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Effect Of Agility and Strength Components on Arm Muscles: Court Tennis Backhand Punches in Amateur Athletes

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Abstract

Having optimal backhand punch performance is the goal of an athlete. The role of the coach is a very important part of the effort to provide programs to improve backhand shots in amateur athletes to achieve the expected achievements. One of them is by paying attention to the integral components of the backhand shot. This study aims to determine the effect of agility and arm power on backhand drive in students of Physical Education, Health and Recreation, Sebelas Maret University, Surakarta. This study uses a quantitative method with a correlational approach. Based on statistical analysis, it was found that there is a correlation between agility and arm power on backhand drive, this can be seen from the results of the correlation test with SPSS 22,There is a significant relationship between arm agility and the results of tennis backhand drive strokes, as evidenced by the calculation table r ≥ r or0.926 > r table 0.576. There is a significant relationship between arm explosive power and tennis backhand groundstroke results, as evidenced by the calculated γ value ≥ γ table or 0.789 >0.576 years. Based on the results of the study, it can be concluded that the Pearson correlation in this analysis is positive, which means that the relationship between the two variables is positive, or in other words, the greater the increase in agility and arm strength, the greater the result of tennis backhand drive strokes. The implications of this study lie in the role of trainers in determining the influence on the agility and strength components on the arm muscles. So that this can be a solution for coaches in an effort to increase backhand shots in amateur athletes.

Keywords: *Agility, Strength, Arm Muscles, Backhand, Athlete.*

Introduction

Table tennis is a sport that is well-known and understood by the wider community. In an effort to develop achievements in a sport, it is highly prioritized. Therefore, it can have a positive impact on every aspect of sports in this country. If achievements increase, it will raise the good name of the region and nation. Tennis is a small ball sport that is played in singles or doubles [1]. This game is played by hitting the ball using a racket to the opponent's field which is limited by a net. Tennis is a game played on a rectangular field divided into two parts by a net [1]. The tennis court is divided into two main parts, namely the home court and the opponent's court [2]. The home court is used for attacking and defending, while the opponent's court is the target of the hit which is limited by the net and the court lines, which determine whether or not the ball can be placed.

Mastering the basic techniques of hitting properly and correctly is one of the important foundations in improving tennis playing skills. For tennis players, mastering the basic techniques of hitting is absolutely necessary to improve performance. Mastery of basic techniques can be achieved with correct, precise, and regular practice. The basic techniques in tennis are (1) Forehand, (2) Backhand, (3) Service, (4) Volley (5) Smash [3]. The forehand stroke is one of the strokes that plays an important

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role in tennis. This stroke is usually always used as the player's main weapon because the forehand stroke is usually harder than the backhand stroke [4]. It is further explained that the forehand stroke is an effective and main stroke for carrying out attacks [5].

There are many techniques that must be mastered by tennis athletes, including: service, groundstroke, volley, smash and lob. In addition, hand muscle strength is the ability of muscles to produce tension in a resistance and lift weights. Arm power is also no less important than hand muscle strength, tennis is one of the sports whose maximum power is concentrated in the arm area, therefore if an athlete's arm is strong and accompanied by good reflex movements, the explosive power in the hand will be even better for the athlete [6]. Flexibility is very useful to support agility and speed of movement when making table tennis strokes [22]. Table tennis players who have high agility will find it very easy to change the direction of body movement to various different positions at high speed [23]. Table tennis strokesckhand is done if the ball is on the left [7].Drive is a stroke with a long swing that produces a horizontal and hard stroke [7.]This type of stroke is hard and fast. Drive is used as an attack stroke or we can also control it as desired. Drive is a stroke technique that begins with a closed racket position and the racket movement from below diagonally upwards ends in front of the forehead.

Many factors can determine to do a perfect shot besides routine training and anatomical and physiological conditions, players must also have good physical condition abilities in their bodies so that they are able to move optimally, including reaction speed and arm muscle strength. Gazali (2016) a person's physical condition is a prerequisite that is very necessary in efforts to improve sports skills, it can even be said to be a basic need that cannot be postponed. [24] According to Ridwan and Irawan (2019) a person's physical condition status can be known by means of an assessment that forms an ability test. [25] Arm muscle strength is the maximum ability of the arm to perform explosive movements. [26] This means that arm muscle strength can affect the direction and speed of the shot. This is because to do a perfect shot, the opponent also has difficulty hitting the tennis ball back.

From various tennis coaching issues, there are two things that need to be known, namely the extent of the accuracy of the backhand and backhand drive service techniques. This opinion shows that the service in tennis has a dual function, namely to bring the ball into play and function as an attack for players who get the opportunity to serve. Meanwhile, for the backhand drive stroke, it shows that the backhand drive stroke can make the opponent have no chance to choose or use an attacking stroke. Table tennis uses a constant movement of hitting and centering the ping pong ball on the opponent's table so that the opponent cannot return the ball, resulting in points for the athlete who hit the ball. [27] This is in line with the opinion if a table tennis game begins with a hit (service) the ball is bounced on your own table to pass over the net after which it bounces on the opponent's table with the aim that the opponent cannot return the service ball. [28] explain that in playing table tennis it is important to master good hitting techniques in order to win the game. [29].

Based on the results of initial observations of the table tennis learning process, it shows that many students still have difficulty demonstrating forehand and backhand stroke techniques. This difficulty is seen in the lack of alertness of students' body movements when hitting the ball. Students' body movements are less agile when anticipating the direction of the ball's bounce from the opponent so that their strokes cannot be done perfectly, such as hitting the ball with a staggering body position or the ball that is hit is very easy to anticipate and return by the opponent. By knowing the ability of backhand serve and backhand drive techniques in students, it will be useful to know the students' abilities in detail as a basis for evaluating the training program that has been running, as a reference in compiling a training program, and as feedback for coaches in training activities. From the aspects that have been described in the background above, it is necessary to know the level of accuracy of the backhand serve technique.

Materials and Methods

The method used in this study is the correlational method. In this study, the relationship studied is the relationship between arm muscle explosive power and grip strength against punches.Backhand stroke tennis court. Number of samplesused in this study were 12 students of Physical Education, Health and Recreation at Sebelas Maret University Surakarta. The sample was selected using random sampling technique. With a population of 22 achievement coaching students. In this study, variables can be identified, namely independent variables and dependent variables. The independent variables in this study are agility and arm power while the variables in this study are backhand drive strokes.

The data collection technique in this study was carried out by means of tests and measurements. The purpose of the tests and measurements is to obtain objective data on the results of the training that

has been given to students. Given the type of information from this study is correlational research, namely research used to determine the magnitude of the relationship between 2 or more variables from the subject sample. Then the analysis was carried out using statistical techniques with regression correlation analysis with SPSS 22.

Table 1. Agility Test NormsIllinois Agility Run

Agility Test	Category
>15.1	Very good
15.2-16.1	Good
16.2-18.1	Enough
18.2-18.3	Not enough
>18.3	Very less

(Roozen et al., 2004)

Agility Test, The purpose of this test is to assess the level of agility using a push up test.

Table 2. Men's Push Up Test Norms

Number of Push Up Movements	Category
>54	Very good
45-54	Good
35-44	Enough
20-34	not enough
0-19	Very less

Arm strength test, The purpose of this test is to assess the level of arm strength using a push up test. Backhand stroke test, The purpose of this test is to assess the level of consistency in performing a backhand groundstroke in a tennis game situation, using the Dyer Tennis Test.

Table 3. Men's Backhand Groundstroke Category

Category	Number of Strokes
Very good	25 >
Good	20 – 24
Enough	15 – 19
Not enough	10 – 14
Less than once	<9

After the data is collected, the next step is to analyze it using data management techniques. The data analysis used by researchers in this study is using the product moment correlation test and multiple correlation test which aims to answer the questions listed in the problem identification.

Result and Discussion

Result

This study aims to determine the relationship between agility and arm power to the results of tennis backhand drive strokes in Physical Education, Health and Recreation students of Sebelas Maret University Surakarta. The results of the research that has been conducted can be described as follows.

Arm muscle power test results, Research data was taken from the Department of Physical Education, Health and Recreation, Sebelas Maret University as a sample of 12 students using the Push Up test which aims to measure arm muscle power. The following is the frequency distribution of the arm muscle power test which can be seen in table 4 below.

Table 4. Frequency Distribution of Arm Power Test Results

Category	Number of Push Ups	Hose	Absolute Frequency	Relative Frequency
Very good	54 >	54-65	number 0	0%
Good	45-54	45-54	3	30%
Enough	35-44	35-44	6	60%
not enough	20-34	20-34	3	30%

Very less	< 19	10-19	number 0	0%
Amount			12	100%

From table 4 above, it shows that arm muscle power in Physical Education, Health and Recreation students of Sebelas Maret University Surakarta can be classified into 5 classes with a class duration of 10, in the first class with a class range of 54 - 65 there were none, the second class with a class range of 45 - 54 was obtained as many as 3 people with a percentage of 30%, the third class with a range of 35 - 44 was obtained as many as 6 people with a percentage of 60%, the fourth class with a range of 20 - 34 was obtained as many as 3 people with a percentage of 30%, and the fifth class with a range of 10 - 19 was none.

Agility Test Results, Research data were taken from students of Physical Education, Health and Recreation, Sebelas Maret University as a sample of 12 students using the Illinois Agility Run test which aims to measure agility. The following is the frequency distribution of the agility test which can be seen in table 5 below.

Table 5. Frequency Distribution of Agility Test Results

Category	Son	Hose	Absolute Frequency	Relative Frequency
Very good	>15.2	15-15.2	number 0	00%
Good	15.2-16.1	15.2-16.1	number 0	00%
At the moment	16.2-18.1	16.2-18.1	12	100%
Not enough	18.2-18.3	18.2-18.3	number 0	00%
Very less	>18.3	18.5-18.3	number 0	0%

From table 5 above it can be seen that agility inStudent of Physical Education, Health and Recreation, Sebelas Maret Universitycan be classified into 5 classes with a class length of 5, in the first class with a range of15-15.2none, the second class with a class range of 15.2-16.1 none, the third class with a range of 16.2-18.1 obtained 12 people with a percentage of 100%, the fourth class with a range of 18.2-18.3 none, and the fifth class with a range of 18.2-18.3 none.18.5-18.3There isn't any.

Backhand Drive Stroke Test Results, Research data were taken from Physical Education, Health and Recreation, Sebelas Maret University, Surakarta as a sample of 12 students using the Dyer Tennis Test which aims to measure the results of backhand drive tennis strokes. The following is the frequency distribution of backhand groundstroke stroke tests using the Dyer Tennis Test which can be seen in table 6 below.

Table 6. Frequency Distribution of Backhand Stroke Test Results

Category	Total Score	Hose	Absolute Frequency	Relative Frequency
Very good	25 >	25-29	number 0	0%
Good	20 – 24	20 – 24	3	30%
Enough	15 – 19	15 – 19	9	90%
Not enough	10 – 14	10 – 14	number 0	0%
Less than once	<9	5-9	number 0	0%
Amount			12	100%

From table 6 above, it shows that the backhand drive stroke using the Dyer tennis test in the Physical Education, Health, and Recreation course at Sebelas Maret University, Surakarta can be classified into 5 classes with a class length of 5, in the first class with a class range of 25-29 there were none, the second class with a class range of 20-24 obtained 3 people with a percentage of 30%, the third class with a range of 15-19 obtained 9 people with a percentage of 90%, the fourth class with a range of 10-14 there were none, and the fifth class with a range of 5-9 there were none.

After the calculation is done to find out the class interval of each type of question, the following is also explained the results of the significance test between variables used using SPSS 22 to find out the magnitude of the relationship between variables. The relationship can be seen in the following explanation.

Table 7. Correlation Results Between Agility and Power in Backhand Drive Strokes Correlation

		Agility	Strength	Backhand Stroke
Agility	Pearson Correlation	1	.730**	.926**
	Sig. (2 tails)		.007	.000
	N	12	12	12
Strength	Pearson Correlation	.730**	1	.789**
	Sig. (2 tails)	.007		.002
	N	12	12	12
Backhand Stroke	Pearson Correlation	.926**	.789**	1
	Sig. (2 tails)	.000	.002	
	N	12	12	12
**. Significant correlation at the 0.01 level (2-tailed).				

Based on the significance value of Sig. (2-tailed): From the output table above, the sig. (2-tailed) value between agility (X1) and Drive Backhand (Y) is 0.000 <0.05, which means that there is a significant correlation between the agility variable and the Drive Backhand variable. The calculated r value for the relationship between agility (X1) and Drive Backhand (Y) is 0.926> r table 0.576, so it can be concluded that there is a relationship or correlation between the agility variable (X1) and Drive Backhand (Y). Based on the significance value of Sig. (2-tailed): From the output table above, the sig. (2-tailed) value between Arm Power (X2) Backhand Drive Tennis (Y) is 0.002 <0.05, which means that there is a significant correlation between the Arm Power variable and the Backhand Drive variable. The calculated r value for the relationship between Arm Power (X2) and Backhand Drive (Y) is 0.789> r table 0.576, so it can be concluded that there is a relationship or correlation between the Arm Power (X2) and Backhand Drive Tennis (Y) variables. Based on the calculation results using SPSS, because the calculated r or Pearson Correlations in this analysis is positive, it means that the relationship between the two variables is positive or in other words, the more Agility and Arm Power increase, the Tennis Backhand Drive Shot Results will also increase.

Discussion

In accordance with the title of this study, namely the relationship between agility and arm power to backhand drive strokes, then to be able to determine the agility and arm power in order to obtain backhand drive stroke data, test and measurement tools are used. The agility test tool uses the Illinois agility running test, arm power uses the push up test and the backhand drive stroke test tool uses the Dyer Tennis Test. The data obtained from the tests conducted will be analyzed using the product moment correlation test which aims to determine the relationship between agility and arm power to the backhand drive stroke. In the background and framework of thought it has been explained that the effectiveness of each sporting activity is supported by elements of physical condition, where among the many elements of physical condition in tennis, especially in the backhand drive stroke, there needs to be support from physical conditions, one of which is by the elements of agility and arm power. To determine the extent of agility and arm power in performing a backhand drive stroke, it needs to be studied scientifically through research procedures.

Based on the significance value of Sig. (2-tailed): From the output table above, the sig. (2-tailed) value between agility (X1) and Drive Backhand (Y) is 0.000 <0.05, which means that there is a significant correlation between the agility variable and the Drive Backhand variable. The calculated r value for the relationship between agility (X1) and Drive Backhand (Y) is 0.926> r table 0.576, so it can be concluded that there is a relationship or correlation between the agility variable (X1) and Drive Backhand (Y). Agility itself can be interpreted as a person's ability to change direction quickly and without losing balance. Harsono (1988:172) states that "People who have the ability to change direction and body position quickly and precisely when moving, without losing balance and awareness of their body position". [8]. Anatomical analysis can be used to develop the main muscles needed for movement or to improve joint balance in athletes while reducing the risk of injury [9].

Based on the significance value of Sig. (2-tailed) it is known that the sig. (2-tailed) value between Arm Power (X2) Backhand Drive Tennis (Y) is 0.002 <0.05 which means that there is a significant correlation between the Arm Power variable and the Backhand Drive variable. The calculated r value

for the relationship between Arm Power (X2) and Backhand Drive (Y) is 0.926> r table 0.576 so it can be concluded that there is a relationship or correlation between the Arm Power (X2) variable and Backhand Drive Tennis (Y). According to Len Kravitz (2001:6) muscle strength is the ability of muscles to use maximum power to lift weights [10]. The strength of the arm muscles in doing a backhand drive is needed to control the hardness of the hit or the distance of the backhand hit, so that the ball can be directed to the desired area. The stronger the hitting arm, the easier it will be to control the hardness of the hit or the distance of the backhand drive, so that the ball can be directed to the desired place. By applying biomechanical concepts to problems related to sports, human movement errors in sports can be reduced or better understood [9].

After the results x1 to Y and xObtained 2 to Y then retested using multiple correlation test, useful to get how big the correlation is. The calculation results using SPSS, Because or calculation or Pearson Correlation in this analysis is positive, meaning the relationship between the two variables is positive or in other words the more Agility and Arm Power increase, the more it will increase the Backhand Drive Shot Tennis Results. It is clear that the contribution of agility and arm power when performing a tennis backhand drive is very important in determining the success of athletes in performing the movement. Because agility has the ability to change direction and body position quickly, hit the ball with a racket and distinguish the events that will be carried out. Muscle strength is the ability of muscles that use maximum power, to lift weights. Arm muscle strength in a backhand drive is needed to control the hardness of the blow or the distance of the backhand hit, so that the ball can be directed to the desired area, so that a perfect backhand drive is created.

Conclusion

Based on the results of the research conducted by the researcher, the following conclusions can be drawn, there is a significant relationship between arm agility and the results of tennis backhand drive strokes, as evidenced by the calculated t value ≥ t table or0.926 > r table 0.576There is a significant relationship between arm explosive power and tennis backhand groundstroke results as evidenced by r count ≥ r table or 0.789 > 0.576.Because the r value or Pearson Correlation calculated in this analysis is positive, it means that the relationship between the two variables is positive or in other words, the more Agility and Arm Power increase, the more the Backhand Drive Tennis Stroke Results will increase. Backhand stroke techniques must be with good skills so that athletes are able to play table tennis skillfully. Without good agility, athletes will find it difficult to anticipate or follow the direction of the ball's movement, making it difficult for them to hit the ball, either using a backhand stroke.

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