

Commentary

Food and Mood: A Dietary Approach to Treating Depression

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Abstract

Providing dietary advice that targets specific health outcomes can be a daunting task given the plethora of often-conflicting advice available in the mainstream and even medical literature. As a psychiatrist, I am specifically interested in how dietary interventions might target mood, particularly depression, a leading cause of disability worldwide. Presented herein is the available research targeting depression with dietary interventions. I will provide a brief introduction on what led me toward an interest in diet and nutrition, discuss the evidence base demonstrating improvements in depression with specific dietary interventions, and provide a discussion on the subset of patients suffering from a type of depression that appears to be in large part a systemic inflammatory condition and the dietary implications for treatment in this group.

Keywords: Whole foods; Plant based; Diet and depression; Mood diet

Introduction

Even prior to starting medical school I was curious about how food impacts health. This curiosity only became stronger when I noticed how nutrition appeared to be the unaddressed elephant in the room during my medical education and during visits with patients. I found this quite odd, since I believe most people assume doctors are experts in nutrition and would likely feel it appropriate to ask for dietary advice from their doctors. The unfortunate truth is that most medical school curricula only include about an hour of nutrition teaching and some do not include any at all, with the focus of

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our educations placed on pharmacological approaches to treating disease. This was true in my experience both as a medical student and as a psychiatry resident. I feel it is our responsibility as physicians to gain an understanding of which foods are health promoting and how to guide our patients in making decisions regarding their diets. The foods we consume do have an impact on our bodies, including on our brains, and I would like to guide my patients in choosing foods that will make this impact a positive one. Herein I discuss the research that demonstrates which foods are beneficial in treating depression.

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Does food impact mood?

Multiple studies over the last decade or so have demonstrated a strong association between diets high in fruits, vegetables, and whole grains (and low in sugar and processed foods), and lower rates of depression.¹⁻¹² In 2014, a rigorous meta-analysis was completed of all the studies completed up to 2013 that examined the association of diet and depression. This review discovered that an association did exist between a diet high in fruits, vegetables, fish, and whole grains and a reduced risk of depression.⁴ A cross-sectional and longitudinal study including 958 people demonstrated that at baseline higher total serum carotenoids (a good indicator of fruit and vegetable intake) were associated with lower probability of depressed mood. At six-year follow-up, this association remained the same.⁵ Another study of 10,000 people measured to be healthy and without depression at the start of the study were followed for a median of 4.4 years, and it was found that those following a more Mediterranean diet pattern were less likely to be diagnosed with depression. Of note, significant adverse trends were observed in this study for dairy and meat consumption.⁶ Conversely, a study conducted in Australia discovered that those women who ate less than 3-4 servings of red meat per week were 50% more likely to be diagnosed with depression. The authors note that this only held true at 3-4 servings; any more and the seemingly protective effect of red meat consumption was no longer observed.⁷ In another study, a protective effect was found in the Japanese study participants who had a high intake of vegetables, fruit, mushrooms and soy products. Those with this dietary pattern had a decreased prevalence of depressive symptoms. This study also found a higher risk of suicide among those with a high seafood intake.⁸

Now, even randomized control trial (RCT) data demonstrate improvement in depression in study participants eating a diet largely based in vegetables, fruits, and whole grains.¹¹⁻¹³

In the SMILES trial, depressed patients were randomized into two groups: one group received multiple sessions of nutritional guidance in line with a modified version of the Mediterranean diet, and the control group received only sessions that provided social support but no dietary guidance. The experimental group was instructed to specifically increase the quality of their diet in the following way: whole grains (5-8 servings/day), vegetables (6/day), fruit (3/day), legumes (3-4 servings/week), low-fat and unsweetened dairy (2-3 servings/day), raw unsalted nuts (1 serving/day), fish (at least 2 servings/week), lean red meats (3-4 servings/week), chicken (2-3 servings/week), eggs (up to 6/week), and olive oil (3 tablespoons/day), while simultaneously reducing intake of processed, high-sugar foods such as sweets, refined cereals, fried food, fast food, processed meats, and sugary drinks. The study did result in a statistically significant improvement in depression scores in the experimental group.¹³

A study published in 2017, the HELFIMED study,¹⁴ also designed as an RCT, similarly studied the effects of a Mediterranean-style diet and fish oil supplements in the experimental group compared to the attendance of social groups in the control



group. The outcomes of this study were similar to those of the SMILES trial, demonstrating a significant reduction in depression scores in the group consuming the whole foods Mediterranean diet supplemented with fish oil.

In the GEICO study,¹⁵ a group of overweight and diabetic employees at the GEICO insurance company was encouraged to eat a whole-food plant-based diet. They were told not to modify their exercise routines in any way, and there was no portion size restriction or calorie counting. The control group received no dietary advice. Over five months the experimental group reported greater diet satisfaction, improved digestion, increased energy, and better sleep, vitality, and mental health, and improved work productivity. This study was then repeated at ten corporate locations across the United States with the same results: improved body weight, blood sugar levels, and cholesterol levels, improved depression and anxiety, and reduction in fatigue.

Additionally, much research has demonstrated that at least a subset of depressive illnesses are likely systemic inflammatory conditions.¹⁶⁻¹⁹ If the mechanism of the aforementioned dietary interventions is indeed a reduction in inflammation, this may, in part, explain why such whole-food, plant-strong diets with or without animal foods have demonstrated reductions in depression. Given that the medical literature has demonstrated that a plant-based diet effectively treats and often reverses other chronic inflammatory diseases such as cardiovascular and autoimmune diseases, this may explain why studies have demonstrated improvement in depression in study participants eating these whole-food Mediterranean-style and, in the case of the GEICO study, entirely plant-based diets.

No discussion of food and mood would be complete without mentioning omega-3 essential fatty acids (EFA), particularly when considering that two of the RCTs discussed above included fish oil supplements in the experimental group. Many studies have demonstrated that a high omega-6 to omega-3 ratio promotes the pathogenesis of many chronic Western diseases, such as cardiovascular disease, cancer, and inflammatory and autoimmune diseases. Conversely, increased levels of omega-3 EFAs or a low omega-6 to omega-3 ratio have demonstrated a suppressive effect on these diseases. The optimal ratio seems to vary depending on the disease under study, but it appears that the lower the omega-6 to omega-3 ratio, the better the outcomes in most cases. It's been suggested that humans evolved on a diet with an omega-6 to omega-3 ratio of approximately 1.²⁰ Unfortunately, the current typical Western diet with its high processed food content skews this evolutionary ratio of omega-6 to omega-3 all the way to about 15:1 or higher.²¹

We will now discuss omega-3 EFAs and how they relate to depression specifically. A 2017 review that included a meta-analysis of 10 clinical trials on the treatment of depression using fish oil concluded, "Fish oil supplementation is beneficial in the treatment of depression when compared with placebo." The researchers also discovered that reduction of inflammation is likely one of two mechanisms that may explain why omega-3 EFAs are helpful in reducing depression, with the second being neural membrane modification.²²

One area of discussion that remains inconclusive is the optimal ratio of eicosapentaenoic acid (EPA) to docosahexaenoic acid (DHA) in fish oil supplements. The approach depends on what is being targeted. If the goal is to target depression specifically, and it is suspected that the patient's mood is suffering due to systemic inflammation, which also includes the brain, then it may be best to recommend a supplement with a higher EPA content. If the goal is to enhance the neuroprotective effects and improve cognition, it may be best to choose a supplement with a lower EPA:DHA ratio. A 2018 study found that lower EPA:DHA ratios reduced cell death in human neuroblastoma cells and in-



creased nerve growth factor expression, implying that a lower EPA:DHA ratio may be best if one is trying to prevent neurodegenerative diseases such as Alzheimer's dementia. The same study found that a higher EPA:DHA ratio was more effective at preventing changes in reactive oxygen species and for reducing TNF- α , i.e., reducing inflammatory processes.²³ Similar results regarding a higher EPA:DHA ratio were found in a study conducted on mice who suffered from diet-induced liver damage.²⁴ In the same review on fish oil and depression discussed earlier, the studies included in the review found that when targeting depression specifically, EPA played a more important role and DHA did not have a significant effect on depression, indicating that it may be best to have a higher EPA:DHA ratio when specifically targeting depressive symptoms.²²

Food for thought

Though specific dietary interventions varied from study to study, what they have in common is a focus on whole foods, a high intake of fruits and vegetables, and a reduction in processed, fried, and sugar-laden foods. These studies found that when participants consumed a whole-foods, low-processed, low-sugar diet, depression did improve. Most of the dietary interventions were largely based in plants, encouraging daily consumption of fruits and vegetables with meat and dairy consumption of only 3-4 servings per week. What these studies fail to determine is what role meat and dairy play in contributing to mood, if any. Other topics that would be valuable for further discussion are which supplements have been studied to be of benefit in depression and what role might spices (frequently high in antioxidants) play in treating depression.

There is an overwhelming amount of research now that confirms a reduction or complete reversal of other major chronic Western diseases such as diabetes, hypertension, and cardiovascular disease including atherosclerosis and stroke, with an entirely plant-based diet devoid of all animal products. It remains unclear if this is also the case with major depressive disorder and other mental illnesses based on the current evidence base, given that some of the RCTs discussed herein do include meat, dairy, eggs, or fish.

Studies designed specifically to investigate the impact of whole-food animal products such as meat, dairy, fish, and eggs, would help us better understand if animal-based foods play an important role in mental health. The GEICO study demonstrates that animal-sourced foods may not be necessary in targeting depression, but still does not conclude whether animal foods play an important role. The GEICO study does show that eating a diet of only plant-based foods will improve depression, but this could also be true if some meat and dairy was included. We also cannot conclude that the improvement in depression, whether or not animal foods are included in the intervention group, is not simply due to the reduction or exclusion of junk foods such as highly processed foods rich in fried fats, oils, and sugar. At least as far as treating depression is concerned, we cannot come to any firm conclusions regarding currently trending diets such as the vegan or plant-based diets or the paleo and keto diets. What we can conclude is that a whole-food diet with a focus on high consumption of a diverse group of vegetables and fruit is important and should be a mainstay in a patient's diet if they are targeting depression with dietary interventions.

It is also important to highlight the benefit of omega-3 EFAs found in fish oil, as multiple studies have demonstrated how utilizing fish oil supplementation, particularly those with a high EPA:DHA ratio, significantly reduced depression scores. It seems that the increased rate of suicide in those consuming higher amounts of fish in some studies could be related to environmental toxins such as mercury concentrated in fish and fish oil that is not purified, as we know that mercury can cause neurological damage²⁵ associated with increased risk of dementia, memory loss, and behavioral disturbances.



Further research specifically comparing fish oil supplements that have been carefully purified using distillation with unpurified fish oil supplements would be important given that the research already demonstrates a reduction in depression in those who are taking fish oil supplements. This would help us elucidate if the elevated suicide rate in those consuming more fish was related to toxins such as mercury found in fish and unpurified fish oil supplements.

The bottom line is that we know that a linear relationship exists between higher fruit and vegetable content and a reduction in depression.⁵ Based on the current available evidence addressing food and depression, it is important to recommend the following to depressed patients wanting to target their symptoms using dietary interventions: high vegetable and fruit intake, a purified fish oil supplement with a high EPA:DHA ratio, and a low to nonexistent intake of sugar-rich, processed, or fried foods. Future research that compares different trending diets (such as vegan, paleo, keto) and the effect that each one has on depression would also help clarify exactly which foods influence mood, given that the research to date only compares the standard Western diet with either a Mediterranean-style diet low in processed foods or an entirely plant-based diet. Though this research has certainly given us important information and is a great foundation from which the aforementioned recommendations can be made, it is clear that much more research is necessary.

Specifically, it is possible that plant-based diets such as that implemented in the GEICO study¹⁵ are so effective in reducing depression scores because they omit the growth hormones and pesticides that are bio-concentrated in factory farmed meat and dairy. It would be valuable to conduct a study comparing diets including regular store-bought meat and dairy to those including organic pasture-raised, hormone-free, and grass-fed meat and dairy as a means to determine if any negative influence of meat consumption on depression scores is due simply to the toxins and hormones found in most regular factory-raised meat and dairy. The study by Jacka in Australia,⁷ which found a reduced likelihood of being diagnosed with depression with higher red meat consumption, might be evidence of this, as most Australian cattle is grass-fed.

Though dietary advice can often come from a desire to approach each patient with a “one size fits all” approach such as through recommending a vegan or paleo diet, the research completed thus far shows that it is not this simple. What we do know and what the research does support is that we need to, in the words of Michael Pollan, “Eat food. Mostly plants. Not too much.”²⁶ Though the instruction to “eat food” sounds simple enough, it actually communicates the very difficulty we have been discussing thus far in the research and the one we currently face in our dismal food landscape: people end up consuming so many processed substances sold to the consumer as food that are not actually real whole food. The studies mentioned and discussed in this article have shown how those patients who ate whole foods with a focus on multiple servings per day of vegetables and fruit fared much better as far as depression is concerned than those who ate diets containing processed food-like substances (the original whole food but processed or sugar- and/or oil-laden to the point that it no longer resembles its original whole form). Given that the research resoundingly does demonstrate that dietary interventions do improve depression, providing depressed patients with dietary counsel in line with this research can be, and many would argue should be, a strong foundation of any treatment plan targeting depression.

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