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Differences in the Effect of the Hello Drill and Glass Balance Training Programs on Backstroke Swimming Speed in Satria Muda Athletes from Sidoarjo Regency

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Abstract: Backstroke swimming often faces body balance challenges that cause trajectory deviation and decreased speed in adolescent athletes. This study aims to examine the differences in the effects of the Hello Drill and Glass Balance training programs on 50-meter backstroke swimming speed. Using a quantitative quasi-experimental approach with a two-group pretest-posttest design, a population of 20 Satria Muda athletes from Sidoarjo Regency aged KU3 (13-14 years) was divided into two equivalent groups (n=10). The speed test instrument was analyzed using the Kolmogorov-Smirnov normality test, Levene's homogeneity test, paired and independent t-test via SPSS 31 (α=0.05). The results showed that Hello Drill increased speed by 6.33% (45.25 to 42.39 seconds; p=0.004) and Glass Balance by 20.81% (45.25 to 35.83 seconds; p=0.001), with a significant difference between groups (p=0.043). Glass Balance is more effective because it optimizes body stability.

Keywords: Balance Training, Backstroke Speed, Glass Balance, Hello Drill, Swimming Performance

Introduction

Backstroke is an advanced swimming stroke that requires swimmers to master the basic techniques of breaststroke and freestyle before learning it (Ishak et al, 2020). This technique emphasizes a supine position parallel to the water's surface, alternating arm movements, flutter kick leg strokes, and relaxed breathing coordination because the face is always above water. Mastering these elements allows swimmers to achieve movement efficiency and optimally reduce water resistance.

Internal factors such as physical condition, technical skill, mental strength, and coordination significantly influence backstroke ability, with technique being the dominant factor over external factors. A stable body position, consistent arm swing, powerful leg strokes, and proper breathing rhythm are key to high performance, while imbalances often lead to trajectory deviation and decreased speed.

Initial observations of 20 Satria Muda athletes from Sidoarjo Regency revealed that pre-test results for 50-meter backstroke swimming speed were suboptimal, with slow times and low limits (Surahman, 2022). Unbalanced body positioning led to a meandering trajectory, which directly hampered speed and propulsion efficiency. A monotonous training program using a pullbuoy, which restricted leg movement and focused solely on

arm swings, exacerbated this problem due to the lack of variety in improving balance and speed (Wijayanto, 2022).

The use of aids such as pullbuoys is effective for basic land or water training, but they fail to comprehensively address imbalances, making it difficult for athletes to maintain a streamlined position. The hello drill, which emphasizes the coordination of constant alternating hand movements with the pullbuoy, is still limited to the rhythmic aspect of the arms without optimizing overall balance. Meanwhile, the glass balance offers a specific approach to horizontal stability and body control, which are crucial for reducing water drag in backstroke.

This study aims to examine the differences in the effects of the Hello Drill and Glass Balance training programs on 50-meter backstroke swimming speed in Satria Muda athletes from Sidoarjo Regency. The urgency lies in the need for training variations for adolescent athletes (KU3) to achieve optimal limits amidst the limitations of existing monotonous programs (Price et al, 2024). The novelty of this study is the direct comparison of these two specific drills in a quasi-experimental context with a pre-post test, which has not been widely explored in Indonesia to increase backstroke speed.

Methodology

Types and Methods of Research

This study used a quantitative approach with a quasi-experimental method, which was chosen to objectively test the causal effect between the Hello Drill and Glass Balance training programs on the 50-meter backstroke swimming speed of Satria Muda athletes from Sidoarjo Regency (Sugiyono, 2023). The research design adopted a two-group pretest-posttest design, where two groups received different treatments with measurements before (O1) and after (O2) the intervention, namely X1 for Hello Drill and X2 for Glass Balance, according to the framework of Lubis et al. (2022). This approach ensures control of confounding variables while maintaining external validity in the context of swimming (Creswell & Creswell, 2023).

Data Analysis Instruments and Techniques

The main instrument was a 50-meter backstroke swimming speed test, conducted with a digital stopwatch at the Satria Muda Sidoarjo swimming pool to measure start-to-finish time. Validity and reliability were tested through pilot testing (Sudaryono, 2021). Data analysis techniques included the Kolmogorov-Smirnov normality test, Levene's homogeneity test, paired sample t-test for intra-group effects, and independent sample t-test for inter-group differences. The analysis was performed using SPSS version 31 with a significance level of 0.05 (Emzir, 2022). This process met parametric assumptions and supported comprehensive hypothesis testing (Sugiyono, 2023).

Population and Sample

The study population consisted of 20 Satria Muda swimming athletes from Sidoarjo Regency in the KU3 age category (13-14 years old), selected through purposive sampling based on the criteria of actively training for at least 6 months and being injury-free (Lubis et al, 2022). The sample was randomly divided into two equivalent groups of 10 athletes each,

with group A receiving Hello Drill and group B Glass Balance, to ensure initial homogeneity through Levene's test (Creswell & Creswell, 2023). This selection strengthened representativeness and reduced selection bias (Sudaryono, 2021).

Research Procedures

The procedure began with a 50-meter swimming speed pretest, followed by 12 training sessions (three times per week, 90 minutes per session) over four weeks, followed by a posttest with identical procedures (Emzir, 2022). Hello Drill emphasized hand coordination with a pullbuoy, while Glass Balance focused on body position stability using a balance glass, as per Wijayanto's (2022) guidelines. All stages were supervised by certified trainers for consistency, with research ethics ensuring informed consent and data confidentiality (Sugiyono, 2023).

Result and Discussion

The data in this study comes from the results of tests conducted on 20 Satria Muda athletes who underwent 12 treatments.

Table 1. Pre-test and Post-Test Results of the 50m Backstroke Sprint (Hello Drill)

No.	Nama	Pre-test Hello Drill	
		Sprint Gaya Punggung	Waktu
1.	Risa	50 meter	34,12
2.	Rarendra Arjuna Uwais	50 meter	38,28
3.	Alisha Putri Fernanda	50 meter	38,81
4.	Khayla Putri Zalva	50 meter	42,67
5.	Haziqa Nurya Widodo	50 meter	44,32
6.	Andini Okta Dewi Prasanti	50 meter	45,88
7.	Neisya Meilani Zulfa	50 meter	47,00
8.	Aqiva Nayla Putri Sulistya	50 meter	50,16
9.	Citranti Khayrani Siddiqyah	50 meter	54,50
10.	Kenes Kamidia Laras	50 meter	56,79

Sumber : Data pribadi

No.	Nama	Post-test Hello Drill	
		Sprint Gaya Punggung	Waktu
1.	Risa	50 meter	33,12
2.	Rarendra Arjuna Uwais	50 meter	35,70
3.	Alisha Putri Fernanda	50 meter	37,80
4.	Khayla Putri Zalva	50 meter	34,43
5.	Haziqa Nurya Widodo	50 meter	38,58
6.	Andini Okta Dewi Prasanti	50 meter	44,00
7.	Neisya Meilani Zulfa	50 meter	44,77
8.	Aqiva Nayla Putri Sulistya	50 meter	48,78
9.	Citranti Khayrani Siddiqyah	50 meter	52,00
10.	Kenes Kamidia Laras	50 meter	54,70

Sumber : Data pribadi

Table 2. Pre-Test and Post-Test Results of the 50m Backstroke Sprint (Glass Balance)

No.	Nama	Pre-test Glass Balance	
		Sprint Gaya Punggung	Waktu
1.	M. Rizky Pratama	50 meter	34,17
2.	Azka	50 meter	37,00
3.	Aira Sapphire Prameswari	50 meter	40,34
4.	Nafia Amira Salvina Audri	50 meter	40,53
5.	Bryant	50 meter	45,22
6.	Fatih Reza Akbar	50 meter	45,30
7.	Ach. Fajar Lazuardi	50 meter	48,43
8.	Afgan	50 meter	48,70
9.	Shavia Alfihana	50 meter	55,99
10.	Quanesha Nada Hanania	50 meter	56,77

Sumber : Data pribadi

No.	Nama	Post-test Glass Balance	
		Sprint Gaya Punggung	Waktu
1.	M. Rizky Pratama	50 meter	30,45
2.	Azka	50 meter	30,18
3.	Aira Sapphire Prameswari	50 meter	31,20
4.	Nafia Amira Salvina Audri	50 meter	33,22
5.	Bryant	50 meter	32,88
6.	Fatih Reza Akbar	50 meter	34,38
7.	Ach. Fajar Lazuardi	50 meter	36,86
8.	Afgan	50 meter	38,52
9.	Shavia Alfihana	50 meter	46,43
10.	Quanesha Nada Hanania	50 meter	44,16

Table 3. Normality Test

Variabel	N	$\bar{X}$ + SD	*Sig.*	Keterangan
Pre-test Latihan *Hello Drill*	10	45,25 + 7,21	0,200	Berdistribusi Normal
Post-test Latihan *Hello Drill*	10	42,39 + 7,62	0,200	Berdistribusi Normal
Pre-test Latihan *Glass Balance*	10	45,25 + 7,51	0,200	Berdistribusi Normal
Post-test Latihan *Glass Balance*	10	35,83 + 5,68	0,200	Berdistribusi Normal

Sumber: Data diolah peneliti dengan SPSS 31

Based on Table 3 above, it can be seen that the results of the normality test show a significance value (Sig.) on all pre-test and post-test data, both in the Hello Drill and Glass Balance exercises, greater than 0.05. This means that the data is normally distributed, so it can be concluded that the data on the results of the 50-meter backstroke swimming speed of the Satria Muda athletes of Sidoarjo Regency meet the assumption of normality.

Table 4. Homogeneity Test

Variabel	N	$\bar{X}$ + SD	*Sig.*	Keterangan
Pre-test dan *Post-test* Latihan *Hello Drill*	20	43,82 + 7,37	0,622	Homogen
Pre-test dan *Post-test* Latihan *Glass Balance*	20	40,54 + 8,08	0,464	Homogen

Sumber: Data diolah peneliti dengan SPSS 31

Based on Table 4 above, it can be seen that in the Hello Drill exercise, the pre-test and post-test scores have an average of 43.82 with a standard deviation of 7.37. Meanwhile, in the Glass Balance exercise, the average pre-test and post-test scores are 40.54 with a standard deviation of 8.08. The results of the homogeneity test show that the significance value for both data groups, namely the Hello Drill exercise and the Glass Balance exercise, are 0.622 and 0.464, respectively, which are greater than 0.05. This indicates that the pre-test and post-test data have the same variance or are homogeneous, so that the 50-meter backstroke swimming speed data for Satria Muda athletes from Sidoarjo Regency meets the assumptions and can be continued with the hypothesis test.

Table 5. Hello Drill T-Test Results

Variabel	N	$\bar{X}$ + SD	t_{hitung}	*Sig.*	%
Pre-test Latihan *Hello Drill*	10	45,25 + 7,21	3,904	0,004	6,33
Post-test Latihan *Hello Drill*	10	42,39 + 7,62			

Sumber: Data diolah peneliti dengan SPSS 31

Based on Table 5 above, it can be seen that the t-value is 3.904 and the significance value is 0.004 < 0.05, so H_a accepted. This means that there is a significant effect of Hello Drill training on the 50-meter backstroke swimming speed of Satria Muda athletes from Sidoarjo Regency. The average speed value increased from 45.25 seconds in the pre-test to 42.39 seconds in the post-test, which means there was a 6.33% increase in speed after being given the Hello Drill training program.

Table 6. Results of the Glass Balance T-Test

Variabel	N	$\bar{X}$ + SD	t_{hitung}	*Sig.*	%
Pre-test Latihan *Glass Balance*	10	45,25 + 7,51	10,681	0,001	20,81
Post-test Latihan *Glass Balance*	10	35,83 + 5,68			

Sumber: Data diolah peneliti dengan SPSS 31

Based on Table 6 above, it can be seen that the t-value is 10.681 and the significance value is 0.001 < 0.05, so $H_a$accepted. This means that there is a significant effect of Glass Balance training on the 50-meter backstroke swimming speed of Satria Muda athletes from Sidoarjo Regency. The average speed value increased from 45.25 seconds in the pre-test to 35.83 seconds in the post-test, which means there was a 20.81% increase in speed after being given the Glass Balance training program.

Table 7. T-Test Results for the Differences Between Hello Drill and Glass Balance Exercises

Variabel	N	$\bar{X}$ + SD	t_{hitung}	*Sig.*
Post-test Latihan *Hello Drill*	10	42,39 + 7,62	2,183	0,043
Post-test Latiham *Glass Balance*	10	35,83 + 5,68		

Sumber: Data diolah peneliti dengan SPSS 31

Based on Table 7 above, it is known that the t-value is 2.183 with a significance value of 0.043 < 0.05, so that $H_a$accepted. This means that there is a significant difference between the Hello Drill and Glass Balance training programs on the 50-meter backstroke swimming speed of Satria Muda athletes from Sidoarjo Regency. The average speed value in the Hello Drill training program is 42.39 seconds, while in the Glass Balance training program it is 35.83 seconds. This shows that Glass Balance training provides better results in increasing the 50-meter backstroke swimming speed of Satria Muda athletes from Sidoarjo Regency, because it produces a faster travel time compared to Hello Drill training.

Discussion

This study aims to determine the effect of the Hello Drill and Glass Balance training programs on the 50-meter backstroke swimming speed of Satria Muda athletes from Sidoarjo Regency, as well as to determine the differences in the effects between the two

training programs. The discussion of the research results is based on descriptive analysis, prerequisite tests, and hypothesis testing that have been conducted.

The Effect of the Hello Drill Training Program on 50 Meter Backstroke Swimming Speed.

Based on the results of the hypothesis test using a paired sample t-test, a significance value of 0.004 (<0.05) was obtained with a calculated t value of 3.904, so it can be concluded that the Hello Drill training program has a significant effect on the speed of the 50-meter backstroke. This is indicated by a decrease in the average travel time from 45.25 seconds in the pre-test to 42.39 seconds in the post-test, with an increase in speed of 6.33%.

These results indicate that the Hello Drill is effective in improving basic backstroke technique, particularly in arm coordination, body position, and stroke rhythm. This exercise helps athletes improve movement efficiency, thereby reducing water resistance and increasing stroke time. Although the improvements are moderate, these results demonstrate that the Hello Drill can be used as an alternative technique training method to improve backstroke performance.

The Effect of Glass Balance Training Program on 50 Meter Backstroke Swimming Speed.

The results of the paired sample t-test on the Glass Balance training program showed a significance value of 0.001 (<0.05) with a calculated t value of 10.681, which means there is a very significant influence on the speed of the 50-meter backstroke. The average athlete's travel time experienced a significant decrease, namely from 45.25 seconds in the pre-test to 35.83 seconds in the post-test, with an increase in speed of 20.81%.

The greater improvement in the Glass Balance exercise indicates that this exercise is more effective in improving backstroke performance. Glass Balance focuses on body balance, horizontal stability, and body control in the water. With good balance, athletes can maintain a more streamlined body position, reduce water resistance, and maximize propulsion from arm and leg movements. This is what led to a more significant increase in swimming speed compared to the Hello Drill.

Differences in the Effects of the Hello Drill and Glass Balance Training Programs on 50-Meter Backstroke Swimming Speed.

The results of the independent sample t-test showed a significance value of 0.043 (<0.05) with a calculated t value of 2.183, so it can be concluded that there is a significant difference between the Hello Drill and Glass Balance training programs on the speed of the 50-meter backstroke.

Descriptively, the average time taken in the Hello Drill post-test was 42.39 seconds, while the Glass Balance training was 35.83 seconds. This indicates that the Glass Balance training

program produced better results than the Hello Drill training. This difference is due to the Glass Balance training's focus on mastering balance and body position in the water, which are important factors in backstroke swimming.

With a stable and balanced body position, athletes can maintain optimal speed throughout the swimming lane. Speed is a key physical component that supports performance in swimming.(Price et al, 2024). Therefore, although both training programs had a significant effect, the Glass Balance training proved to be more effective in increasing the 50-meter backstroke swimming speed of Satria Muda athletes from Sidoarjo Regency.

Conclusion

This study concluded that both the Hello Drill and Glass Balance training programs significantly increased the 50-meter backstroke swimming speed of Satria Muda athletes from Sidoarjo Regency, with an increase of 6.33% (from 45.25 seconds to 42.39 seconds; p=0.004) and 20.81% (from 45.25 seconds to 35.83 seconds; p=0.001), respectively. Independent sample t-tests also confirmed a significant difference between the two programs (p=0.043; t=2.183), with Glass Balance proving more effective due to its focus on body balance that reduces water resistance and improves streamline position. These findings emphasize the importance of specific training variations to address technical limitations in KU3 adolescent athletes, with Glass Balance being a superior intervention for competitive performance.

Despite the strong results, this study has limitations such as a small sample size (20 athletes), a relatively short intervention duration (12 sessions), and the failure to control for physiological variables such as body composition or previous training frequency. Practical implications include recommendations for coaches to integrate Glass Balance as a primary training exercise to optimize speed, while Hello Drill is suitable as a support for arm coordination. Future research suggests expanding the sample size, extending the training period to 8-12 weeks, adding variables such as endurance or breathing techniques, and comparing with a control group without intervention for broader generalization in the Indonesian swimming context.

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