

Good Mood Foods: Stress Busters!

Food is one of the most powerful forces for life. Hippocrates, the father of medicine was the first to suggest the healing power of foods. He stated, "Let food be thy medicine and medicine be thy food". Lyman (1989) stated that, "just as foods determine our moods, so do our moods determine, what we eat".

Leathwood and Pollet (1983) and Deutch (2001) also supported this fact that the food we eat can have a huge impact on our moods. Certain foods have a feel-good factor that may help in modulating stress as people cannot always control their environmental stress. Therefore, good nutrition is emerging as a key strategy for stress management. It is suggested that a balanced diet may reduce stress level, improve mood, brain function and energy level. They explained the fact that food isn't just fuel for the body but it also feeds the mind and affects human behavior.

Today, almost 500 million people suffer from stress worldwide (WHO). Nutrient and bioactive factors found in food can have an important influence on cognitive functioning and mood (Prashad 1998). Diet has the potential to affect mental health and well-being at every stage of life. Stress can lead to unhealthy eating habits. It makes the body crave for foods that are energy dense but nutrient deficient to attain quick satiety. During stress the body's ability to conserve nutrients is compromised and the intake of "junk foods" or convenience foods increases. Research and surveys carried out in the past reveal that food isn't just fuel for the body; it feeds the mind and changes the moods of human beings.

Good mood foods are considered as a panacea for life as it is the key for stress management of life. Good nutrition can have a strong positive correlation with our moods as in general a healthy diet provides us nutrients that help us in depressed conditions. Inadequate nutrient intake has been associated with depression. The right selection and intake of food can help us in feel happier and more energetic which may be helpful to overcome the stress, depression and anxiety of the people particularly in the youth. Certain neurotransmitters like serotonin, dopamine level enhancing foods; omega 3 fatty acids, niacin, folic acid, magnesium, selenium, phenylalanine and tyrosine, tryptophan containing foods can help us in stress management. (Thakur.M etal 2012)

Studies have shown that people with depression can have lower blood levels of many nutrients including zinc, vitamin-D and omega 3 fatty acids. (Chaudhari 2010) With the right nutritional intervention, the impact of stress on the body can be reduced and be effectively repaired too. It is essential to include protective foods such as vitamins and minerals which will help in coping with stress effectively. For instance B complex vitamins help the body cope with stress and control the nervous system; proteins, assist in growth and tissue repair; vitamin A is essential for boosting immunity and is an anti infective vitamin; vitamin C is a strong antioxidant, prevents free radical formation, helps in lowering the amount of cortisol in the body; minerals such calcium, magnesium, zinc and selenium are required for smooth muscle contraction and relaxation, healthy nervous system and maintenance of electrolyte balance as well as bone health.

Role of bioactive compounds in stress management

Today, functional foods or nutraceuticals as natural alternatives to drugs/ chemical formulations are prescribed against the stress and depression management. Various nutrients and bioactive factors found in food have important effects in influencing cognitive functioning and mood. For example, more than 20 different nutrients and bioactive factors have positive effects on mood when they are given as a dietary supplement in clinical trials (Chaudhari 2010). The phytochemicals / bioactive compounds which are responsible for anti stress property in foods are shown in Fig 1 and described as follows:

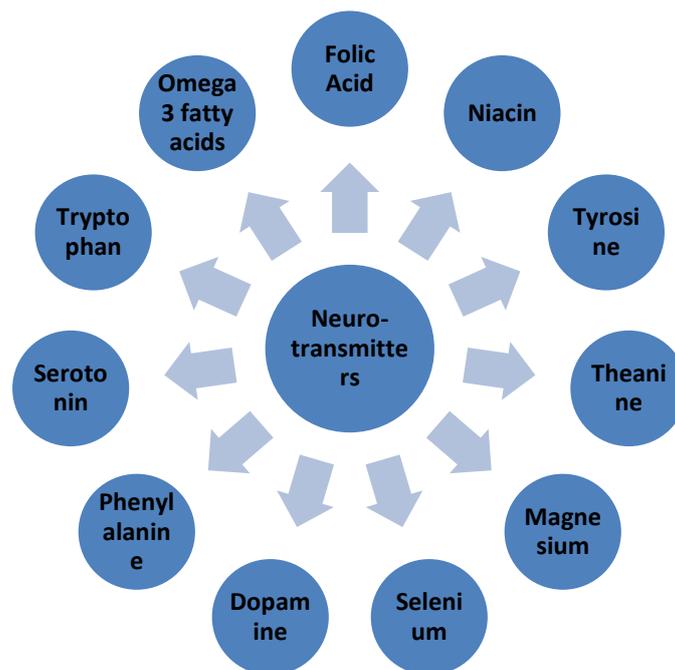


Figure- 1: Bioactive compounds responsible for anti stress properties in Foods

Neurotransmitters responsible for combating stress.

Serotonin

It is a monoamine neurotransmitter, derived from tryptophan. It is well known contributor to feeling of wellbeing; also known as 'Happiness hormone', despite not being a hormone (King 2009). The brain chemical serotonin is a natural tranquiliser. It helps in sleeping, aid in alleviating anxiety and depression and reduces the sensitivity of subjects to pain and migraines. Serotonin is an inhibitory neurotransmitter that has been found to be intimately involved in emotion and mood. Serotonin contains nutrients such as vitamin B₆, B₁₂ and folic acid. Low serotonin levels are associated with many stress-related problems, including violence, aggressive behaviour and attempt to suicide. Amla, pineapple, milk, eggplant, spinach, walnuts, oats, coffee, brown rice, corn, eggs, green leafy vegetables, nuts, peas, sunflower seeds, almonds, flaxseeds, cruciferous vegetables, fish, sesame seeds, tofu (soy paneer), etc are some of the Indian traditional foods which increase serotonin levels in human beings. As complex carbohydrates help in boosting brain's serotonin level which promotes feeling of calmness and decrease stress levels. Incorporation of low glycemic index carbohydrates such as *missi roti*/ multigrain roti or basmati rice in diet can release carbohydrates slowly due to their complex nature.

Omega 3 fatty acids (Docosahexaenoic acid -DHA)

DHA is the key component of the membrane of brain cells. It facilitates the brain to utilize various chemicals and can turn on the genes that make serotonin. It is a natural anti-depressant. The brain needs omega 3 fatty acids to form healthy nerve cells. They are also a component of the myelin sheaths which cover the nerves and help in effective transfer of messages. The brain needs omega 3 fatty acids for the formation of healthy nerve cells. It has also been reported that omega 3 fatty acids are associated with a lower risk of depression. Oily fish such as salmon is rich in omega 3 fatty acids. Mackerel, Sardines, Pilchards, Trout and fresh Tuna also contain sufficient amount of omega 3 fatty acids (Chaudhari 2010).

Theanine

Theanine relaxes the brain, thereby reducing stress and anxiety with tranquilizing effects. As it is digested in the small intestine, L-theanine stimulates the alpha wave production of brain which makes a person feel relaxed but alert. It also helps in relaxation by stimulating the body to produce other calming amino acids such as dopamine and tryptophan (Chaudhari 2010).

Tryptophan

Tryptophan is an amino acid found in milk as well as in many proteins rich foods along with whole grains and fresh fruits and vegetables and can increase serotonin levels which is synthesized from tryptophan. Tryptophan works with vitamin B₆, niacin and magnesium to synthesize serotonin. If too little tryptophan is available for the brain, then it may limit the amount of serotonin. Mung beans (*Phaseolus aureus* Roxb.) are a good mood food containing high levels of tryptophan, which triggers the release of serotonin. Cottage cheese, milk, fish, turkey, bananas, dried dates and peanuts are also tryptophan containing good mood foods. A chronic increase in stress will cause the body to secrete a hormone called 'cortisol'. Chronically high levels of cortisol can be detrimental to health and lead to loss of muscle protein, depressed immunity, visceral adiposity (central fat accumulation) and insulin resistance causing glucose intolerance. In certain studies supplementation of tryptophan was experimented at 300 mg - 600 mg per day that helped in controlling sleep disturbances, migraines, weight loss, appetite control, anxiety and depression. In therapeutic use of this nutrient, the dosage is usually increased considerably, but the toxicity level must be kept in mind. A supplementation of 100 mg at night-time proved beneficial to promote better sleep.

Dopamine

Nutritious food is gratifying because it releases the brain's 'anti-stress' neurotransmitter dopamine, a chemical which normally helps us from healthy natural dependencies in eating, sex and social interaction. So when dopamine falls to low levels, for any reason, unhealthy dependencies can arise because of attempts to boost dopamine to 'normal' levels. Genetic or chemically induced hypodopamine (low dopamine) in the brain's vital mesolimbic 'pleasure reward' (PR) pathway leads to irritability, anxiety, depression and a craving for a variety of different substances and those can lead to addiction.

Phenylalanine and tyrosine

Phenylalanine and tyrosine promote alertness and vitality. They help in increasing the rate at which brain neurons produce antidepressants-dopamine and norepinephrine. Tofu (soy paneer), dairy products, bananas, avocados, lima beans, pumpkin seeds, sesame seeds and almonds are the main sources of phenylalanine and tyrosine. Vitamin C is required to metabolize phenylalanine and tyrosine effectively, this shows, rich source of vitamin C like citrus fruits may help in metabolism of phenylalanine and tyrosine.

Selenium

Selenium a trace element is said to be “good mood” seafood mineral because it is its rich source. Benton. D and Cook. R psychologists reported that people eating less amounts of selenium were the most anxious, depressed and tired and generally felt much better when they were given adequate selenium. But the mechanism is not understood yet, though its antioxidant property is expected to be involved. Elderly people given selenium plus vitamin E showed significant improvements in mood and mental functioning. Welsh researchers speculate that selenium may have some unknown neural function which boosted mood and mental performance. It is involved in the reactions which release energy from cells. Its deficiency may cause fatigue. (Subulakshmi, 2001) Tree nuts and also whole grains (if grown in selenium rich soil) are rich sources of selenium. Adequate supply of vitamin E increases the efficiency of selenium.

Magnesium

Magnesium is known as a natural tranquilizer which in deficient state may lead to excitability, irritability, apprehension and emotional disorders. If severely deficient the brain is particularly affected and leads to clouded thinking, confusion, disorientation, marked depression and even hallucinations. Magnesium an anti-stress mineral, necessary for proper nerve and muscle functioning. It is also essential for absorption of calcium and potassium. Magnesium is present in the chlorophyll of dark green leafy vegetables (DGLV) like spinach, fenugreek, mustard leaves etc. besides bananas, nuts, seeds, almonds and figs.

Zinc

Zinc is implicated in nervous disorders. Its deficiency is a common sign of stress. It is reported that even marginally deficient persons perform poorly on memory and concentration tests. Nuts, green leafy vegetables are rich sources of zinc.

Folic acid

Folic acid deficiencies have been found to contribute to mental illness. Folic acid is present in kidney beans, whole grains, broccoli, sprouts, dark green leafy vegetables, chicory, peanuts, peas, egg yolks. Asparagus is high in B vitamins and folic acid.

B complex vitamins

The B complex vitamins are called as “nerve vitamins” as they are required for the maintenance of a healthy nervous system. These include B₁, B₂, B₆, and B₁₂. Inadequate intake can cause a change in mood as it is linked to some impairment in the brain activity. (Subbulakshmi, 2001)

Niacin (Nicotinic Acid)

Niacin also referred to as nicotinamide. A deficiency of niacin adversely affects tissue respiration and oxidation of glucose and results in the disease known as pellagra in humans. Severe deficiency of niacin leads to mental dullness, depression, confusion, hostility or suspicion, emotional instability and forgetfulness. Pellagra can be cured by feeding niacin or by feeding the essential amino acid tryptophan from which niacin can be made in the body. Good sources of this vitamin are yeast, meat, fish, poultry, peanuts, legumes and whole grain cereals etc. (Subbulakshmi, 2001)

Table1: Foods that alleviate Stress

Foods	Functional Aspects of Foods in Stress Alleviation
Almonds	This is referred to as intellect food or brain food. Almond with cow's milk and honey, improves brain power, helps in relieving nervous disorder and insomnia.
Amla	It is by far the most widely used herb in Ayurveda and it offers many benefits, one of which is its ability to fight the ill-effects of stress. Amla comes loaded with vitamin C which keeps the walls of the capillaries flexible. One of the first signs of stress is the constriction of blood vessels and capillaries right through the body and vitamin C can help counter this. Traditionally, amla juice taken with honey and rose petals in hot milk helps in improving mental alertness, strengthens nerves and improves memory.
Apples	Apples contain phosphorous and folic acid which helps reduces oxidative stress. This, in turn, helps cell-regeneration which is known to be adversely affected in times of stress.
Barley	Good tonic for nervous disorders. High mineral content useful in treating stress and fatigue.
Basil/ Tulsi	Basil aids in concentration and relaxation. It is used to relieve anxiety and headaches. Basil helps regulate blood sugar levels, can relieve spasms, and benefits the circulatory system, too. Besides adding great flavour to your food, basil is a rich source of vitamins A and C, and has abundant amounts of magnesium, iron and potassium. Historically, this herb has been used as an aphrodisiac and an antidepressant. (Patricia. B. etal., 2013).
Banana	Bananas are the superfood, containing tryptophan and magnesium for a mood boost coupled with high carbohydrates for energy. Carbohydrates have quite a relaxing effect on the body as they produce the neurotransmitter, serotonin which gives out a sense of calm. They are rich in potassium too. Potassium deficiencies are associated with breathlessness, fatigue, insomnia and low-blood sugar which are often triggered by stress. Potassium is also essential for healthy heart muscles. It offers serious mood lifting power, with a combination of vitamins B6, A and C; fibre, tryptophan, potassium, phosphorus, iron, carbohydrate and protein (Jong, 2010)
Broccoli	One of the good mood foods is broccoli which has stress relieving vitamin B6. It also contains folic acid which is important in fighting depression (Souza et al., 1999).
Blueberries	Blueberries are full of antioxidants and vitamin C. These nutrients are great stress busters as they fight free radicals which adversely affect

	memory.
Chamomile Anthemis nobilis)	Chamomile may reduce stress and discomfort, and it is useful for digestive health. It helps in calming down and relaxing the nerves. (Patricia. B. etal. ,2013).
Chocolate	Chocolate may interact with a number of neuro transmitter systems (including dopamine, serotonin and endorphins) that contribute to appetite, reward and mood regulation. Chocolate contains two analogues similar to the cannabinoid responsible for euphoria from cannabis (Parker et al., 2006). Chocolate also contains amino acid gammaaminobutyric acid (GABA) that is said to reduce anxiety (White and Reeves, 2008).
Fish	Fish like mackerel, salmon, tuna, sardines contains omega 3 fatty acids which boost the levels of serotonin, a neurotransmitter for good mood. It also has stress fighters like B ₆ and B ₁₂ . Tyrosine, is a brain energizer, helps the body to make brain stimulating chemical.
Flaxseeds	Flaxseeds are rich in alpha linolenic acid (ALA), an omega 3 fatty acid that is a precursor to the form of omega 3 fatty acids found in fish oils called eicosapentaenoic acid or EPA. Omega 3 fatty acids found in flax seeds are good brain foods (Cunnane, 1995).
Figs	Figs have highest mineral content among all fruits. An excellent source of potassium, calcium and fibre.
Honey	Honey is a nerve rejuvenator used to treat fatigue, depression and insomnia. Acetylcholine present in it works on the nerves.
Horseradish	Horseradish contains elements that may relieve depression and fight cancer. It is an expectorant and decongestant, and it contains antibacterial principals. (Patricia. B. etal. ,2013).
<i>Jamun</i>	Jamun fruit, also called Indian blackberry, is a popular seasonal fruit in India. It is has a low glycemic index, improves immunity and bone strength. The fruit is rich in nutrients like calcium, iron, potassium and vitamin C, which makes it great for boosting immunity.
Milk	It contains an amino acid tryptophan, which stimulates the production of serotonin that calms the mind and helps to induce sleep. It's a traditional remedy for insomnia. Milk can affect processes outside the human gut, a proven example is the hypotensive effect of milk bioactive peptides through angiotensin -I-converting enzyme (ACE) inhibition. Milk also contains some opioid peptides having pharmacological similarity to opium. The caseins (α_1 , α_2 , β and κ) and whey proteins are potential

	sources of such opioid peptides. These opioid peptides have antihypertensive and antidepressant activities. Milk also contains DHA, α -Lactalbumin and phospholipids, which affect mood and reduce stress (Mills et al., 2011, Young, 2007, Schubert et al., 2011).
Nutmeg (Myristica fragrans)	Nutmeg has been used since ancient times as a brain tonic. It is used to inhibit mental sluggishness and improve nervous system functions. Modern science has shown that nutmeg possesses substances that may relieve stress and anxiety, and it is an effective sleep aid. It also has antibacterial and muscle relaxation properties. Nutmeg contains copper, iron, potassium and magnesium. (Patricia. B. et al. ,2013).
Oats	Oats are an excellent source of soluble fibre B- glucan, which has been associated with reduced cholesterol levels and reduced risk of heart disease. Oats are also loaded with phytochemicals which in turn help regulate the digestive system and blood sugar levels, which are adversely affected by stress.
Garlic (Allium sativa)	Garlic provides multiple health benefits, including mood-regulating functions, improving the flow of bile, and hormone production. It can also help to expel pinworm is rich in antioxidants, iodine, and sulphur. A clove of garlic daily is beneficial for heart health too. (Patricia. B. et al. ,2013).
Green Tea/ Kahwa	Green tea contains L theanine that helps in brain relaxation, thereby reducing stress and anxiety with tranquilizing effects. Consumption of 50 mg of L theanine which is equivalent to 2-3 cups of tea has shown to stimulate alpha - brain waves which are associated in decreasing tension.
Turmeric (Curcuma longa)	This is the yellow spice of curries which is widely used in Ayurvedic medicine of India. Turmeric may be used internally as well as externally to relieve pain and inflammation. Turmeric protects the liver. It's rich in antioxidants and is anti carcinogenic. It prevents blood clots, and may prevent the progression of multiple sclerosis and Alzheimer's disease. (Patricia. B. et al. , 2013).
Walnuts	An excellent source of omega 3 essential fatty acids and uridine. This combination is thought to be a natural antidepressant (Rudkin, 2009) Walnuts are also rich in B6, tryptophan, protein and folic acid which contribute to good mood. (Perinbis et al., 2012).Higher blood levels of omega 3 fatty acids have been linked with lower rates of depression.

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