The Effect Of 6 Weeks of Selected Plyometric Exercises on Anaerobic Power Indices Of 10-15- Year-Old Male Basketball Players

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Abstract
The aim of this research is to investigate the effect of 6 weeks of selected plyometric exercises on the aerobic power indices of basketball players aged 10 to 15 years. The statistical population of this study consisted of basketball players in the city of Ardabil, aged 10 to 15 years (descriptive information of the control group: age 12.25±2.40, weight 67.35±11.49, height 158.11±12.8, body mass index 19.95±2.15) (descriptive information of the experimental group: age 23.65±2.23, weight 12.14±18.52, height 160.34±8.59, body mass index 20.03±2.31) from which 40 basketball players without any injuries were selected from the statistical population of the research. The participants were randomly assigned to two groups, control and experimental. The experimental group underwent selected plyometric exercises for 6 weeks. The research exercises were at three levels: low, moderate, and high intensity. To evaluate the effects of the exercises, the vertical jump test in basketball, known as the vertical jump test, was used. This study was conducted once before conducting the research and once after completing the presentation of selected exercises for a period of 6 weeks for both the control and experimental groups. Using an independent t-test and a significance level of 0.05, the results obtained from the pre- and post-tests were examined. Statistical analysis revealed that the selected plyometric exercises for 6 weeks led to a significant increase in minimum (p=0.002), average (p=0.000), and maximum (p=0.000) anaerobic power.
Keywords: Plyometric Exercises, Anaerobic Power, Basketball

1.Introduction

Today in the world of sports, experts are striving to use scientific findings to better prepare athletes for national, international, and Olympic competitions. It seems that utilizing the best training methods is one of the most important principles that coaches must adhere to in sports. The effectiveness of sports training depends heavily on intensity, volume, time, and the athlete's ability.

Among the various training methods, one of the most practical ones is plyometric exercises, which have become important among athletes and sports club coaches today. Plyometric exercises consist of various sports techniques that increase strength and responsiveness. Researchers have found that exercises within a specific time period led to increased vertical jump, speed, leg strength, muscle power, increased professional awareness, and improved agility.

On the one hand, the physical and movement readiness requirements are unique in
each sports discipline. Athletes in different sports disciplines require specific elements of physical and movement readiness based on the nature of their discipline. In other words, the use of factors such as strength, endurance, power, flexibility, speed, or a combination of them varies in each sports discipline. For example, in basketball, having high anaerobic power is more important relative to other factors (Wilmore & Costill, 2005). The ability of plyometric exercises to increase anaerobic power in sports disciplines, especially speed disciplines, has attracted a lot of attention from researchers (Masamoto et al., 2003).

Basketball is considered one of the most popular sports in the world, especially among university students. Due to its increasing popularity, numerous research studies have been conducted by researchers in an attempt to find practical information for coaches and players. The popularity of basketball as a sport can be understood from the countless viewers of NBA games (Bouchet et al., 2009).

In the past two decades, basketball has become increasingly competitive, and the capacity of basketball players to produce various types of energy and power such as jumping, acceleration, pivots, and changes of direction has become an important factor in most game situations. Basketball is an intermittent sport that is mostly non-aerobic in nature. Non-aerobic readiness components such as sprint time and jump height have a significant impact on determining sustained success in long-term leagues (Gottlieb et al., 2022).

Anaerobic capacity refers to the maximum amount of energy that the human body can produce within a specific time period without using oxygen. Anaerobic capacity may also be defined as the maximum amount of ATP formed by anaerobic processes during a single exercise session (Gastin, 1994). Typically, athletes in power and speed sports have a high level of this capacity. Generally, activities lasting more than 10 minutes can be considered as anaerobic capacity. Basketball players in this sport cover approximately 5 - 5.4 kilometers during a 40-minute game without overtime, performing various movements such as running, dribbling, changing speed, and

rebounding. To perform such movements, both aerobic and anaerobic energy systems will be engaged. It seems that the main energy system involved in basketball is the anaerobic metabolism system (Helgerud et al., 2007).
The training area includes a technique that involves developing vertical jump ability similar to basketball skills. These exercises are called plyometrics and involve stretching followed by rapid and direct muscle contractions. Plyometric exercises can be effective in improving speed, agility, and vertical jump, which are important skills in basketball. Plyometric comes from the two words "plyo" and "metric," which have Greek roots, meaning "measurable increase" (Radcliffe & Chu, 2002). Plyometric exercises, in general, consist of a set of movements that combine power and range of motion to achieve a type of explosive-reactive movement. Plyometric exercises are often referred to as jumping exercises and depth jumps (Bompa, 2003). Plyometric exercises can increase power and speed in individuals of all ages, even children (Sanborn et al., 2000). Doylarial and colleagues (2010) demonstrated that plyometric exercises can increase vertical jumps in young basketball players.

2.Literature of Review

The game of basketball is an alternating flow of various activities in which elegance,
accuracy, timing and agility are the main factors. One of the most important effective factors in determining the physiological requirements of basketball is movement patterns and game intensity. The intensity of the game in basketball can be different according to the method and system of the game, the coach's philosophy, the game conditions and the level of physical skill of each player. Therefore, the physiological needs of a basketball player may be different according to the way each team plays, and may even be different from other teammates. In research conducted by Vukovich et al. (2010), the intensity of basketball players' movements was investigated in relation to different speeds. As a result of this research, it was found that all types of players spent more than 60% of the game time in low- intensity movement with an average speed lower than 1.4 m/s. Gottlieb et al. (2014) found out during research that the number of moves during a complete basketball game is 997 ± 183 and the change of direction is also done every two seconds. During a European League 1 basketball game, an average of 40-60 jumps and 60 changes of direction have been reported for male players. Zuba et al. (2013) have considered the aerobic apparatus to be essential for success in basketball. The aerobic energy machine uses oxygen to convert glucose and fat into energy, helping to sustain low-intensity, more sustained movements, which represent 65 percent of all active play. Unfortunately, coaches often ignore the role of the aerobic energy system for success in basketball (Ziv et al., 2009).
Anaerobic training is a common and effective type of training, with high intensity and power, and is completely different from aerobic training. This type of exercise includes a set of activities that are performed in order to increase anaerobic fitness. Speed training is an example of anaerobic training. In training planning, paying attention to two principles is very important. The first principle is the principle of exercise specificity. Based on this principle, the design and implementation of the anaerobic training program should be done considering the energy system, muscles and main organs involved in each sport. The second principle is particularly important in exercise science, it is the overload principle (Qarakhanlou et al., 2008).
The duration required for anaerobic training for each sport is different based on the rules and type of activity in those sports, and it depends on the contribution of anaerobic devices in the energy production required by each sport. For example, in sports such as: running 100 meters, basketball, wrestling and handball, where a larger share of the energy required for the activity is provided through anaerobic energy production devices, more time should be devoted to anaerobic exercises. In these types of sports, it is very important to pay attention to the contribution of each of the phosphagen and lactic acid systems in the production of energy required for the activity (Alijani, 2014).
In many sports, the athlete's success depends on the explosive power of the athlete's leg and his muscle strength. In activities such as jumps, jumps, and in sports such as basketball, athletics, and other activities, the athlete must be able to use his strength as quickly as possible and with the most available force (Powell et al., 2003).
The word plyometric has its roots in the Greek word Pleythyein, which means increase or intensify. Plyometrics is derived from two words "playo" and "metric" meaning "evaluable increase" (Radcliffe and Chu, 2002).
A pioneer researcher in the field of plyometric exercises is a Russian-born physical education instructor named Yuri Verkhoshansky, the father of plyometrics. This scientist designed a system of sports activities called jump training, which included successive and repeated jumps to increase the speed and explosive abilities of Russian track and field athletes. A clear example of plyometric exercises was presented by Yuri Verkhoshansky, a

Russian coach. The results were amazing. A for the birds (high jump, triple jump and long jump). An important aspect of his plyometric principles was that these exercises help to improve the entire nervous, muscular system for power movements. He attributed his success to plyometric exercises. In 1970, plyometric exercises were used as a training method by track and field athletes in the United States, but about a decade later, as a popular training method to increase explosive power in sports such as: basketball, football, volleyball, gymnastics and Even weightlifting was employed (Joe, 2013).
Plyometric exercises lead to:

•Increased use and neural activation
•The increase depends on the use of motor units and muscle fibers
•Increasing the level of excitation of motor neurons
•Transforming muscle power into explosive power
•Plyometric exercises develop the nervous system, as a result, this system reacts to muscle stretching with maximum speed; This in turn develops the ability to contract rapidly with maximal force.
•Repetitive reactive exercises lead to fatigue, which affects external contraction
and more importantly internal work capacity.
•Fatigue is characterized by increasing the duration of contact with the ground (Eben et
al., 2011).
Plyometric exercises performed at high intensity in natural activities increase the possibility of injury, in fact many physical therapists and sports trainers believe that plyometrics are an injury waiting to happen. Although plyometric exercises are recognized as a new way to increase explosive power, they put people at risk of sports injuries. Most injuries are caused by too many training sessions per week, too many jumping repetitions per training session, incorrect jumping on hard surfaces, or lack of leg strength (Eben et al., 2011).
Perno et al. (2004), in research, investigated the profile of body composition, physiological and anthropometric profile of elite futsal players in Iran. They reported the average measured physiological indices of futsal players as follows:
Aerobic power (51.4 mm/kg/min), agility (16.11), vertical jump (49.26) and flexibility (33.55 cm), also the results of their research indicated that between Aerobics and aerobics have a negative and significant relationship (r=0.307).
In a research to compare the effects of plyometric exercises and common taekwondo exercises on anaerobic power, Ghasemi et al. (2012) examined adolescents aged 14 to 17 years. These exercises were performed for 8 weeks, 3 sessions per week and 40 minutes each session, on both control and experimental groups. The control group performed the usual taekwondo exercises, while the experimental group also included plyometric exercises in their agenda. The results after analyzing the data obtained through the research test showed that the experimental group achieved a significant improvement in the record of vertical jump, agility and anaerobic power. However, the two-speed record of this group did not show a significant difference.
Khodayi et al. (2013) investigated the effect of two weeks of short-term intense
interval training on anaerobic power output in 20 female student athletes. In this research, the participants were divided into two equal groups, control and experimental. The exercises in question were performed during two weeks, 5 days a week. The analysis of the data from this research showed that a significant increase in the level of maximum oxygen consumption as well as the maximum, average and minimum anaerobic power can be seen using the rest test.
Gholamreza Parsa (1377), conducted a research to investigate and compare the effect of two plyometric training methods and weight training on the vertical jump of volleyball players. 45 volleyball players were divided into three groups of 15 people, two groups were selected as the experimental group and one group was selected as the control group. The first group, in addition to volleyball exercises, plyometric exercises, which include jumping in place, jumping over hurdles and deep jumping. was done. The second group, along with volleyball exercises, did weight exercises that included half squats, deadlifts, and lifting on the toes. The third group, which was the control group, did 2 sessions a week of regular volleyball practice. The result of the research after eight weeks showed that all plyometric exercises had a positive effect.
In research by Tiwari et al. (2022), the effect of plyometric exercises on the shooting accuracy of basketball players was investigated. A 6-week training program including plyometric exercises and medicine ball assisted plyometric exercises (2 kg) was conducted for boys in the age group of 18-25. Two control and experimental groups were created to carry out the research. Before each session, warm-up exercises were performed regularly for 10 minutes. The experimental group did its exercise program in 18 sessions. The plyometric exercises included plyometric swimming, ball throwing with two hands over the head, etc. The results obtained through the fixed three-point shot test were analyzed by spss software. This research showed that plyometric exercises have a positive effect on improving basketball players' shots.
Biswas and Sankar Ghosh (2022) investigated the effect of various plyometric exercises on land and water on the anaerobic power of athletes. A total of 48 athletes in different disciplines were randomly selected from the marginal schools of the city. The participants were divided into four equal groups: a) dry plyometrics (n=12), b) water plyometrics (n=12),
c) water plyometrics group with weight vest (n=12) and d) control group (12) =n). Various plyometric exercises were presented for fourteen weeks to the first three groups. Margaria Kalaman's power test was used to check anaerobic power in this research. Examining the data obtained from this research showed that plyometric exercises had a positive effect on the anaerobic power of all three research groups. But these effects were more intense only in the blue plyometric group with a weighted vest.

Panchar et al. (2020), in research, investigated the effect of 8 weeks of plyometric exercises on anaerobic power, balance and two-speed performance of 12-14-year-old female handball players. In this research, 28 female handball players who were members of the school team were selected. The players were divided into two control and experimental groups with equal numbers. Along with handball exercises, 8 weeks of plyometric exercises, 3 days per week, were given to the control group. Before starting the training on the first day, a pre-test of balance, anaerobic power and two 30-meter sprints was performed on the players. The same tests were taken from the players again in the last training session of the 8-week study. After examining the results, it was found that the use of plyometric exercises can have a positive effect on the performance of two-speed, balance and anaerobic power of 12-14-year-old female handball players.

Wilson (1996), in a study titled the effect of strength training on 21 healthy male athletes, did plyometric and strength training for 11 weeks. The results showed that weight training increased muscle strength and plyometric training increased strength, speed. action and agility.

3.Methods

3.1.Research Method

In this research, due to the lack of control of all disturbing factors in the human study samples, it is of a semi-experimental type, and due to the scientific aspect of the research and the use of its results to solve practical and real problems, it is of an applied research type.

3.2.Participants

The statistical population of this research was made up of male basketball players aged 10 to 15 years old at Poya Sports Club of Sablan, Ardabil city. Among the 56 basketball players present in Sablan dynamic sports club, 40 basketball players were selected completely randomly as the research sample. The selected samples were randomly divided into two equal groups consisting of 20 basketball players. One group was selected as the control group and the other group was selected as the experimental group, and selected plyometric exercises were performed on them.

3.3.Variables Independent Variable

1)Selected plyometric exercises Dependent Variables

2)Maximum anaerobic power

3)Average anaerobic capacity

4)Minimum anaerobic power

3.4.Data Collection Tools

•BAST test (substitute for the RAST test)

•Leather basketball number 7

•Stopwatch to determine the time

•Sports barrier for basketball

•Box to jump

•Digital scale

•Selected plyometric exercises

3.5.Procedure

To conduct the upcoming research, 40 people were randomly selected after the necessary coordination with the Sablan Sports dynamic basketball club in Ardabil. All the selected people were between 10 and 15 years old. The participants were divided into two groups of 20 people, control and experimental. The control group performed their daily exercises with the coordination of the gym trainer, while the experimental group performed the plyometric exercises mentioned in the above table in addition to the usual exercises. Before starting, both research groups were evaluated by a special test for measuring anaerobic power in basketball. It should be noted that the physiological characteristics of the participants including: height and weight were also measured.

During 6 weeks, the experimental group started a series of selected plyometric exercises under the supervision of the researcher as their coach, in addition to regular gym exercises.

To do this, the researcher, in coordination with the coach of the club, presented his desired training program.

The participants performed three 90-minute training sessions for 3 times a week, on even days, for 6 weeks. Each training session included: warm-up exercises, basic gym training exercises, games and cool-down exercises. The researcher used about 20 to 30 minutes to perform plyometric exercises in each session so that the necessary time is available for the gym's own training programs.

In the first week of training, after being introduced by the gym trainer, the researcher started his work with three low-intensity plyometric exercises:

Squat Jump Jump to the sides Jump on the box

On the first day of the first week, the players had been subjected to preliminary evaluations and a pre-test. The players of the experimental group performed the mentioned plyometric exercises on the second and third day of

the first week under the supervision of the researcher. On the second and third day, the intensity of the exercises provided was low.
In the second week, two exercises with low intensity and two exercises with moderate intensity were presented to the experimental group:
Forward Jump Scissor jump
Side jump over the hurdle Climbing Movement
The third week of the study was followed with two low-intensity exercises and three moderate-intensity plyometric exercises:
Jump to the sides Forward Jump
Side jump over the hurdle
Jump over the hurdle with a pause Climbing Movement
In the third week, the researcher spent the third day without providing the mentioned exercises in order to avoid the negative physiological effects of continuous repetition of exercises such as erosion and fatigue. On the third day of the third week, with the arrangements made with the trainers of the club, the participants of both experimental and control groups held a competition together.
At the beginning of the fourth week, the athletes of the experimental group again started the selected plyometric exercises under the supervision of the researcher:
Spinning Ball Sitting Toss Forward Jump
Side jump over the hurdle
Jump over the hurdle with a pause Burpee Move
Due to the fact that basketball is a ball, the researcher used 1 and 1.5 kg special medicine balls in the fourth week. These balls were used to perform the practice of throwing the spinning ball. On the first day of the fourth week of training, a normal size 7 basketball that weighs 625 grams was used for this training. On the second day, the researcher used a 1 kg medicine ball to present this movement. On the third day of the fourth week, the athletes were asked to perform the seated swing ball throwing movement with a one-and-a-half-

kilogram medicine ball, according to the requested number and repetitions.
The fifth week of the study was followed up by presenting three plyometric exercises with high intensity, two exercises with moderate intensity and one exercise with low intensity:
Spinning ball sitting toss Jump on the box Climbing Movement
Jump over the hurdle with a pause Burpee Move
Side jump over the hurdle
Due to the high number of exercises in the fifth week, in order to avoid possible injuries and fatigue caused by the exercise, the researcher followed up the second day of the fifth week without providing plyometric exercises.
Upon reaching the sixth and final week of the research, the researcher used one low- intensity exercise, two moderate-intensity plyometric exercises, and two high-intensity plyometric exercises:
Jump on the box Climbing movement
Jump over the hurdle with a pause Burpee Move
Spinning ball sitting toss
In the final week of training, the first and second days of the week were dedicated to the presentation of plyometric exercises selected by the researcher. The third day of the sixth week was the day of conducting the post-test and recording the players' data. On the third day, the researcher conducted a special test for measuring anaerobic power (BAST test) from the experimental group and recorded the results. For the control group of the research, the researcher asked his fellow trainer, who was in charge of training the control group during 6 weeks with regular gym exercises, to perform the anaerobic power test and record the results. After 6 weeks of providing selected plyometric exercises to 20 male basketball players between 10 and 15 years old, the information obtained through the pre- and post-test of
anaerobic power was analyzed by statistical data analysis software

1.Results

1.1.First Hypothesis

Hypothesis zero: 6 weeks of selected plyometric exercises have no effect on the maximum anaerobic power index of 10–15-year-old male basketball players.
To check the hypothesis, independent t-test was used, which compares the average of two groups of participants. In other words, in this test, the averages obtained from random samples are analyzed and investigated. This means that we randomly select samples from two different communities, regardless of whether the number of samples is equal or unequal, and compare the averages of those two groups.

Table 4-1 Independent T-Test Results of Maximum Power

	Groups	N	Mean	Standard deviation	SEM
Maximum Anaerobic Power Pretest	Control Group	20	62.80	20.572	4.600
	Experimental Group	20	60.40	13.531	3.026
Maximum Anaerobic Power Post Test	Control Group	20	61.70	19.871	4.443
	Experimental Group	20	68.65	13.311	2.973

To analyze the hypothesis, independent t-test was used, which compares the average of two groups of participants. In other words, in this test, the averages obtained from random samples are analyzed and investigated. This means that we randomly select samples from two different communities, regardless of whether the number of samples is equal or unequal, and compare the averages of those two communities.
In the pre-test of Fast, which was taken to check the maximum power, the average maximum power of the control group was 62.80, the standard deviation was 20.572, and the standard error of the average was 4.600. The same information for the experimental research group included 60.40 for the maximum power, 13.531 for the standard deviation and 3.026 for the standard error of the mean.
In the post-test, which was taken from the participants after 6 weeks of plyometric exercises, the mean maximum anaerobic power for the control group was 61.70, the standard deviation was 19.871, and the standard error was 4.443. The results of the experimental research group showed that the average maximum power for this group was 68.65, the standard deviation was 13.311, and the standard error of the average was 2.976 (Table 4-1).

Table 4-2 Independent T-Test Results of Pre-Test and Post-Test of Maximum Power

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Maximum Anaerobic Power Pretest	Equal variances assumed	3.685	.62	.436	38	.665	2.400	5.506	-8.746	13.546
	Equal variances not assumed			.436	32.848	.665	2.400	5.506	-8.746	13.406
Maximum Anaerobic Power Post Test	Equal variances assumed	3.681		1.300	38	.000	-6.950	5.348	-17.777	3.877
	Equal variances not assumed			1.300	33.194	.000	-6.950	5.348	-17.828	3.928

The results of the independent t-test of maximum anaerobic power showed that in the pre-
test of maximum power, the significant level of the test was equal to 0.665. In the post-test of the maximum anaerobic power that was taken after 6 weeks of plyometric exercises, the data from the independent t-test showed that the significance level is 0.000 (Table 4-2).
Considering that no plyometric exercise was done on the research samples before the pre- test, this result is definitive. After the maximum anaerobic power test, the significance level of the independent t test is less than 0.05. This result indicates that the null hypothesis of the research that 6 weeks of selected plyometric exercises on the maximum anaerobic power index of 10–15-year-old male basketball players is not correct and a positive effect of plyometric exercises on maximum anaerobic power has been seen.

3.6.Second Hypothesis

To answer the second research question, it was assumed that 6 weeks of selected plyometric exercises are not effective on the average anaerobic power index of 10-15-year- old male basketball players. To check this hypothesis, the collected data were analyzed with independent t-test.

Table 4-3 Independent T-Test Results of Average Power

	Groups	N	Mean	Standard deviation	SEM
Average Anaerobic Power Pretest	Control Group	20	57.90	19.051	4.260
	Experimental Group	20	55.95	12.559	2.808
Average Anaerobic Power Post Test	Control Group	20	57.20	18.438	4.123
	Experimental Group	20	63.30	12.436	2.781

In the pre-test taken to check the average power variable, the average power for the control group was equal to 57.90, the standard deviation was equal to 19.051, and the standard error of the average was equal to 4.260. In the research experimental group, the data analysis showed that the average mean of anaerobic power is 55.95, the standard deviation is 12.559, and the standard error of the mean is 2.808. In reviewing the average power post-test data, the average power for the control group was 57.20, the standard deviation was 18.438, and the standard error of the average was 4.123. The experimental group recorded a value of 63.30, a standard deviation of 12.436 and a standard error of 2.781 in the post-test of mean anaerobic power (Table 4-3).

Table 4-4 Independent T-Test Results of Pre-Test and Post-Test of Average Power

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Average Anaerobic Power Pretest	Equal variances assumed	2.481	.123	.382	38	.704	1.950	5.102	-8.379	12.279
	Equal variances not assumed			.382	32.891	.704	1.950	5.102	-8.432	12.332
Average Anaerobic Power Post Test	Equal variances assumed	3.010		-1.227	38	.000	-6.100	4.973	-16.167	3.967
	Equal variances not assumed			-1.227	33.322	.000	-6.100	4.973	-16.167	4.014

The results of the independent t-test of the average anaerobic power variable showed that the significance level in the pre-test of the average anaerobic power is 0.704, which is a number greater than 0.05. This difference shows the lack of effect of 6 weeks of plyometric exercises on the anaerobic power of 10 to 15-year-old boy basketball players, which is a reasonable result considering the absence of any selected plyometric exercises before the post-test.

On the other hand, the significance level in the post-test of the average anaerobic power is 0.000. Considering that the significance level of the average anaerobic power variable is less than 0.05, it can be concluded that the hypothesis that the plyometric exercises have no effect on the average anaerobic power of the participants is rejected (Table 4-4). By comparing the averages obtained in the pre- and post-test of the average anaerobic power

in Table 5-4, the proposed hypothesis can be rejected. According to the increase of 7.35 units in the post-test average power compared to the average anaerobic power before the test, 6 weeks of selected plyometric exercises on the anaerobic power of the research participants can be considered effective.

3.7.Third Hypothesis

By providing selected plyometric exercises for 6 weeks to 20 basketball players aged 10 to 15 years participating in the upcoming research, the data collected during the pre-test and post-test of the minimum anaerobic power variable of the experimental group along with the control group were examined and analyzed. was analyzed.

Table 4-5 Independent T-Test Results of Minimum Power

	Groups	N	Mean	Standard deviation	SEM
Minimum Anaerobic Power Pretest	Control Group	20	54.35	17.751	3.969
	Experimental Group	20	51.95	11.892	2.659
Minimum Anaerobic Power Post Test	Control Group	20	53.10	17.075	3.818
	Experimental Group	20	58.45	11.445	2.559

The control group had an average minimum anaerobic power of 54.35 in the pre-test. The standard deviation was 17.751 and the average standard error for this group in the pre-test was 3.969. The experimental group also had an average minimum anaerobic power of 51.95 in the pre-test. The standard deviation for this group was equal to 11.892 and the standard error of the mean was equal to 2.659 (Table 4-5).

Table 4-6 Independent T-Test Results of Pre-Test and Post-Test of Minimum Power

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Minimum Anaerobic Power Pretest	Equal variances assumed	2.195	.147	.502	38	.619	2.400	4.778	-7.282	12.072
	Equal variances not assumed			.502	33.196	.619	2.400	4.778	-7.318	12.118
Minimum Anaerobic Power Post Test	Equal variances assumed	2.753		-1.164	38	.002	-5.350	4.597	-14.655	3.955
	Equal variances not assumed			-1.164	33.205	.002	-5.350	4.597	-14.700	4.000

As shown in Table 4-6, the significance level in the pre-test of the minimum anaerobic power in the independent t-test is 0.619. The result of the independent t-test for the minimum anaerobic power variable showed that the significance level in the post-test of the research is 0.002.

According to Table 4-5, the variable average of the minimum anaerobic power of the control group of the research in the pre-test (54.35) compared to the post-test (53.10) has decreased by 1.25. On the other hand, by comparing the average minimum anaerobic power of the experimental group in the pre- and post-test of the research, the witness has experienced an increase of 6.5 units. This increase can indicate the positive effect of 6 weeks of selected plyometric exercises on the minimum anaerobic power variable of the experimental group.

By examining the significance level obtained by the independent t-test of the minimum anaerobic power variable, it can be seen that the significance level of the pre-test (0.619) is greater than 0.05, which indicates the lack of effect of the selected plyometric exercises on the minimum anaerobic power. This is a natural result. Because

before the minimum power pre-test, no plyometric exercises were given to the groups. However, the significance level after the anaerobic power test is greater than 0.05, which rejects the null hypothesis of the research. Thus, it can be concluded that 6 weeks of selected plyometric exercises had a positive effect on the minimum anaerobic power of 10-15-year-old boy basketball players.

4.Discussion

According to the overall objective of the research, three questions were posed for the research and for each question a null hypothesis was presented:

Examination of the data collected with the closed test for each variable showed
prospective research.

1)6 weeks of selected plyometric exercises affect the maximum anaerobic power index of 10- to 15-year-old boys basketball players.

2)6 weeks of selected plyometric exercises have an effect on the average anaerobic power index of 10- to 15-year-old boys basketball players.

3) 6 weeks of selected plyometric exercises affect the minimum anaerobic capacity index of 10- to 15-year-old boys basketball players.

According to the results obtained, the general question of the research can be answered positively that performing 6 weeks of selected plyometric exercises has a positive effect on the anaerobic power indicators of 10- to 15-year-old boys basketball players.

The results of the current study showed a positive effect of plyometric exercises on the average anaerobic power in subjects, which is consistent with the research of Miller et al (2006), Kara Denizli (2016), Nikolaidis et al (2014) and Alami (1377) was located on one side.

Orhan (2013), Gepaladhas et al. (2014), Hadi (1390) and Alimardan (1382) during their research on the impact of plyometric exercises on anaerobic power, concluded that the use of plyometric exercises in training sessions Semi-professional and amateur athletes can lead to a significant increase in their maximum anaerobic power. According to the results of the mentioned researchers, the results of this research, which showed that the use of selected plyometric exercises is effective on the maximum anaerobic power of 10-15-year-old boy basketball players, are consistent with the mentioned research.

The upcoming research also showed that if 10-15-year-old boy basketball players use selected plyometric exercises in their sports programs, they can witness an improvement in minimum anaerobic power. This finding is in agreement with the results obtained from the researches of Ari and Çolakoğlu (2017), Musachio (2009), Deh Bedi (2011), Rafiei et al. Anaerobic capacity and other indicators of physical fitness were studied on one side.

The results obtained from this research were somehow similar to the results of Shaji and Isha (2009). Shaji and Isha (2009), during research, compared the effect of plyometric and dynamic stretching training programs on the vertical jump and agility of basketball players. In this study, 45 college basketball players aged 18-25 were tested, while in the present study, the target was 10–15-year-old players. Shaji and Isha (2009) subjected subjects to plyometric exercises for 4 weeks, which was 6 weeks in the present study. Part of the results of the research work of Shaji and Isha (2009) showed that the plyometric training group showed an increase in the anaerobic power index after 4 weeks of training. For this result, Dal Popo and Ariens (2010) consider the strengthening effect of plyometric and combined exercises on the nervous, muscular and metabolic systems. Considering that anaerobic power is affected by various factors such as heredity, age, gender, distribution of muscle fibers and type of training, it can be concluded that the difference in each of the presented factors can also affect anaerobic power. to change According to the type of exercise presented in this research, the increase in anaerobic power can be due to a change in the type of exercises (providing plyometric exercises). Probably, features such as: fast mobility, increasing the speed of sending messages of motor neurons, converting power into power, and strengthening the nervous system make the muscles able to respond appropriately to the interactions created during plyometric exercises such as lengthening. (Bompa, 2003).

Balochi (2009) conducted a study on 70 high school basketball players. The aim of Balochi (2009) was to investigate the effect of plyometric exercises on anaerobic power and body composition of intermediate level basketball players. Unlike the previous research, to
measure the anaerobic power of the subjects, Balochi (2010) used Sargent's jump test. The experimental group of Balochi research (2009) performed plyometric exercises for eight weeks. These eight weeks included 3 sessions of 50 minutes per week. However, the present study chose six weeks that included 3 sessions of 90 minutes to provide selected plyometric exercises. Unlike Baluchi (1389), who only chose plyometric exercises for high school students in the experimental group for 50 minutes, the researcher in his research naturally followed the club training process of 10–15-year-old basketball players and during that time he presented exercises Plyometrics and conducting self-study. To analyze the data in Balochi's research (2009), the paired t-test was used, while the present study used the independent t-test to examine its data. The results of Balochi's research (1389) are on the same side as the upcoming research. Balochi (2009) showed in his research that providing plyometric exercises has a significant effect on the anaerobic power of high school basketball players.

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