

Comparison of the physical fitness of karate and taekwondo elite athletes

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Abstract

Introduction. A coach compiles and determines a training program based on the physical fitness profile of the athlete. Central Sulawesi taekwondo and karate athletes have been undergoing independent training since mid-2020.

Objective of the study. This study aims to investigate the comparison in physical fitness of elite athletes in taekwondo and karate

Research methods. This study uses a causal-comparative method, where the researcher seeks to determine the cause or effect of the differences that occur between groups. The sample of this research is 20 elite athletes. Evaluation of physical abilities or physical fitness is an instrument used to measure the physical fitness of taekwondo and karate athletes. An independent sample t-test was used for comparison of independent samples.

Research result and Conclusion. The results and conclusions of the study indicate that descriptively the speed, endurance of abdominal muscle strength, and endurance of thigh muscle strength, agility, flexibility, leg reaction speed, and cardiovascular endurance of taekwondo athletes are higher than karate athletes, while for leg muscle strength and breathing karate athletes are higher than taekwondo athletes. Sig value. (2 tailed) or p-value <0.05, it can be concluded that there is a significant difference in the variable components of physical fitness, abdominal muscle strength, agility, flexibility in leg reaction speed, and cardiovascular endurance between taekwondo athletes and karate athletes. Whereas in the variable components of physical fitness, speed, endurance, thigh muscle strength, and leg and respiratory muscle strength, there were no significant differences between taekwondo athletes and karate.

Key words: Comparison; physical fitness; taekwondo; karate

Introduction

Success in any sport requires special physiological, psychological, and physical abilities[1] [2]. Physical or physical fitness is the ability to perform physical activity for a long time without experiencing significant fatigue[3] [4]. Increasing physical fitness means increasing the degree of health[5] [6]. Physical fitness has a very important role in maintaining the performance of an athlete. The trainer must know about physical fitness because that is one way of compiling and determining a sports training program so that athletes can get their best performance.[7]. Measuring the physical abilities of athletes is a coach's task that must be carried out regularly. Therefore, conducting a physical ability test is the first step that must be taken in selecting athletes which are then followed by determining the sports training program and the required facilities. In martial arts, various factors or general motor components such as cardiorespiratory endurance, muscle strength, muscle explosiveness, speed, agility, flexibility, balance, reaction speed, and coordination are needed.[8] [9] [10] [11] [4]. Any sport requires a certain type of physical fitness, including the martial arts sports taekwondo and karate[12] [13]. Taekwondo martial arts is a modern sport that has its roots in Korean traditional martial arts which consists of three important materials, namely poomse, kyukpa, kayoruki. (Fazdinata & Haridito, 2018) [15] [16] [5]Meanwhile, the karate martial arts sport originated in the Okinawa area, Japan, which has two types of movements that are contested, namely kata and Kumite. (Emad et al., 2020) [1] [18]. Karate and taekwondo martial arts have similar characteristics and types of physical fitness needs, including anaerobic endurance, muscle strength, muscular strength endurance, explosive power, agility, flexibility, reaction speed, and cardiorespiratory or aerobic endurance.[19] [20].

Anaerobic endurance is the ability to use energy in muscles with a lactate response and a short recovery time [1]. Anaerobic energy which is one of the elements of physical fitness is very important because the ability to move in sports requires fast and efficient activities in the short term.[8]. Analysis of motion time and heart rate and blood lactate response to combat shows that Taekwondo competition is very demanding short-term anaerobic strength and the ability to recover.[21]. Muscle strength is the ability of muscles to generate strength against an external resistance[22]. Taekwondo sports using fast kicks with maximum strength[15]. Muscle strength endurance is the ability of muscles to fight fatigue over some time. Explosive power or power is the ability to perform a movement in a short time with maximum force(Wahyuni & Donie, 2020). The martial arts sport of karate requires extensive use of kicking and punching techniques performed with maximum strength and speed[24]. Agility is a person's ability to change the direction and position of the body quickly at the right time[16]. Flexibility is the level of a person's ability to do something based on the balance of muscles and ligaments around the joints[16]. Reaction speed is the ability to change direction in units of time and distance. Aerobic endurance is the ability to fight fatigue or the ability to perform physical activity or exercise at low to moderate intensity for more than three minutes[25] [1].

From the middle of 2020 until now, elite athletes who will take part in the XX Papua National Sports Week (PON), including athletes from the martial arts of Sulawesi karate and taekwondo, are carrying out training independently before later participating in the National sports week in Papua province in October 2021 because of the spread of the coronavirus / COVID 19 [17]. To be able to provide recommendations to coaches and athletes regarding the effect of the training methods that have been given so far on the level of physical fitness

of karate and taekwondo athletes, it is necessary to evaluate through regular physical tests to see the physical fitness charts of athletes from the two sports.[22] [7]. Seeing the comparison of the components of the physical fitness of the athletes in the two sports is of interest because both have been doing training independently from mid-2020, the ages of athletes from these two sports are between 19-25 years old and all of them are elite athletes or the best in Central Sulawesi, as well as art sports karate and taekwondo martial arts have the same character in terms of contemporary fitness needs but have different training facilities and infrastructure. Then also to see to what extent the effects of the independent training method and the success of each trainer in compiling and implementing training programs during the spread of COVID 19 in Central Sulawesi and Indonesia[6][18].

Research methods

This research uses a causal-comparative research method or ex post facto, where the researcher seeks to determine the cause or effect of the differences that occur between groups without manipulating [26] [27]. Participants or samples in the study were 20 athletes who had the following inclusion criteria:

1. Is the best athlete/elite of Central Sulawesi
2. 19-25 years old
3. Not in a state of injury
4. Is an athlete who will take part in XX PON in Papua in 2021

Table 1. Research Sample

Sports	Amount		Total
	Male	Female	
Taekwondo	5	5	10
Karate	5	5	10
Total	10	10	20

Measurement and evaluation of physical abilities or physical fitness of athletes.

Table. 2 Research Instruments

No.	Variable	Instrument	Category
1.	Speed	Run 30 meters	BS, B, S, K, KS
2.	Endurance and strength of the abdominal muscles	Sit-Ups	BS, B, S, K, KS
3.	Endurance thigh muscle strength	Sit on the Wall	BS, B, S, K, KS
4.	Strength of the leg and breathing muscles	Jump Chest	BS, B, S, K, KS
5.	Agility	Running Back and forth	BS, B, S, K, KS
6.	Flexibility	Sit Skating And Grabbing	BS, B, S, K, KS
7.	Foot reaction speed	Foot Reaction	BS, B, S, K, KS
8.	Cardiovascular endurance	Bleep Test	BS, B, S, K, KS

[28]

Information: BS: Very Good, B: Good, S: Average, K: Poor and KS: Very Poor

The research data were analyzed using the Statistical Program (SPSS) version 16.0. An independent sample t-test was used for comparison of independent samples[26] [29]. All statistical analyzes were set at the alpha level of $p < 0.05$.

Result and Discussion

The From the results of statistical tests, the differences in the components of physical fitness in the martial arts of taekwondo and karate are presented in the following table:

Table 3. Results of Different Tests for Components of Physical Fitness Between Sports

Variable	Sports	N	Mean	Std. Dev	F	Sig. (2 Tailed)
Speed	Taekwondo	10	5.2930	0.44769	5,293	0.109
	Karate	10	4,7310	0.93072		
Endurance Abdominal Muscle Strength	Taekwondo	10	47,4000	5,68038	0.332	0.023
	Karate	10	41,5000	4,92725		
Endurance Thigh Muscle Strength	Taekwondo	10	4.9920	2.16375	2,531	0.755
	Karate	10	4,7360	1.35145		
Leg and Breathing Muscles Strength	Taekwondo	10	68,5000	15.84123	0.939	0.593
	Karate	10	72,2000	14.55106		
Agility	Taekwondo	10	15.4360	0.71761	1,462	0.023
	Karate	10	14.4120	1.08427		
Flexibility	Taekwondo	10	43,1500	4.21011	0.364	0.000
	Karate	10	32,9500	5,96494		
Foot Reaction Speed	Taekwondo	10	0.2770	0.02312	0.622	0.063
	Karate	10	0.2550	0.02635		
Cardiovascular Endurance	Taekwondo	10	2.8000	0.42164	4,431	0.053
	Karate	10	2,2000	0.78881		

From the results on the speed variable, it can be seen that the average speed of taekwondo athletes is 5.2930 and a standard deviation is 0.4769 and karate is 4.7310 and a standard deviation is 0.93072. This means that descriptively the speed of taekwondo athletes is higher than karate athletes. While not-test for Equality of Means obtained the price of $t = 1.721$, $db = 18$, and the value of sig. (2 tailed) or $p\text{-value} = 0.109/2 = 0.098 > 0.05$. So it can be concluded that there is no significant difference in the speed variable between taekwondo athletes and karate athletes.

The results on the variable abdominal muscle strength endurance, it can be seen that the average endurance of the abdominal muscle strength of taekwondo athletes is 47.4000 and a standard deviation 5,68038 and the sport of karate 41,5000 and standard deviation 4,92725. This means that descriptively the endurance of the abdominal muscle strength of the athletes in the sport of taekwondo is higher than that of the karate athletes. While not-test for Equality of Means obtained the price of $t = 2.481$, $db = 18$, and the value of sig. (2 tailed) or $p\text{-value} = 0.023/2 = 0.012 < 0.05$. So it can be concluded that there is a significant difference in the variable of endurance and abdominal muscle strength between taekwondo athletes and karate athletes.

The results on the variable thigh muscle strength endurance, it can be seen that the average endurance of the thigh muscle strength of the athletes in the sport of taekwondo is 4.9920 and standard deviation 2.16375 and the sport of karate 4,7360 and standard deviation 1.35145. This means that descriptively the endurance of the thigh muscle strength of the athletes in the sport of taekwondo is higher than that of karate athletes. While not-test

for Equality of Means obtained the price of $t = 0.317$, $db = 18$, and the value of sig. (2 tailed) or $p\text{-value} = 0.755/2 = 0.378 > 0.05$. So it can be concluded that there is no significant difference in the variable endurance and strength of the thigh muscles between taekwondo athletes and karate athletes

The results on the variable ski and breathing muscle strength, it can be seen that the average leg muscle strength and respiration of the athletes in the sport of taekwondo are 68,5000 and standard deviation 15.84123 and the sport of karate 72,2000 and standard deviation 14.55106. This means that descriptively the leg muscle strength and respiration of karate athletes are higher than taekwondo athletes. While not-test for Equality of Means obtained the price of $t = -544$, $db = 18$, and the value of sig. (2 tailed) or $p\text{-value} = 0.593/2 = 0.297 > 0.05$. So it can be concluded that there is no significant difference in the variables of leg muscle strength and breathing between taekwondo athletes and karate athletes.

Result on the agility variable, it can be seen that the average agility of athletes in the sport of taekwondo is equal to 15.4360 and standard deviation 0.71761 and the sport of karate 14.4120 and standard deviation 1.08427. This means that descriptively the agility of taekwondo athletes is higher than karate athletes. While not-test for Equality of Means obtained the price of $t = 2.490$, $db = 18$, and the value of sig. (2 tailed) or $p\text{-value} = 0.023/2 = 0.011 < 0.05$. So it can be concluded that there is a significant difference in the agility variable between taekwondo athletes and karate athletes

Result In the flexibility variable, it can be seen that the average flexibility of athletes in the sport of taekwondo is equal to 43,1500 and standard deviation 4.21011 and the sport of karate 32,9500 and standard deviation 5,96494. This means that descriptively the flexibility of taekwondo athletes is higher than karate athletes. While not-test for Equality of Means obtained the price of $t = 4.418$, $db = 18$, and the value of sig. (2 tailed) or $p\text{-value} = 0.000/2 = 0.000 < 0.05$. So it can be concluded that there is a significant difference in the flexibility variable between athletes in the sport of taekwondo and athletes of karate.

Result In the variable speed of foot reaction, it can be seen that the average foot reaction speed of athletes in the sport of taekwondo is 0.2770 and standard deviation 0.02312 and the sport of karate 0.2550 and standard deviation 0.02635. This means that descriptively the foot reaction speed of the athletes in the sport of taekwondo is higher than that of karate athletes. While not-test for Equality of Means obtained the price of $t = 1985$, $db = 18$, and the value of sig. (2 tailed) or $p\text{-value} = 0.063/2 = 0.031 < 0.05$. So it can be concluded that there is a significant difference in the variable speed of foot reaction between taekwondo athletes and karate athletes

Result on the cardiovascular endurance variable, it can be seen that the average cardiovascular endurance of athletes in the sport of taekwondo is 2.8000 and standard deviation 0.42164 and the sport of karate 2,2000 and standard deviation 0.78881. This means that descriptively the cardiovascular endurance of taekwondo athletes is higher than karate athletes. While not-test for Equality of Means obtained the price of $t = 2.121$, $db = 18$, and the value of sig. (2 tailed) or $p\text{-value} = 0.048/2 = 0.024 < 0.05$. So it can be concluded that there is a significant difference in the cardiovascular endurance variable between taekwondo athletes and karate athletes. The difference in the components of physical fitness in martial arts athletes is very much influenced by the type of sparring or form training that is practiced (Abedimahzoun, 2014) (Schwartz et al., 2015) (Helmi Chaabène et al., 2012) (Bridge et al., 2014)

Conclusion

The results of this study indicate that the ratio of the eight (8) components of physical fitness between elite athletes of taekwondo martial arts and elite athletes of karate are descriptive of speed, abdominal muscle endurance, thigh muscle strength endurance, agility,

flexibility, leg reaction speed, and The cardiovascular endurance of elite athletes in taekwondo is higher than karate athletes, while for leg muscle strength and respiration, elite athletes in karate are higher than elite athletes in taekwondo. Sig value. (2 tailed) or p-value <0.05, It can be concluded that there are significant differences in the variable components of physical fitness, abdominal muscle strength, agility, flexibility, leg reaction speed, and cardiovascular endurance between elite athletes in taekwondo and elite athletes in karate. Whereas in the variable components of physical fitness, speed, endurance, thigh muscle strength, and leg and respiratory muscle strength, there is no significant difference between elite athletes in taekwondo and elite athletes in karate. One of the limitations in this study is that the body mass index (BMI), nutritional status of the athlete, and the type of sparring or form training they are involved in this study are not measured so that future research is expected to be able to add to the BMI comparison of the nutritional status of athletes and the type of sparring or form training that they are engaged in. by athletes.

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