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The Relationship Between Arm And Waist Muscle Strength And Throwing Results In The Wrestling Branch Of Bandung Regency

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Abstract

This research aims to determine the relationship between arm and waist muscle strength and the wrestling performance results in Bandung Regency. This study uses a quantitative method with a correlational approach. The population of this study consists of 30 wrestling athletes from Bandung Regency, with a sample size of 15 people selected using purposive sampling. The instruments used include measuring the strength of the waist or leg muscles with the back and leg dynamometer test, measuring the strength of the arm muscles with the handgrip dynamometer test, and measuring the waist endurance with the 30-second waist endurance test using a doll as the media. Based on table 4.3, the Pearson correlation test shows that. If the calculated r > table r, then reject HO, which means accepting HI. Whereas if r calculated < r table, then HO is not rejected, which means HI is rejected. Based on the analysis results above, the arm muscle strength obtained a calculated r value of 0.884 > table r value of 0.553 for the throwing result, and the waist muscle strength obtained a calculated r value of 0.785 > table r value of 0.553. Therefore, HO is rejected and HI is accepted, which means there is a relationship between arm and waist muscle strength training and the throwing results in the wrestling branch of the Bandung Regency sports. The author draws conclusions about this research based on the results of the data analysis. Strength of the arm and waist muscles is significantly correlated with the performance of the Bandung Regency wrestling branch. Similarly, there is a significant relationship between the performance of the Bandung Regency wrestling branch and the strength of the waist muscles.

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INTRODUCTION

In wrestling, there are two styles contested both nationally and internationally, namely freestyle and Greco-Roman (Kembara et al., 2022)Freestyle is a wrestling style that allows wrestlers to use their arms and entire body to grapple with each other and permits wrestlers to attack both legs according to predetermined rules(Hasyim et al., 2020). Whereas the Greco-Roman style is a wrestling technique that prohibits the use of legs for contact and forbids wrestlers from attacking the lower body or below the hips (Bintoro & Nugraheningsih, 2021). Wrestling is one of the many competitive sports available in Indonesia. (Munasifah, 2009) Wrestling has many local, national, and international competitions. (Septian & Jarmiko, S.Pd., 2018) For example, there are regional championships, national championships, student sports weeks, national sports weeks, the Sea Games, the Asian Games, and many more. These championships also have levels, for example from regional to national, national to international, and so on. (B & Ilahi, 2021).

In general, the problem faced by wrestlers in executing throws is the lack of arm and waist muscle strength when gripping the opponent's hand to perform the throw. The muscle strength used in the throwing technique, especially in the waist throw technique, includes: leg muscle strength, back muscle strength, and arm muscle strength (B & Ilahi, 2021). This results in the lack of strength in the arm and waist muscles being the most fatal when performing a failed throw (Murdiansyah, 2022). For a solution to this issue, it is necessary to strengthen the arm and waist muscles by performing circuit training or barbell exercises (MUSTOFA & JATMIKO, 2019). periodically for about one or two months, therefore, research on the influence of arm and waist muscles on throws in the sport of wrestling in Bandung Regency is very important considering the lack of training references and awareness in performing throws. (Gustiawan, 2021).

Based on the research by (Sabillah et al., 2022).Which examines the importance of power for wrestlers, wrestling involves two people in physical contact. If one of the players lacks power, they will likely experience defeat. There are also other factors such as improper throws and incorrect attacks, but in this study, the most relevant aspect for wrestlers is that a lack of physical strength has a significant impact on every athlete. (Griban et al., 2021).

Wrestling is a martial arts sport that uses a combination of pulling, pushing, lifting, and spinning movements, and emphasizes techniques such as throws, rolls, and holds, which are performed to destabilize the opponent and enhance offensive movements in a set (Maya Sari Br Sembiring et al., 2018). "Wrestling is a physical contact sport between two people, where one of the wrestlers must throw or be able to control their opponent (Yusuf & Jahrir, 2021)." These basic movements are very important and must be practiced continuously (Lingkungan et al., 2022). For that reason, not only technical training is needed but also training of various physical components to support

performance during competitions (Tatlici et al., 2021).

In the research conducted by(Hafiz et al., 2022), which discusses the relationship between trunk muscle strength and arm strength with throwing ability, this study also covers the definition of wrestling and the basic techniques in the sport of wrestling, such as wrestling positions and throws. (Indrayana, 2018) in this study discusses more about the development of wrestling as a competitive sport and also covers arm throws and strength in performing wrestling because wrestling requires good physical condition (Martiani, 2018). However, the research to be presented discusses the relationship between arm and waist muscle strength and the results of throws in the sport of wrestling (Indik Syahrabanu, 2023).

This research aims to determine the relationship between arm and waist muscle strength and the results of throws in the sport of wrestling.(Papassotiriou & Nifli, 2018).Where this research aims to determine whether there is a relationship between arm and waist muscle strength and the results of throws in the sport of wrestling, by using hang grip dynamometer tests, leg dynamometer tests, and a 30-second throwing test for each athlete. In previous research, the focus was on studying the arm wrestling at bandung regency.(Durkalec-Michalski et al., 2018) This research focuses more on whether the hangrip dynamometer test, leg dynamometer, and 30-second grip test are related to the performance in the sport of wrestling.(Cahyono, 2021).

METHODS

The method used in this research is a quantitative method with a correlational design. using correlation tests aimed at determining the relationship between independent and dependent variables. Correlation is the relationship between one variable and another, the degree of the relationship between the two variables is depicted through the magnitude of the correlation. (Juhanis, 2012) The purpose of this research is to determine whether arm and waist muscle training is related to the throws in the wrestling branch of the Bandung Regency sports.

Participants

The research participants used in this study are wrestlers from Bandung Regency who have participated in several tournaments/matches such as PORDA or PON and have experience competing in a match. The sample participants include the characteristics of each athlete, especially their age. Most wrestlers from Bandung Regency are between 20-25 years old. The majority of those who participate in wrestling are male, although there are also female wrestlers. In terms of education level, some have completed high school, while others have continued to higher education.

Sampling Procedures

The population to be sampled in this study consists of wrestling athletes from Bandung Regency, with a total population of 30 wrestling athletes. The sampling technique used by the researcher is Purposive Sampling. Which means that the sampling is done intentionally according to the predetermined criteria. Therefore, the sample to be used in this study will be wrestlers from Bandung Regency, consisting of 15 wrestlers.

Materials and Apparatus

Each research variable must be explained in more detail to provide a better understanding of its characteristics.(Yusuf & Jahrir, 2021) Therefore, the definition of the variables to be studied must be defined operationally, as this definition indicates what work will be done and how the variables will be measured.(Fauzi et al., 2020).This is very important for determining the data collection tools that will be used as well as the subsequent data processing procedures. For this reason, the research variables must be defined operationally as follows(Fauzi et al., 2025).

A state that is connected or related is called a relationship.(Fauzi et al., 2023).Research on relationships or correlations aims to determine whether the relationship exists or not, as well as how strong and significant that relationship is.(Tariki et al., 2023).The focus of this research is on how the strength of the leg and arm muscles correlates with the hip throw technique used in wrestling.(Rezqa et al., 2023).

In this study, the strength of the waist muscles referred to is the ability of a person's waist muscles to overcome resistance or load while moving or contracting when pulling the waist muscle dynamometer.(Fauzi et al., 2024)

In this study, the arm muscle strength referred to is the ability of a person's arm muscles to overcome resistance or load received while moving or contracting when pulling a Hand Grip dynamometer with the arm. (Lengkana & Tangkudung, 2018).This research focuses on one of the throwing techniques used in wrestling.(Atherstone et al., 2021).

Procedures

To measure arm muscle strength The test should be conducted with the sample standing upright with feet shoulder-width apart and facing forward(Lengkana & Sofa, 2017). The position of the hands and arms should be straight with the shoulders while holding and pulling the dynamometer.(Lengkana, 2016) Pull the tool strongly.(Sudirjo et al., 2019).The tool must not touch the waist while pulling, and the hands and elbows must be aligned. This test is performed three times.(Ayi Suherman, Rizal Ahmad Fauzi, Anggi Setia Lengkana, 2021) Assessment:(Lengkana & Sofa, 2017). The best tensile strength score is recorded in kilograms.(Lengkana & Tangkudung, 2019).

The purpose of using the Leg Dynamometer is to measure the strength of the waist muscles. Tools and equipment: Foot dynamometer. How to use it: The athlete stands on the dynamometer platform with knees bent at an angle between 130^0 and 140^0 degrees and the body upright. The length of the dynamometer chain is adjusted so that the handle position is in front of both thighs. Slowly straighten the knee joint to pull the handlebar as hard as possible. When the maximum is reached, read the needle mark on the scale. This test is performed three times, with a one-minute break in between. Assessment: The best score from three trials is calculated in kilograms.(Juhanis, 2012).

Test of Competency in Tackle Techniques This research will test the sample's ability in the throwing technique. (Papassotiriou & Nifli, 2018).The method involves the wrestler or tester standing in front of a dummy or mannequin and preparing to perform the throw. After the command "Yes," the wrestler or tester performs the throwing

technique. (M.Or, 2017).The stopwatch will function until the wrestler or tester can drop the popy or mannequin. Testee and wrestlers are given 30 seconds to perform the throw and are given the opportunity to do it twice. As part of the assessment, participants are recorded on how many times they drop the popy or mannequin using the throwing technique within 30 seconds.(Ahmad, 2022).

Design or Data Analysis

To test the research hypothesis, the collected data must be analyzed using descriptive and inferential statistics. This research uses quantitative methods, and descriptive data analysis is used to provide an overview of the data, including the mean and standard deviation. Additionally, inferential analysis is used to test the research hypotheses using correlation and regression tests. Therefore, statistical data are usually analyzed using the SPSS version 26 computer program, with a significance level of 95% or $\alpha = 0.05$.

RESULT

The research data consists of two independent variables, namely the arm muscle strength variable (X1) and the waist muscle strength variable (X2), as well as the dependent variable, the throwing result (Y). In this section, the data of each variable that has been processed will be described or depicted based on the mean, median, mode, and standard deviation values. In addition, tables of the frequency distribution for each variable are also presented. Here are the details of the data processing results that have been carried out with the help of SPSS version 26.

Statistical Value	Arm Muscle Strength	Strength of the Waist Muscles	Result of the Toss
N	15	15	15
Range	30	93	8
Minimum	26	60	8
Maximum	56	153	16
Sum	657	1840	185
Mean	43.80	122.67	12.33
SD	10.752	29.156	2.554
Variance	115.600	850.095	6.524

It can be noted that the arm muscle strength has an average value of 43.80 and a standard deviation of 10.752, while the waist muscle strength has an average value of 122.67 and a standard deviation of 29.156. And the results of the bounce test obtained an average score of 12.33 and a standard deviation of 2.554.

The author uses the IBM SPSS Statistics Version 26 program to calculate the Kolmogorov-Smirnov normality test to determine whether the data distribution is normal or not. A condition for data to be normally distributed is if the significance obtained from the calculations is greater than Sig.

One-Sample Kolmogorov-Smirnov Test

		Arm Muscle Strength	Strength of the Waist Muscles	Result of the Toss
N		15	15	15
Normal Parameters[a,l]	Mean	43.80	122.67	12.33
	Std. Deviation	10.752	29.156	2.554
Most Extreme Differences	Absolute	.219	.199	.153
	Positive	.130	.149	.153
	Negative	-.219	-.199	-.118
Test Statistic		.219	.199	.153
Asymp. Sig. (2-tailed)		.051[c]	.112[c]	.200[c,d]

Based on table, it shows the significant value of arm muscle strength with a significant value (Sig.) = 0.051 > 0.05, and waist muscle strength 0.112 > 0.05. Therefore, it can be concluded that the data is normally distributed. In the bounce test results, the significant value (Sig.) = 0.200 > 0.05, so it can be concluded that the data is normally distributed.

Testing Pearson correlation. The relationship between one variable and another variable. The degree of the relationship between two variables is illustrated by the magnitude of the correlation coefficient. The correlation between variables is said to be perfect if the correlation coefficient is 1.00. Calculating the Pearson correlation test using IBM SPSS Statistics version 26.

Correlations

		Arm Muscle Strength	Strength of the Waist Muscles	Result of the Toss
Arm Muscle Strength	Pearson Correlation	1	.932**	.884**
	Sig. (2-tailed)		.000	.000
	N	15	15	15
Strength of the Waist Muscles	Pearson Correlation	.932**	1	.785**
	Sig. (2-tailed)	.000		.001
	N	15	15	15
Result of the Toss	Pearson Correlation	.884**	.785**	1
	Sig. (2-tailed)	.000	.001	
	N	15	15	15

Based on the Pearson correlation test, it shows that. If r calculated > r table, then reject HO, which means accepting HI. Whereas if r calculated < r table, then HO is not rejected, which means HI is rejected. Based on the analysis results above, the arm muscle strength value r count 0.884 > r table 0.553 for the throwing results and the waist muscle strength value r count 0.785 > r table 0.553, therefore HO is rejected and HI is accepted, which means there is a relationship between arm and waist muscle strength training and the throwing results in the wrestling branch of the Bandung Regency sports.

After conducting the Pearson correlation test, it was found that the sample data has a relationship. Then we can test linear regression. One of the most popular and useful statistical techniques for analyzing the relationship between two or more variables. In simple terms, linear regression tries to find the best straight line that can describe the relationship between the dependent variable (the variable we want to predict) and one or more independent variables (the variables we use to make predictions). Calculating the Pearson correlation test using IBM SPSS Statistics version 26.

Coefficients[a]

	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	Sig.
1(Constant)	3.446	1.452		2.374	.035
Arm Muscle Strength	.277	.086	1.165	3.213	.007
Strength of the Waist Muscles	-.026	.032	-.301	-.830	.423

A.Testing the First Hypothesis (H1) The Sig value for the relationship between arm muscle strength X1 and the throw

result (Y) is 0.007 < 0.05 and the calculated t value is 3.213 > the table t value of 2.179, thus it can be concluded that there is a relationship between arm muscle strength and the throw result. B.Testing the Second Hypothesis (H2) It is known that the Sig value for the relationship between waist muscle strength X2 and the throw result Y is 0.423 > 0.05 and the t-value -0.830 < 2.179, so it can be concluded that H2 is rejected, which means there is no relationship between waist muscle strength and the throw result. Therefore, from the two T-tests, X1 has an influence (there is a relationship) while X2 does not have an influence (there is no relationship) based on the T-test. Because it can be influenced by the weight of the poppy, which is around 25kg, it can also be influenced by the weight of the athlete and the improper use of techniques in executing throws in the wrestling sport of Bandung Regency.

ANOVA[a]

Model		Sum o Square	df	Mean Square	F	**Sig.**
1	Regression	72.509	2	36.255	23.112	**.000[b]**
	Residual	18.824	12	1.569		
	Total	91.333	14			

C.Testing the Third Hypothesis (H3) Based on the output above, it is known that the significance value for the relationship between Arm Muscle Strength X1 and Waist Muscle Strength X2 simultaneously with the bounce result of 0.000 < 0.05 and the calculated F value of 23.112 > table F 3.81, it can be concluded that H3 is accepted, which means there is a simultaneous relationship between X1 and X2 with Y.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.891[a]	.794	.760	1.252

Based on the output above, the R Square value is 0.794, which means that the variables of arm muscle strength X1 and waist muscle strength X2 simultaneously account for 79.4% of the variance in the Y outcome.

Tables & Figures

Table 1. Table title

TIDAK	Barang	Keterangan
1	Normalitas	Normality
2	Correlations	Related
3	Linear regression	Related
4	Model Summary	Related
5		

Fig 1. Graphic Result of the Toss

DISCUSSION

Based on the data processing results that have been conducted, the author found that there is a relationship between arm muscle strength and waist

muscle strength with the throwing results. Results of the data analysis. This is evidenced by the results of the Pearson correlation test, which showed an arm muscle strength r value of 0.884 > table r value of 0.553 for the wrestling branch, and a waist muscle strength r value of 0.785 > table r value of 0.553, meaning there is a relationship between arm and waist muscle strength training and the wrestling branch results in Bandung Regency.(Ningsih & Jatmiko, 2021).

In this study, wrestling also requires support from physical condition, health, as well as mental and spiritual well-being to maintain good performance in a match. According to(Fauzi et al., 2024). Physical condition is the process of developing the ability to perform physical activities systematically and progressively to maintain or improve the level of physical fitness in order to achieve optimal physical work capacity.(Fauzi et al., 2025).

If the results are linked to the line of thought and theoretical research that has been conducted, the findings are in line with the theory (Juhanis, 2012) which states that strength, or power, is part of a person's physical condition regarding their ability to use their muscles to bear loads while working, and (Indrayana, 2018) states that muscle strength is a quality that allows for the growth of muscle tension in maximal contraction. In the waist throw technique in arm wrestling, the arm muscle strength referred to is used for embracing and pulling.

Hypothesis testing shows that from the data analysis results, there is a significant relationship between arm muscle strength and waist muscle strength with the throwing results in the wrestling branch of the Bandung Regency sports. The results obtained, when linked to the line of thinking and theoretical study that has been conducted, are in accordance with the existing theory. This means that if the strength of the arm muscles and the strength of the waist muscles are classified as good, it will be followed by good performance in wrestling. Similarly, if the values of arm muscle strength and waist muscle strength are poor, it will be followed by poor performance in wrestling.

CONCLUSION

Based on the results of the data analysis, the author draws conclusions about this research. There is a significant relationship between arm muscle strength and the results of the wrestling branch in Bandung Regency. There is a significant relationship between waist muscle strength and the results of the wrestling branch of the Bandung Regency sports. There is a significant relationship between the strength of the arm and waist muscles together with the wrestling performance results in Bandung Regency.

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