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Honey: An Alternative Sports Gel

Richard B. Kreider, PhD, FACSM, EPC;
Christopher J. Rasmussen, CSCS; Stacy L. Lancaster, CSCS;
Chad Kerksick, CSCS; and Michael Greenwood, CSCS*D
Exercise and Sport Nutrition Laboratory
Department of Human Movement Sciences and Education
The University of Memphis

Ann C. Grandjean
Column Editor

IT IS WELL KNOWN THAT INGESTing carbohydrates prior to and during endurance exercise can improve performance capacity. The primary means of enhancing carbohydrate availability prior to exercise has been by ingesting carbohydrate-rich snacks, whereas the ingestion of sports drinks (glucose/electrolyte solutions) has been shown to enhance carbohydrate availability during exercise. Ingesting carbohydrates and protein within 2 hours following exercise (e.g., 1.5 g/kg carbohydrate and 0.5 g/kg protein) has been reported to increase glycogen resynthesis and protein synthesis, promote a more optimal anabolic hormonal environment, and improve immune function. Theoretically, optimizing availability of carbohydrates prior to and during exercise as well as following exercise can help optimize exercise performance and recovery, which lead to greater training adaptations (5).

Although these may seem rather simple recommendations, different types and forms of carbohydrates have varying affects on the delivery of carbohydrates to the muscle and anabolic hormones. In this regard, the type and form of carbohydrate ingested may affect the digestion rate, glucose release in the blood, and insulin response.

Over the last few years, researchers in the Exercise and Sport Nutrition Lab at the University of Memphis have been evaluating the effects of ingesting various types of carbohydrate gels prior to and during exercise on exercise capacity, as well as the effects of different types of carbohydrate/protein powders following exercise on recovery (2–6). The rationale has been to try to determine the optimal type of carbohydrate to ingest prior to, during, and/or following resistance and endurance exercise. An additional goal was to determine whether honey (in gel and powder form) can serve as a natural and less expensive source of carbohydrates.

Our most recent study evaluated the effects of ingesting honey on blood glucose, insulin, and cycling performance prior to and during endurance cycling. Our rationale was based on results of our initial study in this series (3, 6), which found that the carbohydrate profile and glycemic index response of honey was nearly identical to that of a popular sports gel. Moreover, contrary to anecdotal myth, we found honey did not promote physical or psychological signs of hypoglycemia in fasted subjects (3, 5), during resistance training (1), or following resistance training (1, 2). In this study, 9 well-trained male cyclists performed three 40-mile time trials on their own racing bicycle attached to a computerized race simulator. Each race was separated by 1 week. Subjects were asked to prepare for each time trial as they would for a competitive race and to follow similar dietary intake the day before each time trial. In a double-blind, randomized, and counterbalanced manner, subjects ingested 15 g of a noncaloric flavored gel placebo, a dextrose gel, or honey with 250 mL of water prior to and every 10 miles during each time trial. The placebo and carbohydrate gels were packaged in generic foil packets for double-blind administration. Blood samples were taken prior to and every 10 miles during the race. In addition, power output, split times, heart rate, and ratings of

perceived exertion were determined throughout the time trials. Subjects were paid based on their performance during each time trial in order to encourage their best effort.

Results revealed that the subjects tolerated the gels well with no complaints of symptoms of hypoglycemia or gastrointestinal upset. Total time to perform the time trials (placebo 131.3 ± 3.6 minutes, dextrose 128.3 ± 3.8 minutes, and honey 128.8 ± 3.5 minutes; $P = 0.02$) was significantly faster when subjects ingested the dextrose and honey gels compared with the placebo. Average power (placebo 164 ± 11 W, dextrose 175 ± 13 W, and honey 174 ± 12 W; $P = 0.002$) was also significantly higher when subjects ingested the carbohydrate gels during exercise. Additionally, mean heart rate (placebo 171 ± 6 b/min, dextrose 178 ± 7 b/min, and honey 177 ± 5 b/min; $P = 0.08$) and glucose (placebo 5.4 ± 0.2 mmol/L, dextrose 5.8 ± 0.3 mmol/L, and honey 6.0 ± 0.4 mmol/L; $P = 0.10$) values tended to be higher in the groups ingesting carbohydrates during the time trials. No significant differences were observed in insulin (placebo 5.3 ± 0.3 mIU/mL, dextrose 5.1 ± 0.2 mIU/mL, and honey 6.0 ± 0.8 mIU/mL; $P = 0.29$). These findings indicate that ingesting dextrose and honey gels during endurance cycling can improve performance presumably by enhancing carbohydrate availability and work output. Moreover, honey can serve as an effective and less expensive source of carbohydrate gel. ▲

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