The Influence of Fluid Intake Behavior on Cognition and Mood among College Students in Baoding, China

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Keywords

Fluid intake behavior · Cognition · Mood · College students

Abstract

Introduction: Water is a critical nutrient, and it is important for the maintenance of the physiological function of the human body [1–3]. In addition to fluid amounts, fluid intake frequency is also important for hydration status [4, 5]. At present, only few guidelines mention fluid intake behavior that recommend drinking water frequently while in small quantities, however, there is no scientific evidence to support it. Therefore, it is necessary to explore the appropriate fluid intake behavior. **Objective:** The objective of this study is to evaluate the influence of different fluid intake behavior on cognition and mood, to provide scientific basis for proposing the appropriate fluid intake behavior. **Methods:** A double-blinded randomized controlled trial was designed and implemented among college students aged 18–23 years in Baoding, China. Subjects were randomly assigned into each of 3 groups using a random number generated by computer software: the subjects consuming plain water 200 mL/2 h, that is, 1,600 mL during whole day (group 1), 100 mL/2 h, that is, 800 mL during whole day (group 2), and 110 mL/1 h, that is, 1,650 mL during whole day (group 3), respectively. Subjects were asked to fast from 11:00 p.m., without

consuming any foods or drinks the day before the intervention. From 8:00 a.m. to 10:00 p.m. of the first study day, subjects consumed water according to the instructions and repeated it from 8:00 a.m. to 4:00 p.m. of the second study day. Cognition, mood, and urine osmolality were collected twice at 10:00 a.m. (time 1) and 4:00 p.m. (time 2) of the second study day (shown in Fig. 1). **Results:** A total of 92 subjects (46 males, 46 females) completed this study. It was found that the increasing fluid intake amounts lead to an increase in urine output and a decrease in urine osmolality ($p < 0.05$). Use the mixed models to compare measurements for groups 1 and 2, which showed that when compared with those drinking 800 mL per day, people who drank 1,600 mL per day scored higher in vigor (11.8 vs. 9.1, $p < 0.05$) and portrait memory test (22.6 vs. 20.8, $p < 0.05$) but lower in total mood disturbance (90.8 vs. 97.8, $p < 0.05$). By comparing groups 1 and 3, the results indicated that compared with drinking 8 times per day, people who drank 15 times per day scored lower in portrait memory test (21.8 vs. 22.6, $p < 0.05$) and hunger (3.3 vs. 3.6, $p < 0.05$). **Conclusions:** Reasonable fluid intake behavior may be beneficial to improve the cognition and mood of college students. The fluid intake behavior, which is consuming water 200 mL each time and 8 times per day, is recommended. More studies are needed to advise people to have health-beneficial fluid intake behavior.

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Fig. 1. The study procedure. UOsm, urine osmolality; POMS, the profile of mood state; VAS, visual analogue scales; CP, cognitive performances.

Statement of Ethics

The study protocol had been approved by the Peking University Biomedical Ethics Committee (IRB00001052-16071) and this study was conducted in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki and its later amendments. All participants had given their written informed consent prior to their inclusion in the experiment.

Conflict of Interest Statement

H.H. received travel expenses and registration fees from Danone Research to attend the 2019 Hydration for Health Scientific Conference. On behalf of all the authors, the corresponding author states that there is no conflict of interest in relation to the contents of the paper and not receives financial support for the writing of this manuscript.

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Author Contributions

Conceptualization: Jianfen Zhang, Na Zhang, and Guansheng Ma; data curation: Hairong He and Jianfen Zhang; formal analysis: Hairong He; Investigation, Hairong He, Jianfen Zhang, and Na Zhang; methodology: Jianfen Zhang, Na Zhang, and Guansheng Ma; project administration: Guansheng Ma; resources: Shufang Liu, and Guansheng Ma; supervision: Songming Du and Shufang Liu; visualization: Songming Du; writing – original draft: Hairong He; writing – review and editing: Guansheng Ma.

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