

## Effects of Creatine Supplementation in Different Sports: A Review

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### Abstract

Creatine (Cr) is essential for the phosphagen pathway to function in the body. The purpose of oral Cr supplementation is to increase the amount of Cr in the body and specifically in skeletal muscle. The objective of this study was to analyze the effect of creatine supplementation on performance in different sports. Creatine intake was analyzed in soccer, swimming, triathlon, American football, cycling, and volleyball. In conclusion, comment that the intake of creatine has beneficial effects for sports practice, favoring greater performance in performing high-intensity sprints and in recovery between repetitions.

**Keywords:** supplementation, creatine, sports, performance.

### Introduction

Creatine (Cr) is a nitrogenous compound that is synthesized in the body from 3 amino acids: arginine, glycine and methionine. Cr is essential for the phosphagen pathway to function in the body and for this creatine needs a phosphate group to form phosphocreatine (PCr), this energy pathway being used for high-intensity, short-duration exercise [1].

Cr is synthesized in the body at a rate of 1-2 grams per day. Once Cr is synthesized, 90% of Cr is stored in skeletal muscle, with 60% as PCR and the remainder as free Cr. PCR is a key component for the resynthesis of ATP, favoring greater performance in motor actions of high intensity and short duration. Therefore, it has been estimated that supplementation with exogenous Cr may be key in those sports where the phosphagen pathway is used with some frequency [2]

The purpose of oral Cr supplementation is to increase the amount of Cr in the body and specifically in skeletal muscle. The intake of 5 g. of Cr increases its concentration in the blood plasma from 100 to 500 mmol/l 60 minutes after its

ingestion. There are different protocols for creatine intake. However, one of the most accepted is 2-5 grams of Cr/day. The most widely used Cr supplement in food supplements is creatine monohydrate (CrM). CrM has been used in different doses and sports evaluating muscle strength, muscle mass, body composition and performance in sprints [3].

With regard to the intake of creatine as a nutritional supplement, it must be taken into account that muscle tissue has a storage capacity of 150-160 mmoles of Cr per Kg of muscle, so ingesting an amount greater than what is needed has no benefits. In addition, the storage capacity of Cr depends on the degree of trainability of the subject, a very trained subject presents intramuscular deposits of Cr greater than those who are not very trained [3].

Cr intake does not cause any improvement in endurance exercise performance, however it can improve the recovery process after exercise. There is scientific evidence that the intake of Cr with an established protocol can improve performance, recovery and the delay of fatigue in the performance of intense exercise through short repetitions with

incomplete recovery of PCR. Therefore, the main effect of Cr supplementation seems to be closely linked to the increase in the rate of ATP replenishment through PCR [4].

The objective of this review is to check the similarities and differences of creatine monohydrate supplementation in practitioners of different sports such as soccer, cycling, triathlon, volleyball, swimming and American football.

### Material and Methods

A descriptive review study has been carried out with the aim of answering the following research question: Does creatine supplementation have the same effect in different sports?

To do this, a search was carried out in databases such as PubMed and Google Scholar in October 2022. In order to find as many articles as possible, the following keywords were used: creatine, football, supplementation, swimming, cycling, triathlon, volleyball and American football.

For the selection of articles, inclusion criteria were used, such as: articles published in the last 10 years, articles published in any country, articles on creatine supplementation; The following exclusion criteria were established: articles with a publication date greater than 20 years, articles with supplementation other than creatine, articles on sports other than those selected.

### Results

#### Creatine Supplementation in Soccer

Cr supplementation improves anaerobic power exercise performance in soccer players with a Cr load of 20-30g/day spread over 3-4 doses for 6-7 consecutive days and then for 9 weeks of Cr of 5g/day. Another effective dose is to take Cr for 14 days or more consecutively with a dose of 3 mg/kg/day [5].

#### Creatine Supplementation and Swimming Performance

Cr intake during high-intensity sprinting in swimmers reduces exercise-induced cortisol levels, which favors faster

post-exercise recovery by reducing overtraining [6]

Cr supplementation improves swimming performance during repeated sets as well as improves power development in swimmers. Cr intake shows better results on butterfly and breaststroke styles compared to freestyle [7].

Cr intake reduces lactate levels after intermittent sprints in swimming, improving performance. Cr supplementation in trained swimmers can improve anaerobic performance and heart rate variations, independent of the effect of high-intensity sprint swimming [8].

#### Effects of Creatine Intake on Cycling

Power development is greater at the beginning of repeated sprints in cycling, progressively decreasing up to 30 seconds. A 100-g Cr load has a greater effect on muscle power in cycling sprints than a 40-g load. All this is due to the fact that a high concentration of PCR prior to exercise improves the development of power in cycling [9].

In addition to the improvement in speed and power after Cr intake, effects have been shown on the performance of intermittent sprints distributed throughout the resistance exercise. This is due to increased cellular storage of Cr and resynthesis of PCR. The intake of Cr produces a greater performance in the realization of accelerations during cycling training or competition. Furthermore, Cr supplementation decreases lactate throughout incremental cycling exercise [10].

6-week Cr supplementation produced significant increases in mean and maximal power output during repeated sprint cycles when sprint durations were 15 seconds and recovery was 2 minutes [11].

#### Effects of Creatine Intake in Triathlon

Cr supplementation improves anaerobic performance in the final stretch of a triathlon event [12].

#### Creatine Supplementation in Volleyball

Cr intake for 10 weeks improves muscle power and strength in volleyball

players, improving their performance for sports practice [13]

### Creatine Supplementation in American Football Players

In a study conducted with creatine monohydrate supplementation for 9 weeks during an anaerobic training program in football players. It was shown how creatine supplementation improves the ATP-PCR system and allows faster recovery after intense exercise, allowing the soccer player to perform more exercise in the same period of time. It was established that Cr intake can increase muscle cell hydration by drawing extracellular water into the cell, in addition to stimulating protein synthesis [14].

### Conclusions and Future Directions

As conclusions of this review, it is highlighted that the intake of creatine has beneficial effects for the practice of sports, favoring greater performance, especially in the performance of high-intensity interval exercise. Not only the power and speed of execution are improved, but also the number of repetitions to perform and above all there is an improvement in muscle recovery, all of this is due to the improvement of the ATP-PCR system. More studies are needed on recovery between training sessions as well as the effects of different Cr salts, since each compound has a certain effectiveness and dose, as well as the most suitable type of compound for each sport practice.

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