

Exercise-associated muscle cramps

With the humidity and heat just around the corner in Hong Kong, and James' recent shocker of a race where he cramped through the whole run in La Paz, I felt that it would be a good time to review the current research on cramps.



What is a muscle cramp?

A muscle cramp is a sudden, involuntary, painful contraction of a muscle that is often accompanied by a palpable knot within the muscle (Minetto, Holobar, Botter, & Farina, 2013). Cramps that occur during or after exercise but without any underlying pathology have been termed exercise-associated muscle cramps (EAMC) (Schwellnus, Derman, & Noakes, 1997). Exercise-associated muscle cramps are common in triathletes with 67% complaining of them under various training conditions (Kantarowski, Hiller, & Garrett, 1990).

Presentation of cramps

Cramps present with certain unique clinical features:

- Acute pain with possible soreness that can last for several days;
- Visible bulging or knotting of the muscle
- An involuntary sudden onset with gradual spontaneous resolution with stretching;
- Involve only one muscle or a part of it;
- Associated with both modest and/or forceful contractions of shortened muscles; and
- Occur preferentially in calf and foot muscles, followed by the thigh muscles (hamstrings and quadriceps).

How are cramps caused?

Several risk factors exist for EAMC and include family history of cramping, previous occurrence of cramps during or after exercise, increased exercise intensity and duration, and inadequate conditioning for the activity (Schwellnus, 2007, 2009; Schwellnus et al., 1997).



Despite several risk factors for EAMC, the cause of cramps is unknown and controversial (Bergeron, 2008; Miller, Stone, Huxel, & Edwards, 2010; Schweltnus, 2009; Schweltnus et al., 1997). Traditionally, dehydration and other factors associated with exercise in hot and humid environments are given as explanations. However recent evidence suggests a neuromuscular cause (Schweltnus, 2009). One hypothesis is that cramps result from spontaneous discharge of the motor nerves or an abnormal excitation of the motor axons. The other neuromuscular hypothesis is the increased or hyper-excitability of the motor neurons. Further detail on the hypothetical causes of cramps can be ([Minetto, 2013](#)).

Treatment

The lack of experimental data on the cause of cramps has led to the proliferation of treatments, which tend to be anecdotal and unsupported by research. These include ingesting mustard, pickle juice, sports drinks, cryotherapy, thermotherapy, massage, decreasing exercise intensity, body position, intravenous infusion, and transcutaneous electric nerve stimulation (TENS) therapy (Miller et al., 2010).

The traditional dehydration theory suggests that ingesting fluids containing electrolytes can treat EAMC. The National Athletic Trainers' Association has recommended adding 0.3 to 0.7 g/L of salt to drinks to prevent muscle cramps, whereas others have recommended higher amounts (about 3.0 to 6.0 g/L) to sports drinks (Bergeron, 2007; Binkley, Beckett, Casa, Kleiner, & Plummer, 2002).

Other treatments for cramping include:

- Stretching – moderate stretching of the affected muscle has been shown to be effective for EAMC and other types of muscle cramps (Maquirriain & Merello, 2007; Miller et al., 2010; Schweltnus et al., 1997). It is also the most common treatment for EAMC.
- Massage of the affected musculature
- Application of cryotherapy may temporarily relieve discomfort
- Quinine – “There is low quality evidence that quinine (200 mg to 500 mg daily) significantly reduces cramp number and cramp days and moderate quality evidence that quinine reduces cramp intensity. There is moderate quality evidence that with use up to 60 days, the incidence of serious adverse events is not significantly greater than for placebo in the identified trials, but because serious adverse events can be rarely fatal, in some countries prescription of quinine is severely restricted” (El-Tawil et al., 2015)

Once a cramp has been alleviated, it is recommended to seek advice from a health care professional to determine the factors involved in the cramping (e.g. diabetes mellitus, thyroid disease).

Prevention of cramps

Strategies to assist in the prevention of cramps include:

- Maintaining good hydration and electrolyte levels by monitoring fluid loss with replacement during and after exercise. An easy method of ensuring adequate fluid replacement is by monitoring an athlete's body weight
- A balanced diet is important to assist in fluid and electrolyte replacement
- Hydrate prior to competition by drinking a litre of water or sports drink at least 1 hour beforehand
- Plyometric exercises may assist in eliciting neuromuscular adaptations
- Endurance training may delay neuromuscular fatigue

Until next month, happy racing!



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