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A double-blind, randomized pilot trial of chromium picolinate for binge eating disorder: Results of the Binge Eating and Chromium (BEACh) Study

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ABSTRACT

Objective: Chromium treatment has been shown to improve mood, appetite, and glucose regulation in various psychiatric and medical patient populations. The authors propose that chromium may be useful in the treatment of binge eating disorder (BED).

Method: Twenty-four overweight adults with BED were enrolled in a 6-month double-blind placebo-controlled trial and randomly assigned to receive either 1000 mcg chromium/day ("high dose"; n = 8) or 600 mcg chromium/day ("moderate dose"; n = 9) as chromium picolinate or placebo (n = 7). Mixed linear regression models were used to estimate mean change in binge frequency and related psychopathology, weight, symptoms of depression, and fasting glucose.

Results: Fasting glucose was significantly reduced in both chromium groups compared to the placebo group; similarly, numerically, but not significantly, greater reductions in binge frequency, weight, and symptoms of depression were observed in those treated with chromium versus placebo, although statistical power was limited in this pilot trial. For fasting glucose, the findings suggest a dose response with larger effects in the high dose compared to moderate dose group.

Conclusion: These initial findings support further larger trials to determine chromium's efficacy in maintaining normal glucose regulation, reducing binge eating and related psychopathology, promoting modest weight loss, and reducing symptoms of depression in individuals with BED. Studies designed to link the clinical effects of chromium with changes in underlying insulin, serotonin, and dopamine pathways may be especially informative. If efficacious, chromium supplementation may provide a useful, low-cost alternative to or augmentation strategy for selective serotonin reuptake inhibitors, which have partial efficacy in BED. ClinicalTrials.gov NCT00904306.

Introduction

Binge eating is defined as the consumption of an unusually large amount of food coupled with a feeling of loss of control over eating. Binge eating disorder (BED), the most common eating disorder, is characterized by recurrent episodes of binge eating in the absence of regular inappropriate compensatory behaviors [1]. Approximately 3% of Americans suffer with BED in their lifetime [2], and binge eating is increasingly being recognized in youth, as well [3,4]. BED confers additional serious psychiatric and medical risks including depression, obesity, and metabolic syndrome [5,6]. The impending inclusion of BED as a distinct diagnostic category in DSM-5 [7] substantiates its significant mental health relevance and portends an increasing demand for research to improve treatment and clinical outcomes [7,8]. Current pharmacological and psychological therapies for BED have merit but are inadequate in achieving binge eating abstinence as well as metabolic stabilization. Furthermore, our understanding of BED treatment is limited because of the short treatment and follow-up duration in most studies and because of high drop-out rates in prior clinical studies, often due to the side effects of these and similar types of medications [9,10]. Thus, there is a critical need for novel interventions for BED that are sustainable, lead to abstinence from binge eating, promote effective weight regulation in patients who are metabolically at risk, and have less severe side effect profiles.

Chromium is an essential mineral found in foods such as whole grain cereals and bread, lean meats, cheeses, and some spices. Chromium directly enhances insulin [11,12] and serotonergic (5HT) [13,14] activity and may also have downstream effects on dopaminergic (DA) signaling — all three neurotransmitters share a common protein kinase pathway involved in the central control of food intake and energy homeostasis [15–17], and 5HT and DA receptors are linked via functional heterocomplexes [18,19]. In human studies, results of dietary chromium supplementation for treating symptoms related to binge eating have been mixed. In some studies, chromium supplementation has been found to improve glucose regulation [20] and attenuate weight gain [21,22]; to improve appetite and mood dysregulation in depressed patients [23–26]; to reduce food intake, hunger, and fat cravings in

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overweight women who crave carbohydrates [27]; and, to improve cognitive inhibition in adults with mild cognitive impairment [28]. Food cravings [29–32] and negative affect [33,34] have been identified as instrumental triggers for binge eating, and high disinhibition is common among individuals who binge eat [35,36] and is associated with poor treatment outcome [37]. On the other hand, other studies have failed to find any effect of chromium supplementation on glucose metabolism or body weight [38,39]. Across studies, the treatment protocol has varied, and the optimal dosage level and treatment duration for efficacy remain unknown. In the present 6-month placebo-controlled pilot study, we evaluated the effect of high- and moderate-dose chromium supplementation on binge eating and related psychopathology, weight, symptoms of depression, and plasma glucose concentration in overweight individuals with BED. In conducting this pilot study we sought to 1) determine feasibility and acceptability of the intervention, 2) assess side effects, and 3) test the preliminary hypotheses that high dose chromium supplementation would be associated with greater reductions in binge eating, fasting glucose, weight, and symptoms of depression than placebo.

Methods

Participants

Forty-three participants recruited from the community by electronic and printed advertisements underwent preliminary screening and diagnostic interview to assess eligibility. Eligible participants currently met DSM-IV criteria for BED and reported no current suicidal or homicidal intent or other psychiatric condition that required acute intervention. The exclusion criteria were: 1) body mass index (BMI) < 25 (underweight or normal weight) or >45 (severely obese); 2) age <18 or >60 years; 3) pregnant, planning on becoming pregnant during the study period, or lactating; 4) current chromium use; 5) current use of insulin or other medications to control glucose metabolism; 6) current use of medications known to significantly influence appetite or weight (i.e., over-the-counter appetite suppressants that contain phentermine or sibutramine, atypical antipsychotic agents with high weight gain liability [i.e., olanzapine, risperidone] prednisone, etc.); 7) fasting glucose level > 126 mg/dL; and 8) creatinine level > 1.0 for women or >1.2 for men. To increase ecological validity of our study, we sought to include participants on current stable antidepressant therapy. However, scant data were available regarding potential drug–chromium interactions [40]. After considering the available data, the University of North Carolina (UNC) Biomedical Institutional Review Board approved the study with the additional exclusion criterion of "current psychotropic medication use other than stable monotherapy involving citalopram, escitalopram, fluoxetine, fluvoxamine, paroxetine, or sertraline." After complete description of the study to the subjects, written informed consent was obtained.

Study design

Twenty-eight (of the 41 screened) eligible participants underwent a 1-month placebo run-in, after which four participants were excluded as "placebo responders" based on previously established criteria [41] (see CONSORT Diagram, Fig. 1). The remaining 24 participants were randomized in a double-blind manner to one of three treatment arms: high dose (1000 mcg chromium (Cr)/day) as chromium picolinate (CrPic), moderate dose (600 mcg Cr/day) as CrPic, or placebo. The chromium doses were chosen in light of prior studies in non-BED populations. This literature strongly suggested that low doses of chromium (<400 mcg/day) could be sufficient for upregulating insulin binding and improving fasting glucose [42], moderate doses (600 mcg/day) could be sufficient to reduce depressive symptoms and cravings

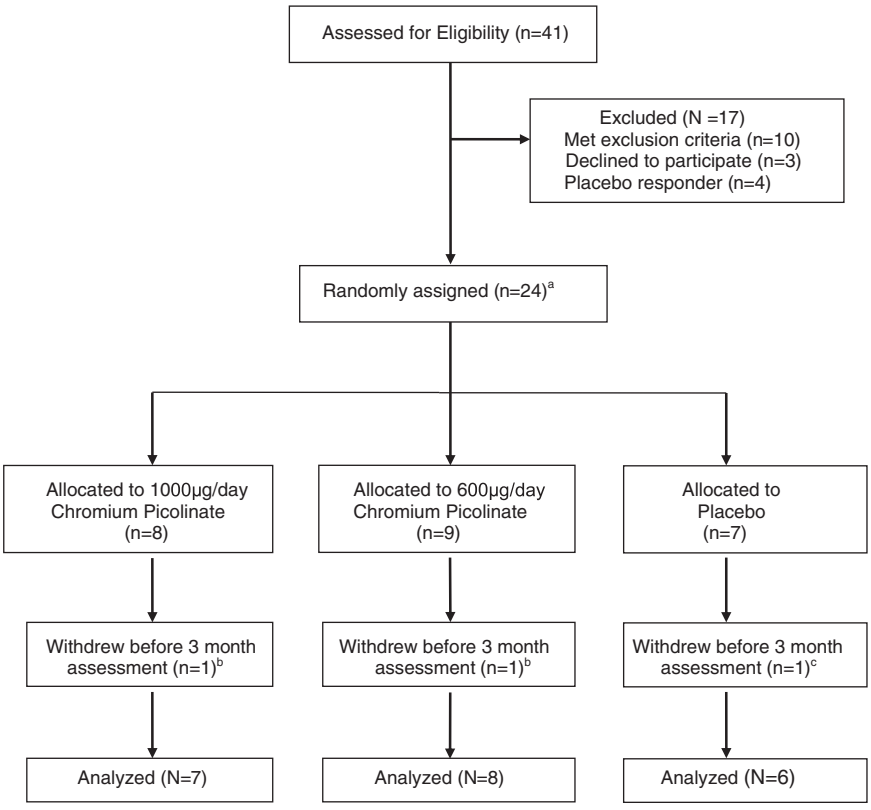

Fig. 1. CONSORT Diagram. [a]Overweight adults with binge eating disorder. [b]Withdrew for personal reasons. [c]Withdrawn due to pregnancy.