The Effect of 1:1 Interval Training and Flexibility on 50 Meter Speed Bifins Numbers in Female Athletes at Octopus Diving Club, Semarang City

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Abstract: The problem in this research is the lack of bifins speed ability in the female athletes of the Octopus Diving Club, Semarang City. The aim of this research was to determine the effect of 1:1 interval training on speed in the 50 meter bifins number and to determine the correlation between flexibility and speed in the 50 meter bifins number in female athletes at the Octopus Diving Club, Semarang City. This type of research uses an experimental method, one group pretest-posttest. The population is all athletes from the Octopus Diving Club, Semarang City, with a total of 25 athletes. The sampling technique is purposive sampling. The criteria for determining the sample include being active in training, being female, having a diving certificate or Diving Athlete Identification Number (NIAS), mastering bifins techniques, not being sick, and being willing to follow the rules of the treatment being applied. The sample that met the criteria was 6 people. Data was collected through a 50 meter bifins speed test and a sit and reach test. Then analyzed using paired sample t-test statistics and product moment correlation. 50 meter variable speed test results, bifins number, Sig value. (2-tailed) was 0.001<0.05 and there was an increase in speed of 50 meters in the bifins number, while testing the flexibility variable produced a Sig value. (2-tailed) of 0.370>0.05. It was concluded that 1:1 interval training had a significant influence on increasing the speed of 50 meter bifins, and flexibility had no significant correlation with the speed of 50 meter bifins of Octopus Diving Club female athletes.
Keywords: Interval Training, Flexibility, Speed, and Bifins

INTRODUCTION

In recent decades, diving has become one of the most popular underwater sports in the world (Rodriguez-Zamora et al., 2018). Diving is a branch of aquatic sports where the winner is determined based on the time achieved. Diving consists of several categories, including visual, parasports, underwater rugby, free dive, underwater hockey, finswimming, and Underwater Observation (OBA) (CMAS, 2024). In Indonesia, the diving championships that are often held are pool finswimming, open water finswimming and Underwater Observation (OBA).

Finswimming is one of the categories of diving competitions carried out on the surface or underwater using equipment such as snorkels, bifins and monofins (Stavrou et al., 2018). The basic techniques in the finswimming category that are contested consist of surface finswimming, apnea finswimming, immersion finswimming, and bifins (CMAS, 2023). Of the four basic techniques, the basic techniques of surface finswimming, apnea finswimming, and immersion finswimming have the same movements, namely movements like butterfly legs, but the rules and tools used are different.

The bifins finswimming technique has equipment that is permitted in the pool for bifins number competitions (CMAS, 2023). Fins used by divers when participating in competitions must be CMAS certified and cannot be modified. Divers are also not allowed to wear long neoprene socks/boots, what is allowed is short neoprene socks/boots worn at the toe. Apart from that, the permitted snorkel size is round with a minimum inner diameter of 15 mm and a maximum inner diameter of 23 mm, as well as a minimum length of 430 mm and an overall length of 480 mm. The top end of the snorkel can be cut at an angle or with a rounded lip, but the length is measured to the highest point. The length of the snorkel must be measured from inside the tube.

Training is a process of accumulating various components including: duration, distance, frequency, number, repetitions, loading, rhythm, intensity, volume, rest time, and density (Nasrulloh et al., 2018). Therefore, in determining training doses and loads, trainers need to consider the training components (Neviantoko et al., 2020). The training components consist of: 1) training volume, 2) training intensity, 3) repetitions, 4) sets, 5) density, 6) training rhythm, and 7) recovery between sets (Nasrulloh et al., 2018).

Diving requires more precise physical training because it requires its own elements of physical condition. In an effort to improve and develop achievements in a sport, athletes must have good physical condition (Candra & Farhanto, 2021; Maidarman, 2019; Pujianto, 2015). Physical conditions must be developed and improved to improve and develop athlete performance (Pujianto, 2015). Components of physical condition that need to be considered and developed include endurance, strength, flexibility, speed, stamina, agility, explosive power and movement coordination (Harsono, 2017). One of the exercises that can improve and develop the physical condition of diving athletes is interval training. Interval training is a training method that provides a training load, where sets and repetitions are alternated with consistent rest periods (Mulyawan et al., 2016). Interval training involves alternating high-intensity activities with lower-intensity activities for rest or recovery (Wu et al., 2021). Interval training typically involves relatively intense repetitive exercise interspersed with short recovery periods (Gibala et al., 2018; Laursen & Buchheit, 2019). Based on this description, it can be concluded that interval training is a type of training that provides consistent rest time between sets and repetitions.

Interval training is a training system that consists of repetitions and rest time between each repetition (Rohman, 2019). Interval training includes alternating periods of work and rest. Interval training is a form of exercise that allows for aerobic and anaerobic exercise depending on work periods and recovery periods (Sumintarsih & Saptono, 2022). The rest or recovery period in interval training can be divided into two, namely active rest and passive rest, where active rest is done by doing basic movements lightly or at low intensity. Interval training can be modified through training distance, training tempo, recovery time, and training repetitions that are adjusted to the training goals (Wiguna, 2017).

Interval training has advantages, such as helping to increase an athlete's speed, endurance and aerobic capacity. Exercises that are usually used to increase speed are short interval training. The energy system used in short interval training is the anaerobic energy system (ATP-PC+lactate) which is used between 20-45 seconds (Sungkowo et al., 2015). Although this system can only last a short time, it can produce energy quickly. Thus, the distance of 50 meter bifins is suitable for developing speed and 1:1 interval training is good applied to 50 meter bifins. 1:1 interval training is a training method where the work interval is the same as the recovery interval.

The level of flexibility greatly influences the movements carried out by a person in minimizing injury, where a person who has a higher level of flexibility has a lower risk of injury, while the lower the level of flexibility he has, the higher the risk of injury (Aprilia & Yani, 2020; Prasetyo & Rochmania , 2020). Therefore, flexibility is one of the determining factors for athlete performance (Hidayatullah et al., 2022). Good flexibility is demonstrated when a joint can make wide and full movements with maximum Range of Motion (ROM) without causing pain (Rahmanto et al., 2019).

Development of achievements in the sport of diving has been carried out by several regions in Indonesia, one of which is the city of Semarang. The city of Semarang has several diving clubs, but only has one club that focuses on achievement, namely the Octopus Diving Club. Octopus Diving Club is an achievement diving club in Semarang City which was officially founded on January 10 2004 by Mr Nur Hidayat. This club has 25 members, but in 2024 there will be 11 athletes still actively training. All Octopus Diving Club athletes already have a Diving Athlete Identification Number (NIAS). Based on the explanation above, the author wants to conduct research entitled "The Effect of 1:1 Interval Training and Flexibility on 50 Meter Speed Bifins Numbers in Female Athletes at the Octopus Diving Club, Semarang City".

METHOD

The research method is an experimental method. This experimental research uses a pre-experimental design, one group pretest-posttest. One group pretest-posttest design is a research activity carried out by giving an initial test (pretest) before being given treatment and giving a posttest after being given treatment (Arikunto, 2016). In this design there is no control group, and subjects are not randomly assigned.

This research was conducted at the Tirta Benteng Raiders Swimming Pool which is located in the Asmil complex of the Raiders Infantry Battalion 400/ BR Srondol Kulon, Banyumanik District, Semarang City, Central Java. This research was carried out from 29 April 2024 to 7 June 2024. The pretest was carried out on 29 April 2024, while the posttest was carried out on 7 June 2024. The treatment was carried out in 16 meetings, with a frequency of 3 times a week, namely on Monday, Wednesday , and Friday 19.00-21.00 WIB

The population of all athletes at the Octopus Diving Club, Semarang City, is a total of 25 athletes. The research sample of 6 people was taken using purposive sampling technique. Purposive sampling is a technique for determining samples with certain considerations (Sugiyono, 2019). The criteria for determining the sample include being active in training, being female, having a diving certificate or Diving Athlete Identification Number (NIAS), mastering bifins techniques, not being sick, and being willing to follow the rules of the treatment being applied.

The instruments in the research were the 50 meter bifins speed test and the sit and reach test. The data analysis technique goes through the stages of normality test and sata homogeneity test. After the data is declared normal and homogeneous, a t-test is then carried out using paired sample t-test analysis to compare the average of the variables between before (pretest) and after (posttest) treatment and a correlation test is carried out using product moment correlation to see whether it exists or not. correlation between flexibility and speed 50 meter bifins number.

RESULTS

Descriptive statistics of pretest and posttest speed of 50 meter bifins, as well as flexibility measurements are presented in the following table.

Table 1. 1 Descriptive Statistics for Pretest, Posttest and Flexibility

	N	Minimum	Maximum	Sum	Mean	Std. Deviation
Pretest	6	30.20	36.54	202.43	33.7383	2.50139
Posttest	6	28.20	33.85	189.66	31.6100	2.20369
Fleksibilitas	6	25.00	43.00	206.00	34.3333	6.52431

Valid N (listwise)	6					

Based on Table 4.3 above, it shows that the average pretest speed for the 50 meter bifins number was 33.74 seconds with a standard deviation (std. Deviation) of 2.50139 and increased during the posttest by 31.61 seconds with a standard deviation (std. Deviation) of 2.20369, and the average -average flexibility is 34.33 cm with a standard deviation (std. Deviation) of 6.52431.

The results of the normality test analysis are presented in the following table.

Table 1. 2 Normality Tests

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	**df**	**Sig.**	**Statistic**	**df**	**Sig.**
Pretest	0.244	6	.200*	0.926	6	0.552
Posttest	0.178	6	.200*	0.929	6	0.571
Fleksibilitas	0.141	6	.200*	0.983	6	0.963

Based on Table 4.4, the results of the statistical analysis of normality tests carried out using the Shapiro-Wilk test show that the pretest and posttest data for the 50 meter speed bifins number, as well as the flexibility measurement data, are normally distributed. The normality test results of all data can be said to be normal because they have a significance value of $p > 0.05$. Because all data is normally distributed, the analysis can be continued.

The homogeneity test results are presented in the following table.

Table 1. 3 Homogeneity tests

		Levene Statistic	**df1**	**df2**	**Sig.**
Hasil	**Based on Mean**	2.475	2	15	0.118
	Based on Median	2.396	2	15	0.125
	Based on Median and with adjusted df	2.396	2	11.108	0.136
	Based on trimmed mean	2.474	2	15	0.118

Based on Table 4.5, the results of the statistical analysis of the homogeneity test which was carried out using the Levene Test can be seen from the calculation results of the significance value of $0.118 \geq 0.05$, thus indicating that the data group

has a homogeneous variance. Because the data is homogeneous, data analysis can be continued with parameric statistics.

The results of the paired sample t-test analysis of 50 meter speed bifins numbers are as follows.

Table 1. 4 Paired Sample T-test Analysis

		Paired Differences							Sig. (2-tailed)
					95% Confidence Interval of the Difference				
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper	t	df	
Pair 1	Pretest 50 Meter Bifins - Posttest	2.12667	0.65777	0.26854	1.43638	2.81696	7.920	5	0.001

From the results of the t-test using the Paired sample test method, it can be seen that the t value is 7.920 and the Sig. (2-tailed) is 0.001 < 0.05, then the hypothesis is accepted. Thus, it can be concluded that there is a significant influence on the experimental class after receiving 1:1 interval training treatment on female athletes from the Octopus Diving Club, Semarang City to increase the speed of the 50 meter bifins number.

Product moment correlation or Pearson correlation is used to test the second hypothesis which reads "There is a correlation between flexibility and speed in the 50 meter bifins number in female athletes at the Octopus Diving Club Semarang City", based on the results of flexibility measurements and the 50 meter speed test in the bifins number. Product moment correlation can prove whether or not there is a correlation between flexibility and 50 meter bifins speed. The calculation results are presented in the following table.

Table 1. 5 Product Moment Correlation Results

		Fleksibilitas	Kecepatan 50 M Bifins
Fleksibilitas	Pearson Correlation	1	0.451
	Sig. (2-tailed)		0.370
	N	6	6
Kecepatan 50	Pearson Correlation	0.451	1

M Bifins	Sig. (2-tailed)	0.370	
	N	6	6

Based on Table 4.7 above, it is known that the Sig. (2-tailed) is 0.370 > 0.05 so it can be concluded that there is no significant correlation between flexibility and speed in the 50 meter bifins number in female athletes at the Octopus Diving Club, Semarang City.

DISCUSSION

Based on the research results, it is known that the results of the t-test using the paired sample test method can be seen that the Sig. (2-tailed) is 0.001<0.05 then the hypothesis is accepted. Because the hypothesis was accepted, it can be concluded that there was a significant influence on the experimental class which had received treatment by applying 1:1 interval training to the female athletes of the Octopus Diving Club, Semarang City, to increase the speed of the 50 meter bifins number. From the pretest data the average was 33.74 and during the posttest the average reached 31.61. The magnitude of this change can be seen from the difference in the average value, which is 2.13.

This is appropriate because 1:1 interval training basically has an influence on the body, especially on the energy system used. The ratio of work to rest can influence the energy system used during interval training (La Monica et al., 2020). 1:1 interval training is included in short interval training. The energy system used in short intervals is ATP-PC+lactate, which is used between 20-45 seconds (Sungkowo, Rahayu and Slamet Budianto, 2015). Thus the distance of 50 meters bifins proved suitable for developing speed.

Based on relevant theories and research results, it is known that each athlete experienced quite significant changes in time after undergoing regular 1:1 interval training program treatment. Where previously, during the pretest, athletes took a relatively long time, whereas when the posttest was carried out, the travel time was faster. Thus, the 50 meter bifins distance proves to be suitable for developing speed.

Flexibility refers to the ability of a joint and muscle to make movements as freely and widely as possible, without experiencing and causing injury (Ibrahim, Polii and Wungouw, 2015; Santika, 2017). Flexibility has an important role in sports, namely how flexibility influences athletes' performance abilities (Apriantono et al., 2021). The level of flexibility greatly influences the movements carried out by a person in minimizing injury, where a person who has a higher level of flexibility, the lower the risk of injury, while the lower the level of flexibility, the higher the risk of injury (Aprilia and Yani, 2020; Prasetyo and Rochmania , 2020).

Flexibility is very necessary for athletes involved in sports that require a lot of flexibility, such as diving, because flexibility allows athletes to move freely

without experiencing and causing injury. Flexibility of the body and joints is needed in freestyle (crawl) swimming movements to produce fast swimming movements (Prawirakusuma and Sukoco, 2019). Because the bifins diving movement is the same as freestyle (crawl), flexibility is also needed in bifins diving to help increase speed, coordination, agility, save energy, and help produce efficient movements. In swimming, this element becomes important when athletes make strokes and connect each movement into an effective but maximal force (Amadea et al., 2023). When performing arm movements, flexibility in pelvic movements is also needed to obtain large amplitude arm movements. A large amplitude in the arm swing will make the arm movement strong and fast, resulting in excellent swimming movement and speed (Syahdin, 2020).

Based on the research results, it is known that the results of the correlation test using product moment correlation can be seen that the Sig. (2-tailed) is 0.370>0.05 then the hypothesis is rejected. Because the hypothesis was rejected, it can be concluded that there is no significant correlation between flexibility and speed in the 50 meter bifins number in female athletes at the Octopus Diving Club, Semarang City. This means that flexibility does not provide a significant correlation to the speed of 50 meter bifins in female athletes at the Octopus Diving Club, Semarang City.

CONCLUSION

The implementation of 1:1 interval training research carried out on female athletes at the Octopus Diving Club, Semarang City, was carried out well and was proven to provide an increase in speed in the 50 meter bifins number after regular 1:1 interval training treatment as seen from the results of the t-test using the paired method. the test sample gets a Sig value. (2-tailed) 0.001<0.05 then the hypothesis is accepted. In other words, there is an effect of 1:1 interval training on the speed of the 50 meter bifins number in the female athletes of the Octopus Diving Club, Semarang City.

Flexibility measurements carried out by female athletes at the Octopus Diving Club in Semarang City were carried out well but were proven to have no correlation with the speed of the 50 meter bifins number. Judging from the results of the correlation test using the product moment correlation method, the Sig value is obtained. (2-tailed) 0.370<0.05 then the hypothesis is rejected. This means that there is no correlation between flexibility and speed in the 50 meter bifins number for female athletes at the Octopus Diving Club, Semarang City.

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