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Behavioral Weight Loss Intervention for Migraine: A Randomized Controlled Trial

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Conflict of Interest

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Abstract

Objective—To test whether behavioral weight loss (BWL) intervention decreases headaches in women with comorbid migraine and overweight/obesity.

Methods—This randomized, single-blind trial allocated women [18–50 years old, 4–20 migraine days/month, Body Mass Index (BMI)=25.0–49.9 kg/m^2] to 16 weeks of BWL, (n=54) that targeted exercise and eating behaviors for weight loss, or Migraine Education control (ME, n=56) that delivered didactic instruction on migraine and treatments. Participants completed a 4-week smartphone headache diary at baseline, post-treatment (16–20 weeks) and follow-up (32–36 weeks). The primary outcome was post-treatment change in migraine days/month, analyzed via linear mixed effects models.

Results—Of 110 participants randomized, 85 (78%) and 80 (73%) completed post-treatment and follow-up. Although BWL achieved greater weight loss [mean (95% CI) kg] vs. ME at post-treatment [−3.8 (−2.5, −5.0) vs. +0.9 (−0.4,2.2) p<.001] and follow-up [−3.2 (−2.0, −4.5) vs. +1.1 (−0.2,2.4), p<.001], there were no significant group (BWL vs. ME) differences [mean (95%CI)] migraine days/month at post-treatment [−3.0 (−2.0, −4.0) vs. −4.0 (−2.9, −5.0), p=.185] or follow-up [−3.8 (−2.7, −4.8) vs. −4.4 (−3.4, −5.5), p=.378].

Conclusion—Contrary to hypotheses, BWL and ME yielded similar, sustained reductions in migraine headaches. Future research should evaluate whether adding BWL to standard pharmacologic and/or non-pharmacologic migraine treatment approaches yields greater benefits.

Keywords

migraine; headache; obesity; weight loss; smartphone

Introduction

Migraine is a neurological disease characterized by moderate-to-severe headache and accompanying autonomic, affective, and sensory features that affects 1 billion people worldwide.[1–3] Migraine is also comorbid with several diseases, including obesity.[4] As per current evidence, obesity contributes to increased migraine risk and severity, especially in reproductive-aged women.[5–6] A recent meta-analysis comprising data from nearly 300,000 participants found that risk of migraine was increased by 27% in adults with obesity,[7] while other studies show that migraine headache frequency, severity, and clinical features increase with greater degree of overweight.[8] These data are corroborated by overlapping physiologic (e.g., inflammatory processes), psychological (depressive symptoms), and behavioral (low physical activity) mechanisms of both diseases.[9]

Given that obesity is a modifiable risk factor for migraine and weight loss has favorable effects on many of the putative mechanisms underlying the migraine-obesity link,[9] the question of whether weight loss intervention holds efficacy for reducing migraine headache frequency is important.[10] Yet, few intervention studies have been conducted. Two studies showed reductions of approximately 1.5 to 3 migraine days/month after bariatric surgery.[11–12] Another study in adolescents showed an average reduction of 3.1 migraine days/month after a 12-month behavioral weight loss (BWL) intervention.[13] To date, only

one randomized trial has been conducted.[14] Findings showed differences in mean reduction of monthly migraine days in favor of bariatric surgery (10.9) compared to monthly behavioral weight loss therapy (4.7), however only after controlling for weight loss and several demographic characteristics. While findings from these studies are promising, all are limited by one or more of the following factors that undermine rigor and robust, clearly interpretable findings: uncontrolled design, retrospective headache measurement, unstandardized behavioral weight loss intervention, and lack of an appropriate non-weight loss producing control condition.

The Women's Health and Migraine (WHAM) study is the first randomized controlled trial to test the impact of a standardized BWL intervention on migraine headache frequency.[15] Women 18–50 years old with overweight/obesity (BMI=25–49.9 kg/m^2) and migraine were randomly assigned to 16 weeks of 1) BWL, which targeted dietary changes and physical activity (PA) for weight loss (but did not address migraine) or 2) Migraine education (ME), which provided didactic instruction on migraine and its treatment (but did not target weight loss). Both groups recorded migraine headache activity in near real time for 28 consecutive days using a smartphone diary at baseline, post-treatment (16–20 weeks), and follow-up (32–36 weeks). The primary outcome was change in monthly migraine headache days at post-treatment. It was hypothesized that BWL would produce greater headache improvements than ME at post-treatment.

Methods

Trial Design

This study involved a 9-month, parallel-group, single-blinded RCT (ClinicalTrials.gov Identifier: NCT01197196) to compare the effects of BWL and ME interventions on migraine headache days. All procedures were conducted at a single site: The Weight Control and Diabetes Research Center (WCDRC) of The Miriam Hospital/Brown Alpert Medical School in Providence RI, USA. Participants were recruited from community and clinical settings via multiple methods (e.g., direct mailing of study brochures to the target demographic, newspaper advertisements, Internet/social media postings) between 11/2012 and 6/2016. Advertisements were targeted to women 18–50 years old, who had migraine and obesity, and sought instruction in behavioral headache management strategies. Women who contacted the WCDRC and were declared initially eligible after a telephone screening interview were invited to an in-person orientation during which the study objective (i.e. testing whether the BWL and ME interventions help alleviate migraine attacks) and procedures were explained in detail. Participants then completed informed consent, had migraine diagnosis confirmed by a study neurologist, underwent height and weight measurement, completed questionnaires, and received a smartphone equipped with a diary application to record headache activity for 28 days. Following the headache monitoring period, participants returned the smartphone to the WCDRC and received their treatment assignment. Identical procedures occurred at post-treatment (16–20 weeks) and follow-up (32–36 weeks). Outcomes assessors were blinded to intervention assignment. The protocol was approved by The Miriam Hospital Institutional Review Board. All participants provided signed informed consent before enrollment.

Participants

Eligibility was limited to women 18–50 years old who had: migraine with or without aura as confirmed by the study neurologist and in accordance with ICHD-3 criteria[16]; ≥3 migraine attacks and 4–20 migraine headache days during each of the past 3 months; and overweight/obesity (BMI=25.0–49.9 kg/m^2). Participants were permitted continued access to preventive and/or abortive pharmacological treatment if they were on a stable regimen for ≥2 months before study entry and agreed not to modify this regimen during the study. This also applied to medications used for depression and oral contraception.

Exclusion criteria included: headache disorder other than migraine or tension-type; previous bariatric surgery, current participation in a weight loss program, use of prescription weight loss medication, or ≥5% weight loss within ≤6 months; pregnancy, breastfeeding, or plans to become pregnant during the trial; contraindication for weight loss or unsupervised exercise; cancer diagnosis within ≤1 year; unable to read/comprehend study materials; and any condition that in the opinion of the investigators would undermine adherence to the study protocol—e.g., terminal illness, relocation outside of the geographic region of the research center, and history of substance abuse, eating disorder diagnosis, or other severe psychiatric problem.

Randomization

Participants were randomized to BWL or ME in a 1:1 ratio using computer-generated randomly permuted blocks of 2, 4 and 6. Condition assignment was not revealed to a participant and the research team until after a participant completed the baseline assessment.

Interventions

BWL participants received a standardized intervention modeled after that used in the Diabetes Prevention Program and Look AHEAD trials.[17–18] The structure consisted of 16 weekly group meetings led by a behavioral interventionist. The same 3 interventionists delivered both conditions to control for therapist effects. Participants were encouraged to lose 1–2 pounds/week toward a ≥7% weight loss goal. To achieve this goal, participants were: 1) placed on a standard calorie and fat restricted diet with goals of 1200–1500 kcal/day and 33–42 fat grams/day (25% calories from fat)[18]; 2) gradually progressed to a goal of 250 minutes/week of moderate intensity, home-based exercise (50 minutes, 5 days/week)[19]; and 3) provided instruction in behavioral modification strategies such as self-monitoring (i.e. diet, exercise, weight), goal-setting, stimulus control, and problem solving to modify eating and PA. BWL sessions did not include content on migraine or its treatment.

Education on migraine, pharmacologic and non-pharmacologic treatments, and self-management strategies is an integral component of the standard of care in headache medicine.[20] Accordingly, ME participants attended 16 weeks of group lectures focused on migraine (e.g., symptoms, pathophysiology, risk factors for progression), pharmacological and non-pharmacological treatments (e.g., preventive medications, acupuncture), and evidence-based self-management strategies (e.g., cognitive restructuring, relaxation techniques, sleep hygiene). With respect to the latter, participants did not practice any strategies in group sessions nor were instructed to practice outside of sessions. Additionally,

ME did not provide BWL-specific information or strategies to minimize potential of weight loss. The length of ME and amount of information presented exceeded that typically provided by standard care to achieve equivalent therapist contact between conditions (thereby minimizing differences in demand characteristics) and similar session attendance.[15]

Treatment fidelity

To ensure reliable delivery of BWL and ME, several strategies were employed: creation of detailed patient and therapist manuals that all clinical staff were required to read and review; weekly supervision sessions with clinical staff during initial implementation; and a combination of independent review/rating of intervention session audio recordings and therapist completion of weekly checklists to verify inclusion of designated intervention components and minimize intervention cross-contamination.

Measures

Migraine headache frequency and severity—A web-based headache diary application, designed by the investigative team for use on smartphones provided to each participant, was used to record migraine headache occurrence ("Did you have a headache today? Yes/No"), maximum headache pain intensity (0 "no pain" to 10 "pain as bad as you can imagine"), and attack duration (hours) prior to bedtime for 28 consecutive days.[15] This ecological momentary assessment (EMA) approach counters limitations of retrospective questionnaires (e.g., bias, poor ecological validity) and paper-and-pencil diaries (inability to verify compliance) by collecting date- and time-verified data, in near real time, in participants' natural environment.[21] All electronic ratings were automatically transmitted to the research center and checked daily to ensure data completeness. If data were incomplete, research staff contacted participants by telephone to obtain missing data. Data were summarized as headache frequency (primary outcome, number of migraine days/month), average maximum pain intensity, and duration in hours.

Headache disability—The Headache Impact Test-6 (HIT-6) assessed severity of headache disability.[22] This measure contains 6 items that measure headache impact on "usual daily activities" with higher scores reflecting more severe impact. The HIT-6 demonstrates good internal consistency and can differentiate levels of migraine frequency and severity.

Anthropometric characteristics—Height (cm) and weight (kg) were measured using a wall-mounted Harpenden stadiometer (Holtain, Ltd., Crosswell, Crymyh, Pembs, UK) and calibrated digital scale (Tanita BWB 800; Tanita Corporation of America, Inc., Arlington Heights, IL, USA). BMI was calculated using the formula = (weight (kg)/height [m^2]). Waist circumference, as a measure of abdominal fat, was measured at the midpoint between the highest point of the iliac crest and lower part of the costal margin at the mid-axillary line.

Demographic characteristics—Age, marital status, race/ethnicity, and level of education were assessed via questionnaire at baseline.

Medications—Information about medications taken to prevent migraine attacks and treat depression were collected via the "brown bag" method. Participants were given a bag to bring all prescription and over-the-counter medications to the research center to be documented.

Statistical analysis

Baseline demographic characteristics and headache parameters were summarized using the mean, standard deviation (SD), and number with percentage. Rates of retention at post-treatment and follow-up were compared using the chi-square test. Linear mixed effects models incorporating a restricted maximum likelihood approach were used to estimate and conduct between-groups comparisons of the primary outcome (change in headache days/month) and secondary outcomes (change in weight and indices of migraine severity) at post-treatment and follow-up. Time was represented in the model via a binary variable coded 0 for post-treatment and 1 for follow-up. Baseline values of the outcome were entered as a covariate. In the first step of analysis, unconditional models were used to evaluate variance components associated with intercepts (change in the outcome at post-treatment) and slopes (rate of change in the outcome from post-treatment to follow-up). In the second step of analysis, intercepts were treated as random effects; treatment condition was added to the model using a variable coded 0 for ME and 1 for BWL and to interact with the effect of time; and age, race/ethnicity (non-Hispanic White versus all others), level of education (at least some post-high school education versus all others), and marital status (married versus not married) were entered as covariates. This intent-to-treat approach allowed all available data to be included in the analysis. Tests of significance were two-tailed with alpha=.05. This trial was designed to detect significant between-groups differences of at least 3 migraine days/month with 0.80 power at post-treatment with n=140 and ≤18% attrition at post-treatment. All analyses were conducted in May of 2017 using IBM SPSS Statistics for Windows, Version 20.0 (Armonk, NY: IBM Corp).

Results

Recruitment and retention

The CONSORT diagram is depicted in Figure 1. Of 738 individuals phone-screened, 110 were randomized to BWL (n=54) or ME (n=56). Six participants (3 in BWL and 3 in ME) were withdrawn after randomization due to family relocation (n=1), personal or family medical emergencies (n=3), and change in work schedule that prevented further group attendance (n=2). Overall retention was 78% (n=85) at post-treatment and 73% (n=80) at follow-up including participants who were withdrawn and whose data were included in the analysis up to the point of withdrawal. There were no significant differences in retention between the conditions at any assessment (*p*s>.50). Data missingness was not related to demographic characteristics, baseline headache frequency, or weight (*p*s>.10).

Sample characteristics

As shown in Table 1, participants on average were 39 years old and had obesity defined by BMI and waist circumference. One-quarter of participants identified as being a member of a

racial minority group and 19% reported having Hispanic ethnicity. Nearly all participants reported at least some post-high school education.

At baseline, participants on average reported having a migraine headache on 8 of 28 days, an attack frequency that is higher than that reported by the majority (~85%) of participants in population-based studies of individuals with migraine.[2, 23] On average, these attacks produced moderate pain intensity and lasted 20 hours. Participants reported a HIT-6 score of 65, indicative of "severe" headache disability. Twelve (9.2%) participants had chronic migraine (≥15 migraine days/month). Taken together, these data indicate that the majority of the sample consisted of individuals with higher frequency and disabling episodic migraine.

Intervention adherence and weight loss

BWL had a significantly greater mean weight loss (kg) versus ME at both post-treatment (−3.8, 95%CI: −2.5, −5.0 vs. +0.9, 95% CI: −0.4, 2.2, $p<.001$) and follow-up (−3.2, 95%CI: −2.0, −4.5 vs. +1.1 95%CI: −0.2, 2.4, $p<.001$). Mean number (SD)/percentage of weekly intervention sessions attended was similar between conditions [BWL vs. ME: 13.3 (5.1)/83% vs. 12.8 (5.4)/80%; $p=.61$).

Primary outcome: Change in migraine headache days

Results of intention-to-treat analysis (see Figure 2) showed that mean reductions in monthly migraine days did not differ between conditions (BWL vs. ME) at the primary post-treatment endpoint (−3.0, 95%CI: −2.0, 4.0 vs. −4.0, 95%CI: −2.9, −5.0, $p=.19$) or follow-up (−3.8, 95%CI: −2.7, −4.8 vs. −4.4, 95%CI: −3.4, −5.5, $p=.38$).

Additional outcomes: Change in migraine severity

Results of intention-to-treat analysis showed that mean reductions in migraine pain intensity and attack duration (hours) over the 28-day monitoring period did not differ between conditions (BWL vs. ME) at the primary post-treatment endpoint (pain intensity: −0.8, 95%CI: 0.0, −1.5 vs. −1.0, 95%CI: −0.3, −1.8, $p=.59$; attack duration: −1.6, 95%CI: −3.1, −6.3 vs. −5.0, 95%CI: −0.3, −9.6, $p=.33$) or follow-up (pain intensity: −1.5, 95%CI: −0.7, −2.3 vs. −0.7, 95%CI: 0.1, −1.5, $p=.15$; attack duration: −2.7, 95%CI: −2.2, −7.5 vs. −2.2, 95%CI: −2.7, −7.1, $p=.89$). Similarly, the groups (BWL vs. ME) did not differ on mean reductions in HIT-6 scores at post-treatment (−5.4, 95%CI: −3.7, −7.1 vs. −4.4, 95%CI: −2.8, −6.1, $p=.440$) or follow-up (−5.7, 95%CI: −3.9, −7.4 vs. −5.6, 95%CI: −3.9, −7.3, $p=.94$).

Discussion

This study is the first to test whether a standardized behavioral intervention to reduce body weight decreases migraine headache frequency in women with comorbid overweight/obesity. Contrary to the primary hypothesis, changes in migraine headache frequency at post-treatment and follow-up were not significantly different between the BWL and ME control interventions. Rather, both BWL and ME had significant reductions in monthly migraine headache days from baseline to post-treatment and follow-up, but the

improvements were comparable in the 2 conditions. A similar pattern of findings occurred for the other indices of migraine severity.

Although BWL lost more weight compared to ME, which gained weight on average, there is no evidence that this greater weight loss led to greater migraine improvements. This might owe to mean BWL weight change (−3.8 kg or 3.3% weight loss) being suboptimal—i.e. falling below the clinically relevant five percent (~5 kg) threshold.[24] It is possible that migraine and its psychological and behavioral sequelae might interfere with ability to lose weight or adhere to behavioral prescriptions.[25–28] Pain intensity, regardless of pain type, is associated with poorer weight loss outcomes after BWL intervention.[29] High calorie, palatable foods might aid in pain coping, possibly undermining adherence to dietary prescriptions focused on energy intake and dietary quality.[25, 30–31] Migraine attacks might also reduce available time to engage in PA or contribute to avoidance of PA in general.[32–33] Research to understand barriers to BWL treatment in patients with migraine is needed.

However, speculation that larger weight losses after BWL might have produced superior migraine improvements compared to ME is tempered when results are placed in the context of previous uncontrolled studies examining association of weight loss and migraine improvements. For example, this investigative team previously reported a comparatively smaller mean reduction of 1.5 migraine days/month after substantially larger mean weight losses (30.2 kg) achieved via bariatric surgery.[11] Another study reported a mean reduction of 3.1 migraine days/month (similar to the current study) in adolescents after a 12-month BWL intervention and a mean weight loss of 7 kg.[13] These findings showing migraine improvements of similar or lesser magnitude after weight losses that are larger than those achieved after the BWL intervention in the current study suggest that additional mechanisms related to or apart from weight loss might also underlie BWL-related improvements.

Moreover, the fact that significant migraine improvements of a similar magnitude occurred after BWL and ME suggests that these treatments may operate through different mechanisms. Notably, special precautions were taken to ensure that migraine was not discussed during BWL and BWL strategies were not discussed during ME. It is conceivable that BWL effects are mediated through both weight loss and related improvements in proposed physiological (e.g., inflammation), psychological (e.g., depression), and behavioral (e.g., PA) factors underlying the migraine-obesity link.[9, 34–35] By contrast, ME effects might be mediated by increased knowledge of migraine (i.e. causes, triggers, treatments) and related improvements in factors such as headache management self-efficacy.[36] Both BWL and ME might be mediated by increased perceptions of emotional social support resulting from engagement with a group of individuals who all experience the adverse impact of migraine on daily life.[37] However, it is unlikely that all of the effect can be attributed to group dynamics given that patients who lose weight via bariatric surgery also experience reduction in migraine.[9,12,14] Finally, although a significant study strength was comparison of BWL to an equally intensive ME condition, the lack of a non-intervention control group limits ability to rule out other explanations for migraine improvements after BWL or ME such as repeated assessments over time and regression to the mean. Given potential mechanistic differences between BWL and ME, future research should examine whether

integration of these interventions produces greater migraine improvements than either intervention alone and/or no intervention.

Study Strengths and Limitations

This study involves the first RCT to test the immediate and sustained effects of BWL as a treatment for migraine in women of reproductive age, who are considered most affected by obesity-related migraine risk.[5–6, 38] Moreover, the inclusion of additional procedures to enhance rigor and minimize bias (e.g., in near real-time, naturalistic daily headache assessment and strategies to optimize protocol adherence and limit therapist effects) advances previous uncontrolled investigations of weight loss treatments for migraine.

This study also has certain limitations. Study participants reflect a highly selective sample. Given that the study was limited to women with migraine of a certain age who met strict headache and weight-related inclusion criteria, it is unclear whether similar outcomes would be observed in individuals who are male, older, and have different headache frequencies or weight status. Despite substantial efforts to recruit and randomize the planned 140 participants, the study was terminated at the end of the funding period with 110 participants randomized, potentially limiting power to detect smaller effects as statistically significant. Although efforts were made to ensure that the BWL intervention did not address migraine, the possibility of expectancy effects regarding migraine improvements cannot be ruled out given BWL participants' awareness that the study was intended to test effects of BWL on migraine frequency and severity. Finally, given previous research showing a relationship between obesity and risk of having migraine, studies are also needed to determine whether behavioral intervention can prevent migraine by preventing weight gain and sustaining a healthy weight.[39]

Conclusions

This study compared the effects of BWL and ME on headache frequency in women aged 18–50 with comorbid migraine and overweight/obesity. Significant improvements in migraine frequency were demonstrated after both BWL and ME and sustained at follow-up, but no differences between these conditions were observed at either time point. Future research is needed to better understand treatment mechanisms and whether BWL can enhance effects of standard pharmacologic and/or non-pharmacologic migraine therapies in patients with comorbid overweight/obesity.

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Study Importance Questions

What is already known about this subject?

- Obesity is associated with increased risk and severity of migraine headaches, particularly in reproductive-aged women.
- The relationship between obesity and migraine is substantiated by putative biological (e.g., inflammation), psychological (e.g., depression), and behavioral (e.g., low physical activity) mechanisms.
- Weight loss has potential to reduce migraine headaches in individuals with obesity.

What does this study add?

- This study involves the first randomized controlled trial to test the effects of behavioral weight loss (BWL) intervention versus migraine education (ME) on migraine headaches in women with comorbid migraine and overweight/obesity.
- Although BWL produced greater weight loss than ME, BWL and ME yielded similar, sustained reductions in migraine headaches.
- Future research is needed to understand treatment mechanisms and whether addition of BWL strategies to standard pharmacologic and/or non-pharmacological migraine treatments yields greater benefit in patients with comorbid overweight/obesity.

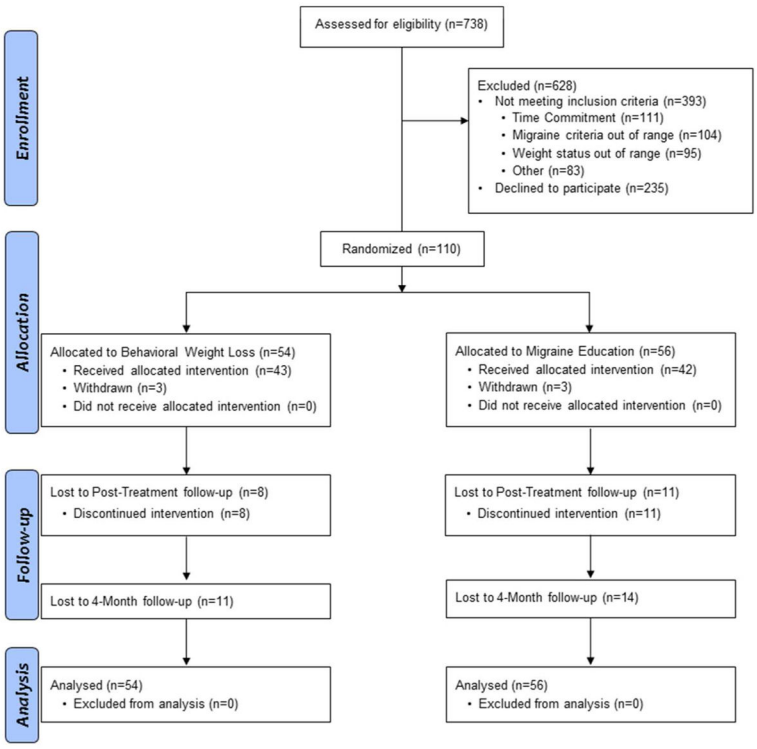

Figure 1.

Flow of participants through the trial. The CONSORT flow diagram includes data on assessment of eligibility, patient enrollment, allocation to condition, follow-up, and primary analysis.

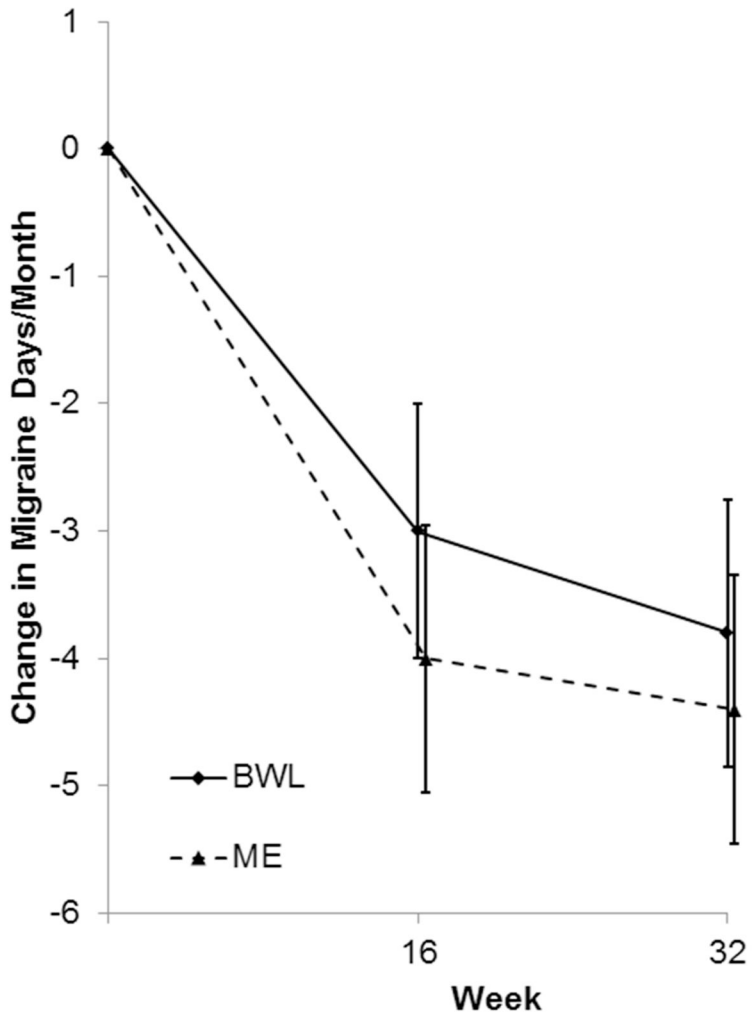

Figure 2.

Model estimates of migraine headache days change in the Behavioral Weight Loss (BWL) and Migraine Education (ME) conditions over the 9-month study period.

Note. Week 16 is the beginning of the 4-week post-treatment assessment and Week 32 is the beginning of the 4-week follow-up assessment.

Table 1

Participant Characteristics at Baseline

	Total (n=110)	BWL[a] (n=54)	ME[b] (n=56)
Demographic characteristics			
Age, mean (±SD), yrs	39.3 (8.0)	38.5 (7.4)	40.0 (8.4)
Race, n (%)			
White	86 (78.2)	37 (68.5)	49 (87.5)
African American	12 (10.9)	10 (18.5)	2 (3.6)
Other	9 (8.2)	5 (9.3)	4 (7.1)
Mixed	3 (2.7)	2 (3.7)	1 (1.8)
Ethnicity, n (%)			
Non-Hispanic	89 (80.9)	49 (90.7)	40 (71.4)
Hispanic	21 (19.1)	5 (9.3)	16 (28.6)
Education, n (%)			
High School Degree	11 (10.0)	6 (11.1)	5 (8.9)
Vocational Training	1 (0.9)	1 (1.9)	0 (0.0)
Some College	34 (30.9)	15 (27.8)	19 (33.9)
College/University Degree	41 (37.3)	22 (40.7)	19 (33.9)
Graduate/Professional Degree	23 (20.9)	10 (18.5)	13 (23.2)
Marital status, n (%)			
Married	63 (57.3)	29 (53.7)	34 (60.7)
Not married (cohabitating)	8 (7.3)	6 (11.1)	2 (3.6)
Never married	26 (23.6)	15 (27.8)	11 (19.6)
Separated or divorced	11 (10.0)	4 (7.4)	7 (12.5)
Other	2 (1.8)	0 (0.0)	2 (3.6)
Anthropometric characteristics			
Body mass index (BMI), mean (±SD), kg/m^2	35.6 (7.7)	35.8 (6.8)	35.4 (8.6)
Waist circumference, mean (±SD) cm	105.2 (15.6)	106.5 (15.5)	103.8 (15.8)
Migraine headache characteristics			
Headaches, mean (±SD) number	5.4 (2.8)	5.3 (2.8)	5.5 (2.7)
Headache days, mean (±SD) number	8.2 (4.5)	7.9 (4.0)	8.6 (4.8)
Pain intensity, mean (±SD), 0–10 scale	5.7 (1.6)	5.6 (1.5)	5.8 (1.5)
Headache duration, mean (±SD) hours	19.9 (15.9)	19.9 (17.5)	19.8 (14.4)
Headache Impact (HIT-6), mean total (±SD)	64.7 (4.5)	65.4 (4.6)	63.9 (4.2)
Use of preventative medications, n (%)	22 (20)	11 (20.4)	11 (19.6)

[a]BWL, Behavioral Weight Loss;

[b]ME, Migraine Education