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Hand-Eye Coordination and Arm Muscles Explosive Power to Basketball Player's Shooting

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Abstract--- *The issue in this study is shooting skills of basketball players which are low categorized. The aim of study is to determine the relationship of hand-eye coordination and arm muscle explosiveness to the shooting ability of basketball players. This is correlational research design. Population is a group of basketball players at a school with 15 players as a sample who taken by saturated sampling technique. The instrument used to collect the data are followings: (1) ballwerfen und-Fangen used to measure hand-eye coordination, (2) basketball throwing is used to measure arm muscle explosive power, and (3) one-handed penalty shooting used to measure shooting ability of basketball player. The data were analyzed by using statistic analysis of Pearson Product-Moment to see whether two independent variables were related to the dependent variable with significant level α=0.05. The result of the research showed that (1) there was a significant correlation between hand-eye coordination on shooting ability (r=0.657 with tobserved=3,258 > ttable=2,145), (2) there was a significant correlation between arm muscle explosive power to shooting ability (r=0,712 with tobserved=3,794 > ttable=2,145), (3) there was a significant correlation between hand-eye coordination and arm muscle explosiveness to the shooting ability (R=0,747 with Fobserved 8,206 > Ftable 3,880).*

Keywords--- *Hand-Eye Coordination, Arm Muscles Explosive Power, Shooting Ability.*

I. BACKGROUND OF STUDY

Among the achievement sports, basketball is a sport that contains complex and varied movements.

The variation in basketball required players to give attention to basic techniques of basketball. The technique are important to perform a good game. The movements in basketball depend on the mastery of basic techniques, efficiency, and effectiveness of movement so that it can achieve the scores as much. The players can combine basic techniques easily while playing without experiencing significant difficulties. To achieve high performance, a player must have a good physical condition and be trained. The components of the physical condition include strength, flexibility, agility, endurance, explosive power and coordination1,2.

Becoming a competent basketball player, it needs understand on basic techniques. The rules of the basketball game comprising: how to play the ball, ball control, ball possession, ball-in and ball throwing into the court1. To display movements depends on the player mastery on the basic techniques, as follows passing and catching, dribbling, shooting, start and stop, body control, pivoting, and guarding1.

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The basketball is also focused on mastering many shooting techniques because this skill contributes directly to the game. Shooting is a technique for shooting to the basketball hoop to get a point. Shooting itself can be done with one or two hands. It is a way to put the ball in the opponent's basket, the scores will be achieved3,4. Generally, these techniques can be distinguished based on the conditions when the shooting occurred, refers to a position of being stationary in a place, jumping, and running. Based on previous studies5, researchers are interested to continue and further deepen the study of hand-eye coordination and arm muscles explosive power to basketball player's shooting.

Basketball is the most popular sports as an extracurricular activities in Indonesian public high school (SMAN). But, many student basketball teams has not shown maximum results yet. It might be caused by the unplanned training, inadequate facilities and infrastructure, inexperienced, and mental athletes are not yet mature, low and lack of mastery of shooting techniques so that the achievement targets have not been reached to the maximum. Developing of basketball sports should be pursued optimally.

Improving the basketball achievements in SMAN are carried out by regular training. Most of the players do not practice the basic techniques optimally. It can be seen when players perform a shooting technique. The ball is rarely or even never enters the ring. Increasing the ability of shooting needs to pay attention to the ability of hand-eye coordination and arm muscles explosive power. To find out the shooting technique ability, it is necessary to conduct research on the relationship of hand-eye coordination and arm muscles explosive power to the ability to shoot. Shooting a ball into the ring that must be done in a basketball. Shooting is the last move to get points generally within 15-20 seconds and almost half of them make it in6. Shooting techniques in basketball could be distinguished based on the condition when shooting into the opponent's ring 3,7,8.

Hand-eye coordination is a cooperation between eye-hand or other body parts in a single sequence and precisely controlled when throwing and catching the ball to the target with the coordination test in units of the number of balls that succeed in catch after the ball is thrown at a predetermined target in accordance with the given time i.e. for 15 seconds. Hand-eye coordination data are measured by Ballwerfen und-Fangen9–12. Hand-eye and foot coordination is a movement that occurs from information integrated into limb movements. All movements must be control by sight and must be precise, according to the rules planned in mind10,11.

The level of coordination determines the mastery of sports skill, especially skill that needed in a basketball such as shooting. The arm muscle explosive power is very necessary because the shooting aims is the the hand movements speed to direct towards the ball gets in the way. So the arm muscle explosive power is needed to produce good shooting in accordance with the purpose it. Generally, it can be interpreted that the arm muscle explosive power is the ability of a group of arm muscle fibers, in doing strong activities and relatively fast3,4.

An explosive power is one of the important bio-motoric components in sports activities because explosive power will determine how hard a person can hit, how far to throw, how high to jump, how fast to run and etc. Many sports require explosive power for their activities. In some sports such as volleyball, basketball, athletics, boxing, gymnastics, etc. required well explosive power13. The explosive power itself is a combination of strength and speed, the ability to apply power in a short time. So if only the power it has without being followed by speed, then the explosive power will not be achieved properly13,14. Muscle power is very important to display high achievement.

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In basketball, the arm muscle explosive power is very necessary because the aim of shooting is the speed of hand movements to aim and try to get the ball into the target.

The arm muscle explosive power is needed to produce good shooting in accordance with the purpose of implementation. To be able on shooting in a basketball, needs the physical condition of the arm muscle explosive elements, because the ability of the physical condition of the arm muscle explosive power is one aspect that will greatly affect for shooting ability, meaning that when performing proper shooting techniques can be implemented correctly, if the techniques for shooting ability are supported by excellent physical condition. It is a necessary combination between speed and strength in the arm muscles. In other words, players must have good muscle explosive power.

II. RESEARCH OBJECTIVES

The research's aim is to be able to shoot correctly, so the physical condition of the arm muscle explosive power and hand-eye coordination is very necessary because the physical condition's ability of the arm muscle explosive power is one aspect that will greatly affect the shooting ability. It means when the shooting technique can be done correctly, if the shooting techniques are supported by an excellent physical condition. It is an necessary combination between speed and strength in the arm muscles.

For making a harmonious movements requires coordination or a complex ability to move the limbs together. Hand-eye coordination is a component of physical condition that is very needed in basketball. Improved eye-hand coordination can be done by sharpening the ability of the athlete's thinking power, increasing the athlete's motoric practice and accuracy of sensory devices such as the eyes and ears because it will affect the nervous system and muscles that respond to the stimulation to act. Hand-eye coordination is a person's ability to harmonize eye functions and hands in response to a stimulus. This can be seen when shooting by focusing on the direction of the basketball hoop and trying to align your eyes with your hands. Obviously, hand-eye coordination is needed to get good shooting results.

III. METHODOLOGY

This study was conducted using the correlational research type. The researcher want to study the relationship between independent and dependent variable, where the independent variable was hand-eye coordination and arm muscle explosive power while the dependent variable is shooting ability. The population was 15 male students as a basketball athlete of SMAN 12 Padang who took part in the training. The sample was a portion or representative of the population to be studied. The sample was done by sampling saturated, then all populations become samples.

There are three things to tested 1) eye-hand coordination, 2) arm muscle explosive power by using a basketball bag with the sitting, 3) one-handed penalty shooting. This was accordance with the research type that was undertaken. Before processing the data, firstly, a normality test and a homogeneity test were performed. The normality test aims to determine whether the sample group comes from populations that are normally distributed or not, and to test normality, a Lilifour test is performed. The homogeneity test aims to see whether the data group is homogeneous or not

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Next, F test was used14. If the population is normally distributed and the data group is homogeneous, then, Pearson product-moment correlation used to know whether the data that has been calculated through the coefficient is significant or not, it is necessary to take steps to find a significant correlation. Whereas for double correlation using a significant test multiple correlations, to understand the variables that have been calculated are significant or not, then steps are taken to find a significant multiple correlation test. Calculating the amount of contribution through the discriminatory index: r2x100% This data was analyzed with Excel and SPSS version 12.

IV. FINDINGS

After testing the requirements analysis, each research variable met the requirements for statistical testing. The hypothetical testing was done 1) hand-eye coordination has a significant relationship to shoot, 2) arm muscle explosive power has a significant relationship to shoot, 3) hand-eye coordination and arm muscle explosive power together has a related relationship significant to shoot. The statistical test used was regression analysis and correlation at the significance level α=0.05.

Table 1: Test of Significance of Correlation X with Y

Correlation	$t_{observed}$	t_{table}	Summary
Hand-Eye Coordination with Shooting (X_1-Y)	3.258	2.145	H0 was rejected
Arm Muscle Explosive Power with Shooting (X_2-Y)	3.794	2.145	H0 was rejected

For more details, it will be presented in sequence as follows. The first hypothesis testing, hand-eye coordination had a significant relationship to the shooting, meaning that H0 was rejected and Ha was accepted, so there was a meaningful relationship between hand-eye coordination and shooting ability. The second, namely arm muscle explosive power had a significant relationship to shooting, meaning that H0 was rejected and Ha was accepted, so there was a significant relationship between arm muscle explosive power and the shooting ability.

Table 2: Test of Significance of Multiple Correlation

Correlation	$F_{observed}$	F_{table}	Summary
Hand-Eye Coordination and Arm Muscle Explosive Power with Shooting	8.206	3.880	H0 was rejected

The multiple correlation hypothesis testing namely hand-eye coordination and arm muscle explosive power had a significant relationship to the shooting of the basketball team, meaning that H0 was rejected and Ha was accepted, so there was a meaningful relationship between eye coordination and arm muscles explosive power with the shooting ability.

V. DISCUSSION

Hand-eye coordination was stated to have a significant relationship with the shooting ability. The resulting correlation coefficient between X1 and Y variables means that there is a meaningful relationship between hand eye coordination with the shooting ability of the basketball teams. This also shows that coordination between the eyes and hands has a positive contribution in improving shooting ability. This situation is due to the shooting ability is expected to have a target and accuracy in shooting so that the ball's speed can be better and has less chance of not on target.

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The arm muscles explosive power was also stated to have a significant relationship with the shooting ability of the basketball team. Correlation analysis between arm muscle explosive power with shooting the significance test for the correlation coefficient between X_2 and Y variables means that there is a significant relationship between arm muscle explosive power and shooting ability. Basically, the arm muscle explosive power is used to push while shooting. For that powerful arm muscles are required.

The multiple correlation hypothesis testing namely hand-eye coordination and arm muscle explosive power had a significant relationship to the shooting of the basketball team. Significance test of the multiple correlation coefficient between the variables X_2 , X Y with Y, so that there was a meaningful relationship between eye coordination and arm muscles explosive power with the shooting ability

Generally, the shooting ability is influenced by hand-eye coordination and arm muscles explosive power. This is shown by the acquisition of Fobserved of 8.206 which was greater than the Ftable of 3.880 which stated that hand-eye coordination and arm muscle explosive power together had a positive contribution to the shooting ability. It can be concluded that the better hand-eye coordination and arm muscles explosive power, the better the shooting ability

Hand-eye coordination and arm muscle explosive power together had a positive contribution to the shooting ability. It can be concluded that the better hand-eye coordination and arm muscles explosive power, the better the shooting ability

Understanding the magnitude contributing of hand-eye coordination and arm muscle explosive power to the shooting ability. They are able to shooting well, because they have good hand-eye coordination and arm muscle explosive power. So it can be believed to practice basketball, hand-eye coordination exercises and arm muscle explosive exercises must get more servings than other physical conditions. Then in making an exercise program a trainer is required to be able to plan an exercise program both short-term and long-term, so that the time to practice eye coordination of hand and arm muscles explosive power as well as basic shooting techniques must be multiplied and monitored, given the factors that are interconnected to achieve maximum performance, because there is no success on basketball without being supported with good shooting skills

In the basketball there are many factors that must be considered to achieve maximum achievement, one of the importent factors that influencing is the shooting with the hand-eye coordination and the arm muscles explosive power. This factor have a significant relationship. The player who has good shooting skills is certainly supported by good hand eye coordination and arm muscle explosive power. For that reason, a trainer should optimize hand-eye coordination training, arm muscle explosive power, and shooting techniques in achieving maximum performance.

VI. CONCLUSION

Based on the discussion, there are conclusions as follows:

- There is a significant correlation between hand-eye coordination with the shooting ability of SMAN 12 Padang basketball players with tobserved=3.258> ttable=2.145.
- There is a significant relationship between the arm muscles explosive power with the shooting ability of a basketball player in SMAN 12 Padang with the acquisition of tobserved=3.794> ttable=2.145.

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- There is a significant relationship between hand-eye coordination and arm muscle explosive power with the ability to shoot basketball players in SMAN 12 Padang, obtained Fobserved 8.206> Ftable 3.880.

Based on the conclusions, suggestions are: 1) The trainer must be able to provide training program acoordances the needs of player, especially in the shooting ability skill level, 2) The basketball players must improve the shooting ability with understanding factors that influence the skill level.

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