile, according to: Raôui & Thomas in I. Dedi and R. Gilang, (2019), "Basketball is a game that relies heavily on excellent physical conditions to be able to perform optimally on the field. High concentration" [3].
To obtain a good condition status, it is necessary to train the physical biomotor components, including; endurance, strength, speed, power, agility, coordination, and flexibility. When viewed based on movement in basketball, the physical biomotor component of endurance required is more specifically anaerobic endurance.
According to Sukadiyanto (2005: 61), "Anaerobic is an activity that does not require oxygen. Anaerobic endurance is defined into two, namely:

a) Lactic anaerobic endurance is a person's ability to cope with training loads with maximum intensity in a period of 10-20 seconds;
b) Anaerobic alactic endurance is a person's ability to cope with the maximum intensity of training in a period of less than 10 seconds" [4].

Anastasiadis in Omar Salim Alghandora and Nina Borisovna Serova (2006).

"Basketball is a very popular sport in the world and has grown quite significantly, so the number of young people involved in the sport has increased significantly. Due to the large number of young people involved in basketball, forming a strong team requires player selection" [5].

Tangkudung and Pusporini in I. A. Budiman (2016: 467), mention "Exercise is an iterative process and increased in order to improve potential to achieve maximum performance" [6]. Still according to I.A. Budiman (2016: 466) that: "Sport as a physical activity promises its own benefits for the culprit, namely the achievement of the intensity of physical fitness and even spiritual freshness. This is consistent with the slogan men sana in corpore sano, in a healthy body there is a strong soul" [7].

The nature of endurance

According to Sukadiyanto (2005:57) "The notion of endurance in terms of muscle work is: the ability to work a muscle or group of muscles in a certain period of time, while the notion of endurance of the energy system is the ability to work the organs of the body in a certain period of time" [4]. Based on this understanding, endurance is defined as the ability of the body's organs to fight fatigue during activities/work.

Understanding anaerobic endurance

According to Pate, Rotella (2003:300) "Anaerobic ability is the maximum speed at which work can be done using anaerobic energy sources. Furthermore, Pate explained that anaerobic ability and speed are determined by the following factors: (1) types of muscle fibers-the distribution of fast and slow muscle fibers, (2) muscle-nerve coordination, (3) biomechanical factors (eg skills), and (4) muscle strength. Any activity that takes place within a few seconds / anaerobically the energy required is highly dependent on ATP (Adenosine Triphosphate) and PPC (Phosphocreatine). Anaerobic endurance is closely related to the type of muscle fibers possessed by athletes" [8]. Next, I.A. Budiman (2017; 455), said that: "Anaerobic threshold is the transfer of energy through aerobic system support shifted into the anaerobic system" [7].

Definition of anaerobic

According to Pate, Rotella (2003:300) "Anaerobic ability is the maximum speed at which work can be done using anaerobic energy sources. Anaerobic ability and speed are determined by the following factors: (a) type of muscle fiber-distribution of fast and slow muscle fibers; (b) muscle-nerve coordination; (c) biomechanical factors; and (d) muscle strength.

1. Alactic anaerobic energy system

This system provides ready-to-use energy required for the start of high-intensity physical activity (high-intensity) energy sources are obtained from the breakdown of available ATP and PC stores in the muscles. At maximum activity this system can only be maintained for 6-8 seconds (short duration), because ATP and PC stores are very small, every 1 kg of muscle contains 4-6 mM ATP and 15-17 Mm PC.

2. Lactic Anaerobic Energy System

If the activity continues while the energy supply from the alactite energy system is no longer sufficient, then energy will be provided by breaking down glycogen and glucose through the anaerobic glycolysis pathway (without the help of oxygen), Anaerobic glycolysis produces energy (23 ATP), also produces lactic acid. Lactic acid is formed and accumulates causing cells to become acidic which will affect muscle work efficiency, muscle pain and fatigue. Lactic acid can be processed into energy again in the form of glucose through the Corry cycle. Almost all sports such as football, basketball, and others use this energy system [8].

Meanwhile, Ersha Ady Nickytha, Mustika Fitri and Kuston Sultoni, (2019: 186) "Anaerobic metabolism produces energy for brief, high-intensity activity that lasts no more than a few minutes before lactic acid build-up reaches a threshold known as the lactate threshold and muscle soreness, burning and fatigue make it difficult to maintain that intensity" [9].

Kephart (2000) cited by Mahendra and Ma'mun (2007:59) "Divides human movement into three types, namely: 1) translational movement, namely movement that moves from place to place, 2) rotational movement, namely rotating motion on an axis, 3) oscillational movement, namely swinging motion [10].

I.A. Budiman, (2020). "Movement skill is the level of efficiency that a person displays in performing complex movement tasks. That the skill movement has two relationships, namely a vertical relationship and a horizontal relationship. The vertical relationship is the level of difficulty of the various skills performed. This relationship is called the level of complexity. While the horizontal relationship is related to the level of a person's ability to teach a movement (level of proficiently)" [11].

Method

The research method used in this research is the experimental method. This method is used on the basis of the consideration that the nature of the research is to try something out to find out the effect or consequences of a treatment. While the research design is "Two Groups Pre-test-Post-test Design", namely the research design that was carried out pre-test before being given treatment and post-test after being given treatment. So that the results will be known more accurately. While the sample used was 20 people, all of whom were extracurricular participants.

Results and Discussion

Before the authors carry out data processing, the authors test the samples in order to obtain the data needed in the study and to complete the shortcomings. The test carried out by the author is to perform a shuttle run test to determine the effect of anaerobic endurance training on the intensity of motion in basketball games. The data obtained from the initial test and the final test under study must be processed and analyzed statistically, in order to solve the problem that the author is researching. Processing and data analysis carried out in accordance with the design that the author has stated above.

Data collection was carried out in this study, data collection was carried out twice, namely data collection for the initial test and the final test. For the initial test, the shuttle run test was carried out before the research sample was given treatment. The sample treatment was in the form of anaerobic endurance training, while the final test data was after being given treatment.

1. Mean, Standard Deviation, Variance, Minimum, and Maximum Value. The data used to analyze the results of this study are data obtained from the initial test and the final test to study the effect of anaerobic endurance

training on the intensity of motion in basketball games. The data was then analyzed through statistical tests to determine the level of difference between the results of the initial test and the results of the final test. The following will describe the descriptive test data obtained during the initial and final tests.

The descriptive shuttle run test data obtained from the initial and final tests can be seen in the following table:

Table 1: Descriptive Pre-Test and Post-Test Data

Test	N	Mean	Standard Deviation	Variance	Minimum	Maximum
Pre-test	20	15.20	1.609	2.589	12	19
Post-test	20	13.15	1.461	2.134	11	17

In the initial test, the data obtained from a sample of 20 people are as follows the average score of 15.20 with the lowest score of 12 and the highest score of 19 with a standard deviation of 1,609 and a variance of 2,589.

In the final test, data obtained from a sample of 20 people are as follows: the average score is 13.15 with the lowest score of 11 and the highest score of 17 with a standard deviation of 1.461 and a variance of 2.134.

2. Normality Test

The normality test was carried out to determine whether the data distribution of the studied variables was normally or not normally distributed, then we could determine whether the test used was parametric or non-parametric statistical tests. If the data is normally distributed, parametric statistical tests are used, whereas if the data distribution is not normal, non-parametric statistical tests are used. The normality test in this study used the Kolmogorov-Smirnov test.

The data from the normality test based on the Kolmogorov-Smirnov test equipment can be seen in table 2 as follows:

Table 2: Normality test results

	Kolmogorov-smirnov			Conclusion
	Statistic	DF	Sig.	
Pre-test & Post-test	,241	20	,074	Normal

The results of the calculation of the normality test of the research data were obtained through calculations using SPSS 19 with the Kolmogorov-Smirnov test tool. The basis for making the decision is if the sig value or probability value > 0.05 then the data distribution is normal, and if the sig value. or the probability value < 0.05, it is said that the distribution of the data is not normal. The following are the results of the normality test from the research data that have been obtained from the results of the initial and final tests. From the calculation results obtained sig value of 0.079> 0.05 then the test results of the normality test are declared normal.

3. Homogeneity Test

The homogeneity test was carried out with the intention of knowing the level of homogeneity of variance of each test group. This test is needed as a requirement in comparing the data between test groups, namely the initial test data and the final test data. This test is calculated using the Levene test (= 0.05), provided that the value of sig. or the probability value is greater than 0.05 (sig > 0.05), then the data is homogeneous, whereas if the value of sig. or the probability value is less than 0.05 (sig. < 0.05), then the data is not homogeneous. The results of the calculation of this homogeneity test can be seen in the table below.

Table 3: Homogeneity Test Results

	Levene Statistic	DF1	DF2	Sig.	Kesimpulan
Tes_Awal Tes_Akhir	1,126	2	16	,349	Homogen

By looking at the table above, it can be concluded that the sig value of 0.349 > 0.05 means that the homogeneity test results are declared homogeneous. Because the research data is above normal and homogeneous, the statistical test used is a parametric statistical test using the paired sample t test.

Discussion

Anaerobic endurance training has an effective influence on the intensity of motion in basketball games. Based on the t arithmetic value of 13,358, then the t table of 2,093 and the significance value of 000, it is concluded that the research hypothesis is accepted.

Endurance is one of the main biomotor components in every sport. The biomotor component of endurance is generally used as a benchmark to determine the level of physical fitness of athletes. Physical fitness is a condition of the ability of the body's equipment to maintain a balance of energy availability before, during and after the activity takes place. Every sport activity that requires maximum intensity in a short time always requires an anaerobic energy source. Meeting energy needs will change from anaerobic to aerobic, if the duration increases which will automatically be followed by a decrease in intensity. Without having good anaerobic ability, the athlete will not be able to work with high intensity and short duration or explosive work.

Any activity that lasts for a few seconds, anaerobically the energy needed is very dependent on Adenosine Triphosphate and Phospo Creatine. Anaerobic endurance is closely related to the type of muscle fibers possessed by athletes. Athletes who have a greater percentage of white muscle fibers (fast-twitch fiber) will tend to produce greater anaerobic power than athletes who have a greater distribution of red muscle fibers (slow-twitch fiber) and this is in accordance with the characteristics shown. Possessed by white muscle fibers, which fast twitch motor units tire quickly.

Conclusion

Based on the t-count value obtained, the anaerobic endurance training group obtained 13,358. Seeing these results, anaerobic endurance training has a significant effect on the intensity of motion in basketball games. Thus the research hypothesis is accepted.

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