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The Contribution of Arm Muscle Explosive Power and Backward Flexion to the Inward Throw on Football Games

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ABSTRACT

This study aims to, among others, (1) determine the contribution of arm muscle explosive power to inward throws in soccer games, (2) determine the contribution of rear strike flex to inward throws in soccer games, (3) determine the contribution of arm muscle explosive power and rear strike flex to inward throws in soccer games. This research belongs to the type of descriptive quantitative research. The population of this study was all FIK UNM students with a sample of 50 people. The data analysis technique used is correlation and regression analysis techniques using the SPSS Version 22 system at a significant level of α0.05. Based on the results of data analysis, this study concluded that: 1) the explosive power of the arm muscles has contributed to the inside throw in the FIK UNM student soccer game by 23%, 2) the rear blow has contributed to the inside throw in the FIK UNM student soccer game by 19.3%, 3) the explosive power of the arm muscles, and the back blow flex has a contribution to the inside throw in the student soccer game FIK UNM is 60.4%.

Keywords: Muscle Explosive Power; Togok Flexion; Throw In; Football.

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INTRODUCTION

Sport is a body activity that is carried out systematically and continuously. Body movements are very different from movement activities in sports. Exercise has several elements of motion, stretching is a starting or warming movement that must be done before starting exercise (Hammado, Razak, et al., 2020). In stretching, movement is also divided into two parts of movement, dynamic and static. Furthermore, the core movement in a sport, for example, the sport of soccer also has a core movement but can still be contained as a warm-up movement. After doing movement activities in a sport, continue with the Cooling Down movement or cooling down (Sahabuddin et al., 2022). The cooling movement is a reflection movement to relax the muscles that have been working (Sahabuddin, 2019).

Sports are not only enjoyed to be a health variable, but apart from that sports can be used as a variable to lift the dignity and dignity of the State. Following SKN Law No. 3 of 2005 sports are used as a way to raise the dignity and dignity of the State. The sport in question is included in the sport of achievement. The development of Indonesian sports can have shown that the quality of its athletes can compete (Aziz & Adityatama, 2020) with other countries, especially European countries that are very advanced in terms of technology and sports science. These achievements can be seen in various sports, for example, badminton, boxing, weightlifting and so on (Yulianto &; Haprabu, 2021). Without exception, the sport of football is currently developing. Progress in the field of sports cannot be separated from the development of sports science and technology (Hammado, Sahabuddin, et al., 2020). Structured and systematic coaching also greatly contributes to the achievement of athletes achievements, supporting research and aims as an output of shortcomings and theories in sports.

Football is one of the sports that is of interest to the Indonesian people, ranging from the lower class to the upper class of the social strata (Mulya &; Millah, 2019). Football is included in sports that require maximum physical condition because the movements in soccer are dominant movements that require speed, strength, explosive power, endurance and muscle flexibility (Aziz &; Adityatama, 2020). Football in Indonesia is still below average above other countries (Jumaking, 2020). Indonesian football until now has not been able to reach the level of the world championship (World Cup). The problem felt by the author from experience is that the development of athlete achievements is still very minimal and research is still lacking, especially government funding in the field of sports (Son, 2021).

Students of the Faculty of Sports Science, Makassar State University have many students who struggle in football. In addition to students who are only interested in the branch, there have also been many FIK UNM student football athletes who have made achievements, ranging from representing Kapaten and provinces to some who have passed at TIMNAS Indonesia. In addition, several FIK UNM students are also registered as a team at PSM Makassar or a club known as the Jargon of Roosters from the East. The quality of the game of FIK UNM students still cannot keep up with the games of clubs in Indonesia, this is caused by physical conditions that are still not optimal. The birth of athlete achievements is caused by the maximum physical condition that must be possessed by athletes or soccer players. Movements in soccer games require maximum strength and flexibility, such as shooting, heading, dribbling, and throwing the ball into the field.

METHODS

Research methods are the science of methods or ways used to achieve a research goal. The method is defined as the study of the basic principles of the meaning of inquiry which often involves problems about logic, classification, and basic assumptions. In the description of this research method, it will be stated about matters concerning variable identification, and research, operational definition of variables, population and sample, data collection techniques, and data analysis techniques. The method used in this study is the correlational method. The research method or method used in this study is a "correlational" research method with regression techniques, namely to achieve the contributions of other variables. One of the factors to determine the smoothness of obtaining data with research is population. The population in this study is FIK UNM students. A sample is a portion of the population that is representative of the population. The sampling is based on the rules proposed by Suharsimi Arikunto (1991): "If the subjects are less than 100, it is better to take the entire population so that the research

is a population study. Conversely, if the subject is large, it can be taken between 10-15%, 20-25% or more. Thus the sample in this study is all members of the population taken using a technique called total sample. The reason for using the total sample is because according to Suharsimi Arikunto quote that "if the subjects are less than 100 it is better to take the sum of the entire population. Thus, the number of samples used in this study was 50 players or students of FIK UNM. Data that need to be collected in this study include the explosive power of the arm muscles the flexion of the togok backwards and the throw of the ball inside in the football game. The data collected through the test is still rough. The data is further analyzed using correlational statistical tests with the help of SPSS packets on the computer. The analysis referred to in the study is descriptive analysis to describe the data as it is and inferential analysis to test hypotheses using correlation analysis and regression correlation analysis.

RESULTS AND DISCUSSION

Descriptive analysis

Descriptive data analysis is intended to get an overview of research data. Descriptive analysis was performed on data on arm muscle explosive power, rear flexure, and throw-in in soccer games. Descriptive analysis includes; Total value, average, range, maximum and minimum. These statistical values, it is expected to give a general idea of the state of the data on arm muscle explosive power, rear flexure, and throw-in in soccer games. The results of descriptive analysis of each research variable can be seen in **Table 1.**

Table 1.
Results of descriptive analysis of each variable

Variable	N	Sum	Mean	Standard Deviation	Range	Min.	Max.
X1	50	19965	399,30	32,214	180	310	490
X2	50	1883	37,66	3,001	12	32	44
Y	50	826	16,53	1,655	6	13	19

The results of **Table 1** above which is an overview of the data on arm muscle explosive power, rear flexure, and throw-in in soccer games can be stated as follows:

a. For the arm muscle explosive power data from 50 total samples, a total value of 19965 was obtained and an average of 399.30 with a standard deviation of 32.214 from a data range of 180 between the minimum value of 310 and 490 for the maximum value.
b. For the rear flex data from 50 samples, a total value of 1883 was obtained and the average obtained was 37.66 with a standard deviation of 3.001 from the data range of 12 between the minimum values of 32 and 44 for the maximum value.
c. For throw-in data from 50 total samples, a total value of 826 was obtained and the average obtained was 16.53 with a standard deviation of 1.655 from the data range 6 between minimum values 13 and 19 for maximum values.

Data normality testing

One assumption that must be met for parametric statistics to be used in research is that the data must follow a normal distribution. To determine the distribution of arm muscle explosive power, rear shock flexion, and inward throws in football games against FIK UNM students, data normality tests were carried out using the Kolmogrov-Smirnov Test (KS-Z). The results of the data normality analysis can be seen in the following summary of **Table 2**:

Table 2.
Results of the normality test of each variable

Variable	KS-Z	P	A	Information
X1	0, 109	0,196	0,05	Usual
X2	0, 112	0,155	0,05	Usual
Y	0, 113	0,142	0,05	Usual

Based on **Table 2** above, shows that the results of normality testing data on arm muscle explosive power, rear flexion, and throw-in in football games using the Kolmogorov-Smirnov test shows the following results:

a. In testing the normality of arm muscle explosive power data on FIK UNM students, a Kolmogorov-Smirnov Test value of 0.109 was obtained with a probability level (P) of 0.196 greater than the value of α0.05. Thus the explosive power data of the arm muscles obtained follows a normal distribution or normal distribution.
b. In testing the normality of the back flex data on FIK UNM students, a Kolmogorov-Smirnov Test value of 0.112 was obtained with a probability level (P) of 0.155 greater than the value of α0.05. Thus the rear shock flex data obtained follows the normal distribution or normal distribution.
c. In the throw-in data normality test, a Kolmogorov-Smirnov Test value of 0.113 was obtained with a probability level (P) of 0.142 greater than the value of α0.05. Thus the inward throw data obtained follows the normal spread or normal distribution.

Inferential Analysis

There is a contribution of the explosive power of arm muscles to throw-ins in the game of soccer.

The results of the data obtained from the study aim to find out between independent variables and dependent variables and prove existing hypotheses. Therefore, the results of hypothesis testing based on data processing through correlation and regression analysis from the SPSS program on the contribution of arm muscle explosive power to throw-ins in soccer games are obtained according to the following **Table 3** summary:

Table 3.
Results of correlation and regression analysis for the first hypothesis

Variable	r/R	Rs	t	P-value	Ket.
Arm muscle explosive power (X1) Throw-in (Y)	0,479	0,230	3,782	0,000	Significant

Statistical hypotheses to be tested:

HO : βx1.y = 0

H1 : βx1.y ≠ 0

Based on the results of the test analysis, correlation, and regression data between the explosive power of arm muscles against throw-ins in a ball game. A correlation and regression value of 0.479 was obtained with a probability level (0.000) < $\alpha_{0.05}$, for an R Square value (coefficient of determination) of 0.230. This means that 23% of throw-ins in football games are explained by the explosive power of arm muscles. From the Coefficients test or t-test, the t-count is 3.782 with a significant level of 0.000. Therefore the probability (0.000) is much smaller than α0.05, so regression models can be used to predict throw-ins in a football game (applicable to the population in which the sample was taken). Therefore the probability (0.000) is much smaller than α 0.05. So Ho is rejected and H1 is accepted or the regression coefficient is significant, or the explosive power of the arm muscles has a significant effect on the inside throw in the game of

football. Thus it can be concluded that the explosive power of arm muscles has contributed to throws into the game of football by 23%.

There is a contribution of the deflection of the back toe to the throw in the game of football.

The results of the data obtained from the study aim to find out between independent variables and dependent variables and prove existing hypotheses. Therefore, the results of hypothesis testing based on data processing through correlation and regression analysis from the SPSS program on the contribution of rear strike flex to throws into football games are obtained according to the following summary of **Table 4** :

Table 4.
Results of correlation and regression analysis for the second hypothesis

Variable	r/R	Rs	t	P-value	Information
Rear strike flex (X2) Throw-in (Y)	0,440	0,193	3,390	0,001	Significant

Statistical hypotheses to be tested:

HO : βx2.y = 0

H1 : βx2.y ≠ 0

Based on the results of testing, correlation analysis, and regression data between the flex of the rear shock and the inward thrust in the game of football. A correlation and regression value of 0.440 was obtained with a probability level of (0.001) < α 0.05, for an R Square value (coefficient of determination) of 0.193. This means that 19.3% of throw-ins in football games are explained by the flexion of the backstroke. From the *Coefficients* test or t-test, the t-count is 3.390 with a significant level of 0.001. Therefore the probability (0.001) is much smaller than α0.05, so regression models can be used to predict throw-ins in football games (applicable to the population in which the sample was taken). Therefore the probability (0.001) is much smaller than α 0.05. So Ho is rejected and H1 is accepted or the regression coefficient is significant, or the flex of the back punch has a significant effect on the throw-in in the game of football. Thus it can be concluded that the flexion of the backstroke contributes to the throw in the game of football by 19.3%.

There is a contribution of explosive power of arm muscles and flexion of the back to throws in the game of football.

The results of the data obtained from the study aim to find out between independent variables and dependent variables and prove existing hypotheses. Therefore, the results of hypothesis testing based on data processing through correlation and regression analysis from the SPSS program on the contribution of arm muscle explosive power, and rear strike flex to throws into football games are obtained according to the following summary of **Table 5**:

Table 5.
Analysis and regression results for the third hypothesis

Variable	r/R	Rs	F	P-value	Information
Arm muscle explosive power (X1) Rear strike flex (X2) Throw-in (Y)	0,604	0,365	13, 532	0,000	Significant

Statistical hypotheses to be tested:

HO : Rx1.2.y = 0

H1 : Rx1.2.y≠0

Based on the results of data regression analysis testing between the explosive power of arm muscles, and the flexion of the back togok against throws into a soccer game in FIK UNM students. A regression value of 0.604 was obtained with a probability level (0.000) < α 0.05, for an R Square value (coefficient of determination) of 0.365. This means that 60.4% of throws in a football game are explained by the explosive power of the arm muscles, and the flex of the backstroke. While the rest can be obtained by other physical components. From the ANOVA test or F test, the F count is 13.532 with a significance level of 0.000. Since the probability (0.000) is much smaller than α 0.05, regression models can be used to predict throws into a football game (applicable to the population in which the sample was taken). Therefore the probability (0.000) is much smaller than α 0.05. Then Ho is rejected and H1 is accepted or the regression coefficient is significant, or the explosive power of the arm muscles, and the flexion of the back punch has a significant effect on the throw in the game of football. Thus it can be concluded that the explosive power of the arm muscles, and the flexion of the back strike have contributed to the throw into the game of football by 60.4%. While the rest is also explained by other physical components that have contributed to the throw-in. Namely balance, agility, hand-eye coordination, and abdominal strength.

Discussion

There is a contribution of the explosive power of arm muscles to throw into the game of football.

The results of statistical analysis show that there is a contribution of the explosive power of arm muscles to throws into the game of football. If the results of the research are associated with the underlying theory and framework, then basically the results of this research support and strengthen the theory and results of previous research that already exist. Explosive power is the ability of the sportsman to overcome resistance at a high rate of contraction. High muscle contraction is defined as the ability of strong and fast muscles to contract. So explosive power is affected by speed, both nerve excitatory speed and contraction speed. Explosive power is a person's ability to display maximum work per unit of time. Therefore explosive power is expressed as work done per unit of time, hence functionally there is a contribution between energy power and work. This proves that an inside throw in a soccer game requires an arm muscle explosive force when throwing in. When making an inside throw, what is expected of the player is to make a good throw to the maximum in a short time to give the ball in hand and precisely and purposefully. It is at that momentum that the role of arm muscle explosive power is visible, so that theoretically and according to the results of the author's analysis the explosive power of arm muscles contributes to an inward throw of 23%.

There is a contribution of the deflection of the backstroke to the throw in the game of football.

The results of statistical analysis showed that there was a contribution of back flex to throwing into a soccer game in FIK UNM students. If the results of the research are associated with the underlying theory and framework, then basically the results of this research support and strengthen the theory and results of previous research that already exist. Flexibility is the effectiveness of a person in his adjustment, to carry out all body activities with the widest extendance, especially the muscles, and ligaments around the joints. The bend of the back throw plays a role in the movement of the throw-in because a

player will pull his body back to throw the ball. This is done to get a wider movement to get space so that the throw inside can be directed and accurate. A player when throwing inside requires more space to move when throwing. At that time, the role of the rear flex contributes before the player throws the ball. Quickly the role of the rear strike flex plays a role so that players easily and freely throw the ball without excessive fatigue and less risk of injury. This follows the results of the author's analysis that the flex of the backstroke contributes to the throw-in by 19.3%.

There is a contribution of the explosive power of the arm muscles, and the flexion of the back tow to the throw into the game of football.

The results of statistical analysis showed that there was a contribution of arm muscle explosive power, and back flex to throwing into a soccer game in FIK UNM students. If the results of the research are associated with the theory and underlying framework, then basically the results of this research support and strengthen the theories and results of previous research that already exist. If the element of physical condition is not or less achieved at a certain stage of exercise, then it can be said that the planning and systematics of the exercise are not quite right. Mastery of basic techniques that are effective and efficient, of course, is not only in technique but also supported by the ability of physical conditions. This was revealed by Jones (2012) that "the consideration of physical condition must be developed and based on the characteristics of the sport he is engaged in because in a particular sport requires overall physical condition, while in other branches only part of it. So the problem of the role of physical condition is relative because it depends on the characteristics of the sport as in the game of football. The components of the physical condition consist of strength, speed, agility, flexibility, endurance, explosive power, coordination, balance, and reaction. According to Subarjah (2012) said that "the components of physical condition consist of components such as muscle strength, muscular endurance, general endurance, flexibility, speed, coordination, agility, and balance. Developing or improving physical condition means developing or improving the physical abilities of athletes. Every effort to improve physical condition must be developed for all existing components, although in its implementation it is necessary to get a larger portion of training following the sport pursued in this case football. The absence of one of the supporting components will affect the results achieved. Likewise, badminton requires a good physical foundation but does not leave out other factors such as technique and mentality. Thus the physical components of explosive power, flexibility, and strength are existing physical components, and cannot be ignored in supporting the ability to throw in the game of soccer. This component of physical condition greatly influences and contributes significantly to the ability to throw in the game of soccer. Explosive power is the ability to be able to use power in a short time. Explosive power works both when taking *off* to throw the ball and when throwing inside. In addition, flexibility will play a role in helping to provide space for movement in throwing, so that flexibility in throwing the ball is more efficient and able to direct the ball to all areas of the field. In the discussion of the term flexibility) includes two things that contribute to each other, namely flexibility is closely related to the state of bones and joints, while flexibility is closely related to the level of elasticity of muscles, tendons, and ligaments. For this reason, the two elements (flexibility and flexibility) will ensure the breadth of motion in the joints and facilitate muscles, tendons, ligaments, and joints when moving. So the results of this study concluded that the flex of the back togok contributes to throwing in. This is also explained by the theories that the author has put forward, that flexibility is very important for every athlete. From the explanation above, the author concludes with the results of the theory and analysis of the study. The two physical components that are variables in this study have a very instrumental contribution in making

throws in. Among these physical components, the explosive power of the arm muscles, and the flexion of the rear thrust, the most dominating contributes to the aspect of the physical component of explosive power, in this case, the explosive power of the arm muscles.

CONCLUSION

Based on the results of research and discussion that has been presented, the following conclusions can be drawn:

1. The explosive power of arm muscles has contributed to throws in the game of football.
2. The flexion of the backstroke has contributed to the throw in the game of soccer.
3. The explosive power of arm muscles and the flexion of the backstroke have contributed to throws in the game of soccer.

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