

The Effect of Cognitive Behavior Therapy (C.B.T.) on Insomnia and Stress: A Review.

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Type of Research: The Review article- provide critical and constructive analysis of existing literature. It will provide a summary, analysis, problem gaps and recommendations for future research.

Why conclusion is important:

With this study the improvement of the knowledge about Cognition Behavior Therapy (CBT), cognitive and psychological alteration mechanism and controlling regulation of sleep homeostasis and stress, circadian rhythms, physiological hyper arousal, stress, cognition and personality.

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1. ABSTRACT-

Prevalence of Insomnia in general population ranges between 10-40% and Stress are fairly common conditions affecting 60- 90% workers, adults and elderly people i.e. nearly one fourth. Insomnia is difficulty falling asleep or staying asleep. Stress is the behavioral response unable to cope with mental or emotional pressure and physical tension. Both affects day time cognitive functioning, psychological behavior, personality alterations and quality of life. Cognitive-behavior impairment and personality impairment scale questionnaires are designed based on various factors like daily hassles, happiness scale, perception of the present and the future by an individual, personality traits, depressive life events and so on. These questionnaires with certain scoring methods, can assess the degree of stress and insomnia involved with root cause analysis.

The appropriate treatment with cognitive behavior therapy (CBT) for Insomnia and Stress on the basis of pre-data gathered, Insomnia severity index (ISI), Pittsberg sleep quality index (PSQI), Perceived sleep quality index (PSQI) and Ardell wellness stress test. The CBT will be highly effective for treating Insomnia and Stress without medicinal interventions and cost effective treatment.

Key words- Insomnia, Stress, CBT, ISS, PSQI, PSS, AWST.

2. INTRODUCTION

Insomnia and Stress is a highly prevalent condition in the general population that affects daytime functioning, behavior, and quality of life. Association of impact of stress and insomnia with mental health i.e. cognitive, psychological, personality alterations and with physical health has remained largely unexplored.

Worldwide epidemiological studies assessed the prevalence of insomnia in the general population ranges between 10-40%; when frequency determined, it was in study by Supraksh Choudhry (2019) estimated chronic insomnia 6-10%, in Bangalore was 33%. While 20-30% of the general population has poor sleep (i.e., insomnia symptoms of difficulty initiating or maintaining sleep, early morning awakening, or non-restorative sleep at any given time), another 8-10% of the population suffers from chronic insomnia.^[1,2] Also, about 4% of the population use sleeping pills in a regular basis.^[3]

The prevalence of chronicity of insomnia increases with age, diabetes and is more common in women. Chronic insomnia interferes with personal functioning and causes distress, fatigue, poor cognitive functioning, and mood disturbance.^[4] In the elderly, 15%–45% had initial insomnia, 20%–65% moderate insomnia, and 15%–54% late insomnia whereas 10% had poor sleep quality.^[5] Chronic insomnia results in attention and memory deficits which could be misinterpreted as mild cognitive impairment or dementia.^{[6],[7]} In early stage its very difficult to diagnose insomnia but in later stage (moderate), insomnia can be diagnosed.^[8]

According to The American Institute of Stress:

- About 33 percent of people report feeling extreme stress
- 77 percent of people experience stress that affects their physical health
- 73 percent of people have stress that impacts their mental health
- 48 percent of people have trouble sleeping because of stress.

The Global Organization for Stress reports that:

- 75 percent of Americans experienced moderate to high stress levels in the past month
- Stress is the number one health concern of high school students
- 80 percent of people feel stress at work.

Stress is a global problem with:

- 91 percent of Australians feeling stressed about one or more important parts of their life
- About 450,000 workers in Britain believing their stress was making them ill
- 86 percent of Chinese workers reporting stress

Currently, 3.5 percent of adults in the U.S. have PTSD during a given year. Acute stress disorder affects as many as half of all people exposed to a serious or life-threatening stressor.

The most common symptoms of stress and the percentage of people who experienced them include:

- **Irritability and anger:** 45 percent of people
- **Fatigue or low energy:** 41 percent
- **Lack of motivation or interest in things:** 38 percent
- **Anxiety, nervousness or worry:** 36 percent
- **Headaches:** 36 percent
- **Feeling sad or depressed:** 34 percent
- **Indigestion, acid reflux or upset stomach:** 26 percent
- **Muscle tension:** 23 percent
- **Appetite changes:** 21 percent
 - It's estimated that American employers spend \$300 billion every year on health care and lost work days linked to stress. Up to 80 percent of workplace accidents come from stress or stress-related problems, like being too distracted or tired.
 - Stress is a costly issue in other areas of the world, too. People in the United Kingdom (UK) miss 13.7 million days of work due to stress each year. The problem costs \$14.2 billion in Australia and about \$37 billion in the UK in lost productivity each year.

Stress and Co-Occurring Health Conditions

Stress affects the entire body and is linked to many co-occurring mental and physical health problems, like:

- Heart disease
- High blood pressure
- Diabetes
- Depression
- Anxiety
- Insomnia

The diagnosis of a major medical illness often has been considered a severe life stressor and often is accompanied by high rates of depression (Cassem 1995)^[9]. For example, a meta-analysis found that 24% of cancer patients are diagnosed with major depression (McDaniel et al. 1995)^[10].

Lifetime exposure to traumatic events in the general population is high, with estimates ranging from 40% to 70% (Norris 1992)^[11]. An estimated 13% of adult women have been exposed to sexual assault (Kilpatrick et al. 1992)^[12]. The Diagnostic and Statistical Manual (DSM-IV-TR) includes two primary diagnoses related to trauma: Acute Stress Disorder (ASD) and Post Traumatic Stress Disorder (PTSD).

In 2009, American Psychological Association further established association of stress to serious health problems. However, a quantitative and accurate way to evaluate and estimate stress status of individuals is still a big challenge !.

2020 has been a stressful year for people in india, this year's respondents reported the highest average stress levels since the survey in 2007 – 5.4 out of 10, an increase of 0.5 since last year. Stress and anxiety^[13] often lead to insomnia and sleep problems.

In general, individuals in any part of the world are experiencing more stress in daily life, leading to disease susceptibility. Insomnia is very common with the hot & dry climatic region and crisis of fulfillment of needs with minimum wages. So, research question arises- will the stress and insomnia of various reasons effect individuals cognitive, psychological and personality alterations?

3. DISCUSSION:

Review of Literature-

Insomnia.

Insomnia was the first psychosomatic disorder described by the Johann Heinroth in 1818, The word “insomnia” comes from Latin words “in”(no) and “Somnus”(sleep), it is also known as sleeplessness, is a sleep disorder in which people have trouble sleeping.^[14] Insomnia manifests as difficulty getting to sleep, staying asleep, and waking to early, or sleep that is experienced as non-restrictive (i.e., 8 hours at night in the dark, quiet room) but cannot despite these good conditions. As people with insomnia know, problems at night always lead to problem during. Common day time problem include fatigue, difficulties with attention and concentration, difficulty with work or school performance, headache, decreased motivation, and worries about the inability, daytime sleepiness, low energy, irritability, and a depressed mood.^[15] It may result in an increased risk of motor vehicle collisions, as well as problems focusing and learning. Insomnia can occur independently or as a result of another problem.

Conditions that can result in insomnia include psychological stress, chronic pain, heart failure, hyperthyroidism, heartburn, restless leg syndrome, menopause, certain medications, and drugs such as caffeine, nicotine, and alcohol.^{[16][17]} Other risk factors include working night

shifts and sleep apnea.^[18] Diagnosis is based on sleep habits and an examination to look for underlying causes of sleep disorders.^[19] Screening may be done with two questions: "do you experience difficulty sleeping?" and "do you have difficulty falling or staying asleep?" The condition can be short-term (acute) or can last a long time (chronic). It may also come and go.

Acute insomnia lasts from 1 night to a few weeks. Insomnia is chronic when it happens at least 3 nights a week for 3 months or more. From a clinical point of view, insomnia definition, and the specific consequences of this complaint still have not been well defined. Insomnia is a serious and pervasive health condition that lowers overall life satisfaction and can lead to an increased risk of depression, anxiety, and substance abuse.

Types of Insomnia

There are two types of insomnia: primary and secondary.

Primary insomnia: This means your sleep problems aren't linked to any other health condition or problem. Primary insomnia includes the following clinical entities: (a) idiopathic insomnia, (b) psycho-physiologic insomnia, (c) paradoxical insomnia.

Secondary insomnia: It includes the following clinical entities: (a) adjustment insomnia, (b) inadequate sleep hygiene; (c) insomnia due to a psychiatric disorder; (d) insomnia due to a medical condition; (e) insomnia due to a drug or substance. Trouble sleeping because of a health condition (like asthma, depression, arthritis, cancer, or heartburn); pain; medication; or substance use (like alcohol).

Classification

Insomnia consists of three basic types: **acute insomnia, primary chronic insomnia, and associated insomnia.**^[20] Acute insomnia results from a triggering causal factor that is easily identifiable in an individual who has not had insomnia before. By definition, the acute form does not last longer than four months.^[21]

Primary chronic insomnia may be caused by several predisposing (genetic and constitutional) factors, including hyperactivity of stress response mechanisms or of the HPA axis; anxiety and depression; and abnormalities in the circadian rhythm (circadian sleep-wakefulness control).^{[22],[23]} Precipitating and perpetuating factors, such as psychosocial features (e.g., fatigue and irritability), behavioral changes, and cognitive characteristics, also contribute to insomnia.

Associated insomnia is primarily related to an underlying mental or mood disorder, such as depression, dysthymia, cyclothymia, bipolar disorder, anxiety, or schizophrenia.^{[24][25][26][27]} This form of insomnia may also be caused by inadequate sleep hygiene (i.e., habits that are inappropriate for good quality of sleep), such as psychologically stressful activities; the consumption of caffeine, nicotine, alcohol, or heavy meals; or vigorous physical activity near bedtime. Other potential causes of associated insomnia include concomitant medical conditions (e.g., infections and metabolic diseases) and the use of substances or medications (e.g., alcohol, stimulants, and antidepressants).

The Centers for Disease Control and Prevention further classifies insomnia as episodic (lasting at least one month but less than three months); persistent (lasting three months or longer); or recurrent (two or more episodes within one year).^[28]

Chronic Insomnia: Poor sleep for at least 3 months or more. It may start in early childhood and be lifelong.

Insomnia is a very complex problem that needs to be differentiated from and taken in context with psychiatric, medical and other sleep disorder.

Severity of Insomnia

There are varying degrees of severity for insomnia.

Mild Insomnia: Poor sleep associated with feeling of restlessness, irritability, mild anxiety, daytime fatigue, and tiredness accompanied by little or no evidence of impairment of social or occupational functioning.

Moderate Insomnia: Moderate occupational, social and work function impairment associated with feeling of restlessness, irritability, mild anxiety, daytime fatigue, tiredness and nightly complaint of insufficient amount of sleep or not feeling rested.

Severe Insomnia: Nightly complaint of insufficient amount of sleep or not feeling rested after habitual sleep episode accompanied by severe/ major feeling of restlessness, irritability, mild anxiety, daytime fatigue, tiredness.

Assessment:

The cluster analysis of insomnia was suggested by Hauri (1983). The goal was to develop a purely empirical classification scheme of insomnia and to compare it with the association of sleep disorder centre, current nosology, which is based on clinical experience. The insomnias associated with psychiatric disorders were split into five subgroups that made some intuitive sense, but did not match exactly with DSM IIIrd (diagnostic and statistical manual, 3rd edition, American psychiatry association) categories.

Hui DS (2009) conducted the study the Pittsburgh Sleep Quality Index (PSQI) measures the retrospective sleep quality and disturbances. Individual self-report items assess a broad range of domains associated with sleep quality, including usual sleep wake patterns, duration of sleep, sleep latency, the frequency and severity of specific sleep-related problems, and the perceived impact of poor sleep on daytime functioning. This index consists of item scores ranges from 0–3. The global score is classified as follows: 10-15, mild depression; 16–23, moderate depression; 24–63, severe depression. Insomnia is a frequently associated symptom of depression or other psychiatric disorders. Hence, the subject's depression symptoms were evaluated as a potential confounder.

Pattern and severity of the insomnia analysis by the Insomnia Severity Index (ISI) is a brief self-report instrument measuring the patient's perception of both nocturnal and diurnal symptoms of insomnia. This instrument brief searching assessment tool designed to evaluate insomnia. It was developed by M.Morin (2016). The ISI is one of the most widely used assessment instrument in clinical and observational studies if insomnia.

Polysomnographic assessment of insomnia was conducted by chervin and Aldrich (1999). While the data provide a useful view of night time events in insomnia, he was not convinced of the

clinical importance of information they obtained concerning sleep apnea, subjective insomnia and periodic movement of sleep.

In other study, According to J.C.Gillin (2000), Psycho physiologic insomnia occurs when an episode of transient insomnia disrupts the Person's circadian rhythm. The bed is associated not with rest and relaxation but with a struggle to sleep. As a result, a pattern of sleep failure emerges. Overtime, this event repeats, and bedtime becomes a source of anxiety. On the bed, the individual broods over his failure to sleep and the adverse effects of sleep loss, resulting in failure to sleep. Persistent worry about lack of sleep provides an automatic nightly trigger for anxiety and arousal. This is worsened by unsuccessful attempts to control thoughts, images, and emotions about insomnia. After such a cycle is established, insomnia becomes a self-fulfilling prophecy that can persist indefinitely.

Some studies are given that insomnia is a genetic (wiki 2020). Heritability estimates of insomnia vary between 38% in males to 59% in females. A genome-wide association study (GWAS) identified 3 genomic loci and 7 genes that influence the risk of insomnia, and showed that insomnia is highly polygenic. In particular, a strong positive association was observed for the MEIS1 gene in both males and females. This study showed that the genetic architecture of insomnia strongly overlaps with psychiatric disorders and metabolic traits. It has been hypothesised that the epigenetics might also influence insomnia through a controlling process of both sleep regulation and brain-stress response having an impact as well on the brain plasticity.

Morin (1999) assessed the validity Stimulus control therapy, according to this therapy, insomnia is a conditioned response to bedtime and environmental cues associated with sleep. When a patient is tossing and turning on the bed for a long time, the body learns to be awake on the bed or an association is made between awakening and bed, which leads to wakefulness. Stimulus control therapy tries to break this association between awakening and bed. Technique used: go to bed only when sleepy. The bed is to be used only for sleep and sex. Do not spend ≥ 20 min while tossing and turning on the bed. Leave the bed if you do not fall asleep within 20 min and do some relaxing activities and only return when you feel sleepy. Wake up at the regular time regardless of sleep duration at night. Avoid napping during the day. Activities which reward being awake such as watching television, using mobile phone, and eating are avoided. This therapy was found to be effective in randomized trials and its effects may be long lasting.

In a study by HJ Tsai (2015), on evaluate the relaxation therapy. Relaxation therapies (RTs) are based on the observation that insomnia patients often display high levels of physiological and cognitive arousal. RT helps patients to attain physical and mental relaxation by reducing tension and negative thought process. All these techniques require regular practice over a period of several weeks, and professional guidance is necessary in the initial stage of training. Studies indicate that RTs are helpful for treating insomnia.

Different types of *relaxation techniques* are as follows:

Diaphragmatic breathing

Deep breathing helps to reduce the patient's level of physiological and cognitive arousal.

Progressive muscle relaxation

In this technique, the patients progressively produces tightening and relaxing-specific groups of muscles of the whole body one by one to reduce stress and anxiety.^[30]

Visualizations and guided imagery

This type of relaxation is a systematic practice of generating detailed mental images and visualization of peaceful, pleasant, and beautiful scenes. Actually, it is a suggestion to the body and unconscious mind that the scenes are real and act accordingly. It results in relaxation and stress reduction which leads to good sleep. This can be done alone or with Jacobson's progressive muscular relaxation.

Ronalad and Micheal (1999) assessed the validity of the *Epworth sleepiness scale score (ES)* as a measure of sleepiness among patient suspected or confirmed to have obstructive sleep apnea syndrome. The ES had a statistically association with self rated problem sleepiness but not with multiple sleep latency (MSL) or measures of sleep apnea severity. Male gender, adjusted for potential confounding variables, had considerably more influence on these than did MSL or measure of sleep apnea severity.

In a study by Sateia, Doghramji and Hauri (2000) on evaluation of chronic insomnia, it was concluded that insomnia is a condition which affects million of individual, giving rise to emotional distress, daytime fatigue and loss of productivity. Despite its prevalence, it has received scant clinical attention. An adequate evaluation of persistent insomnia requires detailed historical information as well as medical, psychological and psychiatric assessment. Use of a classification system for sleep disorder and familiarity with major diagnostic groups will facilitate the clinicians evaluation and treatment. Thorough assessment also requires attention to unique aspects of presentation and specific set of etiologies which are associated with particular age groups.

In many cases, insomnia is co-morbid with another disease suggested by the S J Wilson et.al(2010), side-effects from medications, or a psychological problem. Approximately half of all diagnosed insomnia is related to psychiatric disorders. In depression in many cases "insomnia should be regarded as a co-morbid condition, rather than as a secondary one;" insomnia typically predates psychiatric symptoms infect, it is possible that insomnia represents a significant risk for the development of a subsequent psychiatric disorder^[63]. Insomnia occurs in between 60% and 80% of people with depression. This may partly be due to treatment used for depression.^[30] Determination of causation is not necessary for a diagnosis.^[31]

Pathophysiology of Sleep and its disorder:

Sleep is regulated by a variety of chemicals in the body. In the forebrain and hypothalamus, neurons release gamma- aminobutyric acid (GABA) and histamine. These neurotransmitters have opposing actions on the sleep-wake cycle. **Increased GABA and decreased histamine** release induce non-rapid eye movement (NREM) sleep by deactivating the cortex and thalamus. The sleep-wake cycle is also affected by neurotransmitters released by reticular activating system (RAS) neurons, such as **norepinephrine, acetylcholine, and serotonin**. These neurotransmitters contribute to maintaining wakefulness and significantly decrease during rapid eye movement (REM) sleep. **Orexin**, which is produced in the hypothalamus, is a neuropeptide that plays an important role in maintaining wakefulness. It is hypothesized that the action of orexin changes the activity of the neurotransmitters involved in the regulation of sleep/wake states. Melatonin is a hormone that plays an integral role in diurnal rhythms. It synchronizes the body with the environment's light-dark cycle, peaking during the night and dipping during the day, to stabilize the body's natural circadian rhythm.^{[32],[33]}

The supra- chiasmatic nucleus, located in the hypothalamus, is thought to be the body's anatomic timekeeper, responsible for the release of melatonin on a 25-hour cycle. The pineal gland secretes less melatonin when exposed to bright light; therefore, the level of this chemical is lowest during the daytime hours of wakefulness. Multiple neurotransmitters are thought to play a role in sleep. These include serotonin from the dorsal raphe nucleus, norepinephrine contained in neurons with cell bodies in the locus ceruleus, and acetylcholine from the pontine reticular formation. Dopamine, on the other hand, is associated with wakefulness.

Normal sleep and wake states are generated by a complex neuronal network in the brain and are regulated by homeostatic and circadian mechanisms. Sleep may be divided into 2 main stages: rapid eye movement (REM) and non-REM (NREM) sleep. Disturbances in the pattern and periodicity of REM and NREM sleep are often found when people admit to experiencing sleep disorders.

Sleep-wake cycles are governed by a complex group of biologic processes that serve as internal clocks. REM sleep is also known as paradoxical sleep because it resembles wakefulness with desynchronized electroencephalography (EEG) activity, phasic events such as REM, and bursts of muscle activity. REM sleep also is characterized by dreaming. NREM sleep is characterized by synchronized EEG activity, muscle relaxation, and decreased heart rate, blood pressure, and tidal volume.

Sleep homeostasis refers to the regulatory mechanism that maintains an overall constancy of sleep intensity and duration. Sleep deprivation creates a sleep debt that must be repaid, resulting in compensatory heightened pressure to sleep and eventual increased sleep intensity and duration. Conversely, excessive sleep reduces sleep propensity and amount of sleep.

Sleep physiology changes with age as the brain matures and eventually degenerates. With advancing age, there is a decline in the percentage of sleep that is deep, more frequent awakenings, and sleep fragmentation. In the elderly, sleep disorders such as obstructive sleep apnea (OSA) occur more frequently. Sleep needs also vary with age, decreasing from 16 hours a day in infancy and stabilizing at 7½ to 8 hours for most normal adults.

Antihistamines

Antihistamines are effective for mild insomnia; however, next day sedation is a problem. Antihistamines commonly cause psychomotor impairment and anticholinergic effects.^[34] A randomized, double-blind, cross-over study demonstrated that tolerance to the sedative effect of diphenhydramine develops in 3 days.^[35] In addition, diphenhydramine and doxylamine are minimally effective in inducing sleep, but reduce sleep quality, and cause residual drowsiness and are not recommended for insomnia.^[36]

Melatonin

MT, a hormone produced by the pineal gland, helps regulate the circadian (sleep-wake) rhythms. Darkness stimulates while light inhibits MT production. The significant deterioration of sleep quality seen in many older people is correlated with a decline in MT secretion. MT may

prevent jet lag in some travellers. It may help people who are dependent on sleeping medications withdraw from these agents and maintain good quality sleep. MT may be helpful for people who have difficulty in falling asleep at night but thereafter sleep normally. The most common side effects are sedation, drowsiness, and hypothermia.^[37] A randomized, double-blind, placebo-controlled study of prolonged-release MT for 3 weeks resulted in improvement in sleep latency, sleep quality, and morning alertness. Further, in a subset of patients who continued treatment for 6 months, the improvements were maintained.^[38] However, other studies gave contradictory results.^[39]

Stress is the combination of psychological, physiological, and behavioral reactions that people have in response to events that threaten or challenge them. Stress can be good or bad. Sometimes, stress is helpful, providing people with the extra energy or alertness they need. The good kind of stress is called eustress. Unfortunately, stress is often not helpful and can even be harmful when not managed effectively. Moreover, stress can increase the risk of developing health problems, such as cardiovascular disease and anxiety disorders. The bad kind of stress is called distress.

Stressors are events that threaten or challenge people. They are the sources of stress. Most widely studied stressors in children and adolescents are: Poverty, abuse, trauma, violence, marital conflicts, unemployment, accident, business failure, natural disasters, war and terrorism, medical illness, sexual- physical- emotional neglect/ assault, provocative behavior, the avoidance of intimacy, disturbances in attachment. Stress responses are psychological, physiological, and behavioral reactions to stressors. Stress-related outcomes also vary according to personal and environmental factors. Levels of neuroticism, emotionality, and reactivity correlate with poor interpersonal relationships as well as “event proneness.” Protective factors that have been identified include, coping, resources (e.g., social support, self-esteem, optimism), and finding meaning. Anxiety, depression, concentration difficulties, and muscle tension are all examples of stress responses. Children of divorced parents have more reported antisocial behavior, anxiety, and depression than their peers (Short 2002).

Pathophysiology-Acute Stress Responses

Following the perception of an acute stressful event, there is a cascade of changes in the nervous, cardiovascular, endocrine, and immune systems. The HPA Axis, Hypothalamic Pituitary Gonadal Axis (HPG), Hypothalamic Pituitary Thyroid Axis(HPT), Hypothalamic Neurohypophyseal system(HPS) are 04 neuroendocrine system. The network known as the hypothalamic-pituitary-adrenal (HPA) axis^[39] regulates stress and many body's hormonal response or processes that includes digestive and immune system, mood, emotions, sexuality, energy storage and expenditure. The hypothalamus – a cluster of nuclei located in the brain – will instruct the anterior pituitary gland to release hormone-ACTH which influence GH(STH), Cortisol, TSH, FSH, LH, MSH, Prolactin hormones, while posterior pituitary gland secretes-ADH(Vasopressin), Oxytocin. Thus pituitary gland signals the adrenal glands to produce steroid hormones called glucocorticoids. Two of these glucocorticoids are cortisol (produced by zona fasciculata of adrenal cortex) and epinephrine produced (adrenal medulla & medulla oblongata) involved in visceral functions(e.g. respiration), which are also known as stress hormones.

Epinephrine and norepinephrine have a lot in common. Epinephrine (also called adrenaline), norepinephrine, and dopamine make up a small but important hormone family called catecholamines. Together, catecholamines

and cortisol increase available sources of energy by promoting lipolysis and the conversion of glycogen into glucose (i.e., blood sugar). Lipolysis is the process of breaking down fats into usable sources of energy (i.e., fatty acids and glycerol; Brindley & Rollan 1989).

Epinephrine and norepinephrine are the hormones behind your “fight-or-flight” response (also called the fight, flight, or freeze response). When you experience stress, these two hormones leap into action. They also play roles in some of your everyday bodily functions.

About the Catecholamines

Dopamine- Dopamine is a neurotransmitter, a chemical messenger in your brain. This chemical controls your responses to sensory information. When you yank your hand back from a hot stove or when you find yourself craving something sugary in the candy aisle, that’s dopamine at work. Dopamine’s roles spread far and wide, including:

- Motor control
- Emotions (pleasure or dislike)
- Thought-processing

A dopamine imbalance can lead to a loss of motor control (such as Parkinson’s disease), addiction, ADHD, and schizophrenia.

Epinephrine and norepinephrine. These two hormones work together in stressful situations to increase blood flow throughout your body. Additionally, they break down fat and increase blood sugar (glucose) levels to give your body more energy. Some of the changes that occur are:

- Increased heart rate
- Increase the amount of blood pumping from your heart
- Increased blood pressure

About Epinephrine

You may think of adrenaline as a mysterious chemical that makes you focused and strong enough to lift a car.

Fight or flight. When you experience stress, your heartbeat quickens, you start to sweat, and you feel the need to get away. This is the fight-or-flight response, at the heart of which is adrenaline. Where epinephrine is produced. Like the other catecholamine hormones, adrenaline is produced in the adrenal glands. Within minutes of experiencing stress, adrenaline is sent into your blood toward other organs to cause certain responses. These effects of adrenaline include:

- Dilations of your air passages to take in more oxygen
- Contracting blood vessels to redirect blood flow to important muscles and organs, such as the heart and lungs
- Reduced ability to feel pain
- Increase in strength and physical performance
- Heightened awareness and focus

Epinephrine for Anaphylaxis

Epinephrine injections. Adrenaline shots are commonly used to treat a life-threatening allergic reaction or anaphylaxis. Epinephrine injection is an injection system that is prefilled with a liquid solution of the hormone epinephrine.

Treating anaphylaxis. Symptoms of a mild allergic reaction include hives, itching, and swelling. Symptoms of anaphylaxis are much more severe, can be life-threatening, and vary between each occurrence. Some symptoms of anaphylaxis include:

- Swelling or tightening of the throat
- Difficulty breathing
- Shortness of breath
- Wheezing or coughing
- Lightheadedness or fainting
- Abdominal cramps
- Nausea, vomiting, or diarrhea

Epinephrine injection is the first line of treatment for anaphylaxis. Epinephrine's roles regarding blood flow and oxygen intake help fight the symptoms of anaphylaxis. However, epinephrine injection isn't the final treatment option, and further medical assistance is necessary.

About Norepinephrine

Norepinephrine (sometimes referred to as noradrenaline) is a neurotransmitter and hormone that responds to stress and low blood pressure. It also plays a role in managing your ability and your ability to focus.

Fight or flight. When working alongside adrenaline, norepinephrine supports the fight-or-flight response by increasing your heart rate, breaking down fat, and increasing glucose levels. It gives your brain and body the energy it needs to take action.

Biorhythms. Norepinephrine works to maintain your sleep-wake cycles. It helps you wake up in the morning, improves your attention, and helps you focus throughout the day.

Norepinephrine imbalances. An imbalance of norepinephrine (too much or too little) can have an impact on your mental and emotional health. Conditions such as depression, anxiety, addiction, substance abuse, and post-traumatic stress disorder are caused by an imbalance of norepinephrine. A surge of norepinephrine can cause feelings of happiness and euphoria. However, a surge can also lead to panic attacks, raised blood pressure, and hyperactivity. A lack of norepinephrine can cause lethargy, fatigue, lack of focus, attention deficit hyperactivity disorder (ADHD), and depression.

Norepinephrine as Treatment

You will often find norepinephrine at work treating low blood pressure (hypotension) due to a life-threatening complication or alongside serotonin in antidepressants. Serotonin and norepinephrine reuptake inhibitors (SNRIs) are an antidepressant. SNRIs work by altering the brain chemistry of your serotonin (a “feel good” hormone) and norepinephrine neurotransmitters. This process helps to regulate your mood and relieve depression symptoms.

Getting norepinephrine naturally. You can help your body and brain produce more serotonin and norepinephrine through exercise, sleep, feeling accomplished, enjoying music, and meditation.

Inflammation, Cytokine Production, and Mental Health

In addition to its effects on physical health, prolonged pro-inflammatory cytokine production may also adversely affect mental health in vulnerable individuals. During times of illness (e.g., the flu), proinflammatory cytokines feed back to the CNS and produce symptoms of fatigue, malaise, diminished appetite, and listlessness, which are symptoms usually associated

with depression. The body naturally produces cortisol after we wake up and gradually decreasing throughout the day.

Stress feelings generally of three categories:

Acute stress: Following the perception of an acute stressful event; there is cascade of changes in the nervous, cardiovascular, endocrine and immune systems. We may notice blood pressure and heart rate, followed by feelings of irritability, sadness, and anxiety. Some people also experience headaches, back pain, and gastrointestinal issues. Acute stress may also occur if made significant changes to your bedroom or sleep area e.g. sharing their bedroom with their baby. Children may also have sleep problems immediately after they begin sharing their room with a sibling.

Episodic acute stress: Frustrations through unhealthy behaviors, clinical depression and heart disease, as well as poor performance at work and relationship problems.

Chronic stress: Many factors can contribute to chronic stress, including poverty, abuse, and trauma, socio-psychological behavior and diseases related to cardiovascular, gastrointestinal, musculoskeletal, reproductive, respiratory and nervous systems.

How Does Stress Affect Sleep?

Insomnia is a common sleep disorder^[40] derived from stress. Insomnia is defined as persistent difficulty with sleep onset, excessive daytime sleepiness, fatigue, irritability and other impairments. Current estimates suggest ^[41]10-30% of adults⁷ live with insomnia. Insomnia due to constant stress, with anxiety disorder are at higher risk of experiencing insomnia symptoms:

- Feelings of fatigue and malaise
- Difficulty paying attention, concentrating, or accessing memories
- Impaired performance in social, family, professional, or academic settings
- Irritability and mood disturbances
- Hyperactivity, aggression, impulsivity, and other behavioral issues
- Decreased energy and motivation
- Increased risk for errors and accidents
- Interpersonal relationship issues
- Work-related problems
- Financial loss

Does Sleep Help Stress?

Getting enough sleep on a nightly basis can alleviate stress quite effectively. Unfortunately, a good night's rest can be elusive if you're stressed out – especially if sleep problems are a major source of your day-to-day anxieties.

There are other measures you can take to relieve stress. These include regularly exercising and maintaining a healthy support network of friends and family. However, keeping stress at bay often demands adequate sleep. National Sleep Foundation guidelines^[42] advise that healthy adults should sleep between seven and nine hours each night.

Sleep hygiene guidelines^[43] include:

- Strict sleep schedule
- Optimal bedroom atmosphere
- No electronics
- Reduced evening intake: Avoid nicotine and caffeine, Alcohol.

- Regular exercise
- Engage in relaxing activities
- Create goals for yourself
- Initiate the “stress talk” with your doctor

Causes

➤ Causes of **Non clinical/ Extrinsic** include:

- Stress related to big life events, like a job loss or change, the death of a loved one, divorce, or moving.
- Things around you like noise, light, or temperature, humidity, dryness, sex, food, Physical exertion, uncomfortable bed, Age related, Accident, Quarrelsome.
- Changes to your sleep schedule like jet lag, a new shift at work, or bad habits you picked up when you had other sleep problems.

➤ Causes of **Clinical/ Intrinsic** include:

- Mental health issues like depression, Psychiatric disorder and anxiety.
- Medications for colds, allergies, depression, high blood pressure, and asthma
- Inflammation/ Pain or discomfort at night.
- Caffeine, tobacco, or alcohol use.
- Hyperthyroidism and other endocrine problems.
- Irritable Bowel Syndrome (IBS), Ulcerative Colitis, Crohns disease, Alzheimers/ Dementia.
- Dyspnoea, Diabetes mellitus/ Polyurea, RTI, UTI, Obesity.
- Other sleep disorders, like sleep apnea or restless legs syndrome.

➤ Other Causes of Stress of **idiopathic reasons**.

According to the National Institutes of Health in the USA that only two treatment options (cognitive behavioral therapy [CBT] and approved hypnotic drugs) have sufficient evidence to support their use for the treatment of insomnia.

CBT is a treatment that uses psychological and behavioral methods such as relaxation techniques sleep restriction, stimulus control, and education about sleep hygiene (e.g., diet, exercise, and the bedroom environment). CBT has been shown to be highly effective at treating insomnia, does not carry risks of adverse side effects, and has long-lasting benefits, which is a clear advantage compared with drug treatment.

In study **Cognitive Behavior Therapy (CBT)**, was pioneered by Dr. Aaron T. Beck in the 1960s, while he was a psychiatrist at the University of Pennsylvania. Having studied and practiced psychoanalysis, Dr. Beck designed and carried out several experiments to test psychoanalytic concepts of depression.

CBT-I aims to improve sleep habits and behaviors by identifying and changing the thoughts and the behaviors that affect the ability of a person to sleep well. Fully expecting the research would validate these fundamental concepts, he was surprised to find the opposite. seeks to alter faulty beliefs and attitudes about sleep. The objective is to break the vicious cycle of sleep disturbance, mental distress, dysfunctional cognitions, and further sleep disturbances. CBT for insomnia (CBT-I) uses specific components together to change patient's thoughts and education on

normal sleep behavior and sleep environment. It helps patients with chronic insomnia to discover, identify, and reframe the negative, unrealistic (e.g., “Every night I must get 8 h of sleep”) and dysfunctional thoughts and attitude of the patients about sleep and exaggerating its consequences (e.g., “With a poor night's sleep I cannot accomplish anything”). It is a goal-directed therapy which also teaches set of skills about how to recover from insomnia if it recurs later in life. It is effective therapy for patients with insomnia to improve sleep satisfaction. A meta-analysis of CBT-I in patients with chronic insomnia revealed significant reductions in self-reported time to sleep onset and time awake after falling asleep.^[44] Benefits of therapy were maintained for 6–12 months. Additional advantages of CBT-I include lack of medication side effects.^[45] The drawback is that while hypnotics act immediately, CBT-I takes weeks to show its effect.^[46]

CBTP SCALE –

Cognitive- behavior impairment and personality impairment scale.

The questionnaires are designed based on various factors like daily hassles, happiness scale, perception of the present and the future by an individual, personality traits, depressive life events, and so on ^{[47], [48], [49], [50]}. Although these questionnaires, with certain scoring methods, can assess the degree of stress involved, but there are several drawbacks, such as, a) the subjective bias of an individual towards the assessment of his/her psychological state, b) the tendency of an individual to maintain secrecy regarding personal matters confidentiality is maintained, c) the limitation of questionnaires in terms of their objectivity. Thus, for a more comprehensive and robust evaluation of PS, hormonal assays came into picture in which levels of epinephrine, norepinephrine, and cortisol are checked to differentiate various stressed conditions ^[51]. In addition, other physiological studies which include estimation of various clinical parameters, such as elevated blood pressure, rise in body temperature and changes in body weight, have also been used to measure PS response ^[52]. Recent studies have shown the differentiation of stressed patients based on various pro-inflammatory cytokines, acute phase proteins and minerals which are supposed to be activated in response to a stimulus of PS ^{[53], [54], [55]}.

Memory /attention- (concentration impairment)t Difficulty with attention ,concentration, memory.

Performance of work- impairment of occupation. Difficulty with performance of simple daily tasks

Sleep level- impaired social life can be assessed by the Quality of Life Index.

PSQI: Pitsberg sleep quality index.

Insomnia severity sacle: (0-4)

Depression anxiety stress scale /level / level of fatigue- (DASS-21 SCALE)

Cognitive impairment

Difficulty with performance of simple daily tasks

Mood lability change.

Hormonal change.

Medical history like questionnaire/ screening questionnaire.

Multifactorail mrmory questionnaire (MMO)(57)

Measure of cognitive performance (attention, working memory, episodic memory)

Measure of other daily time symptoms-

- Dysfunctional beliefs and attitude about sleep(30 questions)
- Beck depression inventory-2(to assess severity & depression)
- State trait anxiety inventory(20 questions)
- Multidimensional fatigue inventory (20 questions)
- Arousal pre predisposersy scale (to assess reactivity in response to environmental situations).

Epworth sleepiness scale (ESS) It is to measure asleep in different situation.

Cognitive failure questionnaire (CFQ)

Sleep diary cognitive variables (to rate attention/concentration/memory i.e.1(Never),5(Very often))

DSM-5 criteria

The DSM-5 criteria for insomnia include the following:^[56] Predominant complaint of Stress and dissatisfaction with sleep quantity or quality, associated with one (or more) of the following symptoms:

- Difficulty initiating sleep. (In children, this may manifest as difficulty initiating sleep without caregiver intervention.)
- Difficulty maintaining sleep, characterized by frequent awakenings or problems returning to sleep after awakenings. (In children, this may manifest as difficulty returning to sleep without caregiver intervention.)
- Early-morning awakening with inability to return to sleep.
- In addition, The sleep disturbance causes clinically significant distress or impairment in social, occupational, educational, academic, behavioral, or other important areas of functioning.
- The sleep difficulty occurs at least 3 nights per week.
- The sleep difficulty is present for at least 3 months.
- The sleep difficulty occurs despite adequate opportunity for sleep.

The questionnaire used for preliminary quantification of stress for individuals in the population was divided into three parts; Part A, Part B and Part C (Questionnaire S1).

- Part A was a stress questionnaire that identified people as stressed (S), non-stressed(NS) and borderline (BL). This part took into consideration two aspects associated with psychological stress; a) Physiological, b) Psychological. The questionnaire thus included questions based on the symptoms associated with stress like excessive sweating, severe headaches, insomnia, fatigue and psychological factors like absent-mindedness, procrastination, jealousy.
- Part B dealt with grouping people into chronically stressed or acute stressed. For this classification, two standard questionnaires were used; a) Holmes and Rahe stress scale [57], [58], [59] to score the major life change, illness, mental or physical faced, b) Hari's Stress Inventory [60] accounted for daily hassles that may disturb a person over acute scale. This part in later stages was excluded from the final questionnaire.
- Part C categorises the stressors namely social stressor, personal stressor which included personal dissatisfaction on present job, social status, financial status, achievements and personality and finally others stressors. In the final questionnaire, Part C was appended by questions which included; a) duration of physiological or psychological symptoms, b) information about any severe disease, subject had been afflicted with, c) personality traits.

Various recommendations for a standard research assessment of insomnia which included definition/diagnosis of insomnia and comorbid conditions were presented by Buysse, Ancoli-isreal and Eninger (2006); measures of sleep and insomnia, including qualitative insomnia measure, diary, polysomnography, and actinography; and measures of the waking correlates and consequences of insomnia disorder, such as fatigue, sleepiness, mood, performance, and quality of life. Adoption of a standard research assessment of insomnia disorder will facilitate comparison among different studies and advance the state of knowledge. These recommendations are not intended to be static but must be periodically revised to accommodate further developments and evidence in the field.

Beaulieu-Bonneau, LeBlanc et al (2007) estimated the incidence of insomnia and examined potential risk factors in a cohort of good sleepers followed over a over a one-year period. According to M.Delay,(2009) Seligman drew attention to the possibility that a patient may believe that a particular

treatment would be beneficial and that this belief may affect commitment and adherence to the patient, will seek treatment and the type of treatment they seek.

Lim AS et al,(2013) to assess the large- sample meta analyses have shown that patients with insomnia have mild or moderate dysfunction in attention, episodic memory, working memory and executive function compared with healthy control. Recent efforts have been made to develop quantitative frequency, duration, and severity criteria for insomnia. The study by Edinger, Olsen et al.,(2009)was conducted to test a range of frequency and severity criteria sets for discriminating primary insomnia suffers from normal sleepers. Result suggested that quantitative criteria derived from sleep- long data may be useful for classification of primary insomnia.

In a general sense to suggest the study by JT Michael (2005), insomnia inadequate sleep quality or quantity when one has an adequate opportunity to sleep. In 2014, two prospective studies supported the role of high pre-morbid sleep reactivity in vulnerability to insomnia (Drake et al., 2013; Jarrin et al., 2014). In a sample of 1449 good sleepers, Jarrin et al. found that individuals with high sleep reactivity were nearly 60% more likely to develop insomnia symptoms and were twice as likely to develop chronic insomnia over the next 2 years compared with low-reactive sleepers (Jarrin et al., 2014).

According to the *Diagnostic and Statistical Manual of Mental Disorders*, fifth edition (DSM-5), insomnia is defined as dissatisfaction with sleep quantity or quality that results in clinically significant distress or impairment in social, occupational, or other important areas of functioning. Insomnia is associated with one or more of the following symptoms: difficulty initiating sleep (sleep-onset insomnia or initial insomnia); difficulty maintaining sleep (sleep-maintenance insomnia or middle insomnia); and early-morning awakening with the inability to return to sleep (late insomnia).^[45]

On the other hand Merica et al (2001), in humans, spectral EEG method have identified heightened regional electrical brain activity in patient with insomnia during non-rapid eye movement (NREM) sleep.

DJ buysee et al (2011), proposed that the lack of objective sleep disruption in many patients with insomnia may be due to isolated neuronal groups remaining active during PSG- defined sleep. This dynamic in the brain may be experienced as wakefulness by many patients with insomnia and miscategorised as normal sleep based on standard PSG criteria.

Curiously, rapid eye movement (REM) sleep duration interacted with stress exposure (Petersen et al., 2013). Among highly reactive sleepers, REM sleep duration decreased in response to stress (low to high stress, 119 to 92 min), whereas no such decrease was observed for low-reactive sleepers when stressed (low to high stress, 91 to 97 min, non-significant). Importantly, the highly reactive sleepers exhibited decreased REM sleep and increased nocturnal arousals (particularly during REM) in response to stress, which have been proposed as sleep physiological markers of chronic insomnia (Riemann et al., 2012). Laboratory studies using animal models show that manipulated stress exposure leads to *REM sleep instability* in rats (i.e. short and fragmented REM sleep), especially among those with high stress reactivity (Cano, Mochizuki, & Saper, 2008; Fenzl et al., 2011; Pawlyk, Morrison, Ross, & Brennan, 2008; Revel, Gottowik, Gatti, Wettstein, & Moreau, 2009). Findings on REM sleep instability and stress dysregulation in humans, however, have been more mixed (Akerstedt, Kecklund, & Axelsson, 2007; Buckley & Schatzberg, 2005; Pillai & Drake, 2014; Vandekerckhove & Cluydts, 2010). Even so, in the case of REM decreasing during stress among highly reactive sleepers, it is possible that Petersen et al. (2013) captured stress-induced REM

instability in this insomnia-vulnerable group. Although REM sleep duration did not differ between the sleep-reactivity groups under high stress, a striking observation was the long REM sleep duration among highly reactive sleepers during low stress. By extension, it is possible that a vulnerability to REM change (or REM instability) during stress is a marker for insomnia. Although the association of REM instability with sleep reactivity is consistent with the animal models of stress reactivity noted above, this isolated finding is difficult to interpret as other studies have not revealed stress-related REM abnormalities associated with high sleep reactivity (Drake et al., 2004, 2006).

Effective Tools to study Insomnia and Stress :

1. Cognitive behavior Therapy (CBT)– counseling with CBT like relaxation therapy diaphragmatic therapy, breathing exercise etc.
2. Pitsberg Sleep Quality Index with Insomnia severity scale (PSQI-ISS).
3. Ardell wellness stress test with perceived stress scale (AWST-PSS).

Inclusion Criteria of Participants should be:-

Patients having textual symptoms of Insomnia will be taken as a subject to study. These criteria will be employed before a desiring patient is included in this study.

1. Age-25 to 59 yr
2. Sex: Male / Female
3. Patient who will give written consent.
4. Patients not taking any other treatment for same disease.
5. Willing and able to participate in the study for 04 weeks.
6. Difficulty initiating or maintaining sleep with sleep onset latency (SOL) or wake time after sleep onset (WASO). Superior to 30 minutes, or early morning awakening after sleeping less than 6.5 hrs and a sleep efficiency(SE) below 85%.
7. Insomnia symptoms occurring at least 03 nights per week for at least 02 months.
8. Significant distress or altered functioning in social, occupational or other significant domains.
9. Participants with insomnia who were using medication to facilitate their sleep on an occasional basis (i.e., a maximum of 2 nights per week) were included irrespective of ceasing medication.
10. Meets DSM-IV criteria for mental disorder of stress and sleep disorders- e.g. Axis-I, Axis-IV, Axis-V, other conditions that may be a focus of clinical attention, adjustment disorder, factitious disorder and PTSD.
11. As per textual guidelines of Stress and insomnia mentioned in research studies for inclusion criteria or suggested by guide.

Exclusion criteria of Participants should be:-

1. Any neurological condition/genetic disorder/mentally retarded likely to interfere with sleep or cognitive functioning.
2. Presence of a current major depressive episode or more than two prior major depressive episode/ attack, generalized anxiety disorder, bipolar disorder and history of or presence of central nervous system and neurological diseases e.g. multiple sclerosis.
3. Substances abuse (including alcohol consumption max. 14 drink for men and 7 drink for women per week) within the past 6 months .

4. Patients having major illness/ systemic pathogenesis eg. Cardiac, renal, hepatic since long time (more than 03 months) will be excluded which may interfere in the study..
5. History of any trauma/ fractured joint / surgical/diagnostic intervention.
6. Gross disability in performing daily normal routine i.e. Bed ridden patients or confined to a wheelchair.
7. Patients with evidence of malignancy, pain related.
8. Patients on prolonged (≥ 12 weeks) medication with corticosteroids, anticholinergics and for chronic inflammatory conditions e.g. psoriasis etc. or any other drugs that may have an influence on the outcome of the study.
9. Patients who have participated in other clinical trials within two months of duration other clinical trial.
10. Any other condition which the guide thinks may jeopardize the study.

4. CONCLUSION:-

The prevalence of stress and insomnia in outpatient and morbid population is higher than in general population. Both stress with insomnia impairs cognitive, Psychological and physical functioning and is associated with wide range of impaired daytime functioning across a number of emotional, social, and physical domains compared with good sleepers. Stress is a central concept for understanding both life and evolution. All creatures face threats, which must be met with adaptive responses and our ability to adapt to potent stressors. Individuals who are optimistic and have good coping responses may well dealing with chronic stressors. If stressors are too strong and too persistent in individuals who are biologically vulnerable because of age, genetic, or constitutional factors, stressors may lead to disease.

With this study the knowledge about cognitive and psychological alteration mechanism and controlling regulation of sleep homeostasis and stress, circadian rhythms, physiological hyper arousal, stress, cognition and personality.

CBT is a treatment that uses psychological and behavioral methods such as relaxation techniques sleep restriction, stimulus control, and education about sleep hygiene (e.g., diet, exercise, and the bedroom environment) and stress. CBT is highly effective for treating insomnia & stress, and will not carry risks of adverse side effects, and will have long-lasting benefits. CBT will be advantageous compared with drug treatment and cost effective.

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