



Article

Contribution of Double Legs Speed Hops and Pull Down Resistance Bands Training to the 50 Meter Breaststroke Swimming Speed of Male K.U II Athletes at the Medan Aquatic Swimming Club in 2023

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Abstract

This research is an experimental study whose aim is to determine the contribution of Double Legs Speed Hops and Pull Down Resistance Bands training to the 50 Meter Breaststroke Swimming Speed of Male K.U II Athletes at the Medan Aquatic Swimming Club in 2023. The population of swimming athletes at the Aquatic Swimming Club totaling 20 people, using purposive sampling technique a sample of 8 people was obtained. The research was conducted for 6 weeks, 18 meetings and 3 times a week. Before testing the hypothesis, a prerequisite Normality test was carried out using the Lilifors test so that the three variables were normal and the Homogeneity test (F test) then the three variables after testing the data were homogeneous. Hypothesis analysis produces $F_{count} = 7.259$ and $F_{table} = 5.79$ so that $F_{count} > F_{table}$ so after testing it can be concluded that there is a significant contribution from Double Legs Speed Hops and Pull Down Resistance Bands training to 50 Breaststroke Swimming Speed K.U II Male Athlete Meter at Aquatic Swimming Club Medan in 2023.

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INTRODUCTION

Swimming is a sport that is quite popular and quite a lot of enthusiasts. Iliyas (2018) said swimming is a sport used to improve a person's health. This sport can be done by anyone, not only among teenagers but all ages and does not recognize gender.

Swimming can improve physical fitness in the form of recreation and achievement. According to swimming is a sport that is able to develop physical fitness, because when swimming almost all parts of the body muscles do their work which results in the development of body muscles rapidly and the strength of swimmers is increasing (Muhajir, 2014). Four styles that are often contested, both regionally, nationally and at the international level. There are also four styles are: a) butterfly style (butterfly); b) backstroke (Back Crawl Stroke); c) breaststroke (Breast Stroke); d) freestyle (Crawl), when viewed from the four styles, breaststroke is the most popular style because it is considered easy to master (David, 2006). There are several factors that affect breaststroke swimming are speed and power.

Speed is an important part in the field of sports, especially in terms of swimming, it is because speed and strength or power are needed during swimming competitions in order to achieve maximum ability. Breaststroke swimming is influenced by the speed of hand movement when sliding, and the legs as the dominant driver.

According to Hidayat (2024) said power is the ability of muscles to exert maximum strength in a very fast time. Power is the ability of muscles to move maximum strength in the fastest time possible (Harsono, 2018).

According to the results of observations made at the Aquatic Swimming Club Medan of K.U II athletes aged 13-14 years, I observed that athletes who train at the club are only limited to push ups, sit ups, back ups so that they can do more than just push ups.

Does not increase leg muscle power or arm muscle power, especially in breaststroke swimming for athletes at the club. athletes are also inconsistent about attending training so that the portion of training that athletes feel is still lacking in improving breaststroke swimming in particular. Therefore, during the observations that I made at the club, the breaststroke swimming speed was still relatively low because during the initial test conducted on 8 swimming athletes aged 13-14 it still reached above 39.11 seconds.

Table 1. Initial Observation Results of 8 Athletes at the Medan Aquatic Swimming Club

Number	Name	Age	Freestyle Swimming Speed Test Time	Grade Classification
1.	Thiago	13	39.23	Not at all
2.	Natanael	14	40.12	Not at all

3.	Kyo	13	39.04	Less
4.	Louis	13	40.25	Not at all
5.	Stip	14	40.34	Not at all
6.	Demitri	13	40.17	Not at all
7.	Kornelius	13	41.15	Not at all
8.	Bilal	13	41.04	Not at all

Results of Initial Observation of 8 Athletes at Aquatic Swimming Club Medan where the data results from the swimming competition time from the all Indonesian association (KRAPSI) K.U II say the results of the time above 39.11 are a fairly low value classification or even less. From the results of these observations, approximately 90% of athletes are still considered very poor. This result is caused by the athlete's lack of physical condition and technique, especially in the power of the leg muscles and arm muscles, therefore athletes need a form of leg muscle and arm muscle training. In increasing muscle power, efforts are made by providing training. One of the exercises that can be done is Double legs speed hops and Pull down resistance bands.

Therefore, the purpose of this study is to determine whether there is a contribution of Double legs speed hops and Pull down resistance bands training to the 50 Meter Breaststroke Swimming Speed of K.U II Male Athletes.

At Aquatic Swimming Club Medan in 2023. The hypothesis in this study is that there is a contribution of Double Legs Speed Hops and Pull Down Resistance Bands training to the 50 meter breaststroke swimming speed of K.U II male athletes at the Aquatic Swimming Club Medan in 2023.

METHODS

This research was conducted at the Aquatic Swimming Club Medan pool which is located at Jalan Bahagia By Pass, Suderejo II, Medan, North Sumatra for 18 meetings, where meetings are held 3 times a week at 15.00-16.00 WIB. The population taken in this study were swimming athletes at the Aquatic Swimming Club Medan at K.U II amounted to 20 people and the sampling technique used was purposive sample with criteria: gender, K.U II (13-14 years), proficient in breaststroke swimming, and willing to be a sample. The method in this study is an experiment through pre-test and posttest techniques.

This research design is Sugiyono's experimental research (Sugiyono, 2017) the design used in this writing is the one group pretes-posttes design (initial test and final test).

Table 2. Research Design Table

Pre-Test	Treatment	Post-Test
T1	X	T2

Description :

T1 : Initial measurement

X : Double Legs Speed Hops and Pull Down Resistance Bands Exercises

T2 : Finish measurement

Research Test Instrument

1. Test of Leg Muscle Explosive Power Using Standing Broad Jump

The leg muscle power of athletes can be known through tests, for The researcher used the Standing Broad Jump test:



Fig. 1. Standing Broad Jump

Objective : To determine horizontal leg muscle power

Tools : Using a measuring meter to determine the distance or distance of the jump, the soft landing area when taking off line must be clearly marked, test form.

Officials : Test indicator, result recorder, jump distance meter.

Procedure : An athlete stands behind the starting line with his feet shoulder-width apart and his body straight. With the help of swinging arms and bending knees to help the results of the jump. The result recorded is the distance traveled as far as possible, by landing on

both feet without falling backwards. Three times the best value is taken.

Assessment : The implementation of the test is carried out with 3 times the implementation and then after measuring it is determined for the highest score which is the result of the implementation of the Standing Board Jump.

Table 3. Standing Board Jump Measurement Test Norms

Category	Male	
	(cm)	(Feet, inches)
Very good	>250	>8'2.5"
Good	241-250	7'11"-8'2.5"
Simply	231-240	7'7"-7'10.5"
Medium	221-230	7'3"-7'6.5"
Less	211-220	6'11"-7'2.5"
Poor	191-210	6'3"-6'10.5"
Very Poor	<191	6'3"

(Source: (Akhmad, 2013))

2. Arm Explosive Power Test Using Seated Medicine Ball Chest Ball

The explosive power of the athletes' arm muscles is known through tests as initial data for observation. In this study, researchers utilized a measurement test instrument using a medicine Chest ball.



Fig. 2. Medicine Chest Ball

Objective : To determine arm muscle power

Equipment : Wearing a medicine ball, flat floor, chair, meter, test form

Officials : Guide, measuring the distance of the throw, recording the results.

- Implementation** : The athlete takes a sitting position in a chair placed according to the starting line, both hands holding the ball parallel in front of the chest, then kick forward as far as possible. The skord calculation is done from the starting line until the ball first touches the floor.
- Assessment** : The implementation of the test is carried out with 3 times the implementation and then after measuring it is determined for the highest score which is the result of the implementation of the Standing Board Jump.

Table 4. Medicine Chest Ball Measurement Test Norms

Gender	Very Good	Good	Enough	Currently	Not Enough
Male	>6.23	5.38-6.22	4.53-5.37	3.68-4.52	<3.67
Female	>4.04	3.52-4.03	2.95-3.51	2.38-2.94	<2.37

(Source: (Akhmad, 2013))

Data Analysis Technique

After conducting the initial ability test and final ability to process the data, statistics will be used with regression tests, normality tests, and homogeneity tests with steps

- 1) Finding the average (Sudjana, 2005)

$$\bar{X} = \frac{\sum X}{n} \quad (1)$$

- 2) Standard deviation (Sudjana, 2005)

$$S^2 = \frac{\sum (xi - \bar{x})^2}{n} \quad (2)$$

- 3) T-Score (Nurhasan, 2001)

$$T - Score = 50 + 10 \left(\frac{x - \bar{x}}{s} \right) \quad (3)$$

- 4) Normality Test (Sudjana, 2005)

$$Z_i = \frac{xi - \bar{x}}{s} \quad (4)$$

- 5) Homogeneity Test / F Test (Sugiyono, 2009)

$$F = \frac{\text{Varian Terbesar}}{\text{Varian Terkecil}} \text{ or } F = \frac{s_1^2}{s_2^2} \quad (5)$$

- 6) Multiple Correlation Test (Sugiyono, 2017)

$$R_{yx_1x_2} = \sqrt{\frac{r^2_{yx_1} + r^2_{yx_2} - 2r_{yx_1}r_{yx_2}r_{x_1x_2}}{1 - r^2_{x_1x_2}}} \quad (6)$$

Statistical Hypothesis

In this study, there are temporary hypotheses obtained, namely the null hypothesis and the alternative hypothesis.

(H_0) : There is no contribution of Double Legs Speed Hops Training and Pull Down Resistance Bands on 50 Meter Breaststroke Swimming Speed of K.U II Male Athletes at Aquatic Swimming Club Medan Year 2023.

(H_a) : There is a contribution of Double Legs Speed Hops and Pull Exercises Down Resistance Bands on 50 Meter Breaststroke Swimming Speed of K.U II Male Athletes at Aquatic Swimming Club Medan Year 2023.

RESULTS & DISCUSSION

Description and Research Result

After conducting the pretest and posttest on each athlete, data on the Standing Broad Jump and Medicine Chest Ball variables were obtained. The pretest results obtained from each student can be seen in the following histogram:

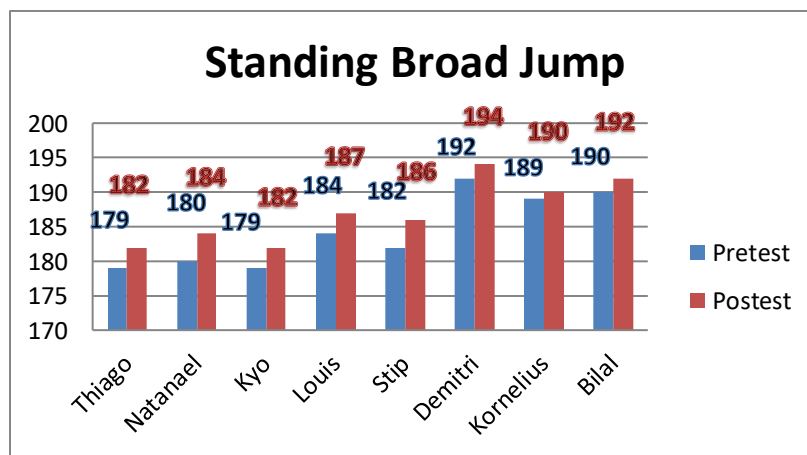


Fig. 3. Histogram of Pretest and Posttest Standing Broad Jump

Judging from Figure 3, it can be seen that the lowest pretest scores were Thiago and Kyio with a jump of 179 cm and the highest pretest score was Demitri with the acquisition of a jump of 192 cm. While in the posttest it can be seen that the closest

jumps are Thiago and Kyio with a jump distance of 182 cm and for the farthest jump is Demitri with a jump distance of 194 cm.

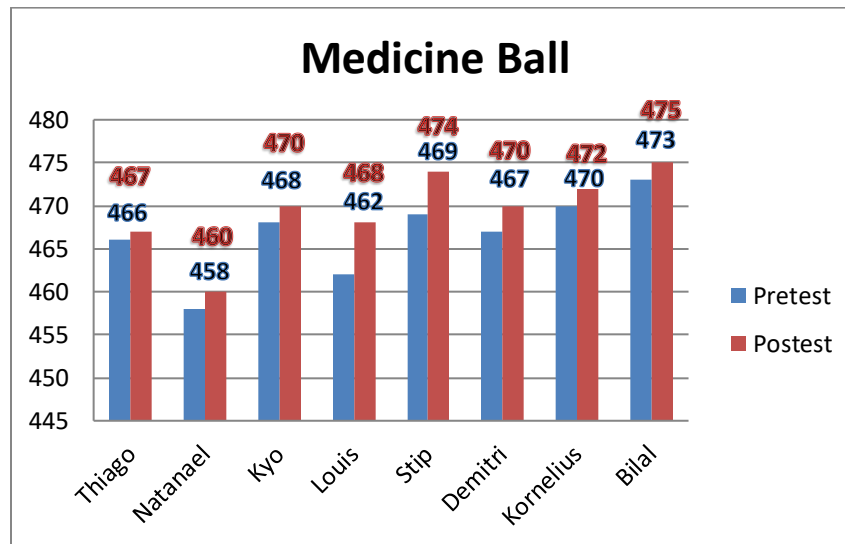


Fig. 4. Medicine Ball Pretest and Posttest Histogram

In Figure 4, the pretest data with the lowest score is Natanael with the acquisition of 450 cm repulsion and the highest score is Bilal with a repulsion distance of 473 cm. Whereas in the posttest data, the furthest distance was achieved by Bilal with a repulsion distance of 475 cm and the closest distance was Natanael as far as 460 cm.

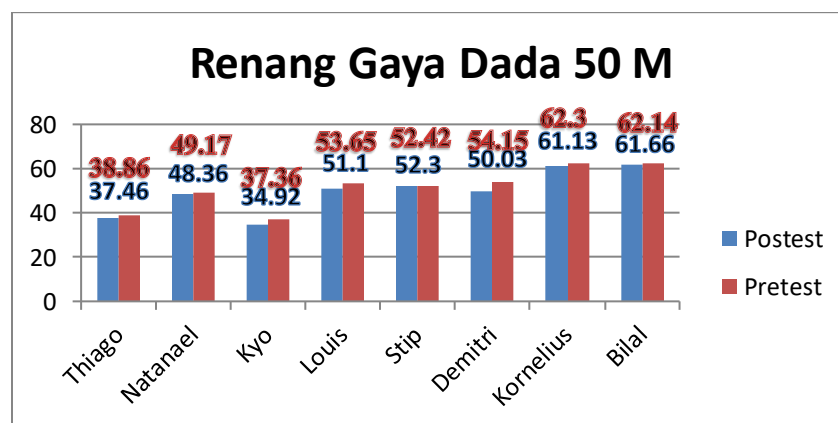


Fig. 5. Histogram of Pretest and Posttest t-Score Values

Figure 5 shows that the swimming speed of each athlete is different in the pretest t-Score data, the athlete who has the lowest swimming speed is Kornelius with a time of 62.3 seconds and the fastest swimming speed is Kyo with a time of 37.36 seconds. In the posttest t-Score data, the athlete who has the lowest speed is Bilal with a time of 61.66 seconds, while the fastest is Thiago with a time of 37.46 seconds.

Description of Prerequisite analysis**Normality Test****Table 5.** Normality Test Data

Variables	Average and Standard Deviation	l_o	l_{Table}	α	Description
<i>Standing Broad Jump</i>	$\bar{X} = 49.99$ Standard Deviation=10.00	0.135	0.285	0.05	NORMAL
Medicine Ball	$\bar{X} = 49.99$ Standard Deviation =10.00	0.227	0.284	0.05	NORMAL
50m Breaststroke Swimming	$\bar{X} = 49.99$ Standard Deviation = 10.00	0.146	0.285	0.05	NORMAL

The data normality test uses the Lilifors test, from Table 5 it can be concluded that the acquisition of l_{count} Standing Broad Jump is 0.135 $l_{table} = 0.285$ with a sample size of 8 athletes and a significant level $\alpha = 0.05$. Then it can be concluded that the standing broad jump data is normal because $l_{count} < l_{table}$ ($0.135 < 0.285$).

The normality test in table 5 shows that l_{count} Medicine ball is 0.227 and $l_{table} = 0.285$ with a sample size of 8 athletes and a significant level $\alpha = 0.05$. So it can be concluded that the medicine ball data is normal because $l_{hitung} < l_{table}$ ($0.227 < 0.285$).

The normality test in Table 5 shows that l_{count} breaststroke swimming is 0.146 and $l_{table} = 0.285$ with a sample size of 8 athletes and a significant level $\alpha = 0.05$. So it can be concluded that breaststroke swimming data is normal because $l_{count} < l_{table}$ ($0.146 < 0.285$).

Homogeneity Test**Table 6.** Homogeneity Test

Sample	F_{table}	F_{count}	Description
<i>Standing Broad Jump</i>	3.787	1.356	Homogeneous
<i>Medicine Ball</i>	3.787	0.999	Homogeneous
<i>50 Breaststroke Swimming</i>	3.787	1.546	Homogeneous

The homogeneity test can be done after doing the normality test. Homogeneity Test (F test) through Pretest and Posttest Standing Broad Jump data, the value of $F_{count} <$

F_{table} ($1.356 < 3.787$) can be concluded that the posttest value on the standing broad jump is Homogeneous.

The Medicine Ball pretest posttest homogeneity test obtained the results of $F_{count} = 0.999$ and $F_{table} = 3.787$. So it can be seen that $F_{count} < F_{table}$ ($0.999 < 3.787$) then the data is homogeneous.

In 50 m breaststroke swimming, the homogeneity test value obtained is $F_{table} = 3.787$ and $F_{count} = 1.546$. So that $F_{count} < F_{table}$ ($1.546 < 3.787$) it can be concluded that the data is homogeneous.

Hypothesis Test

Table 7. Hypothesis Test

Data	F_{table}	F_{count}	Conclusion
Posttest	5.79	7.259	Contribution

The hypothesis test was taken and processed through posttest data from the Stading Broad Jump and Medicine Ball exercises with breaststroke swimming. Hypothesis testing used in this study was carried out using multiple regression analysis. The hypothesis in this study is to determine whether there is a contribution of Stading Broad Jump and Medicine Ball training to the 50 meter breaststroke swimming speed of K.U. male athletes.

II at Aquatic Swimming Club Medan in 2023. From the research results obtained $F_{count} = 7.259$ and $F_{table} = 5.79$, then $F_{count} > F_{table}$ ($7.259 > 5.79$). Through the formulation of the hypothesis H_0 is rejected then H_a is accepted, the conclusion obtained is that there is a contribution of Standing Broad Jump and Medicine Ball training to 50 meters breaststroke swimming speed in Aquatic Swimming Club Medan athletes in 2023.

The research conducted at the Aquatic Swimming Club 2023 with a sample of 8 athletes found that there was a contribution of Double Legs Speed Hops and Pull Down Resistance Bands training to the 50-meter breaststroke swimming speed of K.U. II. Research conducted for 18 times with 3 meetings each week, namely Thursday, Friday, Saturday, obtained the results $F_{count} > F_{table}$ ($7.259 > 5.79$). so that the hypothesis carried out in this study proves the contribution of the exercise. This is also in line with research conducted by Simson H.P Siregar and Sherly Audray Dorotea Br Surbakti explained that

Double Legs Speed Hops and Pull Down Resistance Band exercises can increase the explosive power of leg and arm muscles.

Research Limitations

1) Time

Lack of training time when doing the form of exercise so that athletes are less than optimal in doing the form of exercise.

2) Fund

At the time of the research, the researcher lacked funds to fulfill the tools to help athletes in the exercises carried out.

3) Inconsistent athlete attendance

Some athletes still want to play and disturb other athletes when doing the exercise form.

Based on the above obstacles, the researcher suggests that future researchers make a clearer plan, and can handle these swimming athletes.

CONCLUSION

Based on the results of hypothesis analysis and discussion of research results, it can be concluded that there is a significant contribution of Standing Broad Jump and Medicine Ball training on 50 Meter Breaststroke Swimming Speed of K.U II Male Athletes at Aquatic Swimming Club Medan in 2023.

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