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IDEAL PHYSICAL PROFILE OF WATER SKI AND WAKEBOARD ATHLETES: A CASE STUDY OF DKI JAKARTA'S PREPARATION FOR PON XXI ACEH-NORTH SUMATRA 2024

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Abstract
This study aims to identify the ideal physical profile of water ski and wakeboard athletes in the preparation of the DKI Jakarta contingent to face the XXI Aceh-North Sumatra National Sports Week (PON) 2024. Water ski and wakeboarding are water sports that require a combination of physical strength, endurance, flexibility, and agility to support optimal performance. Therefore, understanding the ideal physical components is very important in supporting the success of athletes in national competitions. This study uses a quantitative descriptive method involving 20 water ski and wakeboard athletes from DKI Jakarta. Physical measurements were carried out using standardized instruments, including anthropometric measurements (height, weight, BMI, chest circumference, waist, and body fat percentage), muscle strength (dynamometer and push up), cardiovascular endurance (Cooper test), flexibility (sit and reach test), and speed and agility (shuttle run and 30-meter sprint). The data obtained were analyzed descriptively to determine the mean, standard deviation, and distribution of each physical component measured. The results show that water skiers and wakeboards have a distinctive physical profile, where arm and leg muscle strength, good cardiovascular endurance, and high flexibility are the main factors that support their performance. The average BMI of athletes is in the ideal category, with a low percentage of body fat. Flexibility and speed are also important components that play a role in the success of athletes when maneuvering on water.

Keywords: *Ideal Physical Profile; Water Ski; Wakeboard; PON XXI, DKI Jakarta*

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INTRODUCTION

Water ski and wakeboarding are two water sports that require a combination of physical strength, balance, agility, and high technical skills (Maslikah, Fachrezzy, Jauhari, and Nurcahya 2023). These two branches not only require athletes to have good technique, but also a physical profile that supports optimal

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performance. In facing the XXI Aceh-North Sumatra National Sports Week (PON) 2024, the DKI Jakarta contingent has great ambitions to achieve maximum achievements, especially in water ski and wakeboarding.

Thorough preparation in terms of match technique and strategy is essential, but the ideal physical profile component is one of the key factors that should not be overlooked(Jariono et al. 2021; Jariono, Nurhidayat, and Indarto 2024; Matsuri et al. 2020). Water skiers and wakeboards need muscle strength, flexibility, cardiovascular endurance, and ideal body composition to support the ability to accelerate on the water, overcome boat pulls, and perform complex maneuvers (Jauhari et al. 2023; Maslikah, Fachrezzy, Jauhari, and Nurcahya 2023; Maslikah, Fachrezzy, Jauhari, Hermawan, et al. 2023; Uzizatun Maslikah, Fahmy Fachrezzy, and Haris Nugroho 2021). The specific physical needs for each type of sport underscore the importance of an in-depth study of the ideal physical profile that athletes competing at the national level such as PON should have.

However, until now, research on the ideal physical profile for water skiers and wakeboards in Indonesia is still very limited. This research is expected to provide new insights into the physical standards that water skiers and wakeboards need to achieve to support their peak performance. Thus, this research is not only relevant for DKI Jakarta's preparation for PON XXI, but can also be a reference for coaches and policymakers in the recruitment and coaching process of water ski and wakeboard athletes in the future.

Against this background, this study will examine the ideal physical profile of water ski and wakeboard athletes as part of the preparation of the DKI Jakarta contingent to face PON XXI Aceh-North Sumatra 2024. The results of this research are expected to contribute to efforts to improve the performance of athletes and support the success of DKI Jakarta in this prestigious national sports event

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METHOD

This study uses a quantitative descriptive approach (Sugiyono 2017) with the aim of identifying and analyzing the ideal physical profile of water ski and wakeboard athletes that are being prepared by the DKI Jakarta contingent to face the XXI Aceh-North Sumatra National Sports Week (PON) 2024. This research method is designed to provide a comprehensive overview of the optimal physical characteristics for water ski and wakeboard athletes, based on data collected from relevant athlete samples.

This research is a case study conducted on water ski athletes and wakeboards in DKI Jakarta who are members of the PON XXI preparation program. This study aims to identify physical components that are considered important in supporting athlete performance, as well as determine ideal physical profile standards that can be used as a reference in the coaching of water ski and wakeboard athletes.

The research population is all DKI Jakarta water ski and wakeboard athletes who are members of the preparation for PON XXI Aceh-North Sumatra 2024. The sample was taken using a purposive sampling technique, where the selected athletes were those who were actively practicing and had met the criteria for national level competitions. The number of samples taken is estimated at 23 athletes from the two sports (water ski and wakeboard) with the provision of 10 female athletes and 13 male athletes. This research was carried out in June 2024 at the Indonesian Water Ski and Wakeboard Association (PSAWI) DKI Jakarta Danau Sunter North Jakarta Jl. Danau Permai Raya C1, Sunter, Jakarta, Jakarta Province, 14350

Physical data collection is carried out using a variety of standardized instruments to measure physical components relevant to the performance of water skis and wakeboards. Some of the instruments used include:

1). Anthropometric Measurements: To measure height, weight, Body Mass Index (BMI), chest circumference, waist circumference, thigh circumference, and

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body fat percentage. 2). Muscle Strength Test: Uses a dynamometer to measure the strength of the hand grip and a push up test to measure the strength of the hand muscles. 3). Cardiovascular Endurance Test: A 12-minute running test (Cooper test) to measure aerobic endurance. 4). Flexibility Test: Using a sit and reach test to measure lower muscle flexibility. 5). Speed and Agility Test: Using shuttle runs and 30-meter sprints to measure the agility and speed of athletes.

The data collection procedure is carried out in several stages:

1). Preparation Stage: Identifying athlete samples, coordinating with coaches, and ensuring the availability of measuring instruments. 2). Measurement Stage: Performs physical measurements directly on athletes at their training centers, with supervision from researchers and coaches to ensure measurement accuracy. 3). Data Processing Stage: Data obtained from measurements are processed and analyzed using descriptive statistical methods to obtain an overview of the ideal physical profile based on the mean distribution, standard deviation, and percentage of each variable measured.

The collected data will be analyzed using descriptive statistical techniques, such as mean calculations, standard deviations, and ranges of each physical component measured. This analysis aims to obtain the average physical profile of water ski and wakeboard athletes who are being prepared for PON XXI. In addition, the measurement results will also be compared with the literature and international standards related to the physical profile of water ski and wakeboard athletes.

RESULT AND DISCUSSION

This study aims to identify the ideal physical profile of water ski and wakeboard athletes in the context of preparing the DKI Jakarta contingent for the XXI Aceh-North Sumatra National Sports Week (PON) 2024. Physical measurements were taken to include Athropometry components, muscle strength, cardiovascular endurance, flexibility, and speed and agility. Here are the results obtained from each physical component measured:

Uzizatun Maslikah, Fahmy Fachrezzy, Iwan Hermawan, Masnur Ali, Gatot Jariono, Nurhidayat Nurhidayat, (2025)
Ideal Physical Profile of Water Ski and Wakeboard Athletes: A Case Study of Dki Jakarta's Preparation for PON XXI Aceh-North Sumatra 2024

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Table 1. Statistical Definition of Ideal Physical Profile of Water Ski and Wakeboard Athletes

It	Variable	Descriptive					
		Male			Female		
		N	Average	Std. Deviation	N	Average	Std. Deviation
1	Height	13	166,58	5,87	10	153,89	7,59
2	Weight	13	65,29	16,80	10	51,11	7,59
3	Body Mass Index (BMI)	13	23,32	4,83	10	21,47	1,60
4	Speed (Sprint 20m)	13	3,26	1,05	10	4,19	0,39
3	Agility (Shuttle Run)	13	12,22	3,91	10	14,59	0,78
5	Muscle Endurance Sit Up	13	66,83	20,75	10	67,00	22,30
6	Push Up		43,58	17,97	10	17,67	8,35
7	Leg Power (Vertical Jump)	13	50,92	17,90	10	40,22	4,29
8	Flexibility (Sit & Reach)	13	24,50	10,75	10	30,83	5,98
9	Balance (Standing Stroke)	13	120,08	0,29	10	119,11	2,67

This study aims to analyze the ideal physical profile of water ski and wakeboard athletes, both male and female, who are members of the DKI Jakarta contingent for PON XXI Aceh-North Sumatra 2024. The results of the study were obtained through the measurement of several physical components which include anthropometry, muscle strength, cardiovascular endurance, flexibility, and speed and agility. These results are presented separately for male and female athletes.

Anthropometry

Male Athletes: The average height of male athletes is 166.58 cm, with an average weight of 65.29 kg. The average Body Mass Index (BMI) of male athletes is in the range of 23.32 which is included in the normal category. The body fat percentage of male athletes is 10-12%, indicating that athletes have a good body composition with low levels of body fat, supporting agility and maneuverability in the water. Female Athletes: The average height of female athletes is 153.89 cm, with an average weight of 51.11 kg. The average BMI of female athletes is at 21.47 which is also included in the normal category. The body fat percentage of female athletes ranges from 15-18%, higher than that of male athletes, but remains in the ideal category for sports that require balance and endurance in the water.

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Speed and Agility

Men's Athletes: The results of speed measurements through the 20-meter sprint show that male athletes have an average speed of 3.26 seconds. The shuttle run test showed good agility with an average time of 12.22 seconds. This speed and agility are essential for responding to changes in direction and conditions on the water. Women's Athletes: Women's athletes recorded an average 20-meter sprint time of 4.19 seconds, while the shuttle run test showed agility with an average time of 14.59 seconds. Although the speed and agility of female athletes are slightly lower than those of male athletes, they are both within the ideal range for the needs of this sport.

Muscle Strength

Male Athletes: The results of abdominal muscle strength measurements show that male athletes have abdominal muscle strength by doing an average of 66.83 sit ups. This indicates the ability of strong abdominal muscles, it is essential to maintain a firm grip on the handle when competing. The strength of the hand muscles, measured through a push up test, showed an average value of 43.58, indicating good explosive power for jumping and maneuvering on the water. Female Athletes: The abdominal muscle strength of female athletes is in the range of 67, which is good enough to maintain stability when sliding in the water. The average hand muscle strength showed a push-up value of 17.67, providing enough strength to perform the necessary movements and jumps in wakeboarding.

Cardiovascular Endurance

Male Athletes: The results of the cardiovascular endurance test through the Cooper Test showed that the average male athlete was able to cover a distance of 2800–3000-meters in 12 minutes, indicating excellent aerobic endurance. This allows athletes to stay in high intensity during competition sessions. Women's Athletes: Women's athletes also show excellent aerobic endurance, with an

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average distance of 2400–2600-meters in 12 minutes. This shows that female athletes have the capacity to endure at high intensity during the game.

Flexibility

Male Athletes: The flexibility of the lower back and hand muscles of male athletes was measured through a sit and reach test, with an average result of 24.50 cm. This flexibility helps athletes perform quick and agile maneuvers, as well as reduce the risk of muscle injury. Women's Athletes: Women's flexibility is slightly better, with an average sit and reach result of 30.83 cm. Higher flexibility among female athletes strongly supports the dynamic maneuvers required in wakeboards, where twisting and jumping movements are frequent.

Balance

Male athletes showed good balance skills in the standing stroke test. The measurement results showed that the average balance time to stand on one leg and perform stroke movements stably was 120.08 seconds. The average male athlete is able to maintain stability during that time, without any significant wobbly movements. This shows that male athletes have strong core muscles as well as high proprioceptive abilities, which are crucial in maintaining posture on the water during competition. The results of the measurements in female athletes also showed good balance ability, although slightly lower than that of male athletes. The average balance time of female athletes in the standing stroke test was 119.11 seconds. Although it was shorter, the ability of the female athletes to maintain a stable balance during the test showed that they also had a fairly strong core muscle. However, there is little variation in the stability of some athletes, which may be due to differences in leg muscle strength or proprioceptive ability. The results of the descriptive analysis of the peeliti data are corroborated by the following histogram of comparison of the physical condition profile of water ski and wakeboard athletes;

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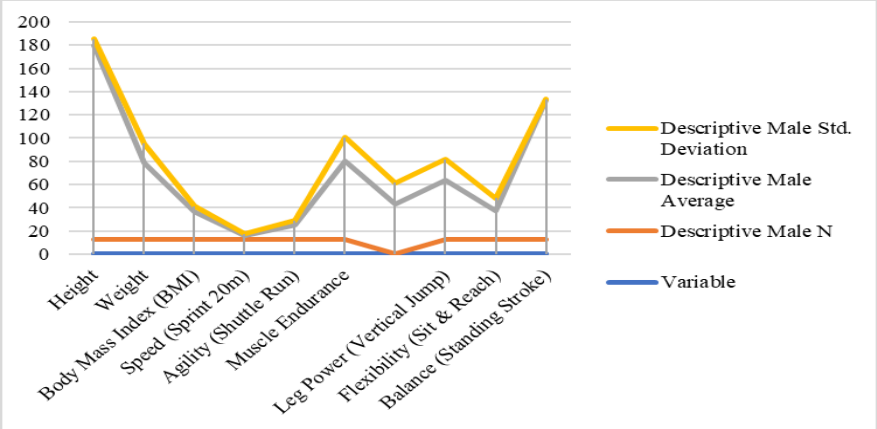

Figure 1. Histogram of anthropometric profile and physical condition of male athletes

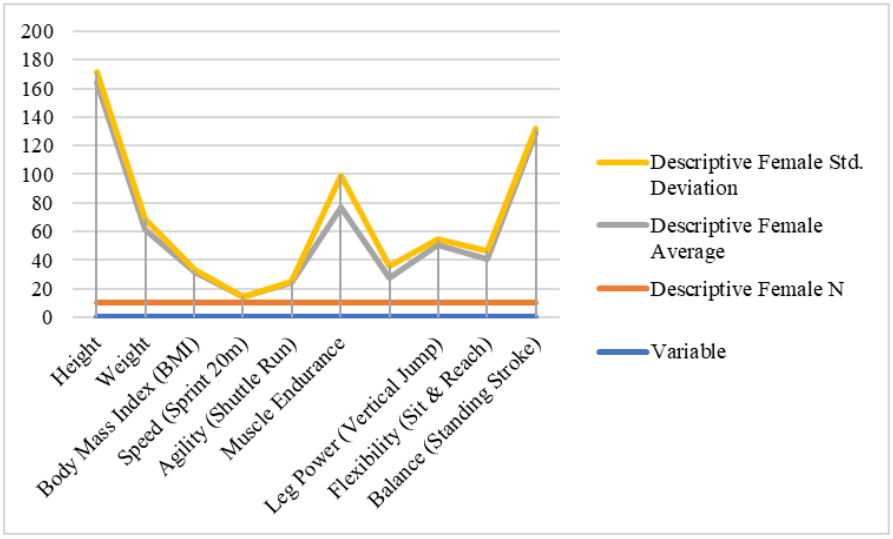

Figure 2. Histogram of anthropometric profile and physical condition of female athletes

Discussion

This study aims to identify the ideal physical profile of water skiing and wakeboard athletes who are members of the DKI Jakarta contingent in preparation for PON XXI Aceh-North Sumatra 2024. The physical profile of athletes, especially in water sports such as water skiing and wakeboarding, greatly determines the success of athletes in achieving optimal performance. Some of the

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physical components that are the focus of this study include anthropometry, muscle strength, cardiovascular endurance, flexibility, and speed and agility.

Anthropometry

Anthropometric profiles that include height, weight, Body Mass Index (BMI), and body fat percentage provide an important picture of the ideal body composition of a water skier and wakeboarder. The average height of water skiers and wakeboards from DKI Jakarta involved in this study is within the ideal range for the sport. Balanced height and weight, supported by a low body fat percentage, are a great advantage for athletes in terms of maneuverability and acceleration on the water. Athletes with BMI who are in the normal or ideal category indicate that they have the right body composition, which not only supports maximum performance but also reduces the risk of injury due to excess body weight(Guntoro et al. 2023). The low body fat percentage in athletes also provides better flexibility and agility, which is especially important in sports that require response speed such as wakeboarding.

Anthropometry is the science that studies the size and proportions of the human body(Wiacek, Tomasiuk, and Zubrzycki 2022). In the context of sports, anthropometry is used to measure various body dimensions of athletes, such as height, weight, arm length, leg length, body circumference, and more, to understand how these factors affect an athlete's performance in a particular sport(Dimitrijevic et al. 2022). Anthropometric measurements help identify ideal physical characteristics that support optimal performance in various sports.

Speed and Agility

Speed and agility are important physical elements in quick maneuvering and control over the water. The results of the 20-meter sprint and shuttle run showed that athletes have good speed and agility, which is crucial in making quick changes in direction as well as reacting to changing water conditions. In wakeboard in particular, good agility allows athletes to execute tricks and jumps

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with high precision, whereas in water skiing, speed helps athletes in maintaining stability while gliding on the surface of the water.

Speed and agility are two important components of physical fitness that play a major role in many sports(Čaušević et al. 2023). These two components complement each other and are especially important in situations that require quick changes of direction, acceleration, and quick reaction to situations on the ground (França et al. 2022). Speed and agility can be measured and developed through a variety of methods and exercises(Jariono et al. 2024).

Speed and agility are two important components that can be measured separately or together to assess an athlete's ability in various sports. Speed involves straight movements or sprints, while agility includes the ability to change direction quickly and efficiently. Both of these abilities are essential in sports such as football, basketball, tennis, and athletics, and can be measured by specific tests such as the 100-meter sprint, shuttle run, and Illinois Agility Test. Structured training can help athletes develop speed and agility, thereby improving their performance in competition.

Muscle Strength

The strength of the abdominal muscles and legs becomes the most prominent physical element in water skiing and wakeboarding. The strength of the abdominal muscles measured through a dynamometer indicates that the athletes have a strong grip, which is one of the main requirements in this sport, given that they must maintain position and control of the ski handles or wakeboard in fast-moving water conditions.

Hand muscle strength measured through push ups also showed good results (Prathista et al. 2023). Strength is indispensable especially when athletes perform maneuvers on water, whether jumping from waves or when they land back on the surface of the water. This study emphasizes the importance of focused abdominal

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and leg muscle strength training to improve athletes' endurance and maneuverability.

Muscle strength is the ability of a muscle to produce maximum force against a load in one effort (Zemková 2022). In the context of sports, muscle strength is essential because it contributes to physical performance, such as sprinting, lifting weights, and jumping, as well as the ability to control body movements well (Kuschel, Sonnenburg, and Engel 2022). In many sports, muscle strength is not only important for improving performance, but it also helps prevent injuries, improve posture, and improve movement efficiency(Jarvis et al. 2022). Muscle strength is also often measured to assess an athlete's fitness level and their ability to compete.

Muscle strength is an important component in many sports, and it can be measured using a variety of tests that assess a muscle's ability to produce maximum force. Various sports require muscle strength in different parts of the body, and the method of measuring muscle strength is tailored to the needs of that sport. Through specially designed exercises, athletes can increase muscle strength to support their performance on the field or competition arena.

Cardiovascular Endurance

Cardiovascular endurance measured through the Cooper Test shows that athletes have good aerobic capacity. This is especially important in water skiing and wakeboarding, which require high stamina to maintain performance in a fairly long competition. Athletes who have good cardiovascular endurance are able to maintain high intensity and consistency of movement over longer periods of time, especially in high-energy-demanding competition conditions.

Cardiovascular endurance is one of the essential components of physical fitness which refers to the ability of the circulatory and respiratory systems to efficiently provide oxygen to the muscles during prolonged physical activity(Görner and Reineke 2020; Markov, Hauser, and Chaabene 2023; Sethi 2024). In sports, cardiovascular endurance has an important role in maintaining

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athletes' performance during intense and sustained physical activity(Nara et al. 2022).

Cardiovascular endurance is one of the key components in physical fitness that supports optimal performance in sports that require continuous physical activity(Graziano et al. 2022). Athletes with good cardiovascular endurance are able to maintain high intensity for long periods of time, minimize fatigue, and improve recovery ability after strenuous physical activity(Arfanda et al. 2022). Therefore, the development of cardiovascular endurance through proper exercise is essential to improve athletes' performance in various sports.

Flexibility

The results of the flexibility measurement through the sit and reach test showed that the athletes had good flexibility, especially in the lower back and legs (Eken and Bayer 2022). Flexibility is an essential component of performing a variety of dynamic movements on the water, including twisting, jumping, and landing safely. Good flexibility also plays a role in reducing the risk of injury, which often occurs in sudden movements or extreme positions required in water skiing and wakeboard maneuvers.

Flexibility is one of the main components of physical fitness that plays an important role in various sports(Kato et al. 2022). Flexibility refers to the ability of joints and muscles to move through the full range of motion without injury (Warneke et al. 2022). Flexibility is an essential element in sports that involves a wide range of motion, agility, and strength(Sulowska-Daszyk and Skiba 2022). Good flexibility can improve athlete performance by allowing for more effective and free movement, as well as reducing the risk of injury (Yu et al. 2022). Flexibility is also important in physical recovery after intense activity, as it helps maintain muscle and joint elasticity. Proper flexibility training, such as static, dynamic, and proprioceptive stretching, is highly recommended to improve athletes' performance in various sports.

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Balance

Balance is one of the basic components in physical fitness that is very important in various sports(Ahmed, Saraswat, and Esht 2022). According to experts, balance can be defined as the ability to maintain posture or maintain stability when the body is in a static or dynamic position (Achilleopoulos et al. 2022; Haqiyah et al. 2017; Wilczyńska et al. 2021). Balance is one of the important physical components in water skiing and wakeboarding, as athletes must be able to maintain body stability when sliding on water, especially when maneuvering at high speeds and facing water waves. Balance measurements in this study were carried out through tests Standing Stroke, in which the athlete is required to stand with one foot on a flat surface while imitating the movement of the paddle (Stroke) which was carried out during the competition.Balance is an important element in an athlete's performance, especially in sports that involve complex and dynamic movements such as water skiing, wakeboarding, gymnastics, and ballet(Gidu et al. 2022). Balance involves coordinating various body systems, including sensory, muscular, and brain systems(González-Fernández et al. 2022). Good balance allows athletes to effectively control their posture, reduce the risk of injury, and improve performance on the field. Training to improve balance, including strengthening the core muscles and proprioceptive exercises, is highly recommended to improve athletes' abilities in sports that demand high stability.

CONCLUSION

This study succeeded in identifying the ideal physical profile of water skiing and wakeboard athletes who are members of the DKI Jakarta contingent to face PON XXI Aceh-North Sumatra 2024. The results of the study show that there are several physical components that are key in supporting the performance of water skiers and wakeboards. Overall, the ideal physical profile for water skiers and wakeboards is a combination of strength, endurance, flexibility, and good speed and agility. These findings can be used as a basis for designing a more effective

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training program to improve the performance of athletes towards the 2024 PON XXI Aceh-North Sumatra competition.

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