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Nutrition and Mental Health: Understanding the Connection

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ABSTRACT

The number of people with mental disorders shows a great deal of increase day by day despite the increasing number of antipsychotic and antidepressant medication use. Nutritional problems and mental illnesses are two interconnected aspects of human health. People who are diagnosed with mental disorders frequently have particular dietary needs and problems that can have a big influence on their general health status. Poor nutrition in this population can be caused by a variety of factors, including stress-related eating habits, dietary restrictions, altered appetite, and side effects from medications. These inaccurate states of dietary intake result in a wide range of difficulties from obesity and undernutrition to vitamin and mineral deficiencies. Strong evidence from research indicates that mental health disorders are linked to a greater likelihood of developing Metabolic Syndrome (MetS). Vitamin and mineral deficiencies, especially vitamin D and Zinc, can play a role in the development and progression of mental diseases, while they can also develop as a result of existing psychiatric diseases. In addition, inadequate diet can also have an impact on the onset and severity of mental illnesses, aggravating symptoms and reducing the effectiveness of therapy. Since comprehending the dietary concerns about mental illnesses is essential for creating comprehensive and individualized treatment methods, this review of existing literature aims to discuss the complex relationship between mental disorders and nutrition by emphasizing common nutritional problems in psychiatric disorders, namely major depressive disorder, bipolar disorder, schizophrenia, and obsessive-compulsive disorder.

Keywords: Nutritional Problems; Bipolar Disorder; Major Depressive Disorder; Schizophrenia; Obsessive Compulsive Disorder

Abbreviations: BDI-II: Beck Depression Inventory-II; HDRS: Hamilton Depression Rating Scale; CV: Cardiovascular; BD: Bipolar Disorder; FEP: First Episode Psychosis; OCD: Obsessive Compulsive Disorder

Introduction

Mental diseases such as depression and bipolar disorder cause an enormous amount of impairment worldwide including considerable negative social, economic, and health impacts (Marx, et al. [1]). Individuals with severe mental illness may have poor physical health due to major side effects from their medications as well as changeable and irreversible risk factors associated with the illness itself (Teasdale, et al. [2]). According to the Turkish Medicines and Medical Devices Authority (TITCK, [3]) and OECD [4], daily usage of antidepressant for 1000 people has increased approximately 58% in 2020 compared to 2010. In fact, current data indicates that the prevalence of depression in the population has not decreased and may even be rising, in spite of a marked rise in the usage of psychotropics and increased accessibility to psychotherapies (Marx, et al. [1]). As stated by (Teasdale, et al. [2]), antipsychotic drugs significantly boost the desire for sweet foods and beverages, diminish the sensation of fullness, and increase hunger. On the other hand, in a vicious cycle, the lack of healthy lifestyle habits impairs mental health, which in turn causes a decrease in the use of healthy lifestyle habits (Kris-Etherton, et al. [5]). In addition, epidemiological research on the association between nutrition and behavioral health problems is especially vulnerable to reverse causation; a poor diet may either cause or result from a behavioral health illness, therefore there is probably a bidirectional relationship (Kris-Etherton, et al. [5]).

Effect of Nutrition on Mental Disorders

Major Depressive Disorder (MDD)

Major depression is known to make it more difficult to manage both current chronic illnesses and potential individual health problems (Ekinci, et al. [6]). Because of the dynamic relationship between depression and nutritional habits, depression may have varying effects on people's food preferences depending on the subtypes of depression (Ekinci, et al. [6]). As claimed by Mills and her colleagues [7], while chronic diseases together with hunger and body weight show a rise as a result of the atypical major depressive disorder; weight loss, and decreased appetite are experienced in melancholic severe depressive disorder. They also indicated that weight gain caused by depression is seen more in females than males (Mills, et al. [7]). The risk of chronic illnesses including metabolic syndrome and cardiovascular disease has been associated with sleep apnea, high blood pressure, insulin dysregulation, and consistent weight gain; which can be triggered by depression (Mills, et al. [7]). Although there is no certain mechanism of depress genic overeating which in turn may contribute to food addiction, the reward property of dopamine is thought to be one of the reasons (Mills, et al. [7]). In a study conducted by Meule and Gearhardt [8], the number of people who meet the food addiction criteria was found approximately three times more in people with MDD than in the general population. Anemia is another significant medical condition that is frequently seen in persons who are diagnosed with MDD (Vulser, et al. [9]).

The researchers explain the potential relationship between anemia and depression in three possible interactions:

1. Anemia may aggravate symptoms by causing functional impairments such as exhaustion,
2. Anemia and depression may also be caused by underlying medical conditions such as inflammatory illnesses or renal failure,
3. MDD can result in unhealthy habits like drinking alcohol or undereating, which can cause vitamin deficiencies and ultimately cause anemia (Vulser, et al. [9]).

For example, Noorazar and his colleagues [10] studied 100 female patients diagnosed with major depression and collected blood samples to measure iron deficiency anemia by accepting Hb < 12 g/dl considered as anemia and TIBC levels > 360 µg/dl, Fe < 30 µg/dl as reference values for iron deficiency anemia. Although there are conflicting findings in the literature, the researchers found that anemia was shown to be considerably greater in individuals with depression, and a significant rise in the Hamilton Depression Rating Scale (HDRS) was observed with lower Hb levels. However, they also indicated that no significant relationship is found between depressive symptoms and levels of serum ferritin (Noorazar, et al. [10]). It is becoming more and more clear from research that vitamin D is a neuroactive steroid that regulates neuroimmunomodulation, the production of antioxidants, and the expression of neurotransmitters (Saji, et al. 2022). For these reasons, researchers state that it is plausible from a biochemical standpoint that vitamin D is linked to symptoms of depression (Saji, et al. 2022).

In a review written by Saji and her colleagues, they stated that the therapeutic effects of vitamin D supplementation and the inverse relationship between depression and blood vitamin D levels underscore clinical implications. In a study done by (Von Känel, et al. [11]), 25(OH) D3 levels of 380 depression patients were measured. Patients with vitamin D deficiency scored higher on the Hospital Anxiety and Depression Scale (HADSD) scale and on an anhedonia symptom factor and the Beck Depression Inventory-II (BDI-II) scale than those with sufficient vitamin D (Von Känel, et al. [11]) Additionally, (Saji, et al. (2022)) have suggested that patients with depression need individualized care, and periodic evaluations should include testing for vitamin D deficiency because Cardiovascular (CV) events are associated with depression, and evidence suggests that low levels of vitamin D may be a major risk factor for CV events while also being connected to depression (Saji, et al. 2022).

Bipolar Disorder (BP)

A mood disorder known as Bipolar Disorder (BD) is marked by alternating affective states between extremes of depression, euthymia, and euphoria or dysphoria (Mangge, et al. [12]). The main signs of depressive episodes are mood swings, anhedonia, and alterations in appetite (Mangge, et al. [12]). According to Mangge and colleagues [12], serum metabolomics data linked BD to mitochondrial dysfunction. The same authors have also stated that a certain amount of the impairment in pathways associated with obesity may be attributed to the effects of BD on the citric acid cycle, urea cycle, and amino acid metabolism. Moreover, increased hunger and an increase in weight can result from some psychopharmacological medications essentially sedating antidepressants and mood stabilizers like lithium. Pilz, et al. (as cited in Mangge, et al. [12]) state that adiponectin's potent anti-inflammatory and anti-atherogenic properties enable it to prevent atherosclerosis. In a study done by (Platzer, et al. [13]), researchers included 120 bipolar disorder patients (75 with euthymic and 45 with mild depressive symptoms) and 68 control subjects. Fasting blood samples were taken from both groups to examine their adiponectin and leptin levels (Platzer, et al. [13]). Results of the study revealed that compared to healthy controls and male BD patients, female depressed patients had noticeably lower levels of adiponectin in their fasting blood (Platzer, et al. [13]). Hereby, the tendency toward moderate chronic inflammation observed in patients with bipolar may be partially explained by a decrease in total adiponectin (Mangge, et al. [12]).

Since an increasing body of research suggests that abnormalities in zinc turnover have a role in the etiology and management of depressive disorders, (Siwek, et al. [14]) wanted to make an investigation about the relationship between zinc deficiency and bipolar disorder.

The study was done with 69 patients with BP type I, 60 patients with BD type II, and 50 healthy controls (Siwek, et al. [14]). When comparing patients with BD type I in the depressed phase to those with mania, remission, and healthy participants, there was a substantial decrease in serum zinc levels (Siwek, et al. [14]). On the other hand, serum zinc levels did not vary statistically from the control group in patients with type II (Siwek, et al. [14]). In addition, (González-Estecha et al. [15]) compared patients in the manic period to the control group and found that there was a statistically significant rise in zinc levels in the manic period.

Schizophrenia Disorder

Schizophrenia is defined as a chronic mental illness characterized by hallucinations, abnormal behavior, disorganized thinking, and delusions (American Psychiatric Association, [16]). As stated by Osuji and Onu [17], researchers have documented a range of improper eating patterns in individuals diagnosed with schizophrenia. For example, among these patients, notable symptoms include fear of becoming fat, carbohydrate preference, pica, and denial of eating or drinking (Osuji, et al. [17]). (Osuji and Onu [17]) studied 206 schizophrenia patients to discuss the different eating habits seen in them. 56.5% of the patients reported denial to eat, and 32.5% of those cases were linked to suspicion (Osuji, et al. [17]). Moreover, improper eating behavior was observed in %13.2 of the patients in which %46.4 of the patients showed unusual meal preparation and %14.3 showed pica (Osuji, et al. [17]). As stated by the researchers of this study, these poor eating habits may result in deficits in macro and micronutrients, which might have a major effect on how the brain functions, remodels, and repairs itself to recover from mental disease. In a meta-analysis completed by (Firth, et al. [18]) consisting of 28 studies, blood levels of 10 minerals and 6 vitamins were assessed in 2612 people— 1221 of whom had First Episode Psychosis (FEP). Comparing FEP to healthy controls, significantly reduced blood levels of vitamin D and folate have been identified (Firth, et al. [18]). Additionally, the inverse correlations between psychological signs in FEP and folate and vitamin D were determined by the same researchers (Küçükerdönmez, et al. [19]). Conducted a research with 104 outpatients with schizophrenia in Turkiye to identify the frequency of food addiction.

The results revealed that food addiction is seen in over half of the schizophrenia patients (60.6%), with female patients having a greater frequency (62.9%) compared to male patients (57.1%) (Küçükerdönmez, et al. [19]). In a review written by Dipasquale and colleagues (as cited in Küçükerdönmez, et al. [19]), patients with schizophrenia have a high frequency of metabolic syndrome, which encompasses cardiovascular risk factors such as central obesity, hypertension, atherogenic dyslipidemia, and impaired glucose and insulin metabolism. The BMI, body weight, waist circumference, and body-fat ratio of 41.3% of schizophrenia patients with food addiction were found to be greater than those of the patients without food addiction which can be the explanation for metabolic syndrome in those patients because their dietary intake mostly dense in terms of energy, carbohydrate, and fat content (Küçükerdönmez, et al. [19]).

Obsessive Compulsive Disorder

American Psychiatric Association [16] defines Obsessive Compulsive Disorder as recurring behavioral or mental routines (compulsions) as well as unwanted, bothersome, and upsetting thoughts and ideas (obsessions) that cause severe suffering. (Abramovitch, et al. [20]) intended to evaluate BMI, the likelihood of overweight and obesity in OCD patients, and the impact of co-occurring depression on BMI. The main hypothesis was that in comparison to other mental diseases and non-clinical controls, OCD would be linked to reduced rates of obesity and BMI (Abramovitch et al., 2019). According to the results, there was no discernible difference in mean BMI between the OCD and the other groups, however, higher BMI values were shown to be highly mediated by accompanied depression in OCD (Abramovitch, et al. [20]). A study including 85 Australian patients with OCD aimed to investigate the connection between diet quality, nutrient consumption, and the severity of OCD (Nguyen, et al. [21]). The sample's nutrient consumption mostly complied with Australian dietary recommendations and there were no significant correlations between OCD severity, nutrient consumption, and dietary quality in linear regression models that were controlled for gender, age, and total energy intake (Nguyen, et al. [21]). However, increased magnesium intake was linked to greater OCD severity in males, while decreased magnesium intake was linked to higher OCD severity in females (Nguyen, et al. [21]).

A longitudinal research by Isomura, et al. [22] identified 12,497,002 people diagnosed with OCD among 25,415 people living in Sweden between 1973 and 2013, with an average follow-up period of 22.33 years in terms of metabolic syndrome and cardiovascular complications. First, compared to people without OCD, patients with OCD had a 45% higher chance of experiencing at least one metabolic or cardiovascular problem (Isomura et al., 2018). In addition, this increased risk was not associated with the dosage and duration of SSRI usage (Isomura, et al. [22]). In another study conducted by Khalkhali, et al. (2023), researchers included 107 OCD patients to study and measure their body compositions and blood samples. According to their results, the prevalence of metabolic syndrome was found at 39,2% and the most common element of MetS was central obesity (68.2%), which was followed by low HDL cholesterol (50.5%) in this sample. Since a large body of studies suggests a bidirectional link between diabetes and mood disorders, research on animals and genetics also points to a potential involvement of insulin signaling in the development and course of OCD (Grassi, et al. [23]). It is proposed that striatal dopamine, inflammation, the HPA axis, and gut microbiome affect insulin signaling and OCD symptoms (Grassi, et al. [23]). However, the gut microbiome composition of OCD patients has only been the subject of a small number of research to date, and the evidence supporting this association is still lacking since alterations in

the gut microbiota may be a cause of OCD or a side effect of the disorder (Kong, et al. [24]).

In a review written by Gerentes, et al. [25] one of the most common observations in OCD is a chronic low-grade inflammation involving both adaptive and innate immune systems, along with concurrent autoimmune morbidities and the stigma of infectious episodes. As stated by Mataix-Cols et al. (2018) (as cited in Gerentes, et al. [25]) spanning several generations reveals that 43% of individuals with OCD are more likely to have an autoimmune condition, with the highest correlations being seen with Sjögren's syndrome, Celiac disease, Guillain-Barré syndrome, Crohn's disease, and Hashimoto's Thyroiditis. In addition, vitamins and minerals are necessary for a number of brain functions, including neuroplasticity, which suggests that they may play a part in mental illnesses (Balandeh, et al. [26]). In a meta-analysis conducted by Balandeh, et al. [26], lower concentrations of vitamins C, E, and B12 were seen, along with a statistically significant increase in homocysteine in patients with OCD. Moreover, Shohag, et al. [27,28] found that serum concentrations of calcium and manganese were substantially higher in patients with OCD than in controls, but the levels of zinc, iron, and magnesium all significantly reduced in patients.

Conclusion

In conclusion, the intricate relationship between dietary practices and mental health conditions leads to a vicious cycle in which one has a detrimental impact on the other. Nutritional habits can have an impact on psychological well-being. On the other hand, psychiatric patients frequently experience particular obstacles that might worsen dietary issues. Longitudinal community-based studies show that people with a diagnosis of depression, bipolar disorder, or schizophrenia had an approximately doubled risk of cardiovascular illnesses and type 2 diabetes compared to the general population, even after accounting for the use of psychotropic medicines. In this context, investigating the nutritional problems that underlie and cause mental illnesses is the first step in developing psychological and nutritional treatments to break this vicious cycle.

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