



Physical Condition Profile of West Java Finswimming Athletes at the Aceh National Sports Week (PON) Based on Competition Number

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Abstract

This research is motivated by the importance of mapping physical conditions as a basis for developing specific training programs for finswimming athletes, especially for national-level competitions such as the National Sport Week. The purpose of this study was to determine the physical condition profile of West Java finswimming athletes based on the competition events at the 2024 Aceh PON. The method used was descriptive quantitative with a total of 14 athletes (n=14) as subjects. Data collection was carried out through a series of physical condition tests covering flexibility, reaction speed, power, endurance, core stability, and VO2Max. Data analysis used descriptive statistics in the form of means, standard deviations, and percentages. The results showed that the core stability component had optimal achievement (100%) in all events, while leg power was the weakest component with an average of around 24%. In addition, aerobic capacity (VO2Max) showed variation between events, with a range of 76% to 99%, where middle to long distance events tended to have higher values than sprints. The conclusion of this study confirms that although athletes' core stability is already very good, increasing leg power needs to be a top priority in the training program. In addition, the differences in VO2Max profiles between events indicate the need for a more specific training approach according to the demands of each event.

How to Cite

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INTRODUCTION

Finswimming is a branch of aquatic sports that has a variety of competition styles with different movement characteristics and physical demands such as surface, bfin, and apnea. These require specific physical abilities according to the distance and technique used, ranging from power and speed in sprint events to aerobic capacity and endurance in middle and long distance events. These differences in physical requirements make athlete performance highly influenced by the suitability of physical characteristics possessed with the demands of the event being undertaken. Therefore, understanding the physical condition of athletes in more detail in each event is important to describe the characteristics that appear in each competition category in the sport of finswimming.

A number of studies have presented the demands of diverse physical conditions in the sport of finswimming. Syafriani et al. (2020) explained that water-based sports, especially long-distance events, have a strong relationship with cardiovascular capacity. Umi et al. (2024) also shows that physical condition components such as VO_2 Max, strength, and power are elements that support athlete performance. In more specific research, Budiyan et al. (2021) revealed that in the 50 meter apnea event, leg power and pelvic flexibility play a very important role, so that for this event, the power and flexibility training program can be optimized.

Meanwhile, Resmana et al. (2024) compare VO_2 capacity:Max between finswimming and swimming athletes, and stated that finswimming athletes have higher aerobic capacity values than swimming athletes. This finding is supported by Penjakora & Ababil (2022). which emphasizes water-based sports, it is necessary to increase aerobic capacity training for middle- and long-distance events, while for short-distance events, it is necessary to increase power training. Morais et al. (2021) explains that aquatic sports require the coordination of various elements of physical condition simultaneously.

Previous research has emphasized the importance of understanding an athlete's physical condition in detail. Physical condition profiling is one method directly related to physical condition because it can identify elements that can support performance based on the competition. Profiling has been proven effective in karate, according to research. Irwansyah et al. (2022) emphasizes that mapping physical conditions can provide an overview of an athlete's strengths and weaknesses,

thus helping to create a more planned program. In the men's indoor hockey sport Artikania et al. (2024) He stated that athlete profiling can help determine the extent of the physical capabilities of athletes in West Java. Furthermore, Marinho et al. (2020) explains that the alignment between technique and energy capacity has different effects for certain sporting events. In the sport of volleyball Sarrani et al. (2022) shows that profiling can reveal the best and weakest aspects of an athlete.

However, research describing the physical condition of finswimming athletes in West Java based on specific competition categories is still limited. Therefore, to understand the characteristics of each athlete, it is crucial to map their physical condition based on competition category.

This study aims to provide a targeted overview of the physical condition profiles of West Java's finswimming athletes based on their respective sporting events. It is hoped that this research will provide a detailed understanding of the physical characteristics required for each athlete, depending on their sporting event. The research question in this study is: What is the physical condition of West Java's finswimming athletes in each sporting event leading up to the 2024 Aceh National Sports Week?

The novelty of this study lies in its focus on event-based physical condition profiling among elite finswimming athletes in Indonesia, particularly those preparing for the 2024 Aceh National Sports Week. Previous studies have generally examined athletes' physical conditions without distinguishing between finswimming events. Therefore, this study offers a more specific and comprehensive analysis that can contribute to evidence-based training programs, athlete monitoring, and performance optimization according to the demands of each finswimming event.

METHOD

This study used a quantitative descriptive method with a documentation approach, as the data analyzed were physical test results already available from previous implementations. The researchers analyzed the test results based on data already available as official documents. This method was used to describe the physical condition of West Java finswimming athletes based on their competition numbers without providing intervention. This approach was chosen because it allows for a structured description of the athletes' condition based on existing data (Creswell, 2014).

The population in this study includes all registered finswimming athletes in West Java. From this population, the researcher determined the sample using a purposive sampling technique, with the following criteria: (1) Officially registered as an athlete of the West Java Pelatda ahead of the 2024 Aceh National Sport Week, (2) Actively participating in all training program sessions, (3) Not having any acute injuries during data collection, (4) occupying the match number selected by the head coach.

The study sample consisted of 14 finswimming athletes from West Java (7 men and 7 women). Of these 14 athletes, 5 participated in more than one event, resulting in a total of The study involved 19 athlete-event data units distributed across nine events, with participants ranging in age from 18 to 29 years old. This study has received ethical approval, and all athletes provided informed consent. Data collection was conducted in January 2024, 10 months before the 2024 Aceh National Games. Physical test data were obtained from the Sport Science Laboratory, Faculty of Sports Education and Health (FPOK), Universitas Pendidikan Indonesia.

The instruments in this study consisted of nine standardized physical tests: (1) Sit and reach for flexibility (Pérez-Vigo et al., 2022); (2) Reaction speed is assessed through a whole body reaction test. (Novan & Kumbul, 2015); (3) Vertical jump is used to measure leg power (Stafylidis et al., 2025); (4) Overhead medicine ball throw tests arm muscle power (González-devesa et al., 2025); (5) Abdominal muscle endurance is measured through a sit-up test (Kuki et al., 2022); (6) Arm muscle endurance using push-up test (Hashim & Ahmad, 2013); (7) The side jump test is used to measure leg muscle endurance (Stojanović et al., 2016); (8) Plank test is used to assess core stability (Rodríguez-perea et al., 2025); (9) Aerobic capacity is measured using the Multistage Fitness Test (bleep test) as an indicator tool for estimating VO₂Max (Senanayake & Dabare, 2024).

The research procedure began by providing an explanation of the purpose and series of tests to all athletes. Then, the athletes did a short warm-up. Each physical test was carried out in the following order: (1) Sit and reach with a sitting position without shoes and both legs straight (Mayorga-vega et al., 2014); (2) Whole body reaction on the sensory field with visual/auditory stimulus, repeated 3-5 times (Mar'ie et al., 2025); (3) Sit with straight legs, 3 attempts, the best result is recorded (Linkovski & Lewis, 2024); (4) Vertical jump vertical jump from a standing position, 3 attempts (Petrigna et al., 2025); (5) 60 second sit-ups

with bent knees (Kuki et al., 2022); (6) Push ups for 60 seconds with the correct movements (Arifin et al., 2020); (7) Side jump test as long as possible, repeatedly passing the limit (Weber et al., 2024); multilevel core plank test to the highest level that can be maintained (Tong et al., 2013); (8) multistage 20 m shuttle run test until the athlete cannot follow the rhythm twice in a row (Paradisis et al., 2014) All measurements were guided by experts from the UPI FPOK Sport Science Laboratory.

Data were analyzed using descriptive statistics including mean, standard deviation (SD), minimum value, and maximum value. All values are presented as a percentage (%) of achievement against the norms of each component according to the FPOK UPI Sport Science Laboratory standards, to facilitate comparisons across components and match numbers. Categorization uses the following scale: $\geq 85\%$ = Very Good; 75-84% = Good; 60-74% = Sufficient; 40-59% = Poor; $< 40\%$ = Very Poor. Results are grouped by match number and presented in a table.

RESULTS AND DISCUSSION

The sample consisted of 14 finswimming athletes from West Java (7 males, 7 females). Because some athletes competed in more than one category, the total data units analyzed were 19 athletes (Table 1). The 100 m bfin had the largest number of athletes (n=5).

Table 1. of Athlete Distribution Based on Match Number

Match Number	Style	n	Distance Category
50 m Bfin	Bfin	3	Sprint
100 m Bfin	Bfin	5	Sprint
200 m Bfin	Bfin	1	Intermediate
50 m Apnea	Apnea	2	Sprint
50 m Surface	Surface	2	Sprint
100 m Surface	Surface	1	Sprint
200 m Surface	Surface	3	Intermediate
400 m Surface	Surface	1	Intermediate
800 m Surface	Surface	1	Far
TOTAL	—	19	—

The athletes in the 50m bfin event are Ari-za Wicaksana, Kaisar Hansel Putra, and Dheya Nazhira Nuramalina. Their physical condition profiles are presented in **Table 2**.

The 50m bfin athlete has main strengths in Core Stability (100%) and Arm Power (79.67%). VO₂Max was in the Good category (76.67%). Conversely, Leg Power (25.67%) and Leg Muscle Endurance (28.67%) were in the Very Poor ca-

tegory. Arm Muscle Endurance showed high variability (SD=20.13), reflecting significant individual differences between athletes in the same event.

Table 2. Physical Condition Profile of 50 m Bifin (unit: % of norm achievement; SD using n-1)

Component	Mean (%)	Elementary School	Min (%)	Max (%)	Category
Pelvic Flex-ibility	54.00	20.81	41	78	Not enough
Back Flex-ibility	69.33	6.11	64	76	Enough
Reaction Speed	68.67	2.08	67	71	Enough
Leg Power	25.67	1.53	24	27	Less than once
Arm Power	79.67	2.31	77	81	Good
Leg Muscle Endurance	28.67	13.05	15	41	Less than once
Arm Muscle Endurance	36.67	20.13	18	58	Less than once
Core Stability	100.00	0.00	100	100	Very well
VO ₂ Max	76.67	7.02	70	84	Good

The 100m bifin event featured the largest number of athletes. The five athletes were Azka Muhammad Fadilah, Kaisar Hansel, Yohana Agatha Siahaan, Hani Rosnawati, and Raquel Azzahra. The athlete condition profiles are presented in **Table 3**.

Table 3. Physical Condition Profile Table 100 m Bifin (unit: % of norm achievement; SD using n-1)

Component	Mean (%)	Elementary School	Min (%)	Max (%)	Category
Pelvic Flex-ibility	74.80	25.56	32	100	Enough
Back Flex-ibility	71.60	17.28	58	100	Enough
Reaction Speed	70.40	6.91	63	81	Enough
Leg Power	24.60	4.77	20	32	Less than once
Arm Power	77.00	3.67	73	83	Good
Leg Muscle Endurance	35.60	12.54	15	49	Less than once
Arm Muscle Endurance	37.00	16.34	18	60	Less than once
Core Stability	100.00	0.00	100	100	Very well
VO ₂ Max	85.40	7.16	76	94	Very well

In the 100m bifin, Core stability showed the most dominant component with an average value of 100% without variation (SD=0.00). VO₂max was also in the very good category (85.40%) with a fairly wide VO₂Max range (76%-94%) indica-

ting that 100m bifin athletes have diverse aerobic capacity backgrounds, so that training programs need to consider individualization of aerobic training loads. Meanwhile, arm power was in the good category with an average value of 77%.

Conversely, leg power was the weakest component, with an average of 24.60%, categorized as very poor, followed by leg muscle endurance (35.60%) and arm muscle endurance (37%), which were also categorized as very poor. Variation between athletes in the hip flexibility component (SD=25.56) indicates differences in ability between athletes in the same event.

In the 200 M surface number there are three athletes, namely Arsy Marendra, I Putu Bayu Ardy, and Davina. The athlete's physical condition profile is presented in the **Table 4**.

Table 4. Physical Condition Profile Table 200 m surface (unit: % of norm achievement; SD using n-1)

Component	Mean (%)	Elementary School	Min (%)	Max (%)	Category
Pelvic Flex-ibility	72.66	20,21	51	91	Enough
Back Flex-ibility	68.00	9.17	58	76	Enough
Reaction Speed	71.33	11.93	58	81	Enough
Leg Power	25.67	3.51	22	29	Less than once
Arm Power	77.33	2.08	75	79	Good
Leg Muscle Endurance	51.00	23.39	37	78	Not enough
Arm Muscle Endurance	30.00	3.00	27	33	Less than once
Core Stability	100.00	0.00	100	100	Very well
VO ₂ Max	86.00	11.53	75	98	Very well

The physical condition profile for the 200M surface event still shows core stability as the most dominant component, with an average score of 100% without any athlete variation (SD=0.00), thus entering the excellent category. VO₂max also fell into the excellent category with an average score of 86%.

Conversely, leg power remained the weakest component, with an average score of 25.67%, which is considered very poor. Furthermore, arm muscle endurance also fell into the very poor category, with an average score of 30%. Variation between athletes was evident in the leg muscle endurance component, which had an SD score of 23.39, indicating differences in ability among athletes in the 200m surface event.

Given the very limited sample size (n=1-2) in this group, the results presented are of an indi-

Table 5. Athlete condition profile with limited sample (n=1-2)

Number	n	Flex P	Flex Pu	Reaction	Pwr Tgk	Pwr Ln	DT Tgk	DT Ln	Core	VO2Max
200m Bifin	1	78.00	58.00	81.00	32.00	76.00	40.00	40.00	100	94.00
50m Apnea	2	92	84	76	21.50	93.50	43.50	35.50	100	77
50m Surface	2	72.50	70	78.50	27	85	58.50	31	100	93.50
100m Surface	1	90	86	76	18	96	48	39	100	65
400m & 800m surface	1	100	84	50	24	61	29	30	100	99

Table 6. Comparative Table across numbers

Component	50 M bifin	100 M bifin	200 M bifin	50 M Apnea	50 M Surface	100 M Surface	200 M Surface	400 M Surface	800 M Surface
Pelvic Flexibility	54.00	74.80	78.00	92.00	72.50	90.00	72.67	100.00	100.00
Back Flexibility	69.33	71.60	58.00	84.00	70.00	86.00	68.00	84.00	84.00
Reaction Speed	68.67	70.40	81.00	76.00	78.50	76.00	71.33	50.00	50.00
Leg Power	25.67	24.60	32.00	21.50	27.00	18.00	25.67	24.00	24.00
Arm Power	79.67	77.00	76.00	93.50	85.00	96.00	77.33	61.00	61.00
Leg Muscle Endurance	28.67	35.60	40.00	43.50	58.50	48.00	51.00	29.00	29.00
Arm Muscle Endurance	36.67	37.00	40.00	35.50	31.00	39.00	30.00	30.00	30.00
Core Stability	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
VO ₂ Max	76.67	85.40	94.00	77.00	93.50	65.00	86.00	99.00	99.00

vidual descriptive nature and cannot be generalized. The **Table 5** shows the physical profiles with a limited sample size (n=1-2).

Core stability was the most dominant component across all events, achieving 100%, which is considered excellent and demonstrating the athlete's excellent core stability. Furthermore, Vo2max in several events, such as the 200-meter bifin (94%), 400-meter surface (99%), and 800-meter surface (99%), was also in the excellent category, indicating the athlete's excellent aerobic capacity.

Conversely, leg strength tended to be the weakest component in each event, with some components, such as arm and leg muscle endurance, relatively low in some events. Overall, these results indicate core stability as the most dominant component, while leg strength and muscle endurance are the components that need improvement, especially in events that require high speed and power.

The **Table 6** shows a comparison of the average physical component scores for each event. Overall, core stability showed the highest average score for each event, achieving 100%. Conversely, leg power showed the lowest score for each event, falling in the very poor category. Furthermore, VO₂Max showed higher average scores in the middle and long distance events compared to the sprint events.

The results of the study showed that physi-

cal condition was the most dominant component in each event, achieving 100% performance with no variation between athletes (SD=0.00). This result indicates that the core stability abilities of West Java finswimming athletes have developed evenly. This high level of achievement is likely related to the West Java Regional Finswimming Center training program, which consistently prioritizes core muscle exercises such as planks and stabilization. This finding aligns with Morais et al. (2021) which states that aquatic sports require coordination to maintain body position and increase movement efficiency. Athletes with good core stability can maintain optimal balance and body control, thus supporting performance in all events.

In contrast to core stability, the component with the lowest average score, and categorized as very poor, was leg power, with an average score of 24%. This indicates that explosive leg muscle capacity is still suboptimal, whereas in finswimming, leg muscles significantly influence speed and performance, particularly in sprint events. This finding aligns with Budiyan et al. (2021) which states that leg power is a key factor in finswimming, especially in the 50-meter apnea event, which relies on explosive strength. Therefore, the low achievement in this study indicates that leg muscle power is a weakness that requires special attention to improve leg strength and power to optimize athlete performance.

The results of the study showed that the-

re were differences in physical condition between the match numbers, especially in the VO component. Max. Athletes who participate in long distance events have a VO value Max is taller than athletes in sprint events. This finding is in line with Penjakora & Ababil. (2022) which states that aerobic capacity is more dominant in middle and long-distance events, while sprint events emphasize the power component. This is also supported by the achievements of West Java finswimming athletes at the 2024 Aceh National Sport Week, where athletes managed to become the best in the 100 m bfin, 200 m bfin, 200 m surface, and 800 m surface events. This achievement shows dominance in middle and long-distance events, some of which were also reported in the media, such as in the 100 m bfin. Borneonews. (2024) and 800 m surface Between. (2024). Conversely, the sprint events are not as strong as the middle and long-distance events, which is consistent with the low leg power values in this study. Thus, the differences in physical condition profiles between competition events reflect the specialization of athletes' physical abilities according to the characteristics they follow.

Based on the research results, the low leg muscle power values indicate that this component requires more attention in the training programs of West Java's finswimming athletes. This is because leg power plays a primary role in finswimming. Budiyan et al. (2021) which states that leg power is a crucial component in supporting the performance of finswimming athletes, especially in events requiring explosive ability. Coaches are advised to prioritize training that focuses on improving explosive leg muscle ability. One approach is through vertical jump and plyometric-based training, which are known to be effective in increasing leg muscle power.

This study has several limitations that need to be considered in understanding the results. The sample size for some events was relatively small, consisting of only 1–2 athletes, so the results presented are primarily descriptive and cannot be broadly generalized. Furthermore, this study used a cross-sectional design, so the data obtained only describe the athletes' condition at a specific point in time and cannot yet demonstrate developments in physical condition over time. Furthermore, this study did not include a comparison group, so the results cannot be compared objectively with other groups. Therefore, future research is recommended to involve a larger sample size, use a longitudinal design, and include a comparison group to provide a more comprehensive picture.

CONCLUSION

The results showed that the most prominent component, with equal achievement across all athletes, was core stability. This indicates that West Java finswimming athletes have successfully developed core stability, a key strength in supporting their performance. Conversely, the component with the lowest achievement and a consistent weakness across all events was leg power. This indicates that although core stability is fundamentally sound, explosive leg power still needs improvement.

Furthermore, this study also demonstrated differences in physical condition profiles across events. Athletes competing in middle- to long-distance events tended to have higher VO₂Max is higher than that of athletes competing in sprint events. This indicates that physical capabilities are adjusted to the demands of each event. Long-distance events tend to require greater endurance, while sprint events rely more on speed and strength. Therefore, the physical condition profile of finswimming athletes can be said to be specific to the characteristics of the events they compete in.

For future research, a longitudinal design is recommended to comprehensively examine the development of athletes' physical condition. Furthermore, the sample size for each event should be increased to ensure more representative results. Future research should include a comparison group to provide a more comprehensive and comprehensive picture of athletes' physical condition.

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