

Meal Plan Home Delivery as a Component of Care for Depression

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Abstract

Patients with major depressive disorder who experience symptoms of low motivation, fatigue, appetite disturbance, or carbohydrate craving frequently struggle to improve their diet, despite evidence that healthier diets can improve mood. We report on a case of treatment resistant depression in a 65-year-old woman that improved after implementing a meal delivery plan in conjunction with mild exercise, with sustained remission at 18 months of follow-up. Meal delivery plans may offer a means for patients to overcome barriers to healthy diet adoption stemming from depressive symptoms, and may be particularly valuable for depressed patients who are obese.

Introduction

Major depressive disorder (MDD) and obesity are bidirectional in causality and both entities are independently associated with reduced quality of life, reduced productivity, and increased all-cause mortality [1]. Exercise is an effective treatment for both conditions and guidance for type and frequency of exercise as a treatment for depression is established: moderate aerobic exercise performed for at least 45 minutes three or more times per week [2]. In contrast, although the efficacy of dietary change has been investigated in multiple trials suggesting that dietary interventions can improve both depression and obesity [1,3], specific guidance regarding the type of diet, ratio and amounts of macro and micronutrients, and mechanism of action in MDD is lacking, leaving clinicians without standardized dietary recommendations to offer patients. Furthermore, patients suffering from MDD often struggle to implement healthy dietary changes due to the symptoms of low motivation, fatigue, increased appetite, and carbohydrate craving. Considering how ubiquitous these symptoms are in MDD patients who might benefit from an improved diet, it is particularly notable that no studies have evaluated the therapeutic effects of home delivery meal plans for patients with MDD. Home delivery meal plans have wide usage by the general public and present a potential solution to these symptom-driven barriers to adopting a healthy diet. Here we report on the successful application of a meal delivery plan in a patient with MDD that was resistant to multiple medication trials.

Case Report

Ms. T was a 65-year-old white female with a psychiatric history of major depressive disorder, recurrent, with anxious distress, chronic insomnia, and a medical history of obesity, hyperlipidemia, stage 1 sarcoidosis, obstructive sleep apnea, and restless leg syndrome. She reported that her first major depres-

sive episode occurred as a teenager and she had two lifetime inpatient hospitalizations for depressive episodes with suicidal ideation. Prior to presenting for care at our clinic, she had been treated with desipramine, fluoxetine, paroxetine, sertraline, escitalopram, duloxetine, venlafaxine, lithium, and aripiprazole, which had all lost efficacy over time or were not tolerated. At the time of her initial visit to our clinic, she had been taking bupropion XL 300mg daily, nortriptyline 50mg nightly, and lorazepam 1 mg as needed for anxiety for the previous six weeks. Her presenting symptoms included depressed mood, hopelessness, guilty ruminations, anhedonia, decreased energy, changes in appetite, early and middle insomnia, and passive suicidal ideation. Increased doses of bupropion and nortriptyline were ineffective, so she was cross-titrated to tranylcypromine to a final dose of 50mg PO daily, which led to remission lasting nine months. However, a recurrence of the depression with suicidal ideation resulted in her third lifetime hospitalization. Unilateral frontal electroconvulsive therapy was initiated with the completion of 8 sessions, and tranylcypromine was titrated to 30mg BID, resulting in remission. She remained in remission for the next 22 months, continuing on the tranylcypromine and supported by completion of 8 sessions of cognitive behavioral therapy. She subsequently experienced recurrence despite ongoing treatment and underwent 36 sessions of repetitive transcranial magnetic stimulation without meaningful improvement. She then received ketamine IV (0.5 mg/kg), experiencing a rapid improvement. She went on to receive 33 ketamine treatments over 24 months, but began to have adverse dissociative and dysphoric reactions to the ketamine, resulting in discontinuation.

Ms. T then decided to address her depression through commitment to diet and exercise while continuing on tranylcypromine. She eliminated high-sugar foods from her diet, started a weight-loss meal delivery program and began walking for 30

minutes daily. Ms. T's meal plan was the Nutrisystem Personal plan with 1,200 calories a day. The diet consisted of approximately 45–55% of calories from carbohydrates, 25–30% of calories from protein, and less than 30% of calories from total fat. On a typical day, Ms. T would have 3 meals, 2 snacks, 2 fruits, and 2 power proteins. After one month on this diet and exercise program, she achieved remission. She continued on the meal plan with exercise for 9 months without relapse, though a trial of reduced tranlycypromine dosage (30 mg/day) led to a partial return of depressive symptoms, so the dose was returned to 50 mg/day. Ms. T summarized her experience on the plan as follows: "I think that having to stop eating food with high sugar content helped with my depression. Before, I would eat only a pie for dinner, but being on the meal plan helped me eat a regimented meal with great variety without having to deal with preparation." The patient has subsequently remained well for 18 months, despite the social isolation resulting from COVID-19 precautions, through continuing her diet, exercise, and tranlycypromine.

Discussion

The traditional Japanese, Norwegian, and Mediterranean diets have a positive correlation with reduced risk for depression in epidemiologic studies [4-8]. These diets tend to be minimally processed, low in animal fat (saturated fats), and have minimal added simple carbohydrates. The meal plan used by Ms. T has a similar macronutrient breakdown to these traditional diets, as described above. Participants in the plan are encouraged to eat up to six times a day and there is an option to drink probiotic shakes. No foods included in the plan were contraindicated with her tranlycypromine.

Diets high in fruits, vegetables, legumes, and nuts are associated with a reduced risk of depression likely on account of higher concentrations of omega-3 polyunsaturated fatty acids, vitamin B6, folate, antioxidants, and zinc. Specific mechanisms thought to be important for mood regulation include an optimal level of anti-oxidative agents and substrates required for methylation, and having a sufficient amount of neurotransmitter substrates and cofactors [7]. Subclinical increases in proinflammatory cytokines and neuronal damage have also been associated with a subgroup of those with MDD [9]. Therefore, nutrients such as carotenoids, vitamin C, and polyphenols may mitigate MDD through free radical scavenging and reducing oxidative damage [9,10]. In populations with combined MDD and low folate levels, depression tends to be more severe and have a longer duration [7]; folate's effects on methylation, homocysteine, and B12 may play a role in neurotransmitter synthesis and modulate mood [9].

Lastly, multiple studies have elucidated the intimate connection between the central nervous system, the gastrointestinal tract, and the gastrointestinal microbiome, often dubbed the "gut-brain axis" [11]. The reciprocal and bidirectional relationship is hypothesized to be mediated by the following factors: gut permeability, activation of the immune system, and inter-endocrine signaling via local neurohormone secretion from microbiota [11]. Furthermore, composition and ratio of gut microbiota are differentially expressed in individuals with various mental health disorders with psychiatric medications, probiotics, and dietary interventions are established to impact the composition and ratio of these microbiota [12]. These observations suggest that psychiatrically beneficial effects can result from altering gut microbiota through diet, psychiatric

medications, and/or probiotics leading to downstream alterations in immune function, hypothalamic-pituitary axis function, and psychiatric symptoms such as depression.

In the case of Ms. T, the mechanism by which her dietary change and exercise led to the sustained improvements in mood cannot be firmly established. However, given the wealth of emerging data indicating the importance of diet and the gut-brain axis for mental health, and the ease of dietary behavior change that can be achieved through home meal plan delivery services, clinicians should give more consideration for recommending that patients use such plans as part of a treatment regimen for mood disorders. It should be noted that no specific meal plans are currently approved by regulatory bodies as treatments for MDD.

Author Contributions

Boadie Dunlop conceived, supervised, edited the manuscript. Jack Van Bezooyen and Benson Ku collected the data and wrote the manuscript.

All authors reviewed and approved the final version of the manuscript.

Conflicts of Interest

B.W.D has received research support from Acadia, Compass, Aptinyx, NIMH, Otsuka, Sage, and Takeda, and has served as a consultant to Greenwich Biosciences, Myriad Neuroscience, Otsuka, Sage, and Sophren Therapeutics. J.V.B. and B.K. report no disclosures.

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