



The Effect of Variations in Freestyle Drill Exercises Using Fins on the Speed of 50-Meter Freestyle Swimming for Men's KU III Athletes from the Tirta Prima Club in Medan

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Abstract. This study aims to determine the effect of varying drill exercises using fins on the 50-meter freestyle swimming speed of male athletes aged 12 and 13 years old from the Tirta Prima Club in Medan. The research method used was an experiment with a one-group pretest-posttest design. The research subjects consisted of eight male athletes aged 12 and 13 years old. The instrument used was a 50-meter freestyle swimming time trial. The data were analyzed using a paired sample t-test with the help of the SPSS version 22 program. The results showed that there was an increase in swimming speed after being given treatment in the form of variations in drill exercises with fins. The average time before treatment was 40.64 seconds, while after treatment it became 39.81 seconds, an increase of 0.83 seconds or about 2.04%. The results of the paired sample t-test showed a t-value of 5.53 with a significance value (p) of 0.001 ($p < 0.05$), which means that there was a significant effect. Thus, it can be concluded that the variation in drill exercises using fins had a significant effect on increasing the 50-meter freestyle swimming speed of male KU III athletes. This exercise is recommended as part of a technique and strength training program to support athletes' performance in sprint swimming events..

Keywords: Drill, Fins, Swimming.

1 Introduction

A successful swimming performance is a multi-factorial accomplishment, resulting from a complex interaction of physical, biomechanical, physiological and psychological factors, all of which are strongly affected by the special medium of water as well as by genetic factors. [1]. This activity can be used as a means of recreation, improving physical health, and as a platform for achieving sporting excellence.

There are four swimming styles, the freestyle is the fastest due to the combination of coordinated arm and leg movements, as well as a streamlined body position that

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optimally reduces water resistance. The distinctive features of the freestyle are that the arms move in a rotating motion resembling airplane propellers alternately, the legs kick up and down continuously, and the body is slightly tilted when taking breaths alternately. In freestyle, approximately 85% of the propulsive force is generated by the arm movements, while approximately 15% is generated by the leg movements. Therefore, if the arm and leg movements are still incorrect, it will affect the final time of the freestyle swim[2].

According to research conducted by Adriansyah entitled “The Difference in the Effect of Side Kick Drill and Vertical Kick Drill Training Methods on the Speed of 100 Meter Freestyle Swimming in Elite Swimming Club Athletes,” it is explained that beginner swimmers generally do not yet demonstrate proper movement techniques, especially in terms of leg kicks, which are still not strong enough. The leg movements tend to hit the surface of the water rather than swing effectively in the water, resulting in splashing rather than propulsion. In addition, weak leg kicks cause a lack of leg muscle strength, which is still underdeveloped[3], [4].

Through observation and interviews conducted with swimming coach Santi Ramadhani on October 17, 2024, it was found that the KU III Putra athletes from the Tirta Prima club still need to improve their training, especially in freestyle. Some of the causes include an open hand position, which results in less than optimal kicking movement, followed by an incomplete backward pull of the hands, which results in suboptimal body propulsion in the water, as well as weak leg kicks due to insufficient leg muscle strength. Therefore, a training program is needed to improve arm movement technique and increase leg strength, considering that speed in freestyle is also related to muscle strength training.

To achieve optimal results in freestyle swimming, it is necessary to practice arm and leg techniques directly in the water. The drill method is one training method that can optimize freestyle swimming. The drill method involves repeated exercises to perfect movements, and researchers want to add variations to the drill exercises to make the training design more interesting. This study uses four drill variations, namely the one-arm drill, catch-up drill, side kick drill, and finger tip drag drill[5]. The purpose of these drill variations is to improve freestyle technique, while to overcome weak leg kicks, an in-water training aid is needed, namely fins. When the legs use fins, the leg kicks become heavy. The use of fins when swimming in water helps the leg movements become efficient and effective in supporting speed when moving through the water [6]. Swimming is one type of exercise that can improve a person's health, and the physical risks associated with swimming are relatively low. This is because when swimming, the entire body weight is supported by the water or buoyancy. Additionally, swimming is the most recommended exercise for those who are overweight (obese), pregnant women, and those with joint disorders or arthritis[7].

Freestyle is the fastest swimming style compared to the other three styles, because this swimming style has good movement coordination and minimal resistance[8]. The distinctive feature of freestyle is that the arms move in a circular motion similar to the propeller of an airplane, paddling alternately together, and the legs move up and down in a crosswise motion with continuous kicks, while the body occasionally tilts to take a breath[9]. In freestyle, approximately 85% of the propulsive force is generated by the

arm movements, while the leg movements contribute about 15% [10]. Basic principles of efficient freestyle swimming technique are the mechanism of force, body position, and movement rhythm. The characteristic of freestyle swimming is that the body is in a straight line and there is a recovery phase when the arms move forward with the elbows high above the water surface, allowing for a long reach forward[11].

Training is carried out regularly, systematically, according to a schedule, following a specific pattern and system, progressing continuously from simple to more complex movements, and repeatedly, meaning that the movements learned must be repeated so that the movement patterns can be performed easily, automatically, and reflexively[12]. Training is an activity carried out systematically, repeatedly, and with an increasing load each day[13].

The main objective of training is to help athletes improve their athletic skills as much as possible. To achieve this training, there are four aspects that need to be considered, namely: Physical training: Physical training is aimed at developing and improving the physical condition of athletes, which includes all physical components, such as muscle strength, flexibility, speed, coordination, and others. Technical training: Technical training is aimed at improving proficiency. Tactical training: Tactical training is aimed at developing athletes' interpretive abilities regarding game patterns and strategies[14]. Mental training: Mental training concerns the inner self and character of humans.

Speed is essential for quickly moving the body or limbs from one position to another, and this speed plays a very important role in achieving performance, especially for sprinters. Speed is a muscle reaction ability characterized by the alternation between contraction and relaxation that leads to maximum performance[15].

Speed is a key physical component that supports performance in swimming, making it an important factor for swimmers to possess. It is important for athletes to hone good swimming techniques and perform appropriate muscle strengthening exercises, which will have an impact on improving swimming speed[16]. Physical strength, especially muscle strength, is an important element in swimming to enable efficient and fast movement in the water.

The One Arm Drill is a swimming technique exercise that focuses on the use of one hand when swimming freestyle. This exercise aims to improve swimmers' skills and techniques, particularly in terms of balance, breathing, and arm movement control[5]. The Catch-Up drill in freestyle swimming is a technique that aims to improve the efficiency of arm movements and coordination between the hands and body. This technique helps swimmers improve arm extension while breathing, so that the body position remains high in the water. By keeping one hand in front during the movement, this drill allows swimmers to understand the correct timing and position of the hands when performing strokes[5].

The Side Kick Drill is a swimming technique that focuses on improving body strength and flexibility as well as body position in the water. This is done by lying on one's side, with one arm extended forward and the other arm extended to the side of the body. The purpose of the Side Kick Drill is to improve kicking technique and increase freestyle leg speed[17]. The Finger Tip Drag Drill is a simple yet effective drill for improving movement technique. The Finger Tip Drag Drill aims to maintain a high

elbow position during the recovery phase and train body position for good balance during the recovery phase[18].

Fins are used on the feet or legs and are made of rubber or plastic. The purpose of using this tool is to assist foot movement in water and increase leg thrust and leg strength[9]. Fins are used to move in water so that foot movement is effective and efficient in swimming speed, and the countries that manufacture fins are in Europe, England, and America. The benefits of using fins are also related to improving physical fitness (physical condition). Using fins causes the legs to kick more heavily. In this kicking motion, the large leg muscles are engaged. Another benefit of using fins is that the ankles are forced to move in a wider range of motion, and increased ankle flexibility will accelerate forward speed through the water[19].

2 **Methodology**

This study used observation methods through pretest and posttest as a means of collecting data. The location where the researcher conducted this study was the Selayang Swimming Pool on Jl. Dr. Mansyur Gg. Sehat No.224, Padang Bulan Selayang I, Kec. Medan, North Sumatra, Indonesia. The research method used was an experiment with a one-group pretest-posttest design. The research subjects consisted of 8 male athletes aged 12 and 13 years old. The instrument used was a 50-meter freestyle swimming time trial. The data were analyzed using a paired sample t-test.

3 **Result and Research Dicussion**

3.1 **Result**

This study was conducted at the Selayang Swimming Pool, Jl. DR Mansyur Gg. Sehat No. 24 Padang Bulan Selayang I, Kec. Medan Selayang, Kota Medan, North Sumatra. This study was conducted from April to May 2025. The initial implementation of pre-test and post-test treatments was conducted to determine the 50-meter freestyle swimming speed of athletes in KU III of the Tirta Prima Club. The pre-test data results of the study are as follows.

Table 1. Pre-Test Data on Swimming Speed 50-Meter Freestyle KU III Male Athletes from Tirta Prima Club

No	Name	50 Meter Freestyle Swim Speed Test	
		<i>Pre - Test</i>	Category
1	Qahtan	40.23	Less
2	Ziqri	41.87	Less
3	Amar	38.62	Less

4	Fayaz	39.54	Less
5	Jona	41.25	Less
6	Awal	39.96	Less
7	Ahala	41.98	Less
8	Ipal	41.69	Less

The following table shows the results of the 50-meter freestyle swimming speed pre-test measured on 8 samples. In the table, the speed of each participant has been recorded and categorized. The fastest value was obtained with a time of 38.62 seconds, while the slowest value was obtained with a time of 41.98 seconds. Based on the results in the 2024 Riau National Championship Results book, the times achieved by all samples were categorized as “Fair.”

For comparison, the following are the results of the 50-meter freestyle swimming speed pre-test and post-test on KU III athletes from the Tirta Prima Medan swimming club after intervention.

Table 2. Results of 50-meter Freestyle Swimming SpeedPre-test and Post-test

No	Name	Pre-test	Post-test	Difference
1	Qahtan	40.23	39.86	00.37
2	Ziqri	41.87	41.20	00.67
3	Amar	38.62	37.54	01.08
4	Fayaz	39.54	38.14	01.40
5	Jona	41.25	40.56	00.69
6	Awal	39.96	38.57	01.39
7	Ahala	41.98	41.68	00.30
8	Ipal	41.69	40.97	00.72
Average		40.642	39.815	0.827

Table 2 shows the results of the pretest and posttest for the 50-meter freestyle swimming speed. The time taken by each participant before and after the treatment was recorded, then the difference was calculated to see the change in speed. Based on the data presented, it can be seen that the average pretest time was 40.642 seconds, while the average posttest time was 39.815 seconds. Thus, the average difference in time between the pretest and posttest was 0.827 seconds. This shows that there was an increase in swimming speed after the treatment, as indicated by the decrease in time taken.

3.2 Discussion

Based on the results of the data analysis shown in Table 1 and 2, the average time for the 50-meter freestyle swim before treatment was 40.64 seconds, while after treatment it was 39.81 seconds. There was a decrease in time by 0.83 seconds, indicating an increase in the athletes' swimming speed after being given treatment in the form of speed training variations using fins. The statistical test results using the Paired Sample T-Test produced a t-value of 5.53 and a significance value (Sig.) of 0.001. Because the Sig. value is smaller than the significance level of 0.005 ($0.001 < 0.005$), it can be concluded that there is a significant effect between the pre-test and post-test results.

In percentage terms, this improvement is equivalent to approximately 2.04%. In the context of the 50-meter sprint, this improvement is very significant because in sports that rely on high speed, such as short-distance swimming, even a fraction of a second can determine the podium position. Therefore, these results show that the treatment given had a real impact on the athletes' performance.

In the another study training using the drill method is one effective approach to improve freestyle swimming skills[20]. This method is carried out through systematic and structured repetition of movements, with the aim of improving skills and technical accuracy. In the study[21], in order to achieve optimal speed in freestyle swimming, correct leg movement technique is required. The use of fins as an aid is one method that can be used to train leg movement speed.

Training with fins can strengthen major muscles such as the latissimus quadriceps, tibialis, sartorius, vastus medialis, gastrocnemius, peroneus longus, and soleus, making them stronger and larger, which helps with thrust and endurance. This is why athletes who swim freestyle over short distances can maximize their thrust.

The results of the study prove that the use of drill variations with the aid of fins has a significant effect on improving the 50-meter freestyle swimming speed of male athletes in age group III at the Tirta Prima Club in Medan. Therefore, the hypothesis stating that this training method can improve freestyle swimming speed is valid and accepted.

4 Conclusion

Based on this study, the researchers concluded that variations in speed training using fins had a significant effect on the 50-meter freestyle sprint speed of male athletes in the KU III category at the Tirta Prima Club in Medan. This was evident from the improvement in post-test results compared to pre-test results before the fins training treatment was given.

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