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The effect of different doses of caffeinated coffee on energy intake and appetite feelings of healthy male and female volunteers

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Few studies have explored the effects of coffee/caffeine on appetite-related feelings and energy intake, especially in females. Studies that included male participants have investigated the effects of caffeine on appetite feelings in combination with other substances like red pepper[1] and nicotine[2] and their results were inconsistent. A previous trial from our group reported minor differences between the coffee and the control interventions in relation to subjective ratings of appetite and no effect on energy intake[3]. On the other hand, the study of Tremblay et al found increased energy intake following caffeine ingestion only in male participants[4]. Thus, the objective of this randomized crossover study was to explore the potential effects of different doses of caffeinated coffee on appetite feelings and energy intake of healthy, male and female, volunteers.

Sixteen women and seventeen men, (age: 27 ± 7 y, body mass index 25.8 ± 5.3 kg/m^2) participated in three daily trials in a random order: they received a standard breakfast with 200 ml of either instant caffeinated coffee with 3 mg of caffeine/kg of body weight (Coffee A) or instant caffeinated coffee with 6 mg of caffeine/kg of body weight (Coffee B) or water. The participants had to complete at fasting, immediately (i.e. 0 min), 15, 30, 60, 90, 120, 150 and 180 min after breakfast and beverage consumption three 10 cm visual analogue scales (VAS) in order to record their feelings of hunger, satiety and desire to eat, respectively. At the end of this period they consumed *ad libitum* a buffet style lunch and their food intake was recorded. The following day participants recalled their food and fluid intake from the time they left the lab until they slept through a telephone recall. The data from VAS were analyzed using the repeated-measures ANCOVA whereas the data for energy intakes were analyzed using univariate ANCOVA.

Data analysis revealed that, in men, Coffee A induced a significant reduction in hunger feelings at 30 ($P = 0.04$) and 60 min ($P = 0.05$) compared to water and a significant increase in satiety at 15 min ($P = 0.02$) compared to Coffee B. Furthermore, Coffee B was found to significantly reduce the desire to eat at 150 ($P = 0.05$) and 180 min ($P = 0.04$) compared to water. No significant difference was observed in energy intake from the *ad libitum* meal, the rest of the day or the total day (*ad libitum* meal plus rest of the day energy intakes) among the three interventions. On the other hand, in women Coffee A significantly increased satiety feelings at 15 ($P = 0.02$) and 60 min ($P = 0.03$) compared to water. A significant difference was observed for the *ad libitum* energy intake ($P = 0.001$) and for the total energy intake ($P = 0.05$) among the three interventions. In specific, the consumption of Coffee B and water led to a lower energy intake at the *ad libitum* meal compared to Coffee A ($P = 0.001$ and $P = 0.004$, respectively). Moreover, the consumption of Coffee B led to a reduced total energy intake compared to Coffee A ($P = 0.01$). The results remained the same even when the energy from the previous day was used as a covariate.

The results of the present study revealed a sex-specific effect of coffee on appetite related feelings and energy intake: only in women consumption of a high coffee dose in the morning resulted in lower energy intake in the lunch time. Further research is required in order to elucidate physiological mechanisms and to replicate these results in real life situations.

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