



Analysis of Limb Explosive Performance of Elite Water Ski and Wakeboard Athletes: A Comparative Study

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Abstract

This research uses the Survey Research Method, a quantitative research type approach meaning research that is comparative or different. The population and sample in this study were water skiers and wakeboard athletes as many as 30 people consisting of male and female athletes. Data collection techniques using tests and measurements: physical condition tests; For leg muscle explosiveness by using a vertical jump measuring instrument and a chronojump. Data analysis using quantitative descriptive analysis techniques, overall The data analysis technique used is a t-test at a significant level of 5%. To obtain the results of this study, which one better results from the explosive power of leg muscles in Water Ski and Wakeboard Athletes of DKI Jakarta Province using Vertical jump and Chronojump? The results of this study showed that: There was a difference in leg explosive power in terms of the use of vertical jump and chronojump tools in Water Ski and Wakeboard athletes with an average value between the two groups, wherein the vertical jump group with an initial test average value of 47.50, the chronojump group with an average value of 27.97. This means that the vertical jump group is better than the chronojump group. However, further research is needed related to the environmental, psychosocial, and psychological factors of athletes and those related to improving athlete performance.



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INTRODUCTION

Indonesia is a Unitary State of the Republic of Indonesia, one of which is the national Sports Development is an effort to improve the quality of human resources. With this connection, national sports have a role in improving achievement, strengthening and fostering friendship between nations, and strengthening national unity and unity. Not only that, sports can raise the dignity, dignity, and honor of the nation through sports achievements at the provincial, national, and international levels. The context, with the empowerment of sports, the sense of nationalism and national identity becomes clearer. Sports in Indonesia are now increasingly advanced and popular. There are three divisions of sports in Indonesia according to Sports Law No. 11 of 2022, namely Education Sports, Achievement Sports, and Community Sports. Sports activities cannot be separated from human life, in sports each individual has different goals, some have goals for fitness, achievement, and community/recreation.

World countries compete with each other to develop their sports with the intention not only to develop mere achievements but more than that as a means of unifying the nation. The Indonesian nation as a developing country also pays attention to the field of sports. This is by Law of the Republic of Indonesia number 3 of 2005 concerning the National Sports System (SKN) in Chapter VI Article 20, namely: (1) Sports Achievement is intended as an effort to improve the ability and potential of sportsmen to improve the dignity and dignity of the nation; (2) Sports achievements are carried out through a tiered and continuous process of coaching and development with the support of science and technology (Law No. 3 of 2005).

Sport is a physical activity or body movement that can be done by individuals and groups from the age of children, and adolescents to the elderly while still able. Sport is everyone's human right regardless of differences. Sport plays an important role in human survival and is considered capable of providing many benefits. Sports are physical activities that are regulated formally or informally by involving competition against others or oneself for pleasure or victory. Sports activities cannot be separated from human life, In exercising each individual has different goals, some aim for achievement, physical freshness, and recreation (Rilastiy 2019; Sukadiyanto 2011). However, this study only examined water skiing performance related to physical performance.

Performance is one component that must always be trained and developed properly (Ulbricht, & Ferrauti 2020; Jakobsson, & Isaksson 2019). This is due to physical performance which is the basis of a water ski athlete's skills in facing a competition. In other words, a champion in water skiing must have good physical condition to produce good competition technique. The level of physical, technical, and tactical capacity required for each sport varies. The relevance of each of these factors depends on the particular sport discipline and technique used (Schneebeli et al. 2020; Willibald et al. 2021). For example, the importance of the physical, technical, and tactical components of water skiing is not the same for other sports, as well as the number of matches (Bompa and Buzzichelli 2019). This difference most likely stems from the wide age range of peak-performance athletes.

The goal of achieving sports achievements is influenced by various factors, both internal and external factors. Each factor certainly has a very close

attachment to fulfilling goals. The achievement of sports achievements does not only depend on technical factors and physical factors. To be able to improve the performance of athletes is not something easy but special tips are needed, such as presenting a fun training program, especially in physical training programs, especially in water skiing.

Physical condition plays an important role in achieving the maximum achievement of an athlete to achieve maximum achievement, and even the very basic ability to achieve an achievement. An athlete cannot step up to the top of achievement if it is not supported by good physical condition. Athletes do not need all the components of the existing physical condition. The government has established sports development policies directed at increasing sports achievements among the community. While sports achievements show the level of quality of human resources and competitiveness of Indonesia at the international level. World countries compete with each other to develop their sports with the intention not only to develop mere achievements but more than that as a means of unifying the nation. Water skiing sports are popular internationally as Water Ski is a type of skill sport or dexterity with skiing on the water (Fachrezzy et al. 2021). It feels very difficult without the support of courage and regular practice, but this activity is indeed challenging as well as being able to provide entertainment or inner satisfaction for those who watch let alone those who do it.

The achievement of water skiing is not only determined by good breeding and breeding but at the elite level to be able to compete with other countries requires a technological approach and pays attention to the physical condition of athletes to achieve achievements in water skiing. Water skiing is a measurable

sport, every component supporting the achievement and achievement of training results can be measured and predicted precisely at the time of the competition.

For the achievements of Indonesian water ski athletes to remain consistent at national and international level competitions, efforts must always be prepared to evaluate and identify the results of each performance during training and competition, as well as the optimal abilities of each individual.

Some that affect the achievement of optimal performance of water ski athletes are seen as physical, technical, tactical, and psychological factors. These factors are interrelated and inseparable from each other. Movement ability and psychological factors are important elements that must be understood and overcome by every athlete in a competition. The success of each athlete must have general physical abilities including endurance, strength, speed, flexibility, and movement techniques in practicing water skiing well, and psychological factors in sports including anxiety, motivation, stress, confidence, and concentration. Based on the phenomenon in the form of these facts, researchers conducted a scientific study related to the profile of the physical condition of water ski athletes and wakeboards in preparation for the DKI Jakarta Regional Training

METHODS

The research method used is the Survey Method using a Quantitative Comparative research type approach. The population in the study was the entire Water Ski and Wakeboard Team incorporated in DKI Jakarta.

Participants

The population in the study was the entire Water Ski and Wakeboard

Team incorporated in DKI Jakarta. The samples in this study were 25 male and female athletes of DKI Jakarta Provincial Water Ski and Wakeboard Athletes. This research was carried out at the FIK UNJ Laboratory, Jl. Pemuda No.10, Rawamangun, East Jakarta, consisting of 13 males and 12 females. This research was carried out at the FIK UNJ Laboratory, Jl. Pemuda No.10, Rawamangun, East Jakarta.

Sampling Procedures

The sampling procedure in this study used purposive sampling, considering the characteristics of the sample following a minimum length of training of one year or more joining the DKI Jakarta Provincial Water Ski and Wakeboard.

Materials and Apparatus

Data collection techniques use tests and measurements: (i) weight scales to measure weight. body weight is measured by a weight measuring instrument in kilograms; (ii) physical condition tests; The limb explosive power test performs a vertical jump test.

Procedures

This study used the following procedures: (i) the first stage of researchers conducting tests and measurements of leg muscle explosive power (Power) with Vertical jump and Chronojump test kits; (ii) researchers group and categorize data; and (iii) the test was carried out at the FIK UNJ Laboratory, Jl. Pemuda No.10, Rawamangun, East Jakarta.

Design or Data Analysis

Data analysis in this study used percentage descriptive analysis. After the data is obtained, proceed with analyzing the data to conclude this study using quantitative descriptive analysis

techniques, and overall data analysis using statistical tests with the help of the SPSS program version 23.00 on the computer.

RESULT

1. Data description

Based on the results of descriptive analysis of frequency related to tests and physical condition measurements consisting of average values and standard deviations can be seen in the following table:

Table 1. Results of descriptive analysis of average values and standard deviations of the physical condition of males and females

Statistic	Vertical jump	Chrono Jump Test
N	25	25
Mean	47,50	27,97
Std. Deviation	10,38	6,47
Range	32,00	24,64
Minimum	33,00	15,17
Maximum	65,00	39,81
Sum	1187,50	699,31

Results of limb explosive power in terms of the use of vertical jump tools on DKI Jakarta Water Ski and Wakeboard Athletes consisting of 25 athletes (n = 25) obtained the highest score of 65 and the lowest score of 33 obtained a range value of 32 with a total value of 1187.50 for an average value of 47.50 and standard deviation of 10.38; and (ii) Limb explosive result data in terms of the use of chronojump devices In the DKI Jakarta Water Ski and Wakeboard Athletes, consisting of 25 athletes (n = 25), the highest score was obtained at 39.81 and the lowest score of 15.17 was obtained at a range value of 24.64 with a total value of 699.31 for an average value of 27.97 and a standard deviation of 6.47.

2. Analysis Requirements Testing

Testing of analytical requirements for hypothesis testing in this study includes (1) sample data derived from normally distributed populations conducted through data normality testing using Kolmogorov-Smirnov Z Test. The following will explain the test results of normality of population distribution and homogeneity of population variance, research data based on the results of analysis of analysis requirements test using the Kolmogorov-Smirnov Z method. From the results of the Kolmogorov-Smirnov Z test carried out, the results were obtained as attached. For calculation results can be seen in the summary of Table 2. Next:

Table 2. Summary of Kolmogorov-Smirnov Z data normality test results

Statistik	Limb explosive power using tools	
	Vertical jump	Chrono Jump Test
N	25	25
Kolmogorov-Smirnov Z	0,157	0,141
Asymp. Sig. (2-tailed)	0,111	.200*

Based on Table 2, the value of Kolmogorov-Smirnov Z (KS-Z) in the entire data group turned out to be greater than the value of $\alpha = 0.05$. Thus, it can be concluded that the sample of this study came from a normally distributed population, it can be described: (i) The results of the normality test of limb explosive data in terms of the use of vertical jump tools from 25 athletes obtained a value of KS-Z = 0.157 with a probability level = 0.111 and greater than the value of 0.05 α or at a significant level of 95%. Thus, the limb explosive power data is reviewed from the use of vertical jump tools obtained in normal distribution; and (ii) The results of the normality test of limb explosive data in terms of the use of chronojump devices

from 25 athletes obtained KS-Z values = 0.141 with probability levels = 0.200 and greater than the values $\alpha 0.05$ or at a significant level of 95%. Thus, the limb explosive power data is reviewed from the use of the chronojump tool obtained in normal distribution.

3. Hypothesis Testing

To determine the significance of the difference in leg explosive power in terms of the use of vertical jump and chronojump tools can be seen in Table 3 below:

Table 3. Recapitulation of the correlation coefficient significance test (t-test)

Variable	t-count	Sig.
The difference in the explosive power of the limbs is seen from the use of vertical jump and chronojump tools	9,353	0,000

Based on the analysis of the t-test correlation coefficient in Table 4.10 above, a t_{hitung} value of 9.353 and $t_{hitung} (25-2(23);0.05)$ of 1.812 was obtained. Based on these results, it can be concluded that in the correlation coefficient (t-test) there is a difference in limb explosive power in terms of the use of vertical jump and chronojump tools significantly, or H_0 is rejected and accepted H_1 . Thus, it can be concluded that the hypothesis that there is a difference in leg explosive power in terms of the use of vertical jump and chronojump tools in DKI Jakarta Water Ski and Wakeboard Athletes is accepted. This means that the coefficient can be generalized or applied to the population as a whole, athletes, water skiing, and wakeboard where a sample of 15 people was taken.

DISCUSSION

The physical condition of water skiing and wakeboarding in preparation for the DKI Jakarta Regional Training in terms of the physical profile tested and measured is the physical component of leg explosive power using the leg explosive power test to conduct a vertical jump test. These components need to be followed up with a continuous training process and must pay attention to technological developments. So the findings of this study are useful for male and female athletes to achieve better achievements.

This study was conducted to determine the profile of the physical condition of water skiing and wakeboard DKI Jakarta. Bringing some of the initial value gained in research into the literature aims to create a reference guide for coaches, and sports scientists. Physical condition as a fundamental element in all sports activities is an absolute necessity for sports players, especially sports achievements (Kashuba et al. 2021; Moskalenko et al. 2020; Sáez, Solabarrieta, and Rubio 2020; Savliuk et al. 2020). Relevant physical conditions must be possessed by every performance sports player.

The results of this study are in line with previous research, namely research conducted by several researchers, namely: (Adams et al. 2020; Borthwick, O'Connor, and Kennedy 2021; Kampling et al. 2022; Yoshimura et al. 2021) The results of this study show that the quality factor of physical condition determines qualified performance in addition to social, psychological and environmental factors related to determining athlete achievement. Physical condition is an ability that is directly associated with the needs of a particular sport (Fachrezzy et al. 2020; H. Indrawira, U. Maslikah, G. Jariono,

Nugroho 2021; Hermawan et al. 2020; Jariono et al. 2020; Nugroho et al. 2021). To achieve sports achievements, many physical condition factors influence each other in it (Franagal, Ligeza, and Smal 2020; Liusnea 2020; Rahmi and Bachtiar 2020; Romanova et al. 2022). The ability factor of physical condition is very important, and for that, it needs to be processed and measured to see whether there is progress or not. Because every sport is not the same, the physical condition required. Each particular sport or discipline requires its specific physical condition abilities.

CONCLUSION

The results of this study can be concluded that to determine sports achievement, one of them is to identify the Physical Condition Profile of water ski athletes and wakeboards in the context of preparing for the DKI Jakarta Regional Training.

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