

Relationship between Leg Muscle Strength, Leg Power and Flexibility with Crawl Style Swimming Start

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Abstract

This study aims to determine the relationship between leg muscle strength, leg power, and flexibility to start swimming in the crawl style of students of Pendidikan Kepelatihan Olahraga Universitas Negeri Gorontalo. This research is correlational description research. The research subjects used were students of Pendidikan Kepelatihan Olahraga Universitas Negeri Gorontalo, totaling 12 students and then given tests and measurements on each sub-variables. The research instrument for leg muscle strength used the Back and Leg Dynamometer, leg power used a vertical jump test, flexibility used a pleximeter, and a crawl style swimming starts test instrument. The data analysis technique used tests and measurements, namely linearity, normality, and regression homogeneity. At the same time, the correlation test used simple correlation and multiple correlations. The results showed a relationship between leg muscle strength, leg power, and flexibility on the crawl-style swimming start of Pendidikan Kepelatihan Olahraga Universitas Negeri Gorontalo students. The conclusion is that crawl style swimmers must pay attention to the physical condition of leg muscle strength, leg power, and flexibility to make a start in crawl style more optimal.

Keyword: leg muscle strength, leg power, flexibility, crawl swimming start

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INTRODUCTION

Swimming is a type of sport in demand by various levels of society (Tahapary and Syaranamual 2020). Swimming is a cardiovascular exercise helpful in increasing VO₂ max and decreasing resting pulse rate (Susanto 2015). Swimming can also be a destination for educational sports, recreational sports, fitness sports, and even achievements (Anon 2018). The basic principle to produce outstanding athletes is that coaches/coaches must formulate training programs in a systematic, planned, and progressive manner to improve maximum performance.

Everyone in this swimming sport has different abilities, especially on very influential things, such as leg muscle strength as a boost. The strength used in swimming is the strength of the leg muscles, including quadriceps extensor,

gastrocnemius, and gluteus maximus (Ozeker, Bilge, and Yildirim Kose 2020). These muscles are involved at the time of starting and play a role in forwarding thrust, leg power, and explosive power (Issurin and Verbitsky 2013). This explosive power is required in some acyclic movements. Explosive power is a combination of maximum speed and maximum power. Improvements in flexibility will reduce injuries to muscles and joints, help improve performance, save energy expenditure during movements and help improve posture. This has a significant impact, especially when it comes to starting.

The start is the beginning of the race and affects the final result of the swimming competition. To use energy efficiently and reduce drag, the force technique requires better joint flexibility. Athletes who have the correct swimming style, start, and reversal techniques, can develop the necessary physical components to the maximum and be carried out effectively and efficiently to obtain optimal results.

The physical components needed by crawl style swimmers are strength, flexibility, speed, endurance, balance, and coordination (Amin 2018). Among the members of strength used by crawl-style swimmers are those related to leg muscle strength as a boost. Muscle strength dramatically affects the success of swimming achievements in addition to mastering the correct style technique.

Previous research stated a relationship between leg muscle strength, leg power, and limb flexibility with the butterfly stroke swimming start in athletes aged 10-16 years in swimming associations. Yuso Yogyakarta (Sadewa 2011). The research conducted by the author has differences from previous research. The author uses research subjects more than 19 years old and is not swimming athletes.

METHOD

This study uses the correlational method (Ramadan & Juniarti, 2020). The population in this study were 31 students of Pendidikan Kepelatihan Olahraga Universitas Negeri Gorontalo who took the Swimming Practice Theory course. The research sample was taken using the purposive sampling method with the characteristics of the male gender, active students, and willingness to follow all research provisions. The sample consisted of 12 students. The research instrument for leg muscle strength uses the Back and Leg Dynamometer. Leg power using the

vertical jump test. Flexibility using a pleximeter. The research instrument for the crawl style swimming start uses a test instrument developed using construct validity, which is sought using the product-moment correlation from Karl Pearson. It is stated that the objectivity coefficient reaches 0.999 (Sadewa 2011).

The data obtained from the results of tests and measurements are then processed and analyzed. The results of this data analysis and processing can be concluded. Before conducting a thorough data analysis, a descriptive research description of leg muscle strength, leg power, and flexibility is presented to start the crawl style swimming. Then the prerequisite test data analysis technique uses linearity test, normality test, and regression homogeneity test. At the same time, the correlation test uses simple correlation and multiple correlations.

RESULTS AND DISCUSSION

Results

The results of descriptive statistical analysis in this study can be seen in the following table:

Table 1 Descriptive Statistical Analysis

Variable	Max	Min	Mean	Median	Modus	St. Dev
Leg muscle strength	215.50	41.00	86.29	64.00	64.00	61.22
Leg power	2.40	0.81	1.30	1.06	0.94	0.53
Flexibility	47.00	34.00	37.92	37.00	37.00	4.14
Crawl style start	3.05	2.50	2.78	2.75	2.75	0.16

The result of the following test is the analysis prerequisite test which includes linearity test, normality test, and regression homogeneity test, which are summarized in the following table:

Table 2 Summary of Normality Test Results

Variable	Kolmogorov-Smirnov		
	Z	P	Information
Leg muscle strength	1.274	0.078	Normal
Leg power	1.154	0.140	Normal
Flexibility	1.048	0.285	Normal
Crawl style start	0.704	0.705	Normal

Table 3 Linearity Test Results

Functional Relationship	F			Information
	count	DB	table	
Leg muscle strength	0.013	1:11	4.484	Linear
Leg power	1.163	1:11	4.484	Linear
Flexibility	0.205	1:11	4.484	Linear

Table 4 Regression Homogeneity Test Results

Functional Relationship	F			Information
	count	DB	table	
Leg muscle strength	2.015	1:10	4.965	homogeneous
Leg power	1.141	1:10	4.965	homogeneous
Flexibility	2.118	1:10	4.965	homogeneous
Crawl style start	1.653	1:10	4.965	homogeneous

Analysis of research data using simple correlation test and multiple correlations which are summarized in the following table:

Table 5 Simple Correlation Test Results

Correlation	r count	r table (0,05;13)	Information
Leg muscle strength. Crawl style start	0.751	0.497	Significant
Leg power. Crawl style start	0.798	0.497	Significant
Flexibility . Crawl style start	0.726	0.497	Significant

Table 6 Multiple Correlation Test Results

Relationship between variables		Correlation coefficient (R)	F count	F table (0.05;3/11)	Information
Leg strength . Leg power . Flexibility. Crawl style start	muscle	0.835	6.141	3.587	Significant

Based on these results, there is a relationship between leg muscle strength, leg power and flexibility with starting crawl style swimming in students Pendidikan Kepelatihan Olahraga Universitas Negeri Gorontalo.

Discussion

This research, which has a student population of Pendidikan Kepelatihan Olahraga Universitas Negeri Gorontalo, produces findings that will be discussed as follows:

Leg muscle strength has a relationship with the crawl style start. The power of the leg muscles in swimming is closely related to the swimmer's impulse when starting the start in the crawl style. Athletes with good leg muscles will have balance in swimming and be strong enough to go into the water (Rasyid, Setyakarnawijaya, and Marani 2017). The findings in this study also corroborate the results of previous studies which stated the same thing. Thus that leg muscle strength plays a vital role in starting crawl style swimming.

Leg power has a relationship with crawl style start. Leg muscle power itself understands the product of leg strength and leg speed (Suharjana 2013) (Mylsidayu and Kurniawan 2015). Findings from other studies also state that leg muscle power becomes a launching force to produce energy that pushes forward (Prawirakusuma and Sukoco 2019). Of course, the addition of the speed of the legs in jumping will increase the thrust of the crawl style start technique.

Flexibility has a relationship with the crawl force start. Joint flexibility serves to maximize the use of energy to be more efficient. Swimming movements performed at speed require the body and flexible joints (Prawirakusuma and Sukoco 2019). The

use of flexibility in the crawl style start itself is used so that the reach and efficiency of motion at the time of the crawl style start can occur optimally.

Leg muscle strength, leg power and flexibility to start crawl style swimming have a relationship together. The results of this study have found that it is essential for crawl-style swimmers to have physical abilities in leg muscle strength, leg power, and flexibility to make an optimal start.

CONCLUSION

Based on the results of data analysis, description, testing of research results, and discussion, it can be concluded that: There is a significant relationship between leg muscle strength, leg power and flexibility at the start of crawl style swimming. Crawl-style swimmers should train their physical abilities to optimize the start technique, especially on leg muscle strength, leg power, and flexibility.

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