

# Nutrition and psychiatry: could nutritional strategies reduce the impact and disability related to mental disorders?

*Nutrición y psiquiatría: ¿podrían las estrategias nutricionales reducir el impacto y la discapacidad relacionada con los trastornos mentales?*

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nutrition, diet, mental health, psychiatric disorders, depression.

## Palabras clave:

nutrición, dieta, salud mental, trastornos psiquiátricos, depresión.

## Abstract

Mental disorders are one of the leading causes of disability worldwide. There is an important need to improve the results, impact and acceptance of current psychiatric treatments. The relationship between nutrition and general health has been known for a long time, however, only recently nutritional interventions have been proposed as a strategy to support conventional treatments in psychiatry. There are multiple lines of evidence that link nutritional habits to psychiatric pathologies, but in general terms it is thought that the relationships are actually bidirectional: changes in diet can favor or modulate the appearance of mental disorders, and in turn, mental disorders can also modify the nutritional habits of patients. In addition, there are some clinical studies on nutritional strategies that have already shown encouraging positive results in some psychiatric pathologies. Nutrition is a little explored therapeutic tool but with great potential as an adjuvant treatment in the future; many more studies will be necessary to know the accurate role of nutrition in mental disorders.

## Resumen

Los trastornos mentales son una de las principales causas de discapacidad en todo el mundo. Existe una necesidad importante de mejorar los resultados, el impacto y la aceptación de los tratamientos psiquiátricos actuales. La relación entre nutrición y salud general se conoce desde hace mucho tiempo, sin embargo, sólo recientemente se han propuesto intervenciones nutricionales como una estrategia de apoyo a los tratamientos convencionales en psiquiatría. Existen múltiples líneas de evidencia que relacionan los hábitos nutricionales con las patologías psiquiátricas, pero en términos generales se piensa que las relaciones son bidireccionales: los cambios en la dieta pueden favorecer o modular la aparición de trastornos mentales y, a su vez, los trastornos mentales también pueden modificar los hábitos nutricionales de los pacientes. De manera adicional, existen algunos estudios clínicos sobre estrategias nutricionales que ya han mostrado resultados positivos alentadores en algunas patologías psiquiátricas. La nutrición es una herramienta terapéutica poco explorada, pero con gran potencial como tratamiento adyuvante en el futuro; serán necesarios más estudios para conocer el papel exacto de la nutrición en los trastornos mentales.

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According to the World Health Organization, depression and anxiety are among the 10 main conditions that cause disability in the world.<sup>1,2</sup> Fortunately, the general population is increasingly beginning to have greater awareness and openness regarding importance of mental health.<sup>3</sup> However, despite this trend, currently available psychiatric treatments still enjoy very low popularity and acceptance in population.<sup>4</sup> This is mainly related to the prejudices that are deeply rooted in the population about the adverse effects generated by psychoactive drugs.<sup>5,6</sup> Regardless of the myths and prejudices established around current psychiatric treatments, the overall therapeutic response in most cases barely exceeds 50%.<sup>7</sup> Therefore, the need to improve the efficacy and impact of mental disorders treatment is evident and urgent.

On the other hand, the relationship between diet and health has been well known for a long time, particularly the relationship between nutritional habits and risk of chronic diseases such as obesity, diabetes and atherosclerosis. However, the association between nutrition and mental disorders or its use as a treatment has only recently begun to be explored.<sup>8</sup> For this reason, dietary interventions have recently been considered as a big area of opportunity to enhance the results of treatment of mental illnesses; intervening in pathophysiological mechanisms such as inflammation, oxidative stress, intestinal microbiota, etc.<sup>8,9</sup> The relationship between nutrition and mental disorders is still not fully understood, but it is thought that the relationships are actually bidirectional: changes in diet can favor or modulate the appearance of psychiatric disorders, and in turn, mental disorders can also modify the nutritional habits of patients.<sup>10</sup>

But what is the role that nutrition plays in psychiatric pathologies? The global picture of this relationship is complex but there are several lines of evidence that support this association, for example, nutrients such as vitamins B6, B12, tryptophan, phenylalanine, tyrosine, histidine, choline and glutamate (all of these obtained through the diet) are necessary for the synthesis of neurotransmitters such as serotonin, dopamine and norepinephrine that are closely related to the regulation of mood, appetite, cognition and sleep.<sup>9</sup> Therefore, it is highly feasible, at least from a theoretical point of view, that nutritional modifications may have an adjuvant effect in the management of psychiatric disorders.

On the other hand, the participation of pathological processes such as inflammation in the de novo

appearance of depression, schizophrenia and bipolar disorder is well known.<sup>11</sup> It has been shown that chronic stress can affect the brain and behavior, favoring an increase in caloric intake, and in turn, this excess caloric intake can result in obesity, which, being a pro-inflammatory pathology, can in turn favor different neurochemical changes that trigger a depression.<sup>10</sup> In this sense, for several decades it has been known that some components of the diet such as polyphenols, unsaturated fats and other antioxidants can contribute to inhibiting oxidative stress and neuroinflammation in several diseases.<sup>12</sup> Additionally, in disorders such as schizophrenia, not only an increase in the generation of reactive oxygen species has been documented, but also a decrease in the brain levels of several antioxidants such as glutathione, vitamin E, vitamin C and coenzyme Q10 compared to healthy controls. Therefore, possibly the supplementation of these antioxidants can contribute to combat some of the pathological processes in this disease.<sup>8</sup> Interestingly, some studies even suggest that dietary supplementation of some carotenoids such as lutein can increase the brain levels of BDNF, whose deficiency has also been related to multiple psychiatric disorders.<sup>13,14</sup>

Another aspect that is strongly related to nutritional habits is the microbiota-gut-brain axis, which is being intensively studied due to its possible involvement in the appearance of mental illnesses; influencing the modulation of BDNF levels, monoaminergic neurotransmission, immune function, stress response, inflammation, etc. This axis can be modified through various strategies such as: the use of prebiotics (a diet rich in indigestible fiber), probiotics, antibiotics, use of bacterial fermentation of short-chain fatty acids, etc.<sup>15-17</sup> Moreover, has been shown that different species of bacteria and fungi, present in the intestinal microbiota, can synthesize and release neurotransmitters such as dopamine, acetylcholine, serotonin and GABA; however, the meaning and functional implications of this phenomenon are not yet known.<sup>16</sup> On the other hand, consistent changes in intestinal microbiota have been identified in depressed patients compared to healthy controls, in addition to demonstrating that alterations in the intestinal epithelial barrier may allow the translocation of bacterial lipopolysaccharides, thus favoring inflammation at a systemic level, and contributing to the development and maintain of depression.<sup>18</sup> Even recently, the term «psychobiotics» was coined to refer to probiotics that can cause affective, cognitive or behavioral alterations, although

it is also used to refer to those interventions focused on influencing the microbiota-brain relationship.<sup>15</sup>

Another question that still does not have a satisfactory answer is whether dietary interventions should include a global modification of the nutritional patterns, (what we know as «dietary regimens», such as the Mediterranean diet); or on the other hand, it is better to use only individual supplements of vitamins, antioxidants, and other nutrients. The available evidence seems to suggest that global changes in the nutritional pattern have more important effects than just adding a vitamin supplement to a conventional diet. In this sense, the SMILES study (Supporting the Modification of lifestyle in Lowered Emotional States) was the first randomized clinical trial to show improvement of depressive symptoms in individuals who followed a Mediterranean diet.<sup>19</sup> However, other similar dietary patterns such as the Japanese diet and the Norwegian diet still show conflicting results that require further study.<sup>9</sup> Similarly, the ketogenic diet, which has shown promising effects in the management of epilepsy, has also been suggested for the management of depression due to its possible effects by modulating GABAergic neurotransmission.<sup>20</sup> An additional advantage of nutritional interventions is that, in many of them, by including a greater amount of vitamins, antioxidants, unsaturated fatty acids, dietary fiber, etc., the potential benefits go beyond their effects on mental health, since they can also benefit the patient's metabolic, cardiovascular, digestive, bone, or cognitive health.<sup>10</sup>

An additional line of evidence linking nutrition to psychiatry comes from the association between diet and sleep. Multiple studies have shown that sleep disorders are associated with metabolic alterations that predispose to the development of obesity, diabetes, hypertension, and dyslipidemia.<sup>21</sup> At the same time, it is well known that different components of the diet can affect sleep or its quality, and that, in turn, poor sleep quality is an important risk factor for the development of different mental disorders.<sup>22,23</sup> But in addition to this, there is a well-characterized syndrome (Night eating syndrome) where the sleep disorder in turn generates disorders in eating behavior, favoring in this case the excessive consumption of food during the night, which in turn is related to an increase in the prevalence of obesity, metabolic syndrome and psychiatric disorders such as depression and anxiety.<sup>24</sup>

Finally, an additional aspect that is recently being explored is the effect that psychotropic drugs (especially

antipsychotic drugs) have on the intestinal microbiota. Recent studies have shown that antipsychotics can modify the populations of some intestinal bacterial species (particularly *Bacteroides* and *Firmicutes*), which also seems to be related to the widely known effects of some antipsychotics on lipid metabolism and obesity.<sup>25</sup>

There is no doubt that the relationships between nutrition and mental disorders are very complex and there are multiple pathways or mechanisms that relate them. Although it is a treatment strategy with great theoretical potential, to date none of these strategies has joined enough clinical evidence to be universally recommended in specific psychiatric conditions (although recently the international society for nutritional psychiatry has suggested some guidelines for the use of omega 3 fatty acids in depression).<sup>26</sup>

At present, despite the lack of conclusive evidence, it is rational to search for specific nutritional deficits in patients with mental illnesses and supplement them appropriately, if necessary; as well as to give general recommendations on a healthier diet in all patients with some mental disorder. All this with the purpose of contributing to optimize the results of its pharmacological and psychotherapeutic treatment. Although this is an empirical recommendation at this time, the potential global health benefits are in addition to the potential benefits in mental disorder. In the future, it is possible that specific nutritional plans for patients with psychiatric disorders may actually be generated in the same way that there are currently dietary regimens for patients with diabetes, hepatic or renal insufficiency, etcetera.

In conclusion, the relationships between nutrition and psychiatry are diverse and complex; there are still multiple questions about its mechanisms and its possible role in the management of mental disorders. However, it is undoubtedly a strategy with great potential to help improve the results of current treatments. Establishing nutritional regimens for mental disorders seems feasible in the future, but the extent to which these regimens will enjoy popularity, acceptance and adherence among patients also remains to be seen. At the same time, it is possible that nutritional strategies as an isolated measure do not have a great impact on the disease and a more comprehensive treatment that combines: pharmacological treatment, psychotherapeutic, exercise, diet, environmental modifications, etc., be necessary to achieve significantly impact the clinical course of different mental disorders.

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