Three consecutive weeks of nutritional ketosis has no effect on cognitive function, sleep, and mood compared with a high-carbohydrate, low-fat diet in healthy individuals: a randomized, crossover, controlled trial

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ABSTRACT

Background

The high-fat ketogenic diet (KD) has become an increasingly popular diet not only in overweight/obese populations, or those with clinical conditions, but also in healthy non-overweight populations.

Objective

Because there are concerns about the association between high-fat diets and cognitive decline, this study aimed to determine the effects of a KD compared with an isocaloric high-carbohydrate, low-fat (HCLF) diet on cognitive function, sleep, and mood in healthy, normal-weight individuals.

Methods

Eleven healthy, normal-weight participants (mean age: 30 ± 9 y) completed this randomized, controlled, crossover study. Participants followed 2 isocaloric diets—an HCLF diet (55% carbohydrate, 20% fat, and 25% protein) and a KD (15% carbohydrate, 60% fat, and 25% protein)—in a randomized order for a minimum of 3 wk, with a 1-wk washout period between diets. Measures of β-hydroxybutyrate confirmed that all participants were in a

state of nutritional ketosis during post-KD assessments (baseline: 0.2 ± 0.2 mmol/L; KD: 1.0 ± 0.5 mmol/L; washout: 0.2 ± 0.1 mmol/L; and HCLF: 0.3 ± 0.2 mmol/L). Cognitive function was assessed using a validated, psychological computer-based test battery before and after each diet. Subjective measures of mood and sleep were also monitored throughout the study using validated scales.

Results

Three weeks of sustained nutritional ketosis, compared with the HCLF diet, had no effect on speed and accuracy responses in tasks designed to measure vigilance (speed: $P = 0.39$, Cohen's $d = 0.26$; accuracy: $P = 0.99$, Cohen's $d = 0.04$), visual learning and memory (speed: $P = 0.99$, Cohen's $d = 0.04$; accuracy: $P = 0.99$, Cohen's $d = 0.03$), working memory (speed: $P = 0.62$, Cohen's $d = 0.26$; accuracy: $P = 0.98$, Cohen's $d = 0.07$), and executive function (speed: $P = 0.60$, Cohen's $d = 0.31$; accuracy: $P = 0.90$, Cohen's $d = 0.19$). Likewise, mood, sleep quality, and morning vigilance did not differ ($P > 0.05$) between the dietary interventions.

Conclusion

The results of our randomized, crossover, controlled study suggest that 3 wk of sustained nutritional ketosis had no effect on cognitive performance, mood, or subjective sleep quality in a sample of healthy individuals. This trial was registered in the Pan African Clinical Trial Registry as PACTR201707002406306.

Keywords: nutritional ketosis, cognitive function, healthy subjects, memory, visual function, sleep, mood

Topic: fat-restricted diet, carbohydrates, diet, ketosis, mental processes, memory, sleep, cognitive impairment, mood, cognitive ability, sleep quality

Issue Section: Nutritional status, dietary intake, and body composition

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