

## IS ANXIETY BE MANAGED BY NUTRITION: STRATEGIES FOR BETTERMENT?

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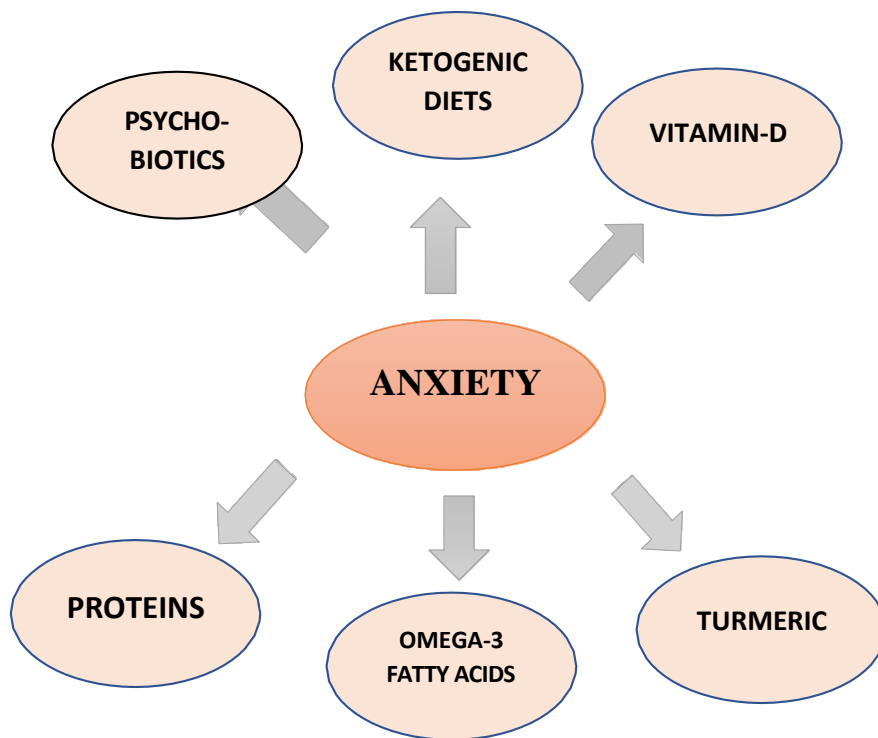
### ABSTRACT:

A group of mental diseases known as anxiety disorders are marked by intense and uncontrollable sensations of dread and terror. The most prevalent psychiatric disease impacting kids and teens is anxiety, and for many of these patients, primary care doctors are their first point of contact *Pettitt et al* has stated.<sup>28</sup> 25% of cases begin before the age of 14, with an average onset age of 19. One-third of the affected people first noticed symptoms as children. Adults 60 years of age and older are more prone than their younger counterparts to show bodily signs of anxiousness. One area of metabolic medicine that involves regular interaction between patients and medical professionals is nutrition. The management of anxiety symptoms by various dietary approaches was examined. Nutritional treatment requirements such as those for omega-3 fatty acids, vitamin D supplements for turmeric (curcumin), ketogenic diets, plants, plant and animal proteins, probiotics, or prebiotics. *Sheikhi et al* reported that, Amino acids, which make up proteins and are the primary precursor to neurotransmitters, the chemical messengers in the brain, whose dysfunction is strongly linked to a variety of brain illnesses.<sup>32</sup> People in society can adapt various lifestyle changes, such as sleep patterns, to manage anxiety. These changes can also help to lower the level of stress in daily life and promote healthy eating habits.

**Key words:** anxiety, nutritional treatment, neurotransmitters, metabolic medicines, sleep patterns.

## INTRODUCTION:

*Pettitt et al* stated that, the most prevalent psychiatric disorder affecting children and adolescents is anxiety, and doctors in primary care settings are frequently the patients' initial point of contact.<sup>28</sup> The majority of antidepressants and other prescription medications have unpleasant side effects, which frequently deter patients from taking their meds. *Shaheen E Lakhan et al* said that, learning about alternative or complementary nutritional therapies is one approach for psychiatrists to combat this noncompliance.<sup>25</sup> *Norwitz and Naidoo* said, despite the enormous incidence of anxiety disorders in contemporary culture, drugs used in psychotherapy frequently failed to completely alleviate symptoms.<sup>1</sup> Given that mental illnesses and neurological conditions share a subset of fundamental metabolic disturbances [such as oxidative stress, insulin resistance, inflammation, and microbiome dysbiosis] that are influenced by lifestyle factors, it makes sense that mental illnesses would benefit from complementary lifestyle approaches. In essence, lifestyle modifications for mental illness are a type of metabolic medicine that is used in conjunction with metabolic disorders. An example of a metabolic medicine is nutrition. This can be accomplished by making dietary changes, such as eliminating gluten and artificial sweets. The gut micro biota and the brain are linked in a bidirectional relationship, which is generally referred to as the micro biome-gut-brain axis, according to a parallel and rapidly expanding body of research. This axis is crucial in controlling how the brain and behaviour work.<sup>6</sup> One potential therapeutic approach is nutritional intervention, which is especially effective at preventing relapses. *Sheikhi et al* stated that, Nutritional treatment requirements, such as those for omega-3 fatty acids, turmeric (curcumin) supplementation with vitamin D, ketogenic diet programmes, plant and animal proteins, probiotics, or prebiotics. Amino acids, which make up proteins and are the primary precursor to neurotransmitters, the chemical messengers in the brain, whose dysfunction is strongly linked to a variety of brain illnesses.<sup>32</sup> According to recent research, eating patterns that are healthy and adhere to dietary guidelines and nutrient requirements may help prevent and manage anxiety.<sup>7</sup>



## DISCUSSION:

With an emphasis on the potential contributions of inflammation and microbiome dysbiosis, we especially examine the pathological correlates of anxiety disorders. This perspective piece is organised as follows: To establish anxiety as a metabolic disease, we first talk about the diseases of inflammation and micro biome dysbiosis, which are particularly pertinent to anxiety disorders. Second, we go over six dietary tactics that are beginning to show promise for reducing anxiety. Abolition of 1. Artificial sweeteners and 2. Gluten, 3. Omega-3 fatty acids 4.turmeric (curcumin), keeping normal levels of 5. Vitamin-D, 6. The ketogenic diet and 7.Probiotic and prebiotic (psychobiotic) foods.

## MICROBIOME:

We will focus on the role of the amygdala, short chain fatty acids (SCFAs), and gut peptide- a structure in the brain largely responsible for the threat response that is hyperactive in anxiety disorders. A comprehensive description of the mechanisms by which the microbiome and gut-brain axis influence the neuroanatomical and neurochemistry of anxiety is outside the scope of

this article. To summarise, food affects the microbiome, and SCFAs from microbes bind to receptors on enter endocrine cells to control the release of gut peptides, which in turn affect the amygdala's receptors and the body's stress response and anxiety. *Monique Aucoin et al* proved, modulating the production of gut peptides implicated in the gut-brain axis and neurotransmitter synthesis are examples of potential mechanisms for the influence of the microbiome on psychiatric health.<sup>36</sup> *Bear et al.* reported, many bacteria require iron as a food, therefore iron consumption through diet has an impact on the composition of the gut microbiota. It has been demonstrated that dietary iron supplements can enhance gut inflammation and harmful microorganisms. The impact of fermented foods and beverages on the gut microbiota and mood, such as breads, sauerkraut, kimchi, and wine<sup>6</sup>

### INFLAMMATION:

*Norwitz and Naidoo* proved, nearly all neurological and neurodegenerative illnesses, including anxiety, share the trait of chronic inflammation. Additionally inflammatory are processed vegetable oils like corn oil and soybean oil that are high in the omega-6 fatty acid linoleic acid. Refined sugars and processed vegetable oils must be eliminated from the diet and replaced with whole foods if one wants to maintain healthy physical, cognitive, and mental health<sup>1</sup> *K. S. SMITH et al* Systemic inflammation is changed as a result of interactions between gut bacteria, immune cells, and the lymphatic system.<sup>4</sup>

### ELIMINATION OF FOODS THAT WORSEN ANXIETY SYMPTOMS:

#### SWEETENERS ARTIFICIALLY USED:

*Norwitz and Naidoo* reported Sweeteners' unfavourable effects on the microbiota and inflammation are probably what cause the anxiolytic effects that they do. The amygdalae of rats, for instance, produced more stress hormones when aspartame was administered to the animals. It may be fair to suggest erythritol, a non-insulinogenic sugar alcohol that is absorbed in the small intestine and is not fermented by gut bacteria, and stevia, a natural non-caloric, non-insulinogenic sweetener, for patients who are hesitant to give up sweets<sup>1</sup>

#### GLUTEN:

Norwitz and Naidoo said, Gluten can cause inflammation by creating a "leaky gut." Increased zonulin expression and higher intestinal permeability are both caused by gluten protein expression. For celiac patients alone, a gluten-free diet has been demonstrated to reduce anxiety<sup>1</sup>.

#### INCLUDING FOODS THAT DECREASE ANXIETY SYMPTOMS:

##### OMEGA-3 FATTY ACIDS:

Norwitz and Naidoo said Omega-3 fatty acids, especially the long-chain omega-3s, eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA), which are powerful anti-inflammatory signalling molecules that support the microbiota and are crucial for cognitive and mental health. Norwitz and Naidoo reported, fish roe, krill oil, salmon, and other fatty fish may be the best choices when suggesting omega-3 sources to patients, followed by them<sup>1</sup> Kuan-Pin Su, MD et al reported, the impact of omega-3 PUFAs on anxiety in people with diverse neuropsychiatric or serious medical disorders. As a result, therapy with omega-3 PUFA may help people feel less anxious<sup>2</sup> Increased consumption of oily fish and long-chain omega-3 fatty acids may lower anxiety risk, according to observational data. Penny M. Kris-Etherton stated, the risk of a group of mental problems, such as stress, anxiety, and/or depression, was shown to be lower in people who regularly ate oily fish.<sup>7</sup>

##### TURMERIC (CURCUMIN):

The spice for brain health that has likely received the most research is turmeric. Curcumin, its main ingredient, has been studied as a potential therapy for depression, Alzheimer's disease, Parkinson's disease, anxiety comorbidities, and anxiety itself. Norwitz and Naidoo said, with increases in neurotransmitter and hormone levels as a side effect, curcumin considerably decreased anxiety-like behaviour.<sup>1</sup> A pleiotropic molecule called curcumin not only directly binds to and prevents the aggregation of misfolded proteins in many neurodegenerative diseases, but it also keeps the inflammatory system in homeostasis, speeds up the removal of toxic aggregates from the brain, scavenges free radicals, chelates iron, and triggers anti-oxidant response elements.<sup>12</sup>

- According to a 2015 research, persons with obesity who took 1 g of curcumin daily

reported feeling less anxious. If a person is interested in high dosage curcumin products, they should talk to their doctor about supplementing.

- Another study discovered that consuming more curcumin raised DHA and decreased anxiety. It's simple to add turmeric to food. Due to its mild flavour, it is suitable for casseroles, curries, and smoothies.

### VITAMIN-D:

*Norwitz and Naidoo* said that endogenous vitamin D production is frequently insufficient since the majority of modern humans spend most of their time inside, dressed completely, or simply residing at high latitudes. The required daily intake of 600 IU of vitamin D requires five gallons of whole milk, even when using the highest estimates for milk's vitamin D concentration. The levels of neurotransmitters like dopamine and serotonin as well as the release of BDNF and nerve growth factor are all regulated by vitamin D in the brain. It also controls calcium homeostasis, ion channels, and neurotransmitter levels. Numerous mental illnesses, such as schizophrenia, sadness, and anxiety, are linked to lower vitamin D levels. One association research found heightened anxiety only in people with severe vitamin D deficiency, suggesting that vitamin D therapy for anxiety is only helpful in people with vitamin D insufficiency. When residing at higher latitudes, it is challenging to get enough vitamin D from food or sun exposure, and optimal vitamin D levels are crucial to general health. Since the majority of patients with anxiety will have low vitamin D levels, vitamin D supplementation should be taken into consideration since the potential benefits to patient health are likely to outweigh the risks<sup>4</sup> The body of scientific research on diets, nutrition, and anxiety points to the advantages of fatty fish and n-3 fatty acids originating from marine sources. *Penny M. Kris-Etherton* proved regarding micronutrients, there is some evidence to suggest that magnesium, zinc, certain vitamins (such as the B vitamins, vitamin C, and vitamin E), the amino acids lysine and arginine, as well as a multivitamin and mineral supplement, may be beneficial in the prevention and treatment of anxiety disorders.<sup>7</sup> Overall, the co-administration of vitamin D and probiotic for 12 weeks to women with PCOS showed positive effects on mental health indicators, serum total testosterone, hirsutism, hs-CRP, plasma TAC, GSH, and MDA levels.<sup>9</sup> Given the limited sources, obtaining vitamin D through diet might be challenging. Additionally, vitamin D sources, such as fish and mushrooms, can have variable amounts of vitamin D, further

complicating the intake of sufficient amounts from food.<sup>13</sup> There is some evidence that vitamin D has a significant role in the health and disease of the brain and nervous system, in addition to its well-known crucial involvement in calcium metabolism and its role in proliferation, differentiation, and immunomodulation.<sup>14</sup>

### KETOGENIC DIETS:

*Norwitz and Naidoo* reported, ketogenic diets—the use of high-fat, low-carbohydrate diets, which cause the body to create ketones, the brain's primary fuel, as a metabolic treatment for a variety of chronic metabolic illnesses, is growing. Additionally, there is proof that ketosis-inducing practises like intermittent fasting cause neuroadaptations in the brain over time, including an increase in SIRT3 and GABAergic activity and neuroprotective changes that lessen anxiety<sup>1</sup>.

About 90% of the energy in the traditional ketogenic diet comes from fat, with the remaining 10% coming from proteins and carbohydrates.

The body enters a metabolic state called ketosis while on the diet, which primarily encourages the ingestion of monosaccharides from sources like fruit, certain vegetables, and honey while restricting the intake of complex carbohydrates. Due to their abnormal (asymmetrical) distribution in the gastrointestinal tract, polysaccharides take much longer to digest than monosaccharides, which can make absorption difficult when leftover food acts as a breeding ground for pathogenic intestinal flora and the body's primary source of energy is the ketone compounds produced from fatty acids in the blood. Low-carb diets (low-carb) are promising for weight reduction optimisation among mentally ill people as well as for their potential anxiolytic effect. A diet is characterised as being low-carb high-fat (LCHF) when fat comprises >70% of the daily calorie consumption, with sugars being 5–15%, and the rest of the calories being supported by proteins.<sup>26</sup>

### PSYCHOBOTICS:

Probiotics and prebiotics, which support beneficial bacteria, are referred to as psychobiotics because they affect the interactions between the bacteria and the brain. Consumed

microorganisms that benefit the microbial flora in the host's intestines are referred to as probiotics. Prebiotics are chemical substances or nutrients that alter the composition of the gut microbiome by nourishing particular bacterial species. Logan and Katzman first proposed the use of probiotics and prebiotics as psychobiotics to treat depression and anxiety in 2005. K. S. K.S. SMITH *et al* Prebiotics that are most frequently used are fructooligosaccharides (FOS) and galactooligosaccharides (GOS), which are dietary fibres having a known effect on gut flora. Certain bacterial species, such as *Bifidobacterium longum* (B. longum) and *Lactobacillus helveticus* (L. helveticus), are being studied specifically for their advantages to hosts' mental health Both of these species have aided in decreasing gastrointestinal discomfort in stress-affected individuals and improving psychological outcomes in healthy humans. B. longum reduces anxiety and stress response in healthy volunteers.<sup>4</sup> Taylor and Holscher stated that Probiotics are inherent in many fermented foods, e.g., yogurt, sauerkraut, and kefir, and are commercially available as dietary supplements. Probiotic consumption can promote gastrointestinal microbiome functions, including inhibition of pathogenic species, epithelial barrier integrity, and modulation of immune response.<sup>5</sup> Most common natural source of probiotic Yogurt contains the healthy bacteria *Lactobacillus* and *Bifidobacteria*. Emerging evidence Trusted Source suggests that these bacteria and fermented products have positive effects on brain health. Yoghurt and other fermented foods may possibly assist to reduce anxiety and stress while supporting the body's natural gut flora. Foods that have undergone fermentation include cheese, sauerkraut, kimchi, and fermented soy products.

### PROTEINS:

The production of cerebral serotonin using tryptophan results in the restoration of serotonergic transmission and a reduction in depressed symptoms. The effects of fasting on the serotonergic system have also been demonstrated in the general population.<sup>11</sup> As the primary precursor of neurotransmitters, the chemical messengers in the brain, amino acids, the components of proteins, are strongly linked to a wide spectrum of brain illnesses.<sup>28</sup> Tryptophan, an amino acid that aids in the production of serotonin, is present in eggs, the only source of protein. Serotonin is a neurotransmitter that helps control mood, sleep, memory, and behaviour. It is a substance that is produced in the brain, gut, and blood platelets. Serotonin is believed to enhance brain function and decrease anxiety. Although it cannot penetrate the blood-brain barrier, foods and medications containing serotonin can cause chemical reactions



that increase serotonin levels in the brain even though they do not directly deliver serotonin. Tryptophan, an amino acid, is also present in other foods besides turkey meat, including eggs, dark chocolate, cheese, pineapple, bananas, oats, and tofu. Protein-rich foods like lean meat, fish, nuts, and dairy products deliver amino acids that the body transforms into feel-good neurotransmitters like serotonin.

## DIETARY PATTERNS:

*W. Marx et al* reported, an older population's increased cognitive function was linked to a Mediterranean diet that included almonds and extra virgin olive oil, according to a different study. A diet that is considered healthy typically includes more fruit, vegetables, seafood, and whole grains.<sup>3</sup> *W. Marx et al* stated that, Mediterranean diet, which places more of a focus on a high intake of legumes, a modest intake of meat and dairy products, and the use of olive oil as the primary source of fat. They claimed that eating a Mediterranean diet protected against anxiety<sup>3</sup> There is proof that anxiety is influenced by nutrition, including dietary habits, foods, and specific nutrients. The production and metabolism of neurotransmitters like serotonin, noradrenaline, and dopamine are regulated by certain nutrients, such as B vitamins, vitamin C, magnesium, and zinc. The likelihood of experiencing severe anxiety may rise as a result of chronic stress's ability to reduce neurotransmitter production. According to results from preclinical and clinical studies, a lack of magnesium and zinc can cause anxiety, but supplementation can help with the symptoms that are similar to anxiety. A mixture of different combination therapy and magnesium supplementation were successful *Penny M. Kris-Etherton* stated that, in treating anxiety and disorders associated to it.<sup>7</sup>

S.NO	FOOD RECOMMENDED	AMOUNT TO BE TAKEN
1.	Fruits and vegetables	>6 servings per day
2.	Grain Products	>6 servings per day
3.	Milk and milk alternatives	>3 servings per day
4.	Saturated fats	<10% of daily calorie intake

5.	Added sugars	<10% of daily calorie intake
6.	Meat and Meat alternatives	>2 servings per day

### **Micronutrients that assist to lessen the signs and symptoms of anxiety:**

Micronutrients are involved in metabolic pathways that influence the growth and successful operation of the nervous system. Therefore, inadequate intake may have a negative impact on psychological status, raising the incidence of depressive illnesses. The B vitamins folic acid, vitamin B6, vitamin B12, and vitamin D are among the micronutrients linked to mental health. Magnesium and zinc have also been linked to mental wellness. In people with anxiety, it's crucial to recognise and treat deficiencies in key fatty acids, magnesium, zinc, B vitamins (folate, B12), and vitamin D.

**Selenium:** Brazil nuts are a good source of selenium. Selenium may enhance mood by lowering inflammation, which is frequently elevated when someone has a mood condition like anxiety. Antioxidants like selenium help stop cell deterioration. Soybeans and mushrooms are two more excellent sources of selenium, along with other nuts, meats, and vegetables.

**Vitamin-E:** Nuts, particularly almonds, are an excellent source of vitamin E and may help fend off vitamin E deficiency, which is associated with mood disorders. Almonds, hazelnuts, peanuts, mango, kiwifruit, and other foods are additional sources of vitamin E.

**Magnesium:** Magnesium lowers stress hormones in the brain, reducing anxiety, restlessness, mood swings, and a variety of other mental health disorders. Cortisol, the main stress hormone, is released at a lower rate and is prevented from reaching the brain by magnesium. The following foods are good sources of magnesium: boiling spinach, 12 cup; cashews; 30g; 74mg; peanuts; 14 cup; 63mg; and soymilk, 1 cup; pumpkin seeds, 30g; chia seeds; 30g; 111mg; almonds; and 30g; 80mg. 100g of unseasoned, rolled oats contain 29mg.

**Green tea:** Green tea includes thiamine, an amino acid that has been under increased study due to its conceivable effects on mood disorders. Thiamine may boost the production of serotonin and dopamine and has relaxing and anti-anxiety properties.

**Dark chocolate:** Dark chocolate may be able to ease anxiety and stress. In particular, flavonoids found in dark chocolate are abundant in polyphenols. According to one study Trusted Source, flavonoids may enhance blood flow while also reducing neuroinflammation and brain cell death.

### **CONCLUSION:**

A strategy that incorporates information on certain meals and dietary trends. One aspect of metabolic medicine that patients and doctors deal with on a daily basis is nutrition. Utilizing this metabolic tool will help us provide those who are experiencing anxiety with a broad range of relief. In light of this, nutritional medicine need to be a main focus of psychiatric treatment for behavioral health disorders. Anxiety can be successfully treated with food alone. A significant alternative strategy to explore is changing one's way of life and behaviors'. The study found that using a dietary approach in addition to medication therapy made it easier to manage anxiety.

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