

Effect of caffeine intake on exercise performance

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RESUMEN:

La cafeína (1,3, 7, trimetilxantina) pertenece al grupo de las metilxantinas (junto con la teofilina y la teobromina) que a su vez es un derivado del grupo de las xantinas. La cafeína tras su ingestión oral se absorbe rápida y completamente en el tubo digestivo. La cafeína se metaboliza en el hígado por una isoenzima del citocromo P-450 hepático. En adultos, dosis únicas de cafeína hasta 200mg (2 tazas de café) son seguras. El DSM recoge los criterios diagnósticos de intoxicación por cafeína. La Agencia Mundial Antidopaje (WADA) retiró la cafeína de su lista de sustancias prohibidas. El deporte tiene distintas modalidades y se clasifican en función de su obtención de energía: ejercicio físico aeróbico y anaeróbico. El objetivo general de este trabajo es conocer el impacto que tiene la cafeína en el rendimiento deportivo. El método llevado a cabo en este trabajo ha sido la recopilación de información de diferentes fuentes: PubMed, Google Académico, Science y manuales para a posteriori sintetizarla y realizar el trabajo. Los resultados muestran que varios estudios han demostrado los beneficios de la cafeína en el ejercicio anaeróbico permitiendo mayor volumen y fuerza; y en el ejercicio aeróbico reduciendo el esfuerzo percibido y la fatiga. El momento de ingesta también ha demostrado tener varios beneficios. La ingesta preentrenamiento mejora el rendimiento general al realizar el ejercicio y la ingesta post-entrenamiento mejora la recuperación. Estos beneficios pueden ser aplicados a varios deportes como el culturismo, el powerlifting o la halterofilia. En cuanto a deportes anaeróbicos, los deportes de resistencia en general se ven beneficiados. El momento de ingesta se puede utilizar para la reducción de fatiga durante el ejercicio además de recuperaciones de entrenamientos muy exigentes y consecutivos.

ABSTRAC:

Caffeine (1,3,7, trimethylxanthine) belongs to the group of methylxanthines (with theophylline and theobromine) is a derivative of the group of xanthines. The caffeine after an oral ingestion is absorbed quickly and completely in the digestive tract. Caffeine is metabolized in the liver by an isoenzyme of the hepatic cytochrome P-450. In adults, single doses of caffeine 200mg (2 coffee cups) are safe. The DSM collects the diagnostic criteria for caffeine poisoning. The World Anti-Doping Agency (WADA) removed caffeine from his list of banned substances. The sport have different modalities and is classify according to its obtaining of energy: aerobic and anaerobic physical exercise. The general objective of this work is to know the impact that caffeine has on sports performance. The method carried out in this work has been the compilation of information from different sources: PubMed, Google Academic, Science and manuals to subsequently synthesize it and carry out the work. The results indicated that several studies have verified the

benefits of caffeine in anaerobic exercise provide greater volume and strength; and in aerobic exercise reducing perceived effort and fatigue. At the moment of ingestion has also obtained several benefits. Pre-workout intake improves overall performance during exercise, and post-workout intake improves recovery. These benefits can be applied to various sports like bodybuilding, powerlifting or weightlifting in terms of anaerobic sports. Endurance sports in general are benefited. The moment of intake could be used for a reduction of the fatigue during exercise also for recoveries from very demanding and consecutive workouts.

PÓSTER:

EFFECT OF CAFFEINE INTAKE ON EXERCISE PERFORMANCE

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INTRODUCTION AND OBJECTIVE

Caffeine (1,3,7 trimethylxanthine) is a methylxanthine, present in more than 60 plants such as coffee or tea.

Pharmacokinetics: The ingestion is oral. The maximum concentration in blood occurs between 30-120 minutes. Factors that influence absorption: dose, characteristics of the drink, food and the digestive tract. Average duration: 3 or 4 hours.

Pharmacodynamics: It is metabolized in the liver by a hepatic cytochrome P-450 isoenzyme.

Recommended dose and toxicity according to DSM manual: 200 mg (3 mg/kg) – 400 mg (5,7 mg/kg) dose safe (2 cups- 4 cups). More than 500 mg/day is toxic.

The World Anti-Doping Agency (WADA) removed caffeine from his list of forbidden substances in 2004. Currently caffeine is in the monitoring program in competition.

Sport: All forms of physical activities that aim at the expression or improvement of physical and mental condition, the development of social relationships or obtaining competitive results at all levels. Two modalities:

Anaerobic (bodybuilding, powerlifting and weightlifting)

Aerobic (resistance exercise)

The objective is to know the effects of caffeine on physical exercise with the available information.

METHOD

Collection of information from various sources: Pubmed, Google Scholar, and Science, manuals.

Anaerobic (Bodybuilding, powerlifting and weightlifting): Increased mechanical tension, greater tolerance to metabolic stress, lower perceived RPE, and more efficiency when exerting force.

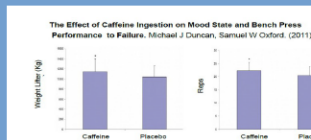
Aerobic or endurance sports (Marathon or cycling): Performance increase due to fatigue delay and less perceived exertion (RPE), glycogen storage, lipolysis and fatty acid oxidation; and decrease VO₂.

Preworkout: Performance improvement and fatigue delay. All sports benefit.

Post workout: Better recovery and glycolytic resynthesis. Demanding workouts and consecutive training days or both

RESULTS

Anaerobic: Increased workload and increased exercise force.



Caffeine enhances upper body strength in resistance-trained women. E. Goldstein, P. L. Jacobs, M. Whitehurst, T. Penholowand J. Antonio (2010).

Bench Press	Placebo	Caffeine
Maximum Repetition (1RM)	52.1±11.7	52.9±11.1*
60% 1RM	23.0±7.1	23.1± 6.2

*Indicates significant difference between conditions, p<0.005

Aerobics: Reduced perception of effort (RPE), preservation of glycogen and delay fatigue

Effects of caffeine ingestion on rating of perceived exertion during and after exercise: A meta-analysis. M Doherty, P M Smith (2005).

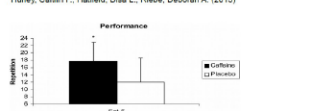
- Caffeine reduced rate of perceived exertion (RPE) during exercise: 5.8% (-4.5% to -5.7%)
- Improved physical exercise performance: 11.2% (4.6% -17.8%)
- Regression analysis: the RPE obtained could be a 29% variation of performance improvement during the exercise.

Caffeine as a Lipolytic Food Component Increases Endurance Performance in Rats and Athletes. S. Ryu, S. K. Choi, S. S. Joung, H. Suh, Y. S. Cha, S. Lee, K. Lim (2001)

- Less respiratory exchange
- Increase of free fatty acids in blood. Reduced glycogen utilization
- Increased fatigue onset time

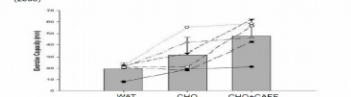
Pre-workout: Intake before physical exercise improved performance

The Effect of Caffeine Ingestion on Delayed Onset Muscle Soreness. Hurley, Caitlin F.; Hatfield, Dina L.; Riebe, Deborah A. (2013)



Post-workout: Large amount of caffeine with carbohydrates helps build muscle glycogen after exercise

High Rates of Muscle Glycogen Replenishment After Exhaustive Exercise When Carbohydrate Is Coingested With Caffeine. D. J. Pedersen, S. J. Leckey, V. G. Coffey, E. G. Churchley, A. M. Woolton, Tracy Ng, M. J. Watt, J. A. Hawley (2006)



CONCLUSIONS

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