

The Effect of a Course of Glutamine Supplementation on Anaerobic Power of Adolescent Wrestlers in Khorramabad

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Abstract

The present study was conducted to compare the effect of a course of glutamine supplementation on anaerobic power of adolescent wrestlers in Khorramabad. For this purpose, 30 elite wrestlers from Khorramabad with an average age of (23.3 ± 3.3) years, average weight (73.6 ± 7.2) kg, and average height (172.8 ± 4.8) cm were selected voluntarily and randomly divided into two experimental groups of 15 (glutamine supplementation and regular wrestling exercises) and a control group (wrestling exercises only). Glutamine supplementation was administered for 10 sessions (0.3 g of supplement per kilogram of body weight per day for five days). 24 hours before the start of the study and 24 hours after the last supplement loading session, the anaerobic power of the two groups was calculated using the Wingate test (30 seconds). Data analysis was performed using independent and dependent t-tests using SPSS version 16 software. The results showed that glutamine supplementation significantly increased the anaerobic power of the experimental group ($P = 0.036$).

Keywords: Glutamine, anaerobic power, wrestler

Introduction

The progress and improvement of sports records, techniques, and tactics in the past hundred years is a sign of the expansion and expansion of scientific awareness and knowledge of sports researchers and coaches. Scientific findings in this field have played an important role in the organization and implementation of training programs for sports champions. Since new records are set every day in various sports disciplines in world competitions and the Olympic Games, sports physiologists are testing numerous programs to determine the minimum and maximum effective stimuli in improving athletes' performance. Because, in addition to hereditary factors and training programs and methods, the use of nutritional and sports supplements also play a decisive role in sports performance. However, there is little information about the optimal amount of these supplements and the superiority of each over the other in achieving the best level of performance.⁽⁵⁾

One of the sports supplements that has recently attracted the attention of athletes is glutamine. Glutamine is one of the most abundant free amino acids in the human body and constitutes 50-60% of the total free amino acid reserves in skeletal muscle and about 20% of the plasma amino acid reserves (4); and its main source is skeletal muscles, from where it is released into the bloodstream and transported to various tissues.⁽⁶⁾

Glutamine is known to play a regulatory role in several specific cellular processes, including body metabolism (such as oxidative fuel, gluconeogenesis precursor, and lipogenesis precursor), cell health (apoptosis, cell proliferation), protein breakdown and synthesis, contractile protein mass, redox potential, respiratory burst, insulin resistance, insulin secretion, and extracellular matrix (ECM) synthesis (10). Glutamine is also involved in the transfer of nitrogen from one organ to another and directly affects the balance of protein synthesis and degradation.⁽⁴⁾

Since glutamine is the most abundant free amino acid in the body, constituting 50 to 60% of the total free amino acids in skeletal muscle and about 20% of plasma amino acid pools, it is essential for homeostasis (including fluid balance, pH, and regulation of body temperature and heart rate) and the optimal function of a number of body tissues, especially the immune system and intestines (5). In their study, Akbarnejad et al. examined the effect of glutamine and creatine supplementation on the athletic performance of elite wrestlers after a period of acute weight loss. The results of their study showed that the anaerobic capacity of the wrestlers increased slightly in the glutamine group. Also, lactate tolerance increased in the glutamine + creatine combination group.

Wrestling is a native sport of our country that has also been considered in some other countries with slight differences, and this has made this sport one of the most popular sports in the Olympic Games. For this reason, various competitions at the general and international levels are held in this sport every year in our country and some other countries. One of the regulations of this sport is the athlete's participation in several heavy and intensive competitions in one day, which, given the nature of the energy supply systems in this sport (lactic acid and phosphagen), requires rapid restoration of lost energy reserves after each competition.

Given the current rules of wrestling, where the athlete is required to perform several high-intensity bouts on the day of the competition, and given the limited time after weigh-in until the start of the competition, finding ways to prevent the loss of lean body mass and other negative effects that occur in most wrestlers following rapid pre-competition weight loss, as well as restoring energy reserves and producing more power and maintaining it for subsequent stages of activity, is of particular importance for athletes who are losing weight, especially wrestlers.

On the other hand, it has always been important for researchers, coaches, and wrestling athletes to accelerate the recovery period by rebuilding and restoring lost ATP reserves so that the athlete can quickly regain lost energy reserves so that his performance is not impaired. However, proper and principled nutrition is very important in achieving the stated goals. Although the use of energy-boosting nutritional supplements such as glutamine by athletes has been going on for several years, not all aspects and areas of its function are yet well understood, and studies and research are still ongoing.

Many more are needed. The effects of creatine and glutamine supplementation (as previously mentioned) on aerobic capacity and the cardiovascular system require further study and investigation. Its beneficial and harmful side effects still contain many unknown and ambiguous points. The effects of taking this supplement along with resistance training, weight training and other exercises have been identified to some extent by various researchers in this field, but as mentioned, there are still many unknowns about the use of these supplements, their effects on the human body and the priority of each over the other.

Considering the current rules of wrestling, which require an athlete to complete several high-pressure and heavy matches in one day, as well as the intense training that wrestlers do in order to improve their sports performance. Finding strategies to maintain the health and well-being of the athlete and prevent the undesirable consequences of competitions and intense training on the athlete's body is mandatory. Similarly, the use of nutritional supplements that can maintain the normal functioning of the body's physiological systems, including the immune system, after intense activities also plays an important role in the success of wrestlers. Therefore, undoubtedly, conducting such applied research can open a new perspective on the use of sports supplements to prevent problems in competitive sports and be effective in raising athletes' awareness about the use of sports supplements and its consequences.

Considering the above, the present study will be conducted with the aim of investigating the effect of a course of glutamine supplementation on the anaerobic power of elite wrestlers in Khorramabad.

Research Methodology

The present research method is semi-experimental and applied in terms of purpose. The statistical sample of the research consisted of 30 elite wrestlers from Khorramabad who voluntarily participated in this research project and were divided into two groups of 15, control and experimental, after matching. The independent variables in

the present study included the consumption of a course of glutamine supplementation and the dependent variable was anaerobic power.

Glutamine supplementation was administered for 10 sessions for both groups. And it was as follows: 0.3 grams of the supplement per kilogram of body weight was consumed daily for five days. Since the consumption of glutamine supplementation is accompanied by exercise training, especially resistance training, and athletes who do strength sports usually use this supplement, therefore, in the present study, the subjects, along with the supplementation, also performed their daily wrestling training at high intensity during the protocol. In other words, during the protocol, which included 10 days of glutamine supplementation, the athletes performed their wrestling training continuously and at high intensity. 24 hours before the start of the study and 24 hours after the end of the supplement loading, the subjects were given an anaerobic power test.

Anaerobic power assessment (30-second Wingate test):

30-second Wingate test To measure peak, average, minimum anaerobic power, and fatigue index in the 30-second Wingate test, a Monarch 864 wheel ergometer made in Sweden was used. Before the test, the height of the wheelchair was adjusted to the length of the subjects' lower limbs (knee joint angle 170 to 175 degrees) and the required load for the test was adjusted to the subjects' body mass (75 grams per kilogram of body mass) (2). The subjects started pedaling at full speed to reach maximum speed. After that, the desired load was applied for 30 seconds. At the end of the test, peak power, average peak, and minimum peak indices were calculated using the special ergometer software.

Kolmogorov-Smirnov test, Levine test, dependent and independent t-test were used to analyze the data.

Research findings

Descriptive information related to the subjects' age, height, weight, and anaerobic power variables is presented in Table 1.

Table 1: Mean and standard deviation of subjects' age, weight, height, and anaerobic power

Control	Experimental	Variables	
23/4 ± 3/54	24/4 ± 3/42	Age (in years)	
174/3 ± 5/8	172/1 ± 4/4	Height (in centimeters)	
73/33 ± 6/99	73 ± 7/42	Weight (in kilograms)	
9/58 ± 88	9/58 ± 0/52	Pre-test	Peak Power
9/85 ± 0/35	9/82 ± 0/6	Post-test	
2/92 ± 0/39	2/84 ± 0/18	Pre-test	Min Power
2/95 ± 0/39	3/09 ± 0/18	Post-test	
6/25 ± 0/41	6/17 ± 0/26	Pre-test	Average Power
6/4 ± 0/27	6/46 ± 0/32	Post-test	

The results of the study indicated that a period of glutamine supplementation had a significant effect on the peak anaerobic power of elite wrestlers in Khorramabad ($P=0.036$). Also, a significant difference was observed between the changes in peak power of the two experimental and control groups (Table 2).

Table 2: Comparison and study of the effect of creatine and glutamine consumption on the peak anaerobic power of wrestlers

Independent T Sig.	t	t dependent Sig.	t	Mean and standard deviation		Anaerobic power (W/Kg)
				Post-test	Pre-test	
0/0001	7/08	0/036	-2/31	9/82 $\pm$ 0/6	9/584 $\pm$ 0/52	Experimental
		0/18	-1/41	9/853 $\pm$ 0/35	9/58 $\pm$ 88	Control

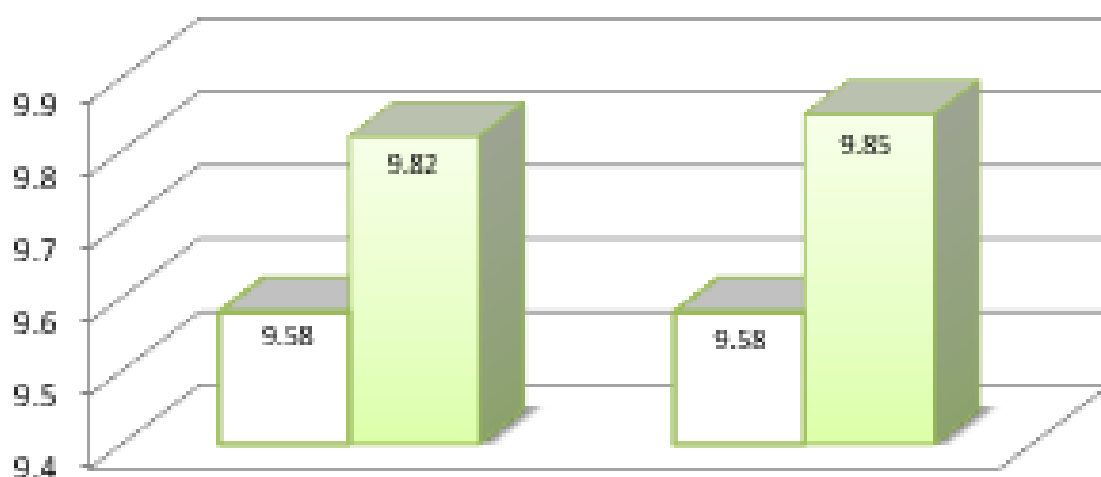


Figure 4-1: Comparison of pre-test and post-test changes in anaerobic power between the experimental and control groups

Discussion and Conclusion

The findings of the study showed that a period of glutamine supplementation had a significant effect on the anaerobic power of wrestlers. The above result is consistent with the findings of Insab et al. (3).

The possible reason for this increase could be the necessity of the amino acid glutamine for the body in certain conditions such as stress, overtraining syndrome, and when the natural process of nutrition is disrupted (especially during the weight loss period in wrestlers). Glutamine, as a substrate, plays a constructive role in the formation of glucose and regulates this process, which increases glucose production and muscle glycogen storage. Glutamine also exerts an anti-catabolic effect on muscle tissue by counteracting the lytic effect of cortisol and reduces the lytic mechanisms, which can be effective in preventing muscle breakdown in athletes during weight loss (2; 7). The results of this study on the use of a combined supplement of glutamine and creatine show that the anaerobic power of the subjects increased significantly from the pre-test to the post-test. There was also a significant difference between this group and the control group. These positive effects can theoretically be associated with increased TCr reserves, increased ATP regeneration during contraction, and increased PCr regeneration during the recovery period.

Research has also shown that glutamine plays a constructive role in glucose regulation. After exercise, muscle and liver glycogen stores are depleted, and glutamine plays a fundamental role in gluco-statics as a substrate for glucose formation and regulation of its levels through the process of gluconeogenesis, which may have a significant effect on increasing anaerobic power in this process. Maintaining the body's reserves and production of glucose and glycogen can increase anaerobic power (12).

Sources and References

1. Kashef Majid; Bonyan Abbas; Rad Morteza (2012), The effect of creatine supplementation and creatine-carbohydrate mixture on anaerobic capacity and cell damage indices (CK, LDH) in 15-18 year old male athletes, *Journal of Sports Biosciences*, Article 8, Volume 4, Issue 13, Pages 125-152
2. Coyle, E.F. and Coyle, E. (1993). "Carbohydrates that speed recovery from training". *Physician Sports Med.* 21: PP:111-123.
3. Jeansub J (2003). . Effects of cretine Supplementation on Body composition, muscle Strenght, and muscle power.
4. Hoffman, JR. Stout, JYR. Falvo, MAJ. Kang, J. Ratames, NSA. (2005) Effect of Low-Dose, Short-Duration Creatine Supplementation on Anaerobic Exercise Performance. *Journal of Strength and Conditioning Research* 19(2): 260-264.
5. Lopez, RM. Casa, DJ. McDermott, DP. et al. (2009) Does Creatine Supplementation Hinder Exercise Heat Tolerance or Hydration Status? A Systematic Review With Meta-Analyses. *Journal of Athletic Training* 44(2): 215-223.
6. Kinugasa R, Akima H, Ota A, Sugura K, Kuno SY. Short-term creatine supplementation dose not improve muscle activation or sprint performance in humans. *Eur J Appl Physiol* 2004; 91(2-3): 230-37.
7. Kocak S, Karli U. Effect of high dose oral creatine supplementation on anaerobic capacity of elite wrestlers. *J Sport Med Physical Fitness.* 2003; 43(4): 488-9.
8. Klinzing, J, E. and Karpowicz, W. (1986). "The effect of rapid weight loss and rehydration on a wrestling performance test". *J. Sports Med.* 26: PP:149-145.
9. Roschel, H. Gualano, B. Marquezi, M. Costa, A. Lanch, AH. (2009) Creatine supplementation spares muscle glycogen during high intensity intermittent exercise in rats. *Journal of the International Society of Sports Nutrition* 7 :6-12.
10. Stephen. P. B. (2003). "Creatine supplementation and exercise performance: A brief review". *J. Sports science and medicine.* PP:123-132.
11. Whitham M, Walker GJ, Bishop NC. (2006). Effect of caffeine supplementation on the extracellular heat shock protein72 response to exercise. *J Appl Physiol* 2006; 101: 1222-7.