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Comparison of the Effect of Creatine and Ginseng Supplementations on the Aerobic Power, Anaerobic Power, and Muscle Strength of the Male Players of the Iran National Epee Team

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Abstract

Background: Measuring physical fitness by studying aerobic metabolism, anaerobic metabolism, and muscular strength in most sports research is one of the important indicators of professional athletes.
Objectives: The aim of the present study was to compare six weeks of creatine supplementation and ginseng on the aerobic and anaerobic strength and muscle strength of the male players of the Iran national epee fencing team.
Methods: This quasi-experimental study with a pretest-posttest design was performed on two experimental groups of creatine and ginseng as a double-blind study. A total of 14 male players of the national epee fencing team were assigned to two groups' creatine supplement and ginseng supplement. The statistical significant difference was determined at $P \geq 0.05$, and ANCOVA test was used to assess the differences between groups. All data were analyzed by the SPSS software version 25.
Results: The results showed that the mean aerobic power in the creatine supplement group was significantly different from the ginseng supplement group (P = 0.001). In addition, the mean anaerobic control within the creatine supplement group is significantly higher than the ginseng supplement group (P = 0.001). The mean muscle strength in the creatine supplement group is significantly different from the ginseng group (P = 0.001). Higher mean aerobic power, anaerobic power, and muscle strength in the creatine supplement group, compared to the ginseng group, showed the more significant role of this supplement in raising aerobic power.
Conclusions: It can be concluded that the role of creatine supplements in improving aerobic and anaerobic power and muscle strength could be more remarkable than the ginseng supplement.

Keywords: Creatine Supplement, Ginseng Supplement, Aerobic Power, Anaerobic Power, Muscle Strength, Male Players of the National Fencing Team

1. Background

Assessment of the physical capacity of athletes is one of the most important issues in modern sports, and various tests are used for selection procedures, screening candidates, or monitoring the efficacy of training regimes. Although sport performance professionals and sports scientists focus on performance assessment, there is a lack of research examining the relationships between various motor skills. There are many motor skills in different sports involving kinematic, biomechanical, and muscular features. However, examining correlations between these skills has proved elusive. Aerobic and anaerobic exercises are two types of exercise that differ based on the intensity, interval, and types of muscle fibers incorporated. Within the competitive world of sports, the smallest advantage can make a large change in the results of a challenge. An ergogenic aid is a substance that improves an athlete's quality, speed, or perseverance. The interaction of anthropometric, physiological, psychological, and biomotor factors leads to the correct implementation of sports skills. Knowing these characteristics causes athletes to find their weaknesses and strengths and take action to eliminate or correct them. Proper body features are important in many sports. Achieving athletic success requires certain physical abilities, such as physical, biomotor, and bioenergetics characteristics. These factors all can play a role in the championship characteristics of elite athletes (1). Physical fitness characteristics indicate the ability to properly perform the skill and achieve success in athletes in active disciplines, such as fencing. The tests taken from these athletes help a lot in identifying and classifying athletes according to appropriate physical characteristics in this

field (2). Physiological and morphological talents such as fencing have been identified in martial arts. There are three fencing branches, foil, epee, and sabre, depending on the type of weapon, way of hitting, and scoring. In epee and foil, blows are struck with a point (the tip of a sword), while in sabre, in addition to points, the blows are also hit with the side of the blade. Valuable targets are the chest and back of each player in the foil weapon, from the waist up in sabre, and the whole body in epee (3). On the other hand, physical fitness is examined by studying anaerobic metabolism, maximum oxygen consumption, speed, strength, and maximum power in most sports research. In measuring anaerobic metabolism, it is possible to measure variables such as oxygen, blood lactate level, and muscle after exercise. Anaerobic power, a component of physical fitness, is an important biomotor ability in sports requiring short-term and fast activities with maximum power efficiency (4). Furthermore, in recent years, there has been a significant development in sports science. Knowing the body's composition and physical fitness factors, such as aerobic power, anaerobic power, and muscle strength, has contributed significantly to the development of various sports and athletes' talent. Evaluation of anaerobic power in athletes is very important, especially in some sports, such as fencing, which has fast and explosive movements. In the last two decades, athletes in this field have become more empowered and sports performance, especially anaerobic performance, has improved (5). Today, dietary and athletes worldwide use sports supplements, and proper and optimal consumption enhances performance and prevents sports injuries. Sports supplements are compounds or products that directly improve the athletic performance of athletes through quasi-pharmacological effects (6). The foremost compelling ergogenic aids are both perilous and unlawful: stimulants, anabolic steroids, and human development hormones. Various common alternatives are showcased as options. This article investigates the various supplements utilized for moving toward sports execution.

Two common supplements, creatine, and ginseng, have seemed to be proper ergogenic aids. Creatine, one of the best-selling and best-documented supplements for improving athletic execution, may be a normally occurring substance that plays an important role in generating vitality in the body. The body converts creatine to creatine phosphate, a type of put away vitality utilized by muscles. In theory, taking supplemental creatine will save creatine phosphate within the muscles to assist them in performing on request. Supplemental creatine may assist the body make creatine phosphate quicker when utilized by intense movement. Moreover, the nutraceutical herbal supplement, ginseng (Panax Ginseng C.A. Meyer; Araliaceae), has been used for thousands of years in Asian culture for its genetic properties, including stress management and fatigue resistance. It is no wonder that many investigations have sought to examine its potential as an ergogenic aid. Hosseini and Ganjbakhsh conducted research entitled "Effect of Resistance Training with Ginseng Supplementation on Body Composition, Muscle Strength, and Oxidative Stress in Athletes." The subjects practiced in their study for 6 weeks and 3 sessions per week. The latter research showed no noteworthy distinction between the post-test of all factors within the two groups. They concluded that the use of ginseng supplement along with resistance training does not have a double effect on the research variables compared to resistance training alone (7). Atashak and Setamdideh conducted a study entitled "The antioxidant Role of Ginseng Supplementation against Oxidative Stress Caused by Strenuous Exercise in Young Athletes." Their findings showed that the increase in malondialdehyde (MDA) immediately and 24 h after activity in the ginseng group was significantly higher than in the supplement group ($P = 0.001$). In addition, the activity of the superoxide dismutase (SOD) enzyme rose significantly in the ginseng group after the depleting activity compared to the creatine group ($P < 0.05$). In general, ginseng short-term supplementation inhibits the oxidative stress caused by debilitating aerobic activity by reducing MDA and increasing SOD activity in young athletes (8). Wax et al. also stated in a study entitled "Creatine for Exercise and Athletic Performance, with Improvements for Athletes" that fencing players seek to improve athletic performance, increase exercise adaptation, and reduce recovery time. Continuous studies show that creatine supplementation has positive ergonomic effects on single and multiple short-term and high-intensity exercises, in addition to strengthening the adaptation of exercise (9). Fencing is a dynamic sport with different movements, such as hitting, bending, running, and fast reactions, sometimes done very quickly and sometimes slowly. In order to perform these movements correctly in the professional levels of this field, all the physical capabilities of the body, including speed, endurance, power, coordination, agility, and balance, must be strengthened so that the person has the best performance. Today, regular physical activity and sports are widely supported by the medical and sports community. This support is due to the fact that physical activities and various sports exercises lead to the reduction of cardiovascular risk factors and prevent injury. To perform an exercise requiring a high amount of strength, the muscles must be properly active, and resistance training is one of the best exercises to increase muscle mass, strength, and stamina. Resistance training initially augments neuromuscular coordination, and as a result, this coordination leads to better perfor-

mance and improved athletic performance (10).

2. Objectives

The purpose of this double-blind, ginseng-controlled investigation was to examine the effects of creatine and ginseng on perception and physical performance measures, including aerobic and anaerobic strength and muscle strength, of the male players of the Iran national epee fencing team.

3. Methods

This quasi-experimental study with a pretest-posttest design was performed on two groups of creatine and ginseng as a double-blind ponder. A total of 14 male players of the national epee fencing team were divided into two groups of creatine and ginseng supplements. The creatine and ginseng supplements used in this study were produced by Mass Global company, USA, and were packed and distributed in Iran by PNC Company, which has approval from the Ministry of Health of the Islamic Republic of Iran. Subjects in both groups performed their typical workout with group training in three weekly sessions. The participants warmed up for 15 min in each preparation session, were restricted on a tall rope for 10 min, and practiced the methods for 20 min. Their final workout was 30 min (15-minute double game), with 5 min break between parts. Each workout session ended with 10 min of exercise to cool down. All subjects, except for team training, separately for three weeks, also had three weekly training sessions in the weight room and were asked to refrain from doing these exercises outside the team during the study. Subjects were asked to indicate the details of any exercise or recreational activity in the forms assigned to them. Creatine and ginseng supplements were divided into packs of 5 gr, and every 24 packs were packed in a plastic bag. A total of 20 bags, of which eight bags contained creatine and ginseng, and the other eight bags contained glucose, were separated by a person outside the study, and each bag was assigned to one person. Subjects started taking supplements the morning after the pre-test, consuming four of the 24 packages delivered to them in four servings each day. Subjects were advised to dissolve the contents of each packet in 250 cc (a glass of soft drink) lukewarm water and consume it with breakfast, lunch, dinner, and the last meal before going to bed.

Aerobic and anaerobic power were assessed by the Wingate test, which is intermittent pedaling on a bike ergometer to measure the amount of muscle power. The subjects were asked to sit on the isokinetic machine (CIN.COM, USA). Five repetitions were performed with the superior leg at a speed of 60 degrees per second. After a five-minute rest, they performed 50 repetitions at a speed of 180 degrees per second, which was the maximum voluntary inward (concentric) contraction in the quadriceps and hamstrings. In this way, the real work of the quadriceps (knee extension) and hamstring (flexion) muscles was calculated. Descriptive and inferential statistics were used for statistical description and analysis. Shapiro-Wilk test was used to assess normal data distribution. The means of the research variables were compared between the two groups of creatine and ginseng supplements using covariance analysis for each dependent variable. A statistically significant difference was considered in the level of P = 0.05. Data were analyzed by the SPSS software version 25.

4. Results

Table 1 shows the descriptive findings for the two groups of creatine and ginseng supplements. The mean weight after taking the supplement in the creatine group increased by 2.93, while this variable decreased after consuming ginseng.

Table 1. Demographic Characteristics of the Participants (Age, Height, Weight) [a]

Groups	Age (y)	Height (cm)	Weight (kg)
Creatine supplement (n = 7)	22.85 ± 0.57	183.22 ± 0.98	80.27 ± 0.84
Ginseng supplement (n = 7)	24.09 ± 0.73	187.65 ± 1.03	81.73 ± 1.18

[a] Values are expressed as mean ± SD.

4.1. Aerobic Power

According to Table 2, the mean aerobic capacity in the creatine supplement group (39.42) was different significantly from the ginseng supplement group (37.12) (P = 0.001). The higher mean aerobic power in the creatine group might show the more remarkable role of this supplement in increasing aerobic power.

4.2. Anaerobic Power

As shown in Table 2, the mean anaerobic power in the creatine supplement group (6.06) is different significantly from the ginseng supplement group (5.69) (P = 0.001), and the higher mean anaerobic power in the creatine supplement group may indicate the more significant role of this supplement in raising anaerobic power.

Table 2. Covariance Analysis to Compare the Effects of Creatine and Ginseng Supplement

Variables	Pre-test	Post-test	P-Value
Aerobic power			0.001
Creatine supplement	36.26 ± 0.27	39.42 ± 0.58	
Ginseng supplement	35.43 ± 0.43	37.12 ± 0.26	
Anaerobic power			0.001
Creatine supplement	4.18 ± 0.14	6.06 ± 0.72	
Ginseng supplement	4.27 ± 0.28	5.69 ± 0.83	
Muscle strength			0.001
Creatine supplement	13.19 ± 0.59	16.46 ± 0.33	
Ginseng supplement	14.17 ± 0.37	15.32 ± 0.51	

4.3. Muscle Strength

Table 2 demonstrates that the mean muscle strength in the creatine supplement group (16.46) was different significantly from the ginseng supplement group (15.32) (P = 0.001). The higher mean muscle strength in the creatine supplement group showed that creatine supplementation could remarkably increase muscle strength.

5. Discussion

The aim of the present study was the effect of six weeks of creatine and ginseng supplementation on the aerobic, anaerobic, and muscular strength of the male players of the Iranian epe fencing team. The results showed that the effect of creatine supplementation on positive changes in aerobic, anaerobic, and muscle strength was greater in the creatine supplementation group than in the ginseng supplementation group. Today, regular physical activity and sports are widely supported by the medical and sports community. This support is based on the existence of valid cognitive and clinical epidemiologic documents and evidences based on the fact that physical activities and various sports exercises and reducing cardiovascular risk factors, preventing injury and improving performance, etc., are of great importance (11). The level of training can have an effect on body composition and anthropometrics, in a way that it reduces weight and fat percentage. It can also be said that different sports fields require the presence of certain characteristics in the athletes of that field in order to ensure their success in competitions, and fencing is no exception to this rule, and access to correct information about physical fitness and anthropometric characteristics of elite athletes is essential. Sports field is necessary and necessary (12). Exercises cause changes and adaptations in the body, which are used according to the volume and duration of exercises to increase muscle mass and improve sports performance in the fields of health and well-being. In the meantime, nutrition has played a prominent role along with exercise to improve performance (13). Although many researches have investigated the effect of creatine and ginseng supplements on different subjects and have obtained different results, the amount of research conducted on athletes is very limited, and there is no result of the supplement effect so far. Creatine and ginseng have not been investigated in hockey players. If positive effects of creatine and ginseng supplements are reported in athletes, they may pay attention to using these supplements instead of using other drugs and supplements that can have irreparable harmful effects on health which is medically safe, and so far, no harmful effects have been reported in healthy people, and by using these supplements, achieve their expectations in the use of supplements and drugs (6). Gribaudo et al. investigated the effect of creatine supplementation on anaerobic power. In this 4-week research, amateur cyclists were divided into two groups: placebo and creatine, and at the end, there was no significant increase in peak power. Perhaps the main reason for the difference between this research and the current research is the training period in Gribaudo et al.'s research, where the creatine supplement could not show its effect (14). Ping et al. investigated the effect of creatine supplementation on aerobic capacity in hot and humid environments on nine running students of the University of Malaysia who received 200 mg of creatine daily. The subjects were divided into creatine supplement and ginseng groups and ran for 30 min four times a week. In the end, the findings showed that consuming 200 mg of creatine for seven days affected aerobic capacity, which could be due to being consistent with the duration of exercise per week. However, the climate factor did not affect their performance indicators (15). In a study by Kulaputana (16), the impact of ginseng supplementation on lactate threshold and anaerobic power was investigated. A workhorse was used for training, and the subjects consumed 3 gr of ginseng daily for 8 weeks. The results showed that at the end, there was no significant difference between the two groups (supplement and placebo) in exercise time, peak power, lactate threshold, and heart rate. The reasons for the inconsistency with the results of the current research can be the type of subjects, training protocol, and supplement dosage, which were used in this research from black people of the navy. Pieralisi et al. studied the influence of creatine supplementation with vitamins on muscle strength in 50 male exercise teachers for 6 weeks. Subjects in the creatine and ginseng supplement groups took two 200 mg capsules daily, one with a creatine capsule and the other with a vitamin capsule. They found that muscle

strength improved with creatine and vitamins, which is in line with the results of the present study (17).

5.1. Conclusions

According to the results of the current study, the role of creatine supplements in changing oxygen consumption, anaerobic control, and muscle quality can be more remarkable than a ginseng supplement. Moreover, higher mean muscle strength was observed in the creatine supplement group, showing the greater role of this supplement in raising muscle strength. According to this study, creatine supplementation and ginseng can favor athletes. It is hoped that in the future, athletes will replace these two supplements with other harmful medications and supplements and use these supplements to achieve their expectations of using supplements and medications.

Footnotes

Authors' Contribution: Study concept and design: A.Y.; Analysis and interpretation of data: A.Y.; Drafting of the manuscript: A.Y.; Critical revision of the manuscript for important intellectual content: T.B., N.N.; Statistical analysis: A.Y.

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