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Comparison of Power, Agility of Male and Female Fin Swimmers by Athletic Career*

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Abstract

Purpose: The purpose of this study is to compare and analyze power and agility, which are factors that affect performance, by dividing adult fin swimmers into groups by male and female careers, and use them as basic data for improving performance during fin swimmer guidance and training. **Research design, data, and methodology:** Accordingly, 21 fin swimmers were selected and they were divided to four groups by gender and career to conduct experiments. Power and agility, which are factors related to performance of fin swimmers, were measured. Independent sample T-Test was conducted to verify differences between groups. **Results:** As a result of this study, there was no statistically significant difference in power and agility by the careers of male and female athletes. **Conclusion:** The results of this study can be used as basic data for organizing training programs suitable for the gen-der of fin swimmers and basic data for the guidance and training of fin swimmers. In future follow-up studies, based on the results of this study, it is expected that follow-up studies should be con-ducted to improve detailed performance according to age, fin swimming events, and gender. Further implications were discussed.

Keywords: Fins swim, Power, Agility

JEL Classifications: I10, I12, I18.

1. Introduction

The ability of people to breathe and dive, that is, with human evolutionary development, fin swimming competitions have begun. With the creation of associations in charge of underwater sports in the 1950s, the International Federation of Confédération Mondiale des Activités Subaquatiques (CMAS), an international organization, was established. It began to attract attention as an international event for events such as world championships, world games, and indoor Asian games in the late 1960s, and has been approved by the International Olympic Committee (IOC). Currently, 1,620 athletes are registered as 296 teams for underwater fin swimmers.

Fin swimming is a race that moves forward at high speed on the surface of the water or underwater using equipment such as a pair of fins, commonly called a mono-fin or bi-fin. The imaging methods of fin swimming are divided into surface, submersion, and image methods using paired fins. Surface swimming is a swimming method that uses fins and snorkels to swim to the surface of the water, and respiratory swimming uses fins, air cylinders, and respirators to swim in the water, but

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in the 50m submersible event, there is only one device used. Swimming using a pair fin is similar to the freestyle swimming method in management, but there is a difference in using a flipper called a pair fin (Kim, 2022).

Fin swimming's events, which are certified by the Confédération Mondiale des Activités Subaquatiques, include seven surface events: 50m, 100m, 200m (short distances above), 400m, 800m (intermediate distances above), 1,500m, and 1,850m (long distances above), and relay events are four events: 4 × 100m for men and women and 4 × 200m. Submarine events are divided into three respiratory submarine events (100m, 400m, 800m) using a snorkel, and 50m apnea submarine events without snorkel. Open water events conducted in natural environments such as oceans, rivers, and lakes vary in distance from 3,000-8,000 meters, but are not recognized by official records

There are no restricted swimming methods in fin swimming, but the mainly used swimming methods are freestyle for dolphin kicks and pair fins. Dolphin kicks are movements that require muscle strength and muscle endurance of the waist, ankles, and knees, and consist of down beat and up beat. Fin swimmers' bodies are strongly resisted by water because they are faster than ordinary swimming events and use dynamic and large fins than swimming spirit movements, which requires more physical strength and muscle strength in fin swimming events (Choi & Yoon, 2016). In addition, fin swimmers repeatedly use dolphin kicks that move their waist and legs up and down while pushing their bodies and arms forward to overcome water resistance and muscle burden. Since dolphin kicks move mainly using muscles such as the abdomen, waist, arms, and width, fin swimmers' performance is directly affected by the strength and muscle function of the abdomen, waist, upper limbs, and lower extremities, which are the center of the body (Lee, 2011).

Various studies on fin swimmers are very insufficient, and there is a need for research on physical factors to improve athletes' performance. In particular, research through the development and application of various training programs of fin swimming is insufficient, and programs tailored to the characteristics of events that can convert the physical fitness factors of fin swimmers into immediate tactics are required. Hence, this study attempts to compare and analyze the power and agility according to the athlete's career to improve the performance of adult elite fin swimmers, to help train methods and foster and discover players, and to provide basic data for improving fin swimming performance.

2. Method

2.1. Subject

This study measured athletes' power and agility in elite fin swimmers registered with the Korean Underwater and fin Swimming Association. The experimenters selected a total of 21 people from 13 men and eight women with more than three years of experience in fin swimming national and national standing groups who currently have no mental or physical illness and have no neurological disease. After explaining the purpose of this study and the contents of the experiment to the study subjects, those who wished to participate voluntarily and those who submitted consent to participate in the study were conducted. In addition, in order to obtain the results of a highly valid study, vigorous exercise, smoking, drinking, and taking and injecting special diets or drugs other than usual were prohibited during the study period. Physical characteristics are presented in <table 1>.

Table 1: Characteristics of Subjects

Subject (n=21)	Athletic experience (month)	Age (year)	height(cm)	weight(kg)	BMI(kg/m^2)
Men have more than 10 years of experience (n=6)	244±44.03	30.57±3.95	177.29±6.07	84.43±3.35	27.14±2.19
Men under 10 years Career(n=7)	108±38.57	21.00±.63	177.33±8.68	82.33±8.14	26.17±1.60

Women's career for more than 10 years(n=4)	135±20.49	24.00±2.45	165.00±10.00	59.75±4.57	21.00±.81
Women under 10 years Career(n=4)	93±15.10	19.00±.00	163.25±3.40	63.25±4.27	23.75±.96

2.2. Measurement Tools and Methods

2.2.1. Power (Long jump in place)

As a test to measure power, jumping in place is a test to measure the ability to exert maximum force in as short a time as possible. One power measurement person, one record person, and one inspection assistant participated in the measurement inspection. It was measured in cm units using the in-place long jump measurement equipment. The subject of inspection should take a comfortable posture with feet spread about 10 to 20cm so as not to cross the display line on the measuring plate. Give enough recoil with your arms, body, and legs to run as far as possible. The feet must be both feet, not one, and the position in the air is free to measure the distance from the cloud to the landing point of the nearest heel, perpendicular to the cloud plate marking line. Take two measurements and record the furthest jump. Keep the foot cloud plate, mat, and measurement site level, do not double-cloud when running, and be careful not to touch the floor when landing.

2.2.2. Agility (Full body response test)

Systemic response measurement is a test to measure coordination and balance with the ability to quickly change the body's position and behavior by measuring the response time until the body's response occurs due to external stimuli. The agility measurement was measured in 0.01 seconds using a systemic response meter with the participation of one measurement person, one record person, and one inspection assistant. After climbing on the measuring equipment, the subject waits in a position where the center of gravity is lowered by bending his knees and waist after spreading his feet shoulder-width apart. wait in the air When the measuring instrument makes a beep sound, quickly remove both feet from the measuring instrument's footplate at the same time and attach it. Record it by repeating it three times in total and the highest value is recognized as the final inspection record. When making measurements, the inspector must be careful not to drag the foot with-out removing it from the measuring scaffold or to remove the foot from the measuring scaffold.

2.3. Data Analysis

The data processing method of this study analyzed the mean and standard deviation of all variables measured using the SPSS 25.0 statistical program, and the analysis between groups of body composition and physical strength was used as an independent sample T-Test. The significance level of all statistics was set at 5% ($p<.05$).

3. Result

3.1. Results of Measuring Power according to Career of Male Fin Swimmer.

Table 2 shows the results of measuring power according to the career of male fin swimmers. There was no significant difference in power, 238.00±19.45 for players with more than 10 years of experience and 246.17±19.03 for players with less than 10 years of experience.

Table 2: Results of measuring power according to career of male fin swimmer.

	experience	mean	t	p
power (cm)	Men have more than 10 years of experience (n=6)	238.00±19.45	-.762	.462
	Men under 10 years Career(n=7)	246.17±19.03		

Note. mean±SD

3.2. Results of Measuring Power according to Career of Female Fin Swimmer

< Table 3> shows the results of measuring power according to the career of female fin swimmers. In terms of power, 189.50±11.84 players with more than 10 years of experience and 190.50±9.11 players with less than 10 years of experience were not significantly different.

Table 3: Results of measuring power according to career of female fin swimmer

	experience	mean	t	p
Power (cm)	Women have more than 10 years of experience (n=6)	189.50±11.84	-.134	.898
	Women under 10 years Career(n=7)	190.50±. 9.11		

Note: mean±SD

3.3. Results of Measuring Agility according to Career of Male Fin Swimmer

As shown in <Table 4>, the results of measuring the agility according to the career of male fin swimmers are shown in <Table 4> for players with more than 10 years of experience. 346±.02. Players with less than 10 years of experience. 367±04.There was no significant difference.

Table 4: Results of measuring agility according to career of male fin swimmer

	experience	mean	t	p
Agility (sec)	Men have more than 10 years of experience (n=6)	.346±.02	-1.045	.318
	Men under 10 years Career(n=7)	.367±.04		

Note. mean±SD

3.4. Results of Measuring Agility according to Career of Female Fin Swimmer

As shown in <Table 5>, the results of measuring the agility according to the career of female fin swimmers are 360± for athletes with more than 10 years of experience.02, players with less than 10 years of experience. There was no significant difference at 354±.01.

Table 5: Results of measuring agility according to career of female fin swimmer

	experience	mean	t	p
Agility (sec)	Women have more than 10 years of experience (n=6)	.360±.02	.306	.770
	Women under 10 years Career(n=7)	.354±.01		

Note: mean±SD

4. Discussion and Conclusion

The purpose of this study is to analyze the difference in power and agility among various factors for improving performance by classifying adult fin swimmers registered with the Korean Underwater and fin Swimming Association into groups of more than 10 years and less than 10 years of experience.

fin swimming uses higher speed and equipment than regular swimming, wears mono-fins, and uses dolphin kicks using only the waist and lower body while in an apnea state (Korea Underwater and Fin Swimming Association, 2023). Power is required for short distances of 100 meters or less. As for the types that need to im-prove power in swimming games, you need to improve your start, turn, and fast stroke to improve your performance. Improving power helps shorten the game record by speeding up the pace at the beginning of the game and operating the game more effectively (Lee, 2013).

Gee, Morrow, Stone, and Bishop (2020) studied the muscle nerve training program of the lower extremities, training through muscle activation of the hip joint and lower extremities affects muscle nerve control of the lower extremities, which reports that it can improve and effect the jumping movement and the movement to control it. In the case of fin swimming, it is believed that there was no difference in the study results as it was repeated in a horizontal form rather than a vertical form. In addition, it showed similar results to another study that there was no significant increase in flexibility and power through swimming training (Yoon, 2016)

In addition, in the case of agility, agility depends on the speed of contraction of muscle fibers, and it can be increased only when fast movement and strong force are exercised to increase the speed of that contraction (Oh & Kim, 2023). Various swimming studies also had a positive effect on flexibility, muscle strength, and body composition, but there was no effect on the physical strength of agility, and research and training pro-grams on physical strength required for swimmers will be required through additional reinforcement training (Choi, 2015).

In future studies, studies are required to consider the physical factors of fin swimmers according to age and to verify the effectiveness of various training.

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