

Role of Diet as a Mediator between Exercise and Pain: a Friend or a Foe?

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Abstract

This short communication explores the intervening role of dietary supplementation on the inter-relationship between exercise and pain. There were two studies on caffeine, three studies on ginger, one study on fluid intake, one study on magnesium, and one study on herbal supplement ephedra. Existing evidence points out the apparently beneficial role of caffeine and oral magnesium supplements, inconsistent role of ginger, and potentially harmful role of herbal supplement ephedra and reconstituted fruit juices with high carbohydrate content on muscle performance and exercise-induced muscle pain. This article highlighted the role of dietary supplements in mediating the interaction between exercising and pain, which is important for clinicians and researchers using nutritional and diet interventions as adjunct to exercise therapy for people with primary complaints of pain.

Keywords: Exercise Dietetics; Nutritional Physiology; Analgesic Diet; Nutritional Analgesia.

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Caffeine

Astorino et al [1] assessed the effect of caffeine on rating of perceived exertion (RPE) and pain perception in 10 active women who completed an 8.2km "all out" time trial on each of 3 days separated by at least 48h. Following the initial phase, the participants randomly ingested anhydrous caffeine and glucose (each 6mg/kg bw+each 6mg/kg bw glucose) or placebo (each 6mg/kg bw of glucose) 1h pre-exercise. Despite not altering ($P>0.05$) RPE, HR, or leg pain, Caffeine improved cycling performance and power output, but not RPE, HOUR or leg pain.

Motl et al [2] examined the effect of ingesting a large dose of caffeine on perceptions of leg muscle pain during moderate intensity cycling exercise in 16 college-aged males who ingested either caffeine (10 mg x kg⁻¹ body weight) or placebo and 1 hour later completed 30 minutes of moderate intensity cycling exercise (60% VO_{2peak}). Leg muscle pain ratings were found to be significantly and moderately reduced after a high dose of caffeine.

Ginger (Zingiberofficinale)

Black et al [3] examined the effects of 11 days of raw (study 1) and heat-treated (study 2) ginger supplementation on muscle pain in 34 and 40 volunteers, respectively. Participants performed 18 eccentric actions of the elbow flexors to induce pain and inflammation. This study demonstrated that daily consumption of raw and heat-treated ginger resulted in moderate-to-large reductions in muscle pain following exercise-induced muscle injury.

Black and O'Connor [4] examined the acute effects of ginger on muscle pain, inflammation and dysfunction induced by eccentric exercise in 27 participants who performed 24 eccentric actions of the non-dominant elbow flexors. Participants who consumed ginger 24 h after exercise was reported to have reduced arm pain the following day and 48 h after exercise. The study concluded that ginger did not attenuate eccentric exercise-induced muscle pain,

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inflammation or dysfunction 45 min after ingestion, with minimal beneficial effect on the day-to-day progression of muscle pain.

Black and Oconnor [5] studied the effects of an oral dose of ginger on quadriceps muscle pain, rating of perceived exertion (RPE), and recovery of oxygen consumption during and after moderate-intensity cycling exercise in 25 college-age participants who ingested a 2-g dose of ginger or placebo in a double-blind, crossover design and 30 min later completed 30 min of cycling at 60% of VO₂ peak. Compared with placebo, ginger had no clinically meaningful or statistically significant effect on perceptions of muscle pain, RPE, work rate, HR, or VO₂ during exercise.

Fluid Intake

Morton et al [6] investigated the effect of ingested fluid composition on the experience of exercise-related transient abdominal pain (ETAP) in 40 subjects, who completed 4 treadmill exercise trials: a no-fluid trial and flavored water (FW, no carbohydrate, osmolality = 48 mosmol/L, pH = 3.3), sports drink (SD, freshly mixed Gatorade, 6% total carbohydrate, 295 mosmol/L, pH = 3.3), and reconstituted fruit juice (FJ, BERRI trade mark orange, 10.4 % total carbohydrate, 489 mosmol/L, pH = 3.2) trials. The study results indicated that in order to avoid ETAP, susceptible individuals should refrain from consuming reconstituted fruit juices and beverages similarly high in carbohydrate content and osmolality, shortly before and during exercise.

Magnesium

Shechter et al [7] examined the impact of oral magnesium on clinical outcomes, such as exercise-induced chest pain, exercise tolerance, and quality of life in 187 patients with CAD who were randomized to receive either oral magnesium 15 mmol twice daily or placebo for 6 months. Magnesium treatment significantly increased exercise duration time and lessened exercise-induced chest pain, with improvements in Quality-of-life.

Herbal Supplement Ephedra

Stahl et al [8] reported a rare case of severe rhabdomyolysis provoked by ingestion of a performance-enhancer herbal supplement containing ephedra in a healthy 21-year-old Army soldier who

complained of "complete muscle failure" after collapsing at the end of Army Physical Fitness Test.

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