

## Relationship between supplement consumption and aerobic capacity in taekwondo athletes

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### ABSTRAK

**Latar Belakang:** Penelitian ini dilatarbelakangi oleh kondisi fisik atlet yang mulai menurun akibat karantina mandiri yang dilakukan selama masa pandemic COVID-19 mulai dari bulan Maret 2020. Hal ini membuat atlet menjadi terbatas dalam melakukan proses latihan karena proses latihan dilakukan secara online. Metode ini dirasa kurang maksimal karena kemungkinan error yang cukup tinggi, sedangkan tuntutan kondisi fisik atlet yang optimal tetap dibutuhkan. Untuk memenuhi kebutuhan kondisi fisik tersebut, atlet tidak boleh hanya berfokus pada latihan fisik saja, namun atlet juga perlu memperhatikan gaya hidup dimana makanan yang tepat memiliki peranan utama. Atlet harus mempertimbangkan kebutuhan nutrisi, asupan kalori dan cairan, serta waktu makan agar memperoleh kebutuhan fisik yang optimal. Namun, atlet mengalami kesulitan untuk melakukan hal tersebut. Ketidakmampuan atlet dalam memenuhi kebutuhan nutrisi dengan maksimal membuat atlet dan pelatih mencoba mencari cara agar mampu memenuhi kebutuhan tersebut, salah satu caranya adalah dengan menggunakan suplemen.

**Tujuan:** Penelitian ini bertujuan untuk menganalisis hubungan antara konsumsi suplemen dengan kapasitas aerobik atlet taekwondo.

**Metode:** Penelitian ini menggunakan desain korelasional yang melibatkan 16 atlet (8 putra dan 8 putri) TKD Universitas Pendidikan Indonesia yang dipilih menggunakan teknik purposive sampling dengan kriteria adalah atlet yang tergabung dalam tim inti dan dipersiapkan khusus untuk menghadapi pertandingan tahun 2021. Instrument penelitian yang digunakan adalah close-ended questionnaire dan balke test.

**Hasil:** Hasil penelitian menunjukkan bahwa sebanyak 63% atlet TKD mengonsumsi suplemen. Jenis suplemen yang paling banyak digunakan berdasarkan kandungan mayoritas didalamnya adalah protein sebanyak 50%. Bentuk suplemen yang paling banyak dikonsumsi adalah bubuk dengan frekuensi konsumsi setiap hari. Informasi tentang suplemen diperoleh dari pelatih sebanyak 50%, teman sebanyak 30% dan lainnya 20%. Kapasitas aerobik yang dimiliki atlet TKD masih 60% dari target yang ditentukan pelatih.

**Kesimpulan:** Kesimpulan penelitian ini adalah tidak terdapat hubungan yang signifikan antara konsumsi suplemen dengan kapasitas aerobik atlet TKD.

**KATA KUNCI:** atlet taekwondo; kapasitas aerobik; kondisi fisik; suplemen

### ABSTRACT

**Background:** This research was motivated by the physical condition of athletes which began to decline due to self-quarantine carried out during the COVID-19 pandemic starting from March 2020. This made athletes limited in carrying out the training process because the training process was carried out online. This method is considered to be less than optimal because the possibility of error is quite high, while the demands of the optimal athlete's physical condition are still needed. To meet the needs of these physical conditions, athletes should not only focus on physical exercise, but athletes also need to pay attention to a lifestyle in which the right food plays a major role. Athletes must consider nutritional needs, calorie, and fluid intake, and meal times to obtain optimal physical needs. However, athletes have difficulty doing this. The inability of athletes to meet their nutritional needs optimally makes athletes and coaches try to find ways to be able to meet these needs, one way is to use supplements.

**Objectives:** This study aims to analyze the relationship between supplement consumption and the aerobic capacity of taekwondo athletes.

**Methods:** This study used a correlational design involving 16 athletes (8 males and 8 females) from TKD of the Universitas Pendidikan Indonesia who were selected using purposive sampling technique with the criteria being athletes who are members of the core team and are specially prepared to face the 2021 competition. The research instrument used was a close-ended questionnaire and a Balke test.

**Results:** The results showed that as many as 63% of TKD athletes use supplements. The type of supplement that is most widely used based on the majority content in it is protein as much as 50%. The most commonly consumed form of supplement is powder at a daily frequency. Information about supplements was obtained from coaches by 50%, friends as much as 30% and the other 20%. The TKD athlete's aerobic capacity is still 60% of the target set by the coach.

**Conclusion:** This study concludes that there is no significant relationship between supplement consumption and the aerobic capacity of TKD athletes.

**KEYWORD:** taekwondo athletes; aerobic capacity; physical condition; supplement

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## INTRODUCTION

Athletes must make a big enough effort to get optimal performance, sometimes even athletes have to push their bodies to their physiological limits(1). The efforts given by these athletes must be supported by optimal physical conditions, because without optimal physical conditions, athletes will not be able to give their best performance, including in the Taekwondo (TKD). TKD is a martial arts sport whose performance is determined by all aspects of training, namely: technique, tactics, physical and psychological(2). In one match, TKD athletes will compete for a short and intensive duration, carrying out attacks (1-5 seconds) and interspersed with a longer period of non-attack activity (pauses) at an average ratio between 1:2 and 1:7 in different styles(2-4). The total duration performed by athletes in one match according to the provisions of the World Taekwondo Federation (WTF) is 6 minutes of competition (3 rounds x 3 minutes) with a total rest break of 1 minute in each round. This results in a near maximal heart rate (HR) response (90% HRpeak) and high lactate concentrations(7.0-12.2 mmol.L-1)(2).

The characteristics of the TKD sport as described above are one of the high-intensity martial arts sports. The high intensity performed by TKD

athletes makes TKD a sport that requires aerobic and anaerobic energy or metabolism(1), however, several studies suggest that TKD is dominated by anaerobes (both alactacids and lactacids)(1,2,5,6). This is also because TKD athletes will usually compete more than once in one match day, so athletes need good recovery abilities(7), such as a good maximum oxygen consumption capability which will contribute to the fast payment of oxygen debt and recovery of macroergic phosphate compounds. Maximum power can be increased to support up to 50% of the maximum alactacid power and can be reached in the first 10-15 seconds to 40 seconds, during which the intensity of action begins to decrease(1).

To meet the needs for optimal sports performance, athletes should not only focus on physical exercise, but athletes also need to pay attention to their lifestyle in which the right diet plays a major role. The athlete's diet must support the activities carried out by the athlete and meet the athlete's energy needs in their daily lives. Regarding TKD athletes, one hour of intensive training in this sporting event involves an energy consumption of about 730 calories for someone weighing 75 kg(1). However, it is unfortunate that not all athletes and even coaches pay attention to this in detail. Athletes

must consider nutritional needs, adequate calorie intake, adequate fluid intake, and meal times to achieve the desired success and performance(8).

The inability of athletes to fulfill their nutritional needs optimally makes athletes and coaches try to find other ways to be able to meet the athlete's nutritional needs. One way is to use additives or supplements, the use of supplements is commonly used by athletes, both from natural and organic sources. The supplements used usually aim to increase energy levels, maintain strength, health, and immune system function, improve performance, and prevent nutritional deficiencies that interfere with health(9). It is known that there is a large amount of research on the effect of nutrition (be it macro-nutrients, micro-nutrients, and supplements) on the athlete's performance and success(8). Athletes have recognized and used nutritional supplements to maintain a healthy lifestyle, regulate malnutrition, strengthen immunity, increase performance, and energy(8). In addition, the use of supplements does not violate doping provisions in the use of other non-natural or organic ingredients while still following the regulations made by the World Anti-Doping Agency (WADA)(10).

During the current COVID-19 pandemic, all activities are limited, including training. The training process had to be changed to an online system from their homes, given the regulations issued by the government to prevent the transmission of the COVID-19 virus. Even so, coaches still provide training programs and monitor athletes' progress online. The training program provided is a technical and physical training program with an intensity of 65-80%. This method is considered not optimal because the possibility of errors caused is quite high, while the demands of athletes for the excellent physical condition are still needed. One of them is the athlete's aerobic capacity (VO<sub>2</sub> Max.), Which is what we know as VO<sub>2</sub> Max. big ones will be very beneficial for athletes. VO<sub>2</sub> Max. is a parameter that represents the potential function of the cardiovascular and respiratory systems related to muscle work without fatigue(11). The higher VO<sub>2</sub> Max. athletes have, the higher the endurance when doing sports activities, which means they will

not quickly experience fatigue when doing sports activities(12). Therefore, this study aims to analyze the relationship between supplement consumption and the aerobic capacity of taekwondo athletes.

## MATERIALS AND METHODS

This study used a correlational design by taking some data from the sample(13). The sample in this study were Taekwondo athletes from Universitas Pendidikan Indonesia who were taken using purposive sampling technique from the population. The sampling criteria are athletes who are members of the core team and are specially prepared to face matches in 2021. The instrument used in this study was the close-ended questionnaire that was used by previous researchers to obtain data on supplement consumption(8) and a balke test for obtaining VO<sub>2</sub> Max./aerobic capacity data in TKD athletes(14).

## RESULTS AND DISCUSSION

The data obtained is raw data, so data processing is required. The processed data is then presented in Table. **Table 1** shows a statistical description of the data. It was found that the sample consisted of 50% male athletes and 50% male athletes. The age of male athletes was  $19.63 \pm 0.92$  years and the age of female athletes was  $19.88 \pm 1.13$  years. The height of the male athletes was  $168.13 \pm 8.58$  cm with a bodyweight of  $66.75 \pm 7.98$  kg and the height of the female athletes was  $157.00 \pm 6.16$  cm with a bodyweight of  $54.88 \pm 7.38$  kg. It is also known that not all athletes take supplements, only 75% of male athletes and 50% of female athletes or only as much as 63% of athletes who take supplements. VO<sub>2</sub> Max Value male athletes

**Table 1. TKD Athlete Statistics Description**

	Men (n=8)	Women (n=8)
Age (year)	$19.63 \pm 0.92$	$19.88 \pm 1.13$
Height (cm)	$168.13 \pm 8.58$	$157.00 \pm 6.16$
Weight (kg)	$66.75 \pm 7.98$	$54.88 \pm 7.38$
Supplements Use (%)		
Yes	75	50
No	25	50
VO <sub>2max</sub> (ml/kg/menit)	$45.88 \pm 2.70$	$35.38 \pm 2.07$

are  $45.88 \pm 2.70$  ml/kg/minute and female athletes are  $35.38 \pm 2.07$  ml/kg/minute.

**Table 2** shows the types of supplements used by TKD athletes based on the majority content in them. TKD athletes use 50% protein supplement, 20% vitamin 30% creatine.

**Table 2. Types of Supplements used by TKD Athletes**

	Protein	Vitamin	Creatine	Mineral
Type of supplement used (%)	50	30	20	-

**Table 3** shows the form of supplement most consumed by TKD athletes. TKD athletes use powdered supplements as much as 80% and tablets/capsules as much as 20%.

**Table 3. Supplement Form used by TKD Athletes**

	Powder	Tablets/Capsules	Fluid
The most widely consumed form of supplement (%)	80	20	-

**Table 4** shows the sources of information obtained by TKD athletes about supplements. TKD athletes obtain information or knowledge about supplements from coaches as much as 50%, friends as much as 30%, and other 20%.

**Table 4. Sources of Information obtained by TKD Athletes about Supplements**

	Coaches	Parents	Friends	Pharmacist	Other
Sources of information on supplements (%)	50	-	30	-	20

**Table 5** shows the results of the correlation test between supplement consumption and the aerobic capacity of TKD athletes using the Spearman Rank Correlation. Based on the test results, the Sig. (2-tailed) of  $0.292 > 0.05$ , it means that there is no significant relationship between supplement consumption and the aerobic capacity of TKD athletes.

**Table 5. Relationship between Supplement Consumption and Aerobic Capacity of TKD Athletes**

	N	Correlation Coefficient	Sig. (2-tailed)
Consumption of Supplements with Aerobic Capacity for TKD Athletes	16	0,281	0.292

The demand for the good physical condition must still be owned by athletes, so it is not unusual for athletes to use supplements to help improve their performance, especially during a pandemic like this. Athletes often want something instantaneous and tend to neglect the essentials of improving performance, especially their aerobic capacity. Even though we know that taking supplements is not needed if someone wants to be physically fit and healthy quickly if you want to get a fit and healthy physique the easiest way is to adopt a healthy lifestyle(12).

One way that can be done to find out a fit and healthy physical condition is by looking at the VO2 Max value. which are owned. Where do we know that aerobic capacity or what we usually know as VO2 Max. is one of the physical components that are very important and must be owned by an athlete, especially TKD sports. VO2 Max requirement each sport and individual is usually different, adjusted to the characteristics of each. In TKD sports, usually, the coach has given a target VO2 Max. for each athlete, usually 55-60 ml/kg/min, or even more(2).

Increasing aerobic capacity is not easy, it takes great and correct effort to achieve it, sometimes even athletes have to push the body to its physiological limits(1), because this aerobic capacity is the main asset of athletes. Especially in the sport of taekwondo, high intensity causes athletes to experience fatigue when competing quickly, therefore athletes need more energy (good nutrition) so that the aerobic capacity of athletes is large.

Based on the results of the study, it was found that the type of supplement most widely used by UPI TKD athletes was 50% protein and the others used 30% vitamin and 20% creatine. The choice of

supplements used by TKD athletes is somewhat inaccurate because previous studies suggest that protein supplements are the best supplements to use to increase muscle mass(15), while to improve athlete's performance is creatine supplements(16). While the most commonly consumed form of supplement is a powder supplement with a frequency of consumption every day, this is quite appropriate because powdered supplements facilitate the absorption process by the body. The information obtained by the sample about supplements was obtained from the trainer as much as 50%, from friends 30%, and the other 20% (powder packaging). This means that the coach has a very important role in providing information to athletes, so the coach must understand what he is going to give his athletes.

The value of aerobic capacity possessed by TKD athletes is quite sufficient and has not yet reached the target set by the coach. The percentage of the aerobic capacity of TKD athletes has only reached 60% of the target set by the coach. This shows that TKD athletes exercising during the COVID-19 pandemic who were sampled were said to be less effective. TKD athletes have used supplements to help improve performance, however, the aerobic capacity of TKD athletes did not increase significantly and tended to decrease.

## CONCLUSSIONS AND RECOMMENDATIONS

Based on the results of the research conducted, the authors conclude that there is no significant relationship between supplement consumption and the aerobic capacity of TKD athletes at the Universitas Pendidikan Indonesia. The author provides recommendations to athletes and coaches to be even more careful in choosing the type of supplement to be used to help athletes achieve predetermined targets. This research is also still very limited in terms of research samples, so further research is needed with a larger research sample.

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