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PHYSICAL EDUCATION

ANALYSIS OF ANAEROBIC CAPACITY OF BASKETBALL PLAYERS

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Abstract

The purpose of the study was to find out the analysis of anaerobic capacity of basketball players. To achieve this purpose of the study, four hundred and eighty basketball players were selected as subjects who were attend the state championship during the year 2015-2016. The selected subjects were aged between 13 to 45 years and they were examined by a qualified physician and certified that they were medically and physically fit to participate above programme. Based on their age the subjects were divided into four equal groups of 120 each namely Group I- under 14 years boys (120), Group II - under 16 years boys (120), Group III - under 18 years boys (120) and Group IV- senior boys (120). The selected criterion variable such as anaerobic capacity was measuring by Margaria-Kalamen Anaerobic Power test. The analysis of variance (ANOVA) was used to find out the significant differences if any, between the groups on selected criterion variable. The 0.05 level of confidence was fixed to test the significance, which was considered as an appropriate. The result of the present study has revealed that there was a significant difference among the groups on anaerobic capacity.

Keywords: Anaerobic Capacity, Basketball PLAYERS, Different Age Categories.

1. Introduction

Sports in the present world have become extremely competitive. It is not the more participation or practice that brings out victory to an individual. Therefore, sports life is affected by various factors, like physiology, Biomechanics. Sports Training, Sports Medicine, and Sociology and Psychology etcetera. All the coaches, trainers, physical education personal and doctors are doing their best to improve the performance of the players of their country. Athletes/players of all the countries are also trying hard to bring laurels/medals for their countries in International competitions. The physical education profession is entering one of the most exciting –dynamic eras in the history. Traditionally the physical education profession has been viewed as providing services within the educational field specifically to the schools within the last5 20 years the scope of physical education has expanded tremendously. Performance of players has dramatically progressed over the past few decades. Performance levels unimaginable before are now common and the no of athletes capable of outstanding results are increasing. One among the contribution factors is that athletics is a challenging field, and intense motivation has encouraged long, hard hours of week. Also, coaching has been more sophisticated, partially from the assistance of sports specialists and scientists. Sports Sciences have progressed from descriptive to scientific. A broader base of knowledge about athletes exciting now is reflected in training methodology. Now a day's people are aware of physical fitness and they know the importance of physical education. The physical education is one part of the education process. In the physical fitness it is very important for the youth people know that slogan a "sport for all". It is developed of physical mental, emotional, social and spiritual though the medium of physical activities. The word physical refers to body and indicates bodily characteristics such as strength, speed, endurance, flexibility, agility, explosive power and performance. IT seemingly contrasts the body with the mind. This refers to a process of education that develops the human body especially fitness and movement skills. Anaerobic exercise is short-lasting, high-intensity activity, where your body's demand for oxygen exceeds the oxygen supply available. Anaerobic exercise relies on energy sources that are stored in the muscles and, unlike aerobic exercise, is not dependent on oxygen from (breathing) the air. Anaerobic capacity is the total amount of energy obtainable from the anaerobic energy systems. That means the combined amount of output for the ATP, phospho-creatine and lactic acid systems within a certain period of time. A simple, less scientific method for measuring this capacity is to run as far as you can at a near-maximal pace. The further you can run at a fast pace the more anaerobic enzymes your body is capable of producing and utilising and the better able you are to buffer lactate. Anaerobic capacity is one of the primary focuses of the unleashed training protocols. The better able your combined anaerobic energy systems are at utilising energy and recovering, the higher the intensity you are able to maintain. For example; a 400 metre runner needs to perform at nearly 100 percent for over 40 seconds when competing at elite level. This is extremely taxing on the anaerobic energy systems and requires a highly conditioned state. By increasing anaerobic capacity the 400 metre runner is able to buffer more lactate at a faster rate, produce and use more anaerobic enzymes and continue turning body fuels into useable energy for immediate access. Endurance athletes must have a well-conditioned anaerobic energy system, especially the more sustainable lactic acid system. The limiting factor in endurance athletes is most-often their anaerobic threshold. If an athlete has a higher threshold he/she is able to maintain a greater pace without dipping too far into the anaerobic energy systems. When you maintain a pace that is beyond aerobic your body goes into debt. Simply put, you end up consuming energy faster than it can be replaced. Eventually your body needs to slow down, there's no choice. So with a more highly conditioned anaerobic (lactic acid) energy system your body will take longer to reach it. This results in the use of fuels that can be replaced continuously. Hence an endurance athlete can maintain faster paces without dipping into these stores, and if/when they do start to use the anaerobic energy systems their body is better equipped to deal with it for longer and then recover when they are well-conditioned. There are only a select few ways to improve your anaerobic capacity. The thing is though that not all methods are specific to your goals or will produce the best result to effort ratio. What has been discovered is that the lactic acid energy system can only be engaged at a high level of output for a very short time. Anything longer and you begin entering the aerobic zone of training, which is not the goal here. High intensity intervals are the primary way to increase anaerobic capacity. Don't be mistaken by anaerobic power, that's a different thing altogether. The lactic acid energy system needs to be trained to near exhaustion on each interval. In order to accomplish this, intervals need to be anywhere from 40 seconds to three minutes and performed at an intensity that can barely be maintained for the given time of each interval. Alternatively, intervals of shorter duration with less recovery time can be used. Methods such as the Tabata protocol will develop anaerobic capacity. Strictly speaking, the terms "aerobic" and "anaerobic" refer to the presence and absence of oxygen, respectively. Most of our cells prefer to get their energy by using oxygen to fuel metabolism. During exercise with adequate fuel and oxygen (i.e., aerobic), muscle cells can contract repeatedly without fatigue. Activities such as walking, long slow runs, rowing, and cycling require a great deal of oxygen to generate the energy needed for prolonged exercise (i.e., aerobic energy expenditure). In sports which require repeated short bursts of exercise however, the anaerobic system enables muscles to recover for the next burst. Anaerobic capacity is defined as the amount of extra work you are able to perform in running beyond your aerobic capacity. When you sustain a fast but submaximal speed long enough, your body will reach a point at which it is consuming oxygen at the highest rate it possibly can. Anaerobic metabolism, or anaerobic energy expenditure, is a natural part of whole-body metabolic energy expenditure. Fast twitch muscle (as compared to slow twitch muscle) operates using anaerobic metabolic systems, such that any recruitment of fast twitch muscle fibers leads to increased anaerobic energy expenditure. Intense exercise lasting upwards of about four minutes (e.g., a mile race) may still have a considerable anaerobic energy expenditure component. High-intensity interval training, although based on aerobic exercises like running, cycling and rowing, effectively becomes anaerobic when performed in excess of 90% maximum heart rate. Anaerobic energy expenditure is difficult to accurately quantify, although several reasonable methods to estimate the anaerobic component to exercise are available. The by-product of anaerobic glycolysis, lactate, has traditionally been thought to be detrimental to muscle function. However, this appears likely only when lactate levels are very high. Elevated lactate levels are only one of many changes that occur within and around muscle cells during intense exercise that can lead to fatigue. Fatigue, that is muscle failure, is a complex subject. Elevated muscle and blood lactate concentrations are a natural consequence of any physical exertion. The effectiveness of anaerobic activity can be improved through training

2. Methodology

In the present study all the students were attend the state championship during the year 2015-2016. A representative sample of four hundred and eighty basketball players was selected as subjects. The selected subjects were aged between 13 to 45 years and they were examined by a qualified physician and certified that they were medically and physically fit to participate above programme. Based on their age the subjects were divided into four equal groups of 120 each namely Group I- under 14 years boys (120), Group II - under 16 years boys (120), Group III - under 18 years boys (120) and Group IV- senior boys (120). The selected criterion variable such as anaerobic capacity was measuring by Margaria-Kalamen Anaerobic Power test.

The athlete's weight is determined in kilograms. The athlete is given a few practice runs up the steps to warm up. The athlete stands ready at the starting line 6 meters in front of the first step. On the command "Go", the athlete sprints to and up the flight of steps, taking three steps at a time (stepping on the 3rd, 6th and 9th steps), attempting to go up the steps as fast as possible. The time to get from the 3rd step to the 9th step is recorded (either using a stopwatch or using switch mats placed on the 3rd and 9th steps), starting when the foot was in first in contact with the 3rd step, and stopped when the foot contacts the 9th step. Allow three trials of the test, with 2-3 minutes recovery between each trial. Scoring: Power (Watts) is calculated from the formula below, where P = Power (Watts), M = Body mass (kg), D = Vertical distance, between steps 3 & 9 (meters), t = Time (seconds). 9.8 is the constant of gravity: $P = (M \times D) \times 9.8 / t$

The analysis of variance (ANOVA) was used to find out the significant differences if any, between the groups on selected criterion variable.

The "F" ratio found to be significant, the Scheffe's post hoc test was used to find out the significant difference among the paired means. The 0.05 level of confidence was fixed to test the significance, which was considered as an appropriate.

3. Results

The mean and standard deviation and "F" ratio scores of under 14 years, under 16 years, under 18 years and senior boys on anaerobic capacity of basketball players are given in table I. '

Table I.

MEAN STANDARD DEVIATION AND "F" RATIO OF UNDER 14 YEARS, UNDER 16 YEARS, UNDER 18 YEARS AND SENIOR BOYS ON ANAEROBIC CAPACITY OF BASKETBALL PLAYERS

Mean and SD				**"F" ratio**
Group I Under 14 yrs	**Group II Under 16 yrs**	**Group III Under 18 yrs**	**Group IV Senior Boys**	
86.42 ± 7.22	88.38 ± 6.54	95.42 ± 6.86	106.53 ± 8.48	173.32

Table I shows the mean, standard deviation and 'F' ratio of different ages of basketball players on anaerobic capacity. The mean values of Group I is 86.42, Group II is 88.38, Group III is 95.42 and Group IV is 106.53 respectively. The values of standard deviation of Group I is 7.22, Group II is 6.54, Group III is 6.86 and Group IV is 8.48 respectively. The obtained "F" value is 173.32 is greater than the table "F" value of 2.62 with df 3 and 476 required for significance at 0.05 level of confidence. The results of the study indicate that there is a significant difference among the mean of Group I, Group II, Group III and Group IV on anaerobic capacity. As the "F" ratio was found significant in case of anaerobic capacity the Scheffe's post hoc test was applied to test the significance of differences between paired means separately among basketball players belonging to different age group which is presented in table II.

Table II.

SIGNIFICANCE DIFFERENCES BETWEEN THE PAIRED MEANS OF ANAEROBIC CAPACITY AMONG BASKETBALL PLAYERS BELONGING TO DIFFERENT AGE GROUPS

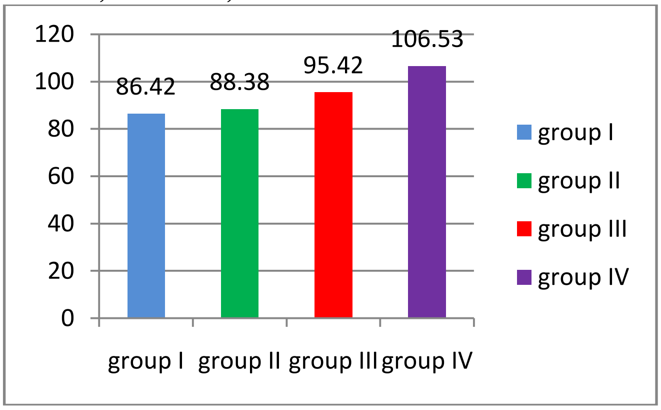
Means				**Mean Difference**
Group I under 14 years boys	**Group II under 16 years boys**	**Group III under 18 years boys**	**Group IV senior boys under 35 yrs**	
86.42	88.38			1.96*
86.42		95.42		9.00*
86.42			106.53	20.11*
	88.38	95.42		7.04*
	88.38		106.53	18.15*
		95.42	106.53	11.11*

Table II shows that the mean differences on Group I and Group II, Group I and Group III, Group I and Group IV, Group II and Group III, Group II and Group IV, Group III and Group IV are 1.96, 9.00, 20.11, 7.04, 18.15 and 11.11 respectively and the above values are greater than the confidence interval value of 1.92, which shows significance differences at 0.05 level of confidence.

However, the improvement in anaerobic capacity was significantly differing from each group and Group IV is higher than the other groups. The mean values of Group I, Group II, Group III and Group IV on anaerobic capacity are graphically represented in the figure I.

Figure I

MEAN VALUES OF GROUP I, GROUP II, GROUP III AND GROUP IV ON ANAEROBIC CAPACITY



4. Discussion

The results of the study showed that the all the age groups have significantly differ in the anaerobic capacity. The result of the study indicates that the group IV has significantly differed from the aerobic endurance, when compared to the group I, group II and group III. It is a known fact that the anaerobic capacity is best suited for developing physical fitness. The present study also revealed that the above findings of the study was supported by Bente and others (2012), Chittibabu (2014) and Zaton and Adam (2011).

5. Conclusion

There was a significant difference on anaerobic capacity among different age groups of basketball players of under 14 years, under 16 years, under 18 years and senior boys. Further the senior boys are better in anaerobic capacity than the other age groups of under 14 years, under 16 years, under 18 years basketball players.

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