**NUTRITION: PREVENTIVE PSYCHIATRY**

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**ABSTRACT**

Mental health is defined as a state of well-being in which every individual realizes his or her own potential, can cope with the normal stresses of life, can work productively and fruitfully, and is able to make a contribution to her or his community. Mental health conditions are associated with long lasting disability and with mortality through suicide, medical illness, and accidental death. Although the determinants of mental health are complex, A growing body of literature links Nutrition to brain health and the risk of psychiatric illness. About half of mental disorders begin before the age of 14. Proper nutrition is a key intervention for mental health and prevention of common mental disorders. As current treatments offer only partial benefit, other options such as nutritional interventions that can augment standard care need to be integrated.

**KEYWORDS:** suicide, medical illness, and accidental death

**INTRODUCTION**

Recent research studies had established, links between nutritional quality and mental health. Patients today often are overfed but undernourished. The increased depression over recent years also proves connection to the change in our diet with shifts away from a diet based on a wide variety of whole foods to processed foods. In the past several years, healthy dietary patterns and a reduced prevalence of, and risk for, depression, and suicide had been reported. Maternal and early-life nutrition act as main determinant of later mental health outcomes in children and severe macronutrient deficiencies leads to both depressive and psychotic disorders.
The interaction of food we eat and brain function could be shown by many frameworks. Prenatal nourishment is essential for brain development, advocated by fact that increase risk for neurodevelopmental disorders like schizophrenia, are associated with prenatal caloric malnutrition. Research connects excess calories intake as a main culprit with weight gain, atherosclerosis, circulatory deficits in the brain, cognitive decline, and mental health conditions.

Research suggests that oxidative stress mechanisms appear to be a common thread in various neurological and emotional condition, and this is counter by antioxidant effect of minerals and vitamins (beta carotene, alphatocopherol), polyphenols, and herbal extracts.

Many epidemiological studies, including prospective studies, have shown that Rapid urbanisation, and an overall transition from traditional lifestyles brings deleterious consequences for mental health the experience of food insecurity generates uncertainty, which in turn leads to stress and symptoms of anxiety and depression. Malnourishment leading to glucose insufficiency leads malfunctioning of brain as Glucose is the preferred fuel source for the brain. The roles of glucose include forming acetylcholine and many other neurotransmitters. One of nutrition’s most important contributions to mental health is the maintenance of the structure and function of the neurons and brain centres. The support and maintenance of the brain’s functions rely on the interplay between the major and minor nutrients.

**NUTRITION FOR NORMAL BRAIN/MENTAL FUNCTION**

Diet consists of two major food component groups: macro- and micronutrients which are classified according to their proportional amount in foods. Macronutrients are fat, proteins and carbohydrates whereas vitamins and minerals make up the class of micronutrients. Both groups of nutrients can affect brain and cognitive development which is reflected by outcomes such as mental performance, mood and behaviour as well as mental disorders.

*Carbohydrates*

Provides glucose, the preferred energy source for erythrocytes and nerve cells and brain. Eating carbohydrates triggers the release of insulin. As insulin levels rise, more of the amino acid tryptophan crosses the blood brain barrier that affects levels of neurotransmitters such as serotonin.
Fat
About 35% of the brain/nervous system tissue comprises polyunsaturated fatty acids that include the essential fatty acids, eicosapentaenoic acid (EPA), and docosahexaenoic acid (DHA). EPA and DHA form phospholipids in brain cell membranes and have important roles in signal transduction.

Protein
Provide amino acids; the precursors of neurotransmitters, and therefore facilitates neurotransmission and neuromodulation. The dietary precursors of serotonin (precursor is tryptophan), dopamine (precursor is phenylalanine), norepinephrine (precursor is tyrosine), and histamine (precursor is histadine) have been the main protein derivatives.

Vitamins
Thiamine (Vitamin B1)
Functions as a coenzyme in the synthesis of acetylcholine, aminobutyric acid (GABA), and glutamate. It can mimic action of acetylcholine.

Niacin (Vitamin B3)
Nicotinamide adenine dinucleotide (NADH) increases tyrosine hydroxylase activity and dopamine production in pheochromocytoma cells. Involved in synthesis of serotonin (5-HT).

Pyridoxine (Vitamin B6)
Have eminent Role in the synthesis of many neurotransmitters (e.g., dopamine, serotonin, norepinephrine, epinephrine, histamine, GABA). Deficiency tends to reduce production of serotonin and GABA.

Folate, folic acid (Vitamin B9)
Functions as a cofactor for enzymes that convert tryptophan into serotonin and tyrosine into norepinephrine/noradrenaline. Can heighten serotonin function by slowing destruction of brain tryptophan. Helps form compounds involved in brain energy metabolism. Involved in the synthesis of dopamine.

Cobalamin (Vitamin B12)
Involved in the synthesis of monoamine neurotransmitters maintains myelin sheaths for nerve conductance. Play imp role in folate metabolism.
**Pantothenic Acid**
Changes to coenzyme A that helps convert macronutrients into energy. Production of red blood cells, hormones, and nerve regulators. Needed for the uptake of amino acids and acetylcholine.

Is necessary to make vitamin D and works closely with B vitamins such as biotin, niacin, vitamins B1, B2, and B6.

**Vitamin C**
Acts as part of the intracellular antioxidant network, and is an important neuroprotective constituent. Acts as a neuromodulator and enzyme cofactor in noradrenaline and dopamine synthesis.

**Vitamin A**
Retinoids influence hormone pathways (steroid and thyroid hormones) known to cause mood elevation and depression.

**Vitamin D**
1,25-Dihydroxyvitamin D3 affects cholinergic activity in several brain regions and may have a role in the neuroendocrine regulation of certain aspects of anterior pituitary function.

**Vitamin E**
Alpha-tocopherol protects cells from damage by free radicals. May reduce brain amyloid beta peptide accumulation, known to be relevant in Alzheimer’s disease.

**Vitamin K**
Involved in the development of the nervous system and affects calcium regulation in the brain through osteocalcin.

**Choline**
Essential roles in structural integrity of cell membranes, cell signalling (precursor to acetylcholine), and nerve impulse transmission. Major source of methyl groups for methylation reactions.

**Minerals**

**Calcium**
Important intracellular messenger, cofactor for enzymes and release of neurotransmitters
Copper
Modulator of NMDA-receptor activity.

Chloride
Negatively charged chloride ions cause influx of sodium ions and reverts the brain cell to its resting state.

Chromium
Involved in glucose and lipid homeostasis.

Iron
Essential cofactor for the production of ATP. Plays an essential role in hemoglobin for ensuring there is sufficient oxygen in the brain for oxidative metabolism. Functions in the enzyme system involved in the production of serotonin, norepinephrine, epinephrine, and dopamine.

Magnesium
Functions as a coenzyme; roles in the metabolism of carbohydrates and fats to produce ATP, and in the synthesis of nucleic acids (DNA and RNA) and proteins. Important for the active transport of ions (such as potassium and calcium) across cell membranes, and for cell signaling.

Manganese
Manganese deficiency results in lowering the catecholaminergic content of the brain.

Phosphate
Helps maintain membrane potential and role in energy metabolism.

Potassium
In the brain, potassium channels regulate neuronal signalling. Potassium channels may also regulate cell volume and protect neurons under metabolic stress. Role in energy metabolism.

Selenium
Glutathione peroxidase maintains the integrity of the cellular and subcellular membranes. This antioxidative protective system of glutathione peroxidase depends heavily on selenium.
Sodium
Voltage-gated sodium channels allow sodium ions to enter the brain cells.

Vanadium
Inhibits Na+-K+-ATPase pump activity

Zinc
Roles in protein synthesis, as well as structure and regulation of gene expression. Serves in neurons and glial cells. Certain zinc-enriched regions (e.g., hippocampus) are especially responsive to dietary zinc deprivation, which can cause learning impairment and olfactory dysfunction.

NUTRITION IN THE PREVENTION OF MENTAL DISEASES
Nutrients commonly associated with mental health include polyunsaturated fatty acids (particularly omega-3 types); minerals such as zinc, magnesium, selenium, copper, and iron; B vitamins such as folate, vitamin B6, and vitamin B12; antioxidant vitamins such as C and E22; and bioactive substances found in foods.

Depression has been known to be associated with deficiencies in neurotransmitters such as serotonin, dopamine, noradrenaline, and GABA. As reported in several studies, the amino acids tryptophan, tyrosine, phenylalanine, and methionine are often helpful in treating many mood disorders, including depression.

Tryptophan is a precursor to serotonin and is usually converted to serotonin when taken alone on an empty stomach. Therefore, tryptophan can induce sleep and tranquility and in cases of serotonin deficiencies, restore serotonin levels leading to diminished depression.

Dietary supplements that contain tyrosine and/or phenylalanine lead to alertness and arousal. Methionine combines with ATP to produce S-adenosylmethionine (SAM), which facilitates the production of neurotransmitters in the brain.

Several mechanisms of action may explain how eicosapentaenoic acid (EPA) which the body converts into docosahexaenoic acid (DHA), the two omega-3 fatty acids found in fish oil, elicit antidepressant effects in humans. Most of the proposed mechanisms involve neurotransmitters and, of course, some have more supporting data than others. For example, antidepressant effects may be due to EPA being converted into prostaglandins, leukotrienes,
and other chemicals the brain needs. Other theories state that EPA and DHA affect signal transduction in brain cells by activating peroxisomal proliferator-activated receptors (PPARs), inhibiting G-proteins and protein kinase C, as well as calcium, sodium, and potassium ion channels. EPA have been shown to stimulate mood elevation in depressed patients.

In addition to omega-3 fatty acids, vitamin B (e.g., folate), and magnesium deficiencies have been linked to depression. In addition, the results of several case studies where patients were treated with 125 to 300 mg of magnesium (as glycinate or taurinate) with each meal and at bedtime led to rapid recovery from major depression in less than seven days for most of the patients.

**Bipolar Disorder**

Bipolar patients tend to have excess acetylcholine receptors, which is a major cause of depression and mania. Bipolar patients also produce elevated levels of vanadium, which causes mania, depression, and melancholy. However, vitamin C has been shown to protect the body from the damage caused by excess vanadium. Taurine is an amino acid made in the liver from cysteine that is known to play a role in the brain by eliciting a calming effect, blocks the effects of excess acetylcholine that contributes to bipolar disorder. A deficiency of this amino acid may increase a bipolar patient's manic episodes. The combination of essential vitamin supplements with the body's natural supply of lithium orotate reduces depressive and manic symptoms of patients suffering from bipolar disorder.

Another well-known factor for mental disorders is that cells within the brain require omega-3 oils in order to be able to transmit signals that enable proper thinking, moods, and emotions.

**Schizophrenia**

Impaired synthesis of serotonin in the central nervous system has been found in schizophrenic patients. High doses (30 g) of glycine have been shown to reduce the more subtle symptoms of schizophrenia, such as social withdrawal, emotional flatness, and apathy, which do not respond to most of the existing medications. Omega-3 fish oils, has been shown to help depressive patients and can also be used to treat schizophrenia.
Obsessive-Compulsive Disorder
It is well documented that selective serotonin reuptake inhibitors (SSRIs) help patients with OCD. Therefore, it is clear that nutrients which increase serotonin levels will reduce the symptoms of OCD. These results clearly depict how the use nutritional supplements can be effective treatments for mental disorders.

CONCLUSIONS
Nutrition play role as the foundation of physiological processes, as well as factor in promoting prevention and management of mental disorders. As a result of the immense burden of mental disorders. Diet and nutrition offer key modifiable targets for the prevention of mental disorders. Thus the time is now right for nutrition to become a mainstream, everyday component of mental health care, and a regular factor in mental health promotion. Present treatment of psychiatric disorders can be improved by giving greater attention to preventive effort by promoting proper nutrition.

REFERENCES


