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Fajrul Falaki Ramadhan
Faculty of Sport and Health Sciences, Yogyakarta State University, Yogyakarta, Indonesia

Endang Rini Sukamti
Faculty of Sport and Health Sciences, Yogyakarta State University, Yogyakarta, Indonesia

Corresponding Author:
Fajrul Falaki Ramadhan
Faculty of Sport and Health Sciences, Yogyakarta State University, Yogyakarta, Indonesia

Physical condition profile, east java takwondo center athletes: Endurance, power, and speed

Fajrul Falaki Ramadhan and Endang Rini Sukamti

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Abstract
Taekwondo is a martial art that involves constant interaction between opponents, aiming at the opponent's target, and utilizing complex kicks and powerful movements. In competitive taekwondo there is constant interaction between opponents. This study aims to determine the physical condition profile of East Java takwondo athletes to find their physical characteristics, which are reviewed from endurance, power, and speed. The method in this study uses quantitative descriptive, with a sample of 6 Puslatda Jatim athletes. The results of measuring physical endurance using the MFT test obtained 47,133 ml / kg / minute, this can be said to be "less". Furthermore, the results of the power test using the standing triple jump test were 7,833 meters, these results are in the "very good" category. Then the speed test using the 20-meter running test got 2.93 seconds, from these results it is included in the "very good" category. In conclusion, athletes must continue to improve their physical condition, because this is one of the keys to achieving achievement.

Keywords: Taekwondo, physical condition, endurance, power, and speed

Introduction
Takwondo is a martial art that has developed by combining various martial arts styles in Korea [1] and has gained international recognition as a sport that has been competed in the Olympics since 2000 [2]. In competition, Takwondo is a martial art that involves continuous interaction between opponents, targeting opponents, and utilizing complex kicks and powerful movements [3]. To achieve success, physical, tactical, technical, and mental are needed [4] therefore takwondo training is designed to achieve this performance [4, 5]. Condition physique is Wrong One factor important in sport [6] confirm that the ability to produce maximum muscle power is important in sports performance. In addition, to achieve good physical condition, it is necessary to prepare a structured and planned training program [7].
The ideal biomotor components that are really needed by taekwondo athletes. The martial art of taekwondo requires several elements of prime physical components such as; Endurance. Strength, speed, coordination, power, and flexibility [8, 9]. Therefore, it is important for coaches and sports scientists to collect objective information about the physical abilities of their players to support training goals, establish short-term and long-term training programs [3]. Physical condition basically makes all components inseparable, both for improvement and maintenance [7]. Improving physical performance requires greater monitoring of physical condition and well-designed functional capacity, so that maximum results can be achieved [10].
In a match, athletes who have good kicking power will be more advantageous in getting points in the match [11]. Basically, takwondo athletes really need explosive leg muscle power to kick, with poor leg power, it is very difficult for athletes to get points in the match. Takwondo is characterized by fast, high, and spinning kicks [12]. So, to get hard and fast kicking ability, explosive leg muscle power and speed are needed. The speed of takwondo athletes in giving short attacks in matches is only about 1-5 seconds [13] resulting in a heart rate response (HR) that is almost 90% (HRpeak) [3] can be concluded that high demands are due to aerobic and anaerobic metabolism [14]. Recent evidence suggests that *aerobic* endurance is widely used to support athlete activity in competition and as a means of recovery between consecutive matches in championship events [15].

The average cardiovascular endurance of international taekwondo athletes ranges from 44–63 ml/kg/min [3]. That average indicates that moderate to high levels of cardiovascular fitness may be needed to support the demands of athletes in international taekwondo competitions. And high endurance is a demand for athletes who often involve matches with a duration of several rounds [16].

So far, there has been no standard reference for physical conditions for taekwondo athletes. So, this research aims to determine the profile of the physical condition of East Javanese takwondo athletes to find their physical characteristics, which may make it easier to find athletes in terms of physical condition. In addition, it can provide data that can be used as a benchmark in program evaluation.

Materials and Methods

Quantitative research using a descriptive approach is a method used in study This. This research is a form of evaluation research, evaluation research is a research which is done to obtain conclusions related to the quality of the object being studied, namely regarding the physical condition profile.

This study aims to determine the profile of the physical condition of takwondo athletes using a sample population of East Java athletes totaling 6 male athletes. The descriptive techniques used in this study are calculating the average; determining the standard deviation; and calculating the percentage. The analysis was carried out using the SPSS 27 program.

The data collection instrument uses a physical condition test, a test used to measure in research, namely;

- **Beep test:** The endurance of the players is measured using *a beep test*, where athletes are required to run back and forth a distance of 20 meters with the right time until the beep is heard. The athlete's assessment is by the number of levels and turns they have achieved until they are unable to keep up with the specified sound.
- **Standing triple jump:** Taekwondo is a sport that is identical with high explosive power, so this test is expected to be able to detect the power of the athlete's kick. Athletes are given 3 opportunities to do this test, each attempt will be given a 2-minute rest period before doing the movement. Athletes stand on the line if they are ready, the athlete will jump with 3 forward jumps, measurements are taken from the take-off line to the closest contact point to the landing.
- **Sprint (20 meters):** test is measured using timing gates. This measurement is done twice and the fastest data is taken. Each trial is given a 2-minute rest period
- There are 3 components that will be analyzed, including speed, endurance, and power.

Results and Discussion

Based on the data processing and analysis that has been done, the distribution of scores from each test is obtained. The following are some test results for each component of the physical condition of East Java Puslatda takwondo athletes.

Results of descriptive analysis using SPSS 27.0

Table 1: The results of descriptive analysis physical conditioning

Descriptive Statistics					
	N	**Minimum**	**Maximum**	**Mean**	**Std. Deviation**
Endurance	6	34.00	56.80	47.1333	8.32843
Power	6	7.00	8.00	7.8333	.40825
Speed	6	2.90	3.00	2.9333	.05164
Valid N (listwise)	6				

Based on the results of the table above, it shows that the average endurance (VO_2 Max) of Puslatda East Java athletes is 47,133 ml/kg/minute, with the highest VO_2 Max value of 56.80 ml/kg/minute, the standard deviation value of 8,328 ml/kg/minute, and the minimum value of the athlete's VO_2 Max of 34.00 ml/kg/minute. and the average power possessed by athletes is measured using a standing triple jump of 7,833 meters, with a minimum power value of 7.00 meters, with a standard deviation value of 0.408, and a maximum power value obtained of 8.00 meters. The average speed possessed by athletes is 2.93 seconds, with a minimum value of 2.90 seconds, a standard deviation value of 0.05 seconds, and a maximum speed value of 3.00 seconds.

Endurance test

Tabel 2: The result of endurance percentages

No	Rating	Total	Percentage
1	very poor	0	0%
2	Poor	5	79%
3	Good	1	21%
4	very good	0	0%

Based on Table 2, the distribution of the percentage of athlete endurance can be seen that the average VO_2 Max of Puslatda Jatim athletes is 47,133 ml/kg/minute. It should be noted that 5 athletes have a low level of endurance, and 1 athlete has a VO_2 Max value that reaches the good category. And the VO_2 Max target that must be achieved by each athlete is 56.8 ml/kg/minute. So, it can be interpreted that the average VO_2 Max value of athletes is still said to be less than that which has been determined.

Standing triple jump

The standing triple jump test is a test used to measure the power of athletes. Here are the test results.

Table 3: Result of power Percentage

No	Rating	Total	Percentage
1	Very Poor	0	0%
2	Poor	0	0%
3	Good	1	15%
4	Very good	5	85%

Based on the table above, it shows that 5 out of 6 athletes met the target with a percentage value of 85%, while the average power measured using a standing triple jump was 7,833 meters. This means that the average power possessed by athletes is very good or has met the specified standards.

Speed

Table 4: Result of speed percentage

No	Rating	Total	Percentage
1	very poor	0	0%
2	Poor	0	0%
3	Good	0	0%
4	very good	6	100%

Based on the distribution results in table 3, it shows that the average speed of the Puslatda Java Timur taekwondo athletes, consisting of 6 athletes, is 2.93 seconds. So, it can be said that all athletes have "very good" speed.

Discussion

The results of this study are expected as a review in the egonomic framework to prepare athletes in facing physical demands in the taekwondo championship [3]. This study only focuses on three main physical components in taekwondo, namely; endurance (cardiovascular), speed, power.

In Takwondo competitions athletes require high levels of aerobic, anaerobic, power and speed endurance. (Marković *et al*., 2005; Bouhlel *et al*., 2006). So, in achieving the highest achievement, elite taekwondo athletes must have an average VO_2 Max value of 54 ml/kg/minute [17]. While the results of the average VO_2 Max value in this study were 47,133 ml/kg/minute, so it can be said that this value is still far from elite athletes. Because endurance greatly affects the athlete's ability [18]. Therefore, the level of endurance needs to be increased to get better performance.

Power is a combination of biomotor speed and strength that can affect movement activities that require *explosive movements* [19]. The power possessed by athletes is useful for helping athletes move quickly in all directions [10]. Thus, the importance of power in helping athletes to gain points when attacking and avoiding giving points to opponents. while the average athlete power is 7,833 meters. This means that the average power possessed by athletes has met the specified standards. Thus, it is possible that coaches will continue to provide power training to maintain or increase power so that they will get super compensation.

The importance of speed in taekwondo shows that it is a prerequisite for success in competition [3]. Speed training using the SAQ method is a form of training that aims to develop basic motor skills and can improve athletes' abilities in terms of speed and strength [20]. Therefore, physical condition ability is a prerequisite that athletes must have in improving performance.

Conclusions

Physical condition is an important thing in achieving achievements in takwondo athletes. Athletes of Puslatda Jatim still have physical endurance conditions that can be said to have not reached the target desired by KONI, while the speed and power of athletes have been able to meet the standards that have been determined. This can hinder the improvement of athlete performance and also athlete achievement. In this case, the coach needs to design a physical training program systematically and also in a planned manner in order to achieve the target physical condition that has been determined. In addition, the coach also needs to evaluate the training program that has been given so that athletes can control the increase or decrease in physical condition and the performance of the athletes themselves.

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