

Could Yeast Infections Impair Recovery From Mental Illness? A Case Study Using Micronutrients and Olive Leaf Extract for the Treatment of ADHD and Depression

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ABSTRACT

Micronutrients are increasingly used to treat psychiatric disorders including attention-deficit/hyperactivity disorder (ADHD), mood disorders, stress, and anxiety. However, a number of factors influence optimal response and absorption of nutrients, including the health of the gut, particularly the presence of yeast infections, such as *Candida*. As part of a wider investigation into the impact of micronutrients on psychiatric symptoms, many participants who experienced a yeast infection during their treatment showed a diminished response to the micronutrients. One case was followed systematically over a period of 3 years with documentation of deterioration in

psychiatric symptoms (ADHD and mood) when infected with *Candida* and then symptom improvement following successful treatment of the infection with olive leaf extract (OLE) and probiotics. This case outlines that micronutrient treatment might be severely compromised by infections such as *Candida* and may highlight the importance of gut health when treating psychiatric disorders with nutrients. Given the role that inflammation can play in absorption of nutrients, it was hypothesized that the infection was impairing absorption of the micronutrients. (*Adv Mind Body Med.* 2013;27(3):##-##.)

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Micronutrients—minerals and vitamins—have been used for centuries for medicinal purposes, although only over the last decade have researchers paid significant attention to micronutrients as a primary treatment for mental illness.¹ Despite the positive benefits associated with micronutrients, some factors may limit a positive response, one of which may be the overgrowth of intestinal *Candida*. This yeast can disrupt normal gastrointestinal functioning through overproduction of acetaldehyde, and in turn, diminish nutrient absorption.² Theoretically, a nutritional treatment for psychiatric symp-

toms would not be as effective in the presence of such an infection.

Candida is a common fungal infection, with increased prevalence being associated with increased use of antibiotics.³ Estimates suggest that up to 75% of women will experience at least one episode of vaginal *Candida* in their lifetimes. The idea that *Candida* may be associated with psychiatric symptoms is not a new one.⁴ A number of studies have documented elevated psychiatric symptoms in individuals infected with *Candida*, including high rates of panic attacks, depression, and poor concentration^{2,5,6}; however, the causal direction is unclear and may be bidirectional.

Furthermore, not all studies have convincingly shown a relationship between remission of *Candida* infection and improvement in psychiatric symptoms.⁷ Regardless, *Candida* has never been discussed in studies on nutrient treatments as a possible limiting factor. Often when psychiatric symptoms return after successful treatment with micronutrients, the recurrence of symptoms is attributed to the failure of micronutrients to continue to work as opposed to the existence of another factor that may be impairing the effectiveness of the nutrients, such as gastrointestinal health. In this article, the author intends to alert clinicians that *Candida* may influence

the expression of mental health symptoms at some time after initiation of nutritional treatments, despite an initial positive response to consumption of micronutrients. The author discusses an individual case that shows this dimension in patient care.

CASE PRESENTATION

2010 Clinical Trial

Kate (an alias) is a 24-year-old female of European descent who had participated in the 2010 trial by Rucklidge et al using micronutrients for the treatment of ADHD.⁸ In the past, she had been prescribed methylphenidate by a psychiatrist but could not tolerate the side effects.

The procedure used by Rucklidge et al for the 2010 trial were approved by the University of Canterbury's Human Ethics Committee and the Health and Disability Ethics Committee. Kate gave written consent at the time of that trial for her participation in that research, and the researchers specifically informed her that her data might be reported as a single case, with her anonymity preserved.

At the time of that study, Kate met the DSM-IV's criteria, based on standardized instruments, for attention-deficit/hyperactivity disorder (ADHD)—combined type, and for recurrent major depressive disorder (MDD), in partial remission. She was not taking any psychotropic medications at the time of her assessment, and she did not take any throughout the trial or during the follow-up period. Her severity of symptoms of depression and ADHD were assessed using the Montgomery-Asberg Depression Rating Scale (MADRS)⁹ and the self-and-observer rating forms of the Conners' Adult ADHD Rating Scales (CAARS). The CAARS has a number of subscales, including DSM-IV's Inattention, Hyperactivity/Impulsivity, and Combined Scales, and the Emotional Lability Scale.

Kate entered the study's initial baseline phase while moderately depressed, with significant ADHD symptoms (Figures 1 and 2). She then received the trial's micronutrient formula (EMPowerplus [EMP+]), which consisted of 36 ingredients: (1) 14 vitamins, (2) 16 minerals, (3) three amino acids, and (4) three antioxidants, taken in a dose of 15 pills per day (5 pills, 3 ×/d). See Table 1 for a list of ingredients. She took the formula for a period of 8 weeks and was monitored fortnightly. By the end of the 8-week trial of micronutrients, Kate was no longer depressed, and her ADHD scores had fallen to within the normal-average range. She reported no side effects, and her compliance was good. Hematological and biochemistry tests performed at baseline and the end of the trial revealed no adverse effects from the treatment, with all tests falling in the normal range.

These positive changes were maintained over 4 months based on follow-up testing using the same measures as baseline. Kate was then seen periodically over the next 2 years and demonstrated good maintenance of symptom changes overall, although she needed to increase her dose prior to her menstrual period. She also noted that her symptoms would gradually return when she didn't regularly take the pills.

Table 1. Ingredients of EMPowerplus With Recommended Daily Allowances for Adults Given in the Same Unit

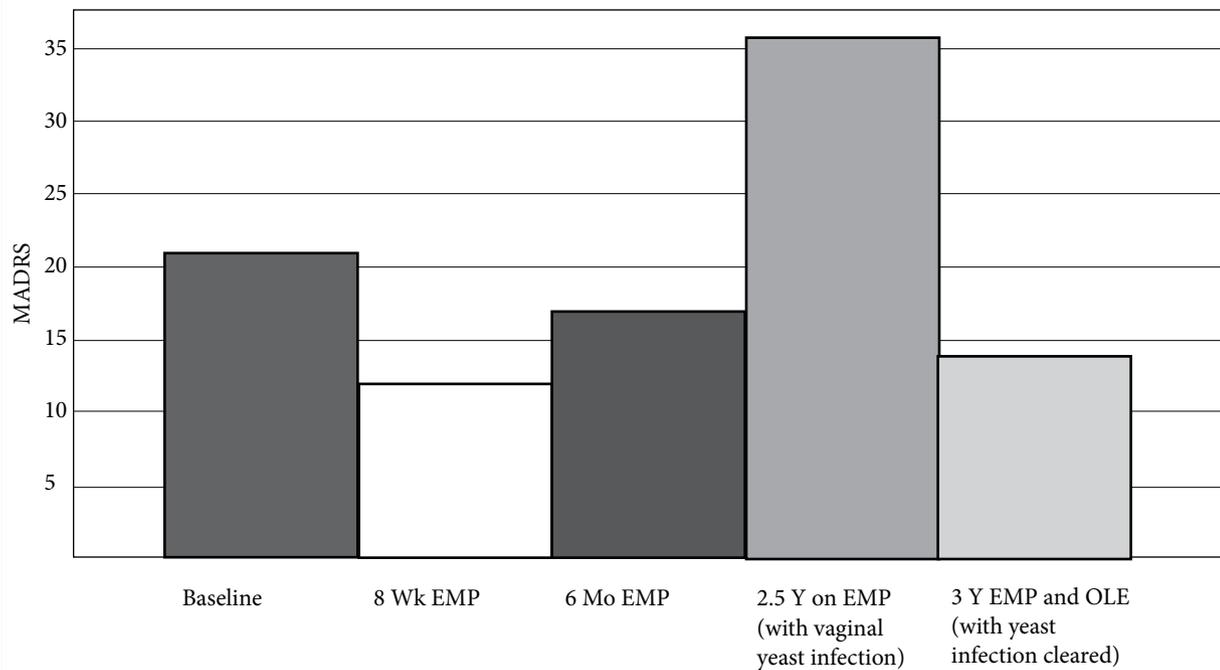
EMP Ingredients	15 Capsules	Male RDA	Female RDA
Vitamin A	5760 IU	3000	2333
Vitamin C	600.0 mg	90	75
Vitamin D	1440 IU	600	600 ^a
Vitamin E	360 IU	22.5	22.5
Thiamin	18.0 mg	1.2	1.1
Riboflavin	13.5 mg	1.3	1.1
Niacin	90.0 mg	16	14
Vitamin B ₆	36.0 mg	1.3	1.3 ^a
Folic acid	1440 µg	400	400
Vitamin B ₁₂	900 µg	2.4	2.4
Biotin	1080 µg	30	30 ^b
Pantothenic acid	21.6 mg	5	5 ^b
Calcium	1320.0 mg	1000	1000 ^a
Iron	13.7 mg	8	18 ^a
Phosphorus	840.0 mg	700	700
Iodine	204 µg	150	150
Magnesium	600.0 mg	400	310 ^a
Zinc	48.0 mg	11	8
Selenium	204 µg	55	55
Copper	7.2 mg	0.9	0.9
Manganese	9.6 mg	2.3	1.8 ^b
Chromium	624 µg	35	25 ^{a,b}
Molybdenum	144 µg	45	45
Potassium	240.0 mg	4700	4700 ^b
Choline bitartrate	540.0 mg	550	425 ^b
DL-Phenylalanine	360.0 mg	-	-
Citrus bioflavonoids	240.0 mg	-	-
Inositol	180.0 mg	-	-
Glutamine	180.0 mg	-	-
Methionine	60.0 mg	-	-
Grape seed	45.0 mg	-	-
<i>Ginkgo biloba</i>	36.0 mg	-	-
Germanium sesquioxide	20.7 mg	-	-
Boron	2400 µg	-	-
Vanadium	1194 µg	-	-
Nickel	29.4 µg	-	-

Abbreviations: RDA = recommended daily allowance; mg = milligrams; IU = international unit; µg = microgram.

^aRDA varies with age.

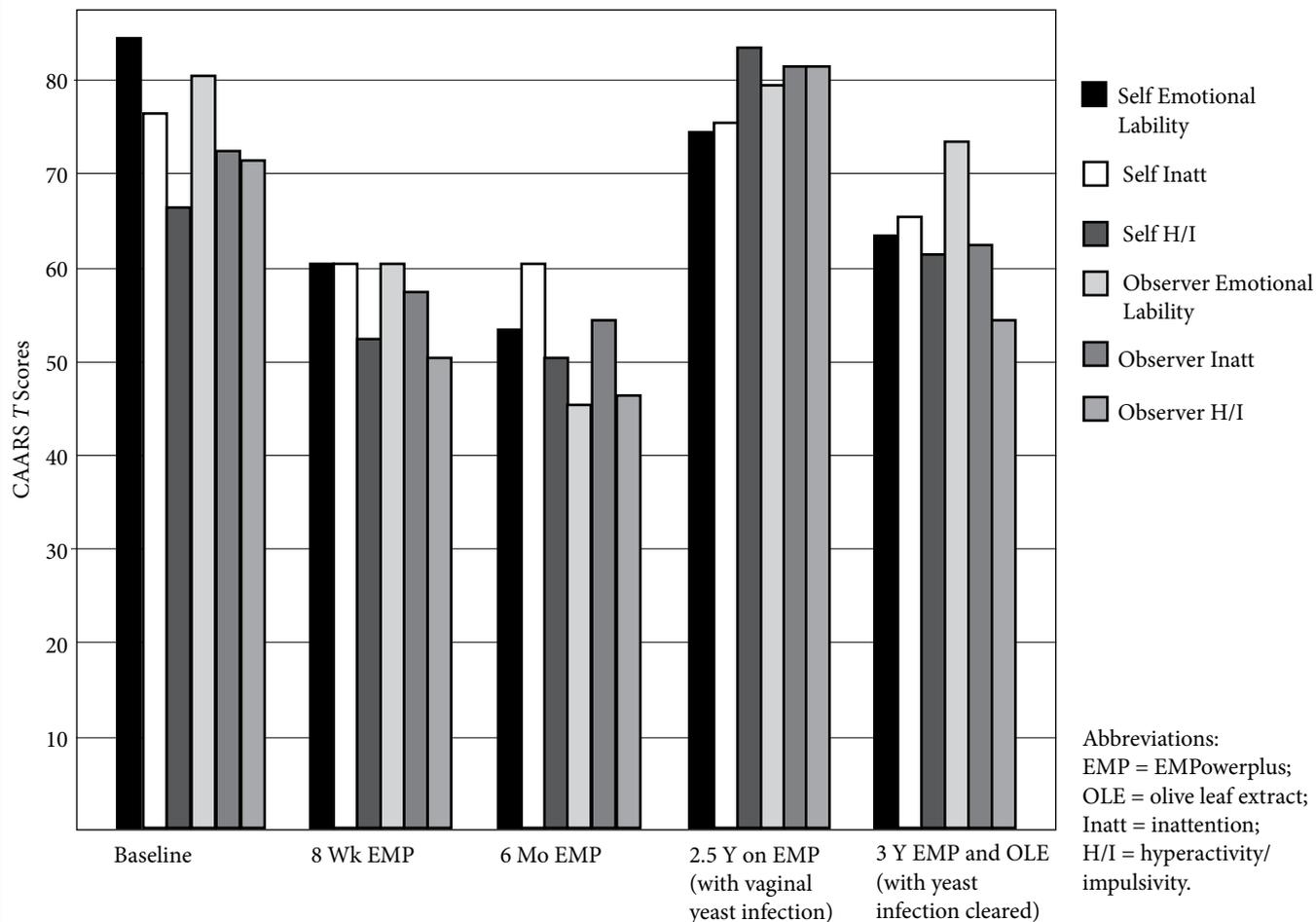
^bReference values are given as adequate intake, not RDA, because RDA was not available.

Figure 1. MADRS Across Time—Formula Use Before and After Treatment of Yeast Infection



Abbreviations: MADRS = Montgomery-Asberg Depression Rating Scale; EMP = EMPowerplus; OLE = olive leaf extract.

Figure 2. Conners' Adult ADHD Rating Scale (CAARS) Scores for Both Self And Observer Across Time and Formula Use Before and After Treatment of Yeast Infection



Abbreviations:
 EMP = EMPowerplus;
 OLE = olive leaf extract;
 Inatt = inattention;
 H/I = hyperactivity/
 impulsivity.

Status 2.5 Years After the Study

About 2.5 years after her participation in the trial, Kate began reporting that she was feeling increasingly unwell, experiencing (1) a chronic sore throat; (2) a constant runny nose; (3) cramps; (4) itchy toes, anus, and vagina; (5) rashes on her legs and groin area; and (6) an overall flu-like feeling. Concomitantly, all her psychiatric symptoms had returned, as evidenced by an increased MADRS score and elevations on the CAARS in the clinical range (Figures 1 and 2). She was moody, anhedonic (unable to experience pleasure), and chronically irritable and was having cravings for sugary and starchy foods.

Kate visited her family physician, who diagnosed Kate with a vaginal yeast infection following culture testing and prescribed an antifungal cream, Micreme H (containing miconazole nitrate 2% and hydrocortisone 1%). According to Kate, the cream had no effect on her symptoms. Her physical and psychiatric symptoms persisted for several months despite ongoing use of the prescribed antifungal cream.

Kate and her mother were adamant about finding a natural cure for Kate and contacted the manufacturer of the micronutrient product for assistance. After reviewing her symptoms and past history, the manufacturer suggested to Kate that she might have a *Candida* infection, which was in line with the diagnosis made by Kate's physician. The manufacturer recommended that Kate try four oral capsules of olive leaf extract (OLE)—Truehope OLE, 500 mg OLE per capsule—and two capsules of probiotics—Truehope GreenBAC—at night to treat the yeast infection, in addition to the 15 capsules of EMP+ per day. The probiotics included the following bacterial strains: (1) *Lactobacillus rhamnosus* A., (2) *Lactobacillus delbrueckii* sub. *bulgaricus*, (3) *Lactobacillus rhamnosus* B., (4) *Bifidobacterium longum*, (5) *Lactobacillus acidophilus*, (6) *Bifidobacterium breve*, (7) *Lactobacillus casei*, and (8) *Streptococcus thermophilus*. The manufacturer also provided advice on what foods to eat and to avoid.

After 1.5 weeks on this regime, Kate's physical and psychiatric symptoms both improved. She and her mother reported (1) improved mood and energy levels, (2) elimination of her runny nose, (3) cessation of the chronic itching of both her anus and vagina, and (4) disappearance of her rash. After 2 months, she had returned to functioning in a manner similar to her response during the trial over 2 years previously (Figures 1 and 2). A follow-up 6 months later confirmed maintenance of the positive gain. Over the following 6 months, it became clear based on her own and her parent's reports that both her physical and psychiatric symptoms returned if Kate did not take the OLE.

DISCUSSION

Kate is a 24-year-old female who presented with severe mood dysregulation and combined-type ADHD. She responded to a micronutrient treatment, with improvements in all her psychiatric symptoms, including depression and

ADHD. These treatment gains were then maintained for over 2 years. At that point, Kate's psychiatric symptoms worsened at the same time that she developed symptoms consistent with *Candida*. Treatment of her intestinal as well as her vaginal *Candida*, together with continued treatment with micronutrients, also resulted in improvement in Kate's psychiatric status. This case illustrates the importance of considering the role that infections may play in the expression of psychiatric symptoms.

Given the role that gut inflammation can play in absorption of nutrients, the author hypothesized that a gastrointestinal infection was impairing the absorption of the micronutrients. While Kate was diagnosed with a vaginal infection, her symptoms of itch in both her vagina and anus suggested that she might also have an infection in her gastrointestinal tract, a common place for the infection to reside in addition to the vagina.⁷ These symptoms indicated that a culture assessment of the infection through fecal testing would be required to confirm the author's hypothesis. Indeed, medical practitioners and researchers do not know how often gastrointestinal infections with *Candida* accompany vaginal infections with *Candida*. A growing body of literature that discusses the gut-brain axis shows that the gut microbiota can influence brain function and subsequent psychiatric functioning.¹⁰ The author's case may illustrate this gut-brain communication at play, whereby improved microbiota led to reduced inflammation, perhaps resulting in improved nutrient absorption, leading to improved psychiatric symptoms. Although speculative, it is a hypothesis worthy of considering and further testing empirically.

The use of OLE as a treatment of *Candida* dates back to the ancient Egyptians,¹¹ and although it appears to be used widely and promoted on the internet as a treatment for *Candida*, the empirical data to support its use are mixed.¹²⁻¹³ Overall, the use of OLE specifically for the treatment of *Candida* has not been adequately tested empirically. Furthermore, even if it does work, the mechanism of action is unknown. Nevertheless, in this case, oral OLE appears to have eliminated all physical symptoms when the topical antifungal treatment had had no effect, providing preliminary support for OLE's use together with a probiotic and dietary change. Given its widespread use by consumers, more research is required to assess its suitability as a primary intervention for *Candida*. The additional use of probiotics was likely important in reculturing the gastrointestinal tract with healthier bacteria, although this mechanism of action was not empirically validated.

It is possible that having *Candida* results in psychiatric symptoms, not because of a gut-brain link, but because the *Candida* symptoms can influence how one feels in general and the relief of the *Candida* brings about psychiatric relief as well.⁶ A study by Dismukes et al challenged this mechanism of action,⁷ attributing improvement in psychiatric symptoms to a placebo effect and not to improvement in a fungal infection per se, even when the infection was improved with use of a traditional antifungal agent. Indeed in the cur-

rent case, Kate continued to receive treatment for her psychiatric symptoms using micronutrients, and therefore, the author has not hypothesized that the OLE alleviated those symptoms. However, only by giving Kate OLE in the absence of the micronutrients could this mode of action be tested. Even then, it would still be challenging to determine if the impact of OLE on psychiatric symptoms was through an indirect means or a direct effect of OLE on the central nervous system.

Kate's contact with the therapist from the 2011 study is unlikely to explain the dramatic increase in Kate's symptoms at a point 2.5 years later because the frequency of that contact was not changed suddenly at that point but rather was gradually tapered off over time, with contact being minimal in the follow-up phase—once every few months. The season of the year also is unlikely to be the primary reason for her change in psychiatric symptoms given that she recovered from her symptoms in winter, when vitamin D exposure was limited. The placebo effect cannot be ruled out, although the benefit's 3-year duration decreases the likelihood that it can be completely attributed to a placebo effect. Nevertheless, the author cannot confidently attribute the observed change to the consumption of the OLE given the robustness of the placebo effect.¹⁴ The author also does not know whether the infection was dormant for a period prior to the start of Kate's symptoms, but she did not evidence any physical symptoms until the infection reached a threshold point. Perhaps the nutrients exacerbated a dormant *Candida* infection, essentially feeding the growth.

The comprehensive intervention in the 2011 study stabilized most participants' ADHD and mood symptoms, and yet its success could have been limited by a number of factors. The current case study emphasizes the complexity associated with successfully treating psychiatric conditions with micronutrients in the presence of infections. The case raises many hypotheses that need to be empirically tested; the one most relevant to this case is the potential importance of ensuring that infections are treated to allow micronutrients to work most effectively. More research is required to assess OLE's suitability as a primary intervention for *Candida* as well as to determine whether the use of OLE impacts directly on the presence of *Candida*, through sampling of both vaginal discharges and fecal matter. In light of this case, clinicians may find it helpful to be mindful of the gut-brain axis when using nutrients as a treatment for psychiatric symptoms and also should appreciate that these treatments are largely understudied and not well understood.

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