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Contribution Of Speed And Explosive Power Of The Leg Muscles To Lay-Up Skills In High School Basketball Athletes Of Budi Agung Medan

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Abstract. It has been determined that high school athletes at SMA Budi Agung in Medan have poor lay-up ability, which led to the creation of this study. It is hypothesized that lack of physical condition, namely speed and explosive power of leg muscles, is the root cause of this disorder. In the context of basketball, the purpose of this study was to determine the extent to which speed and explosive power of leg muscles contribute to the lay-up ability of basketball players attending SMA Budi Agung Medan. In conducting the study, a correlational approach was used. The sample was taken from a population of twenty people, all of whom were athletes from SMA Budi Agung Medan. A complete sampling approach was used to collect the sample. The speed test was conducted by running thirty meters, the explosive power test of leg muscles was conducted by jumping vertically, and the lay-up skill test was conducted using a lay-up test. All of these tests were used to collect data. There is a significant influence between speed and explosive power of leg muscles together on the lay-up ability of basketball athletes at SMA Budi Agung Medan, in accordance with the hypothesis proposed in this study. A simple linear regression statistical approach was used in the data analysis methodology process. This study found that speed contributed to the lay-up ability of basketball athletes by 69.79%, leg muscle explosive power contributed to the lay-up ability by 33.23%, and speed and leg muscle explosive power contributed together to the lay-up ability by 61.34%. These findings were obtained from the results of the study.

Keywords: Speed, Leg Muscle Explosive Power, Lay-Up, Basketball.

1 Introduction

Among the general public, basketball is an increasingly popular sport, especially among school and college students. This is evident from the proliferation of strong clubs throughout the country as well as basketball players at the high school and college levels, who regularly compete with each other in club, regional and national championships. Teenagers who participate in basketball have several advantages, especially in terms of physical, mental and social development.

In addition, basketball has undergone changes and variations in both its movements and the form of the game. These modifications and variations are due to the incorporation of entertainment features such as streetball (freestyle), three-on-three, and chrushbone. These components have made basketball an interesting sport and a fashion trend for young people.

Basketball in Indonesia is currently experiencing a period of extraordinary development. The emergence of technical adjustments and the development of high flexibility in the game of basketball are examples of this phenomenon. Fans do not pay enough attention to mastering the basic methods of basketball as a consequence of this, despite the fact that in the game of basketball, this is very important to produce a good game.

In addition, basketball associations have been established, which include basketball organizations, clubs, and groups. These associations are organized by regional administrators (PB Perbasi) at the provincial level, and PB Perbasi is the one that creates programs every year. This is in accordance with the provisions of Article 20 Paragraph 5 of Law of the Republic of Indonesia No. 11 of 2022, which states that regional governments and/or communities can develop (a) sports associations; (b) centers for research and knowledge, science and sports technology; (c) centers for the development of high-performance sports; (d) sports education and training; (e) facilities and infrastructure for high-performance sports; (f) sports talent development and guidance systems; (g) sports information systems and implementation

Because of the many elements that influence the achievement of optimal performance, basketball is a sport that is full of difficulty and complexity. A sport similar to soccer, basketball requires players to use their hands and feet. In addition, this sport also involves putting the ball into the opponent's basket as much as possible while protecting your own basket from the opponent's threat. Basketball is a sport that requires fast and agile movements because it is designed to meet certain goals. Therefore, to meet these goals, athletes must have good physical condition, including high endurance, strength, speed, and stamina, as well as good technical skills, such as passing, dribbling, shooting, and turning. In addition, they must also have a well-planned training program and complete and adequate facilities and equipment (Amber, 2012: 10).

Basketball is considered an aerobic exercise because each game lasts forty minutes, and the total amount of time spent playing is as long as the game itself. As a result of the explosive nature of the actions involved in basketball, such as shooting, passing, dribbling, and rebounding, the sport is considered an anaerobic event. Throughout the competition, players must maintain constant movement, especially in competitive games. In order to play basketball, you must have fast muscle fibers, but you must also have aerobic capacity.

After reading the above-mentioned statements about the importance of technique and physical conditioning in basketball, the researcher came to the conclusion that both of these aspects are very important in this sport. Under-the-basket, rebounding, dribbling, shooting, passing, and layups are examples of technical components that must be mastered well.

This is the most efficient shot to score in the opponent's basket to make a layup. Since players are allowed to carry the ball twice after finishing dribbling or receiving a pass and releasing the ball while flying on the second count, this is possible. This movement makes this possible. A player can get closer to the opponent's hoop by utilizing this approach. To complete a layup, one must not only run with the ball to the hoop, but also must assist the action with dribbling skills using the feet and hands.

You must have a lot of achievements in basketball in order to be able to rebound, shoot, lay up, and block well. Both of these factors-height and jump height-influence the height of achievement. In addition to being an innate component, height is also a factor that can be improved through physical training. Jump height remains an innate factor. Improving energy fitness and muscle fitness are the main goals of one's participation in physical training. Aerobic, alactic, and aerobic lactic capacities are effective components of energy fitness. Strength, endurance, speed, power, flexibility, balance, coordination, and agility are components of muscle fitness. Other biomotor qualities include strength, speed, and power. In addition, each of these elements is important for the game played in the sport of basketball.

Having strength is necessary to be able to jump, float, and make quick movements. An important component of the physical world is strength. The term “power” refers to the combination of strength and speed, meaning the creation of as much energy as possible in the shortest possible time. In other words, power is the result of using strength and speed together.

In terms of lay-up tactics in basketball, in addition to having extraordinary leg muscle explosive power, speed is also very important. This applies whether the player is holding or not holding the ball. In terms of lay-up tactics, having good speed will give you profitable results. Because the movement will be easily predicted by the opponent if you do not have speed, speed also has the purpose of passing the opponent when you do the lay-up method.

The author witnessed and noticed that a large number of players on the Budi Agung High School basketball team in Medan were unable to do lay-ups. This is most likely due to poor physical condition. Based on the phenomena above, the author has a strong desire to conduct research entitled “The Contribution of Speed and Leg Muscle Explosive Power to Lay-up Skills in Budi Agung High School Basketball Athletes in Medan.”

2 Metode

This type of research is correlational, namely to reveal whether there is a relationship between the speed and explosive power of the leg muscles (independent variables) with lay-up skills (dependent variables). The correlational research method is a type of quantitative research that aims to determine the relationship or association between two or more variables without manipulating the variables. This method does not seek direct cause and effect, but only sees whether there is a relationship and how strong the relationship is.

3 Result

In this case, the measurement results and data analysis results from the speed test, leg muscle explosive power test and lay-up skill test will be presented.

a. Speed

Based on research data for the speed score/value of 20 samples, the lowest score or value was 38 and the highest score was 66. From the data analysis, it can be seen that the average score is 53,566 with a standard deviation of 0.457 from 20 samples of SMA Budi Agung Medan basketball athletes.

Table 1. Description of Research Data

Variabel	N	Average	Sta.dev	Min	Max
Speed	20	53.566	0.457	38	66

Tabel 2. Speed Frequency Distribution

Tscore	Frekuensi	Percentage
38	2	10%
43	4	20%
48	5	25%
57	4	20%
61	3	15%
66	2	10%

Based on the Tscore obtained 38 as many as 2 people (10%), 43 as many as 4 people (20%), 48 as many as 5 people (25%), 57 as many as 4 people (20%), 61 as many as 3 people (15%) and 66 as many as 2 person (10%). For more details, speed data can also be seen in the diagram

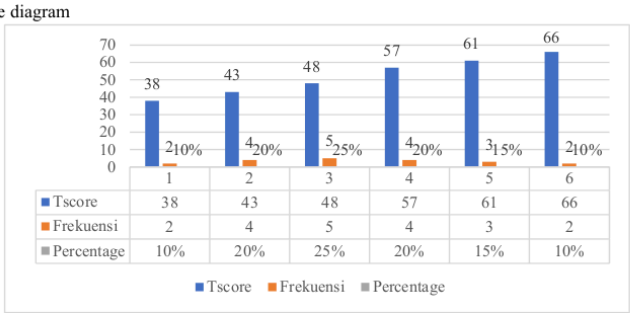


Figure 1. Speed Diagram of Basketball Athletes at Budi Agung Medan High School

b. Leg Muscle Explosiveness

Based on research data for the score / value of leg muscle explosiveness of 20 samples, the lowest score or value is 74 and the highest score is 100. From the data analysis, it can be

seen that the average score is 96.7 standard deviation standard deviation 8.45 of 20 samples of high school basketball athletes Budi Agung Medan.

Table 3. Description of Research Data

Variable	N	Average	Sta.dev	Min	Max
Limb Muscle Explosive Power	20	96.7	8.45	74	100

Table 4. Frequency distribution of Limb Muscle Explosive Power

Tscore	Frequency	Percentage
74	5	25%
88	2	10%
92	3	15%
94	2	10%
96	7	35%
100	1	5%

Based on the Tscore obtained, 74 was 5 people (25%), 88 was 2 people (10%), 92 was 3 people (15%), 94 was 2 people (10%), 96 was 7 people (35%) and 100 was 1 people (5%). For more details, the leg muscle explosive power data can also be seen in the diagram below:

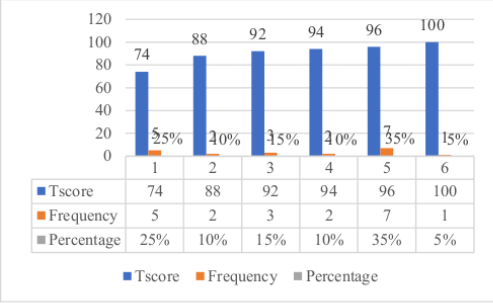


Figure 2. Diagram of Leg Muscle Explosive PowerHigh School Bolabasket Athletes Budi Agung Medan

c. Lay-up Skills

Based on research data for *lay-up* skill scores/grades for 20 samples, the lowest score or value is 77 and the highest score is 109. From the data analysis, it can be seen that the average

score is 98,78 standard deviation standard deviation 9.89 of 20 samples of high school basketball athletes Budi Agung Medan.

Table 5. Description of Research Data

Variable	N	Average	Sta.dev	Min	Max
Lay-up Skill	20	98,78	9.89	77	109

Table 7. Frequency Distribution of *Lay-up* Skills

Tscore	Frequency	Percentage
77	1	5%
81	2	10%
93	3	15%
95	6	30%
102	2	10%
106	2	10%
107	3	15%
109	1	5%

Based on the Tscore obtained, 77 is 1 person (5%), 81 is 2 person (10%), 93 is 3 people (15%), 95 is 6 people (30%), 102 is 2 people (10%) and 106 is 2 person (5%), 107 is 3 people (15%) and 109 is 1 people (5%). For more details, the *lay-up* skill data can also be seen in the diagram below:

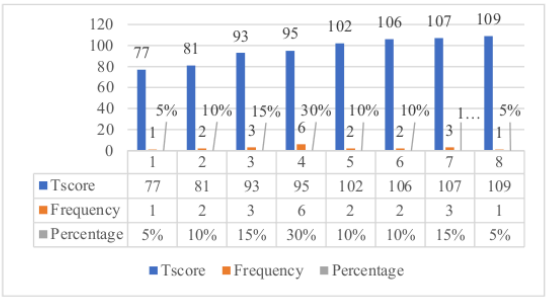
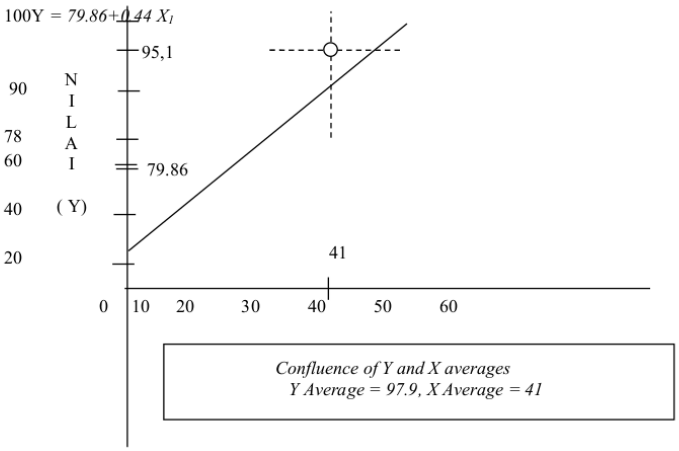


Figure 3. Diagram of Lay-up Skills of High School Basketball Athletes Budi Agung Medan

1. Hypothesis Test

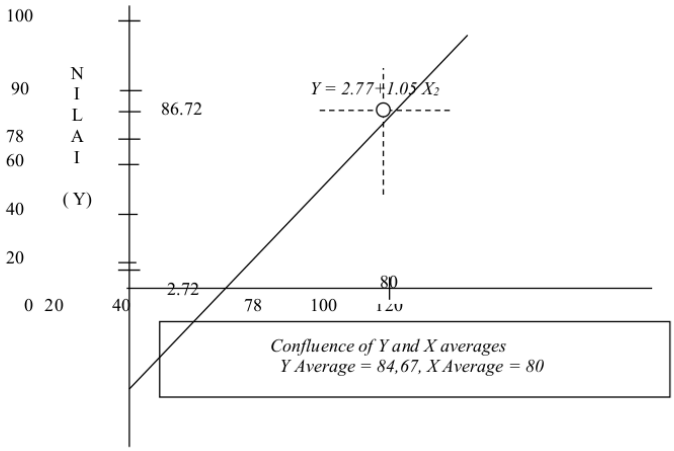
a. There is a Contribution of Speed (X_1)to *Lay-up* Skills (Y).

The results of the analysis show that speed ($X_{1)}$, has a significant relationship and makes a meaningful contribution to *lay-up* skills (Y). In the *correlationanalysis* table, the research data can be read that the relationship (correlation) of speed with *lay-up* skills *is* worth 0.85>$_{r-(tab)}$ *0*.44, meaning that the speed relationship is strong and unidirectional. Based on the strength of the relationship to the two variables, the value of the regression equation can be described as follows *Y*= 79.86 + 0.*44X* $_{1}$, with F_{hit}11.34>$_{F\ (tab)}$ *4*.41 and T_{hit}6.65>$_{T\ (tab)}$1.73. Thus the proposed working hypothesis (Ha) can be accepted. Furthermore, the determination value of the data analysis results (r^2) is 0.85. This means that leg muscle explosiveness as an *independent* variable can contribute 68.89% to the *dependent* variable, namely under basket ability. While the rest is explained by other variables. The results of the analysis can be seen in the attachment. The *regression* line can be drawn based on the equation that has been found (for example if the price of X $_{1}$ = 41 then the Y value on the regression line = (79.86)+ (0.44)(41) = 97.9



There is a Contribution of Limb Muscle Explosiveness (X_{1}) to *Lay-up* Skills (Y).
The results of the analysis show that leg muscle explosiveness ($X_{1)}$, has a significant relationship and makes a meaningful contribution to *lay-up* skills (Y).In the *correlation analysis* table, the research data can be read that the relationship (correlation) of speed with *lay-up* skills *is* valued *at* 0.63>$_{r-(tab)}$ *0*.44, meaning that the speed relationship is strong and unidirectional. Based on the strength of the relationship between the two variables, the value of the regression equation can be described as follows *Y*= 2.77+1.*05X*$_{1}$, with F_{hit}27,67>$_{F(tab)}$ *4*.41 and T_{hit}2.77>$_{T(tab)}$1.73. Thus the proposed working hypothesis (Ha) can be accepted. Furthermore, the determination value of the data analysis results ($r^{2)}$is 0.63. This means that

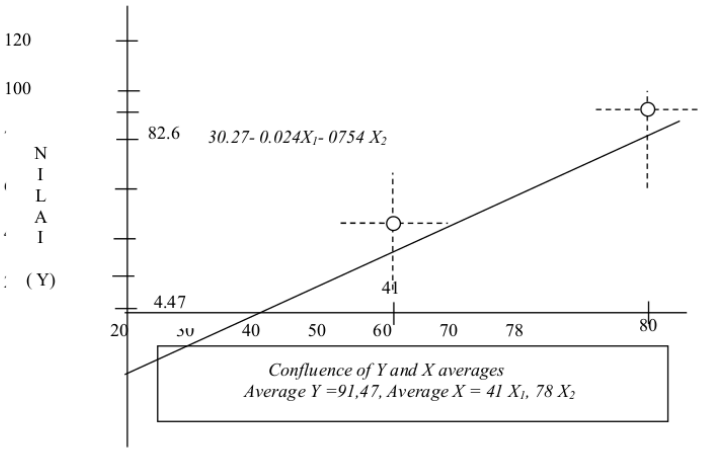
leg muscle explosiveness as an *independent* variable can contribute 33.23% to the *dependent* variable, namely under basket ability. While the rest is explained by other variables. The results of the analysis can be seen in the attachment. The *regression* line can be drawn based on the equation that has been found (for example, if the price of X_2 = 78 then the Y value on the regression line = (2.77)+ (1.05) (78) = 84,67



There is a joint Contribution of Speed (X_1) and Limb Muscle Explosiveness (X_2) to *Lay-up* Skills (Y)

The results of the analysis together ($X_{1,2}$) show that, speed together with leg muscle explosiveness has a significant relationship and makes a meaningful contribution to the ability to under basket (Y), *0.05α.* In the analysis *summary model* table, the research data can be read that the relationship (colleration) of leg muscle explosiveness, agility with under basketball ability is worth $0.79 > {}_{r\text{-}(tab)}$ 0.44, meaning that together the relationship between speed, leg muscle explosiveness and *lay-up* skills is strong and unidirectional.Based on the strength of the relationship to the two variables, the value of the regression equation can be described as follows Y=5.31 + 0.96X_1 + *0.6*X_2, with F_{hit}109,63$>{}_{F\ (tab)}$3.55.Thus the proposed working hypothesis (Ha) can be accepted. Furthermore, jointly obtained the value of determination of the results of the analysis (r^2) of 0.79. This means that leg muscle explosiveness together with agility as an *independent* variable can contribute 61.34% of the *dependent* variable, namely under basket ability. While the rest is explained by other variables. The results of the analysis can be seen in the attachment. The *regression* line can

be drawn based on the equation that has been found (for example if the price of X = 41X $_1$, 78X $_2$, then the Y value on the regression line = (5.31)+ (0.96)(41)+ (0.60)(78) = 91,47



Basketball game is a complex sport, consisting of a complex series of movements as well. In this study, the subjects a study is the contribution of speed and leg muscle explosiveness to *lay-up* skills. From the results of the analysis of the description of the research data, namely speed has a contribution of 69.79% to *lay-up* skills, 33.23% leg muscle explosiveness to *lay-up* skills, and 61.34% contribution from speed and leg muscle explosiveness together to *lay-up* skills. For more clarity, it can be seen in the Histogram graph below:

33.23%33.23%61.3461.34

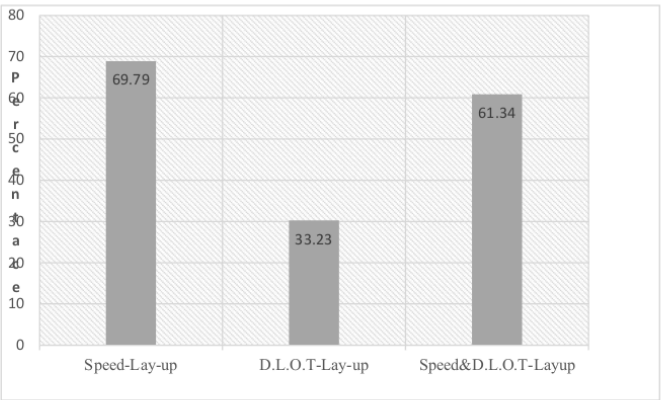


Figure 4. Graph of Contribution of Speed and Limb Muscle Explosiveness to Learning Outcomes

4 Discussion

In basketball, one of the most important physical components is speed. speed can be defined as the ability to perform a series of continuous movements in the shortest possible time or the ability to cover a distance in the shortest possible time. Speed is an important physical ability that plays an important role in most sports, including but not limited to running, long jump, soccer, basketball and other sports. Therefore, speed is a very important factor to consider when trying to achieve the best results in jump training. One of the physical characteristics that play an important role in basketball is explosive power. This is especially true when it comes to putting all parts of the body in a position ready to move quickly. When we talk about leg muscle speed and explosiveness, we are referring to the speed of leg movements that occur when defending, rebounding, shooting under the basket, layups, and other methods that involve changing direction in a very short time. A sport that requires strength and short time is basketball. Footwork, which is the cornerstone of all basic playing skills, is directly related to speed and explosiveness. Footwork is closely related to speed. On the other hand, explosive power plays a very important role in the implementation of various aspects of sudden techniques, defensive movements, attacking, anticipating various possibilities, thwarting opponent obstacles (move off screen), cutting the basketball hoop, and avoiding catches when going to jump attack. Lay-up is a technique supported by a series of complex actions, starting with running with the ball and then jumping to perform follow-up movements. According to Sukintaka, cited in Fardi (2011), lay-up shots are shots that are taken very close to the basketball

ring. This shot is intended to give the impression that the ball is thrown into the ring, and is preceded by a two-step movement. According to Debbie Sumiyarsono, cited in Fardi 2011, lay-up shots can be preceded by jogging, dribbling, or cutting, and then running towards the basketball ring to be shot. Therefore, to make a layup, you must be fast enough to cut or pass your opponent, and you must also have high muscle explosiveness to create a maximum jump.Based on the findings from the previous discussion, it can be concluded that speed and leg muscle explosiveness in high school basketball players Budi Agung Medan have a relationship with lay-up ability and contribute to its development. In addition, it is likely that the cause of the absence of lay-up ability in basketball players is influenced by other elements besides those discussed above. These factors include agility, flexibility, endurance, mental (psychology), training techniques, and other aspects not examined in this study...

5 Conclusion

Based on the results of the research that can be concluded as follows: From the results of the analysis there is a contribution between speed to lay-up skills of 69.79%. From the results of the analysis there is a contribution between leg muscle explosiveness to lay-up skills of 33,23%, From the results of the analysis there is a contribution between speed and leg muscle explosiveness to lay-up skills of 61.34%.

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