

Caffeine and the Adolescent Athlete

Teralyn Bach, Alec Clawson, and Andrew Creer, PhD.

Utah Valley University

Background

Caffeine intake is common among youth and has become increasingly popular among youth athletes due to the perceived ergogenic benefits; however, there may be serious negative side effects to caffeine intake as well. The National Interscholastic Cycling Association (NICA) considers caffeine a B-list prohibited substance, stating that caffeine is an addictive substance inappropriate for young-student athletes (3). With the prevalence of caffeine intake in this demographic, it is important for to understand how caffeine works, in addition to negative side effects that may occur due to overconsumption or improper use.

How does caffeine affect athletic performance?

Caffeine is a psychoactive ingredient that is rapidly absorbed after ingestion. Caffeine works by blocking adenosine receptors in the central nervous system resulting in lower pain perception and increased skeletal muscle contractility during exercise (4). A fairly robust body of evidence exists demonstrating the ergogenic benefits of caffeine on sports performance, including aerobic and anaerobic exercise, with most benefits seen when consuming ≥ 3 mg/kg (3-6mg/kg) in the hour leading up to competition, although lower doses may also be effective (5).

Negative side effects of caffeine ingestion include trouble sleeping, anxiety, high blood pressure, arrhythmia, seizures, cardiovascular issues such as tachycardia or heart palpitations. These side effects are typically associated with moderate to high intakes in youth (> 3 mg/kg/day) but can be seen at lower doses as well (2,4,5). Side effects associated with regular overconsumption of caffeine may negatively impact training adaptations by interrupting regular training and recovery patterns. Additionally, caffeine associated tachycardia, and anxiety may negatively impact competitive performance.

To date there are no reported safe dosages for youth, although 2.5 mg/kg/day has been suggested (4). This would imply that a young athlete with a body mass of 50kg should consume no more than 125 mg of caffeine/day. A major source of caffeine for high school athletes is energy drinks: a third of all teenagers report drinking them regularly and 43-77% of students 13-18 years old have had an energy drink before. Due to the caffeine content in energy drinks (~160mg/16oz), consumption of a single energy drink could easily cause a young athlete to exceed the adverse-effect daily level of intake (2,4).

What does this mean for young athletes?

The verdict is still out on the benefits of caffeine consumption in youth athletes, and the negative side effects of overconsuming caffeine may far outweigh the potential benefits. As a result, caffeine and energy drink consumption is not recommended for children and adolescents at any dosage (4). Young athletes have a much larger potential for performance improvements through maturation and experience, and emphasis should be placed on prudent training and whole food-based nutrition practices to maximize performance as opposed to supplements, even when safe supplements are being considered (1).

Encouraging young, developing athletes to adhere to proper training, nutrition, and recovery practices will have a much greater performance impact than can be provided by supplements and ergogenic aids. Additionally, understanding how ergogenic substances such as caffeine work, along with potential risks involved with consumption (including negative side effects and potential time penalties/disqualification from NICA events) will help guide youth athletes toward healthier, safer performance strategies that prioritize long-term development over short-term gains.

References:

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