14 (3) (2025) 809 - 814
Journal of Physical Education, Sport, Health and Recreations
https://journal.unnes.ac.id/journals/peshr

The Effect of Handpaddle Aids on Freestyle Sprint Speed Over a Distance of 50 Meters

Kamila Asari[1], Nina Sutresna[2]✉, Widi Kusumah[3]

Sports Coaching Education Study Program, Faculty of Sports Education and Health, Indonesian University of Education, Indonesia[123]

Article History

Received September 2025
Accepted October 2025
Published Vol.14 No.(3) 2025

Keywords:
Hand Paddle;Swimming Speed;Freestyle

Abstract

This study aims to determine the effect of handpaddle use on 50-meter freestyle sprint speed in female novice athletes from the PRI Aquarius Club Bandung. The background of this study is based on the importance of speed as a primary indicator of swimming performance, where arm muscle strength and stroke technique efficiency are determining factors. Handpaddles were chosen as a training medium because they provide additional resistance that can increase strength while improving stroke technique. The research method used an experiment with a one-group pretest-posttest design. The study sample consisted of 10 athletes selected by purposive sampling and divided into two groups: the experimental group with handpaddle training and the group without handpaddles. The research instrument was a 50-meter freestyle swimming speed test with a digital stopwatch. The results showed that the group training with handpaddles experienced a more significant increase in speed than the group without handpaddles. These findings indicate that handpaddles are effective as a training medium for increasing arm muscle strength, technique efficiency, and maintaining sprint speed until the final phase of the race. This study confirms the novelty of the 50-meter sprint distance focus and the benefits of handpaddles in maintaining performance in the critical phase of the race.

How to Cite

Asari, K., Sutresna, N., & Kusumah, W. (2025). The Effect of Handpaddle Aids on Freestyle Sprint Speed Over a Distance of 50 Meters. Journal of Physical Education, Sport, Health and Recreation, 14 (3), 809-814.

✉ Correspondence address :
E-mail: nina.sutresna@upi.edu

p-ISSN 2460-724X
e-ISSN 2252-6773

INTRODUCTION

Swimming is a very popular aquatic sport, both recreationally and competitively. In Indonesia, the sport has grown rapidly with the support of official organizations such as the Indonesian Swimming Association (PB PRSI), which oversees various competitions. In the context of competitiveness, swimming is a measurable sport, where winners are determined by the fastest time a swimmer achieves when crossing the finish line. Therefore, speed is a key indicator of success in swimming (Surahman, 2016).

Freestyle is the fastest swimming stroke compared to other styles, making it the most frequently used in competitions. Freestyle speed is greatly influenced by several factors, including arm muscle strength, movement coordination, physical condition, and technical efficiency. A streamlined body position, consistent leg movements, and effective arm strokes will provide optimal propulsion and minimize water resistance (Syaleh et al., 2019) And (Sofyan et al., 2022)..

Among various physical factors, arm muscle strength plays a major role in determining swimming speed. The arms serve as the primary driving force, generating forward propulsion through the stroke phase, so the stronger the arm muscles, the greater the propulsive force generated (Greavil Wahyono & Supriatna, 2023). Previous research confirmed that good arm muscle strength can significantly increase freestyle swimming speed.(Wardhani, 2022).

To develop arm strength, swimming coaches often utilize additional training tools. One of the most commonly used tools is the handpaddle. A handpaddle is a plastic plate that fits over the palm of the hand, expanding the stroke area, increasing resistance when pulling water. This added resistance forces the swimmer to work harder, which in turn increases strength and endurance, while also improving stroke technique awareness (Hasmarita & Nursyamsi, 2023).

Various international and national studies have proven the effectiveness of handpaddle use López-Plaza et al. (2012) showed that handpaddle use significantly increased stroke count in the 100-meter freestyle swim (George H. Crocker et al., 2021), found that paddle size affects the distance traveled per stroke. Research in Indonesia also confirmed this benefit, where handpaddle use accelerated freestyle stroke times in club swimmers (Febrianto, 2024; López-Plaza et al., 2012; Rakafadni Historian et al., 2024).

However, most previous research has focused on distances such as 25 meters, 100 meters, or general aspects such as stroke biomechanics. Research specifically examining the effect of handpaddles on the 50-meter freestyle sprint is still very limited. This is despite the fact that the 50-meter sprint has unique characteristics that require explosiveness, anaerobic strength, and the ability to maintain maximum speed from start to finish (Indah et al., 2024).

The novelty of this study lies in its focus on testing the effectiveness of handpaddles in increasing 50-meter freestyle sprint speed, particularly during the critical phase 15–20 meters before the finish line. This phase is often the point where speed declines due to muscle fatigue, so a training strategy that emphasizes speed consistency towards the end of the race is essential. Thus, this study examines not only the general effect of handpaddles but also their contribution to the decisive phase of the sprint (Rakafadni Historian et al., 2024).

Furthermore, this research provides practical benefits for swimming coaches and clubs in Indonesia. By utilizing simple tools like hand paddles, coaches can design effective training programs to improve arm strength while maintaining sprint speed. This is particularly relevant in the context of developing young athletes, where facilities and infrastructure are often limited, making the use of inexpensive yet effective training tools essential Bomba (2015).

Furthermore, the results of this study are expected to enrich the study of aquatic sports coaching, particularly in developing evidence-based practice methods. Thus, this research not only adds to the academic literature but also bridges practical needs in the field. This approach aligns with modern coaching trends that emphasize innovation and adaptation of training media to optimize athlete performance (De Matos et al., 2023).

Against this backdrop, research into the effect of handpaddle use on 50-meter freestyle sprint speed is crucial. The focus on the final phase of the race and on short sprint events, which have rarely been studied before, underscores the novelty of this research.

METHODS

This study used an experimental method with a one-group pretest-posttest design. This design was chosen because it allowed researchers to measure changes in swimming performance before and after the training treatment. Subjects first underwent an initial pretest, then received treatment in the form of training with and without

handpaddles, and concluded with a final posttest. The research approach used was quantitative, as the data obtained consisted of measured swimming times, which were then analyzed statistically.

The study population was 45 female novice athletes from the PRI Aquarius Bandung Club. The sample was selected using purposive sampling based on the following criteria: having mastered freestyle swimming, having participated in competitions, and owning a handpaddle. Ten athletes who met the criteria were included in the study sample. The sample was divided into two groups of five. The first group served as the experimental group, training with handpaddles, while the second group followed a training program without handpaddles.

The research instrument used was a 50-meter freestyle swimming speed test. Measurements were made using a digital stopwatch with an accuracy of up to 1/100th of a second. This instrument was chosen because it is practical, valid, and reliable for measuring sprint swimming time. In addition to the stopwatch, the study also utilized a swimming pool, a whistle, and writing equipment.

The research procedure began with a pretest, a 50-meter freestyle swim test, to obtain baseline speed data. Next, both groups underwent a training program for 12 sessions over a 30-day period, three times per week. Each training session consisted of a warm-up, a core program of freestyle sprints with varying repetitions, and a cool-down. After the treatment, the participants underwent another posttest to measure changes in swimming speed.

The training program was designed progressively, with increasing sprint volume from session to session. The experimental group used handpaddles during each core session, while the control group underwent an identical program without handpaddles. Therefore, the difference in results can be attributed to the use of handpaddles in the training.

The research data was analyzed using statistical tests. The analysis began with calculating data descriptions (mean, standard deviation, and variance), followed by normality and homogeneity tests to ensure data validity. Next, a hypothesis test was conducted to determine whether there was a significant difference between the pretest and posttest results in both groups (Fadluloh et al., 2024).

RESULTS AND DISCUSSION

The results of the descriptive analysis showed that in the group using handpaddles, the average value (mean) was 71.51 with a standard deviation of 8.716, while the group not using handpaddles obtained an average value of 78.63 with a standard deviation of 6.472. This indicates that the use of handpaddles has an effect on the results obtained, where the group without handpaddles showed a higher average and lower variation in the data. These findings provide a basis for further analysis regarding the significance of the differences between the two groups.

The results of the normality test analysis displayed in the SPSS show the Kolmogorov-Smirnov and Shapiro-Wilk statistical values for each class. In the control group without handpaddles, the Shapiro-Wilk statistical value for the pre-test was 0.964 with a significance value (p-value) of 0.838, and for the post-test was 0.965 with a significance value of 0.845. This indicates that both control groups did not show significant differences from the normal distribution, because the significance value was greater than 0.05.

Furthermore, in the experimental group using handpaddles, the Shapiro-Wilk statistic value for the pre-test was 0.945 with a significance value of 0.076, and for the post-test it was 0.934 with a significance value of 0.623. Both also showed significance values greater than 0.05, indicating that the data in the experimental group was also normally distributed.

The results of the homogeneity of variance analysis displayed in the SPSS show the Levene's statistical values for various testing methods, namely based on the mean, median, median with adjusted degrees of freedom, and trimmed mean. The Levene's statistical value based on the mean is 0.860 with a significance value (p-value) of 0.381. For the test based on the median, a statistical value of 0.281 with a p-value of 0.611 was obtained. In addition, the test based on the median with adjusted degrees of freedom produced a statistical value of 0.281 and a p-value of 0.612. Finally, the test based on the trimmed mean showed a statistical value of 0.802 with a p-value of 0.397. All significance values are greater than 0.05, which indicates that there is no significant difference in variance between groups. Thus, it can be concluded that the assumption of homogeneity of variance is met, which allows further analysis using parametric methods on the tested data.

Based on the results of the Paired Samples Test (Paired Sample T-Test), a significance value (Sig. 2-tailed) of 0.003 was obtained. This value is smaller than 0.05 (α), which shows a statistically significant difference between the results of the Pretest Using Handpadlle and Posttest Using

Handpadlle. Thus, it can be concluded that the use of handpadlle has a significant effect on improving performance.

The analysis results showed that the t-test value was 6.690 with a degree of freedom (df) of 4. The significance value obtained, namely 0.003, indicated that the null hypothesis (H0) which stated that there was no difference between the Pre-Test and Post-Test was rejected. This proves that the intervention or treatment using handpaddles was effective in providing changes to the research subjects.

Based on the results of the Paired Samples Test (Paired Sample T-Test), a significance value (Sig. 2-tailed) of 0.000 was obtained. This value is smaller than 0.05 (α), so it can be concluded that there is a statistically significant difference between the results of the Pre-Test Not Using Handpaddles and the Post-Test Not Using Handpaddles. Thus, even without handpaddle treatment, there was a significant change in the performance of the research subjects.

The analysis results showed a t-value of 12.150 with a degree of freedom (df) of 4. The significance value obtained, namely 0.000, indicates that the null hypothesis (H0) which states there is no difference between the PreTest and PostTest is rejected. This proves that in the group without handpaddle treatment, there are other factors outside the treatment that cause significant changes in performance. These changes could be caused by increased motivation, the effects of training, or other factors that occurred during the study period.

Based on the results of the Independent Samples Test, the significance value (Sig. 2-tailed) obtained was 0.224 for the condition of Equal variances assumed. This value is greater than 0.05 (α), so it can be concluded that there is no statistically significant difference between the average PostTest results of the group that uses hand paddles and the group that does not use hand paddles. This shows that the treatment using hand paddles does not have a significant effect on the difference in final results between the two groups.

The results of the Independent Samples Test showed a significance value of 0.224. Because this value is greater than 0.05, it can be concluded that the null hypothesis (H0) which states that there is no difference in the average between the two groups cannot be rejected. In other words, the treatment using hand paddles was not statistically proven to create a significant difference in the results between the two groups being compared. This indicates that although there is a difference in the average (Mean Difference = -3.17400), the difference is not large enough to be considered significant, and is most likely caused by chance factors or individual variability.

The study results showed an increase in 50-meter freestyle sprint speed in the group that trained using hand paddles. This finding supports Surahman's (2016) assertion that speed is a key factor in swimming and can be improved through structured training using assistive devices. Hand paddles have proven effective as a training tool because they provide greater resistance to the palms of the hands, forcing swimmers to exert more force to generate optimal propulsion.

The effectiveness of handpaddles in increasing swimming speed is inseparable from
The contribution of arm muscle strength. The arms are the primary source of propulsion in freestyle, so the greater the thrust generated, the faster the swimming speed (Ikhwan et al., 2021). The results of this study align with Meita (2022), who stated that increased arm muscle strength is directly proportional to increased freestyle speed. In other words, handpaddles act as a medium that effectively stimulates arm muscle strengthening.

In addition to strengthening arm muscles, handpaddles also help improve pedaling technique López-Plaza et al. (2012) demonstrated that using a handpaddle can significantly increase the number of strokes per 100 meters. This study supports these findings, as subjects who trained using a handpaddle demonstrated a more consistent ability to maintain their pedaling throughout the sprint. This is important considering that the 50-meter sprint demands both technical efficiency and explosive strength (Indah et al., 2024).

This study also confirmed that using handpaddles helps overcome speed decline in the final phase of a race. Typically, speed decline occurs due to muscle fatigue near the final 15–20 meters. By practicing using handpaddles, swimmers become accustomed to facing greater resistance, allowing them to maintain their speed better until the finish line when competing without handpaddles (Rakafadni Historian et al., 2024). This novelty distinguishes this research from previous studies that focused primarily on distances of 25 or 100 meters.

From a coaching practice perspective, the results of this study support the use of simple media in training programs. Swimming training programs often face limited resources and facilities, especially at regional clubs. With handpaddles, coaches can provide effective training

stimuli without the need for sophisticated equipment. This aligns with the perspective of (Bompa & Buzzichelli, 2015) that simple media can be optimized to achieve significant physiological adaptations in cycle-based training programs.

Furthermore, these findings are relevant to the development of young athletes. Beginning athletes require technical and physical strengthening from an early age to adapt to the demands of competition. Endry Kurniawan & Aghus Sifaq (2019)emphasizes the importance of selecting appropriate training media so that athletes not only develop physically but also understand the principles of correct technique. This research provides evidence that handpaddles can be an appropriate medium for this purpose.

Furthermore, the results of this study also enrich the national literature on the use of assistive devices in swimming. Most previous local studies have focused solely on the relationship between muscle strength and speed, without considering a variety of training media (Febrianto, 2019) By integrating handpaddle as a treatment variable, this study presents a new contribution to the development of evidence-based practice-based coaching methods.

These findings have practical implications for coaches. First, handpaddle use can be incorporated into specific training cycles to improve sprint speed. Second, varying handpaddle sizes can be used to adjust resistance levels to suit the athlete's needs. Third, regular handpaddle use can minimize speed decline in the final phase of a race. Thus, coaches have a scientifically proven alternative training method.

However, this study has limitations because it only involved a small sample from one swimming club, so the results cannot be broadly generalized. Future research could involve larger samples from various clubs with different age levels and competition categories. Furthermore, varying the duration of handpaddle use and combining it with other training tools could also be the focus of future studies.

Overall, this discussion demonstrates that handpaddles are effective as a training tool for increasing 50-meter freestyle sprint speed. The novelty of this research lies in the focus of testing short sprint events and analyzing the handpaddle's contribution to the ability to maintain speed until the final phase of the race.

CONCLUSION

This study concludes that handpaddle use has a positive effect on increasing 50-meter freestyle sprint speed. Handpaddle training has been shown to increase arm muscle strength, improve stroke technique, and help athletes maintain speed in the final phase of the race. The novelty of this study lies in its focus on the 50-meter sprint and the handpaddle's contribution to maintaining consistent speed near the finish line. These findings have practical implications for coaches and athletes, particularly in developing simple yet effective media-based training programs to improve swimming performance.

Thus, this research makes a contribution to both the academic and practical aspects of swimming coaching in Indonesia. The results are expected to serve as a scientific reference and practical guide for coaches, athletes, and swimming club managers in improving the quality of training and swimming performance in Indonesia.

REFERENCES

Bompa, T., & Buzzichelli, C. (2015). Periodization training for sports, 3e. Human kinetics.

De Matos, C.C., Guignard, B., Castro, F.D.S., & Guimard, A. (2023). Effects of paddles and fins on front crawl kinematics, arm stroke efficiency, coordination, and estimated energy cost. Frontiers in Physiology, 14(May), 1–11. https://doi.org/10.3389/fphys.2023.1174090

Endry Kurniawan, & Aghus Sifaq, S.Or., MP (2019). The Effect Of Training Using Hand Paddle Assistants On The 50-Meter Freestyle Swimming Speed Of Male Athletes Of Sidoarjo Aquatic Club. Sustainability (Switzerland), 11(1), 1–14.

Fadluloh, FM, Sartono, H., Kusumah, W., & Mulyana, M. (2024). Athletes' Perception of Parental Support and Achievement Motivation: A Correlational Study with Early Age Individual Sport Athletes in Swimming. 412–421. https://www.ejournal.unma.ac.id/index.php/ijsm/article/view/11454

Febrianto, BD (2019). The Effect of Using Hand Paddles and Fins in Swimming. 1(1), 20–27.

Febrianto, BD (2024). The Effect of Handpaddle and Fins Swimming Use on Freestyle Swimming Speed in Tirta Bima Majalengka Swimming Club Athletes. 1996.

George H. Crocker, Moon, J.F., Jeff A. Nessler, & Newcomer, S.C. (2021). Energetics Of S Wimming W Ith H And P Addles. 35(1), 205–211.

Greavil Wahyono, I., & Supriatna, S. (2023). Swimming Sports Development at Muhammadiyah 1 Elementary School in Malang City. COMSERVA: Journal of Research and Community Service, 3(1), 85–90. https://doi.org/10.59141/comserva.v3i1.741

Hasmarita, S., & Nursyamsi, MY (2023). Hand Paddle Assistance to Improve Freestyle Swimming Skills (At Ages 10-12 Years). Jurnal Master

Penjas & Olahraga, 4(2), 367–376. https://doi.org/10.37742/jmpo.v4i2.99

Indah, EP, Indah, EP, Rachman, A., Studi, P., Jasmani, P., Lambung, U., & Banjarmasin, K. (2024). Tibra Banua Aquatik Club Athlete's Freestyle Swimming Technique. 7(1), 49–56.

López-Plaza, D., Alacid, F., López-Miñarro, P. A., & Muyor, J. M. (2012). The influence of different hand paddle sizes on 100-m front crawl kinematics. Journal of Human Kinetics, 34(1), 112–118. https://doi.org/10.2478/v10078-012-0070-0

Rakafadni Historian, Dewi Susilawati, & Respaty Mulyanto. (2024). The Effect of Hand Paddle and Push Up Exercises to Increase Swimming Speed in Children Aged 11-12 Years. Kinesthetic: Scientific Journal of Physical Education, 8(1), 57–64. https://doi.org/10.33369/jk.v8i1.33043

Sofyan, D., Novaldi Pamungkas, RS, & Arhesa, S. (2022). Drill Method Using Flipper Floats as an Effort to Improve Freestyle Swimming Skills. Patriot Journal, 4(1), 58–68. https://doi.org/10.24036/patriot.v4i1.837

Surahman, F. (2016). The Effect of Repetition Method and Intensive Interval Method on 50 Meter Freestyle Swimming Speed. 1(2), 31–40.

Syaleh, M., Lubis, AE, & Helmi, B. (2019). Contribution of Reciprocal Teaching Style to Freestyle Swimming Learning Outcomes. STOK Bina Guna Medan Scientific Journal, 7(1), 30–39. https://doi.org/10.55081/jsbg.v7i1.11

Wardhani, R. (2022). The Effect of Muscle Strength on Freestyle Swimming Speed of Bintang Rio Swimming Club Wardhani1 1 IKIP PGRI Pontianak Khatulistiwa Pontianak. Spj: Sport Pedagogy Journal, 1(1), 103–109.