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Kinematic Analysis Of Male Fin swimming Athletes In Popda City Of Kediri In 2022

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Abstract: Fins wimming is an aquatic sport in which athletes use monofins, biffins, and snorkels to generate movement power. The purpose of this study is to analyze and describe phenomena that focus on numerical data *which includes the number of underwater along with the speed and number of distention per stroke along with the speed per 50 meters so that the 1st place winner can be compared with the Kediri city athletes. The method used in this research is descriptive quantitative. The sample used was the first-place finisher in the East Java POPDA finswimming with athletes from the city of Kediri***.** Data capture process using one camera *Sony RxCamera 10 marks IV with resolution full HD with settings 100 frames per second (fps), a camera placed in tribune highest with distance 25 meters whose view can be recorded by the camera on pool 50 meters. Furthermore, the results videoswill analyze use the software Kinovea 0.8.27. The results of the data analysis show that the frequency of underwater movement greatly affects the distance traveled by the role of the technical contribution of leg strength and propulsion after the start is a key factor for success and performance in finswimming*.

Keywords— Analysis; athletes; fin swimming.

1. INTRODUCTION

Swimming is a sport that requires high technical skills and optimal physical strength (Zulvid, & Arwandi, 2019). Correct and efficient swimming techniques can help athletes reach greater speeds and achieve better results in races. In swimming, leg movement is very important to achieve maximum speed and efficiency in the water. Therefore, kinematic analysis of an athlete's foot movement is very important to improve swimming technique and athlete's performance (Wijayanto, 2021; Yulfadinata, et al, 2022).

Fin swimming is a water sport that involves using finned feet (monofin) to swim as fast as possible underwater. The sport originated in Italy in the 1940s and has since become an official sport with world championships being held every year.

In the water, a fin swimming athlete usually uses a snorkel and goggles to see ahead and breathe. Fin swimming consists of several strokes, including freestyle, breaststroke, backstroke, and butterfly. At world championships, athletes can also participate in relay races and long-distance track races.

Fin swimming involves many specific techniques, including foot techniques, breathing techniques, and efficient hand movement techniques. A good and strong leg technique is essential for achieving high speeds, while a good breathing technique helps athletes to stay focused and stay underwater as long as possible (Lin et al., 2021; Saleh & Abed Al-Imari, 2022) Speed In fin swimming it also really depends on the type of fins or monofin used by athletes. Fins with light and flexible materials are usually used to maximize speed and agility in the water.

Fin swimming is becoming an increasingly popular sport around the world. This sport offers significant health benefits such as increased cardiovascular, muscle strength, and body coordination. In addition, this sport can also help increase endurance and concentration (Hale et al., 2022; Taladriz et al., 2016).

Fin swimming is a sport that has just entered the Regional Sports Week in East Java, this sport has started to develop because many events such as Regional Championships, National Championships, PON, and Seagame have already competed in Fin swimming. Fin swimming itself is an aquatic sport that is carried out both underwater and on the surface (Aditria, I. A. P., & Widodo, 2022).

Several factors affect the performance and health of fin swimming athletes, namely the athlete's physical condition, such as muscle strength, speed, agility, and endurance, greatly affect performance in fin swimming (Zhang et al., 2022 (Zhang et al., 2022). Regular training and a regular exercise program are essential to building and maintaining optimal physical conditions. In addition, a good and efficient technique is very important in fin swimming. Foot techniques, breathing techniques, and hand movement techniques must be well mastered to achieve high speed and movement efficiency in water (Clark et al., 2019). The type of monofin used by athletes also affects performance in fin swimming. A good monofin should fit the athlete's foot, be easy to control, and have optimal propulsion.

Consistent and regular practice is very important to improve the performance and health of finswimming athletes. Irregular or inconsistent training can interfere with the

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athlete's ability to achieve optimal physical condition (Agus, & Sepriadi, 2013).

Swimmers compete based on speed. Recorded race results are strongly influenced by prefixes, swimming time, turning, and finishing time (Taladriz et al., 2016)). Fin swimming underwater can be assisted by using breathing equipment, which is equipment that functions to take air to breathe while underwater. Fin swimmer uses a tool in the form of monofin or bifin. Fin swimming or diving is not much different from the sport of swimming, however, it is only distinguished by the use of tools such as monofins, biffins, and snorkels (Sugeng & Putra, 2021). When swimming, it is greatly influenced by power, underwater, speed, stroke frequency, and stroke efficiency. To find out these things, motion analysis is needed or what is known as kinematic analysis.

An analysis is one of the needs of a coach to find out how an athlete performs when participating in a competition. The results of this analysis will be a reference for improvement in training so that the programming for athletes is right on target, namely knowing the shortcomings of athletes when competing. The analysis that is often used to see athlete performance is kinematic analysis. Kinematic analysis is often used to analyze human movement in depth, including basic motion, speed, and angle (Clark, 2015). Kinematics analysis can be carried out by recording the athlete while moving, then using motion analysis software to calculate the athlete's movements so that the speed and frequency of strokes will be known.

With the finswimming competition, the East Java Regional Sports Week has become a benchmark as a material consideration to determine the success of the training, which has been carried out by Kediri City athletes and has become a coach's evaluation material in preparation for a prestigious championship, namely PORPROV 2023. With this evaluation, coaches and athletes can find out and measure the level of their current ability and to what extent they know what needs to be improved in training. Therefore, this championship event can be used as a reference to the extent of a swimmer's technical ability, especially his kinematic motion. Studying kinematic motion in swimming is important to do as material for evaluating athlete performance.

Based on the explanation above, I agree with coach Rendy the coach who holds the Popda and Porprov team in Kediri City where there is a real need for kinematic evaluation or what can be called motion analysis so that it becomes a reference for improvement. When training includes Underwater, Speed, stroke frequency, and stroke efficiency, so In this study, can be formulated how effective underwater movements and effective and efficient Distention Per Stroke (DPS) sequences when swimming.

2. METHOD

This research uses quantitative descriptive, namely analyzing and presenting facts systematically so that they are easier to understand and conclude. The participants in this study were Bifin Men's participants in the 2022 East Java Regional Sports Week Championships which were attended by eight athletes while the sampling technique used purposive sampling, namely the first winner in the Fin swimming finalist in Men's 400 meters.

The research was conducted at Gor Delta Sidoarjo on November 8, 2022. To simplify the process of analyzing motion calculations, limiting parameters were determined in finswimming, while these parameters included time, distance per stroke, frequency or several movements, and speed.

The data collection instrument in the field uses a Sony Rx Camera 10 Mark IV camera with full HD resolution with a setting of 100 frames per second (fps), the camera is placed on the highest stand with a distance of 25 meters where the view can be recorded by the camera in a 50-meter pool. Next, the video results will be analyzed using the Kinovea 0.8.27 software. The results of the video recording will be analyzed based on kinematics, including Underwater stroke frequency (SF), swimming speed (SV), and Distension Per Stroke (DPS). The data collected is calculated based on the underwater average and stroke per 50 meters. This study describes a description of the phenomenon that focuses on numerical data which includes the amount of underwater along with the speed and the amount of distention per stroke along with the speed per 50 meters so that it can be compared between the 1st place winner and the Kediri city athletes.

3. RESULT

Table 1 presents the results of data analysis of the average value and standard deviation of the 1st winner finalists at PORDA JATIM and Kediri athletes 1 and 2 when performing movement frequency underwater and movement frequency distance per stroke.

Table 1. Average and standard values deviation from the results of data processing (mean ± SD)

Variable analysis	1st winner finalist PORDA JATIM	Kediri city athlete 1	Kediri city athlete 2
UW frequency (number of moves)	6 ± 1.6	3 ± 1.3	5 ± 1.2
UW V (speed)	5.25 ± 0.4	3 ± 0.5	3.1 ± 1.4
DS/50 Frequency (number of moves)	12 ± 1.6	17 ± 0.7	18 ± 2.3
DS/50V (speed)	25.37 ± 3.4	26.14 ± 4.8	28.25 ± 2.49

From the dynamic kinematics parameters, it was found that the average difference in V (speed) where in the 1st winner finalist, the East Java PORDA athlete was lower, namely DS/50 = 25.37 compared to the Kediri 1 city athlete, namely DS/50 = 26.14 and the city athlete Kediri 2 namely DS/50 = 28.25 as well as the *underwater V (speed)* there is an

average value of 5.25 in the 1st place winner PORDA JATIM and the average V (speed) *underwater* athlete in Kediri City 1 is 3.0 and the average V (speed) *of underwater* athletes in Kediri City 2 is 3.1. Presented

4. DISCUSSION

Frequency (number of movements) *underwater* has a strong relationship to *underwater V (speed)*. These results indicate that the distance traveled by swimmers at V (speed) *underwater* is influenced by the contribution of the high frequency of *underwater movements.* the higher the frequency of movement, the farther the distance traveled by the swimmer. The swimmer's fastest sprint time of up to 15 meters is part of the prediction of success in achieving the best time of the entire competition travel time.

The following other parameters indicate that a high movement frequency will affect the distance to be traveled. The role of *mechanic leg power* and *force* after *take-off* is a key factor for success. The key factor for successful performance in *finswimming.* The repulsion of the legs that alternate between one another and the maximum pull of the hands causes the horizontal speed to deliver an increase in the body which will have an impact on the results of the distance traveled further. The results of this study are in line with studies that have been conducted by (García-Ramos et al., 2015) which state that one of the major contributions to the success of the results is *the force of take off.*

leg power movement frequency and propulsion have an important role in V (speed) *finswimming sport*. The repulsion of the legs that alternate with each other and the maximum pull of the two hands causes the body's horizontal speed to increase which impacts the results of the distance traveled. The results of this study are in line with studies that have been conducted by (García-Ramos et al., 2015) explained that one of the indicators of motion kinematics parameters that contributes greatly to the results is the force *of at take off.*

5. CONCLUSION

The conclusion of this research is from the frequency of Underwater strokes (SF) is very influential in speed swimming (SV) and Distention Per Stroke (DPS).

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