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COMPARISON OF 50 METER FREESTYLE SWIMMING SPEED OF SPORTS COACHING STUDENTS

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Abstract
This study aims to determine and compare the 50-meter freestyle swimming speed levels among students of the Sports Coaching Study Program at Universitas Negeri Padang with a sample size of 40 students. The 50-meter freestyle is a sprint event that relies onmaximum speed, making physical condition factors such as arm and leg muscle strength and endurance the main determinants. The population in this study were all sports coaching students who took the swimming course, with a sample of 40 students selected through purposive sampling. The method use disdescriptive comparative with data collection techniques through a 50-meter freestyle speed test. The results showed that students' swimming speed was in the moderate category with an average time of 41.23 seconds. No significant difference was found between four thand sixth semester students. Thisresearchisexpectedtoserve as evaluation material for the development of training program and performance improvement with in the FIK UNP environment.
Keywords: *Speed, 50-Meter Freestyle Swimming, Students, Sports Coaching, Sample of 40*

INTRODUCTION

Swimming is one of the most popular aquatic sports in the world, including Indonesia. In simple terms, swimming means moving the body in the water using a combination of hand and foot movements to move forward. The sport serves as a recreational activity and also becomes competitive, requiring a high mastery of technique, good physical condition, and an understanding of strategy and tactics.

In the study of sports science, there are four swimming styles at the international level, namely freestyle, backstroke, breaststroke, and butterfly. Among the four styles, freestyle is known to be the fastest and most efficient. Maglischo (2003) in his book *Swimming Fastest* explains that freestyle has movements that allow swimmers to push maximum with minimal resistance. Its characteristic is a straight body position, alternating movements of the two arms on the surface of the water, and alternating movements of the legs up and down.

The 50-meter freestyle is the shortest sprint in swimming. The swimmer must be able to maintain maximum speed from start to finish without significant drops. The very short travel time, usually less than 30 seconds for male elite swimmers, makes this number very prestigious in international competitions such

as the Olympics and World Championships.

Speed in a 50-meter freestyle swim is not only a measure of achievement, but also an indicator of a swimmer's ability. The important question is, what are the factors that affect the speed of swimming? In the study of sports biomechanics, speed results from a balance between two main factors: thrust and resistance. Thrust is the force that advances the swimmer, especially from the movements of the hands and feet. Meanwhile, resistance is a force that resists movement, which comes from friction with water and turbulence.

Research by Asy'ari (2013) at the State University of Surabaya showed that hand thrust contributed 70.56% to freestyle swimming speed, while foot thrust contributed 29.16%. The findings are in line with the opinion of Counsilman, a world swimming expert, that freestyle speed is made up of 70% hand thrust and 30% foot thrust. Therefore, the correct mastery of arm movement techniques is essential to achieve optimal speed.

In addition to technique, various physical aspects are also very influential. Research by Cahyandaru (2015) at the Talented Athlete Development Center (PAB) DIY proved that there was a strong relationship between speed and achievement of 50-meter freestyle swimming, with a correlation value of 0.918. Furthermore, Azizah (2017) in her research on swimming extracurricular students of SMK Negeri 2 Bandar Lampung found that speed contributed 82.7% to the achievement of 50 meters freestyle. Regression analysis showed that speed, flexibility, and endurance together contributed 84.2% to swimming performance, but fixed speed was the most dominant.

Specific components such as arm muscle strength and leg muscle explosiveness also make significant contributions. Efrianti (2024) in his research on SeaRIAAquatic swimmers at Padang State University found that arm muscle strength contributed 63.50% to the 50-meter freestyle swimming speed, while leg muscle explosiveness accounted for 57.77%. The two together contributed 65%. Even anthropometric factors such as leg length also influence. Yosucipto and Mardela (2019) found that leg length contributed 30.47% to the swimming speed of 50 meters freestyle.

In the academic environment, especially in the Sports Coaching Study Program, Faculty of Sports Sciences, Padang State University, swimming is a mandatory course for students. This is in accordance with the Semester Learning Plan (RPS) which emphasizes understanding and mastering the concept of swimming biomechanics and basic engineering practices, including freestyle (State University of Surabaya, 2025).

Students of the Sports Coaching Study Program must not only understand coaching theory, but also have sufficient practical skills as a form of professional competence. The Faculty of Sports and Health Undiksha (2026) reports that certification and recognition of competencies in the field of swimming include mastery of basic to advanced techniques, training methodologies, and an understanding of swimming learning safety and management. Therefore, good swimming skills, especially in speed at the 50-meter sprint distance, are an important indicator in shaping the competence of coaching graduates.

However, there is no clear information about the speed level of the 50-meter freestyle swimming of UNP Sports Coaching students. Preliminary research by Zacky et al. (2024) shows that despite good body position and breathing skills, there are still weaknesses in arm movements, which are only in the category of sufficient with 66.67% mastery. This definitely affects the ability to generate maximum thrust while swimming.

Similar research at other universities, such as the State University of Malang (Iskandar, 2014), the State University of Surabaya (Asy'ari, 2013), and the State University of Makassar (Kadari, 2018), has been conducted and has made an important contribution to the development of swimming coaching science. However, at UNP, studies that specifically address the comparison of speed between coaching students and a representative sample are still limited.

The main purpose of swimming sports can be divided into several aspects. First, leisure and health destinations. Swimming is a good sport to improve cardiovascular fitness, strengthen muscles without straining the joints, as well as increase lung capacity. RRI.co.id (2024) reports that freestyle swimming with proper technique can work almost all body muscles simultaneously.

Second, there are competitive goals and achievements. In this case, swimming aims to get the fastest time within a certain distance through improving technique, physical condition, and strategy. The 50-meter freestyle number is an event to prove the acceleration and maximum speed of a swimmer.

Third, are educational and professional goals, especially for coaching students. Swimming aims to provide a thorough understanding of the techniques, training methodologies, and performance evaluation of athletes to prospective coaches. A good swim coach should be able to analyze athletes' movements, find weaknesses, and design the right training program to increase speed.

Maglischo (2003) emphasizes that understanding of swimming biomechanics, including the analysis of thrust and resistance, is an important competency for trainers. Colwin (2002) in Breakthrough Swimming also emphasizes that coaches must be able to combine theoretical knowledge with practical skills to develop an effective training program.

METHOD

This type of research is comparative descriptive research. The goal is to describe and compare a variable or state of the subject or object of research (Azizah et al., 2018). In this case, the researcher will describe the speed level of the student's 50-meter freestyle swim. The approach used is quantitative with survey methods and measurement test techniques.

The population in this study is all active students of the Sports Coaching Study Program, Faculty of Sports Sciences, Padang State University who have taken or are taking swimming courses. The sampling technique uses purposive sampling with the following criteria: (1) male students, (2) have passed basic swimming courses, and (3) are willing to be samples. Based on these criteria, a sample of 40 students was obtained, consisting of 20 students in the fourth semester and 20 students in the sixth semester. This 40 sample count is considered sufficient for comparative research. This is based on the opinions of Sugiyono (2017) and Kadari (2018) who stated that a minimum sample of 30 people is sufficient for correlational or comparative research.

The instrument used in this study was a 50-meter freestyle swimming

speed test. Swimmers start from the top of the starting beam and swim as fast as possible covering a distance of 50 meters. Travel time is recorded in seconds using a digital stopwatch with an accuracy of 0.01 seconds. To ensure the objectivity of the results, each swimmer was given two opportunities and took their best time. The test was carried out in a 50-meter standard swimming pool of FIK UNP.

The data analysis technique used is descriptive statistics. The data is presented in the form of means, medians, modes, standard deviations, frequency distribution tables, and histograms. Before the comparative analysis is carried out, prerequisite tests such as the normality test using Shapiro-Wilk and the homogeneity test using Levene's Test are carried out. To compare the speed between students in the fourth and sixth semesters, if the data is normally distributed and homogeneous, an independent t-test is used. If not eligible, then a non-parametric alternative test of Mann-Whitney U is used. All statistical calculations are assisted by SPSS software version 26 with a significance level of 0.05.

RESULTS

Data on the 50-meter freestyle swimming speed of UNP Sports Coaching students was obtained from a test attended by 40 male students. Based on the measurement results, the following results were obtained

Table 1. Descriptive Statistics of 50 Meter Freestyle Swimming Speed

Statistics	Scor
Sample	40
fast time	32.15
long time	52.47
mean	41.23
median	41.05
Modus	40.8
Standard Deviation	4.56

Table 2. Swimming Speed Frequency Distribution 50 Meters Freestyle

Time Interval	Category	Frekuency	Persentase %
<35.00	Very Fast	4	10
35.00 - 39.99	Fast	10	25
40.00 - 44.99	Enough	16	40
45.00 - 49.99	Slow	7	17.5
50.00	Very Slowly	3	7.5

Based on table 2, most students (40%) are in the medium category with travel time between 40.00 – 44.99 seconds. As many as 25% of students are in the fast category, 10% in the very fast category, while the remaining 25% are in the slow and very slow category.

Comparison Between Groups

Table 3. Comparison of Descriptive Statistics Between Semesters

Team	N	Mean (detik)	SD
Semester IV	20	41.87	4.72
Semester VI	20	40.59	4.38
Total	40	41.23	4.56

The results of the normality test using Shapiro-Wilk showed that the data of the two groups were normally distributed (Semester IV: $p = 0.142 > 0.05$; Semester VI: $p = 0.208 > 0.05$). The results of the homogeneity test with Levene'sTest showed the variance of data for the two homogeneous groups ($p = 0.672 > 0.05$). Next, an independent t-test was carried out.

Table 4. Independent Swim Speed Independent T-Test Results Intersemester

Variabel	t-hitung	df	Sig. (2-tailed	information
Swim Speed	0.884	38	0.382	Not significant

The results of the analysis showed a t-calculated value of 0.884 with a significance (p) of 0.382 ($p > 0.05$). This means that there is no significant difference between the swimming speed of students in semester IV and semester VI. Although descriptively students in the sixth semester had a faster average time (40.59 seconds) than the fourth semester (41.87 seconds), the difference was not large enough to be statistically significant.

DISCUSSION

This study with a sample of 40 people aims to find out the comparison of the speed of 50-meter freestyle swimming in UNP Sports Coaching students. In general, the results of the study showed that the student's swimming speed was in the medium category with

an average time of 41.23 seconds. This condition can be understood considering that swimming speed is influenced by various complex factors, both internal and external. Internal factors include physical conditions such as arm muscle strength, leg muscle explosiveness, abdominal muscle strength, and endurance, while external factors such as training frequency, quality of technique mastery, and facility support.

These findings are in line with research conducted by Kadari (2018) at UNM which states that the strength of the arms, abdomen, and legs muscles has a significant contribution to the ability to swim 50 meters freestyle. At UNM, the contribution of leg muscle strength even reached 72.7%. This corroborates the argument that biomotor components strongly determine the speed of sprint swimming. More specifically, Asy'ari (2013) in his study found that the contribution of hand thrust reached 70.56% and foot thrust 29.16% to freestyle swimming speed, which shows how important the role of these two elements is. With an average time of 41.23 seconds, UNP Coaching students still have considerable room for improvement if they are able to optimize the contribution of hand and foot encouragement through structured exercises.

When viewed from the comparison between groups, the absence of significant differences between students in semesters IV and VI is an interesting finding to discuss. Theoretically, VI semester students should have higher experience and flight hours because they have taken more practical lectures. However, the results of the study show that the improvement in swimming skills does not necessarily increase along with the increase in semesters. This can be indicated that after taking swimming courses, students tend not to do consistent independent exercises. In fact, as revealed by Maglischo (2003) and Colwin (2002), training consistency is a key factor in improving swimming performance.

This phenomenon is also reflected in the results of Zacky et al.'s research (2024) in the same environment, which found that swimming specialization students still have weaknesses in the aspect of arm movements with a mastery rate of only 66.67% (sufficient category). If specialization students still have limitations, it is normal for regular students who only take basic swimming courses to experience ability stagnation after lectures are completed. This shows the need for a continuous training program or the establishment of an internal swimming club that can facilitate students to continue practicing and developing their abilities.

Research from Gunung SwimmingClub (GSC) Padang and SeaRIAAquatic UNP is also relevant to be discussed in this context. The results of the study at GSC showed that

the strength of the arms, legs, and back muscles together contributed greatly to the swimming speed of athletes (BISp-Datenbanken). In SeaRIAAquatic UNP, arm muscle strength contributed 63.50% and leg muscle explosiveness 57.77% to the freestyle 50-meter swim speed (Efrianti, 2024). This indicates that the potential speed of UNP students can actually be significantly increased if the physical exercise program is well structured. One method that has proven effective is plyometric exercises such as doublelegspeed hop, which in the study of Garitny et al. (2023) showed a significant influence on increasing freestyle swimming speed.

In addition to physical factors, technical factors such as movement efficiency, streamlined body position, and the ability to do flipturns also play an important role in maximizing speed without adding extra power. A good mastery of technique will reduce obstacles in the water and make movement more economical. Iskandar (2014) also added that anthropometry such as weight and height can affect swimming speed, although the effect is not always significant. Meanwhile, Yoscipto and Mardela (2019) specifically found that leg length contributed 30.47% to the 50-meter freestyle swimming speed in Women'sSwimmingClub Padang athletes. Thus, the evaluation of the speed of UNP students must be seen holistically, including physical, technical, anthropometric, and psychological aspects.

By using a sample of 40 people, the results of this study provide a more stable picture than if only using a minimal sample. The data showed a fairly wide variation (SD = 4.56), which indicates that there is a considerable difference in ability between students. The time range from 32.15 seconds to 52.47 seconds shows that in the same study program, there are students with the same ability as athletes and students who are still very slow. This is a challenge for study programs and lecturers to be able to equalize students' abilities through more intensive learning and training programs as well as individual approaches according to the needs of each student.

CONCLUSION

Based on the results of research and discussion with a sample of 40 students, it can be concluded that: 1) The speed of the 50-meter freestyle swimming of Sports Coaching students of Padang State University is in the medium category with an average time of 41.23 seconds. 2) There was no significant difference in swimming speed between students in the fourth and sixth semesters, indicating the need for a continuous self-

training program after the swimming lessons were completed. 3) The factors of arm muscle strength, leg muscle explosiveness, and the contribution of hand-leg thrust are important components that need attention in efforts to increase swimming speed.

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