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The Contribution of Leg Explosive Power, Abdominal Muscle Strength, and Balance to the Ability to Kick in the Game of Football

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Authors' contribution:
A. *Conception and design of the study;* ***B.*** *Acquisition of data;* ***C.*** *Analysis and interpretation of data;* ***D.*** *Manuscript preparation;* ***E.*** *Obtaining funding*

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ABSTRACT

This study aims to find out whether there is a contribution of leg explosive power, abdominal muscle strength, and balance to the ability to kick in a football game. This study included correlational descriptive research with three independent variables, namely, leg explosive power, abdominal muscle strength and balance, and one dependent variable namely the ability to kick the ball in a football game. The population of this study was students of SMA Negeri 4 Takalar. Through the random sampling technique, a sample of 40 students of SMA Negeri 4 Takalar was selected. Data collection techniques using tests measuring leg explosive power with long jumps, abdominal muscle strength using a stopwatch and balance device using static balance tests and the ability to kick the ball in football games with data analysis techniques used are single and multiple regression analysis which is analyzed using SPSS program computer facilities. At a significant rate of 95% or α= 0.05 Based on data analysis, the results were obtained: (1) There was a contribution of leg explosive power to the ability to kick the ball in a football game, a contribution value of 73.5% was obtained. (2) There is a contribution of abdominal muscle strength to the ability to kick the ball in football games, obtaining a contribution value of 41.7%. (3) There is a balance contribution to the ability to kick the ball in a football game, a contribution value of 29.5% is obtained (4) There is a contribution of leg explosive power, abdominal muscle strength, and balance simultaneously to the speed of the ability to kick the ball in a football game, a contribution value of 87.1% is obtained.

Keyword: Explosive Power; Muscle Strength; Balance; Kicking The Ball; Football

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INTRODUCTION

Football is one of the sports that are quite popular and favoured by all levels of society, especially men ranging from children, teenagers, and adults (Roesdianto & Widodo,

2020). This is evident from the fact that most of them prefer the game of football compared to other sports, both in urban communities and in rural communities (Akhbar & Mahendra, 2021). This is because boys are more interested in things that strain nerves, especially games that require different types of movements including football games (Sari & Nurrochmah, 2021) Because most boys always want to show their movement skills in various situations. The development of the sport, especially in the South Sulawesi region, has shown encouraging and satisfying results, as evidenced by the achievements that have been achieved that have been able to raise the degree and bring the fragrance of the name of the region, so it can be said that the appearance of our players can compete at the national level.

See sports conditions Football, it should not be denied that the sport is not like other sports, especially now that football is one of the sports whose coaching is prioritized in various regions (Putra Maiza Rianda et al., 2020). Therefore, its coaching must be programmed systematically with appropriate and effective training methods and guided by training principles for maximum performance improvement (Ramadan & Shafii, 2022). Several things need to be considered in coaching football sports to lead to increased achievement, namely medical, physical, mental, technical, tactical and skill factors (Erfayliana & Wati, 2020). These factors are requirements that must be owned by a football player because without these factors it is difficult to be able to achieve high achievements (Fatikhatun, 2020). One of the sequences of emphasis of football training is the solidification or mastery of football playing skills, including the ability to kick the ball in the game of football (Pratama, 2019). Kicking or punting the ball is one of the most important technical parts of the game of football because, with a good ball kick, the cooperation carried out by the team both in defence and attack will be able to run well (Akhmad & Suriatno, 2018). The ability to kick the ball in the football game referred to in this study is the ability to kick the ball in the floating football game (Heri, 2017). Kicking the ball in a football game is a way to move the ball from one place to another using the feet. Kicking the ball at the target (goal) can be done whether the ball is stationary, rolling or even floating in the air.

In the game of football kicking a floating ball is often featured in both defence and attack including kicking the ball towards the goal which is the ultimate goal in the game of football to create a goal (Putra et al., 2015). To obtain optimal shot results, in addition to kicking techniques, it must also be supported by good physical condition (Subandi & Sin, 2018). With mastery of ball-kicking techniques combined with physical conditions, it is hoped that the results of ball-kicking accuracy will be better, more directed and more accurate (Wibowo et al., 2016). As well as the physical element, the good explosive power of the legs is also from the player (Aziz & Adityatama, 2020). Because with good leg explosive power, it is possible to kick the ball strongly and quickly and this is very supportive in obtaining the results of a hard floating ball kick and right aimed at the target area we want (Dany et al., 2016). In addition, in the game of football the ability to kick the ball in a football game can be achieved well if supported by the strength of the abdominal muscles also affects a person's ability to kick the ball (S. & Yulifri, 2019). In this case, the role of the abdominal muscles lies in the time of kicking the ball, because to be able to get good ball kick results, it takes the ability of the abdominal muscles to contract with the legs in kicking the ball (Jumaking, 2020), So it can be said that a player who has good abdominal muscles will be the better the speed of the ball kicked (Putra, 2021). In addition to the explosive power of the legs, the strength of the abdominal muscles and the balance factor of the body are needed when kicking the ball (Meidiansya et al., 2021). What is meant by balance is the ability of a person to maintain the position

and stability of the body in dynamic motion situations, namely the ability to maintain body stability during movement, for example when kicking the ball and maintaining weight points after kicking the ball (Yulianto & Haprabu, 2021).

Based on the description above, the support to get the results of the accuracy of kicking the ball well and right on target requires physical conditions such as balance, and explosive power of leg muscles and abdominal muscles. Players who have good body balance explosive leg muscle explosive power and good abdominal muscles are also predicted to have more potential in shooting the ball on target. Conversely, if the body's balance is less stable the explosive power of the legs is weak and the abdominal muscles are less than optimal, someone can't get good ball-kicking accuracy. Based on observations I made at SMA Negeri 4 Takalar, I got information from the sports teacher of SMA Negeri 4 Takalar that the SMA Negeri 4 Takalar football team has reliable football skills but lacks good ball kicks, so I took the initiative to be able to research at the school, to be able to find out whether the explosive power of the legs, Abdominal muscle strength and balance contribute to kicking the ball.

METHODS

There are two variables involved in this study, namely the independent variable and the dependent variable. The two variables will be identified in this study as follows: independent variables, namely: leg explosive power (X1), abdominal muscle strength (X2), balance (X3), and dependent variables, namely: the ability to kick the ball in a football game (Y). Research design is a design or description that is used as a reference in conducting a study. This research is a type of research that is descriptive correlational. The population of this study was the entire students of SMA 4 Takalar. However, this population is limited to male students only based on considerations to have similar traits in terms of gender and both have received football sports subjects. The sample in this study was a portion of individuals representing students of SMA 4 Takalar. Next, determine the number of students (sample) to be used in the study. This was done by purposive random sampling through a lottery so that the number of samples was obtained as many as 40 male students of SMA 4 Takalar. The determination of the sample with a total of 40 students in this study was carried out with the consideration that given the limited ability of the author both regarding cost, time and energy it was not possible to conduct research with a large number of samples. In addition, the sample size of 40 people is already eligible for use in descriptive types of research. Data collection technique is a way used to collect data in a study. The data to be collected in this study include; balance data, leg muscle explosive power data, abdominal muscle strength data and ball kicking data in football games. After all research data are obtained, namely balance data, leg muscle explosive power data abdominal muscle strength data and accuracy data on kicking the ball in football games, then to test the correctness of the proposed research hypothesis, the data that has been collected needs to be analyzed statistically descriptively and inferentially using the help of the SPSS program Version 21.00.

RESULTS AND DISCUSSION

Descriptive analysis

Descriptive analysis is carried out for the explosive power of the legs, the strength of the abdominal muscles, and the balance against the ability to kick in the game of football. A summary of the results of the analysis is listed in **Table 1** as follows:

Table 1.
The results of descriptive analysis of data for each variable.

Variable	N	Sum	Mean	SD	Min.	Max.	Range
X1	40	9990.00	2.4975	5.42430	240.00	260.00	20.00
X2	40	366.00	9.1500	4.27605	4.00	19.00	15.00
X3	40	2090.00	52.2500	7.46874	39.00	65.00	26.00
Y	40	1443.00	36.0750	4.89053	27.00	42.00	15.00

Test data normality

To find out whether the data in this study were normally distributed, testing was carried out using the Kolmogorov-Smirnov test. A summary of the test results can be seen in **Table 2**.

Table 2.
The results of the data normality test for each variable.

Variable	Absolute	Positive	Negative	KS-Z	As.Sig	Information
X1	0.184	0.184	-0.158	1.166	0.132	Usual
X2	0.131	0.131	-0.122	0.829	0.498	Usual
X3	0.168	0.109	-0.168	1.060	0.211	Usual
Y	0.228	0.113	-0.228	1.442	0.031	Usual

Regression analysis

There is a contribution of leg explosive power to the ability to kick the ball in the game of football.

Leg explosive power data is obtained through measurements using a meter and the unit of this tool is a centimetre (cm) To determine the explosive power of the legs with the ability to kick the ball in a football game, a regression analysis is carried out. A summary of the results of the analysis is listed in **Table 3**.

Table 3.
The results of the regression analysis of the explosive power of the legs with the ability to kick the ball in a football game.

Variable	B	To	P	Information
X1Y	0.106	0.602	0,000	Significant

Statistical hypotheses to be tested:

H0: βx1y= 0

H1: $\beta x_{1y} \neq 0$

Based on **Table 3** above, it can be seen that the results obtained a value of β = 0.106 with a value of t = 0.602 (P < 0.05), then H0 rejected and H1 accepted, meaning there is a significant relationship between the explosive power of the legs with the ability to kick the ball in the game of football. If a student has a strong leg explosive power, it will automatically produce a faster and farther-forward ball kick, whereas if a student has less leg explosive power, it will naturally produce a ball kick that is less far ahead.

There is a contribution of abdominal muscle strength to the ability to kick the ball in the game of football.

Data on abdominal muscle strength is obtained through measurements using a stopwatch. A summary of the results of the regression analysis is listed in

Table 4.

The results of the regression analysis of abdominal muscle strength on the ability to kick the ball in a football game.

Variable	B	To	P	Information
X2Y	0.228	1.202	0,000	Significant

Statistical hypotheses to be tested:

H0: βx2y= 0

H1: $\beta x_{2y} \neq 0$

Based on **Table 4** above, it can be seen that the results obtained a value of β = 0.228 with a value of t = 1.202 (P < 0.05), then H0 rejected and H1 accepted, meaning there is a significant contribution of abdominal muscle strength to the ability to kick the ball in the game of football. If a student has good abdominal muscle strength, it will naturally produce a fast and precise ball kick on target, otherwise if a student has poor abdominal muscle strength, it will naturally produce a less good ball kick.

There is a balance contribution to the ability to kick the ball in the game of football.

Balance data is obtained through static balance tests. To determine the contribution of balance to the ability to kick the ball in a football game, a regression analysis was carried out. A summary of the results of the analysis is listed in **Table 5.**

Table 5.

The results of the balance regression analysis with the ability to kick the ball in a football game.

Variable	B	To	P	Information
X3Y	-0.010	-1.511	0,000	Significant

Statistical hypotheses to be tested:

H0: βx3y= 0

H1: $\beta x_{3y} \neq 0$

Based on **Table 5** above, it can be seen that the result obtained a value of β = -0.010 with a value of t = -1.511 (P < 0.05), then H0 is rejected and H1 is accepted, meaning that there is a significant contribution of balance to the ability to kick the ball in the game of football. If a student has a good balance, it will automatically produce a ball kick that is right on target, whereas if a student has a strong balance, it will naturally produce a less good kick

There is a contribution of leg explosive power, abdominal muscle strength, and balance to the ability to kick in a football game.

Double regression was carried out to determine the relationship of the three independent variables to the dependent variable, namely the relationship between leg explosive power, abdominal muscle strength, balance and the ability to kick in a football game. A summary of the results of the analysis is listed in **Table 6.**

Table 6.

The results of the regression analysis of leg explosive power, abdominal muscle strength, and balance against the ability to kick in a football game.

Variable	Ro	Fo	P	Information
X1,2,3Y	0.912	35,467	0,000	Significant

Statistical hypotheses to be tested:

H0: $Ry_{(1,2,3y)} = 0$

H1: $Ry_{(1,2,3y)} \neq 0$

Based on **Table 6** above, it can be seen that the results of multiple regression data obtained the value of R count (Ro) = 0.912 with a value of Fo = 35.467 (P < 0.05), then H0 is rejected and H1 is accepted, meaning a significant contribution together of leg explosive power, abdominal muscle strength and balance to the ability to kick in a football game. If a student has leg explosive power, abdominal muscle strength and balance, then by itself it will produce a ball kick that is far ahead and right on target.

Discussion

There is a contribution between the explosive power of the legs and the ability to kick the ball in football games in SMA 4 TAKALAR students. From the results of data analysis, the jump is statistically processed, a regression value is obtained with β = 0.106, then H0 is rejected and H1 is accepted, meaning that there is a significant contribution of leg explosive power to the ability to kick the ball in football games. This means that, if a student has a strong leg explosive power, it is followed by the ability to kick the ball. Vice versa if a student has a less strong leg explosive power followed by the ability to kick the ball, then when kicking the ball can be done with strong explosive power, to produce forward kick thrust quickly and precisely on target. The amount of contribution given by the explosive power of the legs to the ability of the ball kick. The amount of contribution given to the ability to kick the ball in football games is = 73.5%. If analyzed theoretically, in doing the movement of the ball kick, the foot movement is the main source of energy as a means of encouragement so that the ball can go quickly. When driving will not be separated from the resistance factor as an obstacle to the pace of the ball forward, among them is the mass of the body itself and water. To overcome this, strength is needed in the legs to fight resistance as an obstacle. The resulting force is not only against one-foot movement but is needed to get the maximum speed of the ball's body forward by covering a relatively long distance. So that the explosive power of the legs but several times the movement, so the explosive power of the legs needed must be able to last a long time. Thus the results of this study have proven that there is a contribution of leg explosive power with the ability to kick the ball in football games.

There is a contribution between abdominal muscle strength and the ability to kick the ball in the game of football. From the results of the analysis of abdominal muscle strength data after statistical processing, a regression value was obtained with β = 0.228 then H0 rejected and H1 accepted, meaning there is a significant contribution of abdominal muscle strength to the ability to kick the ball in football games. This means that, if students have good abdominal muscle strength, they are followed by kicking the ball. Vice versa if students have less abdominal muscle strength scores, it will also be followed by the ability to kick the ball poorly. This is caused by less abdominal muscle strength, so when kicking the ball forward can be done with a leg swing, to produce a forward ball thrust quickly and precisely on target. The amount of contribution given by abdominal muscle strength to the ability to kick the ball in football games is = 41.7%. Abdominal muscle strength is the ability to use abdominal muscle strength and be able to change it in the form of very fast movements against an object, in this case, a kick that is done. The strength produced by the muscles depends on the size of the muscle fibres themselves. As Mochamad Sajoto (1998) said: the size of one's muscle fibers, greatly affecting the power is a reality. The larger a person's muscle fibres, the stronger the muscles. So in this case, if someone has large muscle fibres and is also supported by great talent, and accompanied by regular training then the results

obtained will be more satisfying. Sadoso Sumasardjuna (1987) said that sit-ups are usually considered the best movement to strengthen the abdominal muscles. However, if you are wrong in doing body sit-up movements, it causes severe injury. Crunches with straight legs are very dangerous for the waist. Because the abdominal muscles can raise the body from the floor to approximately 30 degrees. The abdominal muscles are stretched between the pelvic bracelet and the pectoral frame. The muscle can actively shorten. This contribution has been proven in the results of this study, which states there is a contribution of abdominal muscle strength with the ability to kick the ball in football games.

There is a balanced contribution with the ability to kick the ball in the game of football. From the results of balance data analysis after statistical processing, a regression value with $\beta = -0.010$ is obtained then H0 is rejected and H1 is accepted, meaning there is a significant contribution to balance to the ability to kick the ball in football games. This means that, if students have good balance, then followed by the ability to kick the ball in a good football game. Vice versa if students have a lower balance score, it will also be followed by the ability to kick the ball in a less football game. This is due to good balance, so when kicking the ball can be done with a good balance swing, to produce forward ball thrust quickly and on target. The amount of contribution given by balance to the ability to kick the ball in football games is = 29.5%. Almost all sports that are competed require a physical element of balance. Because balance is the ability of a person to maintain his body system both in a static position and in a dynamic motion position. Harsono (1988) explained about balance that balance is related to self-coordination, and in some skills, also agility" Thus, to maintain balance in carrying out physical activities, the movements carried out need to be well coordinated as an effort to control all movements. Thus the results of this study have proven that there is a balance contribution with the ability to kick the ball in the game of football.

There is a significant contribution of leg explosive power, speed, abdominal muscle strength and balance to the ability to kick in the game of football. From the results of the analysis of multiple regression data, an $R = 0.912$ value was obtained after a significant test with a regression test using the F test obtained a calculated F value = 35467 ($P<0.05$), then H0 was rejected and H1 was accepted, meaning there was a significant contribution of leg explosive power, abdominal muscle strength and balance to the ability to kick in a football game. The value of R squared obtained = 0.871 this means that 87.1% of the ability to kick the ball in a football game can be explained by all three independent variables together, while the rest is explained by other variables not observed in this study by 12.9%. The explosive power of the legs is about fast footwork in kicking, the strength of the abdominal muscles is about kicking the ball and balance is about kicking the ball with good results and right on target.

CONCLUSION

Based on the results of research and discussion that has been proposed, a conclusion can be drawn as follows:

1. The explosive power of the legs has contributed to the ability to kick the ball in the game of football
2. Abdominal muscle strength has contributed to the ability to kick the ball in the game of football.
3. Balance has contributed to the ability to kick the ball in the game of football.
4. Leg explosive power, abdominal muscle strength and balance have contributed to the ability to kick the ball in the game of football.

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