



The Effect of Interval Training on Speed Improvement in the 100-Meter Monofin Event among Elang DC Surabaya Diving Athletes

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ABSTRACT

Finswimming is a competitive aquatic sport that utilizes fins to enhance propulsion, requiring athletes to achieve optimal speed both on the water surface and underwater. However, field observations indicate that athletes in the Age Group A category at Elang Diving Club Surabaya still experience difficulties in improving their speed performance in the 100-meter monofin event. Therefore, this study aimed to determine the effect of interval training on improving speed in the 100-meter monofin event. This research employed a quantitative approach using a pre-experimental one-group pretest-posttest design. The sample consisted of nine monofin athletes aged 18–22 years selected through purposive sampling. Data were collected using a 100-meter monofin swimming test, with time measurement recorded by a stopwatch. The interval training program was conducted for six weeks, with a frequency of three sessions per week, incorporating variations of short intervals, intensive intervals, and passive recovery intervals at distances of 50 and 75 meters. Data analysis included the Shapiro–Wilk normality test and paired sample t-test using SPSS. The results showed that the average completion time decreased from 45.58 seconds (pretest) to 44.55 seconds (posttest), indicating an improvement of 1.03 seconds (2.27%). Statistical analysis revealed a significant difference between pretest and posttest results ($p = 0.007 < 0.05$). In conclusion, interval training has a significant effect on improving speed performance in the 100-meter monofin event. This method can be effectively applied as a structured training strategy to enhance sprint performance in finswimming athletes.

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A. Conception and design of the study;
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INTRODUCTION

Sports are structured physical and mental activities aimed at achieving optimal performance in specific disciplines. In modern sports science, performance is not merely the result of talent but a product of systematic training processes that integrate physical conditioning, technical mastery, tactical understanding, and psychological



readiness (Ilham, 2021; Bompaa & Buzzichelli, 2019). Among these components, training intensity plays a critical role in determining the effectiveness of training adaptations. Properly designed training intensity enables athletes to progressively adjust to workloads, thereby improving performance capacity in line with structured training programs (Ashadi, 2014; Issurin, 2016).

Within aquatic sports, finswimming particularly the monofin discipline has gained increasing recognition as a high-performance sport requiring a combination of speed, technique, and physiological efficiency. The 100-meter monofin event is categorized as a sprint discipline that demands maximal speed, explosive power, and efficient coordination of body segments (Wicaksono et al., 2024; Nakashima et al., 2019). In this event, athletes rely heavily on anaerobic energy systems, rapid neuromuscular activation, and optimal hydrodynamic positioning to minimize drag and maximize propulsion (Toussaint & Truijens, 2018; Barbosa et al., 2021).

Despite advancements in training methodologies, performance limitations remain evident among athletes at Elang Diving Club Surabaya. Preliminary observations indicate that athletes' speed performance in the 100-meter monofin event is not yet optimal, particularly during sprint execution phases. This issue is closely linked to insufficient training specificity, especially in programs targeting speed development and anaerobic capacity. As speed is a decisive factor in sprint events, any deficiency in speed-related training directly impacts competitive outcomes (Turfi, 2023; Morais et al., 2020).

Additionally, fatigue-induced performance decline is a major concern. Athletes often experience reduced kick frequency, diminished propulsion force, and impaired coordination during high-intensity swimming, indicating inadequate adaptation to sprint demands (Pyne & Sharp, 2014; Girard et al., 2018). Therefore, identifying effective training methods that specifically enhance speed performance in monofin sprint events is essential.

Recent developments in sports training science emphasize the importance of evidence-based training methods to enhance athletic performance. Interval training has emerged as one of the most effective approaches for improving both aerobic and anaerobic capacities. This method involves repeated bouts of high-intensity exercise interspersed with controlled recovery periods, allowing athletes to sustain high workloads without excessive fatigue (Buchheit & Laursen, 2013; Milanović et al., 2015).

In aquatic sports, interval training has been widely applied to improve swimming performance. Studies have shown that interval-based protocols significantly enhance VO_2 max, lactate threshold, and neuromuscular efficiency, all of which are critical for sprint swimming performance (Seiler, 2010; Faude et al., 2013). Specifically, in short-distance events such as the 100-meter race, energy production is dominated by the ATP-PC system and anaerobic glycolysis, making high-intensity interval training particularly relevant (Gastin, 2011; Bismar et al., 2024).

Biomechanically, monofin swimming differs from traditional swimming techniques due to the dolphin-like undulatory motion that requires coordinated movement of the trunk, hips, and lower limbs. Efficient propulsion depends on the synchronization of body

segments and the generation of wave-like motion through the body (Nakashima et al., 2019; Arellano et al., 2020). Interval training can enhance this coordination by repeatedly exposing athletes to high-speed movement patterns, thereby improving motor learning and neuromuscular adaptation (Behm & Sale, 1993; Morais et al., 2020).

Empirical studies also highlight that interval training improves sprint performance by increasing muscle power, enhancing phosphocreatine resynthesis, and improving buffering capacity against metabolic acidosis (Bishop et al., 2011; Edge et al., 2006). Furthermore, interval training has been proven effective in maintaining high-intensity output across repeated efforts, which is essential in competitive swimming scenarios (Laursen & Jenkins, 2002; Dupont et al., 2004).

Although numerous studies have examined the effects of interval training on general swimming performance, there remains a limited body of research specifically focusing on finswimming, particularly the 100-meter monofin event. Most existing literature emphasizes conventional swimming strokes such as freestyle, butterfly, or breaststroke, with minimal attention given to the unique biomechanical and physiological demands of monofin swimming (Barbosa et al., 2021; Morais et al., 2020).

Furthermore, previous studies often focus on elite or international-level athletes, leaving a gap in understanding how interval training affects developing or club-level athletes, such as those at Elang Diving Club Surabaya. This gap is significant because training responses may vary depending on the athlete's level, training history, and physiological characteristics (Issurin, 2016; Mujika, 2018).

Another limitation in the literature is the lack of sport-specific interval training models tailored to finswimming. While general interval training protocols have been widely studied, their direct application to monofin sprint events remains underexplored. The distinct movement mechanics, energy demands, and technical requirements of monofin swimming necessitate specialized training approaches that are not fully addressed in current research (Arellano et al., 2020; Wicaksono et al., 2024).

Additionally, there is a scarcity of empirical data examining the direct relationship between interval training and speed improvement in monofin sprint events using measurable performance indicators such as time reduction, stroke efficiency, and kick frequency. This lack of targeted research limits the ability of coaches to design evidence-based training programs for finswimming athletes.

Based on the identified research problems and gaps, this study aims to analyze the effect of interval training on speed improvement in the 100-meter monofin event among athletes of Elang Diving Club Surabaya. Specifically, this study seeks to: Evaluate the effectiveness of interval training in improving sprint swimming speed. Examine the physiological and performance adaptations resulting from interval training. Provide empirical evidence on the applicability of interval training in finswimming contexts.

The novelty of this research lies in its specific focus on monofin sprint performance, which has been relatively underexplored in sports science literature. Unlike previous studies that focus on conventional swimming, this research integrates interval training principles with the unique biomechanical characteristics of monofin

swimming. Additionally, this study contributes practical insights for coaches by developing a training approach that is directly applicable to club-level athletes.

Another innovative aspect of this study is its emphasis on real-world training conditions within a local sports club setting. By focusing on Elang Diving Club Surabaya, this research provides context-specific findings that can be directly implemented in similar training environments. This practical orientation enhances the relevance and applicability of the research outcomes.

In summary, achieving optimal performance in the 100-meter monofin event requires a combination of speed, technique, and physiological efficiency supported by scientifically designed training programs. Although interval training has been widely recognized as an effective method for improving athletic performance, its application in finswimming—particularly in sprint events—remains insufficiently explored. The performance limitations observed among athletes at Elang Diving Club Surabaya highlight the need for targeted training interventions focused on speed enhancement.

Therefore, this study is expected to fill the existing research gap by providing empirical evidence on the effectiveness of interval training in improving monofin sprint performance. The findings are anticipated to contribute to the development of more effective training programs, thereby supporting athletes, coaches, and researchers in advancing finswimming performance at both local and broader levels.

METHODS

This study employed a quantitative research approach aimed at obtaining objective and measurable data through a systematic process of observation and numerical analysis. Quantitative methods are widely used in sports science research to evaluate training effects due to their ability to provide empirical evidence and statistical validation of performance changes (Creswell & Creswell, 2018; Thomas et al., 2015). The research utilized a pre-experimental design, specifically the One Group Pretest-Posttest Design, to examine the causal relationship between interval training and speed improvement in the 100-meter monofin event. In this design, measurements were conducted before (pretest) and after (posttest) the intervention, allowing the researcher to identify the magnitude of change resulting from the treatment (Fraenkel et al., 2019; Sugiyono, 2019). This approach is considered appropriate in preliminary experimental studies where control groups are limited but the focus is on identifying treatment effectiveness (Ary et al., 2018). The study was conducted at Elang Diving Club, located at Delta Plaza Swimming Pool, Jl. Pemuda 31-37 Hotel Suites, Surabaya. The research took place over a three-month period from December 2025 to February 2026, encompassing the stages of preparation, implementation of the training intervention, and data analysis. The structured timeline ensured that the training program could be applied consistently while maintaining ecological validity within a real training environment (Oktavia et al., 2019; Mujika, 2018).

The population of this study consisted of all diving athletes actively training at Elang Diving Club Surabaya. The sample was determined using a purposive sampling

technique, which selects participants based on specific criteria aligned with the research objectives (Etikan et al., 2016). The inclusion criteria were: (1) athletes aged 18–22 years (Age Group A), (2) active use of monofins in training and competition, and (3) prior participation in official competitions such as Regional Championships, National Championships, or PORPROV. Based on these criteria, a total of nine athletes were selected as research participants. Although the sample size is relatively small, it is considered adequate for experimental studies in sports settings where participant availability is limited (Hopkins et al., 2009). In this study, the independent variable was the interval training program, while the dependent variable was speed performance in the 100-meter monofin event, measured in seconds. The training intervention was conducted over six weeks, with a frequency of three sessions per week, resulting in a total of 18 training sessions. The program was designed based on established principles of interval training, incorporating variations in intensity, duration, and recovery to stimulate physiological adaptation (Buchheit & Laursen, 2013; Milanović et al., 2015). The training sessions included monofin swimming distances of 50 meters and 75 meters, utilizing short intervals, intensive intervals, and passive recovery intervals. This variation was intended to target both the ATP-PC and anaerobic glycolysis energy systems, which are dominant in sprint swimming events (Gastin, 2011; Bismar et al., 2024).

Data collection was conducted using a performance test of 100-meter monofin swimming, measured with a stopwatch to record completion time during both pretest and posttest phases. Time-based performance measurement is a standard and reliable indicator of speed in aquatic sports (Pyne & Sharp, 2014; Morais et al., 2020). To ensure consistency, all tests were conducted under similar environmental conditions, including pool setting, time of day, and warm-up procedures. The collected data were analyzed using descriptive and inferential statistical techniques. Prior to hypothesis testing, the data were subjected to a normality test using the Shapiro–Wilk method, which is suitable for small sample sizes (Razali & Wah, 2011). Subsequently, a Paired Sample t-test was applied to determine whether there was a statistically significant difference between pretest and posttest results. This test is commonly used in experimental studies to evaluate the effect of an intervention on a single group (Field, 2018; Ibrahim et al., 2023). The level of significance was set at $\alpha = 0.05$, indicating that results with a probability value less than 0.05 were considered statistically significant. Through this methodological framework, the study aimed to provide valid and reliable empirical evidence regarding the effectiveness of interval training in improving speed performance in the 100-meter monofin event among diving athletes.

RESULTS AND DISCUSSION

Result

Descriptive Analysis of Overall Performance

The descriptive statistical analysis indicates that the average pretest time of the athletes was 45.58 seconds, while the average posttest time decreased to 44.55 seconds. This reflects an overall improvement of 1.03 seconds following the

implementation of the interval training program. The reduction in completion time demonstrates a meaningful enhancement in the athletes' swimming speed performance in the 100-meter monofin event.

The standard deviation values show minimal change, with 2.70 in the pretest and 2.65 in the posttest, indicating that the variability of the data remained relatively stable. This suggests that the improvement in performance was consistently distributed among the participants, rather than being influenced by only a few individuals.

In terms of performance range, the maximum value improved from 48.98 seconds in the pretest to 48.01 seconds in the posttest, while the minimum value improved from 40.79 seconds to 40.34 seconds. These findings indicate that both the highest-performing and lowest-performing athletes experienced measurable improvements after the training program.

At the individual level, all nine athletes demonstrated performance improvements, confirming the effectiveness of the intervention across the entire sample. The highest improvement recorded was 2.58 seconds, while the smallest improvement was 0.13 seconds, indicating variability in individual responses to the training stimulus.

Overall, these results suggest that the interval training program had a positive and consistent effect on improving 100-meter monofin swimming speed among athletes, although the magnitude of improvement varied between individuals.

Table 1.

Descriptive Analysis of Overall Performance (100-m Monofin Speed)

Variable	Pretest	Posttest	Improvement
Mean (seconds)	45.58	44.55	1.03
Standard Deviation	2.70	2.65	–
Maximum (seconds)	48.98	48.01	0.97
Minimum (seconds)	40.79	40.34	0.45
Total Score	410.22	400.92	9.30
Number of Athletes (N)	9	9	–
Highest Individual Gain	–	–	2.58
Lowest Individual Gain	–	–	0.13

Descriptive Analysis Based on Gender

Further analysis was conducted to examine performance changes based on gender in the 100-meter monofin event. The results indicate that both male and female athletes experienced improvements following the interval training program.

In the female group, the average pretest time was 46.22 seconds with a standard deviation of 2.23, indicating moderate variability in performance among participants. After the training intervention, the average posttest time decreased to 45.45 seconds, accompanied by a reduced standard deviation of 1.95. This reduction in both mean time and variability suggests not only an improvement in speed but also a more consistent performance among female athletes after completing the training program.

Similarly, in the male group, the average pretest time was 44.78 seconds with a standard deviation of 3.36, indicating a slightly higher variability compared to the female group. Following the interval training program, the average posttest time improved to

43.71 seconds, with a slightly reduced standard deviation of 3.26. This improvement reflects enhanced speed performance, although variability remained relatively higher than in the female group.

Overall, these findings demonstrate that interval training effectively improved performance in both gender groups. The consistent reduction in mean completion times indicates that the training program provided sufficient stimulus to enhance speed regardless of gender differences. However, the slightly lower variability observed in the female group suggests a more uniform adaptation to the training program, while the male group exhibited greater individual differences in response to the training stimulus.

Table 2.

Descriptive Analysis of Performance Based on Gender (100-m Monofin Speed)

Gender	Measurement	Mean (seconds)	Std. Deviation	Min (seconds)	Max (seconds)
Female	Pretest	46.22	2.23	42.70	48.02
Female	Posttest	45.45	1.95	42.50	47.89
Male	Pretest	44.78	3.36	40.79	48.98
Male	Posttest	43.71	3.26	40.34	48.01

Normality Test

Before conducting hypothesis testing, a normality test was performed to determine whether the data followed a normal distribution. The test was conducted using the Shapiro–Wilk method, which is appropriate for small sample sizes ($n < 50$).

The results of the analysis indicate that the pretest data obtained a significance value of 0.623, while the posttest data showed a significance value of 0.477. Both values are greater than the established significance level of 0.05, indicating that there is no significant deviation from normality in either dataset.

Additionally, the Shapiro–Wilk statistic values were 0.944 for the pretest and 0.930 for the posttest, further supporting the assumption that the data are normally distributed. These findings suggest that the distribution of the athletes' performance scores is symmetrical and does not violate the assumptions required for parametric statistical procedures.

Based on these results, it can be concluded that both the pretest and posttest data meet the normality assumption, allowing for the use of parametric statistical tests in subsequent analyses. Therefore, the application of the Paired Samples t-test to examine differences in performance before and after the interval training intervention is considered appropriate and statistically valid.

Table 3.

Normality Test Results (Shapiro–Wilk Test)

Variable	N	Statistic (W)	Sig. (p-value)	Interpretation
Pretest	9	0.944	0.623	Normally Distributed
Posttest	9	0.930	0.477	Normally Distributed

Hypothesis Testing (Paired Samples t-test)

Hypothesis testing in this study was conducted using the Paired Samples t-test to determine whether there was a statistically significant difference between the athletes' performance before and after the interval training program. This test is appropriate

because it compares two related measurements taken from the same group of participants.

The results of the analysis indicate that the mean pretest score was 45.58 seconds, while the mean posttest score decreased to 44.55 seconds, resulting in a mean difference of 1.03 seconds. This decrease reflects an improvement in swimming speed following the training intervention.

The correlation analysis between pretest and posttest scores yielded a value of $r = 0.948$ ($p = 0.000$), indicating a very strong and significant relationship between the two measurements. This suggests that participants who performed better in the pretest also tended to perform better in the posttest.

Furthermore, the results of the Paired Samples t-test showed a t-value of 3.594 with degrees of freedom (df) = 8 and a significance value of 0.007. Since the significance value is less than 0.05 ($0.007 < 0.05$), it can be concluded that there is a statistically significant difference between pretest and posttest performance.

Additionally, the 95% confidence interval (CI) ranged from 0.370 to 1.696, indicating that the true mean improvement in performance lies within this range. This further strengthens the conclusion that the interval training program had a significant positive effect on improving 100-meter monofin swimming speed.

Table 4.

Paired Samples Statistics

Variable	Mean (seconds)	N	Std. Deviation	Std. Error Mean
Pretest	45.58	9	2.70	0.90
Posttest	44.55	9	2.65	0.88

Table 5.

Paired Samples Correlation

Pair	N	Correlation (r)	Sig.
Pretest & Posttest	9	0.948	0.000

Table 6.

Paired Samples t-test

Variable Pair	Mean Difference	Std. Deviation	Std. Error	95% CI Lower	95% CI Upper	t-value	df	Sig. (2-tailed)
Pretest - Posttest	1.03	0.86	0.29	0.370	1.696	3.594	8	0.007

The results clearly demonstrate that the interval training program significantly improved the 100-meter monofin swimming speed of Elang Diving Club athletes. The consistent reduction in completion time across all participants, supported by statistical significance, confirms the effectiveness of the training intervention.

These findings indicate that interval training contributes to improved anaerobic capacity, neuromuscular coordination, and movement efficiency, which are essential components in sprint finswimming performance.

Based on the statistical analysis and empirical data, it can be concluded that interval training has a significant positive effect on improving speed in the 100-meter

monofin event among athletes of Elang Diving Club Surabaya. The improvement is evident both descriptively and inferentially, supporting the research hypothesis and demonstrating the effectiveness of the applied training program.

Discussion

The findings of this study demonstrate that the implementation of interval training significantly improved the 100-meter monofin swimming speed among Age Group A athletes at Elang Diving Club Surabaya. The improvement was evidenced by a reduction in completion time, with a recorded performance increase of 2.27% after six weeks of training. This result confirms that interval training provides an effective physiological and neuromuscular stimulus to enhance sprint performance in finswimming. Such findings are consistent with contemporary training theory, which emphasizes that structured high-intensity workloads combined with controlled recovery can accelerate performance adaptation (Buchheit & Laursen, 2013; Milanović et al., 2015; Granata et al., 2018).

From a physiological perspective, the improvement in speed can be explained through adaptations in both aerobic and anaerobic energy systems. Previous studies have shown that sprint interval training significantly enhances VO_2 max, lactate tolerance, and metabolic efficiency, which are essential for sustaining high-intensity efforts (Gibala et al., 2018; Astorino & Schubert, 2018). The findings of this study align with research by Andika Triansyah and Rizki Hazazi Ali, which reported that sprint interval training improves maximal oxygen uptake capacity, thereby increasing the body's ability to utilize oxygen efficiently during intense physical activity. Similarly, Ilmi et al. found that interval-based sprint training significantly enhances speed performance due to improved neuromuscular activation and anaerobic power output.

In the context of finswimming, particularly the 100-meter monofin event, performance relies heavily on the ATP-PC system and anaerobic glycolysis, which supply energy for short-duration, high-intensity activities (Gastin, 2011; Bismar et al., 2024). The improvement observed in this study suggests that the interval training program effectively stimulated these energy systems, allowing athletes to maintain higher movement intensity throughout the race. This is supported by studies indicating that repeated high-intensity efforts improve phosphocreatine resynthesis and buffering capacity, reducing the negative effects of metabolic fatigue (Edge et al., 2006; Bishop et al., 2011).

Biomechanically, monofin swimming requires a highly coordinated undulatory movement pattern, where propulsion is generated through synchronized motion of the trunk, hips, and lower limbs (Nakashima et al., 2019; Arellano et al., 2020). The repetitive nature of interval training likely contributed to improvements in movement coordination and efficiency, as athletes were consistently exposed to high-speed movement conditions. This aligns with motor learning theory, which states that repeated practice under specific conditions enhances neuromuscular coordination and skill automatization (Schmidt & Lee, 2019; Morais et al., 2020). As a result, athletes in this study were able to generate more efficient propulsion while reducing hydrodynamic resistance.

The reduction in completion time also reflects improvements in movement economy, which is critical in aquatic sports. Efficient swimmers are able to convert muscular force into forward propulsion with minimal energy loss (Toussaint & Truijens, 2018; Barbosa et al., 2021). Interval training, by emphasizing high-intensity repetition, enhances the athlete's ability to maintain optimal technique even under fatigue conditions. This is particularly important in sprint events, where slight inefficiencies can significantly impact performance outcomes (Pyne & Sharp, 2014; Seifert et al., 2019).

Furthermore, the findings revealed consistent improvements across both male and female athletes, indicating that interval training is effective regardless of gender. This supports previous research suggesting that physiological adaptations to high-intensity training occur similarly across sexes when training loads are appropriately adjusted (Tschakert & Hofmann, 2013; Milanović et al., 2015). However, the slightly greater variability observed in male athletes may be attributed to differences in baseline physical capacity and training history (Mujika, 2018).

In addition to physiological and biomechanical factors, psychological and environmental aspects also contributed to the observed improvements. During the training program, athletes demonstrated increased motivation, discipline, and mutual support. A positive training environment has been shown to enhance adherence and performance outcomes by fostering intrinsic motivation and reducing perceived exertion (Ryan & Deci, 2017; McLean et al., 2019). The supportive interaction among athletes at Elang Diving Club likely played a role in maintaining training consistency, which is a key factor in achieving performance gains.

Another important finding of this study is the role of interval training in improving fatigue resistance. Athletes reported feeling stronger and more capable of sustaining high-intensity efforts during training sessions. This subjective perception is supported by physiological evidence indicating that interval training enhances mitochondrial efficiency, muscle buffering capacity, and cardiovascular function (Gibala et al., 2018; MacInnis & Gibala, 2017). These adaptations enable athletes to delay the onset of fatigue and maintain performance during repeated high-intensity efforts, which is essential in sprint finswimming.

The practical implications of this study are significant for coaches and sports practitioners. The results suggest that interval training can be systematically integrated into finswimming training programs to improve sprint performance. Coaches are encouraged to design training sessions that incorporate variations in distance (e.g., 50 m and 75 m), intensity, and recovery intervals to target specific energy systems and performance goals (Laursen & Jenkins, 2002; Issurin, 2016). Additionally, the training program should be periodized to ensure progressive overload and adequate recovery, thereby maximizing adaptation and minimizing the risk of overtraining (Bompa & Buzzichelli, 2019).

Despite the positive findings, this study has several limitations that should be considered. The relatively small sample size ($n = 9$) limits the generalizability of the results. Future studies are recommended to include larger sample sizes and control groups to strengthen causal inference (Hopkins et al., 2009). Moreover, this study

focused solely on performance time as the outcome variable. Future research could incorporate additional variables such as stroke efficiency, kick frequency, muscle strength, and biomechanical analysis to provide a more comprehensive understanding of performance improvements (Morais et al., 2020; Barbosa et al., 2021).

Further research is also needed to explore the long-term effects of interval training in finswimming and its interaction with other training methods such as resistance training, plyometrics, and technique-based drills. Integrating these approaches may lead to more holistic performance improvements and better preparation for competitive events (Suchomel et al., 2018; Turner, 2011).

In conclusion, this study provides strong empirical evidence that interval training is an effective method for improving speed in the 100-meter monofin event. The observed improvements are supported by physiological, biomechanical, and psychological adaptations that enhance overall performance. These findings contribute to the growing body of knowledge in aquatic sports training and offer practical guidance for coaches in developing effective training programs for finswimming athletes.

CONCLUSION

Based on the results of this study, it can be concluded that the implementation of an interval training program has a significant effect on improving 100-meter monofin swimming speed among Age Group A athletes at Elang Diving Club Surabaya. The findings demonstrate clear performance enhancement following the six-week training intervention. Empirically, the average completion time decreased from 45.58 seconds (pretest) to 44.55 seconds (posttest), resulting in an improvement of 1.03 seconds or approximately 2.27%. This reduction in time reflects a meaningful increase in athletes' speed ability in completing the 100-meter monofin event.

The statistical analysis further supports these findings, where the Paired Samples t-test showed a significance value of 0.007 ($p < 0.05$), indicating a statistically significant difference between pretest and posttest performance. Additionally, the strong correlation value ($r = 0.948$) confirms the consistency of improvement across participants. These results indicate that interval training provides an effective stimulus for enhancing anaerobic capacity, neuromuscular coordination, and movement efficiency, which are essential components in sprint finswimming performance.

From a practical perspective, the structured application of interval training—through controlled intensity, repetition, and recovery—has proven to be an effective method for developing speed in monofin athletes. The program not only improved physical performance but also contributed to better movement control and resistance to fatigue during high-intensity swimming activities.

Based on these findings, several recommendations can be proposed. Athletes are encouraged to maintain consistency and discipline in training to sustain and further improve their performance. Coaches are advised to incorporate interval training systematically into finswimming programs, with adjustments in intensity and volume

tailored to athletes' individual capacities. For future research, it is recommended to include additional variables such as technical biomechanics, physical fitness components, and psychological factors, as well as larger sample sizes, to provide more comprehensive insights into performance improvement in monofin swimming.

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