

THE PLYOMETRIC TRAINING ON FREE THROW SHOOTING ABILITY AND SKILLS IN BASKETBALL

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Received:15.04.2020

Revised: 20.05.2020

Accepted: 19.06.2020

Abstract

This research aimed to reveal the effect of the plyometric training on free throw shooting ability and skills in basketball of the Physical Education and Sports Faculty, Universitas Jambi students. This research used the experimental method by using **One Group Pretest-Posttest** Design. The independent variable of this research was plyometric training, while the dependent variables of this research were one-handed free throw shooting ability and skills in basketball. The collected data were analyzed by using a t-test which done a normality and homogeneity test before. Based on the results of the hypothesis test (1), it was got $t_{count} = 10,3 > t_{table} = 1,658$. This means that there was an effect of plyometric training on one-handed free throw shooting ability in basketball, while for the hypothesis (2), it was got $t_h = 10,55 > t_{table} = 1,658$, there was an effect of plyometric training on one-handed free throw shooting skills in basketball. Then, the conclusions of this research were (1) the plyometric training effects on *one-handed free throw shooting ability* in basketball of the Physical Education and Sports Faculty, Universitas Jambi students that program basketball course, (2) the plyometric training effects on *one-handed free throw shooting skills* in basketball of the Physical Education and Sports Faculty, Universitas Jambi students that program basketball course.

Keywords: ability, free throw shooting, plyometric, skills

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DOI: <http://dx.doi.org/10.31838/jcr.07.14.144>

INTRODUCTION

Sports which done in all levels of education are all activities and efforts done consciously to encourage, awake and foster physical strength and spiritual forces where they are part of efforts to improve the quality of humans through the educational process. Sports education is an integration of the pedagogical educational process in the field of movement and movement experience. The efforts to achieve the goals of sports can be done by some activities such as training, teaching, and exercising. The exercises provided are the goals oriented which stated by changing the whole behaviors. The skills can only be possessed through a process of movement learning. As stated in the Law of Republic of Indonesia Number 3 of 2005, about National Sports System that there are three components of sports, they are educational sport, competitive sport, and recreational sport. Then, the coaching and developing system are carried out through the stage of sports introduction, monitoring and scouting talent, and increasing achievement.

As an educational sport, the basketball game has been in the curriculum at all levels of education starts from the elementary school to the university, whereas as a competitive sport, the basketball game has competed in several championships such as a *single event*, *multi-events* start at the regional, national, and international levels. Then, as a recreational sport, the basketball game is included in most public places or outdoor sports, so it needs to invite many people to play voluntarily with low costs but can provide better health and fitness effects. Based on the achievement data of Indonesian basketball, it is known that Indonesian basketball is not too encouraging. This can be seen when it never becomes the best in Southeast Asia (never win a gold medal) at sporting events both women's teams and men's teams, especially at a higher level.

The Physical Education and Sports Faculty, Universitas Jambi is one of the educational institutions in the field of sport that is intended for physical education for both sports prospective teacher and non-educational institution, so that it is necessary to find a teaching method to fulfill the students' needs such as knowledge, abilities, skills, etc. One of the courses as a compulsory course that requires the students to have knowledge, abilities, and skills in the curriculum of the Physical Education and Sports Faculty, Universitas Jambi is

basketball. Therefore the lecturers who teach the course are required to find methods or ways in teaching and learning processes or exercises so that the students can reach the goals of this course.

The learning achievements and training achievements in all sports are not only determined by the mastery of the basic techniques but also influenced by the ability and readiness of physical conditions needed in each sport. This is as stated by Sajoto (1988) that in a match of individual or combination form both males and females that require a fit physical condition are determined by the process of how someone does the training. In this physical condition, there are some elements such as strength, endurance, explosive power, speed, flexibility, balance, coordination, agility, accuracy, and reaction. One of the causes that make the basketball players do not have the free throw shooting ability and skills is the physical condition that possessed such lack of arm power, eyes, and hand coordination and lack of drilling training which is done by the coach or the lecturer. Actually, there are various techniques or methods that can be used to improve someone's physical condition, such as weight training either by the tools (external loads) or not using tools (internal loads). The effectiveness of the two types of training still raises questions if they are compared, moreover if the two types of loads training combined, this is the same as what stated by Robert (1980) that training should be given in the form of external loads and plyometric. Related to the above, the researcher wants to try to apply the plyometric training method to improve the free throw shooting ability and skills of the Physical Education and Sports Faculty Universitas Jambi students that take basketball class. Based on the description above, the formulations of the problem are:

1. Is there any effect of plyometric training on one-handed free throw shooting ability in basketball of the Physical Education and Sports Faculty Universitas Jambi students who program the basketball course?
2. Is there any effect of plyometric training on one-handed free throw shooting skills in basketball of the Physical Education and Sports Faculty Universitas Jambi students who program the basketball course?

Based on the formulation of the problem and the framework, so the research hypotheses of this research are:

1. There is an effect of plyometric training on one-handed free throws shooting ability of Physical Education and Sports Faculty, Universitas Jambi students that program basketball course.
2. There is an effect of plyometric training in one-handed free throws shooting skill of the Physical Education and Sports Faculty, Universitas Jambi students that program basketball course.

REVIEW AND RELATED LITERATURE

Basketball Games

In a basketball game, there are some basic techniques that must be mastered correctly by the players, such as dribbling, passing, and shooting. Then, there will be activities in this game such as lay-up, pivot, tricks, tactics, etc. However, the other skills will develop by themselves following instincts if those have seriously played basketball. The basketball match between the two teams is both try to win the match by trying to get points as many as possible throwing the ball into the opponent's basket. To be basketball players, those have to master the basic techniques in a basketball game. Here are the basic techniques.

1) Dribbling Techniques

Dribbling technique is a technique of carrying all to avoid the opponents in order to get points. The steps are as follows.

- a. The stepping stance of both feet is slightly bent
- b. The body is leaning forward
- c. Push the ball to the floor using the palm of both right and left hand
- d. The source of movement pushes from the elbow

In doing dribbling techniques, we must bounce the ball after stepping 3 times. If it is more than 3 times, it will be considered as a violation. This will benefit the opponents since they will be easy to get points.

2) Passing Techniques

The passing technique is a movement of throwing the ball to a friend using one or two hands. These techniques must be done in basketball game to prevent the opponents who want to seize the ball. There are 6 types of passing that can be done to strategize and get point, they are:

1. Overhead pass
2. Chess pass
3. Baseball pass
4. Bounce pass
5. Hook pass
6. Underpass

3) Pivot techniques

Pivot technique is a rotating movement to all directions with one foot resting when the player has the ball, while the leg that moved can pass through the front or back. The function of the pivot movement is to protect the ball from the struggles of the opposing players.

4) Shooting Techniques

In playing basketball, shooting techniques must be mastered. By doing a right shooting, the team will get points. Below are the steps to do shooting techniques.

a. One-Handed Shooting Technique

1. Standing with right leg in front and left leg behind
2. With both knees low, the ball is held by the right hand above the head with the fingers open, while the left hand helps to hold.
3. Then, the ball is pushed and shot with one hand until the arms are straight.

b. Two-Handed Shooting Technique

Two-handed shooting technique is almost the same as one-handed shooting technique, the difference is when shooting with two hands, the ball is held and pushed using two hands. Shooting techniques can be done by jumping (lay up) or without jumping (lay up).

5) Rebound Technique

Rebound is one term that often used in a basketball game where the players try to get a bouncy ball that fails to get into the ring by scrambling the ball around the basketball ring. This technique is very useful in winning the basketball game. Rebound technique is a technique of frustrating an opponent who wants to put the ball into the ring. The basic technique above can only be mastered by doing regular exercise on limbs that very instrumental in playing basketball, one of the exercises is plyometric training for arms.

Free Throw Shooting Ability

Shooting or free throw shooting in a basketball game is one of the basic techniques that always get attention. Winning in a basketball game is determined by the balls that can be passed through the opponent's ring. The difference accumulation of putting the ball into the opponent's ring determines a team's winning or losing. Shooting is an effort to throw the ball into the opponent's ring to get points. In doing this shooting, it can be done in two ways, they are two-handed shooting and one-handed shooting. http://id.wikipedia.org/wiki/Bola_basket. A free throw is the same as free shot as a result of violations by the opposing players. It is given by the player who violated the position will do the shot or the foul team. According to Danny Kosasih (2008:46), there are two basic principles in playing basketball, they are creating the shooting opportunities to score when offensive and preventing the opponents to do the same thing when defensive. To train the ability and accuracy of shooting can be done through various exercises for example like training the player's arm ability so that there will be strength in doing the shooting. Thus, the players can have the ability to do the shooting.

The free throw shooting ability of basketball games in this research refers to the score of a basketball player's ability to do free throw shooting or repulsing by using one hand to the ring and pass through the basket so it will get points. When shooting, especially for beginner players, usually there is an error in how to hold and throw the ball. The correct theory is the ball is repulsed and not to be thrown. The position of the elbow should be at 90 degrees angle, straight towards the ring by holding it relaxed. Below is the picture of the way to do the one-handed shooting.



picture: 1. Ways to do one-handed free throw shooting

Source: <http://www.freethrowtrainer.com/no-improvement-in-50-years.html>

Free Throw Shooting Skills

The skills that we assume as behaviors or tasks are an indicator of the proficiency level. Some terminology in the learning movement relates to the term of action and skills movement. A skill will consist of motor responses and perceptions obtained through learning. If it is assumed as motor action or task implementation. In sports, for example, shooting in basketball games is a skill in the motor domain and mostly known as motor skills. *Skill* is a word that often heard and used in teaching or training sports. Skill is an ability that can produce maximum results with minimum energy and time expenditure (Schmidt, 1991). This opinion was also stated by Magill that skill is a word that commonly used to signify a task that has a specific goal to be achieved (Ricard A Magill, 1998: 7). For example, shooting and dribbling movement. Both are basic skills in playing basketball because of the movements made to achieve goals. The free throw shooting skills in basketball can only be achieved by training. Without training, it will be difficult to have these skills. To be skilled in doing free throw shooting, many things are interrelated, especially the strength of arm muscle strength. Without having strength of arm muscle, it would certainly not be possible to have free throw shooting skills in basketball.

To distinguish whether a movement is a gross skill or fine skill, it can be known from what type of muscle is active when doing a movement. For gross skills, it is characterized by large muscles that work, while for the fine skill, it is characterized by only smooth muscles that work. Pairing buttons on clothes using needles is also a skill that uses smooth muscle, as well as when we are painting and weaving. According to Abdul Kadir Ateng (1992), two aspects that need to be learned in motor development, which is motor development that relates to physical abilities increased dexterity, especially because of maturity. Besides, the main problems for motor development are talent and environmental influences, relationship among age, gender and motor development, intelligence, physical fitness of children and sport's development as a teenager. Based on the description above, what meant by free throw shooting skill is the score of limb movement performed to

achieve a goal that starts from the beginning movement to the ending movement.

Plyometric Training

One of the efforts to improve an athlete's skill is managing the training system well and regularly. The training program must follow the concept of periodization, planned, and structured specifically and properly. Then, the energy system must base on the needs of each particular sport. Bompa (1994) stated that the training method is an activity done in a long time systematically and based on the level of individual activity. This aims to establish the physiological and psychological functions that fulfill the requirements of sports activities. In a basketball game, plyometric is a series of training used to improve the power of both legs and arms of the players. Besides that, it can also improve the reflex movement, body coordination, and balance, so the players can make explosive movements and improve the performance of the game. Plyometric training involves movements that used to strengthen the muscle tissue and brain nerve cells to stimulate the muscle contractions in a certain pattern so the muscles can produce the possible strongest contractions in a short time. The word of *Plyometric* comes from Latin which is *plyo*+*metric* means measurable improvement (Chu, 1992). Then, Donald (1992) stated that muscle contraction becomes strong with very fast movement. Another opinion stated by Hazeldine (1989) that plyometric is a strength and power done explosively with movement reaction seen in activities such as jumping, throwing, and running. Then, Bompa (1999) also stated that the mobilization movement speed is strongly influenced by plyometric training that does not cause muscle hypertrophy.

Based on some opinions above, it can be concluded that plyometric training is a weight training done to stimulate the neuron's body so that the appearance becomes effective. The forms of plyometric training in this research are push up, medicine ball chest pass, and dumbbell as in the following pictures.



Picture 2: Plyometric movements

Source: <http://u.msn.com/id-1d/kesehatan/kekuatan/latihan/Ex744/medicine-ball-overhead-throws>

Information: 1) Push-up, 2) medicine ball chest pass 3) dumbbell. To do the plyometric training safely, there are things should be considered as follow. Age, players under 13 years old only do this training with low intensity.

- 1) Surface, it is needed a training ground with a not too hard surface, such as grass.
- 2) Weight, players who are overweight must be very careful and should only do this exercise with low intensity.
- 3) Technique, it is the most important thing that players must be instructed on how to do the movements in this training correctly before doing it. Besides, players must have adequate rest and free from injury.

RESEARCH METHODOLOGY

This research used the experimental method by using *One Group Pretest-Posttest* design that gave treatment to the independent variable. However, before doing the pretest, the meetings should have been 16 times then ended with a posttest. The samples of this research were 54 students. As stated by Sugiyono (2008), the minimum sample limit should consist of 30 samples. Besides, simple experimental research with a control group should have at least 10 to 20 samples for each group. To get data about one-handed free throws shooting ability, the researcher did by doing a test of one-handed free throws shooting in a free shot area for 5 times. Every ball that passed through the hoops was scored 2. When it did not pass completely through the basket, there would be no points counted. The number of balls that passes through the basket is multiplied by two so that it becomes the score of one-handed free throw shooting ability of the sample.

Table 1. The Norms of One-Handed Free Throws Shooting Ability

NO	Interval	Category
1	8 -10	Good
2	4 -6	Enough
3	0 - 2	Less

To get the data about one-handed free throw shooting skill, it was done by doing a one-handed free throw shooting test in a free shot area, and then followed by an observation of the sample through the process, while filling the observation sheets that have been provided. Every event that suitable for

the observation sheet made by the sample was marked $\sqrt{\quad}$ (check). Each checkmark was scored 2. The number of the checkmark is multiplied by two that is the score of one-handed free throw shooting skills by the sample.

Table 2. The Norm of One-Handed Free Throw Shooting Skill in Basketball

No	Interval	Category
1	26 - 30	Very good
2	21 - 25	Good
3	14 - 20	Enough
4	6 - 13	Poor
5	0 - 5	Very Poor

THE RESULT OF THE RESEARCH AND DISCUSSIONS

Data Description

The result of the plyometric training research on the free throw shooting in basketball skills and ability are as follows.

Table 3. The Description of Free Throw Shooting Ability Pre-test and Post-test

Free Throw Shooting Ability	N	Mean	Sd	Var	Max	Min
Pre-test	54	1,074	1,439	2,070	6	0
Post-test	54	5,926	1,692	2,862	8	4

Table 4. The Description of Free Throw Shooting Skill Pre-test and Post-test

Free Throw Shooting Skill	N	Mean	Sd	Var	Max	Min
Pre-test	54	19,259	2,275	5,177	24	16
Post-test	54	28,407	1,957	3,831	30	24

The Pre-Test of Free Throw Shooting Ability

The results obtained from the free throw shooting ability test for the Physical Education and Sports Faculty Universitas Jambi male students that program basketball course were 54 samples with the average was 1.074, the standard deviation

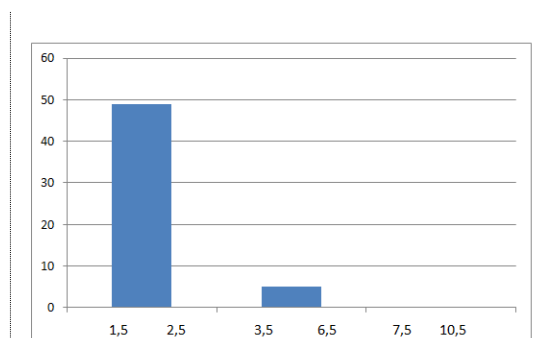
was 1.439, the best ability was 6, the poor ability was 0, the range was 6 and the variance was 2.07. The distribution data of the pretest result for free throw shooting ability can be seen in the following frequency distribution table.

Table 5. The Frequency Distribution of PreTest Data for Free Throw Shooting Ability

Interval Class	Frekuensi		Category
	Absolute	Relative	
0 - 2	49	91%	Less
4 -6	5	9%	Enough
8 -10	0	0%	Good
Total	54	100%	

Based on the distribution data of the pretest result for the free throw shooting ability with a total number of the samples was 54, there were 49 samples (91%) obtained "less" in the class of

0-2 and 5 samples (9%) obtained "enough" in the class 4-6. The distribution data can be seen in the following histogram.

**Picture 3. The Histogram of Free Throw Shooting Ability Pre-test**

The Posttest of Free Throw Shooting Ability

The results obtained from the posttest of free throw shooting ability of the Physical Education and Sports Faculty Universitas Jambi male students that consisted of 54 samples that program basketball course got an average score was

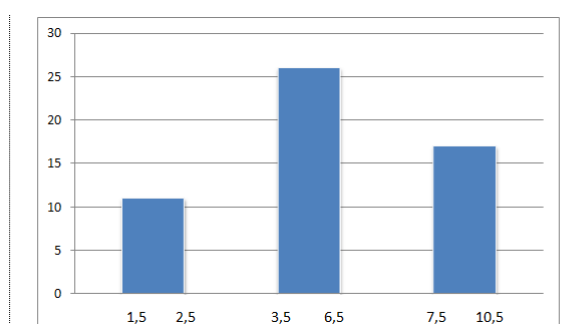
5,926, a standard deviation was 1,692, the best ability was 8, the lowest ability was 4, the range was 4 and variance was 2,86. The distribution data of the posttest for the free throw shooting ability can be seen in the table of frequency distribution as follows.

Table 6. The Frequency Distribution Data of Free Throw Shooting Ability Posttest

Interval Class	Frekuensi		Category
	Absolute	Relative	
0 - 2	11	20%	Less
4 -6	26	48%	Enough
8 -10	17	31%	Good
Total	54	100%	

Based on the distribution data of the posttest results with the total number of 54 samples, there were 11 samples (20%) that obtained "less" category in the interval class of 0-2, 26 samples (48%) obtained "enough" category in the interval

class of 4-6 and 17 samples (31%) obtained "good" category in the interval class of 8-10. The distribution data can be seen in the following histogram.

**Picture 4. The Histogram of Free Throw Shooting Skill Post-test****The Pretest Data of Free Throw Shooting Skill**

The results obtained from the pretest of free throw shooting skill of Physical Education and Sports Faculty Universitas Jambi male students that consisted of 54 students as samples that program basketball course got the average score was

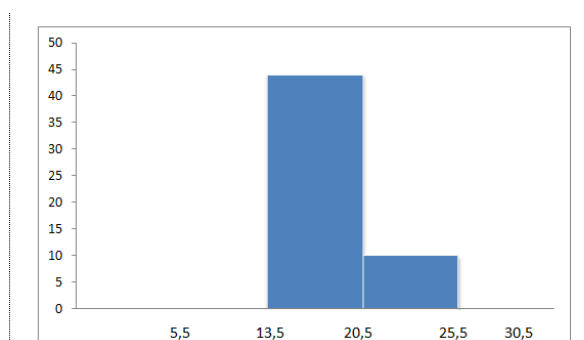
19,259, a standard deviation was 2,275, the best ability was 24, the lowest ability was 16, the range was 8 and variance was 5,177. The distribution data of pretest for the free throw shooting skill can be seen in the table of frequency distribution as follows.

Table 7. The Frequency Distribution Data of Free Throw Shooting Skill Pretest

Interval Class	Frekuensi		Category
	Absolute	Relative	
0-5	0	0	Very Poor
6-13	0	0	Poor
14-20	44	81%	Enough
21-25	10	19%	Good
26-30	0	0	Very Good
Total	54	100%	

Based on the pretest results of the distribution data of the free throw shooting with the total number of 54 samples, there were 44 samples (81%) obtained skill in the category of

enough in the interval class of 14-20, and 10 samples (19%) in the category of good in the interval class of 21-25. The data distribution can be seen in the following histogram.

**Picture 5. The Histogram of Free Throw Shooting Skill Pre-test**

The Posttest Data of Free Throw Shooting Skill

The data description of free throw shooting skill test for the Physical Education and Sports Faculty, Universitas Jambi male students for the 54 students as samples that program basketball course got the average was 28,8407, a standard

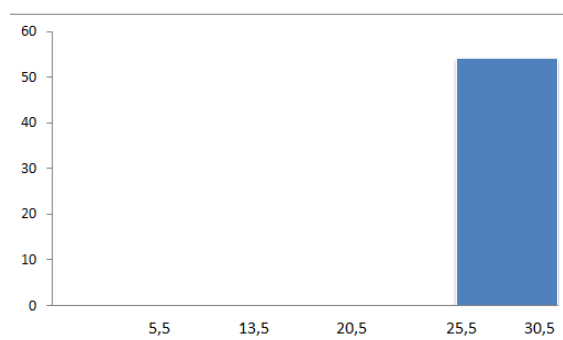
deviation was 1,957, the best ability was 30, the lowest ability was 24, a range of 6, and variance of 3,831. The distribution data of free throw shooting skill can be seen in the table of frequency distribution below:

Table 8. The Frequency Distribution Data of Free Throw Shooting Skill Posttest

Interval Class	Frequency		Category
	Absolute	Relative	
0-5	0	0%	Very Low
6-13	0	0%	Low
14-20	0	0%	Enough
21-25	0	0%	Good
26-30	54	100%	Very Good
Total	54	100%	

Based on the data description of the pretest results with the total number of samples was 54, there were 54 samples (100%) had free throw shooting ability and skill as a "very

good" category in the interval class of 26-30. The data distribution can also be seen in the following histogram.



Picture 6 The Histogram of Free Throw Shooting Ability Pre-test

Hypothesis Test

The researcher did the normality and homogeneity test before testing the hypothesis. Based on the test results of this research, the data showed normal and homogeneous. The

hypothesis test used in this research was the T-test. The criteria of decision making with the t-test is if t-count is bigger than t-table (t-count > t-table). It means that H_a is accepted and it shows significant. The t-test hypothesis is as follows.

Table 11. The Hypothesis Testing Results

No	The Result of Pre-test and Post-test	N	t-count	T table $\alpha = 0,05$	Category
1	Free Throw Shooting Ability	54	10,3	1,658	Hypothesis is accepted
2	Free Throw Shooting Skill	54	10,55	1,658	Hypothesis is accepted

The Hypothesis Testing Results 1

Based on the results of the testing hypothesis of the effect of plyometric training on one-handed free throw shooting ability of the Physical Education and Sports Faculty Universitas Jambi students that program basketball course got **t-count** = 10,3 > **t-table** = 1,658. This hypothesis means that there was an effect of plyometric training on one-handed free throw shooting ability of the physical education and sports Faculty Universitas Jambi that program basketball course.

The Hypothesis Testing Results 2

There is an effect of plyometric training on one-handed free throw shooting skill of the Physical Education and Sports Faculty Universitas Jambi students that program basketball, it was got **t-count** = 10,55 > **t-table** = 1,658. This means the hypothesis stated that there was an effect of one-handed free throw shooting skill in basketball of the Physical Education and Sports Faculty Universitas Jambi that program basketball course.

DISCUSSIONS

There is an effect of plyometric training on one-handed free throw basketball shooting ability in basketball of the Physical Education and Sports Faculty Universitas Jambi students that program basketball course.

Based on the hypothesis testing results, the effect of plyometric training on one-handed free throw shooting ability in basketball of the Physical Education and Sports Faculty Universitas Jambi students that program basketball course got **t-count** = 10,3 > **t-table** = 1,658, (table 11). This showed that there was an effect of the plyometric training on one-handed free throw shooting ability in basketball of the Physical Education and Sports Faculty Universitas Jambi students that program basketball course on the hypothesis. This happens because the plyometric training can cause arm muscles to be stronger. According to Donald A. Chu, (1992:1), plyometric training method is a way of training that can produce muscle contraction becomes strong with explosive movements and it becomes the main key of a successfulness in an activity. This makes the athletes can push or repulse (one-handed free throw shooting in basketball) well, so when doing one-handed free throw shooting in basketball, it will always pass through the basketball ring or basket so it is possible to get more points.

There is an effect of plyometric training on one-handed free throw basketball shooting in basketball skill of the Physical Education and Sports Faculty Universitas Jambi students that program basketball course.

Based on the hypothesis testing results, the effect of plyometric training on one-handed free throw shooting skill in

basketball of the Physical Education and Sports Faculty Universitas Jambi students that program basketball course got **t-count** = 10,55 > **t-table** = 1,658, (table 11). This hypothesis showed that there was an effect of the plyometric training on one-handed free throw shooting ability in basketball of the Physical Education and Sports Faculty Universitas Jambi students that program basketball course. This can happen because plyometric training in form of medicine ball chest pass or shooting training using a medicine ball that repeatedly done will form automatic movements so it can form the arm muscle strength and one-handed free throw shooting skill. This is the same as stated by Ilham (2016:8) that skill can be formed and become better if it sharpened or used repeatedly.

CONCLUSIONS

Based on the results of the research, the hypothesis testing and analysis, and the discussion that have been conducted before, the conclusions of this research are:

1. Plyometric training affects the one-handed free throw shooting ability in basketball of the Physical Education and Sports Faculty Universitas Jambi students that program basketball course.
2. Plyometric training affects the one-handed free throw shooting skill in basketball of the Physical Education and Sports Faculty Universitas Jambi students that program basketball course.

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