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# Relationship of Neurotransmitters with Stress and Sleep (A-Review)

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ABSTRACT

Chemicals which allow the transmission of signals from one neuron to the next across synapses are called neurotransmitters. Two harmones(neurotransmitters) Serotonin and melatonin are associated with various important functions of body such as regulation of body temperature, sleep, appetite and mood.Seratonin is considered to be feel good harmone it gives feeling of relaxation and happiness while melatonin is responsible for sound sleep.

Amino acid tryptophan is instrumental to produce serotonin and melatonin is generated from serotonin. Tryptophan can be obtained from foods like cottage cheese, brown rice, avocados, bananas, walnuts, tomatoes, soy protein, meat and turkey (highest tryptophan food) and starchy carbohydrates (bread, pasta, carrots and potatoes). Vitamin B6 is also needed to produce serotonin.

**KEYWORDS** neurotransmitters, melatonin, seratonin,sleep,stress

There are two types of neurotransmitters inhibitory and excitatory [1,2,3].The serotonin and GABA are inhibitory ( repressive) neurotransmitters they make us feel good and also are responsible for our self-esteem and sleep. When these get depleted and we suffer from depression, insomnia, and even anger. The other type of neurotransmitters are excitatory (stimulate) these are glutamate, catecholamines, PEA, and dopamine. These are responsible for making us alert, our thinking, focus, memory, ambition, and stress.

In brain both of these Serotonin and Melatonin are secreted by a pea-sized, gland pineal gland which is located in the center of the brain. The pineal gland secrets hormones primarily into the small, inner serial/spinal fluid holding verticals and channels inside the brain, cerebellum and spinal cord. Most of the Melatonin receptors in the body are located in the inside parts of the central nervous system that line the verticals and canals that contain the ceribrial/spinal fluid. So the ceribial/spinal fluid is what dissolves and carries Serotonin and Melatonin to their receptors. Serotonin and melatonin are interrelated, melatonin controls sleep cycle and serotonin calms us down and is light sensitive. seratonin is converted to melatonin .melatonin is stress reliever ,antioxidant, decreases cholestrol , slows down the ageing process and makes to feel better.

Melatonin is present in unicellular organisms, plants, fungi and also in animals and humans [4-6]. A major site of melatonin biosynthesis in vertebrates is the pineal gland but its production also occurs in retina, gastrointestinal tract, skin, bone marrow cells (in human and mouse), and lymphocytes, among other organs [7-15].While Melatonin makes us to sleep, but during the later phases of sleep a very common natural steroid hormone called DHE(DiHydroEpiAndosterone) keeps us sleeping during the later phases of normal sleep. DHEA keeps us intensified dreaming, memory consolidation, bodily repair and hormonal recharging that peak during the later hours of sleep, even while Melatonin production, and levels, are declining and crashing.

When people grow old there is too little DHEA to support the later phases of sleep and dreaming. This results in the insomnia which often presists for hours. Low levels of DHEA produce sensations of tiredness,and also drive the need to take naps in the middle of the day. Very important function of Melatonin is to switches off the connections of the dreaming brain from the rest of our bodies. So while dreaming our other organs do not act according to image projected in the dream. But if someone talk or walk in his sleep, that may be a sign of low Melatonin levels. Melatonin levels normally pick during the early hours of sleep, and drop to almost low during the later hours of sleep.Melatonin contols biological rhythms and has important effects on reproductive function of many animals. Pineal glands are light sensitive so they are sometimes referred as "third eye" of the body.Melatonin affects circadian rhythms. Consequently, it has been reported to have significant effects on reproduction, sleep-wake cycles and other phenomena showing circadian rhythm.

Also the production of melatonin decreases with the age. In young child the production of melatonin is very high so they are able to sleep for more time as compared to elders.

**MECHANISM OF ACTIVATION OF PINEAL GLANDS BY LIGHT;**Light through retina is first relayed to the suprachiasmatic[16] nucleus of the hypothalamus, which controls biological clock signals. Fibers from the hypothalamus descend to the spinal cord and ultimately project to the superior cervical ganglia, from which post-ganglionic neurons ascend back to the pineal gland [17-18]. In addition to the retina, the SCN also receive numerous inputs from other brain areas [19,20]

**EFFECT OF STRESS ON NEUROTRANSMITTERS :** Stress depletes neurotransmitters. Stress raises free radicals, insulin, and blood pressure which all damage neurons. When we are stressed and our catecholamines rise we will release serotonin and GABA to counteract it. If we are constantly under stress and releasing serotonin and GABA we will desensitize to them and they will become depleted. This leaves the catecholamines to run rampant. Excess amounts of catecholamines in our system lead to depression, anxiety, and insomnia. Poor sleep and illness .Also Cortisol actually damages serotonin receptor sites.

studies indicate that repeated stress lead to dissociation of memory and mental experience [21-24] There is evidence that stress disrupts normal activity and memory consolidation in the hippocampus and prefrontal cortex [25-27]. Further studies also found the interactions among stress, melatonin and the pineal gland [28-33]] stress may cause insomnia, and reduces nocturnal peak of pineal melatonin secretion leading to depression [34-37]. These studies suggest that the pineal gland may be significantly affected by stress

**CONCLUSIONS**;Human body requires all these neurotransmitters in balance to function properly. We need to eat right, manage our stress, and get the right amount of exercise in order to achieve our health goals. Meditation has been shown to lower catecholamines and exercise can actually double serotonin and brain repair chemicals. Sunlight has significant effect on the production of neurotransmitters,the serotonin increases with light .During day time environment of proper light should be preferred.

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