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Effects of Bee Bread Supplementation on Anaerobic Components in Male Athletes

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Research Article

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Abstract

Nutritional strategies are the common types of ergogenic aids used by athletes to enhance their sports performance. Scientific data on the ergogenic effects of bee products consumed at pre exercise on anaerobic sports performance is scanty. This study investigated the effects of 8-week bee bread supplementation at pre exercise on anaerobic components in male athletes. Twelve male athletes (age: 24.0 ± 1.8 years old; BMI: 22.3 ± 1.3 $kg.m^{-2}$; VO_{2max}: 52.0 ± 2.8 $mL.kg^{-1}.min^{-1}$) were recruited in this study. Participants consumed either bee bread at a dosage of 20 $g.d^{-1}$ or placebo for 8 weeks prior to the experimental trial. Participants' anaerobic components such as mean power, peak power, anaerobic capacity and anaerobic power was measured before and after 8 weeks of experimental period. Statistical analyses were performed using ANOVA with repeated measures. There were no significant different in mean power, peak power, anaerobic capacity and anaerobic power between placebo and bee bread trial at pre and post supplementation test. Supplementation of bee bread for 8 weeks at a dosage of 20 g daily didn't enhance anaerobic components in male athletes.

Keywords: Mean power; Peak power, Anaerobic capacity; Anaerobic power; Sports performance

Introduction

Bee products have been used thousand years ago as a healthy supplement. Bee products such as honey, bee pollen, bee bread and royal jelly can be used as potential ergogenic aid due to its nutrition content. To date, several studies found that bee products has anti-inflammatory [1,2], antitumor [3], anti-allergic [4], antioxidant [5-8], antimicrobial [9-11], anti-mutagenic [12], and antitumor [13] properties.

There are limited studies on effect of bee products supplementation on sports performance. For instances, Earnest, et al. [14] reported that supplementation of honey at a dosage of 15g every 16 km during a simulated 64-km cycling time trial was significantly faster to

complete time trial in comparison with placebo trial. Shukri, et al. [15] found that ingestion of 500 ml of honey drink one hour before trial and 3 mL. Kg body weight^{-1} of cool honey drink every 20 minutes during the running trial was as good as a sports drink in improving running time trial performance and has similar effects on blood glucose in a hot environment. Nechaeva [16] reported that ingestion of 10 g of pollen for 15 days among Russian sport female students significantly improved viso-motoric reaction in comparison with the placebo trial. However, Abbey and Rankin [17] reported that acute supplementation of honey beverage at a dosage of 1g.kg body weight^{-1} before and during soccer- stimulation test did not significantly improve progressive shuttle-run (PSR) test to exhaustion in comparison with the placebo trial. However, no study has been carried out to investigate the possible beneficial effects of bee bread supplementation on anaerobic components. Therefore, the aim of this study was to investigate effects bee bread supplementation at pre exercise on anaerobic components in male athletes.

Methodology

Twelve male athletes were recruited in this study. Participants were asked to refrain from heavy exercise for 24 hours before the tests to ensure that they have adequate rest before the experimental trials. Their food diary and physical activity diary for the last 72 hours were also collected. Participants recorded their food intake for 3 days prior to the first trial and repeated the same diet over 3 days before the days of consecutive trials. This was done to minimize the differences in muscle glycogen between the trials.

Excalibur Sport Ergometer (Lode Groningen, Netherlands) was used to measure anaerobic components of the participants via the Wingate anaerobic test. Wingate anaerobic test is a 30 seconds all out exhaustive ergometer test. All participants were fully informed about the procedures of Wingate anaerobic test before performing this test. Participants familiarised with the Wingate test procedure before the actual trial. Body weight of participants were collected using an electrical body composition analyser (Tanita: Model TBF-410, Japan) prior the testing.

To begin the test, participants selected their optimal seat height on Excalibur Sport Ergometer. Particpants were required to warm up by pedaling up to 60 rpm for 5 minutes. After the warm up, participants were requred to maintain 1 minutes of cycling at 60 rpm and 10 second countdowm prior to 30 seconds of Wingate test. During the test, participants were required to pedal as fast as they could for 30 seconds. Similar verbal encouragement was given to the participants so that they tried their utmost best to complete the test. Once completed the subject were requested to cool down by pedalling without resistance for about 5 minutes.

All the statistical analyses were computed by using the Statistical Programme for the Social Sciences (SPSS) version 22.0 (SPSS Incorp, United States). The level of significance for all analysis was set at $p<0.05$. All the collected data were expressed in mean and standard deviation (SD). ANOVA with repeated measures was used to determine the differences of the measured anaerobic components parameters over time and between trials. Bonferroni adjustment for multiple comparisons was used to locate the differences when repeated measures analysis of variance revealed a significant main effect of time.

Results

The mean body mass index (BMI) of the participants was categorised as normal and healthy. Mean maximum oxygen consumption (VO_{2max}) reflected that the participants had good cardio-respiratory fitness (Table 1).

Physical characteristics and anthropometry measurement	Mean ± SD
Age (years)	24.0± 1.8
Body mass (kg)	67.4± 6.2
Height (cm)	173.7 ±6.1
Body mass index (kg.m^{-2})	22.3 ± 1.3
VO_{2max} (mL.kg^{-1}. min^{-1})	52.0 ± 2.8

Table 1: Mean and SD of physical characteristics and anthropometry measurements of the participants

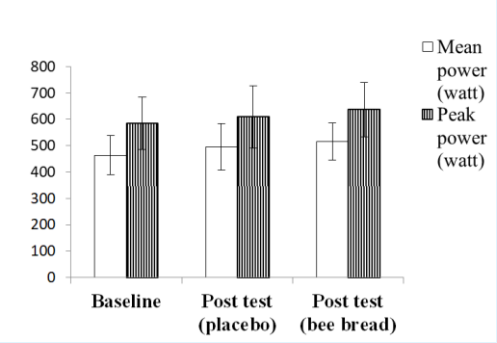

Figure 1: Mean power and peak power of the two trials. Data are presented as mean ± SD.

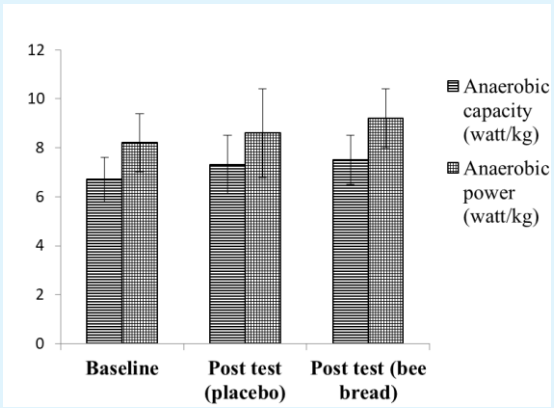

Figure 2: Mean anaerobic capacity and anaerobic power of the two trials. Data are presented as mean ± SD.

There was no significant difference in mean power, peak power, anaerobic capacity and anaerobic power between pre and post tests in both trials ($p>0.05$). Mean and SD of anaerobic mean power and peak power is shown in Figure 1 while anaerobic capacity and anaerobic power is shown in Figure 2.

Discussion

This present study found that mean power, peak power, anaerobic capacity and anaerobic power after 8 weeks supplementation in the bee bread trial was no significant difference compared to the placebo trial. This finding indicated that 8-week supplementation of bee bread did not significantly enhance anaerobic components compared to the placebo trial. This was the first study carried up to investigate bee bread supplementation on anaerobic components. This finding was in agreement with the previous finding reported that honey [18], carbohydrate [19], protein [20], whey protein and casein [21] and betaine [22] supplementation did not enhance anaerobic performance.

Woolfolk, et al. investigated the effect of honey on anaerobic performance among male collegiate soccer players. Participants ingested one of three different supplements i.e. 9.5 oz. of flavoured water, 9.5 oz. of PowerAde, and 1 tablespoon of honey mixed with 3 oz. of water for a week. During the tests, participants performed a repeated anaerobic sprint test (RAST). This previous study found that supplementation of honey at the prescribed dosage did not significantly improve anaerobic performance compared to the flavoured water. In another study, Pritchett, et al. demonstrated that supplementation of an energy bar containing 20 g of carbohydrate, 12 g of protein and 4.5 g of fat at 60 minutes before cycling on Wingate test did not significantly increase anaerobic power in comparison with the placebo trial.

Bee bread has high content of protein and the present finding was similar with the previous findings which also reported that protein supplementation did not enhance anaerobic exercise performance [20-22]. Kerksicket, et al. found supplementation of 40 gram of whey protein and 8 gram of casein did not significantly increase anaerobic power compared to the placebo group. Another study by Hoffman *et al*. reported that participants of supplemented group who consumed protein at 24% from total energy intake per day for 12 weeks did not show any significant increase in peak power and mean power compared to the placebo group. Hoffman, et al. demonstrated that 15 days of Betaine supplementation, which it is a trimethyl derivative of the amino acid glycine at a dosage of 1.25 g per day did not significantly enhance mean power and peak power measured via Wingate test compared to the participants in the control group.

The present study found that bee bread supplementation at a dosage of 20 g per day for 8-week did not contribute ergogenic effect on anaerobic components. It is speculated that bee bread supplementation did not enhance creatine phosphate storage in the skeletal muscle and did not seem to contribute to the phosphagen system or adenosine triphosphate-creatine phosphate (ATP-CP) system to produce energy during the anaerobic power exercise. The phosphagen system is the predominant energy system for anaerobic exercise and limited storage of creatine phosphate in skeletal muscle will lead to the fatigue.

Although bee bread contains glucose, protein, free fatty acid, multi vitamin and mineral [5-6], it did not seem to exert any ergogenic effect on anaerobic exercise performance. Phosphagen system is an oxygen-independent to re-synthesis and regeneration of adenosine triphosphate (ATP), and neither carbohydrate, protein nor fat is used in this phosphagen system to produce adenosine triphosphate (ATP) during anaerobic exercise performance. Specific training methodologies such as speed, power and strength training are very important factors to enhance the anaerobic components of the athletes. In the present study, participants did not go through any specific training programme and may explain why no improvement in the anaerobic components was observed. Thus, bee bread

supplementation alone without any specific training programme did not affect the contractile properties of the muscles that may improve the anaerobic components of the participants.

Conclusion

Supplementation of bee bread for 8 weeks at a dosage of 20 g daily didn't enhance anaerobic components compared to the placebo in male athletes.

Conflict of Interest

The author declare no conflict of interest

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