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Impact of diet and vitamins on Mental Health - A systematic review

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Abstract

Aim of the study

The primary aim of this study is to examine the correlation between the presence of mental health disorders and malnutrition and vitamin level imbalance. Analysis of numerous studies and trials that observe the connection between lifestyle factors, health habits, vitamin levels or consumed supplements with the development of depression.

Materials and Methods

A systematic search of major electronic databases was conducted to identify relevant studies and papers registered in PubMed and Google Scholar. The search used the keywords: mental health disorders, vitamins, diet habits, vitamin D, Vitamin B12, Vitamin B6, folate, depression. The review included 27 articles.

Conclusions

Classical antidepressants primarily work by providing monoamine balance. However, it might not be effective or sufficient in all cases. Therefore, it is worth considering combining pharmacotherapy with an appropriate diet or vitamin supplementation. Integrating supplements into treatment plans may be viewed as a more natural and holistic approach to manage mental health disorders, potentially enhancing patient response to treatment.

Keywords: mental health disorders, vitamins, diet habits, vitamin D, Vitamin B12, Vitamin B6, folate, depression

Abstract

The process of determining risk factors and direct causes that contributed to the development of mental health disorders is not yet completely understood and it is considered multifactorial. Numerous studies have examined the correlation between lifestyle factors, health habits, vitamin levels or consumed supplements with the development of depression. Therefore, observed associations established the importance of dietary patterns, deficiencies of vitamin D or B-complex vitamins (B6, B9, B12) in patients with depressive symptoms. Moreover, these vitamins are involved in essential neurobiological processes such as neurotransmitter synthesis, homocysteine metabolism, neuroinflammation regulation, and oxidative stress reduction. Studies have also shown that the supplementation of the essential nutrients provide promising benefits and may improve the quality of life and well-being. Acknowledging the nutritional impact on mental health can contribute to a better understanding of its etiology and plan more effective treatment strategies.

Introduction

Nowadays, according to the World Health Organization statistics, over 300 million people are affected by a depression or depressive disorders, with the increasing number of suicides cases correlated to it [1]. What is more, those disorders are more frequently observed in younger groups of patients. The incidents of death occur 5 to 10 years earlier in patients with psychiatric disorders compared to those where those disorders are not observed. In patients without mental disorders the most common causes of death are cancers, vascular diseases, diabetes or pulmonary disorders [2-4].

Diet

The researches have shown that both dietary style, food preferences and proper nutrition can have a major impact on mental health. Dietary habits may influence depression indirectly by promoting unhealthy eating routine and leading to obesity [1, 5]. The study from 2021 established the connection between the higher risk of depressive symptoms in women consuming fast food, mayonnaise, sugars, salt, desserts, fats and soft drinks, than in women leading a more healthy lifestyle, consuming a higher amount of vegetables, fruits, eggs, nuts , fish or olive oil. It has been shown that a healthy dietary pattern lowers the likelihood of developing depression [6]. Furthermore, numerous studies confirmed the depression association with low vitamin levels such as folate or vitamin B12 [7-9]. It has been shown that the importance of sustaining a proper diet rich in valuable and nutritional components is extremely important in order to reduce the risk of depression. Additionally, a healthy diet contributes to a lower risk of other chronic conditions, including cancer or cardiovascular disease. Nutrients may be also ingested through supplements, which may be an easier form of administration especially in cases of malnutrition or patients with impaired absorption. Nutrient supplements are prevalent across the different populations and there is a visible clinical focus on the potential role in managing various mental health disorders [10].

Nevertheless, there is a lot of evidence suggesting that diet, including supplements, is linked both to mental health and physical functioning, particularly in cases where deficiencies occur. A diet high in fiber is a crucial factor to control in the context of mental health disorders due to its dose- dependent correlation with the risk of depression [11]. Apart from that, there exist other dietary components that may contribute to lower the possibility of developing mental health disorders. Among them can be distinguished homocysteine, which takes part in carbon transfer reactions, B12 and folate metabolic pathways. Homocysteine, as a precursor to S-adenosylmethionine- a key methyl group donor, is especially important in methylation processes in Deoxyribonucleic acid (DNA), proteins, phospholipids and neurotransmitters such as dopamine, serotonin or norephrine. Disruption in any of these biochemical processes can contribute significantly to the pathophysiology of depression [12].

Vitamins B complex

A number of authors have also established the correlation between vitamin B6 and commonly occurring illnesses such as depression and anxiety, which are mostly treated pharmacologically [13]. The University of Reading researchers found that supplementing vitamin B6 can alleviate symptoms of anxiety and depression while reducing stress. The study involved depressed and anxious participants given either vitamin B6, B12, or a placebo, and demonstrated that higher levels of vitamin B6 reduce the production of Gamma-aminobutyric acid (GABA) and serotonin. GABA, which is a neurotransmitter that inhibits impulses between neurons in the nervous system, providing slower brain activity, calming effect and decreased emotions of stress, anxiety and fear [14]. What is more, vitamin B6 can even reduce the severity of neurodevelopmental disorders such as Tourette syndrome, by showing therapeutic potential in managing tic disorders and anxiety- related symptoms [15].

Folate- also known as vitamin B9 belongs to a group of water-soluble substances. It is involved in numerous processes such as synthesizing nitrogenous bases in DNA and Ribonucleic acid (RNA), reducing levels of amino acid- homocysteine. Folate is also essential in forming healthy red blood cells or even during the pregnancy, due to its influence on fetal neural tube development [16]. Some research suggests a correlation between folate deficiency, increased plasma homocysteine, and mood disorders. Folate and S-adenosylmethionine impact mood, while hyperhomocysteinemia is linked to neuroinflammation. Folate-producing probiotic strains may aid in reducing neuroinflammation. Although folate and vitamin B12 treatment may help in relieving depressive symptoms, further research is needed due to limited and heterogeneous studies [8, 17]. Some fruits, vegetables or whole grains are abundant both in fiber and folate, providing protective effects against depression [6]. However, folate deficiency may not always be linked to the presence of depressive episodes according to cross-sectional analyses, but reduced folate levels have been associated with an increased risk of developing depression two years later [8]. Due to its low price, availability and proven beneficial evidence, folate should be considered as an addition to antidepressants in preliminary treatment of depression [9]. What is more, folic acid is also found to diminish the negative schizophrenic symptoms which co-occurs along with an increase of white matter after supplementing methylfolate for 12 weeks [18].

Concurrently, vitamin B12 which is also a water-soluble micronutrient that can be found in animal-based foods such as meat, eggs, poultry, and dairy products. Its crucial role in the proper functioning of the nervous system, including the process of myelination, as well as its involvement in the formation of healthy red blood cells and DNA, underscores its vital importance to human health and well-being [19]. The impact of nutrition on mental health has been a subject of significant interest. The trial data from May 2014 showed that combined therapy of citalopram, folic acid, vitamin B6 and vitamin B12 reduced the remission of symptoms of major depressive disorder. A 12-week trial with citalopram and B vitamins did not show immediate improvement, but over 52 weeks, the vitamins enhanced the response to the drug. Moreover, the participants were randomized to citalopram with B6, B12, folic acid, or a placebo. It demonstrated that taking B vitamins with citalopram is safe and even more effective. Demographic and health data were collected for the study. Some authors also show that there is a connection between B12 deficiency and depression which often occur together [7]. Another study aimed to compare the effect of B12 supplementation in depressive patients with low normal B12 levels. Patients with B12 deficiency were not included in the study. However, the results established that high levels of B12 in plasma are associated with better response to antidepressant treatment [20].

Additionally, some researchers suggested that the combination of magnesium supplements and vitamin B6 can help to relieve stress and improve the quality of life. The study showed that people with low magnesemia are more likely to experience severe stress and anxiety symptoms in comparison to people that supplement them. It is also concluded that supplementation of magnesium without vitamin B6 achieves lower improvement of relieving stress and quality of life. Therefore, a combined intake of vitamin B6 and magnesium can provide a better lifestyle and even better self-esteem. Taking that into consideration, the supplementation of these vitamins shouldn’t be forgotten as an addition to the medication by the patients who are currently struggling with anxiety, depression or stress [21].

Vitamin D

Vitamin D belongs to fat-soluble molecules of the steroid hormone group. It is responsible for calcium-phosphate homeostasis, by increasing calcium serum level. Different isoforms can be distinguished such as ergocalciferol (D2) and cholecalciferol (D3). The research has

demonstrated that calcifediol deficiency is frequently associated with numerous disorders that can affect cardiovascular, immune, antineoplastic and neurological functions [22]. According to studies, vitamin D has been shown to significantly alleviate depressive symptoms in individuals diagnosed with clinical depression [18].

Currently, an increasing number of trials focus on the impact of vitamin D in mental health disorders [23-27]. The results of those studies indicate that there is a visible correlation between vitamin D supplementation and therapeutic benefits in individuals with syndromal depression. It is possible that due to antioxidant effects of vitamin D, it may play a visible role in therapeutic efficacy in depressed patients [26]. What is more, hypovitaminosis D in serum is linked to the prevalence of depressive symptoms in the population. Therefore, in hospitalized patients with episodes of depression, the decreased level of this vitamin can be commonly observed [25]. The study from 2012 examined vitamin D deficiency in 54 depressed adolescents. It confirmed a significant association between 25-hydroxyvitamin D concentration and well-being in patients. Furthermore, vitamin D supplementation favorably improved the depressive symptoms in adolescents [23].

Conclusions

Undoubtedly, the basic treatment of nervous system disorders consist of pharmacological treatment. Classical antidepressants primarily work by providing monoamine balance. However, it might not be effective or sufficient in all cases. Therefore, it is worth considering combining pharmacotherapy with an appropriate diet or vitamin supplementation. Integrating supplements into treatment plans may be viewed as a more natural and holistic approach to manage mental health disorders, potentially enhancing patient response to treatment.

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